Introduction

IN PRESENTING Catalogue No. 28, we invite particular attention to those new valves, gages and appliances which have been added to our long-established and well-known line of Ashton pop safety and relief valves, gages, and kindred locomotive and power-plant specialties.

These improvements have been carefully developed and tested both in our own works and actual service, before offering them to the trade.

For over half a century we have excelled in the manufacture of valves and gages, with the result that the Ashton product is recognized generally as of absolutely dependable quality. This high standard will be maintained.

Ashton Patents

ASHTON PATENTS already issued cover broadly the most valuable and desirable improvements on this line. To these we make additions from time to time as study and experiment prove advisable. Furthermore, we keep fully informed regarding the inventions of others and do not hesitate to strengthen our position by acquiring such as may be meritorious.

Believing the validity of our patents to be beyond question, we protect our customers by guaranteeing them against all loss, costs, damage, and expense arising from the use of our goods.

Ashton Trademark

As an additional protection against imitations, the name ASHTON has been registered as our trademark. We own the exclusive right to use it.

We particularly desire to have the trade of those who discriminate for quality in preference to first cost.

TERMS—Net Cash 30 days; no deduction for prepayment. Minimum Charge 50 cents. All parcel post shipments are insured, and at customer's expense. All prices F. O. B. Boston, Mass. (Subject to change without notice).

Ashton
High Capacity Pop Safety Valves

Points of Mechanical Superiority

SEAT BUSHING

The seat bushing with 46 degree seat is of extra heavy construction and threaded into the base of the valve. It is of ample length to accommodate the long guides of the wing valve and also forms the inner wall of the supplementary pop chamber, and is not in contact with the valve base above the threaded joint. This construction allows the upper portion of the bushing to expand without interference with or distortion of the seat.

All cast steel valves are fitted with nickel seat bushings which we also recommend for cast iron valves operating at pressures exceeding 150 pounds and for bad water conditions. Bronze seat bushings may be used in the cast iron valves for lower pressures.

WING VALVE

The wing valve is guided in its operation by six wings or guides below the seat and above the seat with top sleeve guide or head ring, assuring perfect alignment.

MAIN POP CHAMBER

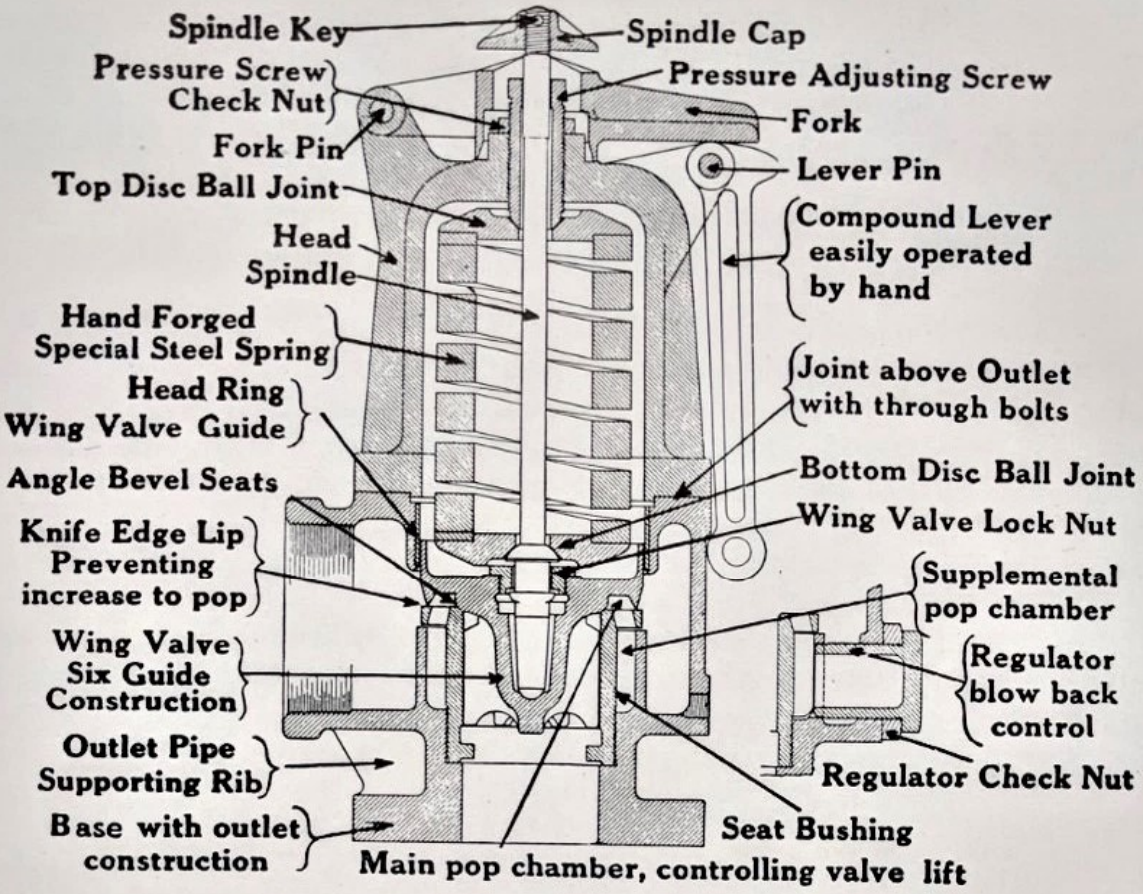
The pop or huddling chamber is the annular space formed by the overhanging knife-edge lip over the seat bushing. The wing valve in rising from the seat allows a pressure to accumulate in the pop chamber, causing the spring to compress slightly whereby the steam passes out beneath the lip to the atmosphere. This knife-edge pop lip wears down in proportion to the wear on the seat, thereby keeping the outlet of the pop chamber in the same relative proportion to the inlet, giving a steady and unvarying pop which insures long service without adjustment.

SUPPLEMENTAL POP CHAMBER

The supplemental pop chamber is the annular space between the outside of the seat bushing and the valve base and is connected with the pop or huddling chamber by a series of holes around the seat bushing. The proper pressure may be maintained in both chambers when the valve is in operation by the adjustment of the two outside plug pop regulators opposite each other on the sides of the valve.

BACK PRESSURE

Under ordinary conditions these valves are not affected by back pressure; the head of the wing valve makes a telescopic joint in the head ring, assuring a sustained lift and making it possible to guarantee the relieving capacities on page 10. The spring is thereby protected from the steam discharge when the valve is operating.



POP OR BLOW-DOWN REGULATION

High steam pressures emphasize the importance of efficient regulation in the operation of a safety valve. An excessive loss of steam, or reduction of the boiler pressure more than necessary to close the valve, is wasteful. Each valve is equipped with two plug pop regulators, located opposite each other on the outside of the valve base casting. They are always accessible and may be adjusted with a wrench, without danger even when the valve is blowing. The regulators may be removed from the base casting and the threads lubricated with graphite while the valve is under pressure and seated.

SPRINGS

The exposed spring type construction has many advantages for either saturated or superheated steam service. High temperatures cannot weaken the spring, it being protected from excessive heat by the head ring, and also exposed to the atmosphere.

The durability and efficiency of a safety valve depend largely upon the spring; therefore, the springs in Ashton Valves are of generous proportions of special imported steel and are subjected to the most rigid tests for elasticity and endurance.

OUR HAND-WOUND SPRINGS HAVE NO EQUAL FOR UNIFORMITY AND DURABILITY, AND ARE GUARANTEED FOR FIVE YEARS SERVICE WHEN THEY ARE USED AT THE PRESSURES FOR WHICH THEY ARE DESIGNED.

For Temperatures over 450° special high temperature steel is used.

ALIGNMENT

Proper alignment of all parts is most essential in safety valve con-

struction. The wing valve must have an absolute vertical lift and all undue friction eliminated. This is insured by the six guides on the wing valve, the centering of spindle in bottom of wing valve well below the seat level and the ball joint contacts of the spring discs with the spindle and pressure screw.

The head ring, forming a top guide for the wing valve and seat bushing, is fitted into the valve base in perfect alignment.

LIFTING DEVICE

It is not always convenient or advisable to increase the boiler pressure to blow a safety valve to ascertain if it is in perfect working order. The powerful cam lever lifting device, when operated by hand, lifts the wing valve from the bushing seat when the pressure is far below the blowing point of the valve.

We recommend, in testing or lifting a valve by the hand lever, that the valve be held open a sufficient length of time to thoroughly clean the side walls of the boiler nozzle and valve of the scale and other foreign matter that may become lodged between the seats.

ENLARGED OUTLET

High capacity safety valves require a larger area of outlet than inlet, owing to the increased volume of steam at atmospheric pressure. Therefore Ashton High Capacity Valve outlets are two pipe sizes larger than the inlet, *i.e.*, a valve 4 inches in diameter at the seat has a 5-inch outlet.

The discharge, therefore, passes to the atmosphere without creating a back pressure in the valve base, and a far greater relieving capacity is assured.

OUTLET (Reinforcement)

A rib or gusset is cast on the underside of the valve outlet above the inlet flange to provide a support for the weight of the outlet piping, and to protect the valve base from undue strains which might otherwise distort the seat and cause the valve to leak. A short nipple, elbow and four feet of vertical pipe are usually sufficient to pass the requirements of the American Society of Mechanical Engineers' Boiler Code. If discharge piping of greater length is necessary it should be supported independent of the valve. The discharge pipe from all safety valves should be equal to the full area of the valve outlet, for, if reduced, the proper functioning of the valve is seriously affected, particularly the relieving capacity, which is greatly reduced.

BASE OUTLET CONSTRUCTION

Both inlet and outlet are in the base casting permitting taking the valve apart for regrinding or cleaning without disturbing the outlet piping.

BOLTS AND NUTS

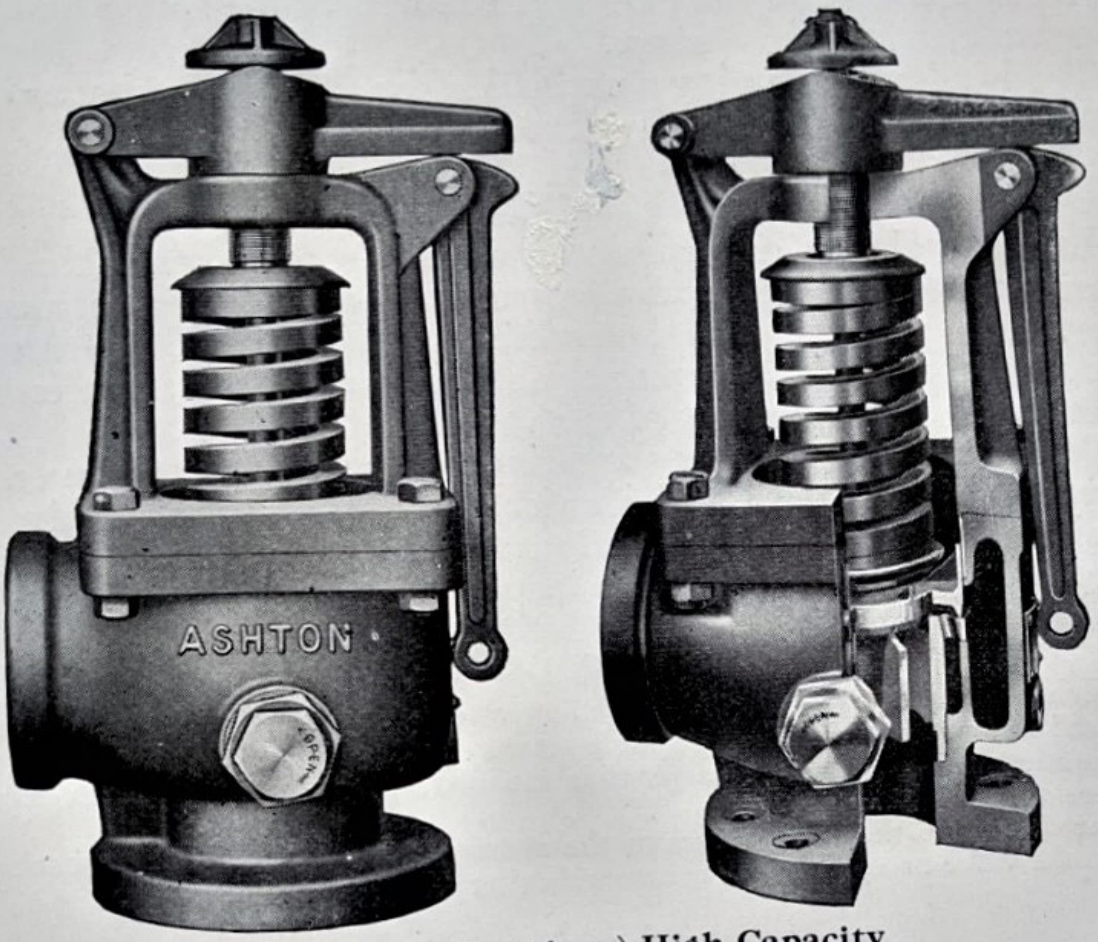
Through bolts and nuts are used for assembling the valve head to the base eliminating the annoyance frequently encountered in breaking bolts or studs.

CAPACITY

Many of the large power plants at the present time are operating their boilers far in excess of the normal rating and it is, therefore, necessary that the safety valve equipment be of sufficient capacity to discharge all of the steam that may be generated. Safety valves of low or moderate relieving capacity are therefore impractical for such installations on account of the number of valves that would be required to give the necessary relief due to the limited number of safety valve nozzles. Charts giving the relieving capacities of Ashton Valves in the several sizes and styles for the various pressures are detailed on page 10. These capacities are figured according to the formula authorized by the American Society of Mechanical Engineers' Boiler Code and are based on actual boiler tests.

Ashton Pop Safety Valves

For Stationary and Marine Boilers



C. I. Style (cast iron) High Capacity
C. I. M. Style (cast iron) Moderate Capacity

For Saturated Steam
Maximum Pressure 250 lbs.

SPECIFICATIONS

Base and Head	Cast Iron	Spring	Crucible Steel
Seat Bushing	Bronze or Nickel	Spindle	Steel
Wing Valve	Bronze	Fork and Lever	Malleable Iron
Pop Regulators	Bronze		

These valves fully conform to the requirements of the American Society of Mechanical Engineers' Boiler Code and with all State and City Regulations, and have been approved by the United States Board of Supervising Inspectors of Steam Vessels. They are likewise registered in the Dominion of Canada. These valves are regularly constructed with A. E. S. C. 250 pound standard inlet flanges (drilled only when specified) and with female threaded outlets.

The C. I. M. Style Valve is designed more particularly for replacements of safety valves on old boiler installations, where large relieving capacity is not required. Relieving capacities charted on pages 10 and 11; dimensions on page 16; and part list on page 18.

DIMENSIONS IN INCHES

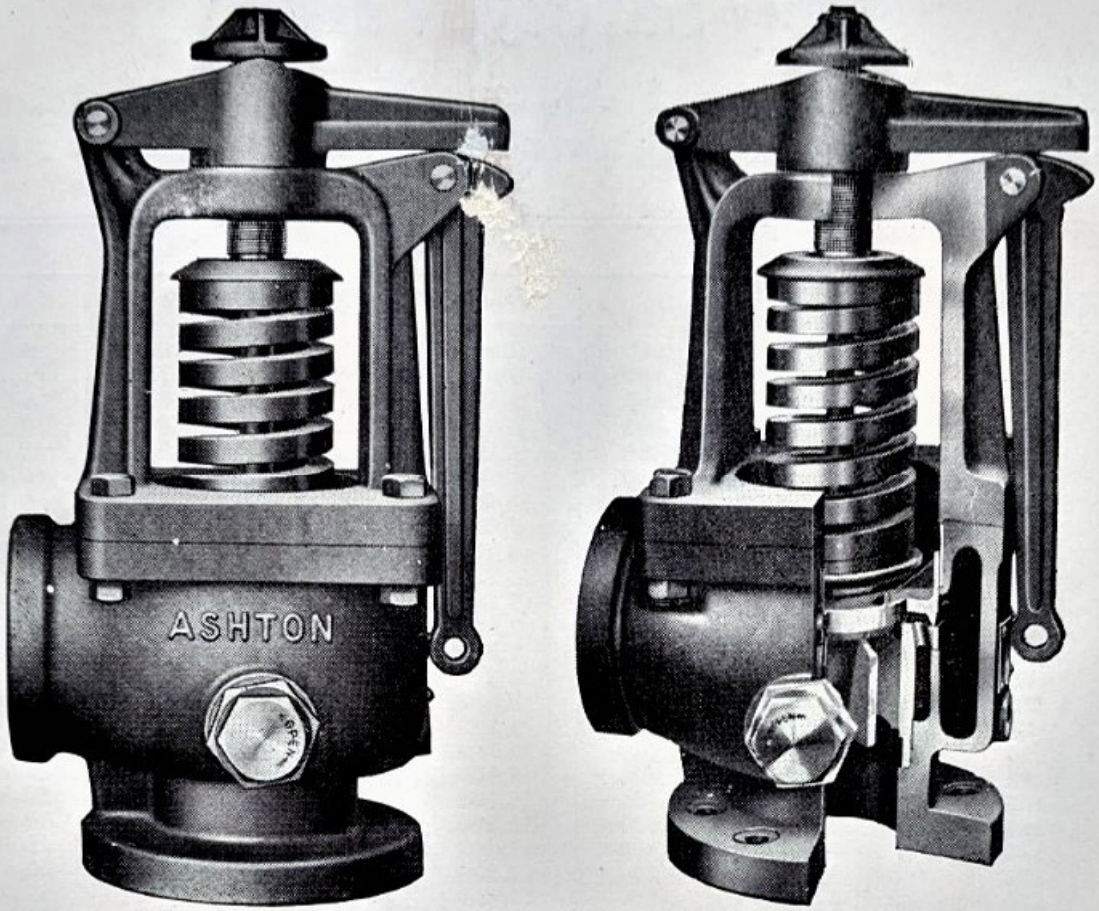
Size	2	2½	3	3½	4	4½
Diameter of Inlet Flange	6½	7½	8¼	9	10	10½
Outlet (Standard Pipe Size)	3	3½	4	4	5	6
Weight, Pounds	72	95	140	154	196	242

Orders should always specify style number of valve, size and maximum working pressure and, wherever possible, the total heating surface and maximum rating of boiler.

PRICES ON APPLICATION

Ashton Pop Safety Valves

For Stationary and Marine Boilers



C. S. Style (cast steel) High Capacity
C. S. M. Style (cast steel) Moderate Capacity

For Superheated or Saturated Steam
Maximum pressure 400 lbs.

SPECIFICATIONS

Base and Head	Cast Steel	Spring	Crucible Steel
Seat Bushing	Nickel	Spindle	Steel
Wing Valve	Nickel	Fork and Lever	Malleable Iron
Pop Regulators	Bronze		

These valves fully conform to the requirements of the American Society of Mechanical Engineers' Boiler Code and with all State and City Regulations, and have been approved by the United States Board of Supervising Inspectors of Steam Vessels. They are likewise registered in the Dominion of Canada. They are regularly made with A. E. S. C. 400-pound standard inlet flange (drilled only when specified) and with female threaded outlet.

These valves are of the same general construction and differ only in relieving capacity. Relieving capacities charted on pages 10 and 11; dimensions on page 16; and part list on page 18.

We are prepared to furnish valves of cast steel for pressures exceeding 400 pounds. See page 14.

DIMENSIONS IN INCHES

Size	2	2½	3	3½	4	4½
Diameter of Inlet Flange	6½	7½	8¼	9	10	10½
Outlet (Standard Pipe Size)	3	3½	4	4	5	6
Weight, pounds	85	95	145	160	196	255

Orders should always specify style number of valve, size and maximum working pressure and whenever possible the total heating surface and maximum rating of boiler. If to be used on superheated steam, specify maximum temperature.

Ashton "High Capacity" Pop Safety Valves

Discharge Capacities of Ashton C.I., C.S., C.I.-10, and C.S.-10 Style Pop Safety Valves in pounds of steam per hour

Lbs. Pressure per Square Inch Gage	Size, inches					
	2	2½	3	3½	4	4½
10	1,370	1,900	2,500	3,100	3,900	4,600
15	1,600	2,300	3,000	3,700	4,700	5,400
20	1,880	2,600	3,500	4,300	5,400	6,300
25	2,140	3,000	4,000	4,800	6,100	7,200
30	2,400	3,400	4,500	5,400	6,900	8,000
35	2,630	3,700	4,900	6,000	7,600	8,600
40	2,870	4,000	5,400	6,500	8,300	9,700
45	3,100	4,400	5,800	7,000	9,000	10,500
50	3,340	4,700	6,200	7,500	9,600	11,200
55	3,560	5,000	6,700	8,000	10,300	12,000
60	3,780	5,300	7,100	8,500	10,900	12,800
65	4,000	5,700	7,500	9,000	11,500	13,600
70	4,200	6,000	7,900	9,500	12,100	14,300
75	4,400	6,200	8,300	10,000	12,700	15,100
80	4,600	6,600	8,700	10,500	13,300	15,800
85	4,800	6,900	9,100	10,900	13,900	16,500
90	4,900	7,100	9,500	11,400	14,400	17,200
95	5,100	7,400	9,900	11,800	15,000	17,800
100	5,300	7,700	10,300	12,200	15,500	18,500
105	5,500	8,000	10,600	12,600	16,100	19,200
110	5,700	8,200	11,000	13,000	16,500	19,900
115	5,900	8,500	11,300	13,400	17,000	20,400
120	6,000	8,700	11,600	13,700	17,500	21,000
125	6,200	9,000	11,900	14,100	18,000	21,700
130	6,400	9,200	12,200	14,500	18,500	22,400
135	6,500	9,400	12,600	14,900	18,900	22,900
140	6,600	9,600	12,900	15,200	19,400	23,500
145	6,800	9,900	13,200	15,500	19,800	24,100
150	6,900	10,100	13,400	15,900	20,200	24,600
155	7,100	10,300	13,700	16,200	20,600	25,200
160	7,200	10,500	14,000	16,500	21,000	25,700
165	7,300	10,700	14,200	16,800	21,300	26,300
170	7,400	10,900	14,500	17,000	21,700	26,700
175	7,500	11,000	14,800	17,300	22,000	27,300
180	7,700	11,200	15,000	17,600	22,300	27,800
185	7,800	11,400	15,200	17,900	22,600	28,200
190	7,900	11,600	15,500	18,200	23,000	28,700
195	7,900	11,800	15,600	18,400	23,200	29,200
200	8,000	11,900	15,900	18,700	23,500	29,600
210	8,200	12,200	16,300	19,000	24,000	30,400
220	8,400	12,500	16,700	19,500	24,500	31,200
230	8,500	12,700	17,000	19,800	25,000	32,000
240	8,600	12,900	17,200	20,100	25,300	32,600
250	8,700	13,100	17,500	20,400	25,600	33,300
260	8,900	13,300	17,600	20,800	26,300	33,900
270	8,900	13,500	17,700	21,000	26,800	34,400
280	9,100	13,700	17,700	21,400	27,400	35,000
290	9,200	13,800	17,700	21,600	27,900	35,500
300	9,200	13,900	17,700	21,800	28,400	35,900
310	9,300	14,000	17,900	22,100	28,900	36,600
320	9,300	14,200	18,100	22,400	29,200	37,200
330	9,300	14,400	18,300	22,700	29,600	37,800
340	9,400	14,500	18,500	22,900	29,800	38,400
350	9,400	14,600	18,600	23,200	30,200	38,900
360	9,400	14,700	18,800	23,300	30,400	39,400
370	9,400	14,800	18,900	23,600	30,600	39,900
380	9,400	14,800	19,000	23,700	30,800	40,300
390	9,400	14,900	19,200	23,800	31,000	40,700
400	9,400	14,900	19,200	24,000	31,000	41,100

C. I. Style Valves are recommended for pressures up to and including 250 pounds; the C. S. Style (cast steel) for pressures up to and including 400 pounds and for high tem-

Ashton Moderate Capacity Pop Safety Valves

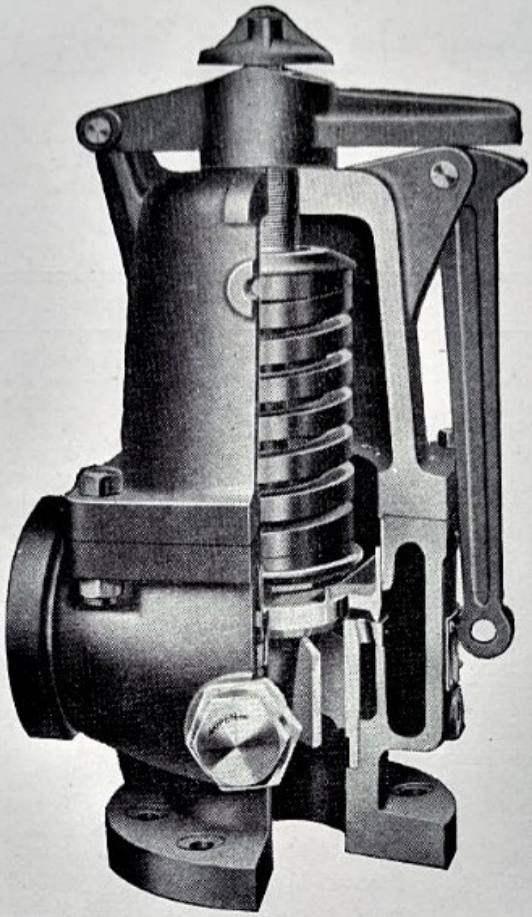
Discharge Capacities of Ashton C.I.M., C.S.M., C.I.M.-10, and C.S.M.-10 Style (Moderate Capacity) Pop Safety Valves in pounds of steam per hour

Lbs. Pressure per Square Inch Gage	Size, inches					
	2	2½	3	3½	4	4½
10	685	950	1,250	1,550	1,950	2,300
15	800	1,150	1,500	1,850	2,350	2,700
20	940	1,300	1,750	2,150	2,700	3,150
25	1,070	1,500	2,000	2,400	3,050	3,600
30	1,200	1,700	2,250	2,700	3,450	4,000
35	1,315	1,850	2,450	3,000	3,800	4,300
40	1,435	2,000	2,700	3,250	4,150	4,850
45	1,550	2,200	2,900	3,500	4,500	5,250
50	1,670	2,350	3,100	3,750	4,800	5,600
55	1,780	2,500	3,350	4,000	5,150	6,000
60	1,890	2,650	3,550	4,250	5,450	6,400
65	2,000	2,850	3,750	4,500	5,750	6,800
70	2,100	3,000	3,950	4,750	6,050	7,150
75	2,200	3,100	4,150	5,000	6,350	7,550
80	2,300	3,300	4,350	5,250	6,650	7,900
85	2,400	3,450	4,550	5,450	6,950	8,250
90	2,450	3,550	4,750	5,700	7,200	8,600
95	2,550	3,700	4,950	5,900	7,500	8,900
100	2,650	3,850	5,150	6,100	7,750	9,250
105	2,750	4,000	5,300	6,300	8,050	9,600
110	2,850	4,100	5,500	6,500	8,250	9,950
115	2,950	4,250	5,650	6,700	8,500	10,200
120	3,000	4,350	5,800	6,850	8,750	10,500
125	3,100	4,500	5,950	7,050	9,000	10,850
130	3,200	4,600	6,100	7,250	9,250	11,200
135	3,250	4,700	6,300	7,450	9,450	11,450
140	3,300	4,800	6,450	7,600	9,700	11,750
145	3,400	4,950	6,600	7,750	9,900	12,050
150	3,450	5,050	6,700	7,950	10,100	12,300
155	3,550	5,150	6,850	8,100	10,300	12,600
160	3,600	5,250	7,000	8,250	10,500	12,850
165	3,650	5,350	7,100	8,400	10,650	13,150
170	3,700	5,450	7,250	8,500	10,850	13,350
175	3,750	5,500	7,400	8,650	11,000	13,650
180	3,850	5,600	7,500	8,800	11,150	13,900
185	3,900	5,700	7,600	8,950	11,300	14,100
190	3,950	5,800	7,750	9,100	11,500	14,350
195	3,950	5,900	7,800	9,200	11,600	14,600
200	4,000	5,950	7,950	9,350	11,750	14,800
210	4,100	6,100	8,150	9,500	12,000	15,200
220	4,200	6,250	8,350	9,750	12,250	15,600
230	4,250	6,350	8,500	9,900	12,500	16,000
240	4,300	6,450	8,600	10,050	12,650	16,300
250	4,350	6,550	8,750	10,200	12,800	16,650
260	4,450	6,650	8,800	10,400	13,150	16,950
270	4,450	6,750	8,850	10,500	13,400	17,200
280	4,550	6,850	8,850	10,700	13,700	17,500
290	4,600	6,900	8,850	10,800	13,950	17,750
300	4,600	6,950	8,850	10,900	14,200	17,950
310	4,650	7,000	8,950	11,050	14,450	18,300
320	4,650	7,100	9,050	11,200	14,600	18,600
330	4,650	7,200	9,150	11,350	14,800	18,900
340	4,700	7,250	9,250	11,450	14,900	19,200
350	4,700	7,300	9,300	11,600	15,100	19,450
360	4,700	7,350	9,400	11,650	15,200	19,700
370	4,700	7,400	9,450	11,800	15,300	19,950
380	4,700	7,400	9,500	11,850	15,400	20,150
390	4,700	7,450	9,600	11,900	15,500	20,350
400	4,700	7,450	9,600	12,000	15,500	20,550

C. I. M. Style valves are recommended for pressures up to and including 250 pounds; the C. S. M. Style (Cast Steel) for pressures up to and including 400 pounds and for high temperatures of superheated steam. To figure the discharge of FREE

Ashton Pop Safety Valve

With Enclosed Spring Head



For Stationary and Marine Boilers

C. I.-10 Style (cast iron) High Capacity
C. I. M.-10 Style (cast iron) Moderate Capacity
For Saturated Steam. Maximum Pressure 250 lbs.

SPECIFICATIONS

Base and Head	Cast Iron	Spring	Crucible Steel
Seat Bushing	Bronze or Nickel	Spindle	Steel
Wing Valve	Bronze	Fork and Lever	Malleable Iron
Pop Regulators	Bronze		

The enclosed head prevents the escape of steam into the fire room and protects the interior parts from dirt or other foreign matter. It is made in the C. I.-10 Style (cast iron); high relieving capacity, as charted on page 10, also C. I. M.-10 Style (cast iron); moderate relieving capacity, as charted on page 11. Ashton Valves have been approved by the United States Board of Supervising Inspectors of Steam Vessels, Bureau of Steam Engineering United States Navy Department, and fully conform to the requirements of the American Society of Mechanical Engineers' Boiler Code, and with all State and City Regulations, and are also registered in the Dominion of Canada. They are regularly constructed with A. E. S. C. 250 pound standard inlet flange (drilled only when specified) and with female threaded outlet.

For marine service we recommend valves with moderate relieving capacity as charted on page 11 and when specified valves will be furnished with flanged outlets. For dimensions see page 16; part list, page 18.

Excessive length, or reduced outlet piping should be avoided, to eliminate possible back pressure on the valve, which will interfere with the pop control.

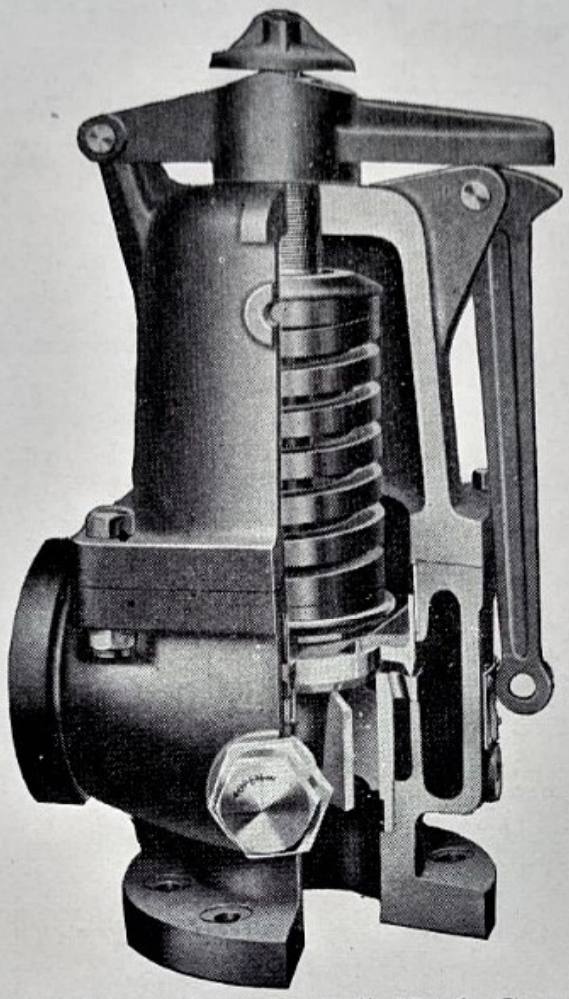
DIMENSIONS IN INCHES

Size	2	2½	3	3½	4	4½
Diameter of Inlet Flange	6½	7½	8¼	9	10	10½
Outlet (Standard Pipe Size)	3	3½	4	4	5	6
Weight, pounds	95	105	145	160	210	287

Orders should always specify style number of valve, size, maximum working pressure and, wherever possible, the total heating surface and maximum rating of boiler.

Ashton Pop Safety Valve

With Enclosed Spring Head



For Stationary and Marine Boilers

C. S.-10 Style (cast steel) High Capacity
C. S. M.-10 Style (cast steel) Moderate Capacity

For Saturated Steam. Maximum Pressure 400 lbs.

SPECIFICATIONS

Base and Head	Cast Steel	Spring	Crucible Steel
Seat Bushing	Nickel	Spindle	Steel
Wing Valve	Nickel	Fork and Lever	Malleable Iron
Pop Regulators	Bronze		

The enclosed head prevents the escape of steam into the fire room and protects the interior parts from dirt or other foreign matter. It is made in the C. S.-10 Style (cast steel), high relieving capacity, as charted on page 10; C. S. M.-10 Style (cast steel), moderate relieving capacity, as charted on page 11. Ashton Valves have been approved by the United States Board of Supervising Inspectors of Steam Vessels, Bureau of Steam Engineering United States Navy Department, and fully conform to the requirements of the American Society of Mechanical Engineers' Boiler Code, and with all State and City Regulations, and are also registered in the Dominion of Canada. They are regularly constructed with A.E.S.C. 400 pound standard inlet flange (drilled only when specified) and with female threaded outlet.

For marine service we recommend valves with moderate relieving capacity as charted on page 11 and when specified valves will be furnished with flanged outlets. For dimensions see page 16; part list, page 18.

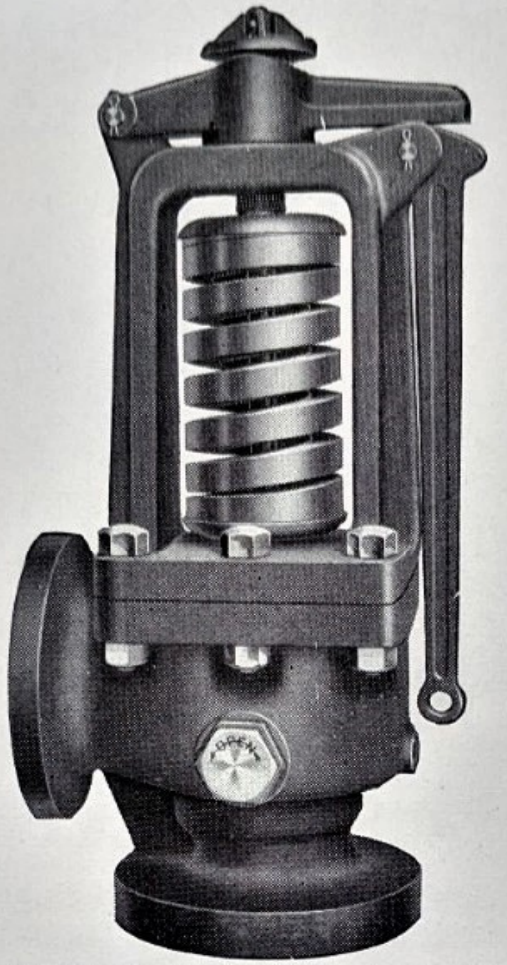
Excessive length, or reduced outlet piping should be avoided, to eliminate possible back pressure on the valve, which will interfere with the pop control.

DIMENSIONS IN INCHES

Size	2	2½	3	3½	4	4½
Diameter of Inlet Flange	6½	7½	8¼	9	10	10½
Outlet (Standard Pipe Size)	3	3½	4	4	5	6
				165	215	290

High Capacity Pop Safety Valve

FOR HIGH PRESSURE



C. S. H. Style with Outside Spring
For Superheated or Saturated Steam, Maximum Pressure 600 lbs.

SPECIFICATIONS

Base and Head .	Cast Steel	Spring	Alloy Steel, heat treated
Seat Bushing . . .	Ni. Alloy or Stainless Steel	Spindle . . .	Alloy Steel
Wing Valve	Ni. Alloy or Stainless Steel	Fork	Cast Steel
Pop Regulators .	Ni. Alloy	Lever	Malleable Iron

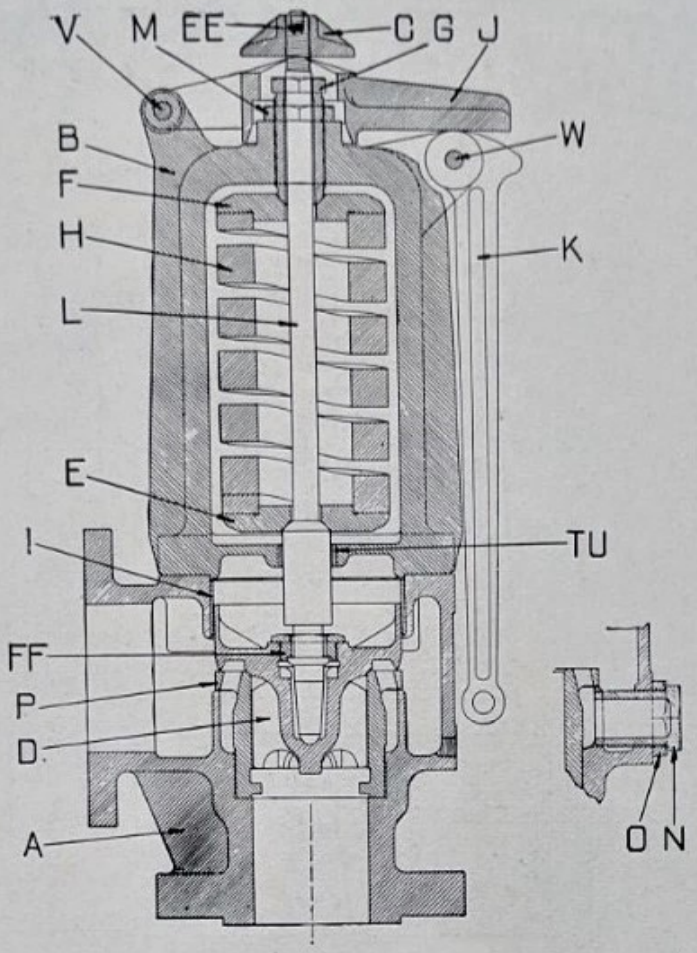
The Ashton C. S. H. Style Valve is specially designed for extreme high temperatures and pressures. The spring is made of a special alloy steel to withstand high temperatures, and being wholly outside the valve is not exposed to the steam.

This valve fully conforms to the requirements of the American Society of Mechanical Engineers' Boiler Code and with all State and City Regulations. The 3 and 4 inch sizes are made with inlet and outlet flanges to standard dimensions. The 1 and 2 inch size are regularly made with standard inlet and outlet flanges for superheated steam but can be furnished with screwed connections for saturated steam or low temperatures. We are prepared to furnish like valves for higher pressures.

Discharge Capacities of Ashton C. S. H. Style Pop Safety Valves in pounds of steam per hour

Lbs. Pressure per Square Inch Gage	Sizes			
	1	2	3	4
400	6,700	16,800	30,200	56,000
500	7,300	18,300	32,900	61,000
600	7,800	19,500	35,100	65,000

Orders should always specify style number of valve, size and maximum working pressure and whenever possible the total heating surface and maximum rating of boiler. If to be used on superheated steam, specify maximum temperature.

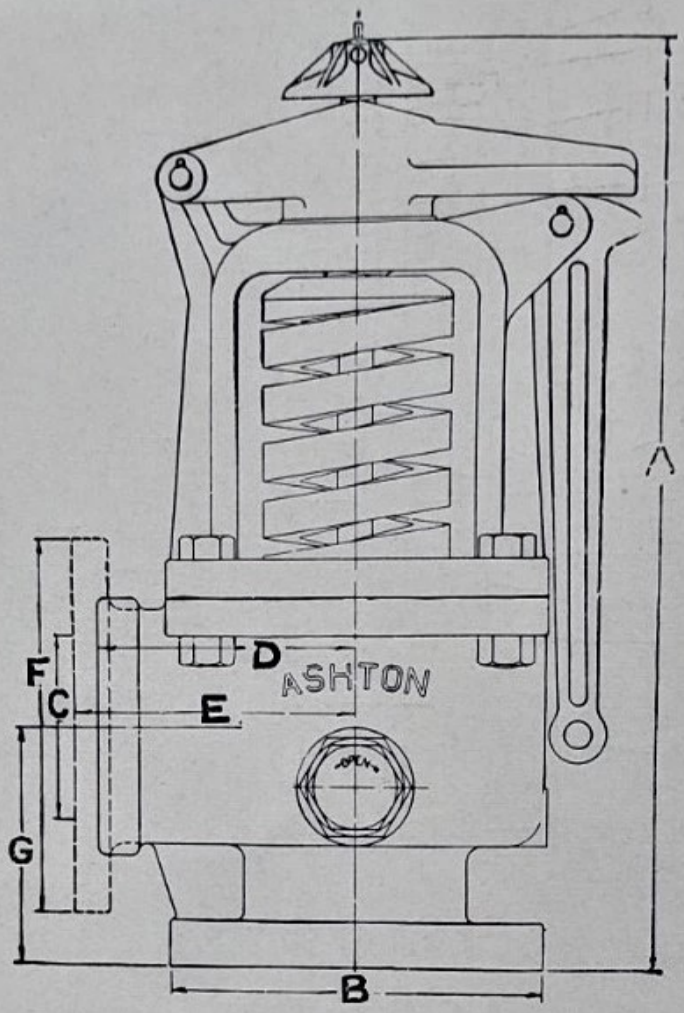


List of Parts

C. S. H. Valve

Name of Part	Letter	Size, inches			
		1	2	3	4
Base (with head ring I)	A	$63.50	$82.00	$91.00	$100.00
Head (with head bushing TU)	B	57.50	66.50	71.50	80.50
Cap	C	3.40	3.70	4.10	4.55
Wing Valve	D	36.40	43.25	52.50	64.00
Wing Valve Lock Nut	FF	5.25	5.70	6.30	6.80
Bottom Disc	E	3.85	4.10	4.55	5.15
Top Disc	F	3.85	4.10	4.55	5.15
Pressure Screw	G	6.80	8.50	10.25	12.50
Spring	H	18.40	22.70	26.30	29.70
Head Ring	I	6.65	7.25	9.10	11.40
Fork	J	2.55	3.00	3.70	4.55
Lever	K	1.15	1.50	1.85	2.30
Spindle	L	26.25	30.60	33.70	36.50
Spindle Key	EE	.20	.20	.20	.25
Pressure Screw Check Nut	M	.40	.40	.55	.70
Regulator	N	5.70	6.55	7.25	7.95
Regulator Check Nut	O	.50	.55	.80	.80
Seat Bushing	P	18.50	27.25	38.70	50.00
Fork Pin	V	3.70	4.10	4.10	4.10
Lever Pin	W	3.70	4.10	4.10	4.10
Base Bolt and Nut, not shown	Z	.35	.35	.45	.60
Base Stud and Nut, not shown	T	.35	.35	.45	.60
Data Plate, not shown	HH	.90	.90	.90	.90

Ashton Pop Safety Valves



DIMENSIONS IN INCHES

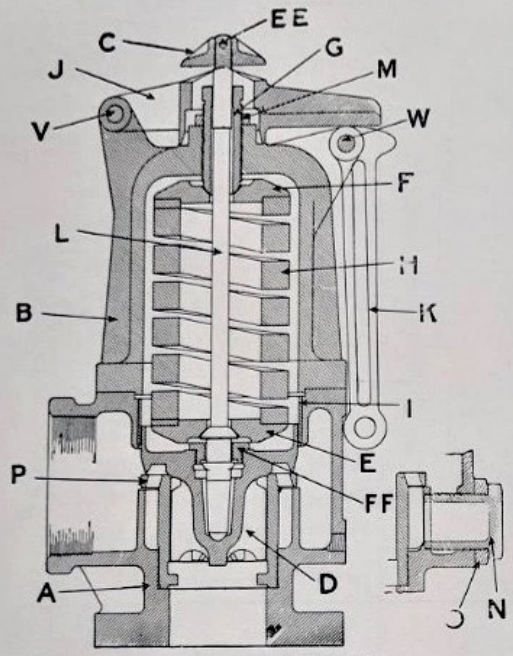
Ashton C. I.; C. I.-10; C. I. M.; and C. I. M.-10 Valves

Size	A	B	C	D	E	F	G
2	18 1/2	6 1/2	3	5	5 3/4	7 1/2	4 5/8
2 1/2	20	7 1/2	3 1/2	5 1/2	6 3/8	8 1/2	5 1/4
3	22 1/2	8 1/4	4	5 5/8	6 7/8	9	5 5/8
3 1/2	22 1/2	9	4	6 5/16	6 3/4	9	5 3/4
4	25 1/4	10	5	7	7 5/8	10	6 7/16
4 1/2	26 3/4	10 1/2	6	7 1/2	8 1/2	11	6 15/16

Ashton C. S.; C. S.-10.; C. S. M.; and C. S. M.-10 Valves

Size	A	B	C	D	E	F	G
2	18 7/8	6 1/2	3	5	5 3/4	7 1/2	5
2 1/2	20 3/8	7 1/2	3 1/2	5 1/2	6 3/8	8 1/2	5 5/8
3	22 7/8	8 1/4	4	5 5/8	6 7/8	9	6
3 1/2	22 15/16	9	4	6 5/16	6 3/4	9	6 3/16
4	25 5/16	10	5	7	7 5/8	10	6 11/16
4 1/2	26 3/4	10 1/2	6	7 1/2	8 1/2	11	7 5/16

Ashton Pop Safety Valves



LIST OF PARTS

Ashton C.I., C.I.-10, C.I.M., C.I.M.-10; C.S., C.S.-10, C.S.M. and C.S.M.-10 Valves

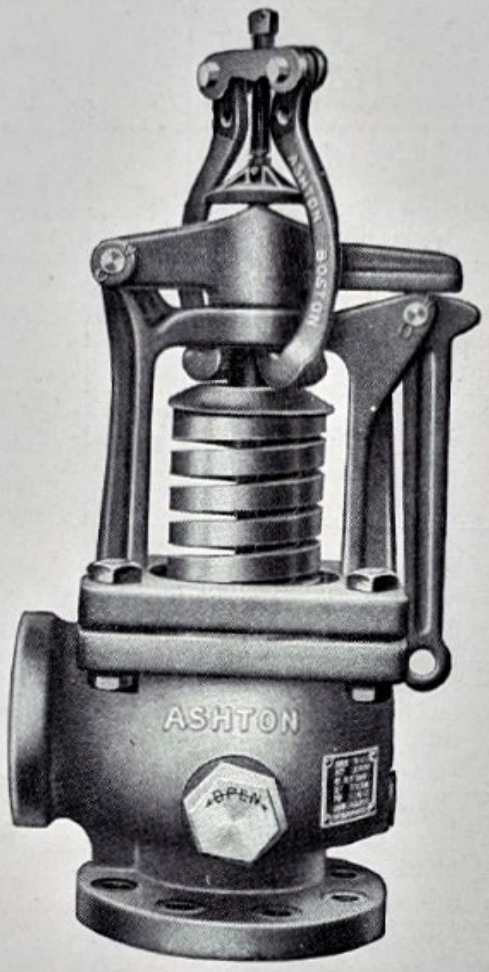
Name of Part	Letter	Style Valve	2″	2½″	3″	3½″	4″	4½″
Base (With Head Ring "I")	A	C.I.- C.I.M. C.I.-10:C.I.M.-10	$19.75	$22.00	$22.00	$24.00	$26.25	$43.75
		C.S.- C.S.M. C.S.-10:C.S.M.-10	52.50	61.25	65.75	65.75	65.75	78.75
Head	B	C.I.- C.I.M.	5.50	5.50	6.50	7.75	8.75	11.50
		C.S.- C.S.M.	24.00	26.00	26.00	26.00	26.00	26.00
		C.I.-10:C.I.M.-10	22.00	22.00	24.00	26.25	26.25	30.75
		C.S.-10:C.S.M.-10	46.00	46.00	46.00	46.00	46.00	46.00
Cap	C	C.I.- C.I.M. C.S.- C.S.M. C.I.-10:C.I.M.-10 C.S.-10:C.S.M.-10	.80	.80	.90	.90	1.65	1.65
Wing Valve Bronze	D	C.I.- C.I.M. C.I.-10:C.I.M.-10	5.75	6.00	8.50	12.00	13.25	18.75
Wing Valve Nickel	D	C.S.- C.S.M. C.S.-10:C.S.M.-10	15.50	17.50	19.75	22.00	26.25	30.75
Wing Valve Lock Nut	FF	C.I.- C.I.M. C.S.- C.S.M. C.I.-10:C.I.M.-10 C.S.-10:C.S.M.-10	.90	.90	1.10	1.10	1.25	1.25
Bottom Disc and Top Disc	E F	C.I.- C.I.M. C.S.- C.S.M. C.I.-10:C.I.M.-10 C.S.-10:C.S.M.-10	.50	.50	.60	.60	.75	.75

Ashton Pop Safety Valves

Name of Part	Letter	Style Valve	2″	2½″	3″	3½″	4″	4½″
Pressure Screw	G	C.I.- C.I.M. C.S.- C.S.M. C.I.-10:C.I.M.-10 C.S.-10:C.S.M.-10	$1.75	$1.75	$2.00	$2.00	$3.50	$3.50
Spring	H	C.I.- C.I.M. C.S.- C.S.M. C.I.-10:C.I.M.-10 C.S.-10:C.S.M.-10	8.75	13.25	17.50	17.50	19.75	24.00
Head Ring	I	C.I.- C.I.M. C.S.- C.S.M. C.I.-10:C.I.M.-10 C.S.-10:C.S.M.-10	1.50	1.50	1.75	2.00	2.75	3.50
Fork	J	C.I.- C.I.M. C.S.- C.S.M. C.I.-10:C.I.M.-10 C.S.-10:C.S.M.-10	.90	.90	1.10	1.10	1.60	1.60
Lever	K	C.I.- C.I.M. C.S.- C.S.M. C.I.-10:C.I.M.-10 C.S.-10:C.S.M.-10	.60	.60	.70	.70	.90	.90
Spindle	L	C.I.- C.I.M. C.S.- C.S.M. C.I.-10:C.I.M.-10 C.S.-10:C.S.M.-10	3.50	3.50	3.50	3.50	3.50	3.50
Spindle Key	EE	C.I.- C.I.M. C.S.- C.S.M. C.I.-10:C.I.M.-10 C.S.-10:C.S.M.-10	.20	.20	.20	.20	.25	.25
Pressure Screw Check Nut	M	C.I.- C.I.M. C.S.- C.S.M. C.I.-10:C.I.M.-10 C.S.-10:C.S.M.-10	.40	.40	.55	.55	.70	.70
Regulator	N	C.I.- C.I.M. C.S.- C.S.M. C.I.-10:C.I.M.-10 C.S.-10:C.S.M.-10	1.75	1.75	2.25	2.25	2.50	3.00
Regulator Check Nut	O	C.I.- C.I.M. C.S.- C.S.M. C.I.-10:C.I.M.-10 C.S.-10:C.S.M.-10	.55	.70	.80	.80	.80	1.10
Seat Bushing Bronze	P	C.I.- C.I.M. C.I.-10:C.I.M.-10	4.00	6.50	7.00	10.00	12.00	16.50
Seat Bushing Nickel	P	C.I.- C.I.M. C.S.- C.S.M. C.I.-10:C.I.M.-10 C.S.-10:C.S.M.-10	8.75	11.00	14.25	16.75	22.00	27.50
Fork Pin	V	C.I.- C.I.M. C.S.- C.S.M. C.I.-10:C.I.M.-10 C.S.-10:C.S.M.-10	.50	.50	.50	.50	.50	.50
Lever Pin	W	C.I.- C.I.M. C.S.- C.S.M. C.I.-10:C.I.M.-10 C.S.-10:C.S.M.-10	.50	.50	.50	.50	.50	.50
Base Bolt and Nut (not shown)	Z	C.I.- C.I.M. C.S.- C.S.M. C.I.-10:C.I.M.-10 C.S.-10:C.S.M.-10	.10	.10	.10	.10	.10	.20
Data Plate (Not shown)	HH	C.I.- C.I.M. C.S.- C.S.M. C.I.-10:C.I.M.-10 C.S.-10:C.S.M.-10	.90	.90	.90	.90	.90	.90

In ordering new parts, it is necessary to specify style number of valve, size, name of part and letter, also serial number as shown on data plate, and if new springs are ordered, the working pressure, and temperature if for superheated steam.

Ashton Valve Testing Clamp



No. 5

With this testing clamp, the safety valve need not be taken off when a boiler is tested, nor is it necessary to change the set pressure of the valve. This saves the valve spring from excessive and undue strain. A set of testing clamps is furnished with our Stationary and Marine Pop Safety Valves when requested.

To apply the clamp, place the ends of the clamp arms beneath the head of valve as shown above. Setting down the clamp screw on the valve spindle will hold the valve rigidly on its seat. After the boiler test is over, remove clamp and the valve will then work perfectly at exactly the original set pressure.

Don't forget to remove clamp after test is over.

Ashton Safety Valve Yoke

No. 11A (cast iron)
No. 11B (cast steel)

This Yoke is of the same grade of cast iron as the Ashton Cast Iron Valves, is of extra heavy construction and designed for 250 pounds. The flanges are faced, and when specified on order, are drilled A. E. S. C. 250 pound standard (without extra charge).

We are prepared to furnish yokes of cast steel, for use with the Ashton Cast Steel Valves, suitable for 400 pounds; specify No. 11B. When so ordered valves will be mounted on yokes, at an extra charge.

The two inside holes in each top flange are tapped for studs.

DIMENSIONS IN INCHES

No. 11A

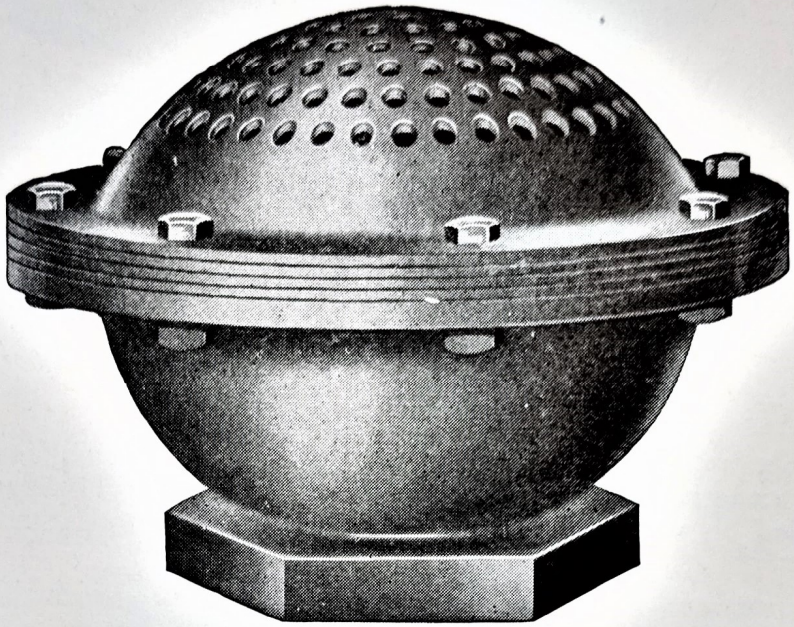
Size	2	2½	3	3½	4	4½
Diameter Top Flanges	6½	7½	8¼	9	10	10½
Diameter Bottom Flange	8¼	9	10½	11	12½	14
Diameter Inlet Hole	3	3 9/16	4¼	5	6	6⅜
Distance between centers of Top Flanges	10	11¼	12¾	13¼	14½	16½
Distance between Top and Bottom Flanges	6 13/16	7½	8⅛	9⅜	10	10 15/16
Weight, pounds, Cast Iron	52	70	105	127	178	199

No. 11B

Size	2	2½	3	3½	4	4½
Diameter Top Flanges	6½	7½	8¼	9	10	10½
Diameter Bottom Flange	8¼	9	10½	11	12½	14
Diameter Inlet Hole	3	3 9/16	4¼	5	6	6⅜
Distance between centers of Top Flanges	10	11¼	12¾	13¼	14½	16½
*Distance between Top and Bottom Flanges	7⅝	8⅝	9 7/16	10¼	11⅛	12 1/16
Weight, pounds, Cast Steel	53	72	107	130	182	203

* Including raised faces.

Ashton Muffler Attachment



No. 4

The above Muffler Attachment is made of cast iron with female inlet for connecting to pipe, and effectively muffles the noise of escaping steam.

In ordering specify size of pipe.

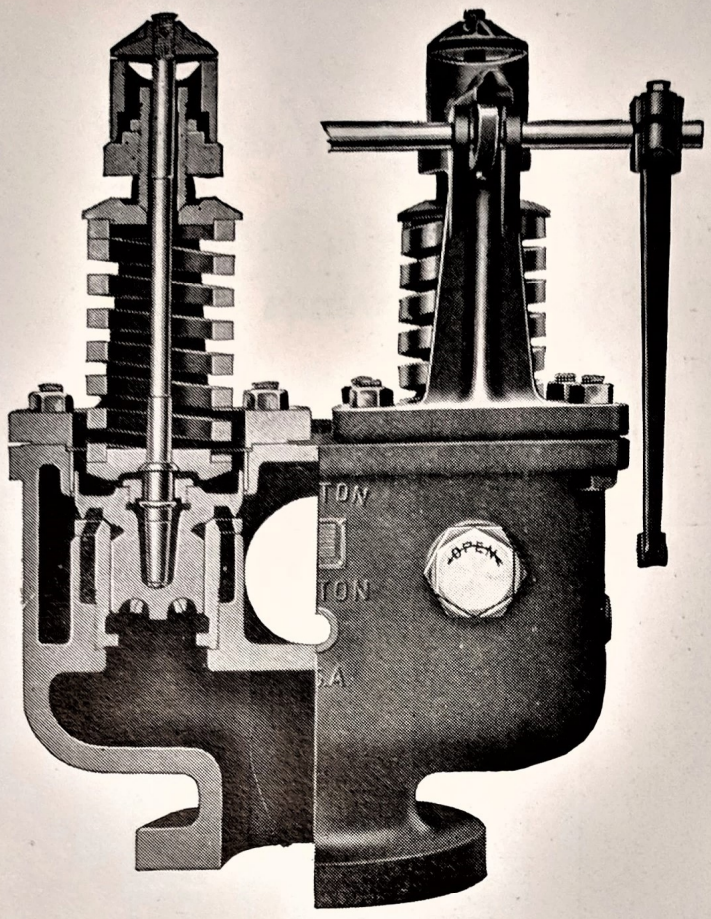
Size, inches	2	2½	3	3½	4	4½	5	6
Weight, pounds	21	21	50	52	55	60	77	80

Ashton Duplex Pop Safety Valves

Discharge Capacities of Ashton D.I., D.I.-10, D.I.-11 and D.I.-12 Style Pop Safety Valves in pounds of steam per hour

Lbs. Pressure per Square Inch Gage	Size, inches					
	2	2½	3	3½	4	4½
15	2,200	2,900	4,000	5,100	6,100	6,800
20	2,600	3,400	4,600	5,900	7,100	8,000
25	3,000	3,900	5,300	6,800	8,100	9,100
30	3,300	4,400	6,000	7,600	9,100	10,200
35	3,700	4,900	6,600	8,500	10,100	11,400
40	4,100	5,400	7,300	9,300	11,100	12,500
45	4,400	5,900	7,900	10,200	12,100	13,600
50	4,800	6,400	8,600	11,000	13,100	14,800
55	5,200	6,900	9,300	11,900	14,100	15,900
60	5,600	7,400	9,900	12,700	15,200	17,000
65	5,900	7,800	10,600	13,400	16,200	18,200
70	6,300	8,000	11,200	14,100	17,200	19,300
75	6,500	8,300	11,900	14,900	18,000	20,600
80	6,700	8,700	12,400	15,600	18,800	21,400
85	6,800	9,000	12,900	16,100	19,600	22,200
90	7,000	9,300	13,300	16,500	20,400	22,900
95	7,200	9,600	13,700	16,900	21,000	23,600
100	7,400	10,000	14,000	17,400	21,000	24,300
105	7,600	10,000	14,200	17,900	21,300	25,300
110	7,800	10,400	14,800	18,400	22,000	26,100
115	8,000	10,700	15,300	19,000	22,800	27,000
120	8,300	11,200	16,000	19,800	23,800	28,000
125	8,600	11,500	16,600	20,500	24,600	29,000
130	8,900	11,900	17,200	21,200	25,500	30,100
135	9,200	12,300	17,800	21,900	26,400	31,200
140	9,500	12,700	18,400	22,600	27,300	32,100
145	10,000	13,200	18,900	23,400	28,100	33,200
150	10,200	13,600	19,500	24,100	29,000	34,400
155	10,500	14,000	20,000	24,800	29,900	35,300
160	10,800	14,400	20,700	25,500	30,700	36,300
165	11,000	14,800	21,300	26,300	31,600	37,400
170	11,400	15,300	21,900	27,000	32,500	38,400
175	11,700	15,600	22,500	27,900	33,400	39,400
180	12,000	16,000	23,100	28,500	34,300	40,500
185	12,300	16,500	23,700	29,300	35,200	41,500
190	12,600	16,900	24,300	29,900	36,000	42,600
195	13,000	17,300	24,900	30,600	37,000	43,600
200	13,300	17,900	25,500	31,400	37,900	44,700
205	13,500	17,900	25,800	31,700	38,300	45,200
210	13,500	18,000	26,000	32,100	38,700	45,700
215	13,600	18,200	26,300	32,500	39,100	46,300
220	13,600	18,400	26,600	32,900	39,600	46,900
225	13,800	18,600	26,900	33,300	40,000	47,500
230	14,000	18,800	27,500	33,900	40,900	48,400
235	14,200	19,200	28,000	34,600	41,700	49,400
240	14,500	19,700	28,000	35,300	42,600	50,300
245	14,800	20,000	29,100	36,000	43,400	51,400
250	15,000	20,200	29,700	36,500	44,000	52,400

The Ashton D.I., D.I.-10, D.I.-11 and D. I.-12 Style (cast iron) Valves are recommended for pressures up to and including 250 pounds. To figure the discharge of FREE AIR in cubic feet per minute multiply charted values by .24.



D.I.-11 Style (Cast Iron)
For Saturated Steam
Maximum Pressure, 250 pounds
Moderate Capacity

Ashton Duplex Pop Safety Valves

WITH EXPOSED SPRINGS

D.I.-Style
(Without Rocker Shaft)

D.I.-11 Style
(With Rocker Shaft)

Stationary and Marine Boilers

SPECIFICATIONS

Base and Heads	Cast Iron
Seat Bushings	Bronze or Nickel
Wing Valves	Bronze
Pop Regulators	Bronze
Springs	Crucible Steel
Spindles	Steel
Forks and Levers	Malleable Iron

The Ashton Duplex Valve base is a one-piece casting, requiring only one connection to the boiler, and has a single outlet connection, thus minimizing the possible leakage at boiler connection joints. It is considered good practice to use duplex valves on boilers, for the single boiler connection economizes space.

These valves are especially adapted for marine service, and have been approved by the United States Board of Supervising Inspectors of Steam Vessels, Bureau of Steam Engineering, United States Navy Department, and when specified are made to conform to Lloyd's Register. When specially ordered they (D. I.-11 Style) are fitted with rocker shaft single lever for lifting the valves from their seats in succession, as illustrated above, for which there is an extra charge.

These valves are of the moderate capacity type with the inlet and outlet openings both of the same size and are regularly made with A.E.S.C. 250-pound standard inlet and 125-pound standard outlet flanges, drilled only when specified. For pressures in excess of 150 pounds we recommend nickel seat bushings.

Excessive length, or reduced outlet piping should be avoided, to eliminate possible back pressure which will interfere with the pop control.

Relieving capacity of these valves is charted on page 23; dimensions on page 26; and part list on page 27.

DIMENSIONS IN INCHES

Size	2	2½	3	3½	4	4½
Diameter of Inlet Flange	8¼	9	10½	11	12½	14
Diameter of Outlet Flange	7½	8½	10	10	11	13½
Weight, pounds (approximate)	170	210	340	370	500	580

Orders should always specify style number of valve, size and maximum working pressure, also rocker shaft if required, and, wherever possible, the total heating surface and maximum rating of boiler. When rocker shaft is desired order should specify on which end lever is to be placed when facing outlet.

Ashton Duplex Pop Safety Valves

WITH ENCLOSED SPRING HEADS

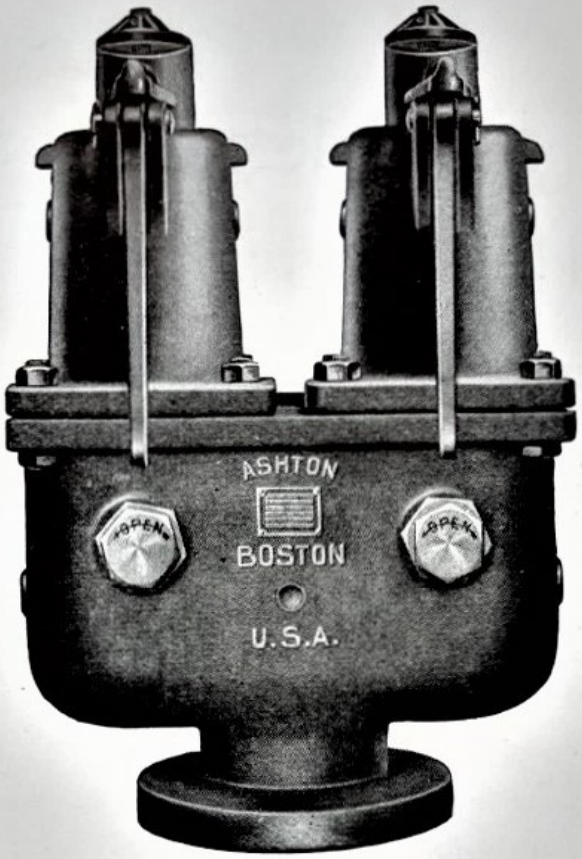
D.I.-10 Style
(Without Rocker Shaft)

D.I.-12 Style
(With Rocker Shaft)

Stationary and Marine Boilers

SPECIFICATIONS

Base and Heads	Cast Iron
Seat Bushings	Bronze or Nickel
Wing Valves	Bronze
Pop Regulators	Bronze
Springs	Crucible Steel
Spindles	Steel
Forks and Levers	Malleable Iron



D.I.-10 Style (Cast Iron)
For Saturated Steam
Maximum Pressure 250 Pounds
Moderate Capacity

The Ashton D.I.-10 Style Duplex Valve above illustrated is made with enclosed spring head, and is particularly desirable for marine service.

The enclosed head prevents the escape of steam into the fire room and protects the interior parts from dirt or other foreign matter; otherwise the construction is the same as the D. I. Style Duplex Valve, as described on page 24. Ashton Valves have been approved by the United States Board of Supervising Inspectors of Steam Vessels, Bureau of Steam Engineering, United States Navy Department. When specified these valves are made to conform to Lloyd's Register; when specially ordered are fitted with rocker shaft single lever for lifting the valves from their seats in succession, for which there is an extra charge, and should be ordered as D. I.-12 Style.

These valves are of the moderate capacity type with inlet and outlet openings both of the same size, and are regularly made with A.E.S.C. 250-pound standard inlet and 125-pound standard outlet flanges, drilled only when specified. For pressures in excess of 150 pounds we recommend nickel seat bushings.

Excessive length, or reduced outlet piping, should be avoided to eliminate possible back pressure which will interfere with the pop control. Relieving capacity is charted on page 23; dimensions on page 26; and part list on page 27.

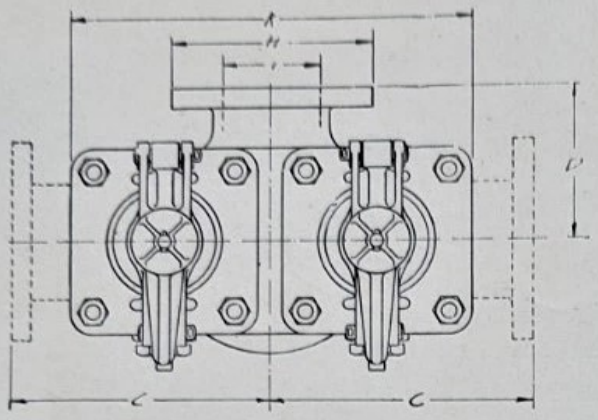
DIMENSIONS IN INCHES

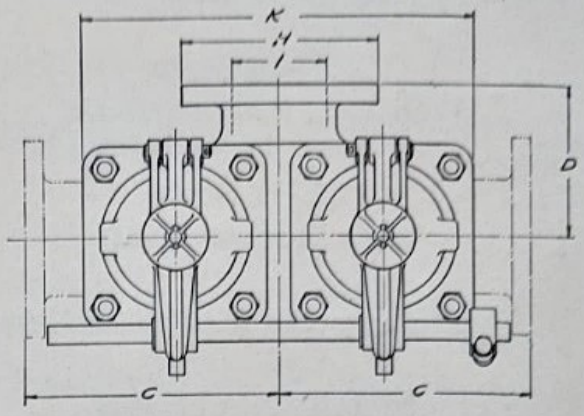
Size	2	2½	3	3½	4	4½
Diameter of Inlet Flange	8¼	9	10½	11	12½	14
Diameter of Outlet Flange	7½	8½	10	10	11	13½
Weight, pounds (approximate)	180	240	360	390	580	630

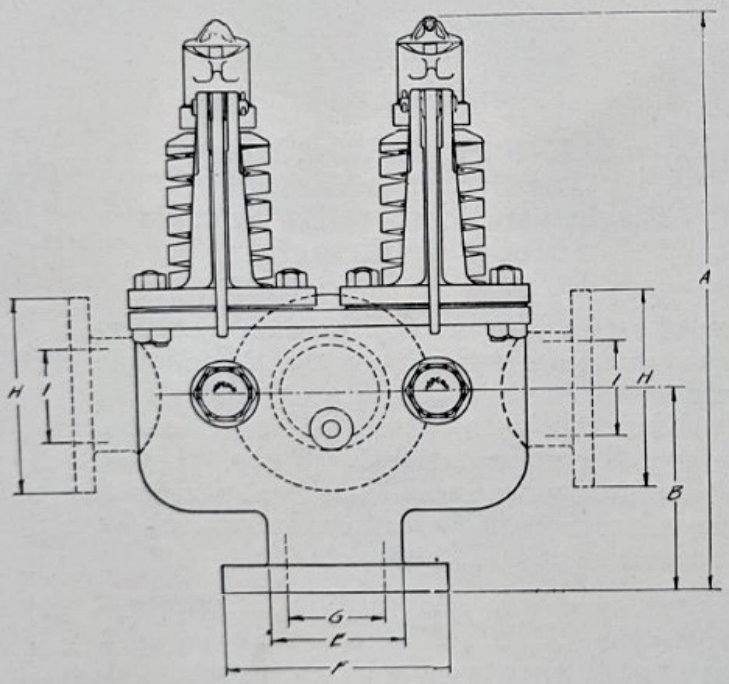
Orders should always specify style number of valve, size and maximum working pressure, also rocker shaft if required, and whenever possible the total heating surface and maximum rating of boiler. When rocker shaft is desired order should specify on which end lever is to be placed when facing outlet.

PRICES ON APPLICATION

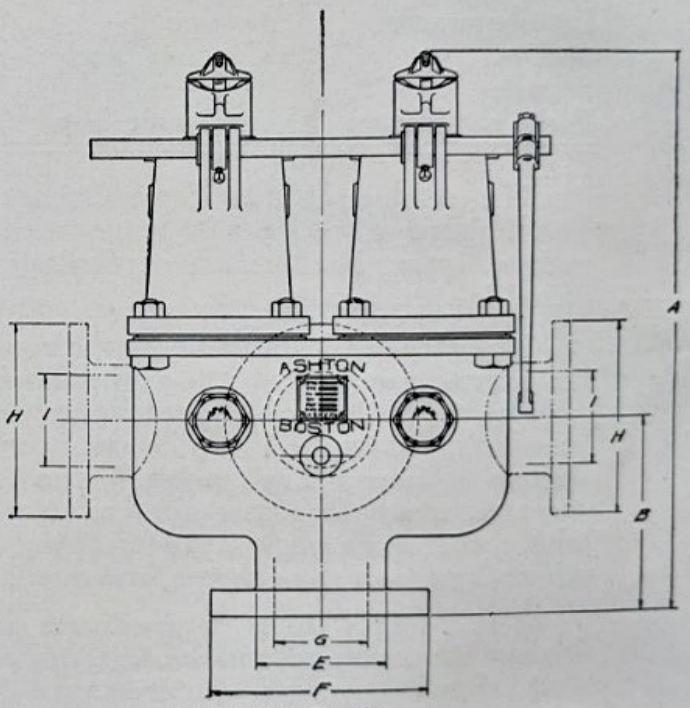
Ashton
Duplex Pop Safety Valves







D. I. Style
With Exposed Springs
With Double Cam Levers



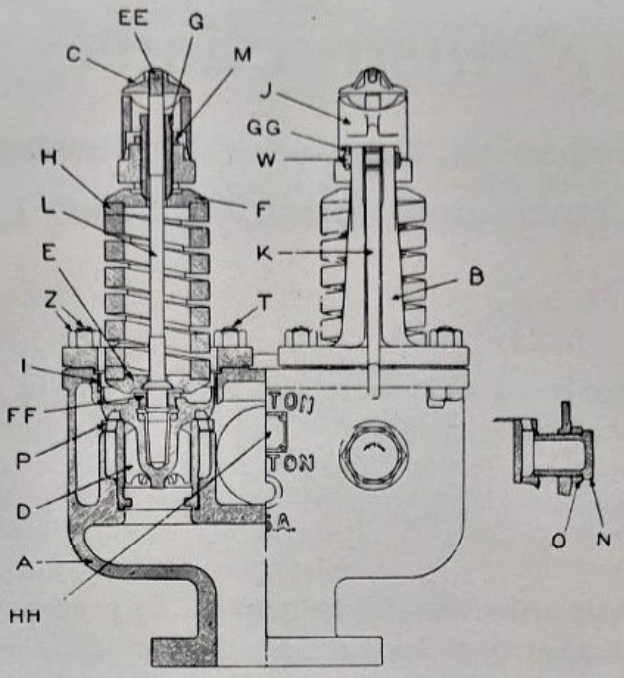
D. I.-12 Style
With Enclosed Springs
With Rocker Shaft Single Lever

DIMENSIONS, INCHES

Ashton D. I., D. I.-10, D. I.-11 and D. I.-12 Valves

Size	A	B	C	D	E	F	G	H	I	K
2	21½	6 5/16	9¼	5 11/16	4¼	8¼	2 7/8	7½	2 7/8	14
2½	23½	7½	10 7/16	6 3/8	5 1/16	9	3 9/16	8½	3 9/16	15¾
3	27½	9½	11 15/16	7 1/16	6¼	10½	4½	10	4½	18 3/8
3½	27	8 7/8	12 15/16	7½	6 5/8	11	5	10	5	20
4	29½	9½	14 1/8	8	7 7/16	12½	5 11/16	11	5 11/16	22 3/8
4½	31¼	10½	14 3/16	8 7/16	8¼	14	6 3/8	13½	6 3/8	22¾

Ashton Duplex Pop Safety Valves



LIST OF PARTS

Ashton D.I., D.I.-10, D.I.-11 and D.I.-12 Valves

Name of Part	Letter	Style No.	SIZE, INCHES					
			2	2½	3	3½	4	4½
Base (with head ring I)	A	D.I., D.I.-10, D.I.-11, D.I.-12	$35.00	$53.00	$68.00	$77.00	$88.00	$102.00
		D.I.	5.50	5.50	6.50	7.75	8.75	11.50
		D.I.-10	22.00	22.00	24.00	26.25	26.25	30.75
Head	B	D.I.-11 With Bushings for Shaft	10.50	10.50	10.00	11.00	11.80	12.70
		D.I.-12 With Bushings for Shaft	12.25	12.70	13.40	14.30	16.60	18.50
Cap	C	D.I., D.I.-10, D.I.-11, D.I.-12	.80	.80	90	.90	1.65	1.65
Wing Valve	D	D.I., D.I.-10, D.I.-11, D.I.-12	5.75	6.00	8.50	12.00	13.25	18.75
Wing Valve Lock Nut	FF	D.I., D.I.-10, D.I.-11, D.I.-12	.90	90	1.10	1.10	1.25	1.25
Bottom Disc	E	D.I., D.I.-10						
Top Disc	F	D.I-11, D.I.-12	.50	.50	.60	60	.75	.75
Spindle Key	EE	D.I., D.I.-10, D.I.-11, D.I.-12	.20	.20	.20	.20	.25	.25
Pressure Screw	G	D.I., D.I.-10, D.I.-11, D.I.-12	1.75	1.75	2.00	2.00	3.50	3.50
Spring	H	D.I., D.I.-10, D.I.-11, D.I.-12	8.75	13.25	17.50	17.50	19.75	24.00
Data Plate	HH	D.I., D.I.-10 D.I.-11, D.I.-12	90	90	.90	.90	90	.90
Head Ring	I	D.I., D.I.-10 . D.I.-11, D.I.-12	1.50	1.50	1.75	2.00	2.75	3.50
Fork	J	D.I., D.I.-10 D.I.-11, D.I.-12	90	90	1.10	1.10	1.60	1.60
Lever	K	D.I., D.I -10	.60	.60	70	70	.90	90
Rocker Shaft Lever with Lever Screw, not shown	KK	D.I.-11, D I.-12	4.00	4.00	4.25	4.25	4.75	4.75
Spindle	L	D.I., D.I.-10, D.I.-11, D.I.-12	3.50	3.50	3.50	3.50	3.50	3.50
Pressure Screw Check Nut	M	D.I., D.I.-10, D.I.-11, D.I.-12	.40	40	55	55	70	.70
Regulator	N	D.I., D.I.-10, D.I.-11, D.I.-12	1.75	1.75	2.25	2.25	2.50	3.00
Regulator Check Nut	O	D.I., D.I.-10, D.I.-11, D.I.-12	55	.70	.80	.80	.80	1.10
Seat Bushing Bronze	P	D.I., D.I.-10, D.I.-11, D.I.-12	4.00	6.50	7.00	10.00	12.00	16.50
Seat Bushing Nickel	P	D.I., D.I.-10, D.I.-11, D.I.-12	8.75	11.00	14.25	16.75	22.00	27.50
Cam, not shown	Q	D.I.-11, D.I.-12	1.50	1.50	1.50	1.50	1.75	1.75
Key for Cam, not shown	R	D.I.-11, D.I.-12	.05	.05	05	.05	05	.05
Rocker Shaft, not shown	S	D.I.-11, D.I.-12	6.00	6.00	6 00	6.00	00	7.00
Rocker Shaft Bushing (not shown)	SS	D.I.-11, D.I.-12	1.75	1.75	1.75	1.75	1.75	1.75
Stud and Hex. Nut	T	D.I., D.I.-10, D.I.-11, D.I.-12	.15	.15	15	.15	.15	.15
Fork Pin, not shown	V	D.I., D.I.-10 D.I.-11, D.I.-12	.50	50	.50	.50	.50	.50
Lever Pin	W	D.I., D.I.-10 D.I.-11, D.I.-12	.50	50	.50	.50	50	.50
Base Bolt and Nut	Z	D.I., D.I.-10 D.I.-11, D.I.-12	10	.10	10	10	.10	.20
Lever Screw, not shown		D.I.-11, D.I.-12	10	.10	10	10	10	.10

In ordering new parts, it is necessary to specify style number of valve, size, name of part and letter, also serial number of valve, and if new springs are ordered, the working pressure.

Instructions

For the Application, Care, and Maintenance of Ashton Stationary and Marine Pop Safety Valves

1. Always apply valves close to the boiler or main supply of steam, on short nipples or nozzles having full inside diameter. When otherwise connected they are likely to chatter when blowing, and will not give full capacity of relief, due to restricted steam supply.

2. Each safety valve should be applied to a separate boiler nozzle, with no engine or auxiliary pipe line connected thereto. This will insure the valves having a full and steady supply of steam to maintain their full lift without fluctuation.

3. Joints between safety valves and connections must be carefully made up. Red lead, or other similar material, used on screwed joints, should be put on sparingly and be applied only on the male connection. Packing used for gaskets on flanged joints should be carefully trimmed on its inside diameter. Following these instructions will prevent any joint material from working up into the valves to clog them or make them leak.

4. Safety valves should be placed in a vertical position. When otherwise applied they will wear unevenly and become out of alignment, which will cause them to leak by preventing true seating.

5. Valves should be operated frequently. If this does not occur in regular service at least once a day, they should be opened by hand, as can readily be done by use of the trip lever. This practice keeps the valves in good working condition and prevents the accumulation of dirt or other foreign matter that might clog the important working parts.

6. Never change set pressure adjustment of valves, when they do not operate at apparently the correct pressure unless the steam gage is known to be absolutely correct. Gages are more likely to be inaccurate than safety valves owing to their more sensitive action and delicate construction.

7. The leaking of safety valves may be due to several causes. Generally it is because of some foreign substance having blown out of the boiler or the safety valve connection and become lodged on the valve seat. When this occurs the valve should be taken apart at the first opportunity and the seat cleaned. If the seat has become scratched or slightly defaced it can be made perfect by grinding in with fine quartz and oil. If more than slightly defaced it will require machining, in which case the same amount of metal should be removed from the lip as from the seat.

7a. As previously stated valves will also leak if red lead or packing from the connection joints gets into the valves. They will also leak if they are allowed to chatter, due to improper installation or wrong adjustment of the pop, giving too small a blow-down.

7b. Valves having long, unsupported outlet pipes connected to them are often found to be leaking because of the weight of the pipe unduly straining the valve body and distorting the seat. Such pipes must be supported otherwise than by the valve only.

When discharge pipes of two or more safety valves are joined, they should have slip joints. See page 17 for recommended practice. Drain provided from base of valve should be suitably piped and pipe kept unobstructed to prevent accumulation of water above the valve seat, which may result in serious damage to the valve.

7c. Lifting mechanism attached to safety valve levers must be so arranged that when it is not being used the lever will stand in its normal position. If there is the slightest drag on the lever the valve is likely to leak.

8. The cause of safety valves chattering. This fault in operation is usually due to wrong application such as mentioned in paragraphs 1 and 2. Pop safety valves give such a large and sudden relief that they must be so connected that they will obtain a full supply of steam to keep them well off their seats during their entire operation. They are also so sensitive that if an engine pipe or other auxiliary is connected to the safety valve nozzle, it will cause sufficient fluctuation of pressure to make the valve correspondingly fluctuate in its lift when blowing and result in chattering.

8a. Valves which have the pop, or blow-down, regulated too fine will chatter. The adjustment should be such that the difference between the opening and closing pressures will not be less than 2 pounds, otherwise the valves will remain on a balance.

9. Valves which have an excessive blow-down or pop, are usually hung up in the head of the wing valve, or between the valve wings and the seat bushing. They should be taken apart and cleaned. If the spring is too light the pop is likely to be too heavy. A satisfactory pop for ordinary pressures is 3% of set pressure. Adjustments should be made within this limit for satisfactory service and economy in steam. The outside pop regulator will accomplish this under normal conditions.

10. Safety valve springs have a limited range of service. They cannot be used for a greater range than 10% above or below the original set pressure without impairing the efficiency of the valve and the regulation of the pop control. When a greater change of set pressure is desired, ask for instructions.

10a. Screwing down safety valve springs beyond their maximum range, to make hydrostatic tests, subjects them to an excessive strain that may destroy their life and efficiency. It is a bad as well as a dangerous practice. Use testing clamp.

Special Instructions

For Repairing and Adjusting

Ashton Stationary and Marine Pop Safety Valves

Shown on previous pages

The following special instructions embody the fundamental principles found in all Ashton Pop Safety Valves, and with slight modifications have general application to all styles shown in the catalogue.

1. To take Ashton Safety Valves apart, remove spindle key, spindle cap and raise fork, exposing pressure screw. Loosen pressure screw check nut and pressure screw until all tension is removed from spring. The valve head can be unbolted or unscrewed, as the case may be and removed from the base when all interior parts will be accessible.

2. To reseat Ashton Safety Valves particular attention should be given to retain the original lines and proper relation of the lip of the wing valve to the seat bushing. Valve seats that are only slightly defaced can usually be ground in tight by the use of fine quartz and oil, and the best results can be obtained by alternating the direction of operations. Seats which require machining must afterwards be ground in. Such valves also require the removal of the same amount of metal from the bottom of the knife-edge lip as was taken from the seat, otherwise the wing valve will rest on the lip and not on the seat. The lip should always extend down close to the bushing, but must never touch it. An easy way to test a valve to determine whether it is properly resting on its seat and not on the lip is to note if it can be slightly rocked by hand, as should be possible. If it does not, the bottom of the lip should have a light chip turned off. When in service the lip wears down equally with the seat and requires no special attention.

3. To change the set pressure of Ashton Valves it is only necessary to adjust the pressure screw by screwing it downward for a higher working pressure, or upward for a lower pressure. It is obviously necessary to release the pressure screw check nut before making an adjustment and always tightening it afterwards.

4. To change the pop, or blow-down, of Ashton Valves, it is unnecessary to take them apart, as this can be done while the valves are in service. The only exception to this is that of those small size valves, which do not have outside pop regulators. These regulators consist of screw plugs located on the sides of the valve base just above the neck. The face of the hexagon head of the regulator is stamped "Open." To increase pop turn regulator to right; to decrease pop turn regulator to left.

Tighten check nuts after adjustment. It is advisable to divide adjustment equally between regulators.

Ashton valves require less pop regulation than other valves, and their regulators do not stick and become inoperative in adjustment

5. The main pop chamber in Ashton Valves should be kept to approximately its original dimensions. This chamber is the space enclosed within the walls of the knife-edge lip of the wing valve into which the steam passes immediately after the valve rises from its seat, where it exerts a substantial pressure upon an increased area of the wing valve, thereby adding considerably to the lift, and consequently to the discharge capacity of the valve. It is, therefore, essential when making extensive repairs to see that the original depth of the pop chamber is fairly closely maintained, also that the knife-edge lip bears its proper relation to the seat bushing as directed in paragraph 2.

6. The following cuts show in outline the design of the essential parts of the wing valve and seat bushing in Ashton valves.

Figure 1 of the wing valve "D" represents the knife-edge lip.

Figure 2 shows a portion of the seat bushing "P" with its bevel seat "y". To obtain the best results it is advisable to maintain the original narrow width of seat of not over one eighth of an inch regardless of the size of the valve.

Figure 3 shows the wing valve in normal position on the seat bushing. "X" is the main pop chamber above referred to. The approximate clearance below the knife-edge lip is also indicated.

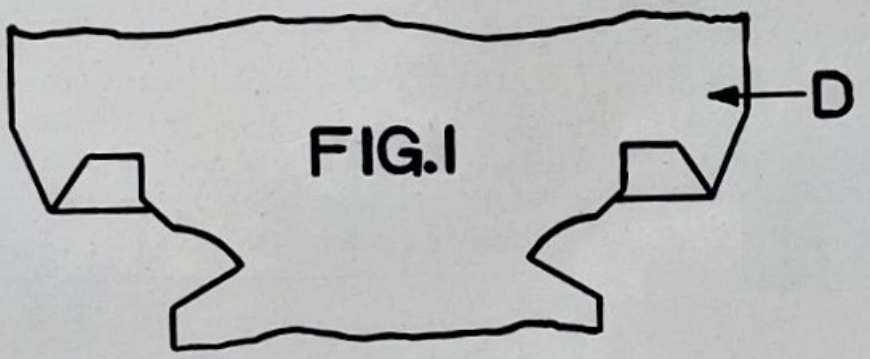


FIG.1

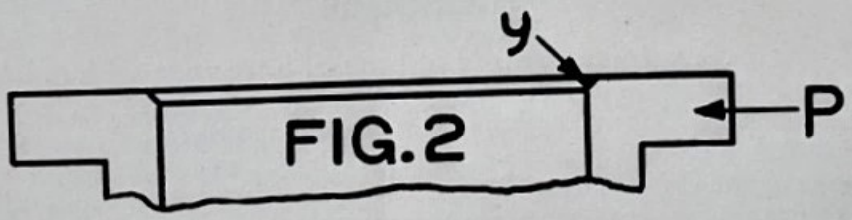


FIG.2

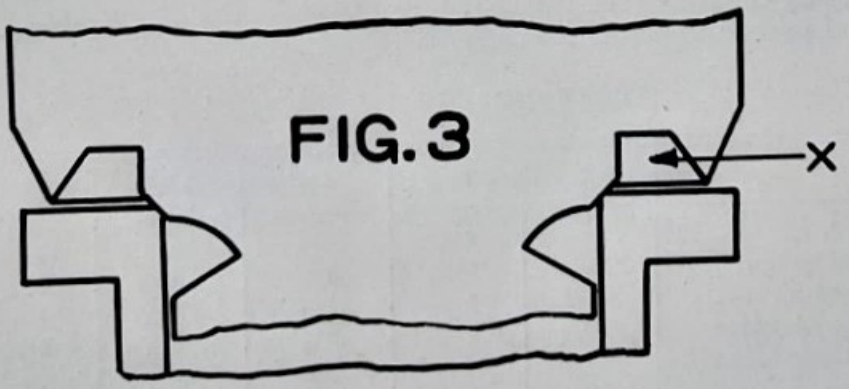
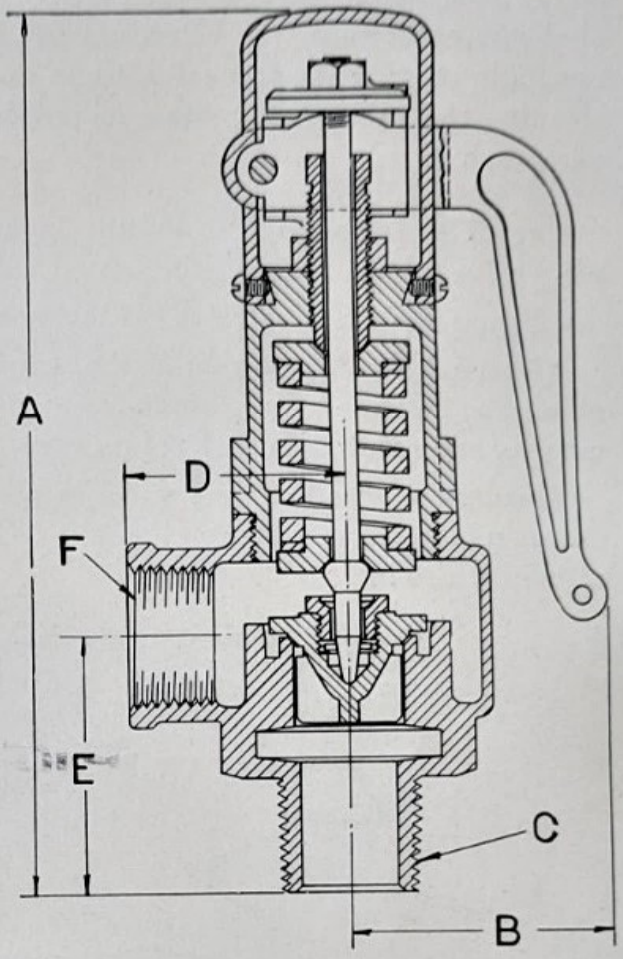


FIG.3

Ashton Pop Safety Valves

For Marine, Small Stationary and Portable Boilers, Air Tanks, Etc.



A.C. Style

The A.C. and B.C. valves are made of bronze, have encased hand-forged springs made of imported steel, male inlet, pop regulators that are always accessible from outside of valve, lever for lifting valve from seat, sealing arrangement, and conform to the requirements of the A.S.M.E. Boiler Code, all state and city regulations and the Rules and Regulations of the United States Board of Supervising Inspectors of Steam Vessels.

They are suitable for steam or air pressures up to 300 pounds maximum.

The A.C. valve shown above has female threaded outlet for piping the discharge.

For relieving capacities see page 37.

For list of parts and prices see page 36.

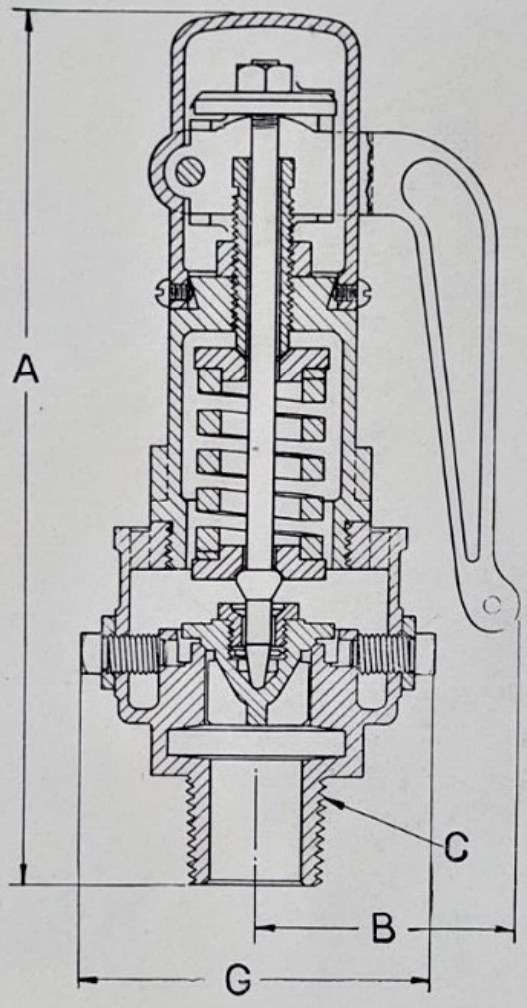
DIMENSIONS IN INCHES

Size	¾	1	1¼	1½	2	2½
"A" Height over all	7	8¼	9 5/16	10½	10 13/16	13 7/16
"B" Center to outside of Lever	2 1/16	2 13/32	2 9/16	2 13/16	3⅛	3 19/32
"C" Pipe Thread	¾	1	1¼	1½	2	2½
"D" Center to outlet face	1 25/32	2	2 9/32	2½	2 13/32	3¾
"E" Center outlet to face of inlet	1⅞	2 5/16	2 17/32	2¾	2 3/32	3 27/32
"F" Pipe Thread	¾	1	1¼	1½	2	2½
Weight, pounds	4	4¾	7	9¾	11½	20¼

Orders should specify style number, size and set pressure.

Ashton Pop Safety Valves

For Small Stationary and Portable Boilers, Air Tanks, etc.



B.C. Style

The B.C. valve shown above, general description of which is given on preceding page, is the same as the A.C. except that it has open discharge instead of outlet for piping. As mentioned in general description, this valve conforms to A.S.M.E. Code.

For relieving capacities see page 37.

For list of parts and prices see page 36.

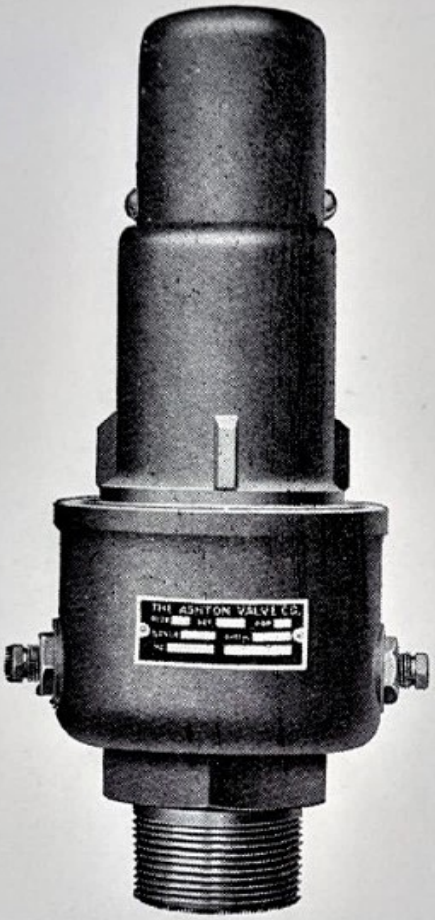
DIMENSIONS IN INCHES

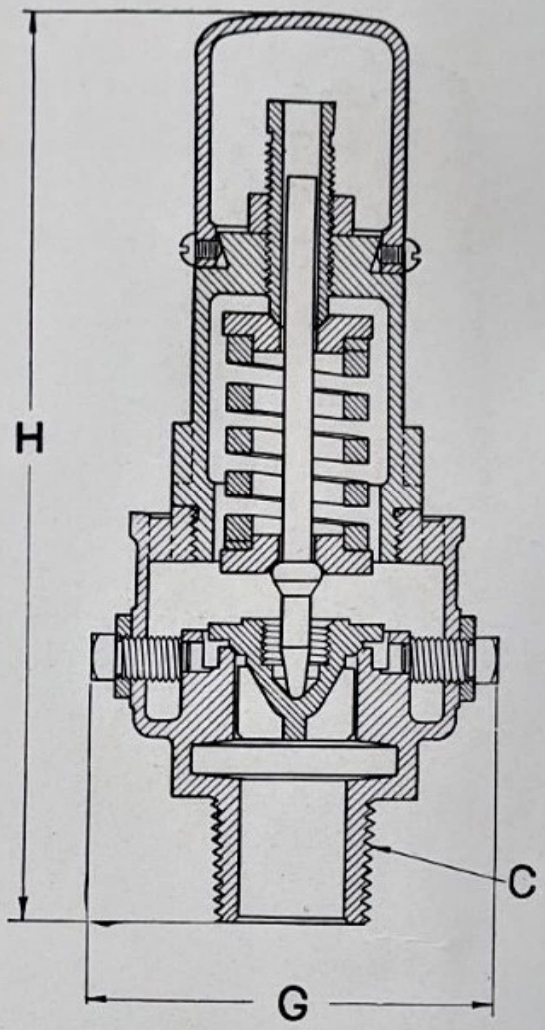
Size	¾	1	1¼	1½	2	2½
"A" Height over all	7	8¼	9 5/16	10½	10 13/16	13 7/16
"B" Center to outside of Lever	2 1/16	2 13/32	2 9/16	2 13/16	3⅛	3 19/32
"C" Pipe Thread	¾	1	1¼	1½	2	2½
"G" Outside Diameter	3 9/16	3⅞	4½	5 1/16	6 1/16	6 15/16
Weight, pounds	3¾	4½	6¾	9½	11½	19½

Orders should specify style number, size and set pressure.

Ashton Pop Safety Valves

For Small Stationary and Portable Boilers





No. B.C.-10

The No. B. C.-10 valve shown above is the same in construction as B. C. except that it has no lever for lifting valve from its seat.

For relieving capacities see page 37.

For list of parts and prices see page 36.

DIMENSIONS IN INCHES

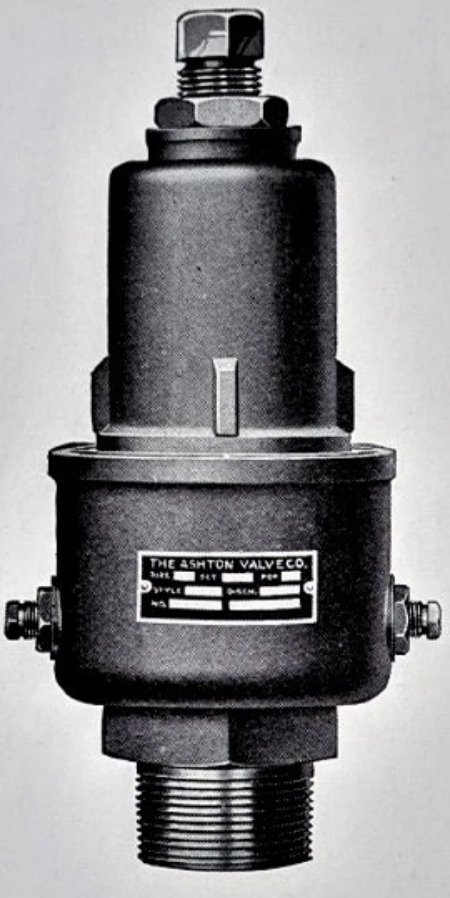
Size	¾	1	1¼	1½	2	2½
"C" Pipe Thread	¾	1	1¼	1½	2	2½
"G" Outside Diameter	3 9/16	3 7/8	4 1/2	5 1/16	6 1/16	6 15/16
"H" Height over all	6 3/32	7 13/32	8 7/16	9 17/32	9 27/32	12 9/32
Weight, pounds	3¼	4	6	8¾	10¾	18¾

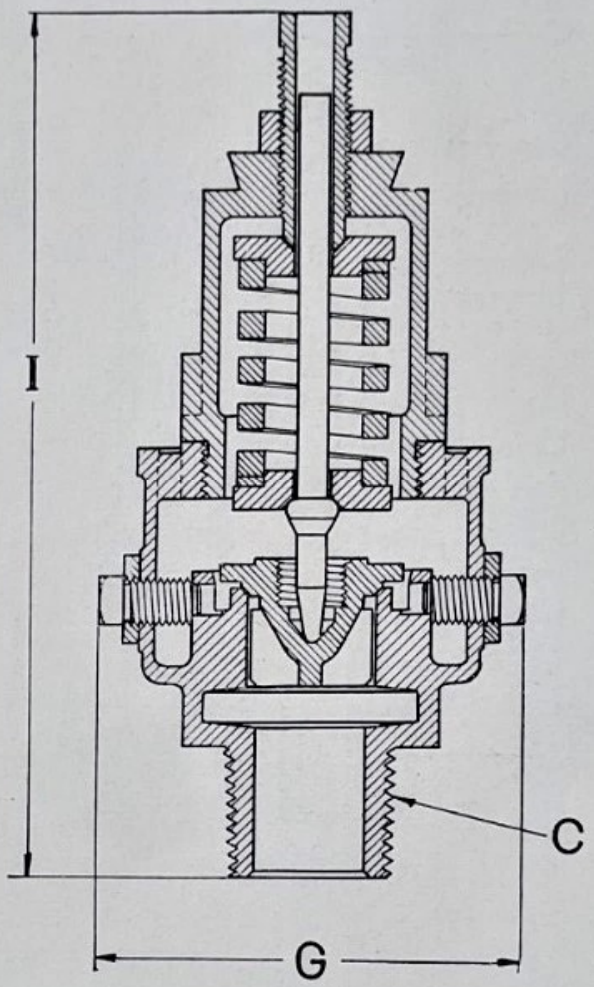
Orders should specify style number, size and set pressure.

PRICES ON APPLICATION

Ashton Pop Safety Valves

For Small Stationary and Portable Boilers





No. B.C.-11

The No. B. C.-11 valve shown above is the same as No. B. C.-10 except that it has no top cap.

For relieving capacities see page 37.

For list of parts and prices see page 36.

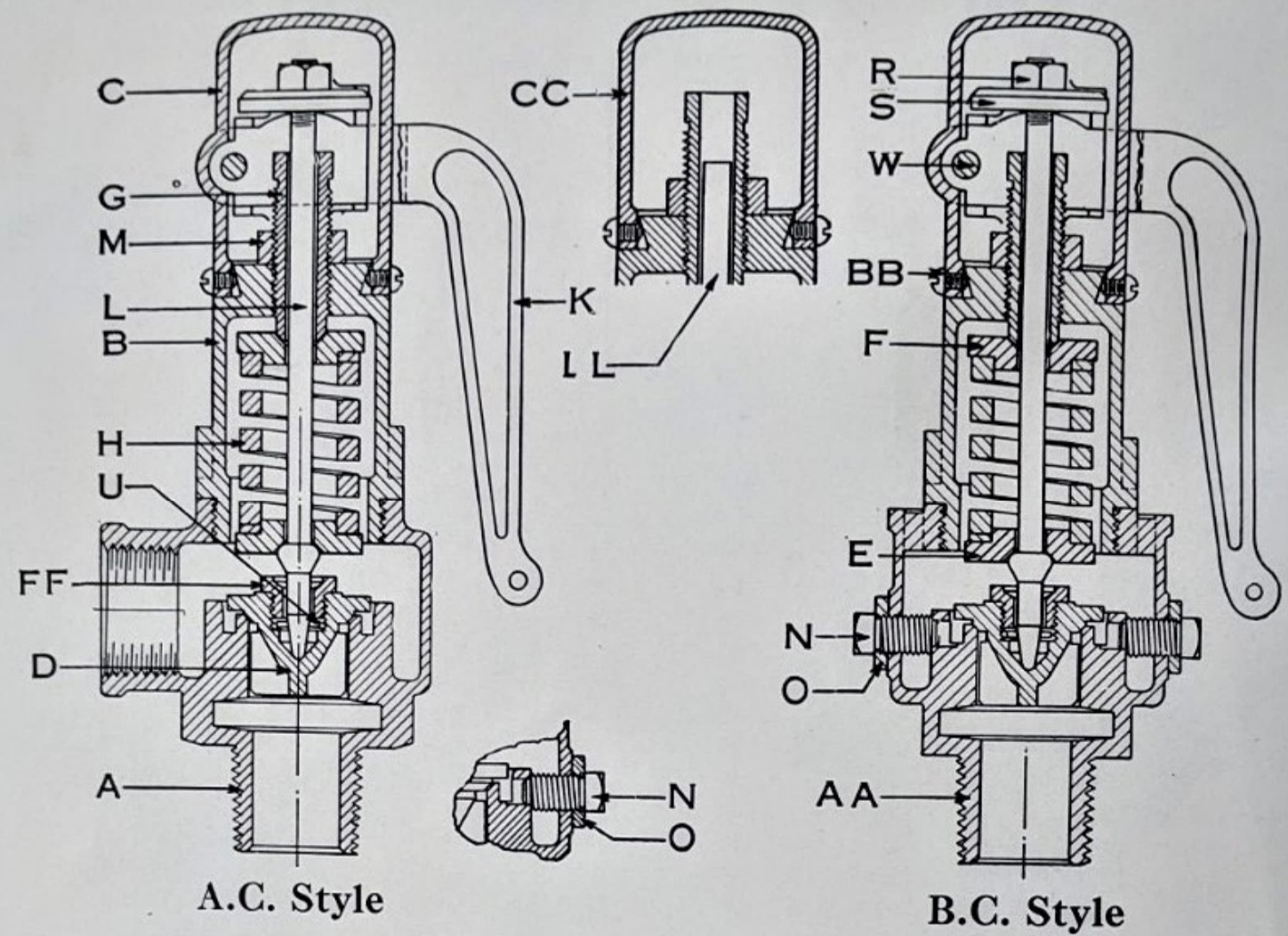
DIMENSIONS IN INCHES

Size	¾	1	1¼	1½	2	2½
"C" Pipe Thread	¾	1	1¼	1½	2	2½
"G" Outside Diameter . . .	3 9/16	3 7/8	4½	5 1/16	6 1/16	6 15/16
"I" Height over all	5 7/8	6¾	7¾	8¾	9 7/16	11 13/16
Weight, pounds	2½	3¼	5½	8	10	18

Orders should specify style number, size and set pressure.

PRICES ON APPLICATION

Ashton Pop Safety Valves



A.C. Style

B.C. Style

PRICE LIST OF PARTS

Ashton No. A.C., B.C., B.C.-10, B.C.-11 Style Valves

Name of Part	Letter	Style No.	Size, inches					
			¾	1	1¼	1½	2	2½
Base	A	A.C.	4.55	5.25	5.90	6.60	9.80	13.65
Base	AA	B.C. B.C.-10 B.C.-11	3.90	4.55	5.25	5.90	9.10	12.30
Head	B	A.C. B.C. B.C.-10 B.C.-11	1.80	2.50	3.20	4.10	5.70	9.10
Cap Screw	BB	A.C. B.C.; B.C.-10	.05	.05	.05	.05	.05	.05
Cap	CC	B.C.-10	.45	.70	.70	.95	.95	.95
Wing Valve	C	A.C. B.C.	.90	1.15	1.15	1.35	1.35	1.70
Bottom Disc	D	A.C. B.C. B.C.-10 B.C.-11	1.25	1.60	2.15	2.95	3.65	4.55
Top Disc	E	A.C. B.C. B.C.-10 B.C.-11	.35	.50	.70	.95	1.25	1.85
Wing Valve Lock Nut	F	A.C. B.C. B.C.-10 B.C.-11	.35	.50	.70	.95	1.25	1.85
Pressure Screw	FF	A.C. B.C.	.60	.60	.85	.95	.95	.95
Spring	G	A.C. B.C. B.C.-10 B.C.-11	.90	1.15	1.35	1.50	1.50	2.15
Lever	H	A.C. B.C. B.C.-10 B.C.-11	1.15	1.45	1.80	2.20	2.70	4.55
Spindle	K	A.C. B.C.	.35	.45	.60	.70	.80	1.00
Spindle	LL	B.C.-10 B.C.-11	1.00	1.25	1.50	1.70	1.95	2.40
Pressure Screw Check Nut	L	A.C. B.C.	1.15	1.35	1.60	1.80	2.05	2.50
Pop Regulator	M	A.C. B.C. B.C.-10 B.C.-11	.25	.25	.25	.30	.30	.70
Regulator Check Nut	N	A.C. B.C. B.C.-10 B.C.-11	.35	.40	.50	.60	.70	1.00
Spindle Nut	O	A.C. B.C. B.C.-10 B.C.-11	.25	.25	.25	.25	.30	.30
Spindle Cap	R	A.C. B.C.	.25	.25	.30	.30	.30	.30
Spindle Pin	S	A.C. B.C.	.25	.30	.35	.45	.45	.45
Lever Pin	U	A.C. B.C.						
	W							

Ashton Pop Safety Valves

Discharge Capacities of Ashton A.C., B.C., B.C.-10, and B.C.-11 Style Pop Safety Valves in pounds of steam per hour.

Pressure Lbs. per Square Inch Gage	Size, inches					
	¾	1	1¼	1½	2	2½
25	250	400	600	800	1,100	1,700
50	425	700	900	1,300	1,800	2,800
75	600	900	1,200	1,800	2,500	3,900
100	750	1,200	1,500	2,300	3,200	5,000
125	800	1,400	1,800	2,700	3,700	6,000
150	950	1,600	2,100	3,200	4,300	7,100
175	1,100	1,800	2,400	3,700	5,000	8,100
200	1,250	2,100	2,800	4,200	5,600	9,200
225	1,400	2,400	3,100	4,700	6,300	10,200
250	1,550	2,600	3,400	5,200	7,000	11,300
275	1,700	2,800	3,700	5,700	7,600	12,400
300	1,800	3,100	4,100	6,200	8,300	13,500

For discharge of air in cu. ft. per min. multiply charted values by .24.

DISCHARGE CAPACITY OF AIR AND GAS

CU. FT. PER MINUTE

Pressure	Sizes in inches					
	¾	1	1¼	1½	2	2½
100	150	250	350	550	750	1200
150	200	350	450	750	1000	1700
200	250	450	600	1000	1300	2200
250	350	600	800	1250	1650	2700

Ashton Pop Safety Valves

For Small Boilers and Pressure Tanks

No. 31

No. 32

These valves are very compact, and solidly made of bronze. They have encased spring made of special steel, knife-edge pop lip, beveled seats, and a lever for raising the valve.

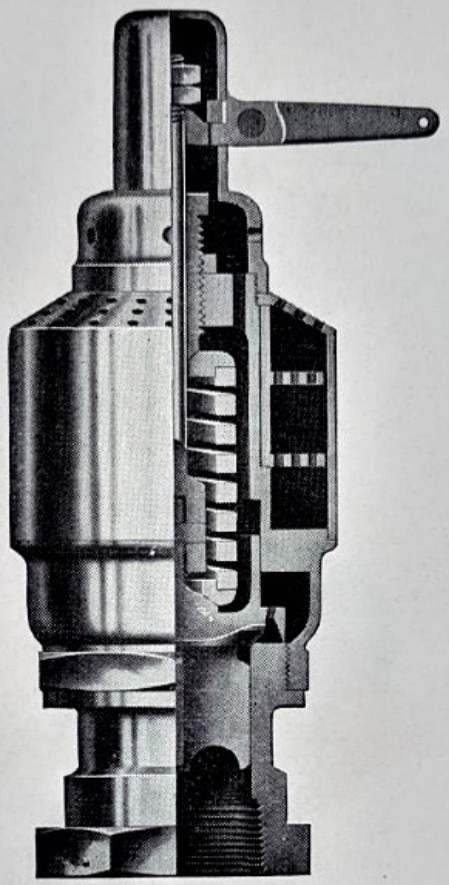
Every valve is carefully tested and set to blow at the desired pressure.

No. 31 has open discharge outlet, while No. 32 has pipe outlet.

Maximum set pressure 250 pounds.

Size, inches	⅜	½
Weight in ounces	13	14
Style Connection, inlet	female	male

Ashton Stationary Muffled Safety Valve



No. 34 with Lever
No. 34A Plain

The Ashton Stationary Muffled Pop Safety Valve is largely used on steam roller, derrick and traction engine boilers. It is particularly desirable for use on any application where a quiet safety valve discharge is required.

This valve has the same efficiency as the open discharge valves and is made of bronze with either plain top or trip lever as above shown. It is serviceable for pressure up to 250 pounds per square inch.

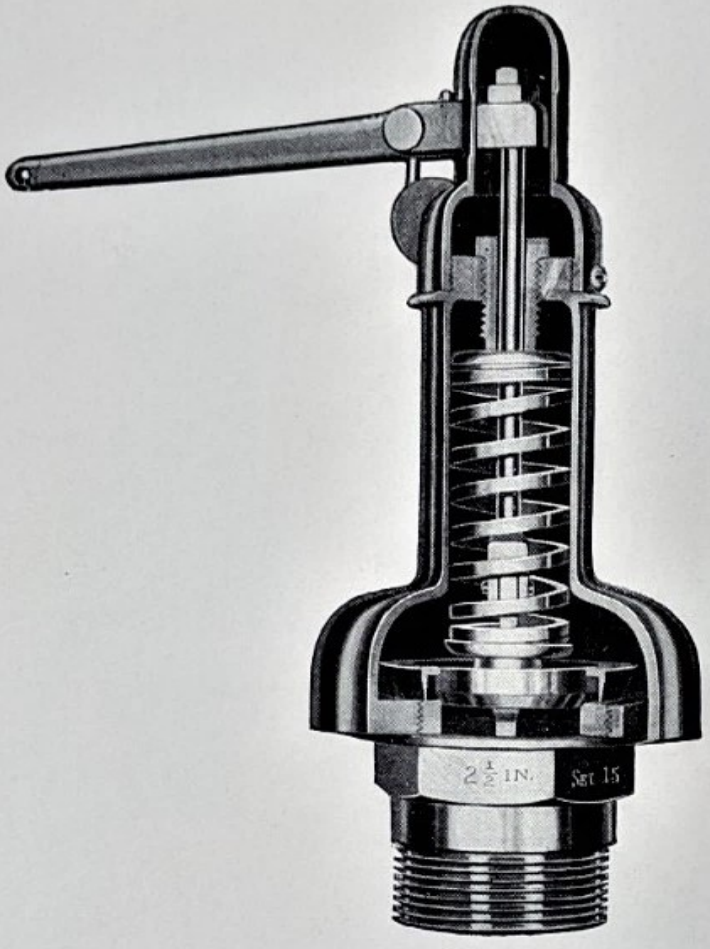
All sizes have female inlet.

Size, inches	1	1¼	1½	2

PRICES ON APPLICATION

Ashton Police Lock-up Pop Safety Valve

For Low-Pressure Heating Boilers
Approved by Massachusetts District Police



No. 14

The lock-up attachment prevents tampering with the adjustment. A standard lock is furnished for each valve. Pressure regulating screw is so arranged that the valve cannot be set for more than 15 pounds, — an additional safeguard against carrying more pressure.

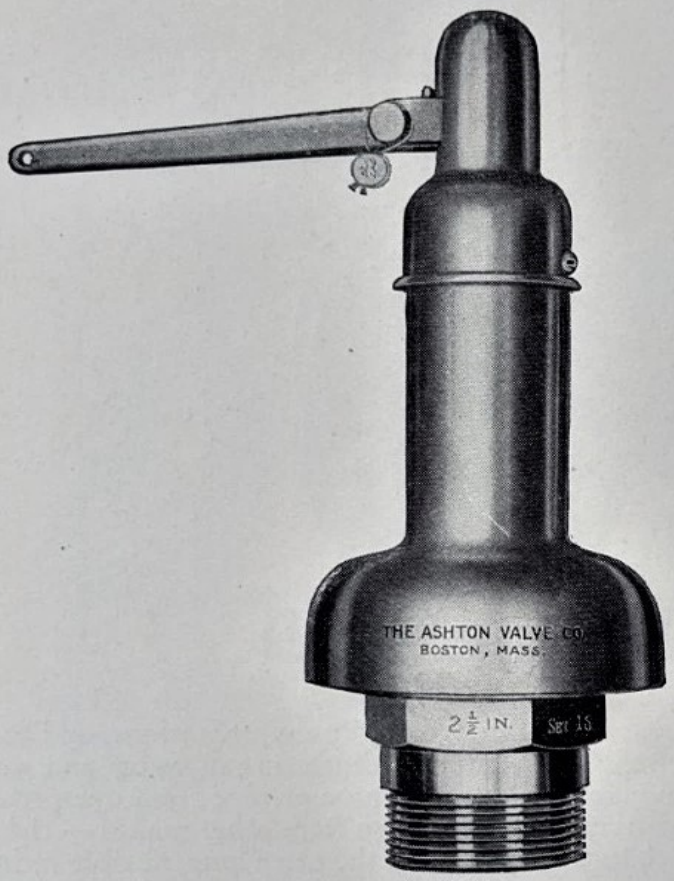
The downward discharge outlet prevents dust or dirt getting into the interior.

The spring is of good length, of special steel, and all other working parts are of high-grade bronze which insures great durability. A long trip lever is capable of raising the wing valve off its seat a distance equal to one-fourth the diameter of the valve. The spindle is directly connected to the wing valve.

The 4 inch size is also made with exterior of iron and interior working parts (except spring) of bronze. It has female inlet and is called No. 14A.

Size, inches	2	2½	3	3½	4
Grate Area, square feet. In Mass.	7.9	12	17.6	24	31.4
Weight, pounds	9	13¼	21½	24½	28½

Ashton Low Pressure Pop Safety Valve



No. 14B.

This valve is of the same style as the No. 14 valve shown on opposite page, but is made for a greater range of pressure, having the usual ordinary pressure screw adjustment whereby it can be used up to a maximum of 30 pounds pressure. It is set and sealed before shipment.

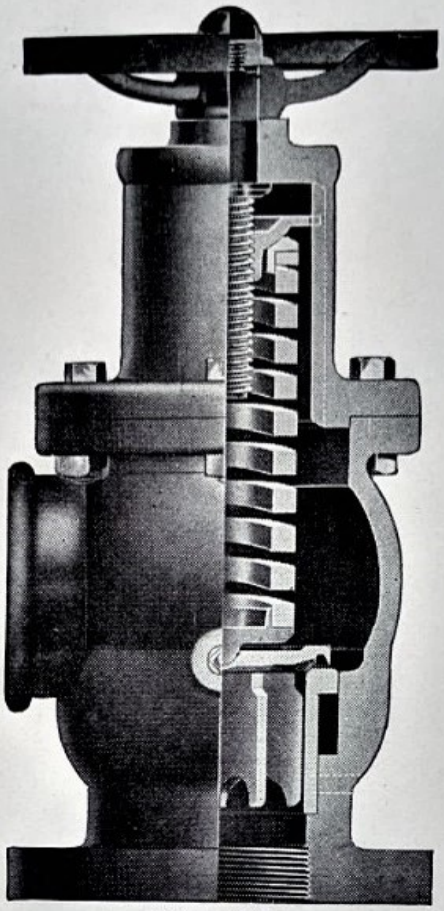
It is made of bronze, has open downward discharge and trip lever.

The 4 inch size is also made with exterior of iron and interior working parts (except spring) of bronze. It has female inlet and is called No. 14E.

Size, inches	¾	1	1¼	1½	2	2½	3	3½	4
Weight, lbs. . . .	2½	3½	4½	6½	9	13¼	21½	24½	28½

PRICES ON APPLICATION

Ashton Standard Relief Valve



No. 22

For Pumps, Hydraulic Elevators, Water Works, Pumping Stations, and Standpipes. These valves give automatic relief, preventing overpressure of water and water hammer, and when used on a fire pump, will protect hose or pipe from overpressure.

Extra large relief is what distinguishes this valve from other makes — the iron base is large, giving a generous discharge chamber, and the extra long, flexible spring insures ample relief. Easy adjustment of set pressure is obtained by the large wheel.

As shown above, both inlet and outlet are in the same base casting, which allows taking valve apart for repairs without breaking connections. Working parts are of high-grade bronze to prevent corrosion, and the spring is of special steel.

No. 22 relief valve is regularly furnished with flanged inlet and screwed outlet, as shown above; but inlet and outlet can be screwed or flanged as desired.

Orders should specify set pressure. Maximum 300 pounds.

DIRECTIONS

To increase set pressure, turn wheel to left; to *decrease* set pressure, turn to right.

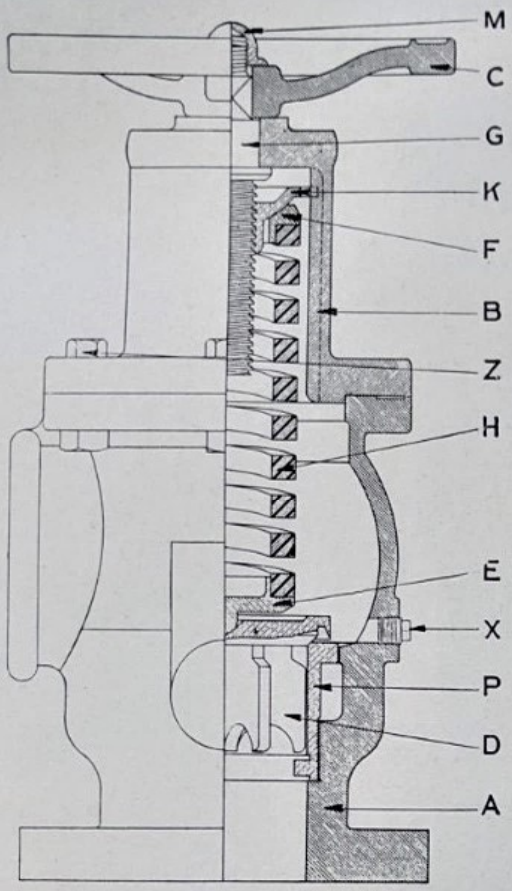
Discharge Capacity
Cu. Ft. of Air and Gas, per Minute

Pressure	Size, inches											
	2	2½	3	3½	4	4½	5	5½	6	8	10	12
100	350	450	700	1000	1200	1500	....	....	....	....	....	....
150	500	650	1100	1450	1800	2200	....	....	....	....	....	....
200	650	900	1400	1800	2400	2900	....	....	....	....	....	....
250	800	1100	1700	2300	2900	3600	....	....	....	....	....	....
300	1000	1300	2100	2700	3500	4300	....	....	....	....	....	....
	Gallons of Water per Minute											
100	200	350	500	750	1000	1250	1500	1750	2000	....	....	....
In. Flge.	6½	7½	8¼	9	10	10½	11	12½	12½	15	17½	20½
Wt., lbs.	55	65	94	105	130	182	195	230	300	...	1100	1270

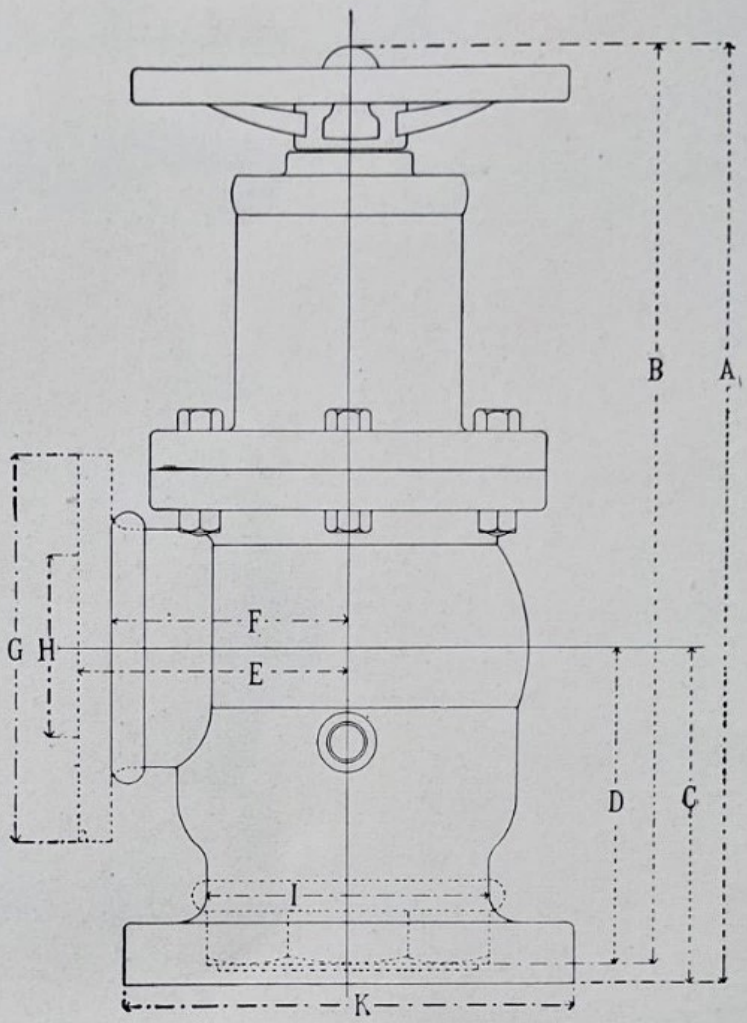
For dimensions see page 43. For price list of parts see page 43.

PRICES ON APPLICATION

Ashton Water Relief Valve



No. 22 Style



DIMENSIONS IN INCHES

Sizes	A	B	C	D	E	F	G	H	I	K
2	13 5/8	13 5/8	5 1/8	5 1/8	4	3 3/8	6	2	4	6 1/2
2 1/2	17 3/4	17 3/4	6 5/16	6 5/16	4 13/16	4 1/8	7	2 1/2	4 2/8	7 1/2
3	19	19	6 3/4	6 3/4	5 1/4	4 1/2	7 1/2	3	5 1/8	8 1/4
3 1/2	20 5/8	20 5/8	7 11/16	7 11/16	6 1/16	5 1/4	8 1/2	3 1/2	5 1/4	9
4	20 3/16	20 3/16	7 3/8	7 3/8	6 1/4	5 5/16	9	4	6 1/4	10
4 1/2	19 1/8	19 1/8	7 5/8	7 5/8	6 9/16	5 5/8	10	5	6 3/4	10 1/2
5	20 5/16	20 5/16	8 1/4	8 1/4	6 15/16	6	10	5	7 1/4	11
6	24 1/4	24 1/4	9	9	7 3/4	6 3/4	11	6	9	12 1/2

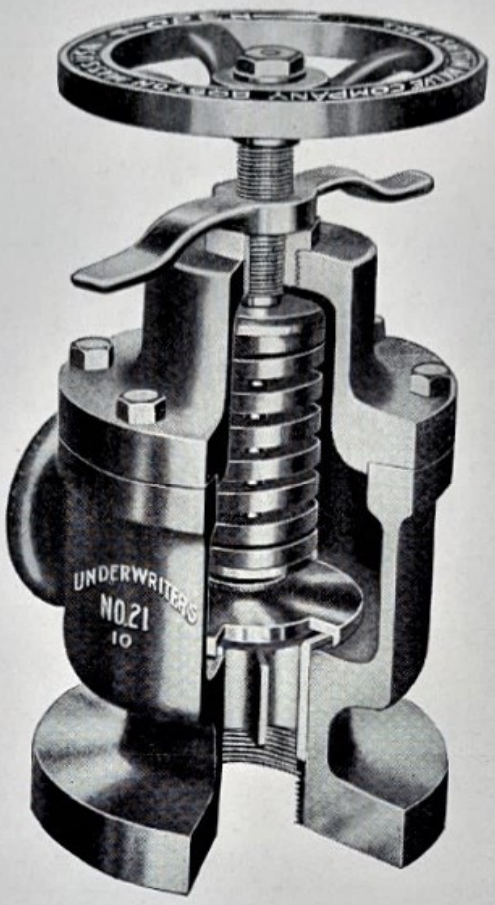
PRICE LIST OF PARTS

Name of Part	Letter	Size, inches							
		2	2 1/2	3	3 1/2	4	4 1/2	5	6
Base	A	$12.75	$13.75	$15.50	$17.50	$21.00	$25.25	$32.00	$51.75
Head	B	4.25	5.00	6.00	8.00	8.00	9.75	9.75	12.50
Hand Wheel	C	.75	1.00	1.50	2.00	2.00	2.25	2.25	2.75
Wing Valve	D	4.50	5.50	6.50	8.75	11.00	13.25	16.50	25.25
Bottom Disc	E	1.75	1.75	2.25	2.25	2.25	4.50	4.50	4.75
Top Disc	F	1.50	1.50	2.00	2.00	2.00	4.25	4.25	4.50
Pressure Screw	G	3.25	4.50	5.00	6.50	6.50	8.75	8.75	10.75
Spring	H	6.85	8.00	14.75	14.75	16.00	17.00	18.20	29.60
Pressure Screw Nut	K	3.00	3.25	3.75	3.75	3.75	5.50	6.00	7.25
Wheel Nut	M	1.00	1.00	1.50	1.50	1.50	1.75	1.75	1.75
Seat Bushing	P	6.50	7.75	10.00	12.00	14.25	16.50	19.75	28.50
Seat Drip Plug	X	.10	.10	.10	.10	.10	.10	.10	.10
Base Belt and Nut	Z	.10	.10	.10	.10	.15	.15	.15	.15

In ordering new parts it is necessary to specify style number of valve, size, name of part and letter, and if new springs are ordered, the *working pressure.*

Ashton Water Relief Valve

Underwriter Pattern



No. 21

This valve has been competitively tested and formally accepted by the Associated Factory Mutual Fire Insurance Companies, having complied fully with all their requirements. It has capacity such "that when set at 100 pounds it can pass all the water discharged by the pump at full speed, at a pump pressure not exceeding 125 pounds per square inch."

This valve is made with iron body and high-grade bronze working parts which prevents corrosion. The spring is of special steel and of extra length.

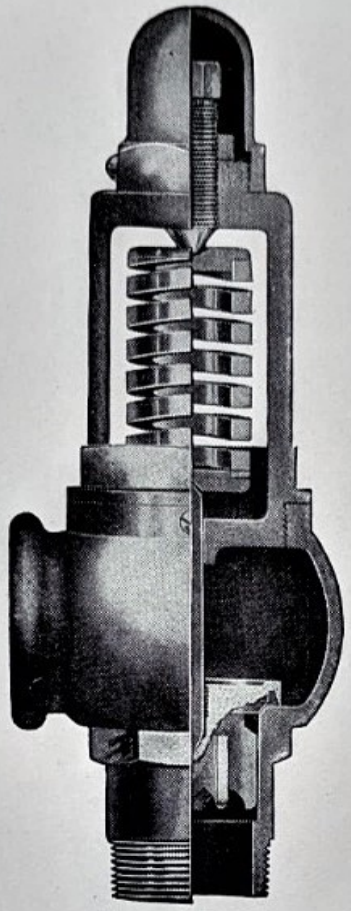
Directions

To increase set pressure, turn adjusting wheel at top from left to right, in the same way that an ordinary globe valve is closed. The wheel moves up or down as the pressure is decreased or increased.

Size, inches	3	3½	4	5
Pump Rating, gallons per minute	500	750	1,000	1,500
Diameter Inlet Flange, inches	7½	8½	9	10
Weight, pounds	105	165	180	205

PRICES ON APPLICATION

Ashton Outside Spring Relief Valve



No. 18R.

The outside spring design of relief valve, above shown, meets the requirements of a valve which has the spring fully exposed to view, and which can be readily removed without taking the valve apart, or disconnecting piping. The spring also does not come in contact with the steam or water discharge.

It is regularly made of bronze, spring of special hand forged steel, and is suitable for pressures up to 250 pounds per square inch, but for special requirements can be made of nickel alloy.

This valve is used in U. S. Navy and Merchant Marine service where a particularly reliable safety or relief valve application is desirable.

When ordering, it should be specified whether screwed or flanged connections are desired, and the pressure at which the valves are to operate in order that they may be fitted with proper size springs and adjusted for the correct working pressure.

WEIGHTS, POUNDS

Size, inches	1	1¼	1½	2	2½
Screwed Inlet and Outlet	5	7	8	11	12
Flanged Inlet.	9	12	14	20	29
Flanged Inlet and Outlet	13	16	18	25	36

Ashton Relief Valve

G.C. Style

This Valve is used on cylinders, condensers, or on any apparatus which needs a quick-working relief valve. It is made of bronze, with pipe outlet and has base outlet construction which permits taking valve apart for cleaning or regrinding without breaking connections.

Orders should specify set pressure. Maximum, 300 pounds.

Size, inches	½	¾	1	1¼	1½	2	2½	3
Relieving Capacity, gals. per minute at 100 lbs.	20	30	40	50	60	90	125	140
Weight, pounds	1	3	4	5½	7½	11½	18	38

PRICES ON APPLI

Ashton Relief Valve

Small Pattern

No. GC-10

This valve is automatic in relief and is adapted to the same kind of service as our No. 22 valve, but it is made on a smaller scale. It is of high grade bronze with spring of special steel and may be used as a cylinder relief valve.

The base outlet construction permits cleaning and regrinding without breaking connections, for both inlet and outlet are in same casting.

It is equipped with hand wheel for easy adjustment and has lock nut to prevent change in relief pressure through vibration.

Orders should specify set pressure. Maximum, 300 lbs.

For high pressure hydraulic relief valve see page 48.

Directions

To increase set pressure, turn wheel to right; to decrease pressure turn wheel to left.

Size, inches	¾	1	1¼	1½	2	2½
Relieving Capacity, gals. per minute at 100 lbs.	30	40	50	60	90	125
Weight, pounds	2¾	3¾	5¼	7½	11	23

PRICES ON APPLICATION

Ashton Hydraulic Relief Valve

No. 25L
No. 25H

Ashton Hydraulic Relief Valves are made for use on hydraulic presses, pumps, or wherever a high-pressure relief is required. They are substantially made of high grade bronze having great tensile strength, and do not corrode. The spring is of special hand forged steel.

These valves are so designed that they may be taken apart for cleaning or regrinding without breaking inlet or outlet connection.

When ordering, the highest working pressure should be stated; also whether flanged or screwed connections are desired.

For hydraulic pressure gages see pages 136 and 137.

No. 25L — LIGHT PATTERN
For Pressures 2,000 pounds and less

Size, inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½
Weight, pounds . . .	4	4	5	5	5	10	12	15	17	20

No. 25H — HEAVY PATTERN
For Pressures above 2,000 pounds

Size, inches	¼	⅜	½	¾	1	1¼	1½	2
Weight, pounds	10	10	12	12	15	16	17	20
Maximum Pressure Pounds	8,000			6,000	10,000	12,000		10,000

Ashton Hydraulic Relief Valve

***For 800 Pounds Pressure**

No. 25 B.

The Ashton Hydraulic Relief Valve is designed for pressures up to and including 800 pounds per square inch. It is made with extra heavy base and head of cast iron, with interior working parts of bronze, long spring of special hand forged steel, and with flanged inlet and outlet connections.

The construction is such that it may be taken apart and cleaned or repaired without disturbing the inlet or outlet piping.

*For pressures exceeding 800 pounds we are prepared to furnish similar valves with cast steel base and head and will quote prices on application.

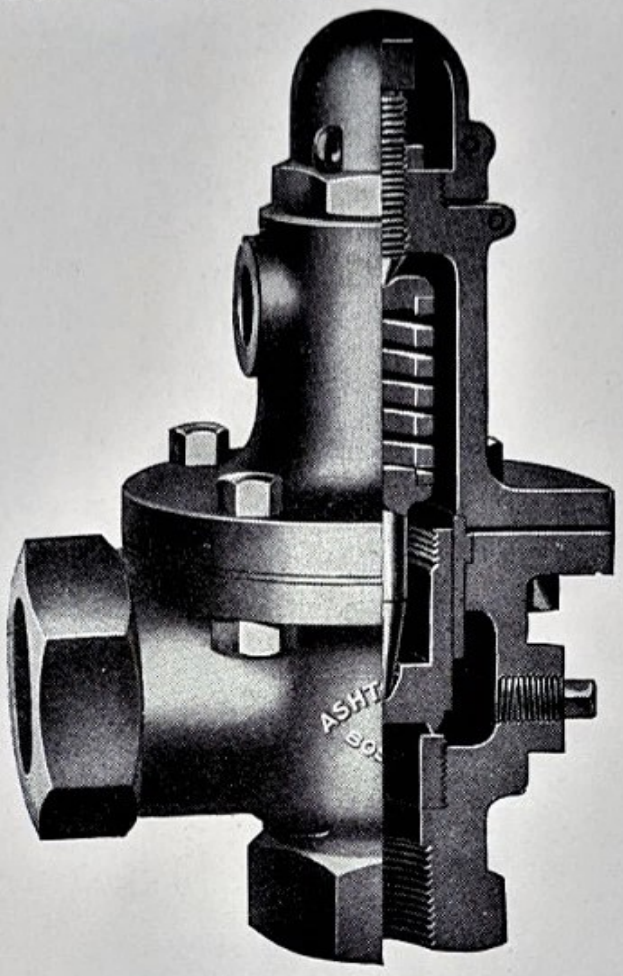
For hydraulic pressure gages see page 137.

Size, inches	2½	3	3½	4	4½
Diameter Inlet Flange, inches	7½	8½	9½	10¾	11½
Approximate Relieving Capacity, g l. per Minute at 100 lbs.	350	500	750	1000	1250
Weight, pounds	70	95	110	130	190

PRICES ON APPLICATION

Ashton Ammonia Relief Valve

Approved Massachusetts Style



No. 23 M.A.

The Ashton No. 23 M. A. Ammonia Relief Valve has been approved by the Board of Boiler Rules of the State of Massachusetts and fully complies with the requirements of Chapter 467, Acts of 1914.

This valve is set to open at not to exceed 250 pounds pressure, with full lift of at least one sixth its diameter at maximum pressure of 275 pounds and is marked "Massachusetts Standard Ammonia, 250-275 pounds" with name, Ashton, Boston, and sealed before shipment. All ammonia valves are given three different tests, the last one on ammonia gas and are guaranteed to be tight when leaving our works.

Extreme care should be used to see that the systems on which ammonia valves are applied are clean and free from sediment, otherwise after the valves have operated particles of a foreign nature may lodge on the seats and cause the valves to leak.

This valve also is extensively used outside of the State of Massachusetts and should be ordered as the "No. 23 M.B. Style" when the above marking is left off.

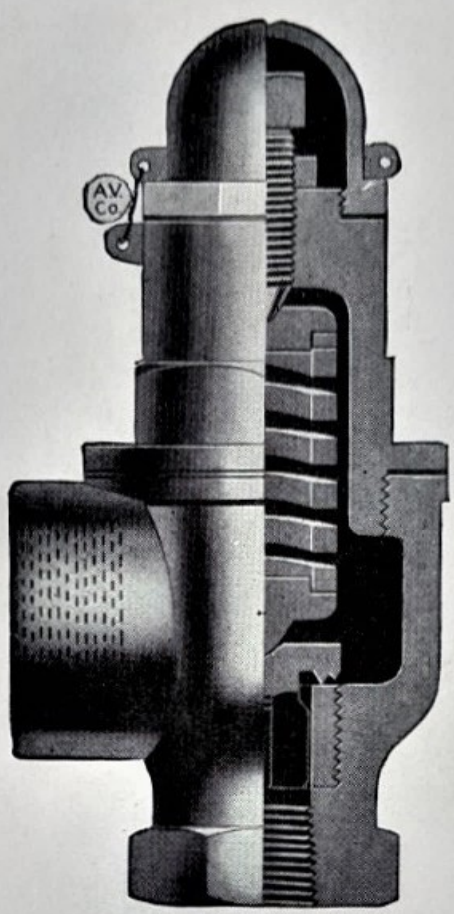
Requirements of Massachusetts Board of Boiler Rules

The minimum size of Relief Valves required on Ammonia Compressors, in accordance with paragraph 21 of the Specifications of the Massachusetts Board of Boiler Rules, based upon cubic feet displacement per minute, is as follows, in all of which sizes this valve is made.

Size, inches	½	¾	1	1¼	1½	2
Displacement in cubic feet	120	280	510	830	1,200	2,120
Weight, pounds	8	10	14	20	24	38

For Nos. 23E and 23C ammonia valves

Ashton Ammonia Relief Valve



No. 23E

The Ashton No. 23E Style Ammonia Relief Valve is suitable for pressures up to 500 pounds per square inch. It is made with cast iron head and base and so designed that it may be taken apart for cleaning without breaking the inlet and outlet connections.

The seat bushing is of lead and antimony, the cast iron wing valve has knife edge lip and will keep tight in continuous service, if the system on which it is applied is clean and free from foreign matter.

The No. 23E Style valve fully complies with the requirements of the New York City Fire Department, and is also extensively used in many of the States.

The outlet connection to the valve above illustrated is two (2) pipe sizes larger than the inlet; but when desired this valve will be furnished with both the inlet and outlet of the same size and should be ordered as the No. 23C Style.

All ammonia valves are given three different tests, the last one on ammonia gas, and are guaranteed to be tight when leaving our works.

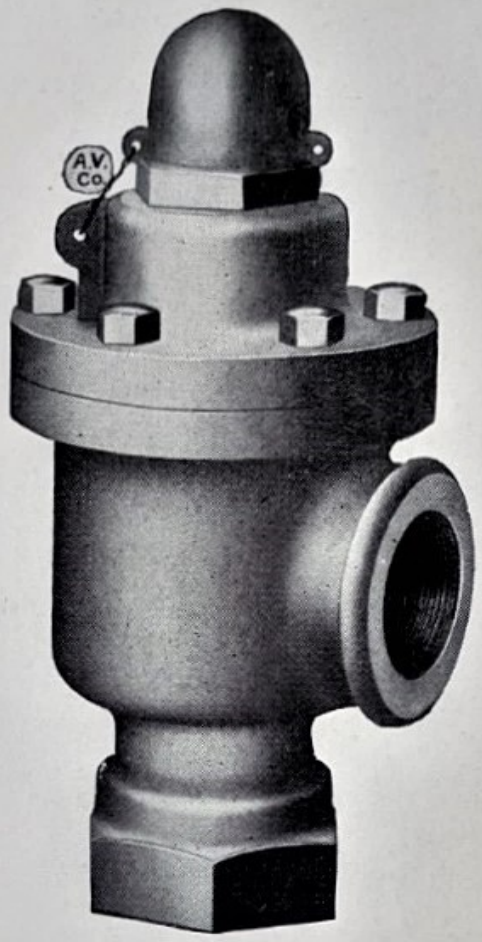
One-quarter to 1½ inch inclusive have screwed head as illustrated; 2 and 2½ inch have bolted head (see No. 23).

For ammonia diffusers see page 53.
For ammonia pressure gages see page 138.

Size, inches	¼	½	¾	1	1¼	1½	2	2½
Weight, pounds	1	6	6	9½	18	18	34	52

PRICES ON APPLICATION

Ashton All Iron Relief Valve



No. 23

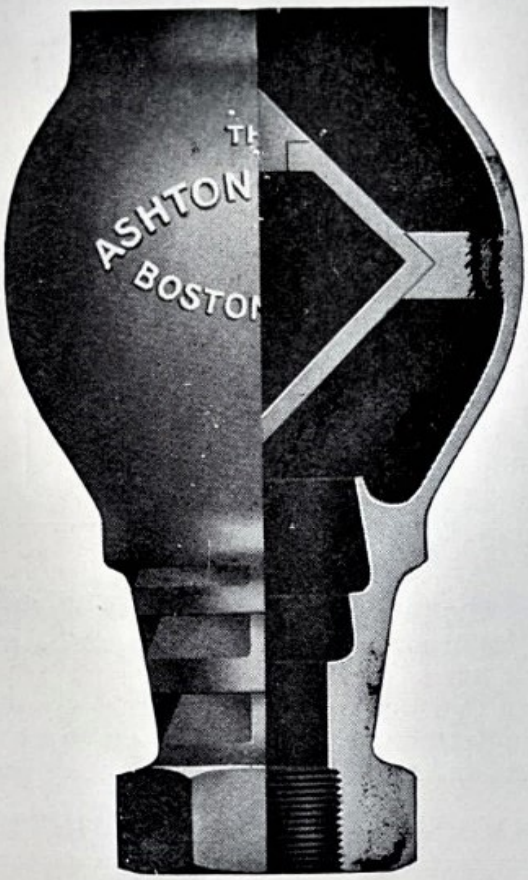
This valve is suitable for pressures up to 500 pounds per square inch and will remain tight in continued service. It gives prompt and free relief. Its cast iron head and base are of substantial construction and so designed that it can be taken apart for cleaning or regrinding without breaking inlet or outlet connection. It has cold rolled steel bushing with 46° seat. Its ferrous construction makes it suitable for use with some liquids that attack bronze.

The No. 23 Valve is provided with a seal to prevent tampering with set pressure adjustment, and has full size inlet and outlet connections. To change pressure adjustment remove top cap, thus exposing pressure screw, which should be turned down for increased pressure, or up for less pressure. After each readjustment the lock nut on pressure screw should be set up tight.

One-half to 1½ inch inclusive have screwed head (see No. 23 E); 2 and 2½ inch have bolted head as illustrated.

Size, inches	½	¾	1	1¼	1½	2	2½
Weight, pounds	6	6	9½	18	18	34	52

Ashton Ammonia Diffuser



No. 23D.

The Ashton No. 23 D Ammonia Diffuser we recommend for use in connection with the No. 23 M. A. Approved Ammonia Relief Valve, but may also be used with any Ashton Ammonia Relief Valve. By its use the discharge of ammonia gas from the relief valve will be effectively diffused with air before being freed into the atmosphere.

This diffuser is made with standard pipe thread inlet connection of the same size as relief valve outlet. The air inlets have a combined area approximately double the area of the ammonia nozzle, and the top discharge outlet has an area equal to that of the air inlets and the ammonia nozzle.

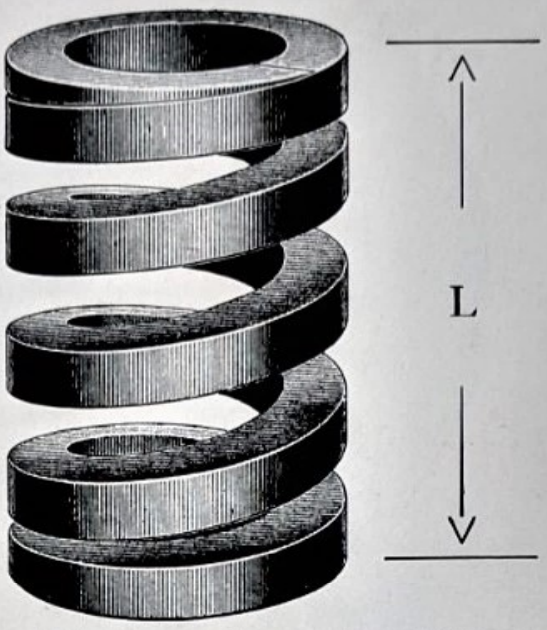
The design of the diffuser is such that it will not readily corrode or otherwise become inoperative, nor will it offer any obstruction to the free flow of the ammonia gas. It should always be applied in a vertical position at the end of the relief valve discharge pipe.

Size, inches	½	¾	1	1¼	1½	2	2½	3
Weight, pounds	9	9	9	10½	10½	30	30	63

PRICES ON APPLICATION

Ashton Valve Springs

|< I. D. >|



In ordering new springs it is necessary to specify style number of valve, size, pressure, length and inside diameter.

The springs used in Ashton Valves are of a superior quality and workmanship and are essentially different from those of ordinary commercial manufacture. They are made of special high grade steel.

Each spring is drawn to a uniform temper, accurately squared up on both ends, and when completed is subjected to a cold compression test closing it solid. They are guaranteed against defects and to give entirely satisfactory service.

VALVE SPRING PRICES—DIMENSIONS–LENGTH × ARBOR (I. D.)

Style No.	Size, Inches								
	1/8 and 1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2
14, 14B	....	....	....	1 3/8 x 7/8	1 3/4 x 7/8	1 3/4 x 7/8	1 7/8 x 1 1/4	2 1/2 x 1 1/4	4 x 1 1/4
	....	....	....	2.50	2.50	2.50	2.95	3.20	3.65
AC, BC, BC-10, BC-11, GC, GC-10	....	....	....	1 1/2 x 5/8	1 3/4 x 3/4	2 1/2 x 7/8	3 x 1 1/8	3 x 1 1/4	4 1/4 x 1 7/8
	....	....	....	1.15	1.45	1.80	2.20	2.70	4.55
34, 18R	....	....	....	....	2 1/2 x 7/8	2 1/2 x 7/8	3 x 1 1/8	3 x 1 1/4	4 1/4 x 1 1/2
	....	....	....	....	1.80	1.80	2.20	2.70	5.90
23M.A., 23M.B.	....	....	2 x 5/8	2 x 5/8	3 1/2 x 3/4	4 x 1	4 1/2 x 1 1/4	5 1/2 x 1 3/4	.....
	....	....	3.00	3.00	3.65	4.35	5.45	6.85	.....
23, 23E, 23C	1 x 3/8	....	2 1/8 x 3/4	2 1/8 x 3/4	2 7/8 x 1	3 x 1 1/8	3 x 1 1/8	4 x 1 1/2	4 1/2 x 1 3/4
	1.05	....	3.00	3.00	3.65	2.20	2.20	5.70	6.40
31, 32	....	1 3/8 x 1/2	1 3/8 x 1/2	....	.....	.....	....	.....	.....
	....	1.35	1.35	....	.....	.....	....	.....	.....
25L	2 x 5/8	2 x 5/8	2 1/4 x 5/8	2 1/4 x 5/8	2 7/8 x 3/4	2 7/8 x 3/4	3 x 1 1/8	3 1/2 x 7/8	4 x 1 1/2
	3.00	3.00	3.00	3.00	3.30	3.30	2.20	4.10	5.70
25H	3 x 7/8	3 x 7/8	3 x 7/8	3 x 7/8	5 x 1 1/4	5 x 1 1/4	6 x 2	6 x 2	....
	4.00	4.00	4.00	4.00	5.70	5.70	8.75	8.75	....

Style No.	1	2	2 1/2	3	3 1/2	4	4 1/2
14, 14B	....	....	.....	4 1/4 x 1 1/2	4 1/4 x 1 1/2	5 x 1 1/2	.....
	....	....	.....	5.90	6.15	6.15	.....
C.I., C.S., C.I.M., C.S.M., C.I.-10, C.S.-10, C.I.M.-10, C.S.M.-10, D.I., D.I.-10, D.I.-11, D.I.-12	....	6 x 2	7 x 2 1/4	8 x 3	8 x 3	9 x 3	10 x 3
	....	8.75	13.25	17.50	17.50	19.75	24.00
21	....	....	.....	5 7/8 x 2	9 7/8 x 2 3/4	10 1/4 x 2 3/4	.....
	....	....	.....	11.40	22.75	27.30	.....
22	....	5 3/4 x 1 5/8	7 3/4 x 1 3/4	8 1/4 x 2 1/4	8 1/4 x 2 1/4	8 3/4 x 2 1/4	7 1/4 x 2 3/4
	....	6.85	8.00	14.75	14.75	16.00	17.00
25B	....	....	8 1/4 x 1 3/4	9 x 2	8 1/4 x 2 1/4	9 x 2 1/2	.....
	....	....	9.10	13.65	14.75	17.00	.....

High Temperature Springs Over 450° C.S.H.	18.40	22.70	.....	26.30	....	29.70	.....
C.S., C.S.M., C.S.-10, C.S.M.-10	....	6 x 2	7 x 2 1/4	8 x 3	8 x 3	9 x 3	10 x 3
	....	9.65	14.60	19.25	19.25	21.75	26.40

Style No.	5	5 1/2	6	8	10	12	
22	8 1/4 x 2 3/4	10 x 2 3/4	10 1/4 x 2 3/4				

Ashton Locomotive Safety Valves

With an enviable record of over half a century Ashton Safety Valves are well known to the railroads. The most important features of design and construction are described on the following pages. These features have proved most successful in both locomotive and stationary service.

The springs of special hand forged steel are made in our own shops and we guarantee them for at least five years when used at the pressures for which they are designed.

The wing valves, springs, spring discs, pressure screws, and lock nuts of all latest styles interchange between our Open and Muffled types, thereby reducing the number of spare parts required.

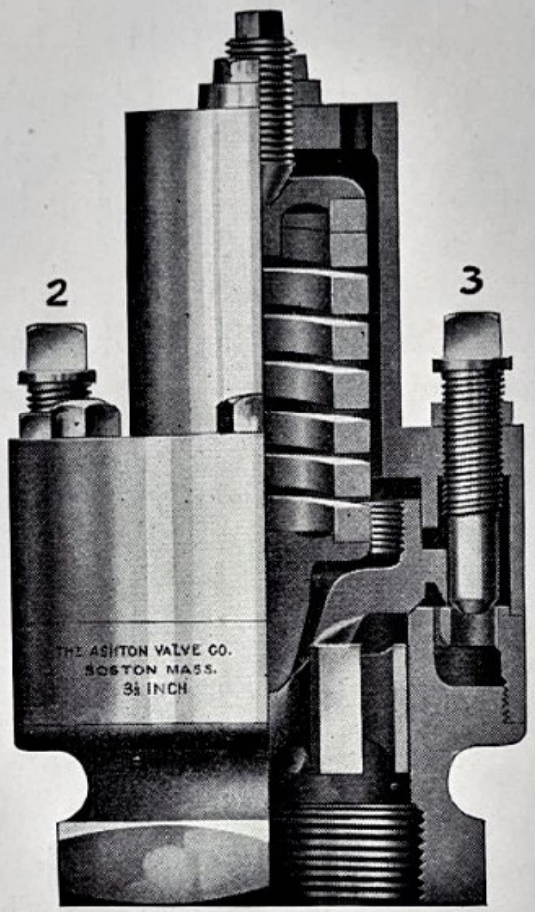
One of the essential features in safety valve construction is the means provided for pop regulation. The pop of Ashton Valves is regulated from the outside, easily accessible to the men making the adjustment. The regulation requires no special wrenches, no rings or sleeves which usually become so corroded that they cannot be operated.

We will furnish upon request one or more of any of our various styles of locomotive valves, for trial and subject to approval only if satisfactory after actual service. We guarantee them to fully relieve the boiler, require less attention, operate closer, that is with less reduction of pressure, to be of heavier construction, and stay out of the shop longer than any other make of safety valve on the American market.

We also furnish those interested in our product a form showing the number and size of valves we recommend for locomotive boilers of various sizes and pressures.

Our M.M. Safety Valves are constructed in accordance with the recommended practice of the Committee on Safety Valves of the American Railway Master Mechanics' Association, 1912. They include these features: hexagon of standard specified wrench size; standard pipe thread connections the same size as valves; .10 valve lift and 46 degree seats.

Ashton Master Mechanics' Open Pop Locomotive Safety Valve



No. 28 M.M. — 3 and 3½ inch
No. 28 M.M.B. — 2½ and 4 inch

These valves are made in accordance with the practice recommended by the Committee on Safety Valves of the American Railway Master Mechanics' Association, 1912. They have hexagon base of standard wrench size, standard pipe thread connections same size as valve, .10 inch valve lift, 46 degree seats and these important features:

OUTSIDE ADJUSTMENT for regulating the pop. This feature saves time and expense because it is easily accessible. It requires no special wrenches, no rings or sleeves, which soon corrode and stick fast. To increase pop, simply slack the check nuts on the top pop regulators 2 and 3 and screw down. For less pop, turn regulators in opposite direction.

KNIFE-EDGE pop lip which wears evenly with the valve seat, giving unvarying pop.

ENCASED SPRING.

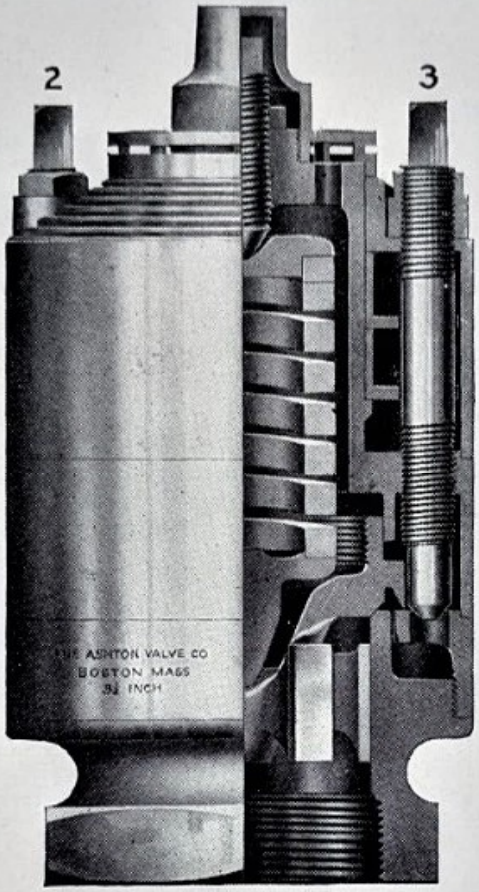
The wing valves, springs, spring discs, pressure screws, and lock nuts interchange in the several sizes with the Muffled Pop Valves No. 30 M.M. and No. 30 M.M.B. respectively, thus reducing the number of spare parts to be carried in store department.

We guarantee our special hand forged steel springs for five years when used at pressures for which they are made and we guarantee these safety valves to stay out of the shop longer than any other make.

To change set pressure, slack check nut and turn pressure screw down for increased pressure, or up for less pressure; set up check nut. When the set pressure is to be changed more than 15 pounds above or below pressure stamped on outside of end coil, new springs of suitable size should be ordered.

For dimensions and parts see pages 61 to 63. General Instructions, pages 66 and 67.
When ordering always specify style, size, and pressure.

Ashton Master Mechanics' Muffled Pop Safety Valve



No. 30 M.M. — 3 and 3½ inch
No. 30 M.M.B. — 2½ and 4 inch

The Ashton Muffled Pop Safety Valve has been used so extensively during the last thirty years that this form may be considered standard. It is a quiet, perfect muffler, and has all the pop safety valve features which distinguish Ashton valves.

These valves conform to the requirements of the Committee on Safety Valves of the American Railway Master Mechanics' Association, 1912. They have hexagon base of standard wrench size, standard pipe thread connections same size as valve, .10 valve lift, and 46 degree seats.

All working parts have the typical Ashton features, including outside pop regulator and knife-edge lip wing valve.

It is a well-known fact that the durability and efficiency of a safety valve depend largely upon the spring. We positively guarantee our special hand forged steel springs for five years when used on the pressures for which they are designed.

The working parts are interchangeable with those of No. 28 M.M. and No. 28 M.M.B. respectively, thus reducing the number of spare parts to be carried in the store department.

On application we will furnish a schedule showing the number and size of these valves that we recommend for locomotive boilers of various sizes and pressures. We will also furnish a set of valves for trial and guarantee them to fully relieve the boiler, require less attention, and show greater durability than any other similar valve on the market. When ordering always specify style, size, and pressure.

For dimensions and parts see pages 61 to 63. General Instructions, pages 66 and 67.

PRICES ON APPLICATION

Ashton Locomotive Increased Lift Open Pop Safety Valve

No. 28 I.L.
No. 28 I.L.A.-3 inch

The increase in heating surface and pressure of locomotive boilers requires safety valves of larger capacity and heavier construction. To meet these conditions we have developed the Ashton Increased Lift Open Pop and Muffled Safety Valves, which have been thoroughly tested on modern locomotives and are now standard on many large railroads. They are equal in capacity to any on the market, are heavier, and will operate longer without adjustment or repairs.

The wing valves, springs, etc., of No. 28 I.L. and No. 28 I.L.A. interchange with the Increased Lift Muffled Valve No. 30 I.L. and No. 30 I.L.A. and the inlet connections are the same.

These valves are furnished with standard pipe thread connection same size as valve unless otherwise specified.

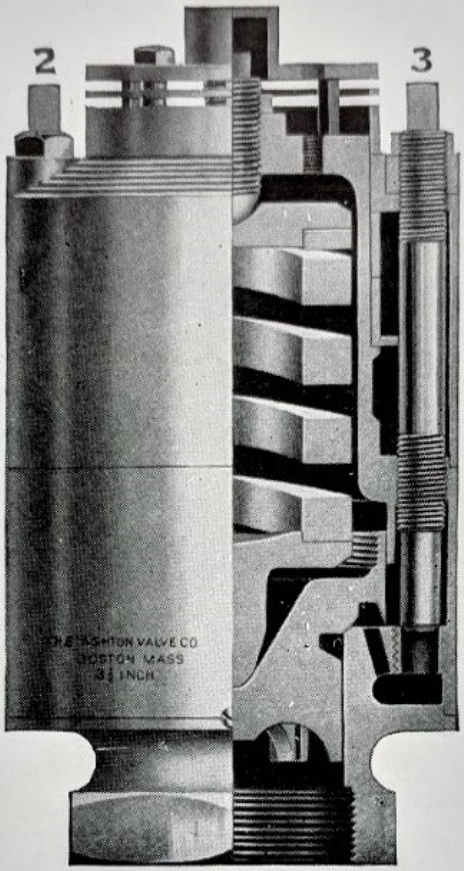
On application we will furnish a schedule showing the number and size of Increased Lift Valves which we recommend for locomotive boilers of various sizes and pressures. Trial sets of valves will be furnished on application.

When ordering always give style, size, pressure, and connection desired.

For dimensions and parts see pages 61 to 63. General Instructions, pages 66 and 67.

PRICES ON APPLICATION

Ashton Locomotive Increased Lift Muffled Pop Safety Valve



No. 30 I.L.
No. 30 I.L.A.-3 inch

The development of this type of muffled safety valve is the same as that of the No. 28 I. L. and No. 28 I. L. A. open pop valves, both of which are described on the previous page.

We guarantee its heavy construction and it will give long service without adjustments or repairs.

The wing valve, spring, etc., interchange with our Increased Lift Open Pop Safety Valves, No. 28 I.L. and No. 28 I.L.A.

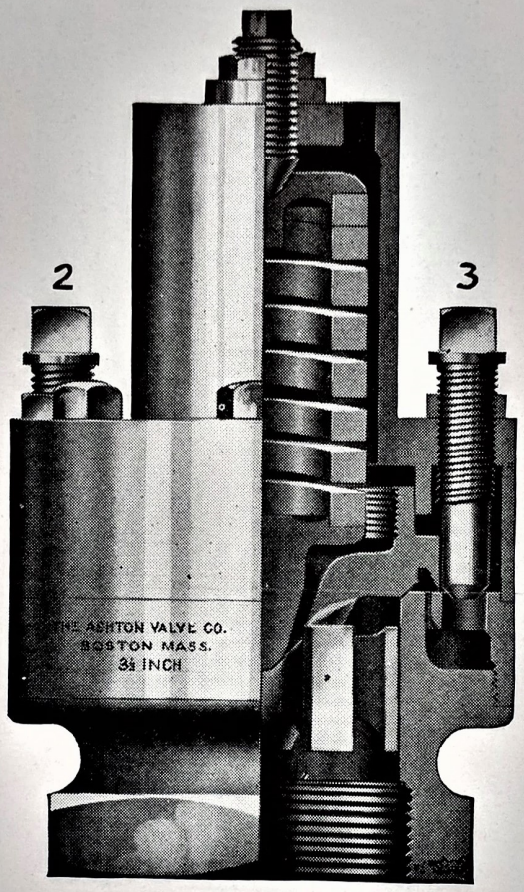
The No. 30 I.L. and No. 30 I.L.A. Valves are furnished with standard pipe thread connection same size as valve, but will be made without extra charge with special threads to fit any size dome connection.

When ordering give style, size, pressure, and connection desired.

For dimensions and parts see pages 61 to 63. General Instructions, pages 66 and 67.

PRICES ON APPLICATION

United States Government Standard Style Locomotive Safety Valves



No. 28 U.S.

The valve, as above shown, was formally approved and adopted as an accepted standard by the United States Railroad Administration for new locomotive equipment. It embodies the essential features of merit found in the various other styles of Ashton Locomotive Open Pop Safety Valves, and differs from them only in dimensions and minor details of construction.

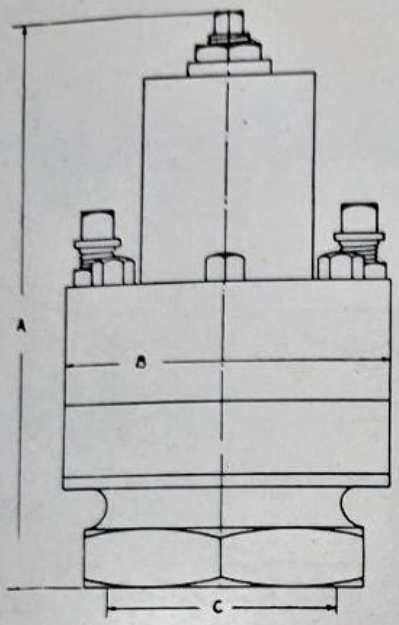
This valve is made with interchangeable parts in standard sizes 3 inch and 3½ inch. The inlet connections have full size standard pipe thread. The body as well as all working parts are of high grade bronze and the spring of special hand forged steel.

When ordering always give style, size, and pressure desired.

For dimensions and parts see pages 61 to 63. General Instructions, pages 66 and 67.

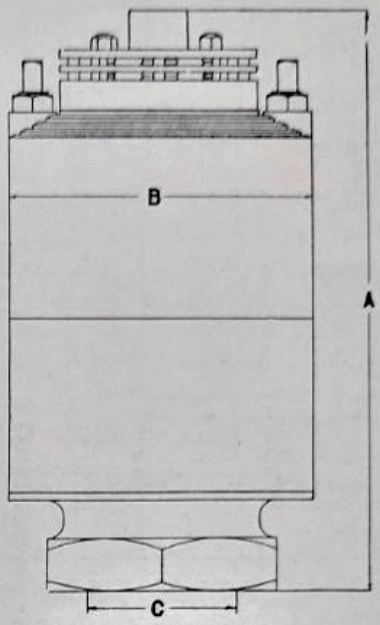
PRICES ON APPLICATION

Ashton Locomotive Safety Valves



No. 28 U.S.
No. 28 M.M.
No. 28 M.M.B.
No. 28 I.L.
No. 28 I.L.A.

Dimension Sheets



No. 30 M.M.
No. 30 M.M.B.
No. 30 I.L.
No. 30 I.L.A.

DIMENSIONS IN INCHES

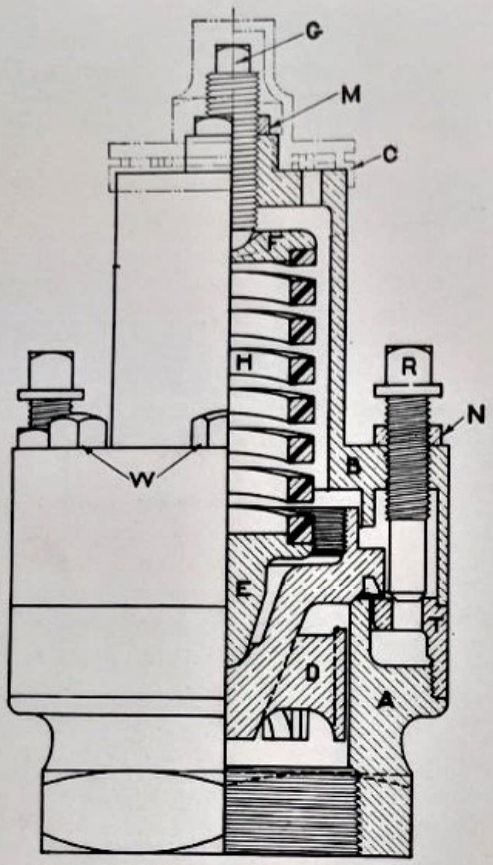
Style	Size	A	B	C
No. 28 MMB	2½	10½	5½	2½ in. pipe
No. 28 M.M.	3	11½	6	3 " "
	3½	11⅝	6⅜	3½ " "
No. 28 MMB	4	12½	7⅝	4 " "
No. 28 I.L.	2½	11⅝	6	2½ in. pipe
No. 28 I.L.A.	3	12½	6 11/16	3 " "
No. 28 I.L.	3½	13⅛	7⅛	3½ " "
	4	13⅜	8⅝	4 " "

Style	Size	A	B	C
No. 28 U.S.	3	11 1/16	6	3 in. pipe
	3½	11	6⅜	3½ " "

NOTE: Inlet connections of Locomotive Safety Valves are regularly made with standard pipe threads, as given in this dimension sheet; but when specified No. 28 I.L. and 28 I.L.A. and No. 30 I.L. and 30 I.L.A. are made to fit any size dome connection.

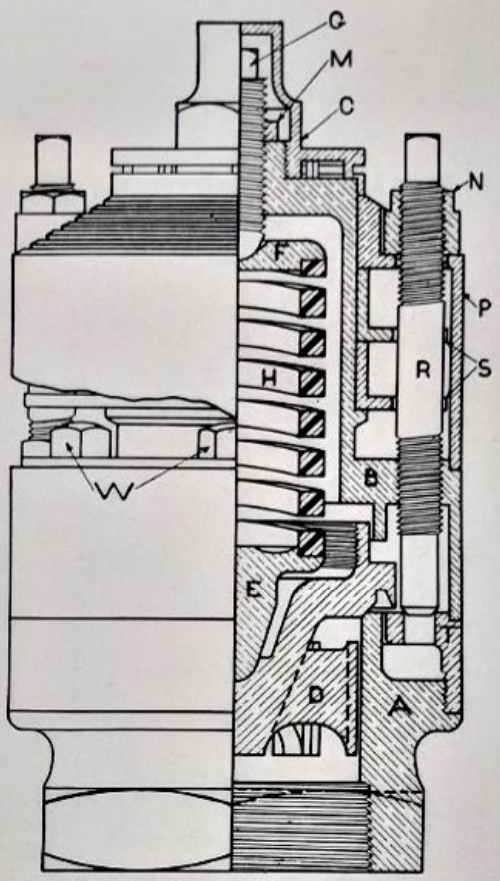
Style	Size	A	B	C
No. 30 MMB	2½	10 7/8	5½	2½ in. pipe
No. 30 M.M.	3	12	6	3 " "
	3½	12¼	6⅜	3½ " "
No. 30 MMB	4	13	7⅝	4 " "
No. 30 I.L.	2½	11½	6	2½ in. pipe
No. 30 I.L.A.	3	12½	6 11/16	3 " "
No. 30 I.L.	3½	13½	7⅛	3½ " "
	4	14	8⅝	4 " "

Ashton Locomotive Pop Safety Valves

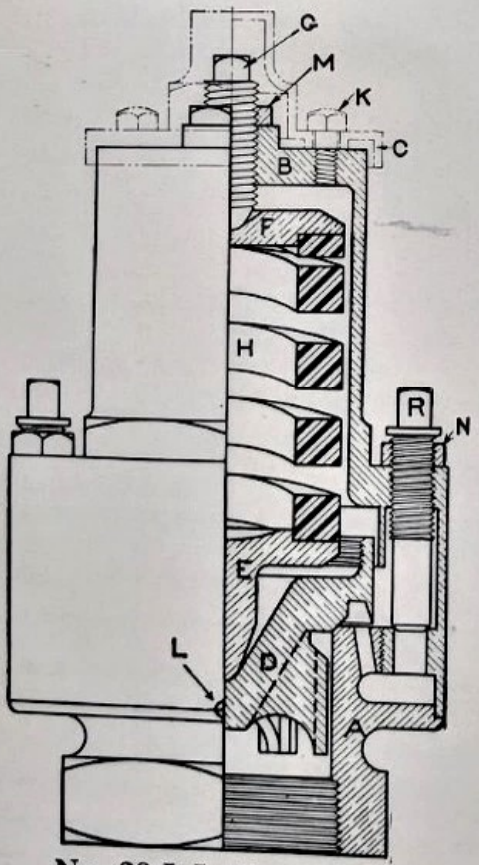


No. 28 M.M. Open Pop
No. 28 M.M.B. Open Pop

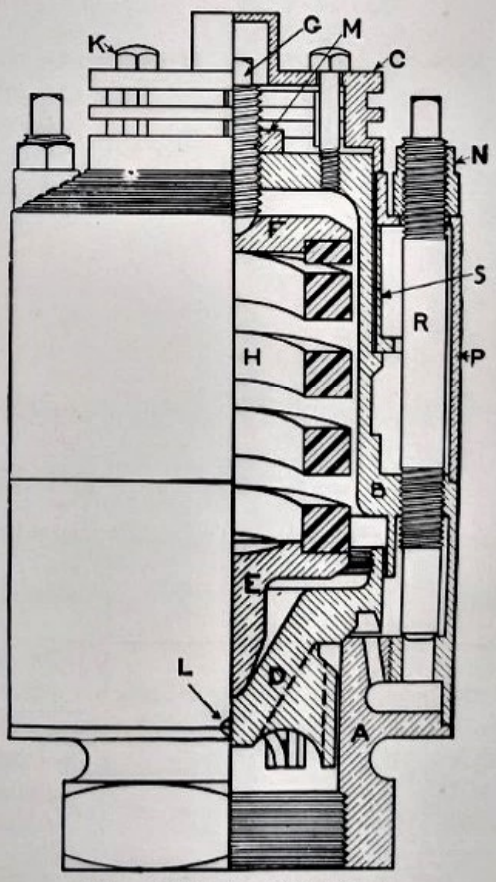
Reference List of Parts



No. 30 M.M. Muffler
No. 30 M.M.B. Muffler



No. 28 I. L. Open Pop
No. 28 I.L.A. Open Pop



No. 30 I. L. Muffler
No. 30 I.L.A. Muffler

For list prices of parts see opposite page.
For General Instructions see pages 66 and 67

Ashton Locomotive Safety Valves

Price List of Parts

Name of Part	Letter	Style No.	SIZE, INCHES 2½	3	3½	4
Bottom	A	28IL-28ILA-30IL-30ILA	$16.00	$20.00	$26.00	$35.00
		28MM-30MM 28MMB-30MMB	22.00	28.00	37.00	45.00
Head	B	28IL-28ILA	20.00	26.00	37.00	51.50
		28MM-28MMB	16.00	19.00	20.00	31.00
		30IL-30ILA	23.00	27.00	37.00	51.50
		30MM-30MMB	16.00	18.00	20.00	33.00
Cap	C	28IL-28ILA-30IL-30ILA	3.50	4.00	4.50	4.50
		30MM-30MMB	3.00	4.00	4.00	4.50
Wing Valve	D	28IL-28ILA-30IL-30ILA	8.50	10.00	13.00	16.00
		28MM-30MM 28MMB-30MMB	8.00	10.00	12.00	15.00
Lower Disc	E	28IL-28ILA-30IL-30ILA	1.60	2.00	2.60	2.80
		28MM-30MM 28MMB-30MMB	1.40	1.60	1.60	2.60
Upper Disc	F	28IL-28ILA-30IL-30ILA	1.20	1.50	2.00	2.50
		28MM-30MM 28MMB-30MMB	1.10	1.30	1.30	2.40
Pressure Screw	G	28IL-28ILA-30IL-30ILA	.70	.80	.90	1.30
		28MM-30MM 28MMB-30MMB	.70	.80	.90	1.30
Spring	H	28IL-28ILA-30IL-30ILA	5.50	6.00	7.00	8.50
		28MM-30MM 28MMB-30MMB	5.00	5.50	6.00	7.50
Cap Bolt	K	28IL-28ILA-30IL-30ILA	.10	.10	.10	.10
Lock Screw	L	28IL-28ILA-30IL-30ILA	.10	.10	.10	.10
Pressure Screw Check Nut	M	All Styles	.40	.40	.40	.40
Regulator Check Nut	N	All Styles	.40	.40	.40	.40
Dome Top	P	30IL	9.00	10.00	13.00	20.00
		30MM-30MMB	9.00	10.00	11.00	13.00
Pop Regulator	R	28IL-28ILA	1.00	1.00	1.10	1.10
		28MM-28MMB	1.00	1.10	1.20	1.50
		30IL-30ILA	1.30	1.30	1.40	1.40
		30MM-30MMB	1.30	1.40	1.50	1.70
Muffler Plate	S	30IL-30ILA	1.80	2.30	2.50	3.40
		30MM-30MMB	1.90	2.00	2.10	2.50
Base Ring	T	Furnished only as part of Bottom "A"				
Muffler Plate Space Ring	U	30IL-30ILA	1.20	1.40	1.80	2.10
		30MM-30MMB	1.00	1.00	1.10	1.40
Head Bolt	W	28MM-30MM 28MMB-30MMB	.20	.25	.25	.30

Subject to Discount

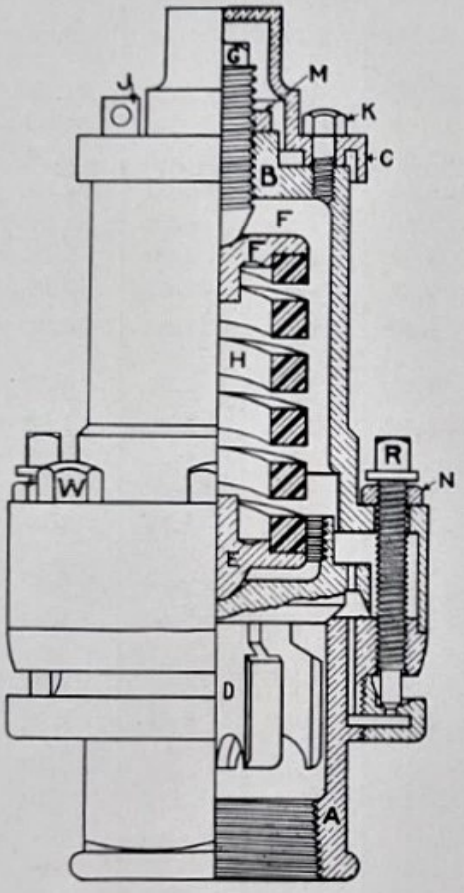
Three inch and 3½ inch No. 28 U. S. Standard Style Open Pop Locomotive Safety Valve parts take same list as No. 28MM style.

For Reference List of Parts see opposite page

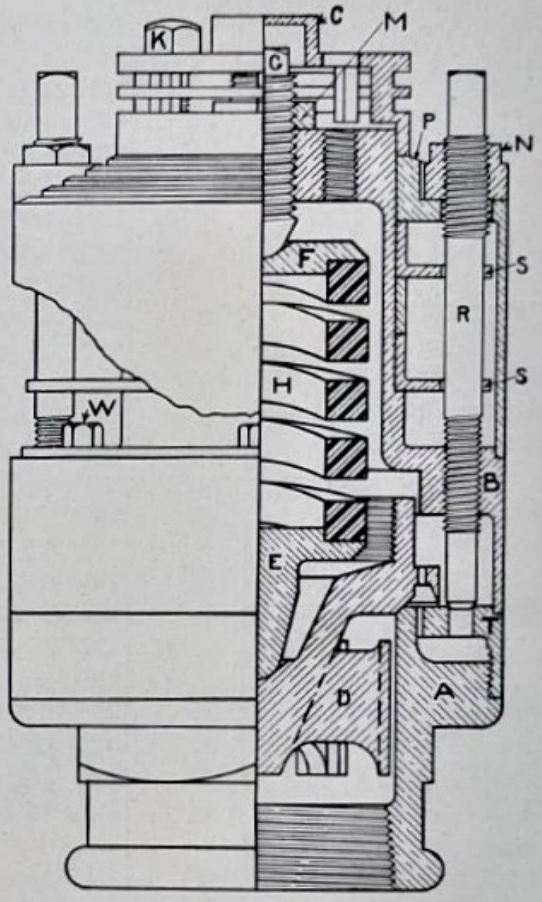
For reference list of parts for 28B and 30B valves, and dimensions, refer to Instruc-

Ashton
Locomotive Pop Safety Valves

Reference List of Parts



No. 28 Open Pop



No. 30 Muffler

In Ordering New Parts

It is necessary to specify size of valve and style number, name of part and letter. For bottoms (Part A) specify diameter and number of threads per inch, if connection is special. When new springs are ordered, state length and inside diameter, also working pressure. It is also advisable to give the serial number of valve, which will be found stamped on the "head" B near bottom.

For list prices of parts see opposite page

Ashton Locomotive Safety Valves

Price List of Parts

Name of Parts	Letter	Style No.	SIZE, INCHES			
			2½	3	3½	4
Bottom	A	28-30	$20.00	$27.00	$32.00	$46.00
Head	B	28	16.00	19.00	25.00	32.00
		30	16.00	18.00	22.00	26.00
Cap	C	28-30	3.50	4.00	4.00	4.00
Wing Valve	D	28-30	8.50	11.00	12.00	15.00
Lower Disc	E	28-30	1.00	1.60	1.60	2.40
Upper Disc	F	28-30	1.00	1.30	1.30	1.60
Pressure Screw	G	28-30	.70	.80	.90	1.00
Spring	H	28-30	5.00	5.50	6.00	7.00
Lock Staple	J	28	.50	.50	.50	.50
Cap Bolt	K	28-30	.10	.10	.10	.20
Pressure Screw Check Nut	M	28-30	.40	.40	.40	.40
Regulator Check Nut	N	28-30	.40	.40	.40	.40
Dome Top	P	30	8.50	10.00	12.50	20.00
Pop Regulator	R	28	1.20	1.20	1.20	1.30
		30	1.50	1.50	1.50	1.60
Muffler Plate	S	30	1.70	2.10	2.20	3.10
Base Ring	T	Furnished only as part of Bottom "A"				
Muffler Plate Space Ring	U	30	1.00	1.00	1.10	1.50
Head Bolt	W	28-30	.15	.15	.15	.30

Subject to Discount

For Reference List of Parts see opposite page

SPECIAL STYLES

2½ inch No. 26A parts take same list as 2½ inch No. 28 style
3 inch No. 26B parts take same list as 3 inch No. 28 style
3½ inch No. 26C parts take same list as 3½ inch No. 28 style
3½ inch No. 28A parts take same list as 3½ inch No. 28 style
3 inch No. 30C parts take same list as 3 inch No. 30 style
3½ inch No. 30D parts take same list as 3½ inch No. 30 style

General Instructions

Applying to Ashton Locomotive Muffled and Open Pop Safety Valves

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To change "pop," slack check nut on either one or both of the pop regulators, and screw down for increased "pop" or up for less "pop."

Never change set pressure of a safety valve until gage has been tested and found correct.

To change set pressure first remove top cap, thus exposing the pressure screw; then slack check nut and turn pressure screw down for increased or up for less pressure; afterwards set up check nut. When it is desired to change set pressure more than fifteen pounds above or below pressure stamped on outside of end coil, new springs should be ordered to obtain the greatest efficiency.

Valves must be repaired in such a manner as to retain original lines. When necessary to turn seats or wing valves do this to template.

Valve seats, 46 degree, $\frac{3}{32}$ inch wide; 4 inch, $\frac{1}{8}$ inch wide.

Valve bottom should not be bored out. This practice increases the diameter of the valve, overloads the spring, and decreases the extended area of the lip on wing valve, which will prevent the valve popping as it should.

If wing valve is loose in bottom, wings should be peined out, then turned up true with 45 degree seat. Allow .010 inch maximum clearance on diameter for expansion.

If necessary to reseat wing valve be sure that lower beveled edge does not extend more than $\frac{1}{16}$ inch below the inside edge of seat. Otherwise the pop will be affected and free discharge of steam obstructed.

If necessary to machine seat on valve bottom, take cut straight across upper end and same amount off recess into which head fits. If this practice is not followed the repairing will eventually lower the wing valve below the top sleeve, which may prevent valve opening.

Before facing off seat on valve bottom care should be taken to see that bottom is trued up with diameter and length of bore, not with face of valve seat.

Do not turn off $\frac{1}{16}$ inch if $\frac{1}{64}$ inch will answer the purpose. Frequently the service of valves is shortened years by excess cut

Extended lip on wing valve must be within approximately .010 inch of face of valve seat to obtain pop regulation and good results. Wing valve must rest solidly on the bevel seat *and slightly heavy on inside edge;* therefore the knife-edge lip must never touch, otherwise the valve will leak. It is customary to fit the valve when new so that it can be slightly rocked by hand.

After valve is repaired assemble without spring and see that the wing valve can be moved freely from its seat 3/16 inch or more, and that the wings do not extend below pipe thread, or strike the shoulder at end of thread where valve screws on to nipple.

Use graphite on bolts and pivot points of spring discs, also on dome nipple.

Spring showing a deflection of 3/8 inch or more from original length, or out of line 1/8 inch when measured parallel with the length, should be discarded.

Thoroughly clean out the turret or dome on boiler with air or water pressure before valves are applied, to prevent chips or foreign substances working into the valves.

Strong pop or blow-back is essential to efficiency. If valves are properly repaired pop regulators will control blow-back 0 to 10 pounds; they are effective from a closed position for full pop to an elevation equal to their diameter for no pop.

Example for setting safety valves, locomotive boiler equipped with three valves, pressure 200 pounds.

Valve	Set	Pop	Close
3rd	204	6	198
2nd	202	5	197
1st	200	4	196

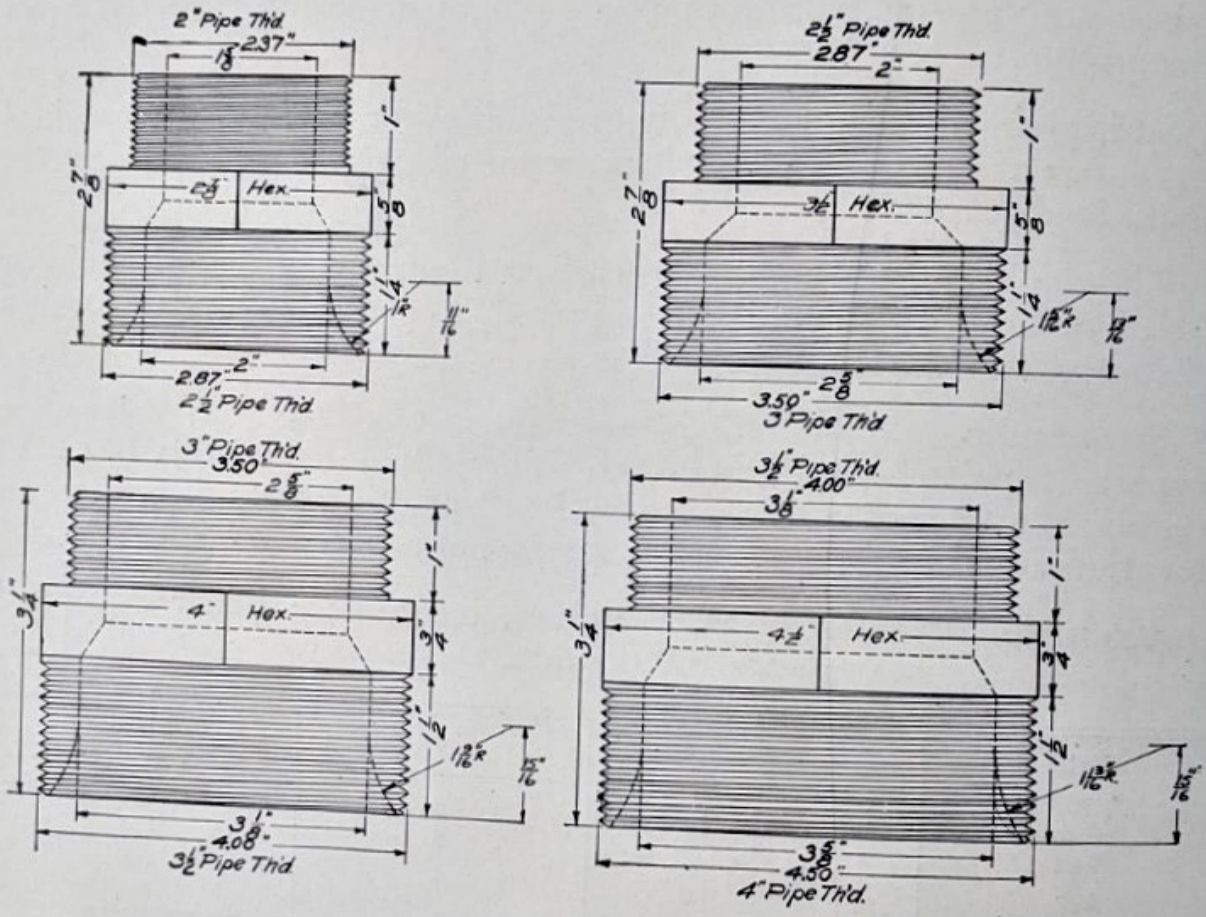
Always set and regulate pressure and blow-back on high valve first. Locomotives equipped with two valves use same formula. After setting valves at required pressure and when adjusting blow-back, should valve then open a pound or two light, do not change the pressure adjustment; the repeated opening of the valve and flow of steam heat up the body and spring, and may cause a slight reduction in set pressure that will not occur in regular service.

Please note following suggestions

Our Pop Safety Valves are set at our works under steam to the required pressure; but if, after being in use a few days, they should blow off at a slightly lower pressure (as is likely to be the case with any new valve), please see that the pressure is set back promptly to the original pressure again. If allowed to run light it causes the valve to remain on a balance and hammer to its injury. When adjusted in this way once or twice, as needed, the valve will run for months without further readjustment.

Ashton Safety Valve and Locomotive Dome Connections

Recommended Practice



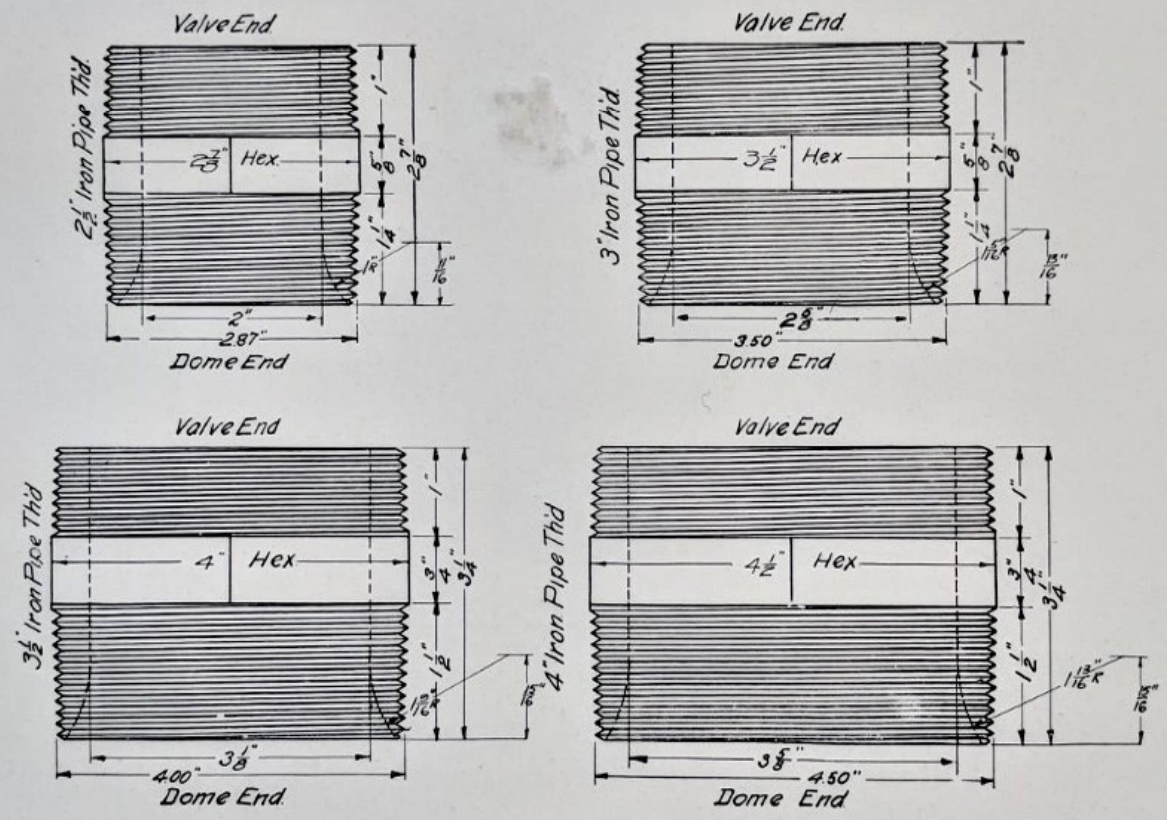
No. 37

The above cuts show the dimensions of standard bushings for Ashton No. 28 and No. 30 Valves in the regular sizes of 2½ inch, 3 inch, 3½ inch, and 4 inch. The top connection is made smaller to fit the reduced size of the valve inlet. The threads are all standard pipe size.

These bushings are substantially made of high grade bronze castings and give durable and satisfactory service. We do not recommend greater lengths or smaller diameters than mentioned above.

Ashton Safety Valve and Locomotive Dome Connections

Recommended Practice



No. 38

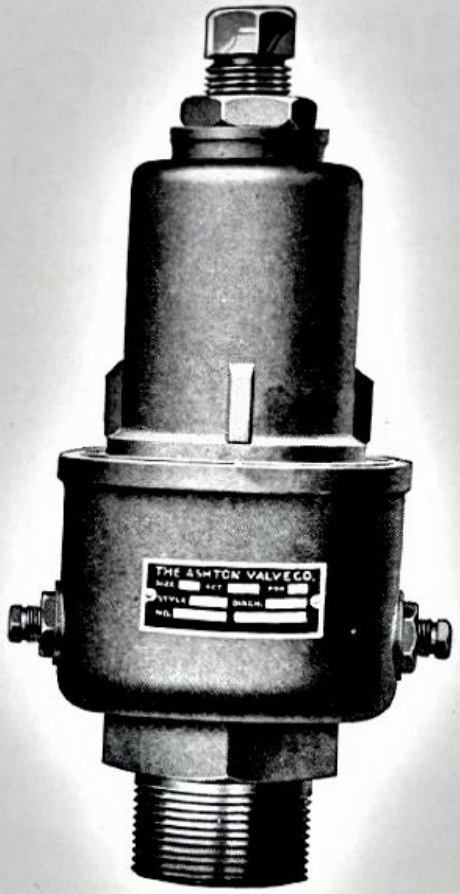
The above cuts show the dimensions of standard cast bushings for Ashton Master Mechanics and Increased Lift Styles of Muffled and Open Pop Valves in the regular sizes of 2½ inch, 3 inch, 3½ inch, and 4 inch. Both top and bottom ends are of the same size and threaded to standard pipe sizes.

These bushings are substantially made of high-grade bronze castings and will give durable and satisfactory service. We do not recommend greater lengths or smaller diameters than above specified.

PRICES ON APPLICATION

Ashton Pop Safety Valve

For Superheaters on Locomotives



No. B.C.-12

This valve, of Ashton quality throughout, is the same design as the B.C.-11 already described, having open discharge but is made of high grade nickel alloy, with encased spring of special high temperature steel, making it suitable for use on locomotive superheaters.

Good for maximum pressure of 300 pounds.

Parts are the same letters as for No. B.C.-11.

It is made in the 1½ and 2 inch sizes only.

Size, inches	1½	2
Weight, pounds	8	10

PRICES ON APPLICATION

When ordering always state

Discharge Capacity in Pounds Per Hour of Ashton Locomotive Safety Valves

No. 28 M.M., No. 28 M.M.B., No. 30 M.M., No. 30 M.M.B.

Pressure Lbs. per Square Inch Gage	Size, inches			
	2½	3	3½	4
150	4,650	5,550	6,500	7,450
160	4,950	5,900	6,900	7,900
170	5,250	6,250	7,300	8,350
180	5,500	6,600	7,700	8,800
190	5,800	6,950	8,100	9,250
200	6,100	7,300	8,500	9,700
210	6,350	7,600	8,900	10,150
220	6,650	7,900	9,300	10,600
230	6,950	8,250	9,700	11,050
240	7,250	8,600	10,100	11,500
250	7,500	8,950	10,500	11,950
260	7,800	9,300	10,900	12,400
270	8,100	9,650	11,300	12,850
280	8,400	10,000	11,700	13,300
290	8,700	10,300	12,100	13,750
300	9,000	10,650	12,500	14,200

No. 28 I.L., No. 28 I.L.A., No. 30 I.L., No. 30 I.L.A.

Pressure Lbs. per Square Inch Gage	Size, inches			
	2½	3	3½	4
150	5,170	6,770	7,900	8,280
160	5,490	7,180	8,380	8,780
170	5,800	7,600	8,860	9,280
180	6,120	8,010	9,340	9,790
190	6,430	8,420	9,820	10,290
200	6,740	8,830	10,300	10,790
210	7,060	9,240	10,780	11,290
220	7,370	9,650	11,260	11,800
230	7,690	10,060	11,740	12,300
240	8,000	10,470	12,220	12,800
250	8,310	10,880	12,700	13,300
260	8,630	11,300	13,180	13,810
270	8,940	11,710	13,660	14,310
280	9,260	12,120	14,140	14,810
290	9,570	12,530	14,620	15,310
300	9,890	12,940	15,100	15,820

We are prepared to furnish valves for higher pressures if required.

Locomotive Pressure Gages

Locomotive service, with its high pressures and severe external vibrations, calls for a double-spring pressure gage of substantial construction, which is distinctly superior for this kind of service to the single-spring type. The double spring eliminates most of the vibration of the gage hand and causes a steadier operation of the gage movement, resulting in much less wear and greater durability.

Ashton Locomotive Gages are the result of a careful study of railway conditions. That they meet all requirements is evident from an inspection of the gages themselves and the fact that they are giving such excellent service on a great majority of the largest railroads.

Seamless drawn brass tube spring, well seasoned to prevent set, and subjected to a pulsating or whip test at 100% above working pressure, which removes stresses set up in process of forming, movement of noncorrodible metals with nickel silver pinions and shafts, phosphor bronze sector and bushings,—these features insure accuracy not only when the gage is first put into service but after long, hard use.

The inside back of gage case on which movements are mounted is machined—also tops of dial posts and inside of case for proper fit and alignment of dials. This machine work insures perfect relation of the parts. The front edges of cases are finished, affording an even bearing which prevents glass from coming loose.

While all Ashton gages combine the best of materials and most skillful workmanship, we have developed certain designs that best meet the requirements of various conditions, and to insure most satisfactory service the proper type should be selected.

We also make gage testing and proving outfits for locomotive inspectors who are required to test the steam gages more frequently than heretofore according to the rules of the Interstate Commerce Commission.

Certain gage numbers have been revised and table below explains the changes.

Style No. 52. Original Lane style.

Style No. 52J. Same as No. 52 with dustproof case.

Style No. 52R. Same as No. 52 with bar link No. 6 changed to adjustable link.

Style No. 52RA. Same as No. 52R with dustproof case.

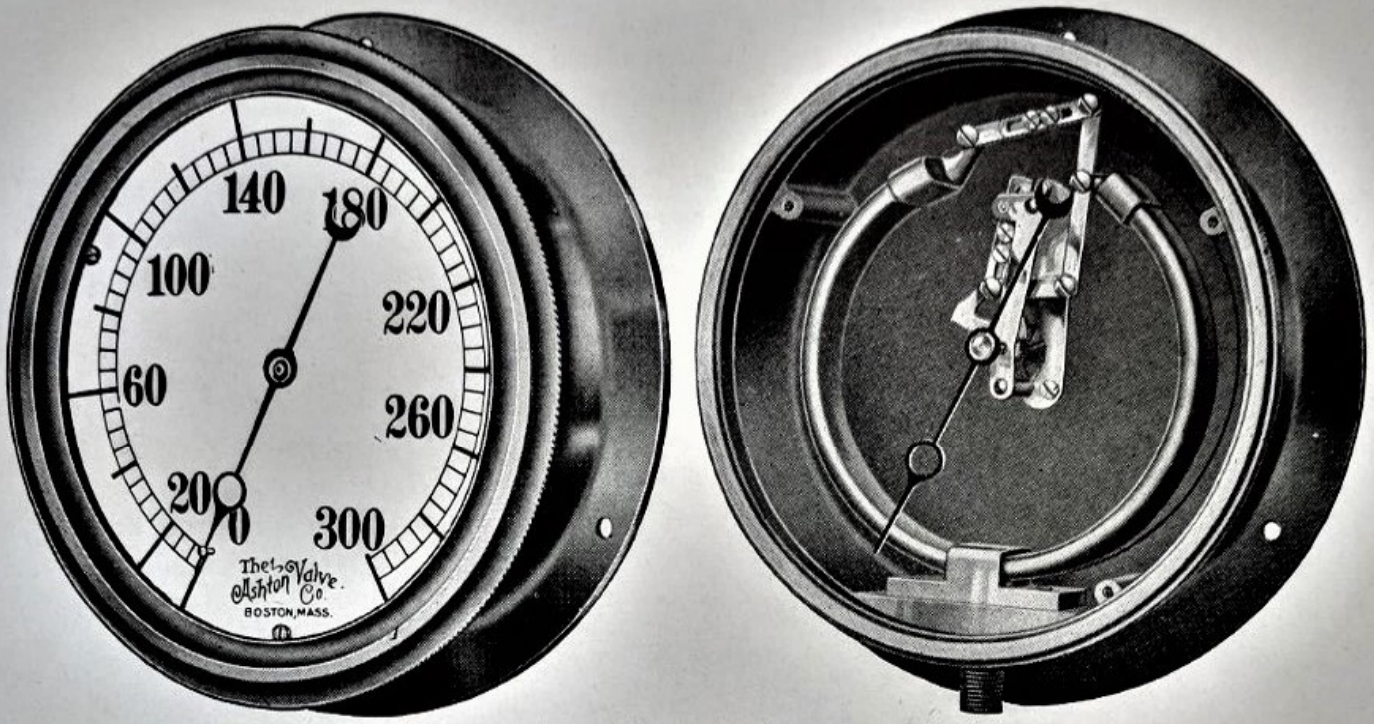
Style No. 52LB. Original Lane Bourdon gage.

Style No. 52LBE. Same as No. 52LB with dustproof case.

Style No. 52LBD. Same as No. 52LB with new style linkage.

Style No. 52LBDA. Same as No. 52LBD with dustproof case.

Ashton - Lane - Bourdon Locomotive Gage



No. 52 L.B.D.A.

White Enameled Dial and Flush Ring "K"

Showing Threaded Case with Dust-Proof Felt Gasket

This improved gage, particularly adapted to high-pressure locomotive service, meets the conditions of close regulation required by the rules of the Federal Boiler Inspectors.

The double spring construction minimizes vibration and permits tubes to be drained to prevent freezing.

A dust-proof (felt gasket) threaded ring reduces the glass breakage, caused by expansion, and saves time in making test. Other distinctive features are wide sector of phosphor bronze, pinion of nickel silver and bushed movement.

Made with style "K" flush ring, black, silvered, or white enameled dial; graduated to 300, 400 or 500 pounds, or as specified.

Locomotive standard size, 6¾ inch white enameled dial.

Siphons must be used with all steam gages.

Connection is ¼ inch pipe size, male.

Orders should specify style number of gage, size, finish of dial, maximum graduation and style of case.

Without cocks or fittings.

Made in following sizes and cases.

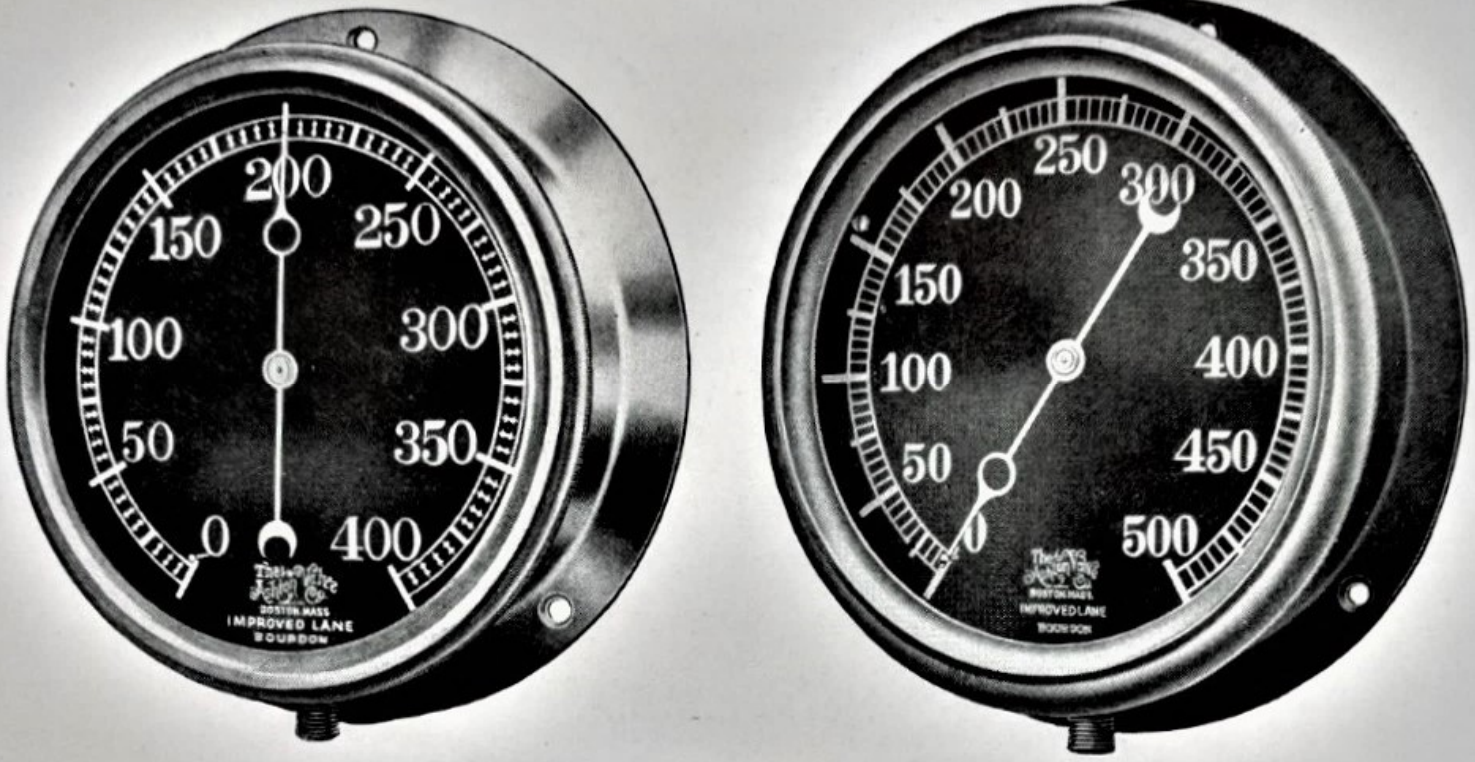
	Iron Case Brass Ring	Brass Case
6¾ inch Dial		
6 inch Dial		

PRICES ON APPLICATION

For reference list of parts and prices see pages 97 and 103.
For weights see page 156.
For dimensions see page 158.

Ashton Standard Locomotive Steam Gage

With Double Spring



No. 52 L.B.D.

Specifically a locomotive gage, in which service it has established in the last thirty years an enviable reputation with many of the most prominent railroads of America.

A distinct improvement over the ordinary single-spring gage.

The double spring construction minimizes vibration and permits tubes to be drained to prevent freezing.

As there is little vibration of the hand there is little wear on the movement, which includes nickel silver pinion and shafts, phosphor bronze sector and bushings.

Threaded ring, style "K" flush.

Black dial is regularly furnished.

Connection is ¼ inch pipe size, male.

Standard graduations 300, 400 or 500 pounds.

Standard locomotive size, 6¾ inch dial.

Siphons must be used with all steam gages.

Orders should specify style number of gage, style of case and maximum graduation.

Without cocks or fittings.

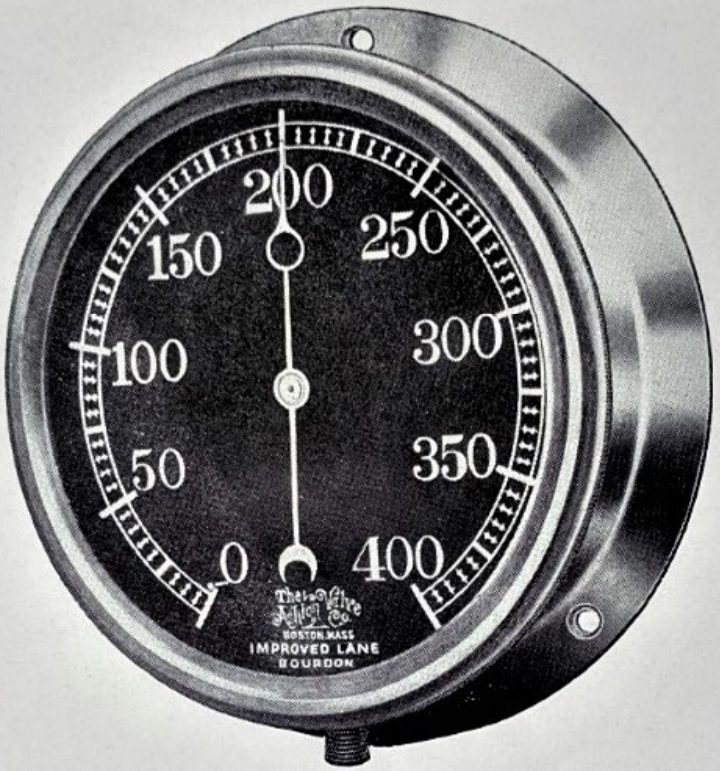
6¾ inch Dial	Iron Case, Brass Ring	Brass Case

PRICES ON APPLICATION

For reference list of parts and prices see pages 97 and 103.
For weights see page 156.
For dimensions see page 158.

Ashton Double Spring Locomotive Steam Gage

With Vertical Reading Adjustable Dial



No. 66

By a simple dial adjustment and resetting of hand this gage can be made to show the working pressure at the top of the dial, and the gage hand always vertical when at maximum pressure. This arrangement enables the enginemen to see at a glance the working pressure of the locomotive to which they are assigned. Simply noting the position of the hand, without reading the graduations, permits the engineer and fireman to observe how close the pressure is to the maximum.

This locomotive gage has double spring, Bourdon movement, and is of Ashton quality throughout. Made with style "K" flush ring and black dial, as above shown, or when specified, furnished with silvered dial.

The double spring construction minimizes vibration and permits tubes to be drained to prevent freezing.

Siphons must be used with all steam gages.

Standard locomotive size, 6¾ inch dial graduated 300, 400 or 500 pounds or as specified.

Connection is ¼ inch pipe size, male.

Orders should specify style number of gage, size, maximum graduation and style of case.

Without cocks or fittings.

Made in following sizes and cases.

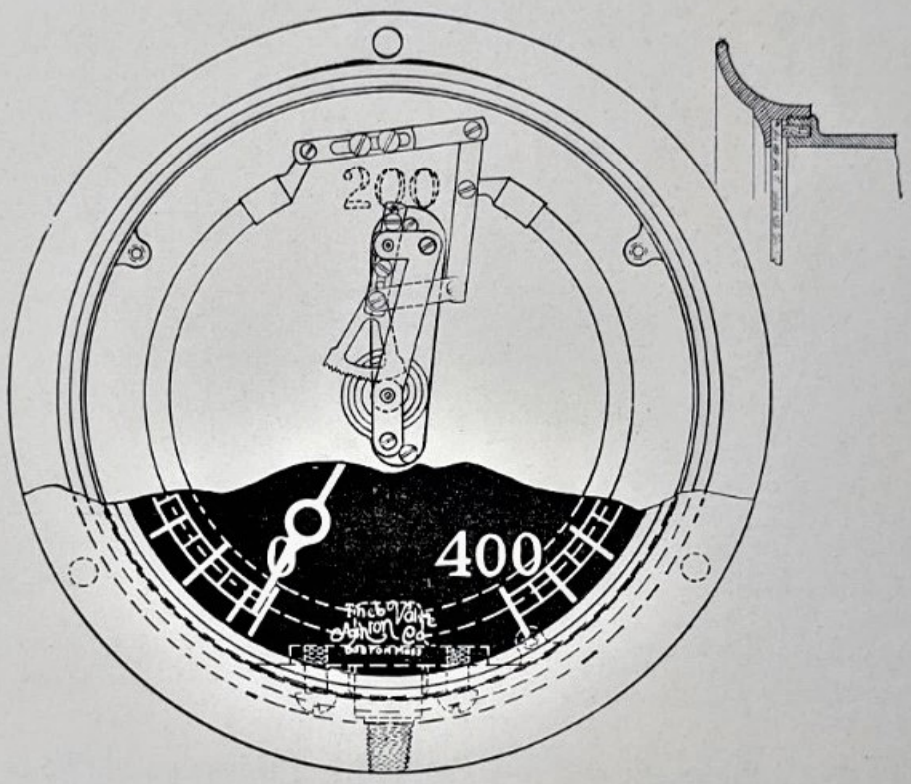
	Iron Case, Brass Ring	Brass Case
6¾ inch Dial		
6 inch Dial		

PRICES ON APPLICATION

For reference list of parts and prices see pages 97 and 103.
For weights see page 156.

United States Government Standard Style Locomotive Steam Gage

With Double Spring



No. 52 U.S.

The above cut shows a special style of the Ashton Locomotive Steam Gage as approved and adopted for use by the United States Railroad Administration for their standard locomotives. It fully complies with their specifications both as to dimensions, quality of material, and general construction.

In the upper section of the illustration are shown the interior working parts of the gage. The lower section shows the ¼ inch pipe connection, the black dial with its white enamel graduations, pressure marks, and white enamel hand. The cross-section cut, in upper right-hand corner, shows portion of style "A" gage ring as to its shape and fit on case, together with the dust-proof joint as made between glass and packing.

The double spring construction minimizes vibration and permits tubes to be drained to prevent freezing.

This gage is made in one size and style only as indicated below.

Siphons must be used with all steam gages.

Orders should specify style number of gage and size.

Without cocks or fittings.

6¾ inch Dial, with dust-proof iron case and brass threaded ring.

PRICE ON APPLICATION

For reference list of parts and prices see page 97 and 103

Ashton Locomotive Master Pilot Steam Gage

Patented

No. 62 B.B.

The Ashton No. 62 B. B. Style Locomotive Master Pilot Gage is made with special dial having two circles of pressure graduations. The outer circle is graduated through a range of 40 pounds which permits of wide graduations in one-pound increments, which are approximately $\frac{3}{8}$-inch apart, with the figures for the working pressure at the top of the dial. The inner circle is graduated through the full range of pressure from 0 to the maximum. With the coarse graduations on the outer circle of the dial the enginemen may easily detect the slightest fluctuation within the range of the working pressure, and check the advancing steam, thus preventing waste through the safety valves, or reduction of pressure below the efficient and economical operating point. It is particularly adapted for stoker-fired and fuel-oil-burning locomotives, and will contribute to greater efficiency and economy through a more uniform boiler pressure.

The above illustration shows a dial for 200 pounds working pressure, but the gage can be furnished for other working pressures as may be desired. It is the standard practice to graduate the outer dial through a range of 40 pounds or 20 pounds above and below the working pressure, which, predetermined, should be at the top of the dial.

The gage is made in the $6\frac{3}{4}$-inch dial size only. Dial is black in either iron or brass case with style "A" threaded ring, and of the same dimensions as the Ashton Standard $6\frac{3}{4}$-inch Locomotive Steam Gage, with the exception that the case is a trifle deeper, and it can therefore be applied in place of the $6\frac{3}{4}$-inch Standard Locomotive Steam Gage, without the necessity of changes or inconvenience.

Siphons must be used with all steam gages.

Connection is $\frac{1}{4}$-inch pipe size, male.

Orders should specify style number of gage, inner and outer graduations, and style of case.

Without cocks or fittings.

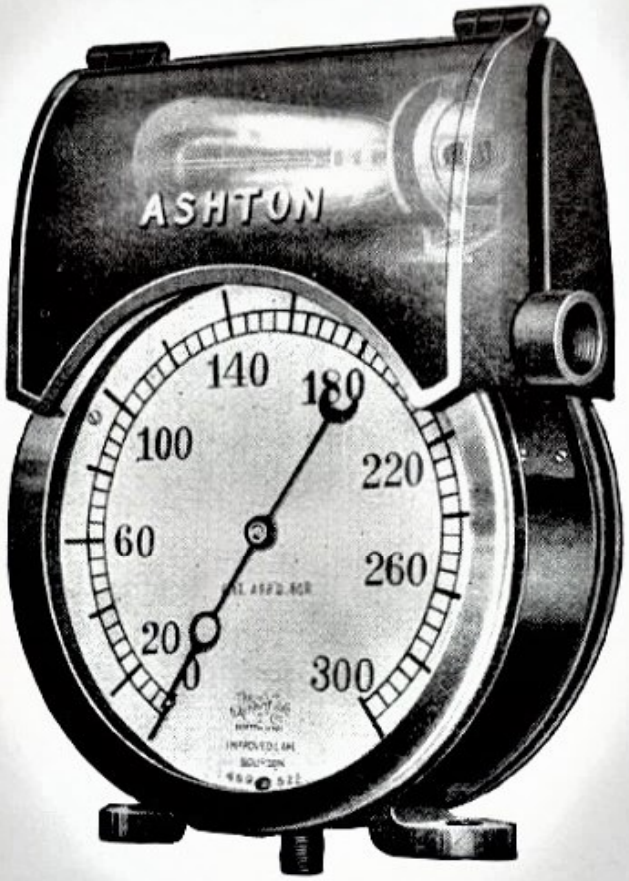
Size	Dimensions, inches	Weight
$6\frac{3}{4}$ inch Dial	$8\frac{1}{2}$ x $3\frac{1}{2}$	9 pounds

PRICES ON APPLICATION

For reference list of parts and prices see pages 99 and 104

Ashton Double Dial Locomotive Steam Gage

With Electric Light Attachment



Patent Applied For

No. 52 D.I.

The Ashton Double Dial Locomotive Steam Gage is particularly designed for use on large oil-burning locomotives and locomotives having large fire boxes with boiler heads extending back into the cabs requiring two steam gages, one visible to the engineer from one side of the cab and one for the fireman on the other side.

The particular advantage of this gage is to eliminate the necessity of two gages for the same purpose, and also provide for the illumination of both dials, which is accomplished in a practical and compact manner.

The housing is self-contained, is equipped with the American Railway Master Mechanics' Standard Receptacle for Lamp Bulb, is substantially fastened to the top of the gage, and so arranged that the light is reflected downward on to the two dials in such a manner as not to interfere with the vision of the enginemen.

The double spring construction minimizes vibration and permits the tubes to be drained to prevent freezing.

Wiring inlet is threaded for standard strain relief bushing.

This gage is made in the 6¾-inch dial size only, in dust-proof iron or brass case, with style "R" threaded knurled brass rings, with ¼-inch standard male pipe thread connection.

In ordering, be particular to specify style number of gage, whether iron or brass case, and maximum pressure to which dials should be graduated, also finish of dial, silvered, or black.

Silvered dial graduated to 300, 400 or 500 pounds is standard.

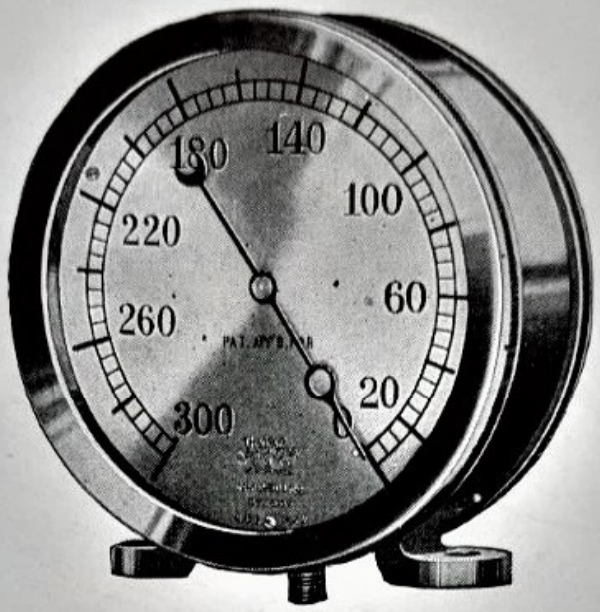
Siphons must be used with all steam gages.

Without cocks or fittings.

Size 6¾ inch Dials	Dimensions, inches	Weight

Ashton Double Dial Locomotive Steam Gage

Without Electric Light Attachment



Patent Applied For

No. 52 D.

The gage illustrated above is of the same general construction as the No. 52 D. I. style as explained on previous page.

This gage is made with two hands, and also two dials which are opposite and parallel to each other, with the hand working clockwise on one dial, and contra clockwise on the other. The dials are finished either silvered or black, as specified.

Silvered dial graduated to 300, 400 or 500 pounds is standard.

The gage should be rigidly secured either on top or in front of the firebox boiler head, and in such a position as to be protected from overheating.

This gage is made in the 6¾-inch dial size only, in dust-proof iron or brass case, with style "R" threaded knurled brass rings, with ¼-inch standard male pipe thread connection.

In ordering, be particular to specify style number of gage, whether iron or brass case, and maximum pressure to which dials should be graduated, also style of dial, silvered or black.

Siphons must be used with all steam gages.

Without cocks or fittings.

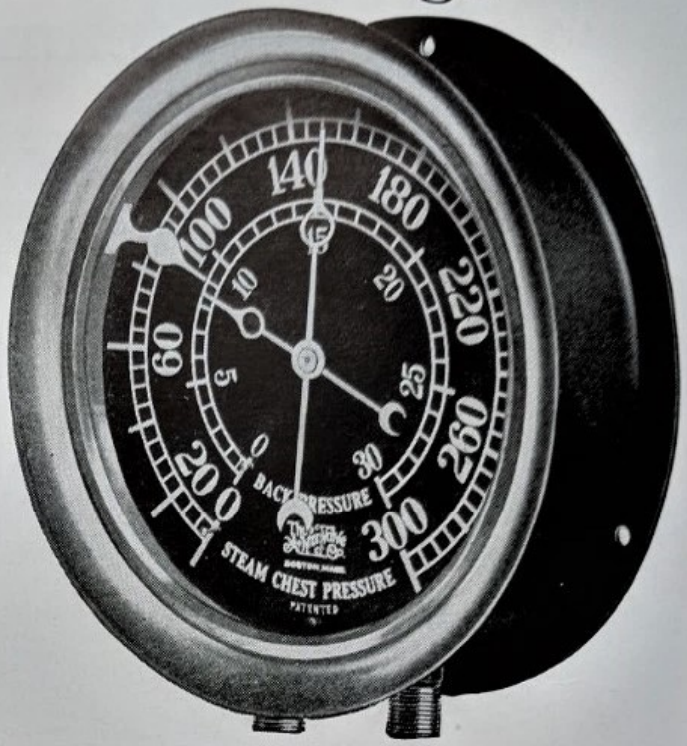
Size	Dimensions, inches	Weight
6¾-inch Dials	7¾ x 3 x 8	9 pounds

PRICES ON APPLICATION

Ashton Locomotive Duplex Back Pressure Gage

No. 62 B.A.

Patented



No. 62 B.A.A.

The Ashton No. 62 B. A. style Gage is designed for indicating the steam chest and back pressures in locomotive cylinders. It has been instrumental in producing some very satisfactory results in fuel economy by materially reducing the back pressure on locomotives. Without such a gage the enginemen have but a vague idea of what constitutes a full throttle and how to adjust the cut-off to the best advantage.

The standard graduation of inside circle on dial is 30 pounds and the hand indicates back pressure. The outer circle is graduated to 300 pounds and the hand indicates steam chest pressure, enabling the engineman at a glance to take advantage of the longest expansion possible in the cylinder and thus secure the maximum efficiency and economy. Corresponding graduations of 50 and 400 pounds may be had if specified.

Furthermore, the gage provides a telltale or indicator by which the enginemen may, from day to day, repeat the performance of individual runs and not be dependent, as heretofore, on the sense of hearing or feeling to determine the best locomotive performance.

This gage is made in the 6¾-inch size only, in either iron or brass case with style "A" threaded ring and black dial.

Sockets are cast in one piece, are of heavy construction and made to resist pipe strains that frequently affect the accuracy of some gages.

For a small additional charge this gage can be fitted with a lazy hand which can be set to indicate the most advantageous point at which to carry the back pressure as described in fourth paragraph on page 84.

When ordering with lazy hand specify No. 62 B. A. A. See cut.

Siphons must be used with all steam gages. Connections are ¼-inch pipe size, male.

Orders should specify style number of gage, style of case, and maximum pressures.

The pulsating pressures to which Gage No. 62 B. A. is subjected are extremely severe, and to reduce these to a minimum we recommend that the Ashton No. 120 Retard Device, shown on page 107, be provided for both the steam chest and back pressure lines.

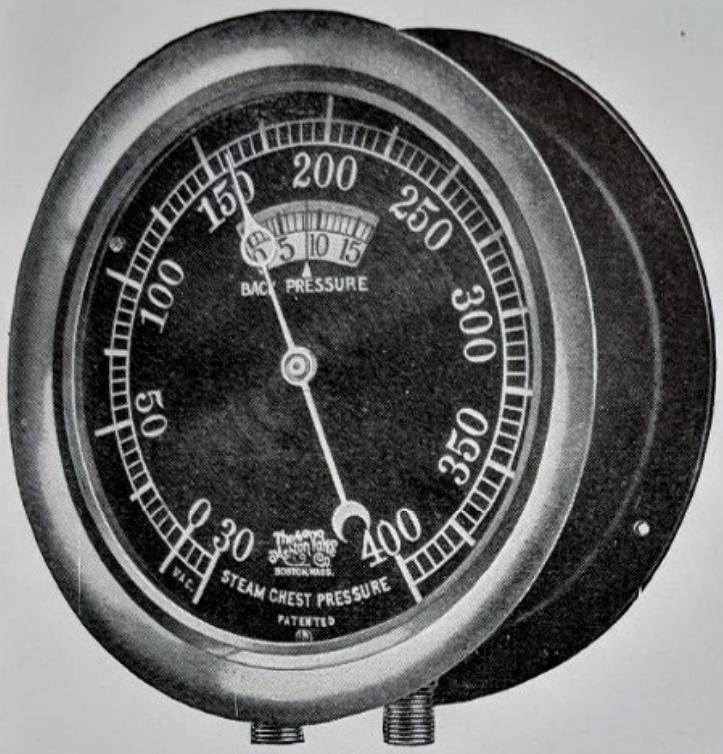
Blue print showing piping arrangement for connecting gages and retard devices will be furnished on request. Without cocks or fittings.

Size, 6¾-inch Dial | **Dimensions, inches, 8½ x 3½** | **Weight, 9 pounds**

PRICES ON APPLICATION

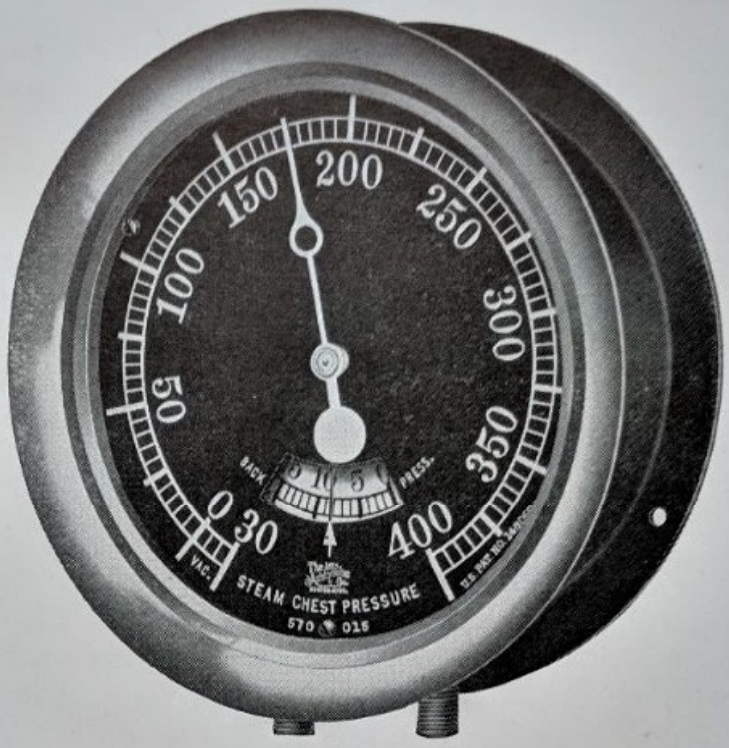
For reference list of parts and prices see pages 100 and 104

Ashton Locomotive Duplex Back Pressure and Vacuum Gage



No. 62 B.P.

Patented



No. 62 B.P.A.

These gages are similar in construction to the No. 62 B.A. and No. 62 B.O. gages described on page 80. They have the distinctive feature of the graduations for back pressure on a rotating dial which may be read through the opening in the large dial.

On the No. 62 B.P.A. gage the opening in dial is so placed that the large hand does not obstruct the view of the rotating dial when both are in the normal working position.

The large, or "steam chest pressure" dial, is black with white figures, and the small or "back pressure" rotating dial, is white with black figures.

These gages are made in the 6¾-inch size only, in either iron or brass case with style "A" threaded ring and can be furnished with electric light attachment as shown on page 83.

Sockets are cast in one piece, are of heavy construction and made to resist pipe strains that frequently affect the accuracy of some gages.

Orders should specify style number of gage, iron or brass case and maximum pressure graduations desired on the dials; standard graduations are:

Large dial, 400 pounds by 30-inch vacuum, small dial 50 pounds; or large dial 300 pounds by 30-inch vacuum and small dial 30 pounds, when specified.

The pulsating pressures to which this gage is subjected are extremely severe, and to reduce these to a minimum we recommend that the Ashton No. 120 Retard Device, as shown on page 107, be provided for both the steam chest and back pressure lines.

Blueprint showing piping arrangement for connecting gages and retard devices will be furnished on request.

Connections are ¼-inch pipe size, male.

Siphons must be used with all steam gages.

Without cocks or fittings.

Size, 6¾ inch Dial	Dimensions, inches, 8½ x 3½	Weight, 9 lbs.

PRICES ON APPLICATION

For reference list of parts and prices see pages 100 and 104.

Ashton Locomotive Duplex Back Pressure Gage

Patented

No. 62 B.O.

The Ashton No. 62 B. O. Gage, illustrated above, is similar to No. 62 B. A. in design, size, etc., but with the inside circle regularly graduated to 50 pounds maximum for Back Pressure, and the outside circle, Steam Chest Pressure, regularly graduated to a maximum of 400 pounds pressure and also 30-inch vacuum.

Corresponding graduations of 30 and 300 pounds and 30 inch vacuum may be had if specified.

This gage is made in the 6¾-inch size only, in either iron or brass case with style "A" threaded ring and black dial.

Sockets are cast in one piece, are of heavy construction and made to resist pipe strains that frequently affect the accuracy of some gages.

For a small additional charge this gage can be fitted with a lazy hand which can be set to indicate the most advantageous point at which to carry the back pressure as described in fourth paragraph on page 84.

When ordering with lazy hand specify No. 62 B. O. A. See cut of No. 62 B. A. A.

Connections are ¼-inch pipe size, male.

Siphons must be used with all steam gages.

Orders should specify style number of gage, style of case and graduations.

Without cocks or fittings.

The pulsating pressures to which Gage No. 62 B. O. is subjected are extremely severe, and to reduce these pulsations to a minimum we recommend that the Ashton No. 120 Retard Device, as illustrated and described on page 107 be provided for both the steam chest and back pressure lines.

Blue print showing piping arrangement for connecting gages and retard devices will be furnished on request.

Size	Dimensions, inches	Weight
6¾-inch Dial	8½ x 3½	9 pounds

PRICES ON APPLICATION

For reference list of parts and prices see pages 100 and 104.

Ashton Locomotive Duplex Back Pressure Gage

With Electric Light Attachment

Patented

No. 62 B.A.I.

This illustration shows the method of illuminating which can be applied to Nos. 62 B. A., 62 B. O., 62 B. P., or 62 B. B.

Illumination of the dial is accomplished by an electric light enclosed in a special hood, which prevents diffusion of the light rays over other parts of the cab, and in no way interferes with the vision of the enginemen.

It is designed for a standard, S–17 cab lamp of 15 watts, 34 volts, in standard receptacle with lamp grip, as adopted by A. R. Association, Mechanical Section 1920, and wiring inlet is threaded for standard strain relief bushing.

When this attachment is required orders should specify No. 62 B. A. I., 62 B. O. I., 62 B. P. I., or 62 B. B. I. Style "R" ring is furnished.

Size	Dimensions, inches	Weight
6¾-inch Dial	8½ x 4 x 11⅛	14 pounds

PRICE ON APPLICATION

Information for Application and Service of Locomotive Back Pressure Gages

THE ASHTON DUPLEX LOCOMOTIVE BACK PRESSURE GAGE is designed to indicate the effective pressure on the pistons of the locomotive. The steam chest pressure (large dial) pipe line is connected to the live steam passage between the throttle and the cylinder. The back pressure (small dial) pipe line is connected to the exhaust passage of the cylinders.

The difference between the two pressures, namely steam chest pressure minus back pressure represents the actual effective pressure in the cylinder at the point of cut off.

When the locomotive is at rest both hands are at 0. When the throttle is open the large hand indicates the maximum steam chest pressure, which should, in operation of the locomotive, be maintained as near the maximum boiler pressure as possible. As the locomotive gains speed, back pressure is built up and indicated on the small dial and the cut-off should be set back or reduced to use the steam expansively, thereby cutting down the back pressure.

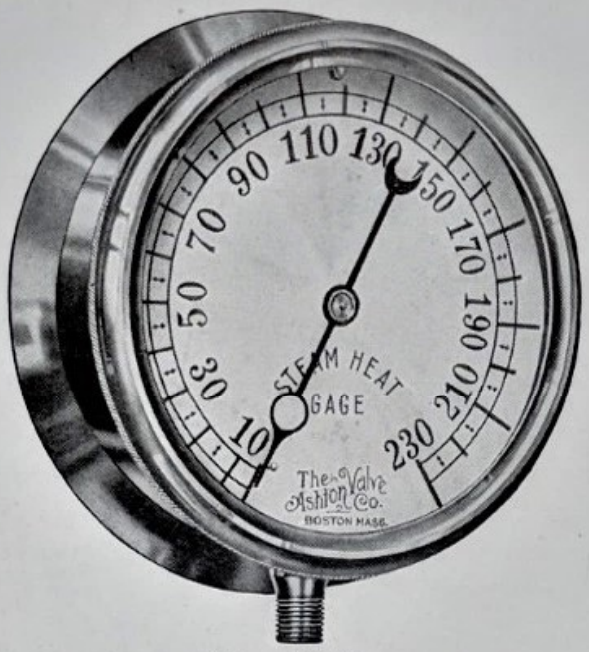
It is most desirable to operate the locomotives with a minimum difference between the working boiler pressure and the initial steam chest pressure, with the proper throttle opening and position of reverse lever, so as to maintain the desired running speed and carry as low a back pressure as possible. This practice will give the best results in fuel economy. By frequently comparing the steam chest pressure with the locomotive boiler pressure gage, when the locomotive is in operation, any drop in steam chest pressure can be noted, and such indicates the necessity of readjustment of the throttle and cut-off to the speed of the engine.

The above illustrates an ideal condition or general principle but locomotives vary so much that each has a back pressure peculiar to itself, that will give the maximum draw bar horsepower.

The No. 62 B. O. and No. 62 B. P. style gages have a vacuum scale on the large dial, so that if vacuum is built up when the locomotive is drifting, it will be indicated by the large hand and the engineer may relieve same by opening the drifting valve or throttle in accordance with the practice or rules of the railroad.

The rapid fluctuation of pressure on these gages is compensated for by using a needle valve retard device, which should be so adjusted as to eliminate violent vibration of the hands, but permitting them to gradually rise or fall with the variable pressure. A very slight movement of the needle valve will accomplish the desired results and frequent alterations or adjustments are unnecessary. Adjustments should be made only when the gage is in operation, and at the average working pressure. To blow out any sediment that may lodge on the seat, close the needle valve, remove pipe plug and open the needle valve. *Caution.* We recommend the work of cleaning or blowing out of the retard devices be handled at the shops. If done on the road care must be taken to avoid leaks and escaping steam.

Ashton Double Spring Locomotive Steam Heat Gage



No. 52 A.

This gage is for indicating the pressure in the train heating system.

It is of the same general design and high quality as our No. 52 L. B. D., but smaller, usually with 4½-inch dial, and graduated to 160, 200, or 230 pounds.

The double spring construction minimizes vibration and permits tubes to be drained to prevent freezing.

It is furnished with silvered, black, or white enamel dial as specified. The figures on the dial are large and prominent. The ring is style "K" threaded. Two hundred thirty pound silvered dial is standard.

Siphons must be used with all steam gages.

Connection is ¼-inch pipe size, male.

Orders should specify style number of gage, size, style of case, style of dial and maximum graduation.

Without cocks or fittings.

Made in following sizes and cases.

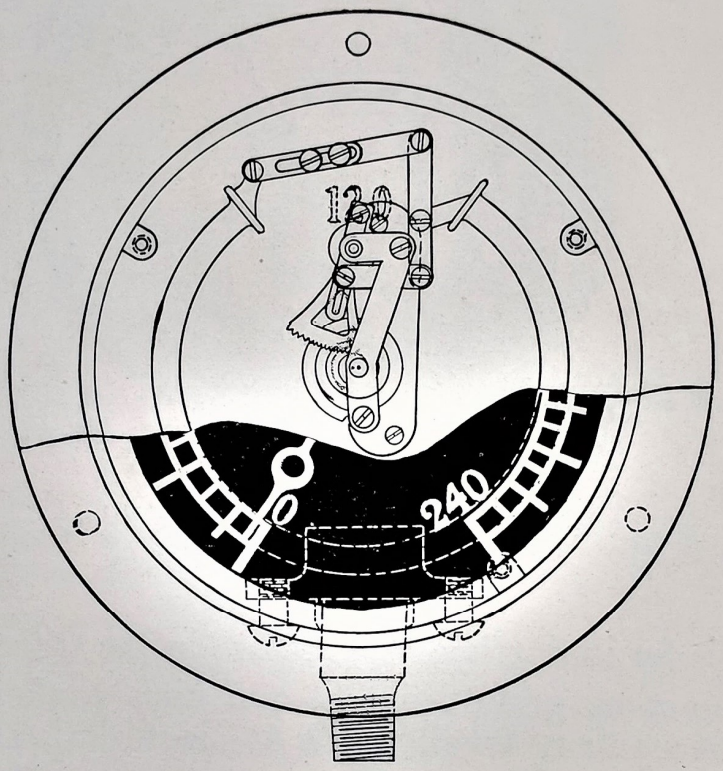
	Iron Case, Brass Ring	Brass Case
5 inch Dial 4½ inch Dial		

PRICES ON APPLICATION

For reference list of parts and prices see pages 97 and 103.
For weights see page 156.
For dimensions see page 158.

United States Government Standard Locomotive Steam Heat Gage

With Double Spring



No. 52 U.S.

The above cut shows a special style of the Ashton Locomotive Steam Heat Gage, as approved and adopted for use by the United States Railroad Administration for their standard locomotives. It fully complies with their specifications, both as to dimensions, quality of material, and general construction.

The cut shows in upper section the interior working parts, while in the lower section is shown the ¼-inch pipe connection, as well as the black dial with white enamel graduations, pressure marks, and indicating hand.

The double spring construction minimizes vibration and permits the tubes to be drained to prevent freezing.

This gage is made in one size and style as indicated below.

Siphons must be used with all steam gages.

Orders should specify style number of gage, and size.

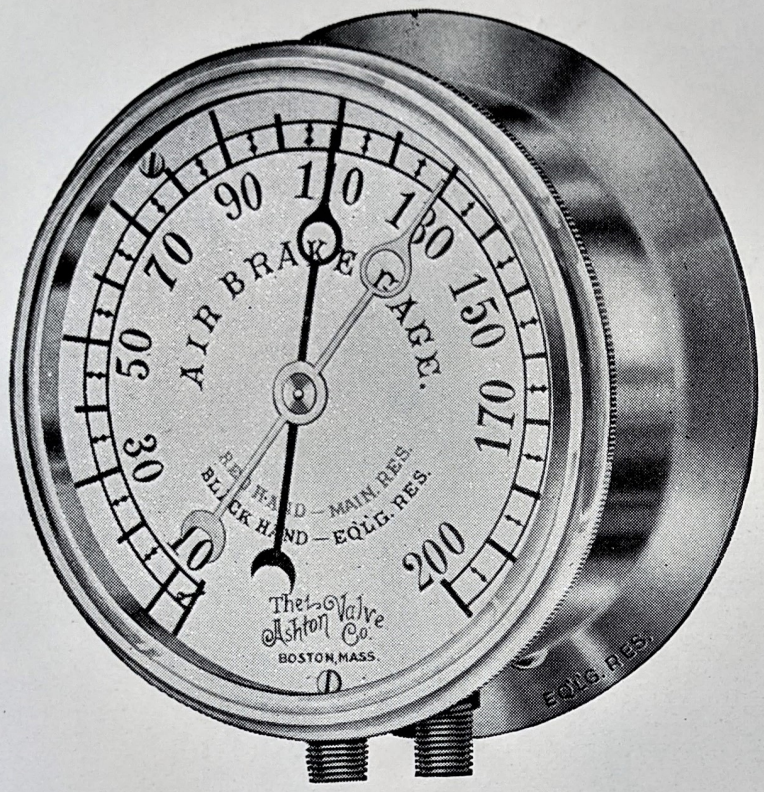
Without cock or fitting.

4½ inch Dial, with iron case and brass threaded ring, style "A"

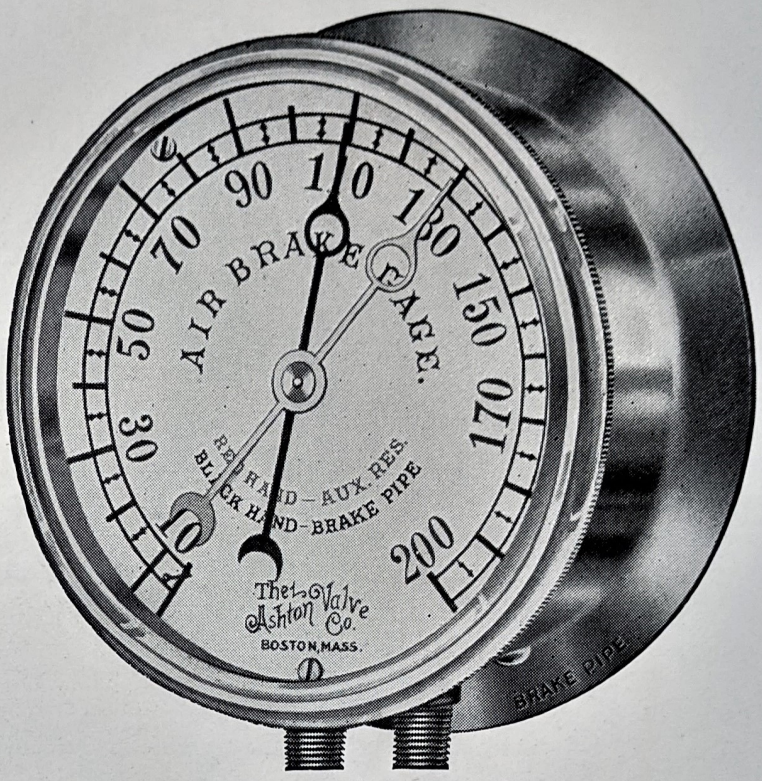
PRICE ON APPLICATION

For reference list of parts and prices see pages 97 and 103

Ashton Improved Duplex Air Brake Gages



No. 62 B. Fig. 1



No. 62 B. Fig. 2

These gages are made with two independent springs and connections; the red and black hands indicate the individual service pressures as marked on dials and flanges.

The movements are of substantial construction, with nickel silver pinions and shafts, sectors and bushings of phosphor bronze, springs of seamless drawn brass tubing.

Sockets are cast in one piece, are of heavy construction and made to resist pipe strains that frequently affect the accuracy of some gages.

Rings are threaded cast brass, style "K".

Dials are silvered.

Made in 5-inch size only, graduated and marked as shown unless otherwise specified.

Connections are ¼-inch pipe size, male.

Without cocks or fittings.

Orders should specify iron or brass case and Fig. 1 or Fig. 2.

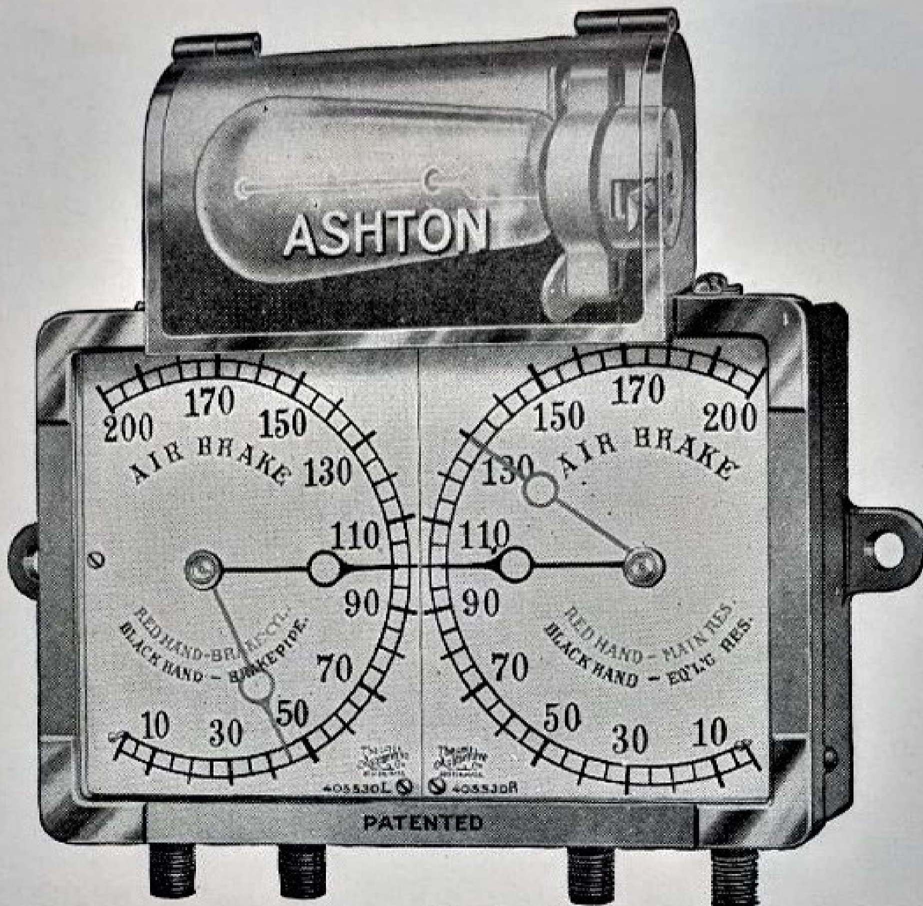
Dimensions, inches	Weight
$6\frac{5}{16} \times 3\frac{1}{8}$	5 pounds

PRICES ON APPLICATION

For reference list of parts and prices see pages 98 and 105.

Ashton 5" Dial Quadruplex Air Brake Gage

With Electric Light Attachment



No. 62 Q. I.

The Ashton innovation in gage construction combines two duplex air gages in one case (3½" and 5" sizes ordinarily used) thus producing uniformity in size of dials, one less gage case and economizing space in the locomotive cab.

The principal object of this new design is to place in a centralized position the two air gages and the indicating hands of same as near together as possible, so that the engineer by concentrating his vision particularly on the Brake Pipe and Equalizing Reservoir hands may regulate more uniformly and accurately his brake applications and secure smooth handling of the train.

The illumination of the dials is accomplished by the special enclosed electric light attachment, which prevents diffusion of the light rays over other sections of the cab and thus in no way interferes with the vision of the Enginemen. The electric attachment for No. 62 Q. I. gage is designed for a standard cab lamp, S-17 bulb, 15 watts, 34 volts, having standard receptacle with lamp grip, as adopted by A. R. Association, Mechanical Section, 1920.

Dials will be silvered, graduated to 200 lbs. and marked as illustrated unless otherwise ordered.

Movements have phosphor bronze sector and bushings, nickel silver pinions and shafts.

Sockets are cast in one piece, are of heavy construction and made to resist pipe strains that frequently affect the accuracy of some gages.

Connections are ¼ inch pipe size, male.

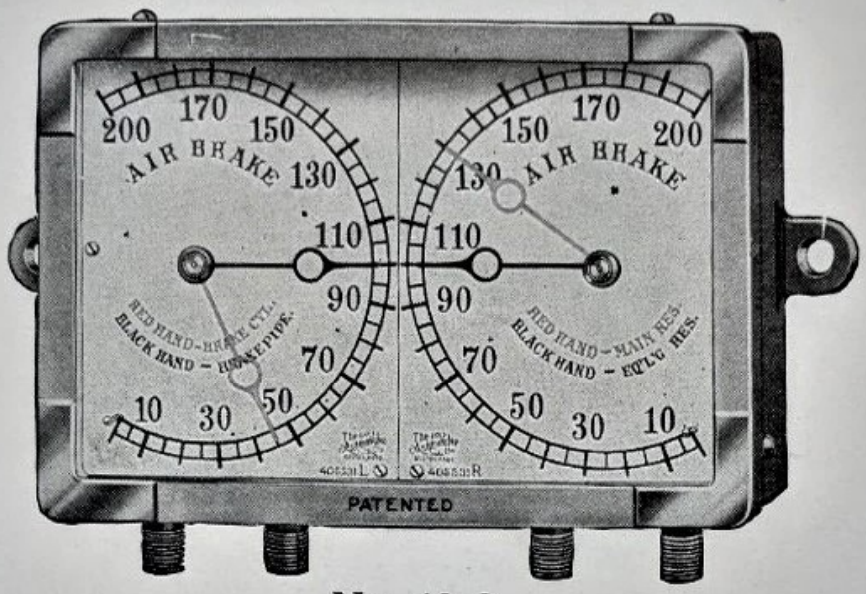
Ring is style "S".

Without cocks or fittings.

Style Case Brass	Size, 5" Dial	Weight

Ashton 5″ Dial Quadruplex Air Brake Gage

Without Electric Light Attachment



No. 62 Q.

The gage case being oblong will induce the mechanic to install it straight and will establish a uniformity in location of zero marks, a condition that will remain impossible as long as round case gages are used and installed to fit pipes or bracket holes originally placed to accommodate a gage of different make or diameter.

The movements and interior construction of the gages are similar to those used in the Ashton No. 62 B. Duplex Air Brake Gages; therefore involve no complications in repairs or experiments. The quadruplex air gage is so constructed that one side may be tested, adjusted or repaired without interfering with the other.

Dials will be silvered, graduated to 200 lbs., and marked as illustrated unless otherwise ordered.

Sockets are cast in one piece, are of heavy construction and made to resist pipe strains that frequently affect the accuracy of some gages.

Movements and connections are same as for No. 62 Q. I.

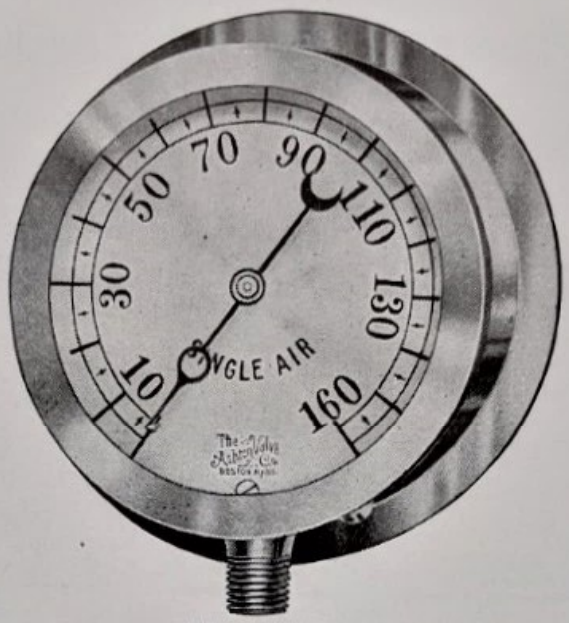
Ring is style "S".

Without cocks or fittings.

Style Case	Size, 5 inch Dial	Weight
Brass	Size Case, 8 7/8″ x 5 7/8″ x 3 1/8″	11¼ pounds

PRICE ON APPLICATION

Ashton Improved Single Air Brake Gage



No. 51 B.

This gage of the single spring type, is used in connection with Straight Air Brake Equipment on locomotives and also on test racks in repair shops. The dial graduation is similar to that of the Duplex Air Brake Gage. The large figures and flush threaded ring style "F" give a full and unobstructed view of the dial, making it possible to read the gage at greater distance than can be done with the ordinary gage used for this service.

It is usually made in sizes 3½ inch, 4½-inch, and 5-inch, iron or brass case graduated 160 or 200 pounds as specified.

Dial is silvered.

Connection is ¼-inch pipe size, male.

Orders should specify style number of gage, size, style of case, maximum pressure graduation.

Without cocks or fittings.

LIST PRICES

Size	Iron Case	Brass Case
5 inch dial	$9.00	$11.00
4½ inch dial	8.00	10.00
3½ inch dial	7.00	9.00

Subject to Discount

For reference list of parts and prices see pages 97 and 105.
For weights see page 156.
For dimensions see page 158.

Ashton Special Caboose Air Brake Pressure Gage

No. 51 C.

Designed especially for caboose service. It is a constant indicator of the train line or brake pipe pressure — a telltale for the freight train conductor. It has large prominent figures and hand, so that train men may read it from a distance. The flush ring style "K" also gives a better view of the dial, and being threaded on the case, reduces the chance of broken glass so common because of shocks and vibration.

Made in 5 inch size, of the single spring type, iron or brass case, graduated to 150 pounds.

The sturdy construction of this gage including movement with phosphor bronze bushings and sector, nickel silver pinion and shafts and above-mentioned threaded ring in contrast to light movement, spun ring or slip ring held on with screws commonly used on cheap gages, makes it particularly desirable for the severe use to which it is subjected.

Dial is silvered.

Connection is ¼ inch pipe size, male.

Orders should specify style number of gage, iron or brass case.

Without cocks or fittings.

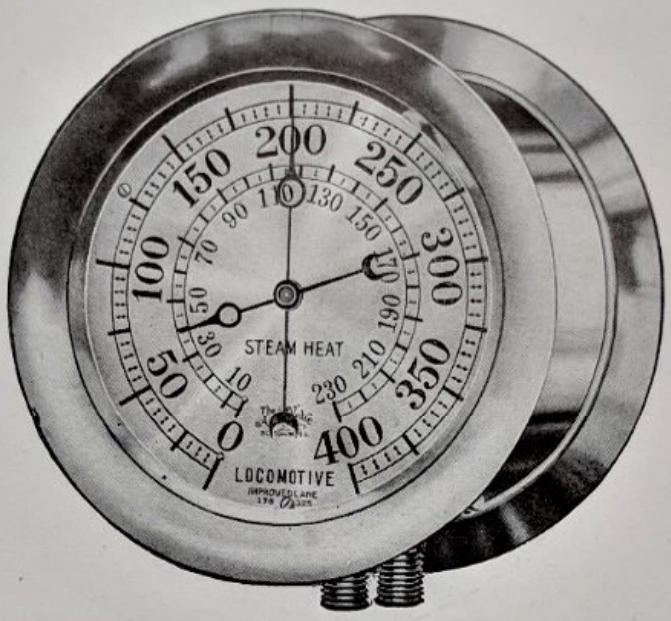
LIST PRICES

Size	Iron Case, Brass Ring	Brass Case
5 inch dial	$9.00	$11.00

Subject to Discount

For reference list of parts and prices see pages 97 and 105.
For weights see page 156.

Ashton Duplex Locomotive and Steam Heat Gage



No. 52 C.

An Ashton Idea that makes it unnecessary to use a separate steam heat gage. Two separate and independent springs and movements are embodied in this gage and enable the engineman to read pressures in boiler and car heating system from one gage.

Sockets are cast in one piece, are of heavy construction and made to resist pipe strains that frequently affect the accuracy of some gages.

The boiler pressure part is of the same double-spring construction as our No. 52 L.B.D. Gage, while the steam heat part is smaller and the dial graduated to a lower maximum pressure.

The double spring construction minimizes vibration and permits the tubes to be drained to prevent freezing.

Both movements are of substantial construction, with nickel silver pinions and shafts, phosphor bronze sectors and bushings, and the springs of seamless drawn brass tubing.

Silvered dial graduated as above unless otherwise specified.

Ring is threaded cast brass style "A".

Siphons must be used with all steam gages.

Connections are ¼-inch pipe size, male.

Made in 6¾-inch size only.

Orders should specify style number of gage, iron or brass case.

Without cocks or fittings.

PRICES ON APPLICATION

Ashton Improved Duplex Air Brake Gage

Small Pattern

No. 62 C.

This gage is similar in construction and operation to the No. 62 B. Duplex Air Brake Gage shown on page 87, but is of smaller size with 3½ inch diameter dial. It is used specially on locomotive driving wheel brake systems, and is made with special back flange so as to occupy as small a space in the locomotive cab as possible.

Sockets are cast in one piece, are of heavy construction and made to resist pipe strains that frequently affect the accuracy of some gages.

Ring is threaded cast brass, flush, style "F".

Movement has nickel silver pinions and shafts, phosphor bronze sectors and bushings.

Dial is silvered.

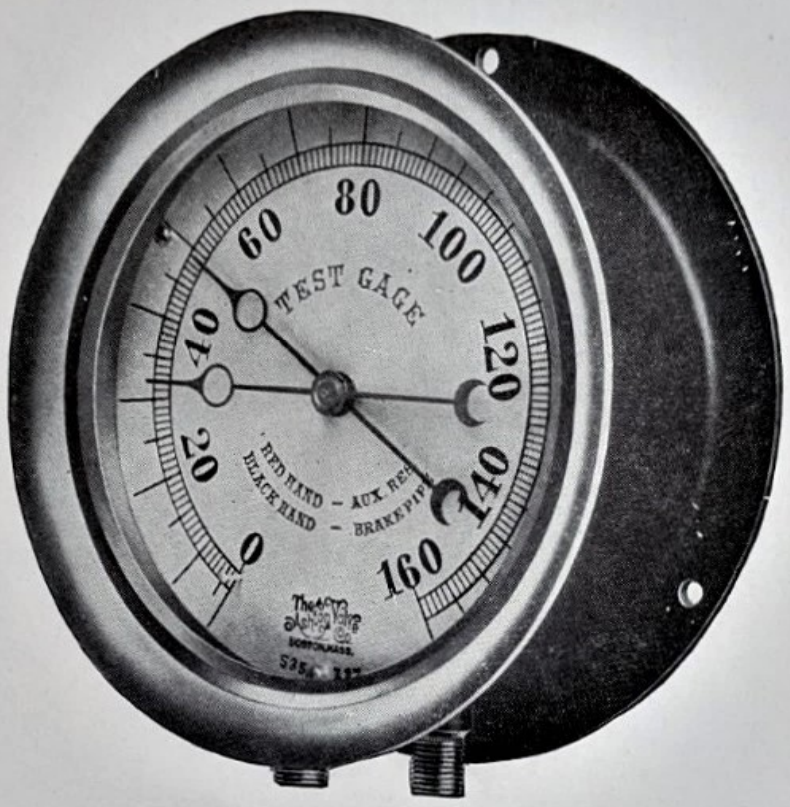
Connections are ¼-inch pipe size, male.

Orders should specify style number of gage, iron or brass case.

Without cocks or fittings.

PRICES ON APPLICATION

Ashton
Duplex Air Brake Test Gage



No. 62 B.R.

The Ashton No. 62 B. R. Style Duplex Test Gage is designed more particularly for use on test rack for indicating reservoir and brake cylinder pressures. The silvered dial is graduated in 1 lb. increments, 5 lb. spacings, and 20 lb. figures, up to 160 lbs. maximum, and marked "Red Hand—Aux. Res.," "Black Hand—Brake Pipe," unless otherwise specified.

Sockets are cast in one piece, are of heavy construction and made to resist pipe strains that frequently affect the accuracy of some gages.

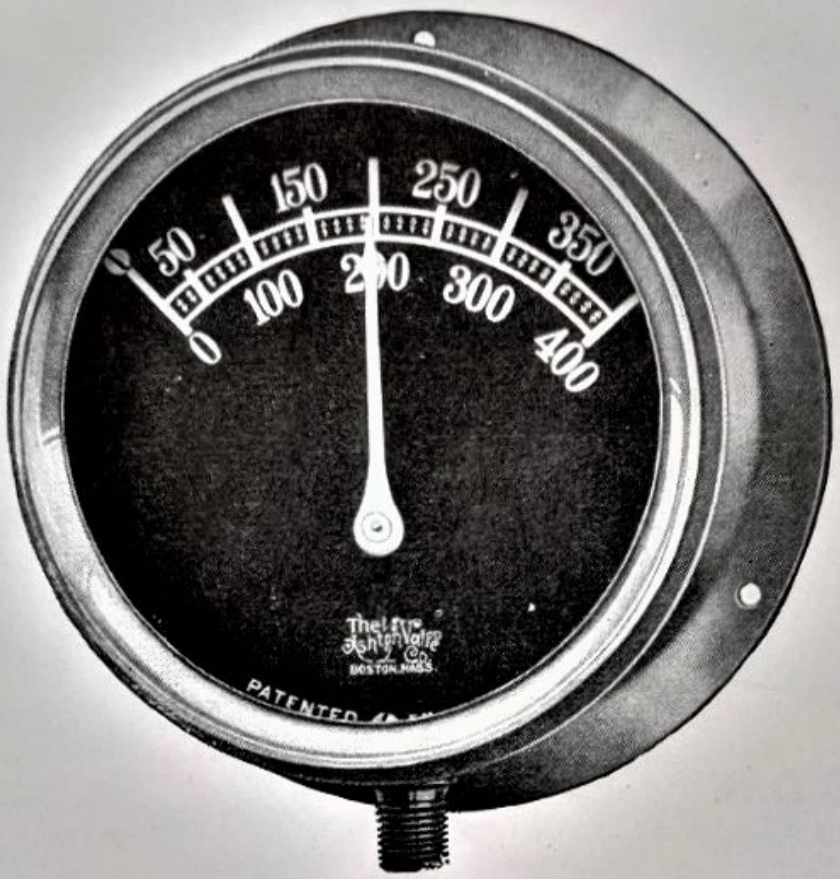
This gage is made in the 6-inch dial size, brass case only.

Connections are ¼-inch pipe size, male.

Without cocks or fittings.

Dimensions, inches	Weight
7¾ x 3½	8 pounds

Ashton Special
Single Spring Pressure Gage



Patented

No. 51 E—5 inch (Worthington)
No. 51 S—6 inch (Elesco)

These gages were designed to withstand extreme and rapid variations of pressure.

The No. 51 E. is extensively used on locomotive feed water heaters and has given good satisfaction in this very severe service. It is regularly made in the 5-inch size in unfinished cast brass case, with black dial graduated to 400 pounds. Worthington dial. Designating numbers of gages other than above are:

51EA—51E without Worthington dial.

51EC—Iron or finished brass case, over 50 pounds.

51EB—51EC, without heavy link, 50 pounds or less, specially; can also be used over 50 pounds.

The No. 51 S. is used for similar service. It is regularly made in either iron or finished brass case, with black or white porcelain dial graduated to 400 pounds.

These gages can be furnished with other dial graduations or in other sizes.

Both styles have a spring stop for the sector which prevents damage to the hand on sudden release of pressure.

Threaded ring style "K" is standard. Connection is ¼-inch pipe size, male.

No cock or fitting is included in price but we can furnish a special cock so designed as to dampen the pulsations of pressure and allow blowing out an obstruction.

Orders should specify style number of gage, size, style of case, and maximum graduation.

PRICES ON APPLICATION

Ashton Locomotive Stoker Gages

No. 52 L.B.D.B.
Main Steam Gage

No. 62 B.U.
Steam Jet Gage

The above cuts illustrate modifications of Ashton No. 52 L. B. D. and No. 62 B. gages with special dials for use with locomotive stokers.

The "Main Steam Gage" has silvered or black dial graduated to 250 pounds (or 350 pounds).

The double spring construction of the No. 52 L. B. D. B. minimizes vibration and permits tubes to be drained to prevent freezing.

The "Steam Jet Gage" has silvered dial graduated to 100 pounds, black and red hands.

It can also be furnished with black dial, white and red hands.

Both gages are 5-inch size, have movements with phosphor bronze sectors and bushings, nickel silver pinions and shafts.

Rings are O. G. style "A".

Connections are ¼-inch pipe size, male.

Orders should specify style number of gage as shown under cuts, pressure, iron or brass case and marking on dial.

Siphons must be used with all steam gages.

Without cocks or fittings.

PRICES ON APPLICATION

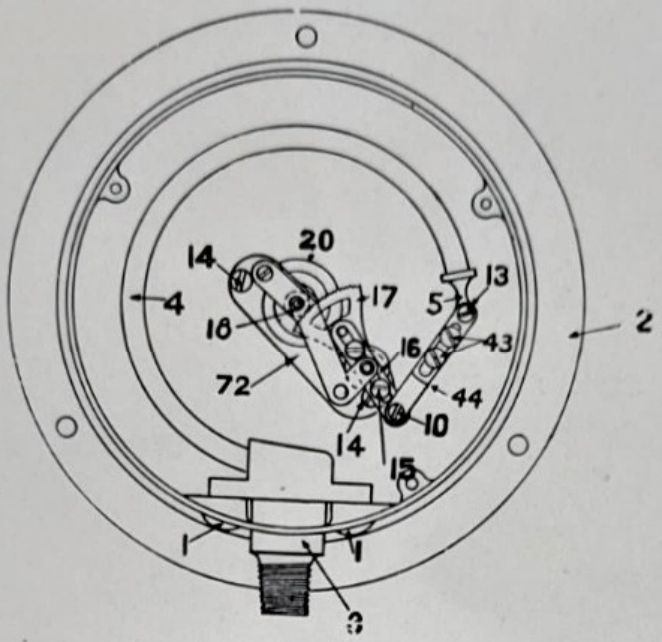
For reference list of parts and prices see pages 97 and 103.

For weight of No. 52 L. B. D. B. see page 156.

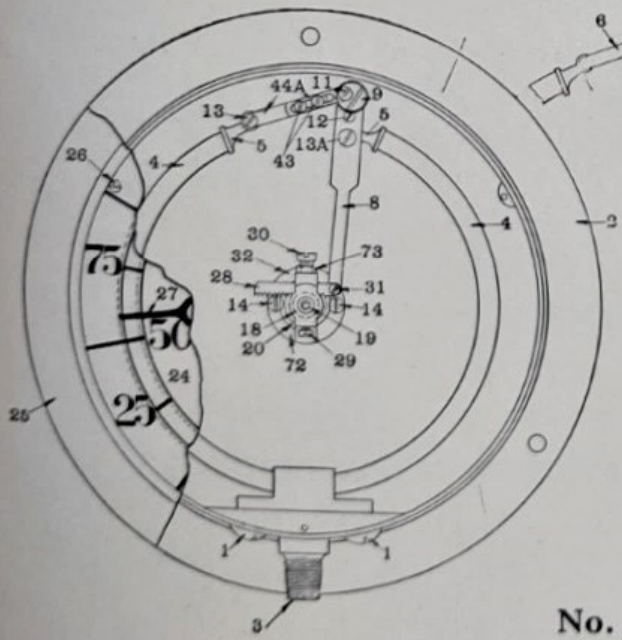
For dimensions of No. 52 L. B. D. B. see page 158.

Ashton Single Air, Caboose, Steam Heat and Locomotive Steam Gages

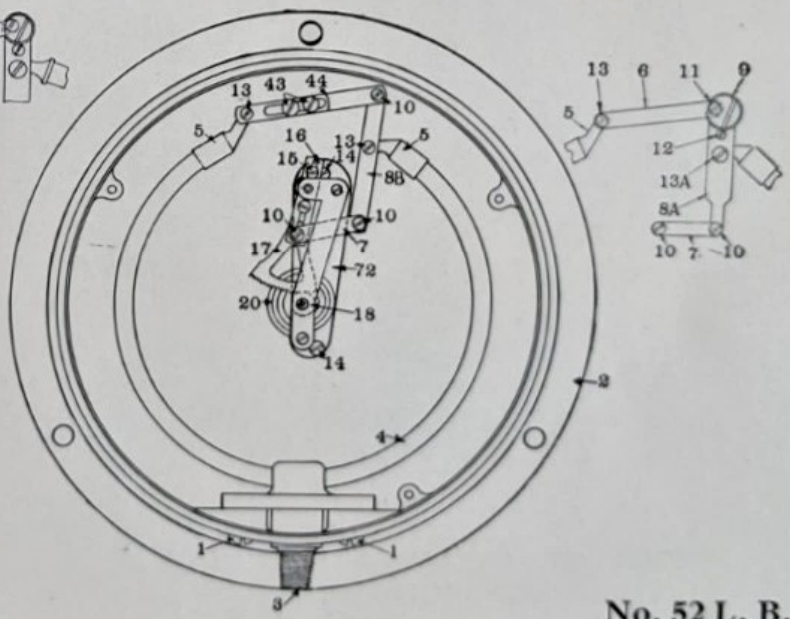
Reference List of Parts



No. 51 B Single Air Gage
No. 51 C Caboose Gage
(Single Spring)



No. 52
No. 52J. (Dust Proof)



No. 52 L. B.
No. 52 L.B.E. (Dust Proof)

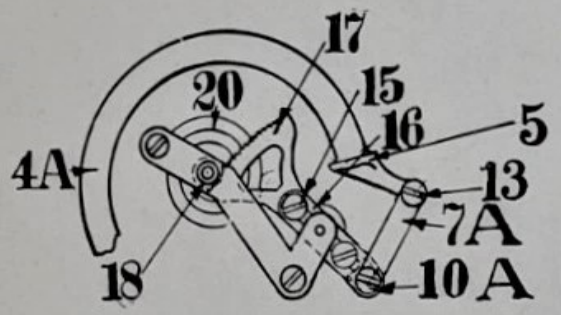
No. 52R Loco. Steam Gage
No. 52RA (Dust Proof)

No. 52 L. B. D. Loco. Steam Gage
No. 52 L. B. D. A. (Dust Proof)
No. 52 U. S. Loco. Steam Gage
No. 52 U. S. Loco. Steam Ht. Gage
No. 66 Loco. Steam Gage
No. 52A Loco Steam Ht. Gage
No. 52 L.B.D.B. Loco. Stoker Gage

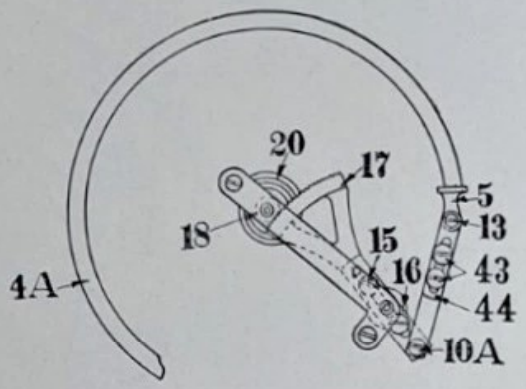
In ordering parts always specify style number of gage, size, maximum dial graduation, iron or brass case, O. G. or flush ring, and whether silvered, black or white enamel dial.

Ashton Duplex Air Brake Gages

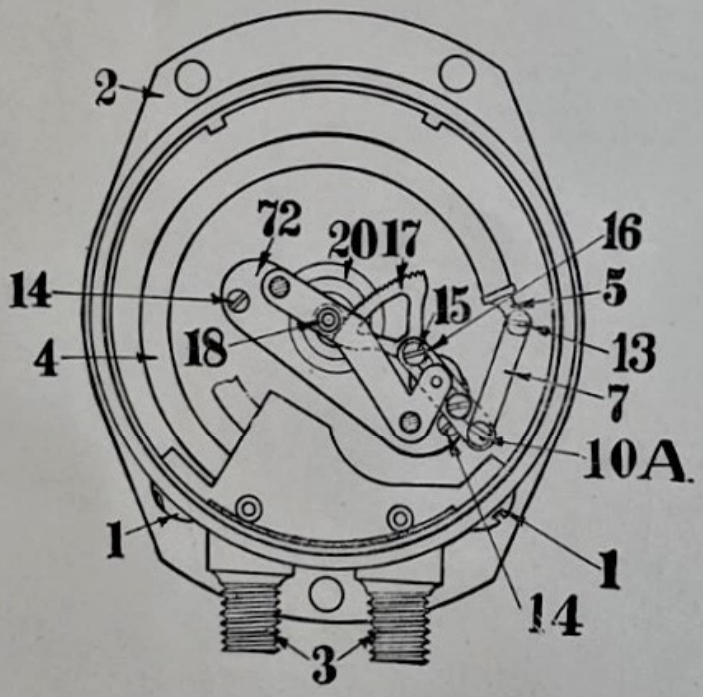
Reference List of Parts



INNER OR BRAKE PIPE SPRING & CONNECTIONS.

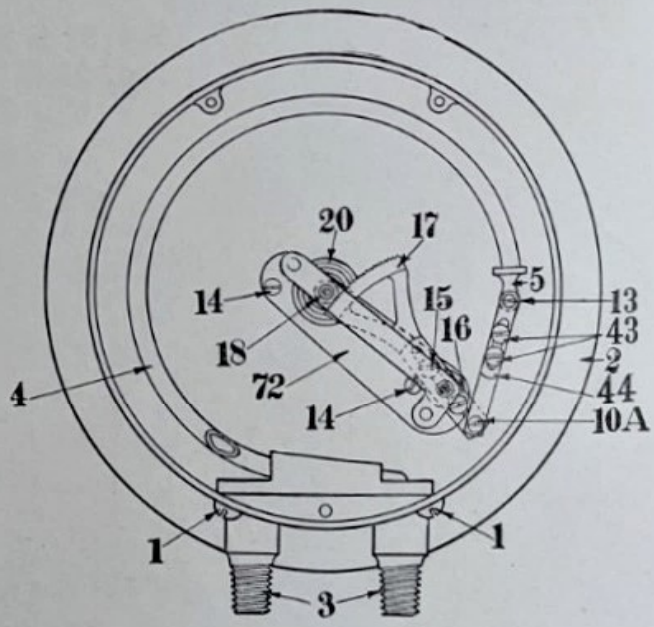


UPPER SPRING & CONNECTIONS.



OUTER OR CYLINDER SPRING & CONNECTIONS.

3½ inch No. 62C.
Duplex Air Brake Gage
(Single Spring)



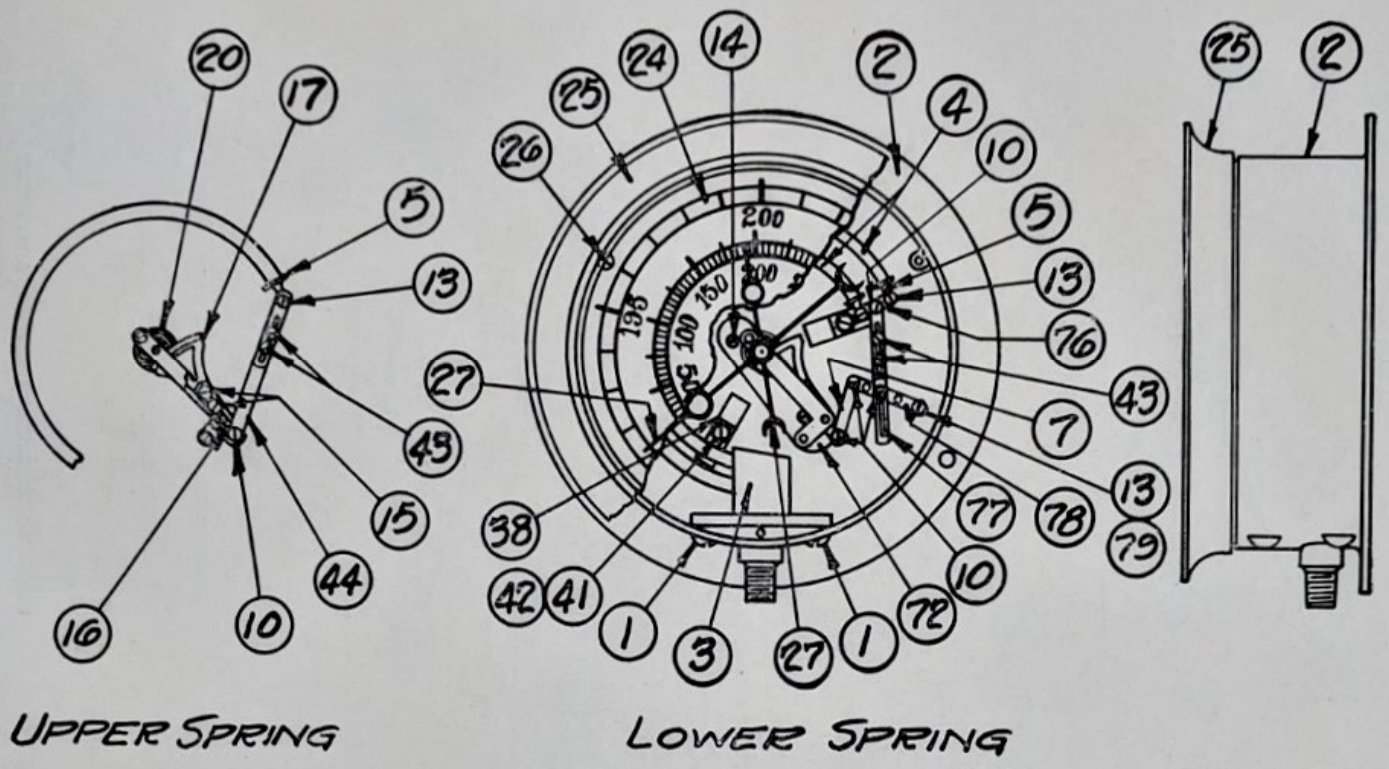
LOWER SPRING & CONNECTIONS.

5 inch No. 62 B.
5 inch No. 62 B. U.
(Single Spring)

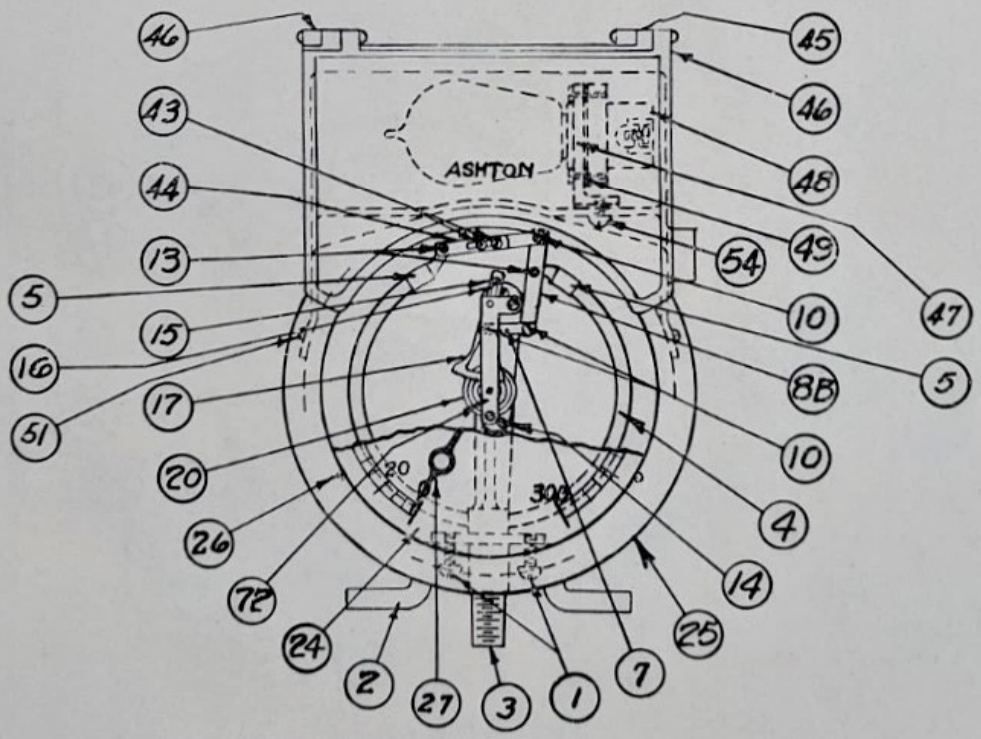
In ordering parts always specify style number of gage; maximum dial graduation; iron or brass case, hairspring, top or bottom style; hand, red or black; dial marking desired. Unless otherwise specif

Ashton Loco. Master Pilot Gage
Double Dial Loco. Steam Gage

Reference List of Parts



No. 62 B.B.



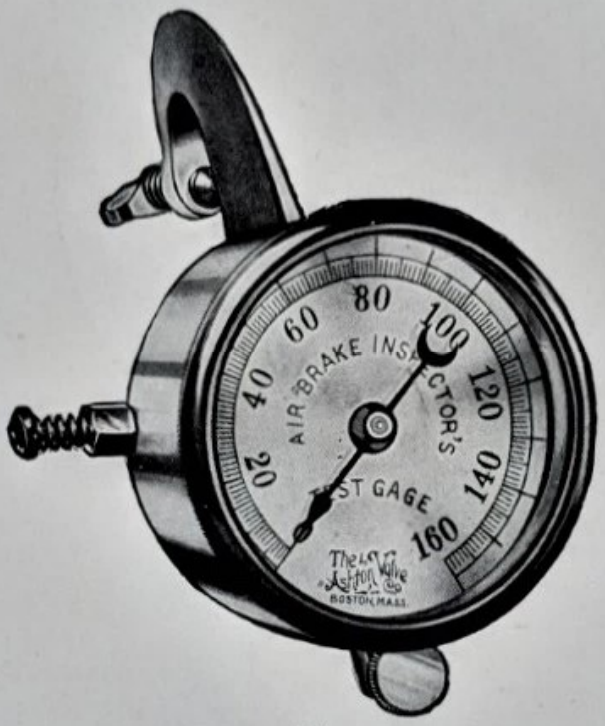
No. 52 D. I.
No. 52 D. (Without lighting attachment)

In ordering parts always specify style number of gage; maximum dial graduation; iron or brass case; hand, red or black; dial marking.

For No. 62 B. B. also specify hairspring, top or bottom style.

Ashton Air Brake Inspectors' Test Gage

With Hose Coupling Clamp Attachment



No. 68

A handy, compact test gage having hose coupling bracket for instant attachment to air brake or signal line couplings, thus enabling the inspector to make frequent tests, unobserved, at the rear of the train.

This gage has 2½ inch dial and the case is fully nickeled. By means of the top and bottom thumbscrews a perfectly tight connection is easily made and the side valve serves as a drain cock to allow the escape of air pressure between the hose cock and gage when the cock is shut off after the test.

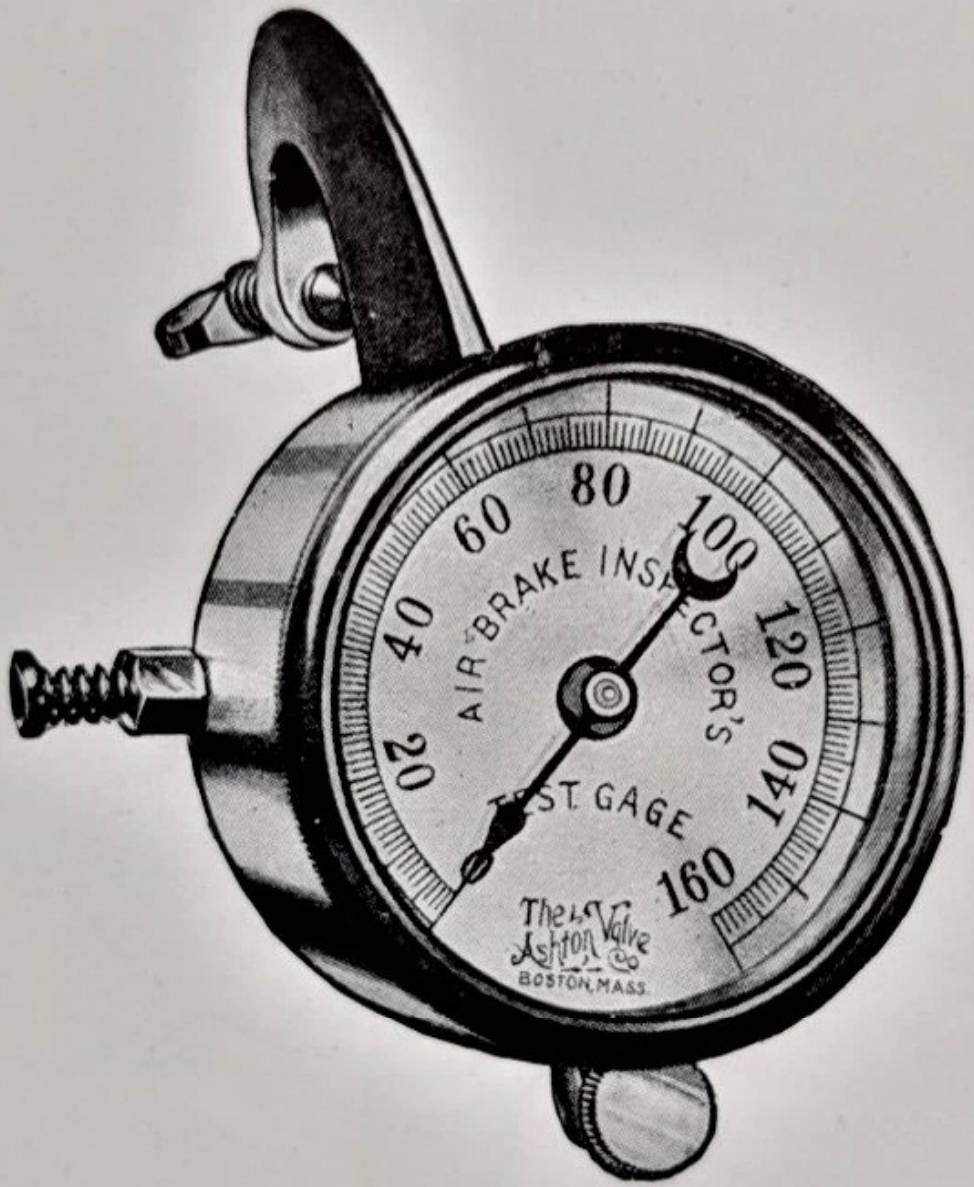
LIST PRICE

Size	Nickel-Plated Case
2½ inch Dial	$16.00

Subject to discount

Ashton Air Brake Inspectors' Test Gage

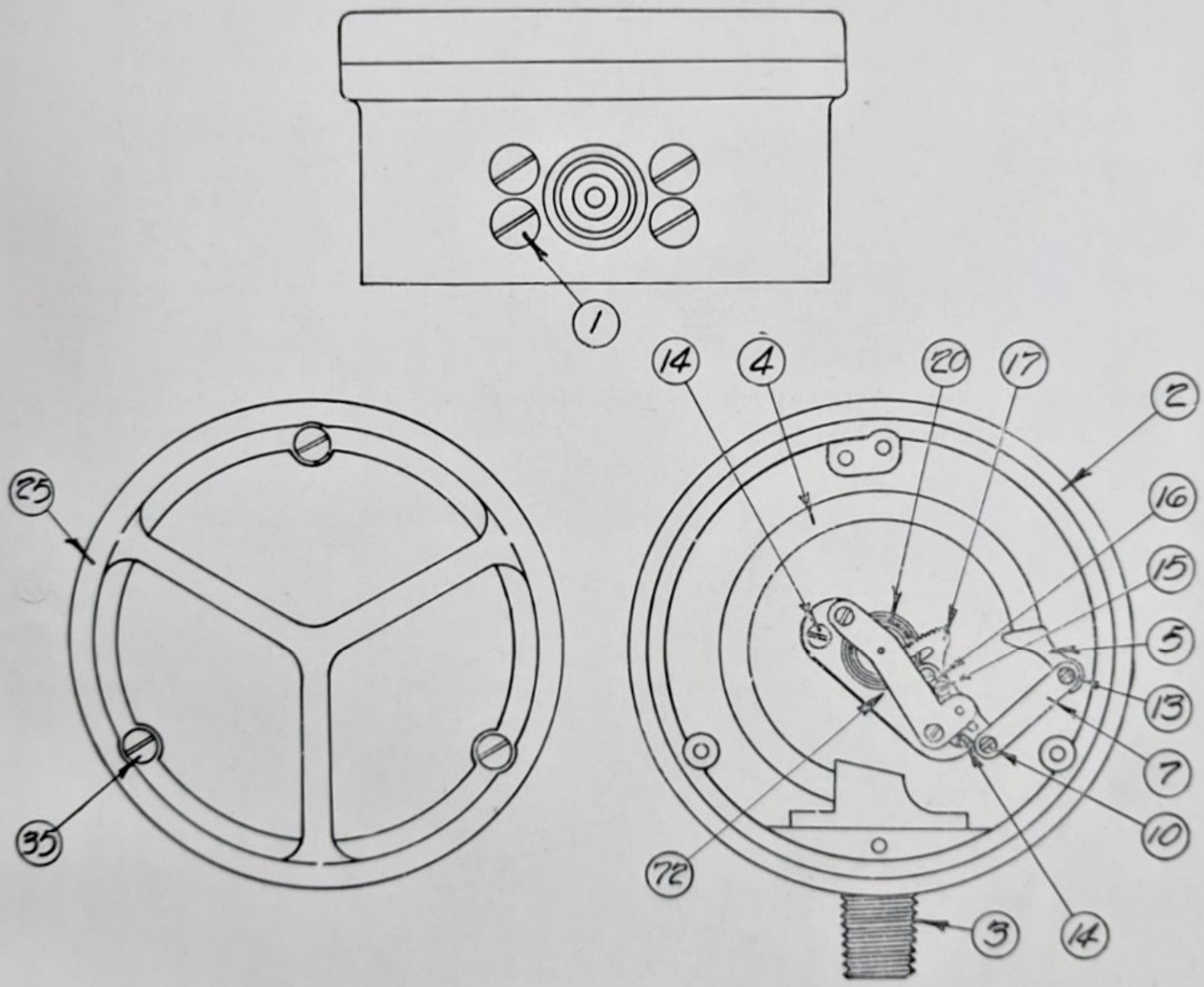
With Hose Coupling Clamp Attachment



No. 68

Ashton Protected Dial Pressure Gage

Reference List of Parts



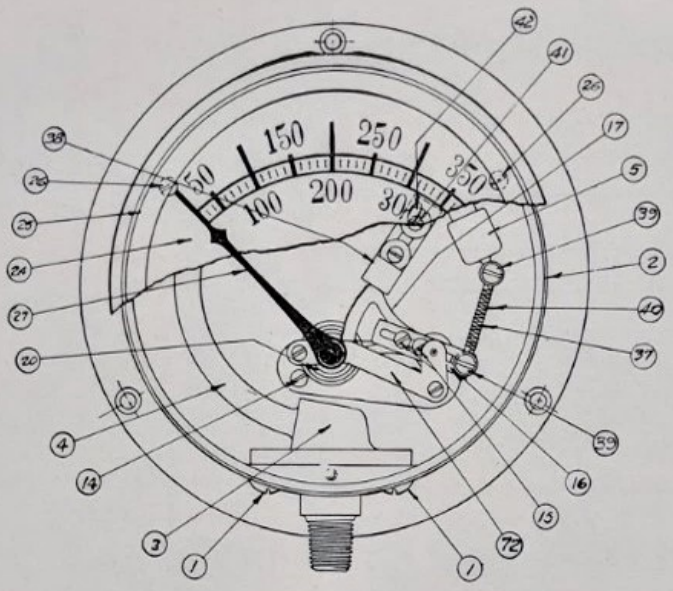
No. 59 C.

In ordering parts always specify style number of gage.

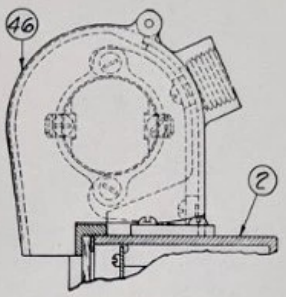
For price list of parts see page 105

Ashton 5″ Dial Quadruplex Air Brake Gage

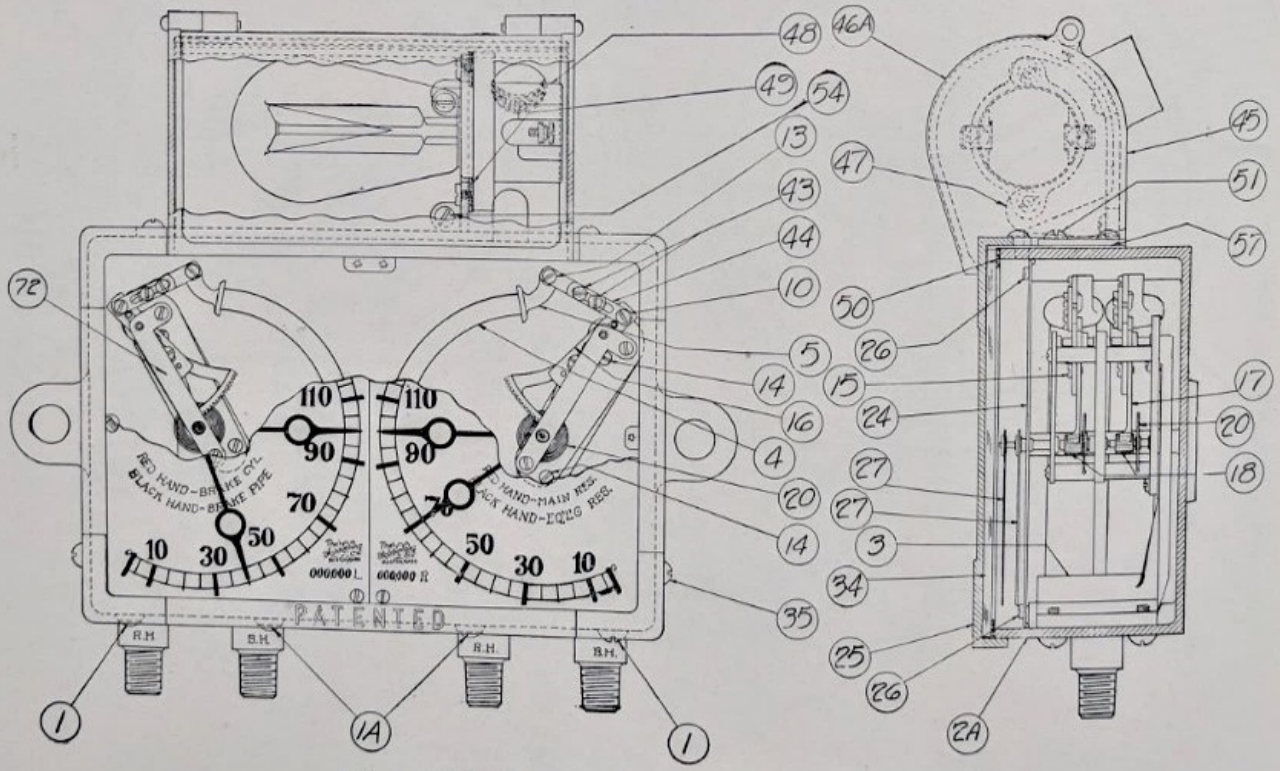
Reference List of Parts



No. 51 E.
No. 51 S.



No. 62 Q. E. Old style
Outside illumination



No. 62 Q. I. Inside direct illumination
No. 62 Q. (Without lighting attachment)

In ordering parts always specify style number of gage; maximum dial graduations; iron or brass case; hand, red or black; dial marking desired.
For Nos. 62Q., 62Q.E., or 62 Q.I., hairspring, specify top or bottom style.
For price list of parts see page 104.

Ashton Locomotive Steam and Steam Heat Gages

List Prices of Parts

Style No.		No. 52US Steam Heat No. 52LBD No. 52A	No. 52LB No. 52A No. 52LBE (Dust Proof) No. 52LBD. No. 52LBDB No. 52LBDA (Dust Proof)	No. 52LB No. 52LBE (Dust Proof) No. 52LBD No. 52LBDA (Dust Proof) No. 66	No. 52LB No. 52LBE (Dust Proof) No. 52LBD No. 52LBDA (Dust Proof) No. 66	No. 52US Loco. Steam (Dust Proof)
Size, Inches		4½	5	6	6¾	6¾
Name of Part	Fig.	PRICE, EACH				
Socket Screw, Iron	1	.08	.08	.08	.08	.08
Socket Screw, Brass	1	.10	.10	.10	.10	.10
Case, Iron	2	1.50	2.00	3.00	3.50	...
Case, Iron, dust proof, Nos. 52US (6¾), 52LBE, 52LBDA only	2	...	2.50	3.50	4.00	4.00
Case, Brass	2	4.00	4.50	5.50	6.50	...
Case, Brass, dust proof, Nos. 52LBE, 52LBDA, only	2	...	5.00	6.00	7.00	...
Socket, Spring and Tip Complete not furnished separately, note below	3–4–5	2.00	2.50	2.80	3.00	3.00
Conn. Arm, Nos 52LB, 52US old style, 52LBE, only	6	.10	.10	.10	.10	.10
Movement Connection Arm	7	.10	.10	.10	.10	.10
Lever, Nos. 52US old style (6¾), 52LB, 52LBE, only	8A	...	.30	.50	.50	.50
Lever, Nos. 52LBD, 52LBDA, 52US, 52A, 66	8B	.20	.20	.20	.20	.20
Hub, Nos. 52LB, 52LBE, only	9	...	.65	.65	.65	...
Connection Screw	10	.10	.10	.10	.10	.10
Hub Screw, Nos. 52LB, 52LBE, only	11	...	.10	.10	.10	...
Hub Lock Screw, Nos. 52LB, 52LBE, only	12	...	.10	.10	.10	...
Tip Connection Screw	13	.10	.10	.10	.10	.10
Lever Connec. Screw Nos. 52LB, 52LBE, only	13A	...	.10	.10	.10	...
Movement Case Screw	14	.10	.10	.10	.10	.10
Adjusting Slide Lock Screw	15	.08	.08	.08	.08	.08
Adjusting Slide	16	.10	.10	.10	.10	.10
Sector	17	.60	.60	.60	.60	.60
Pinion	18	.40	.40	.40	.40	.40
Hair Spring	20	.20	.20	.20	.20	.20
Dial, Silvered or Black, note below, not shown	24	2.00	2.30	2.80	3.00	3.00
Dial, White Enamel, note below, not shown	24	...	2.50	3.00	3.30	...
Ring, O. G. or Flush, Threaded, note below, not shown	25	2.50	2.75	3.00	3.50	...
Ring, Threaded, dust proof, Nos. 52US (6¾), 52LBE, 52LBDA, only, not shown	25	...	3.00	3.50	4.00	4.00
Dial Screw, not shown	26	.05	.05	.05	.05	.05
Hand, Black or White, note below	27	.15	.20	.20	.20	.20
Glass, not shown	34	.15	.15	.20	.20	.20
Adjustable Link Screw	43	.10	.10	.10	.10	.10
Adjustable Link complete	44	.45	.45	.50	.50	.50
Felt, Nos. 52US (6¾), 52LBE, 52LBDA, only, not shown	74	...	.20	.20	.20	.20
Hand Stop Pin not shown	75	.05	.05	.05	.05	.05
Movement Complete note below	72	1.50	1.50	1.80	1.80	1.80

When ordering Springs (3–4–5) or Dials (24) it is necessary to specify the maximum pressure, and whether Dials are to be Silvered, Black or White enamel. Specify whether Hands (27) are to be black or white; see page 157. Specify whether Rings are O. G. Style "A" or Flush Style

Special Single Spring Pressure Gage
Locomotive Duplex Back Pressure Gage
Quadruplex Air Brake Gage
Master Pilot Locomotive Steam Gages
Double Dial Locomotive Steam Gages

List Prices of Parts

Style No.		No. 51E	No. 62Q	No. 62QI No. 62QE	No. 51S	No. 52D	No. 52DI	No. 62BA	No. 62BAI	No. 62BO	No. 62BP No. 62BPA	No. 62BB
Size, Inches		5	5	5	6	6¾	6¾	6¾	6¾	6¾	6¾	6¾
Name of Part	Fig.	PRICE, EACH										
Socket Screw, Iron	1	.08	...	...	.08	.08	.08	.08	.08	.08	.08	.08
Socket Screw, Brass	1, 1A	.10	*1 .10	*1 .10	.10	.10	.10	.10	.10	.10	.10	.10
Case, Iron	2	3.75	...	...	...	8.00	8.00	4.00	4.00	4.00	4.00	4.00
Case, Brass	2	4.25	8.00	*3 8.00	5.50	9.50	9.50	8.00	8.00	8.00	8.00	8.00
Socket, Spring, Tip, not furnished separately . . note below	3-4-5	2.50	*10 5.00	*10 5.00	2.80	3.00	3.00	5.00	5.00	5.00	5.00	7.00
Movement Connection Arm .	7	...	...	...	...	.10	.10	...	...	...	...	.10
Lever	8B	...	...	...	...	.20	.20	...	...	...	...	...
Connection Screw	10	...	.10	.10	...	.10	.10	.10	.10	.10	.10	.10
Tip Connection Screw . . .	13	...	.10	.10	...	.10	.10	.10	.10	.10	.10	.10
Movement Case Screw . .	14	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10
Adjusting Slide Lock Screw .	15	.08	.08	.08	.08	.08	.08	.08	.08	.08	.08	.08
Adjusting Slide	16	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10
Sector	17	.60	*11 .60	*11 .60	.60	.60	.60	*11 .60	*11 .60	*11 .60	*11 .60	*11 .60
Pinion . . . . . not shown	18	.40	*11 .40	*11 .40	.40	.40	.40	*11 .40	*11 .40	*11 .40	*11 .40	*11 .40
Hair Spring	20	.20	*11 .20	*11 .20	.20	.20	.20	*11 .20	*11 .20	*11 .20	*11 .20	*11 .20
Dial, note below	24	2.30	*10 2.80	*10 2.80	*9 2.80	*14 3.00	*14 3.00	*14 4.50	*14 4.50	*14 5.00	*14 4.00	*14 5.00
Dial, Rotating, No. 62BP and 62BPA only . . note below	24R	...	...	...	...	...	...	...	...	...	2.60	...
Ring or Cover	25	2.75	1.50	1.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
Dial Screw	26	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05
Hand.	27	.20	*12 .20	*12 .20	.20	*13 .20	*13 .20	*15 .20	*15 .20	*15 .20	*13 .20	*15 .20
Glass . . . . not shown	34	.15	.30	.30	.20	.20	.20	.20	.20	.20	.20	.20
Tension Spring	37	.60	...	...	.60	...	...	.60	.60	.60	.60	...
Spring Stop Post	38	.40	...	...	.40	...	...	.40	.40	.40	.40	.40
Connection Arm Screw. . .	39	.20	...	...	.20	...	...	.20	.20	.20	.20	...
Connection Arm.	40	.40	...	...	.40	...	...	.30	.30	.30	.30	...
Spring Stop Post Screw . .	41	.10	...	...	.10	...	...	.10	.10	.10	.10	.10
Spring Stop Post Washer . .	42	.05	...	...	.05	...	...	.05	.05	.05	.05	.05
Adjustable Link Screw. . .	43	...	.10	.10	...	.10	.10	.10	.10	.10	.10	.10
Adjustable Link Complete. .	44	...	.45	.45	...	.50	.50	.50	.50	.50	.50	.50
								For ele	ctric li	ght att	achme	nt see 62BAI
Lamp Case or Frame . . .	45	...	...	3.00		...	3.00	...	3.00			
Lamp Case Cover	46	...	...	*2 2.25	...	...	*6 2.25	...	2.25	...	...	...
Receptacle Holder	47	...	...	1.50	...	...	1.50	...	1.50	...	...	...
Receptacle or Lamp Socket .	48	...	...	.70	...	...	.70	...	.70	...	...	...
Receptacle Washer. . . .	49	...	...	.20	...	...	.20	...	.20	...	...	...
Gasket	50	...	.50	.50	...	...	...	...	...	...	...	...
Lamp and gage case cover screw	35, 51	...	.10	.10	...	...	.10	...	.10	...	...	...
Movement Lift . . not shown	53	...	...	...	...	...	...	.20	.20	.20	.20	.20
Receptacle Holder Screw. .	54	...	...	.10	...	...	.10	...	.10	...	...	...
Transparent Slot Cover . .	57	...	...	*3 .40	...	...	...	...	...	...	...	...
Lighting Attachment, Complete	45, 46, 47 48, 49, 51	...	...	*4 8.00	...	...	10.00	...	10.00	...	...	...
Lazy Hand . . . not shown		...	...	...	...	...	...	*5 1.50	*5 1.50	*5 1.50	...	...
Hand Stop Pin	75	...	.05	.05	...	.05	.05	...	...	...	...	...
Tip conn. link, No. 62BB only	76	...	...	...	...	...	...	...	...	...	...	.50
Adjustable take-up link No. 62BB only	77	...	...	...	...	...	...	...	...	...	...	2.00
Take-up link, No. 62BB only	78	...	...	...	...	...	...	...	...	...	...	1.00
Pivot post, No. 62BB only . .	79	...	...	...	...	...	...	...	...	...	...	1.00
Movement complete, note below	*8 72	1.50	*10 3.00	*10 3.00	1.80	2.50	2.50	3.00	3.00	3.00	3.00	5.00

When ordering Springs (3, 4, and 5) or Dials (24) specify the maximum pressure. For style of Hands (27) see page 157. *1 1 and 1A for 62Q, 62QI and 62QE. *2 46 for 62QE; 46A for 62QI. *3 57 and 2A used on 62QI only. *4 For No. 62QE. 45, 46, 47, 48, 49, 51. For No. 62QI. 45, 46A, 47, 48, 49, 51, 57. *5 Add "A" to No.; *e.g.*, 62BAIA. *6 Specify right or left, facing tapped hole on lamp case frame (45). *8 It is more economical to order complete new movements than their component ... maximum pressure ...

Ashton Duplex, Caboose and Single Air Brake Gages

List Prices of Parts

Style No.		No. 59C No. 59B (Old Style)	No. 51B	No. 51B	No. 51B No. 51C	No. 62C Duplex	No. 62B No.62BU
Size		3 in.	3½ in.	4½ in.	5 in.	3½ in.	5 in.
Name of Part	Fig.	PRICE EACH					
Socket Screw Iron	1	.....	.08	.08	.08	.08	.08
Socket Screw Brass	1	Nickel Plated .10	.10	.10	.10	.10	.10
Case Iron	2	1.80 59B only	1.50	1.50	2.00	1.50	2.00
Case Brass	2	Aluminum 3.00	4.00	4.00	4.50	4.00	4.50
Socket, Spring & Tip Complete, not furnished separately, note below	3-4-5	3.00	1.50	1.60	1.75	3.00	3.25
Socket, Spring & Tip Complete, not furnished separately, note below	3-4A-5	.....	.....	.....	.....		
Connection Arm, old style	6	.....	.10	.10	.10	.....	.....
Movement Conn. Arm	7	.10	.10	.....	.....	*2 .10	.....
Connection Screw	10	.10	.10	.10	.10	.....	.....
Movement Arm Con. Screw	10A	.....	.....	.....	.....	.10	.10
Tip Connection Screw	13	.10	.10	.10	.10	.10	.10
Movement Case Screw	14	.10	.10	.10	.10	.10	.10
Adjusting Slide Lock Screw	15	.08	.08	.08	.08	.08	.08
Adjusting Slide	16	.10	.10	.10	.10	.10	.10
Sector	17	.60	.60	.60	.60	Specify or Lower .60	Upper .60
Pinion, Nickel Silver	18	.40	.40	.40	.40	Specify or Lower .40	Upper .40
Hair Spring, note below	20	.20	.20	.20	.20	.20	.20
Dial, Silvered or Black, note below, not shown	24	1.50	2.00	2.00	2.30	2.50	3.00
Dial, White Enamel, note below, not shown	24	.....	.....	.....	.....	2.70	3.20
Ring, Flush Slip	25	Aluminum 1.00	.....	.....	.....	.....	.....
Ring, Flush or O. G., Threaded, not shown	25	....	2.50	2.50	2.75	2.50	2.75
Ring, Slip, 59B only, not shown	25B	1.00	.....	.....	.....	.....	.....
Dial Screw, not shown	26	.05	.05	.05	.05	.05	.05
Hand, Black or Red, note below, not shown	27	.15	.15	.15	.20	.15	.20
Glass, not shown	34	Celluloid.25 59C Glass .15 59B	.15	.15	.15	.15	.15
Ring Screw	35	.05	.....	.....	.....	.....	.....
Ring Center Piece 59B only	36	.25	.....	.....	.....	.....	.....
Cross Bar 59B only	37	.20	.....	.....	.....	.....	.....
Cork Gasket, 59B only, not shown	38	.25	.....	.....	.....	.....	.....
Adjustable Link Screw	43	....	.....	.10	.10	.....	.10
Adjustable Link, Complete	44	....	*1	.45	.45	*1	.45
Hand Stop Pin, not shown	75	.05	.05	.05	.05	.05	.05
Movement Complete, note below	72	1.00	1.50	1.50	1.50	3.00	3.00

When ordering Springs (3-4-5; 3-4A-5; or Dials 24) it is necessary to specify the maximum pressure. Unless otherwise specified, socket connections will be furnished parallel with back of case.

Specify whether Hands (27) are to be White, Black or Red.

Hair springs for Duplex gages should be specified Upper or Lower.

It is more economical to order Complete new Movements, than their component parts for

Ashton Locomotive Steam and Steam Heat Gages

Old Style

List Prices of Parts

Style No.		No. 52 No. 52R	No. 52 No. 52J (Dust Proof) No. 52R No. 52R.A. (Dust Proof)	No. 52 No. 52J (Dust Proof) No. 52R No. 52R.A. (Dust Proof)	No. 52 No. 52J (Dust Proof) No. 52R No. 52R.A. (Dust Proof)
Size, Inches		4½	5	6	6¾
Name of Part	Fig.	PRICE EACH			
Socket Screw { Iron	1	$.08	$.08	$.08	$.08
Socket Screw { Brass	1	.10	.10	.10	.10
Case, Iron Nos. 52, 52A, 52R, 66, only	2	1.50	2.00	3.00	3.50
Case, Iron, Dust Proof Nos. 52J, 52R.A., only	2	....	2.50	3.50	4.00
Case, Brass	2	4.00	4.50	5.50	6.50
Case, Brass, Dust Proof No. 52J, No. 52R.A., only	2	....	5.00	6.00	7.00
Socket, Spring & Tip Complete (not furn. separately, note below)	3–4–5	2.00	2.50	2.80	3.00
Conn. Arm, No. 52 and 52J, only	6	.10	.10	.10	.10
Lever	8	.30	.30	.50	.50
Hub	9	.65	.65	.65	.65
Hub Screw	11	.10	.10	.10	.10
Hub Lock Screw	12	.10	.10	.10	.10
Tip Connection Screw	13	.10	.10	.10	.10
Tip Connection Screw	13A	.10	.10	.10	.10
Movement Case Screw	14	.10	.10	.10	.10
Pinion, Nickel Silver	18	.40	.40	.40	.40
Bushing, Nickel Silver	19	.20	.20	.20	.20
Hair Spring	20	.20	.20	.20	.20
Dial, Silvered or Black, note below	24	2.00	2.30	2.80	3.00
Dial, White Enamel, note below	24	2.20	2.50	3.00	3.30
Ring, O.G. or Flush, Threaded, note below	25	2.50	2.75	3.00	3.50
Ring Threaded, Dust Proof, Nos. 52J and 52R.A., only	25	....	3.00	3.50	4.00
Dial Screw	26	.05	.05	.05	.05
Hand, Black or White, note below	27	.15	.20	.20	.20
Rack, Nickel Silver	28	.40	.40	.40	.40
Bushing Screw, Nickel Silver	29	.10	.10	.10	.10
Rack Adjusting Screw	30	.15	.15	.15	.15
Rack Connecting Screw	31	.10	.10	.10	.10
Movement Frame	32	.50	.50	.50	.50
Glass, not shown	34	.15	.15	.20	.20
Adjustable Link Screw	43	.10	.10	.10	.10
Adjustable Link, Complete	44A	.45	.45	.50	.50
Rack Adjusting Screw, Lock Nut	73	.10	.10	.10	.10
Felt, No. 52J, No. 52R.A., only, not shown	74	....	.20	.20	.20
Hand Stop Pin, not shown	75	.05	.05	.05	.05
Movement Complete, note below	72	1.50	1.50	1.80	1.80

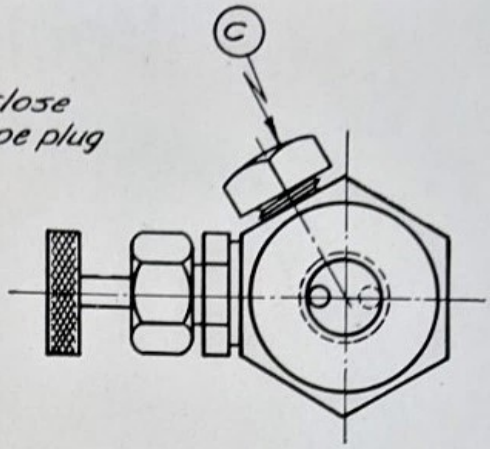
When ordering springs (3-4-5), or Dials (24) it is necessary to specify the maximum pressure, and whether dials are to be silvered, black, or white enamel.

Specify whether hands are to be white or black and give size, see page 157.

Specify whether rings are O.G. or Flush and give style letter.

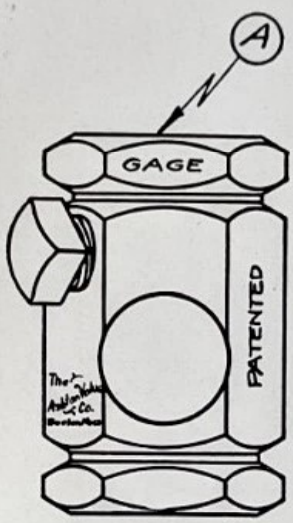
It is more economical to order complete new movements than their component parts for reassembling.

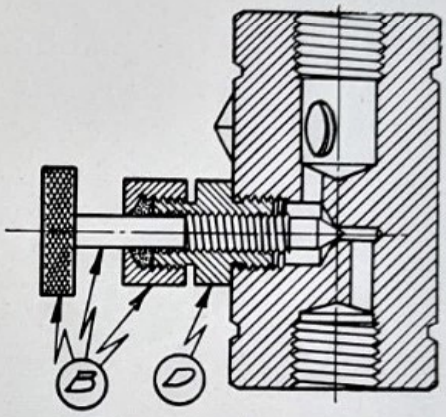
Ashton Pulsation Retard Device



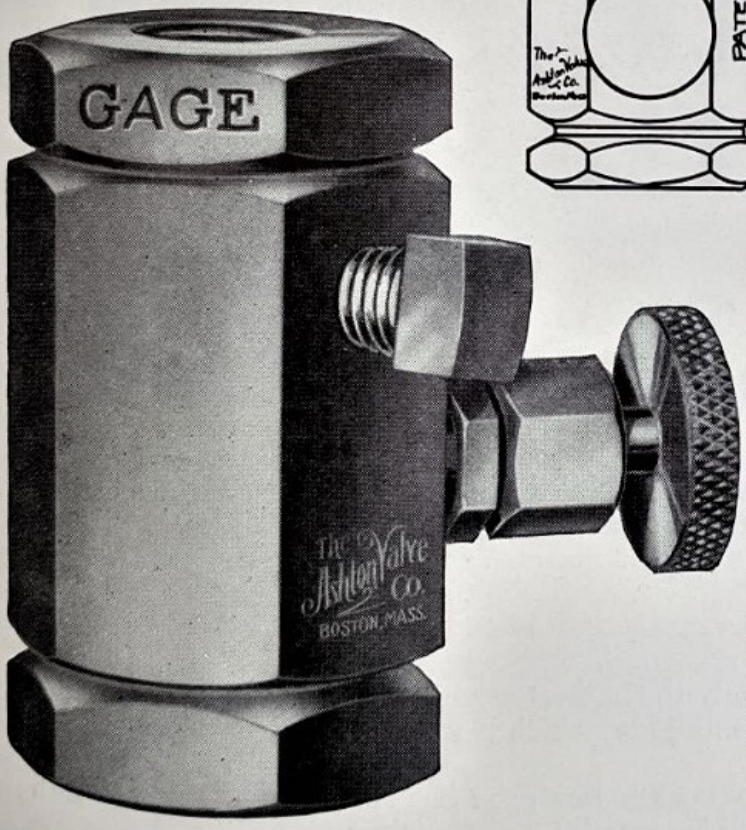
To blow out sediment close needle valve, remove pipe plug and open needle valve

There is a blow out passage through the body "A" and across the seat of the needle valve "B", and by removing plug "C" it is possible to blow out any sediment that may have lodged on the seat or in the passage.





No. 120



This device is especially designed to retard the pulsations to which the Ashton No. 62 B.P., No. 62 B.P.A., No. 62 B.A. and No. 62 B.O. steam chest pressure and back pressure gages are subjected on locomotives.

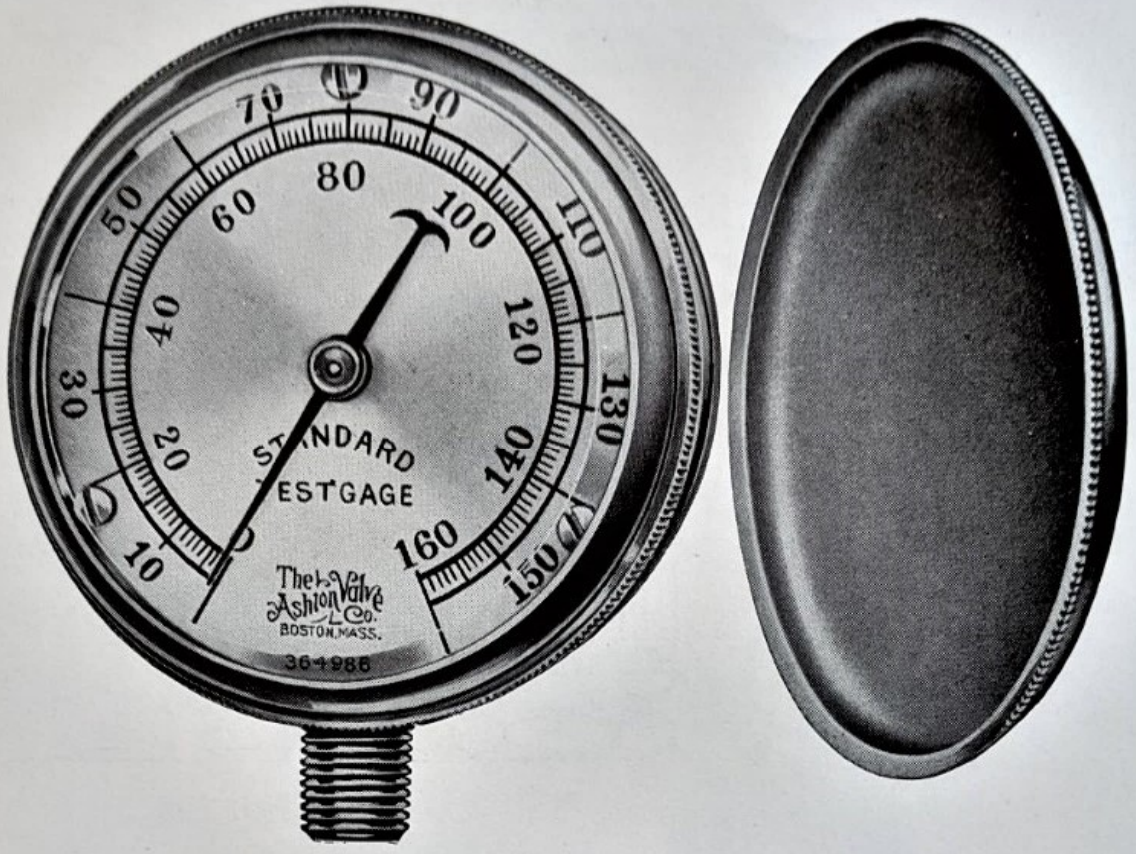
It consists of a needle valve, having a very sharp point which may be adjusted to effectively retard the pulsations and eliminate the vibration of the hand.

We recommend that both the high and low pressure units of the Ashton No. 62 B.A., No. 62 B.P., No. 62 B.P.A. and No. 62 B.O. Gages, be protected from the severe pulsations by installation of the Ashton No. 120 Retarding Device which is made for ¼-inch standard pipe thread connections, and this device should be installed in the pipe line below the usual steam gage siphon, which further prevents the condensation in the siphon from being blown out and live steam allowed to enter the gage tube.

Blueprint showing piping arrangement for connecting the Gage and Retard Device will be furnished on request.

Dimensions	*Weight*
2⅜-inch wide, including needle valve 2¼-inch long	¾ pounds

Ashton Inspectors' Pocket Test Gage



No. 59A.

A neat, light test gage of suitable size for carrying in the pocket or tool box. It weighs only about one pound. For perfect protection of dial and hand, this gage has bevel plate glass front with metal cover.

Used principally by air-brake inspectors, boiler inspectors, and master mechanics, it is graduated for any desired pressure up to 500 pounds.

The 3 inch diameter of dial limits the graduations as follows:—

160 pounds maximum	. . . . .	1 pound marks
300 " "	. . . . .	2 " "
500 " "	. . . . .	5 " "

Its accuracy is unquestioned. Only the highest grade of material and most skillful workmanship are allowed in making this gage, which is carefully tested before leaving the factory.

Like all other Ashton gages, this pocket test gage has spring of seamless drawn brass tubing, movement of noncorrodible material.

Standard graduations, 160, 300, 500 pounds.

Ring is cast brass, threaded, Style "Q".

Dial is silvered.

Connection is ¼ inch pipe size, male.

Orders should specify style No. of gage, and maximum pressure.

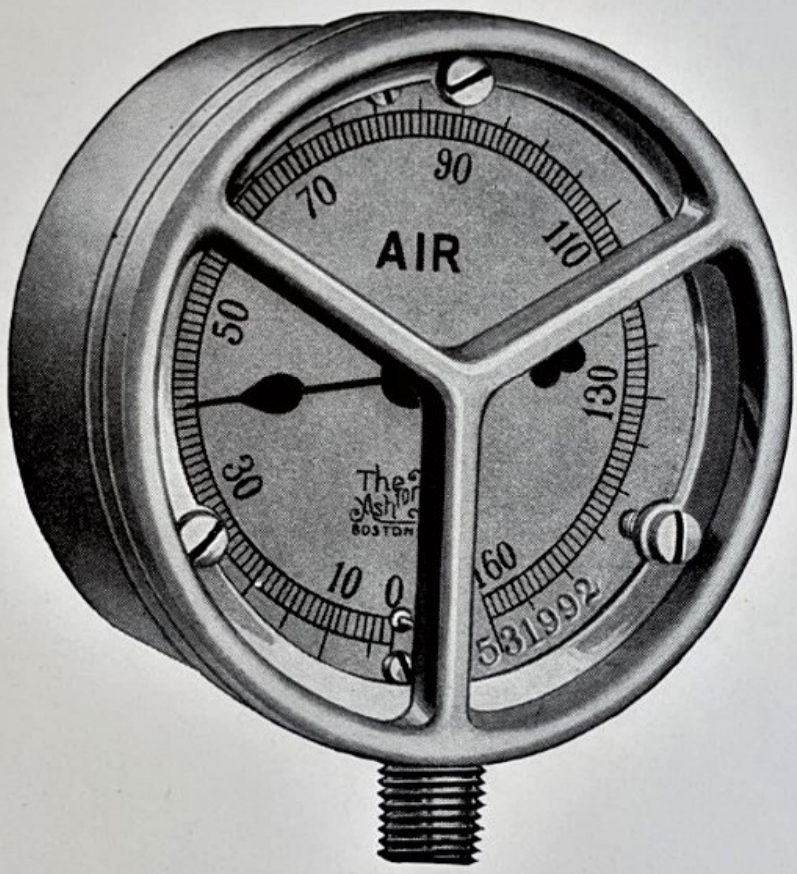
Without cock or fitting.

LIST PRICES

Size	Brass Case	N. P. Case	Aluminum Case
3 inch Dial	$14.00	$14.60	$15.50
Weight, ounces	17	17	10

Subject to Discount

Ashton Protected Dial Pressure Gage



No. 59C

The Ashton Protected Dial Gage is specially designed to suit the requirements in air brake service and particularly in connection with the rear end train brake cock. With such a gage rear end trainmen having in charge the backing of trains can know at a glance the exact pressure on the brake system, assuring perfect control. It is also a handy and practical instrument for use of Air Brake Inspectors in repair, classification and passenger-car yards.

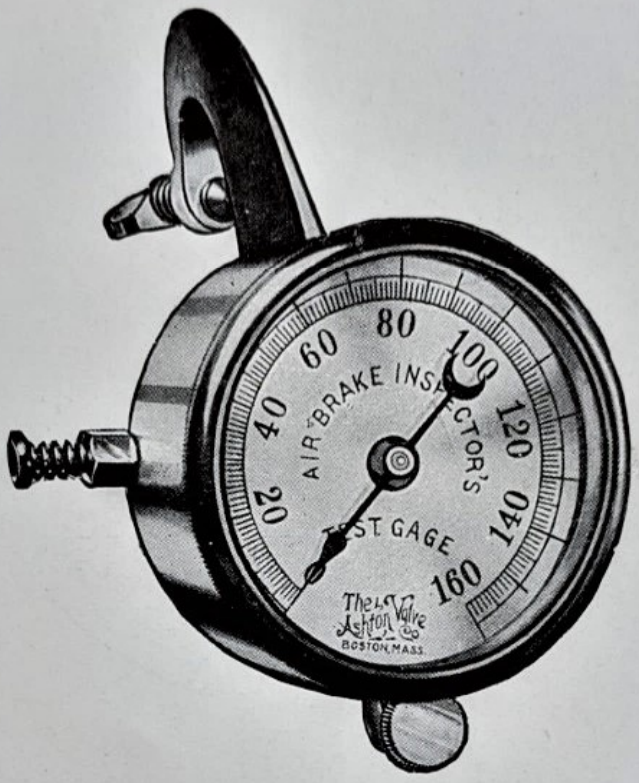
The face of the gage is protected from damage by having the transparent celluloid disc and the dial set considerably below the top rim, and furthermore by protecting crossbars. These bars will not only prevent ordinary projections from penetrating the gage, but will also stand being struck with considerable force without breaking.

This gage is made in the 3 inch dial size, with ¼ inch connection, and has aluminum case and ring Style "P" with the crossbars combined with the ring in one casting.

Without cock or fitting.

Ashton Air Brake Inspectors' Test Gage

With Hose Coupling Clamp Attachment



No. 68

A handy, compact fully nickeled test gage having hose coupling bracket for instant attachment to air brake or signal line coupling, thus enabling the inspector to conveniently make tests at the rear of the train.

This gage has 2½ inch dial. By means of the top and bottom thumbscrews a perfectly tight connection is easily made and the side valve serves as a drain cock to allow the escape of air pressure between the hose cock and gage when the cock is shut off after the test.

Style "E" ring is furnished.

PRICE ON APPLICATION

Ashton Inspectors' Testing and Proving Outfit

No. 45

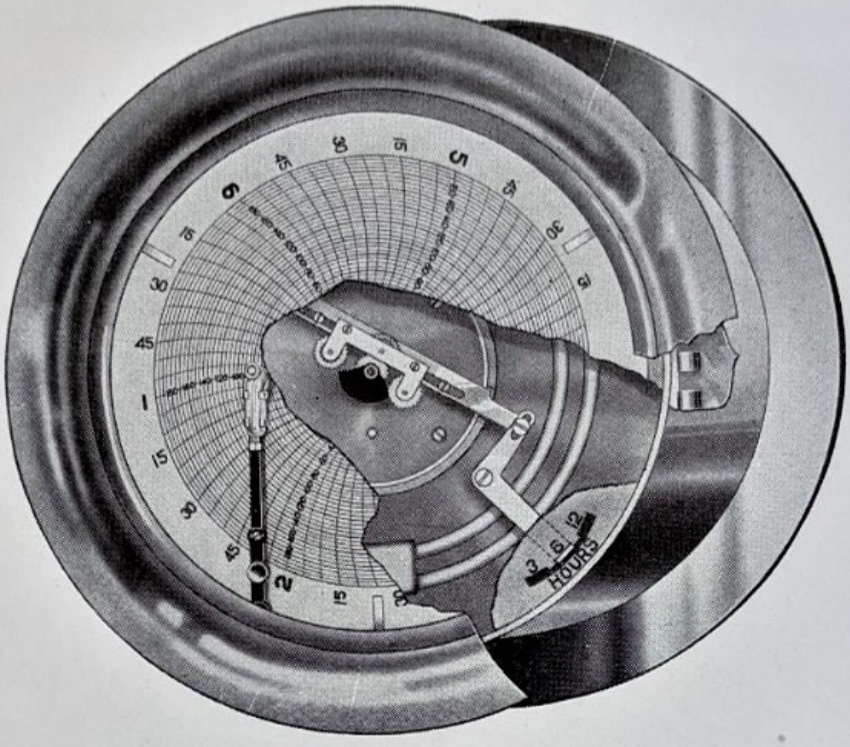
This outfit is particularly adapted to the requirements of inspectors who make tests and inspections of locomotive and stationary boilers.

It is accurate, durable, and easily portable, weighing eight and one half pounds, and ten and one half by twelve by three and one-quarter inches in size.

The finely finished, velvet-lined case, with handle and lock, contains the following nickel-plated instruments and tools:

One 3 inch No. 59 A Standard Pocket Test Gage graduated to 300 pounds.
One No. 3 Screw Test Pump.
One No. 94 A Hand Puller.
One Hand Set
One Lever Handle Union Cock.
One Screw driver.
One ¼ × ⅛ Bushing.
Maximum capacity is 600 pounds.

Ashton Three-Speed Air Brake Recording Gage



No. 75

This gage is designed to meet the requirements of Air Brake Inspectors in making tests and recording the operation of air brakes on passenger and freight trains as desired, but may be used for recording pressures where a variable speed of chart is required.

It has the distinct advantage of a fast rotating chart, which more clearly indicates the variations in pressure or reductions made.

It is constructed with high grade 24 hour clock movement; special tube to eliminate excessive vibration; capillary glass pen with platinum tube point, which is noncorrodible and gives a clear record, and may be refilled without detaching.

With each instrument are furnished a bottle of special recording ink, not affected by ordinary changes of temperature; one extra pen with cleaning wires, 100 each of the three styles of charts, ink dropper and gage cock.

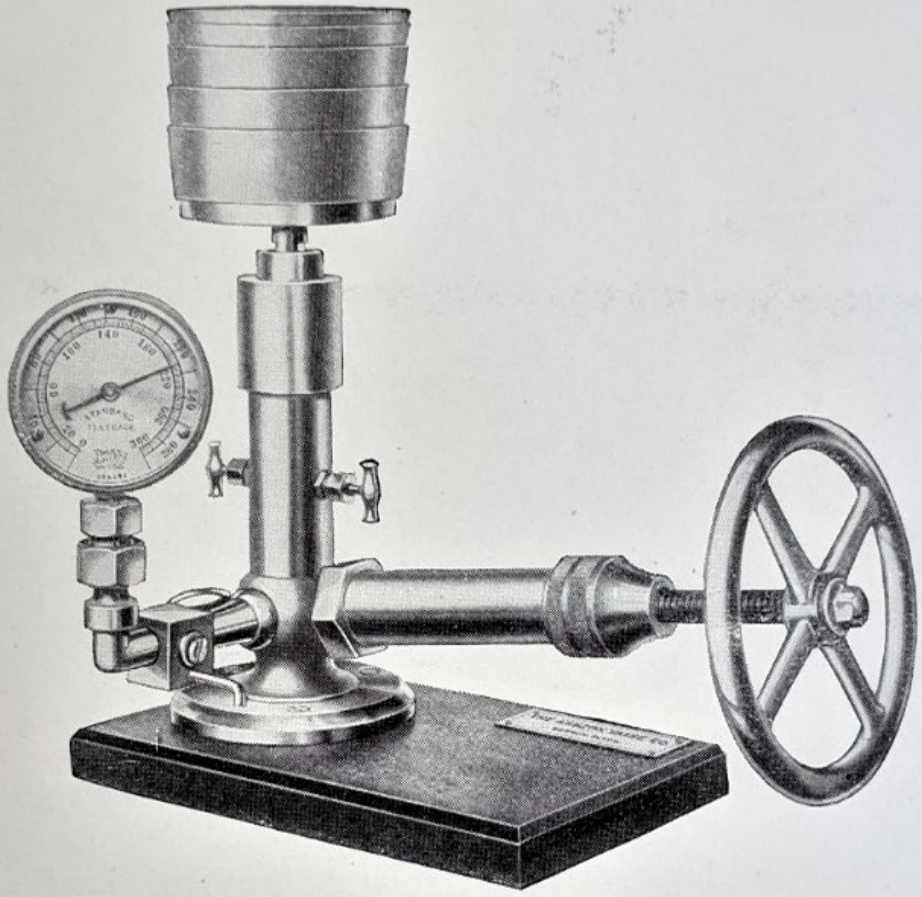
Style "D" ring is furnished.

Made in brass or aluminum case.

	Chart No.
12 in. Size; 3, 6 and 12 hour charts in 5 lb. increments to 125 lbs.	**99, 101, 110.**
12 in. Size; 3, 6 and 12 hour charts in 5 lb. increments to 150 lbs.	**107, 108, 109.**
12 in. Size; 6, 9 and 12 hour charts in 5 lb. increments to 150 lbs.	**108, 111, 109.**
12 in. Size; 3, 6 and 12 hour charts in 5 lb. increments to 200 lbs.	**92, 94, 95.**
10 in. Size; 3, 6 and 12 hour charts in 5 lb. increments to 160 lbs.	**89A, 89B, 89C.**
10 in. Size; 3, 6 and 12 hour charts in 5 lb. increments to 240 lbs.	**87, 86, 85.**

PRICES ON APPLICATION

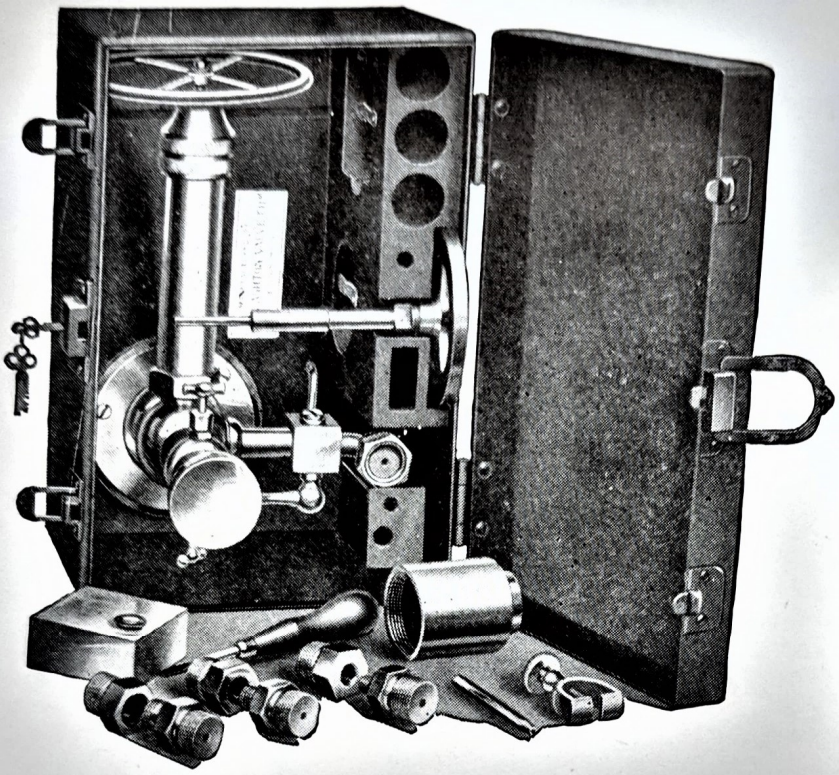
Ashton Improved Dead-Weight Pressure Gage Tester



THE ASHTON DEAD-WEIGHT GAGE TESTER, as shown above, offers in convenient form an improved method for accurately testing pressure gages by means of weights, and is a recognized standard extensively adopted for this important service. It is equal in accuracy to a mercury column, and has the added advantage of compactness, portability, and much lower cost.

This Tester is also preferable to the ordinary styles of similar designs because of its special distinctive construction with double area plunger. This exclusive feature renders it possible to make tests within its designated range of pressure with only one-fourth the usual number of weights, which is a matter of considerable convenience as well as economy of time. The gage shown in above illustration is not furnished, being merely an illustration of a gage as applied for test.

Ashton Improved Dead-Weight Pressure Gage Tester



Tester in box, and fittings

Nest of weights in box

Each ASHTON DEAD-WEIGHT GAGE TESTER is furnished in pressed steel box, the seams of which are electrically welded, and provided with lock and key, also handle for convenience in carrying.

EQUIPMENT

With each tester is furnished a complete equipment of necessary weights and tools, consisting of screwdriver, oil can, gage hand puller, hand set, and six connecting nipples for attaching gages.

The weights for each tester are packed in separate pressed steel box, with electrically welded seams, with handle. When additional testing capacity is desired, it can be accomplished up to 2,000 pounds by ordering extra weights at a nominal expense.

Testers are furnished with suitable weights for the following capacities, and orders should specify style number and capacity.

No. 80 Style for testing to **2,000** pounds
No. 80A Style for testing to **1,500** pounds
No. 79 Style for testing to **1,000** pounds
No. 79A Style for testing to **500** pounds
No. 79B Style for testing to **300** pounds
No. 79C Style for testing to **200** pounds

PRICES ON APPLICATION

Ashton Improved Dead-Weight Pressure Gage Tester

DIRECTIONS FOR OPERATING

Place the Tester on a table or bench that is level, so that the weight plunger will stand exactly vertical and work smoothly in the upright cylinder without friction on any side, which might otherwise give a false reading. Thoroughly clean all interior parts, which must be entirely free from grit or dirt. The best results are obtained by using only sperm oil in the machine.

When ready to fill the Tester with oil, the three-way cock on the gage connection arm should be closed by turning the lever handle to a vertical position. The hand wheel should be screwed into the oil reservoir as far as it will go. The cap on top of cylinder having been removed—and the overflow cup screwed on in place of it, the oil can then be slowly poured into the cylinder, and the hand wheel gradually unscrewed until the instrument is completely filled.

The gage to be tested can now be applied, as shown in the cut and the three-way cock opened by turning lever handle to a horizontal position to the right. The weight plunger with tray may then be inserted in cylinder, making Tester complete and ready for use.

To insure accuracy of readings, THE PLUNGER SHOULD BE REVOLVED SLOWLY to reduce any friction there might be in the cylinder. As the plunger is forced to the bottom of the cylinder by the weights applied, the hand wheel should be screwed in more and more. The overflow cup is of such a height as to prevent plunger from striking the bottom. Do not force the weight plunger up too high;three-eighths inch is sufficient.

When testing at low pressures, the machine should be adjusted to use the combined large and small area of plunger. This is accomplished by closing the cock on left-hand side of vertical cylinder and opening the right-hand one. For testing at high pressures no additional weights are required, it being merely necessary to reverse the adjustment of the cylinder cocks. The one on the left should be opened and that on the right closed as shown in cut. This makes use of only the small area of the plunger, and the pressure then exerted will be four times as great as before, and applies to the weight holder as well as to each of the weights, increasing the testing capacity to full maximum. BEFORE MAKING THIS CHANGE, IT IS ALWAYS ADVISABLE TO REMOVE ALL PRESSURE IN THE TESTER BY UNSCREWING THE HAND WHEEL.

The plunger and weight holder will exert a pressure on the gage of exactly five pounds with combined area adjustment (or twenty pounds with small area), and by adding the various weights the desired maximum pressure can be obtained. Each weight is marked with the number of pounds per square inch it will exert on the gage with either combined area adjustment or small area adjustment.

When each test is completed the three-way cock should be closed by turning lever back to vertical position, which will shut off the connection to gage, as well as drain the oil from it into the oil can, which should be placed under the drain cock. The gage then can be removed and another one applied and three-way cock opened again. Never attempt to take off the weights or plunger without first unscrewing hand wheel as far as it will go.

The oil may be left in the machine, when not in use, but the plunger should be taken out and carefully cleaned before being put away. The cap should be screwed on to the top of the cylinder to prevent dirt from entering. To completely drain all

Ashton Improved Dead-Weight Pressure Gage Tester

PRICE LIST OF PARTS

‡A.	Body:	
	Double Area	$22.00
	Single Area (old style) (note below)	22.00
‡B.	Plunger:	
	Double Area	12.00
	Single Area (old style) (note below)	12.00
C.	Plug	1.00
*D.	Pump Cylinder	3.50
*E.	Pressure End of Pump Cylinder	2.50
§F.	Pump Cylinder Nut	3.00
§G.	Pump Plunger Screw	3.75
H.	Follower	1.75
I.	Follower Nut	.90
J.	Cup Leather	.50
L.	Handwheel	2.00
M.	Handwheel Nut	.35
N.	Leather Washer	.10
O.	Oil Overflow Cup	3.00
‡P.	Weight Holder	5.75
Q.	Cup Leather Washer Nut	.20
R.	Bonnet for Needle Valve of Pressure By-pass	.80
S.	By-pass Needle Valve	1.40
T.	Packing Nut	.35
U.	Cover to replace O when Tester is not in use	2.00
V.	Packing Nut	.35
W.	Bonnet for Atmosphere Needle Valve	.80
X.	Atmosphere Needle Valve	1.40
†Y.	Washer for Three-Way Cock	.05
†Z.	Screw for Three-Way Cock	.10
†AA.	Three-Way Cock Body	10.00
†BB.	Three-Way Cock Plug	8.00
†CC.	Coupling Nut	.90
DD.	1/8 in. Female Connection	1.50
EE.	1/8 in. Male Connection	1.50
FF.	1/4 in. Female Connection	1.50
GG.	1/4 in. Male Connection	1.50
HH.	3/8 in. Female Connection	1.50
II.	3/8 in. Male Connection	1.50
JJ.	Washer for Cup Leather	.25
†KK.	Drip Pipe	.25
†LL.	Tail Pipe	1.25

Pressed Steel Box for Weights	11.00
Pressed Steel Box for Instruments	18.00
1/4 pound Weight	2.25
1/2 pound Weight	2.50
1 pound Weight	2.75
2 pound Weight	3.25
4 pound Weight	4.00

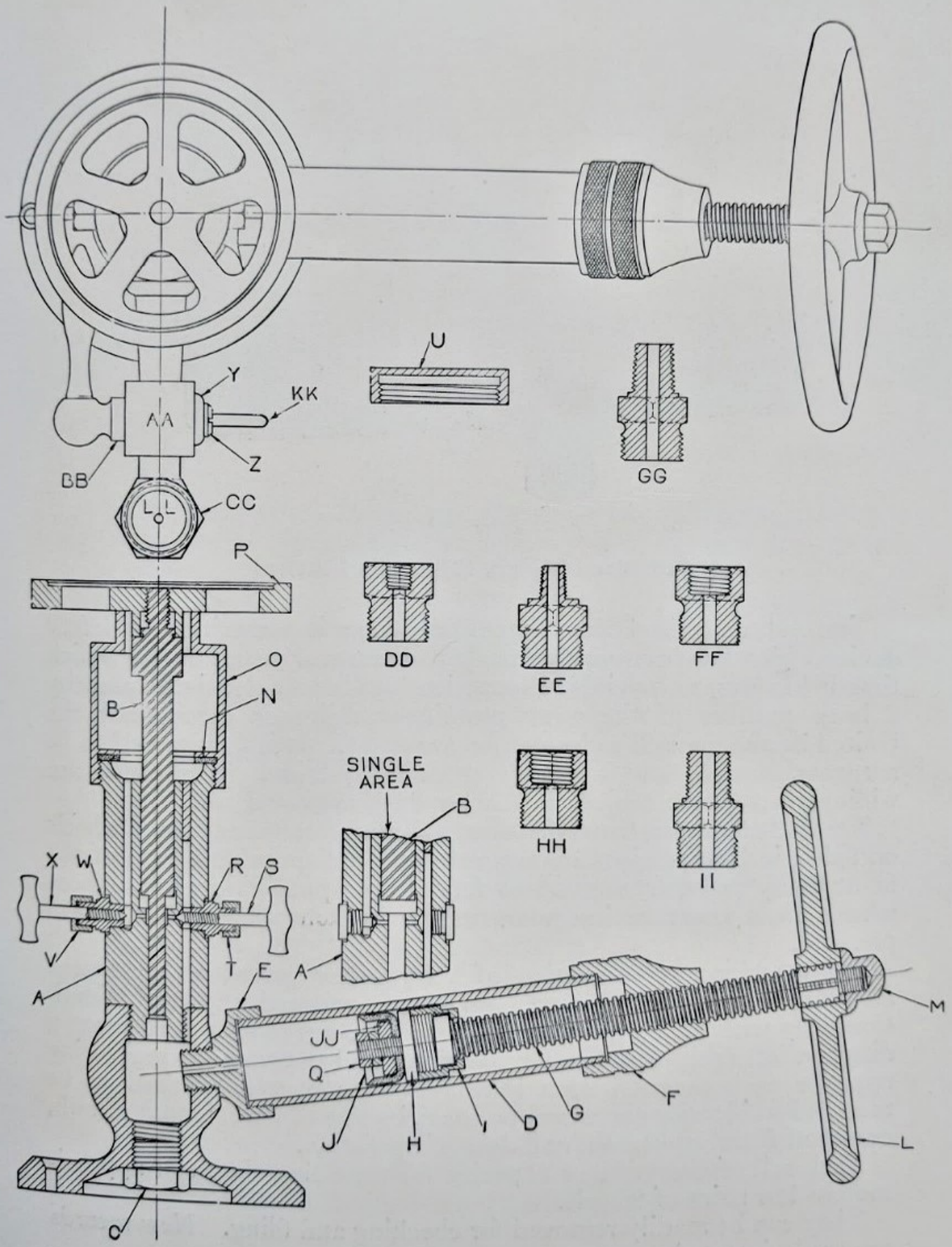
*†‡§We recommend that the following parts be purchased assembled to insure proper fitting and accuracy.

In ordering parts A. & B. specify whether double area; or single area (old style).

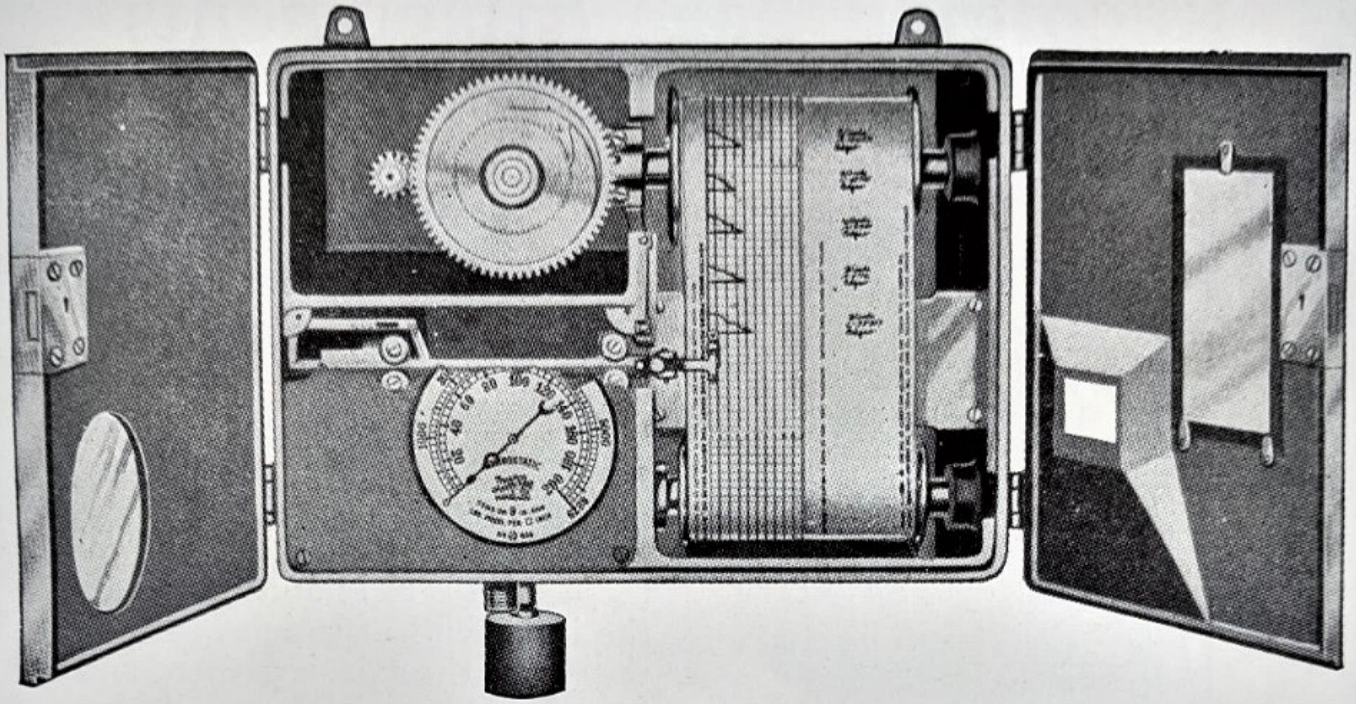
*D, E. Pump Cylinder Assembled	$7.00
†AA, BB, CC, KK, LL, Y & Z. Three-Way Cock Assembled	23.40
‡A, B & P. Body, Plunger and Weight Holder Assembled	37.60

Ashton Improved Dead-Weight Pressure Gage Tester

List of Parts



Ashton Wheel Press Recording Gage



No. 46

The Capillary Glass Pen as used in Ashton Recording Gages is of exceptional merit. It is unique in design and overcomes the troubles commonly experienced with recording gage pens. It is made with platinum tube point, giving a clear, fine line record, and is noncorrodible. Its design is such that it will stand vibration and yet not throw ink. It has a large, easily filled reservoir, which obviates the necessity of frequent filling, and is so fitted that it can be refilled without detaching. Cleaning wires are supplied with pen.

The Ashton Wheel Press Recording Gage is adaptable for use on single or double ram wheel press. With the latter, the attachments described on following page should be used.

In ordering always specify the diameter of the ram of the wheel press and the maximum pressure in tons desired. This should be based upon the regular run of work and not the capacity of the wheel press; recorders graduated to 400 tons will necessarily make a small record when used for 40 to 50 tons pressure.

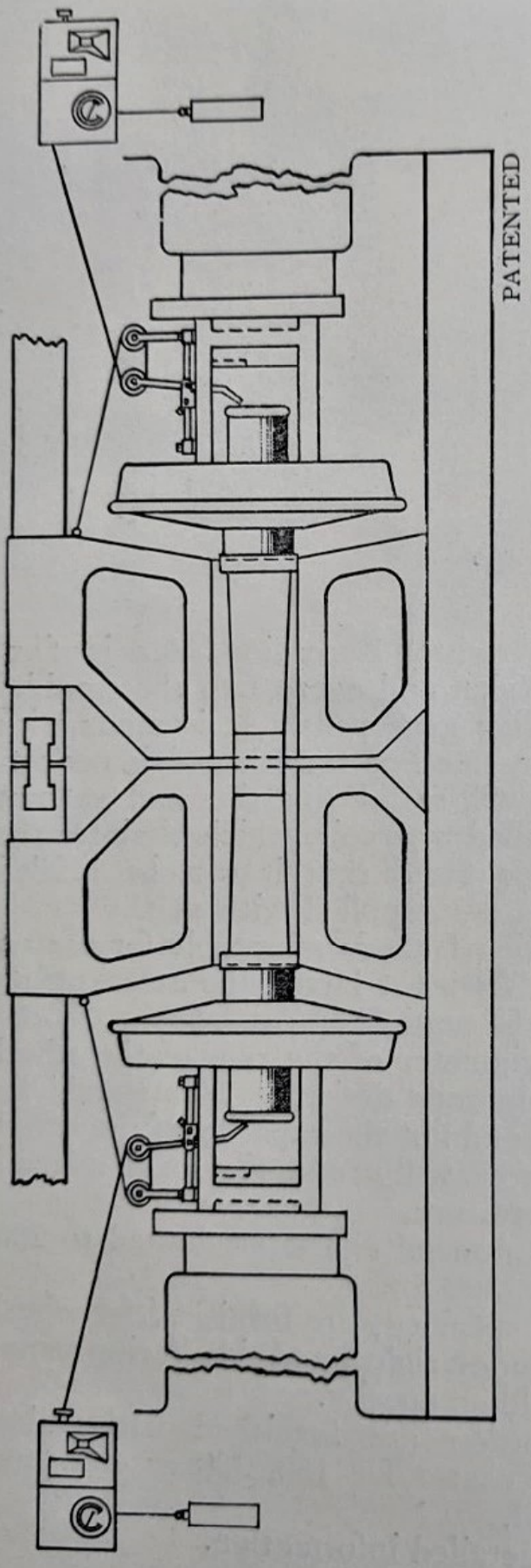
For car wheel mounting we recommend charts graduated to 200 tons; for locomotive driving wheels, 300 tons.

The recorders, unless otherwise specified, are furnished for wheel presses, with the ram head or cylinder on right-hand side, facing same; if for left-hand presses, order should so specify.

Unless otherwise specified, recorders are furnished with ruled charts graduated to 200 tons, but charts for 150, 300 or 400 tons maximum can be supplied if desired.

Send for special Circular giving detailed information.

Ashton Wheel Press Recording Gage Attachments



The cut shows the attachments for adapting the recorder for use with a double ram press, also method of installation and use.

The essential parts of the mechanism are two arms attached to each ram shoe, each of which has a sheave, at the top, around which passes the cable that operates the gage. One of these arms is rigid and the other, the lower end of which bears on the end of the axle, is pivoted and free to move with any relative movement of wheel and axle. This movement separates the sheaves, changing the distance between the ends of cable and actuates the recording device.

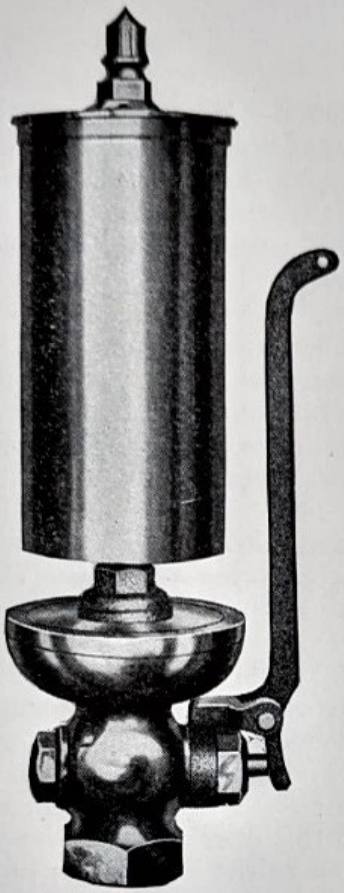
Filler blocks are recessed to clear the ends of pivoted arms.

When either wheel moves with the axle, the sheaves will move along the cable but will not change the distance between its ends and movement will not be recorded.

A spring or weight is used to return the movable arm to normal position, allowing the recording gage to return to zero when the wheels and axle have been removed.

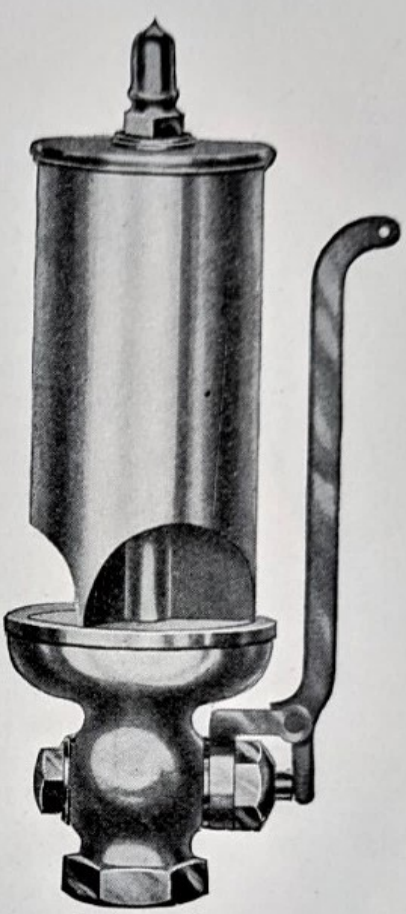
These attachments should likewise be used on a single ram press when mounting wheels simultaneously, using two recorders as illustrated above.

Ashton Locomotive Steam Whistles



No. 90

Plain Whistle



No. 91

Chime Whistle

These whistles are particularly designed for the extreme hard service on locomotives, the bodies being extra heavy to stand the vibration. They are made from the best steam metal and suitable for the highest pressure.

The No. 90 Plain Whistle is more often used on freight locomotives.

The No. 91 Chime Whistle is recommended for passenger locomotives and is adjusted to produce the most agreeable and penetrating tone.

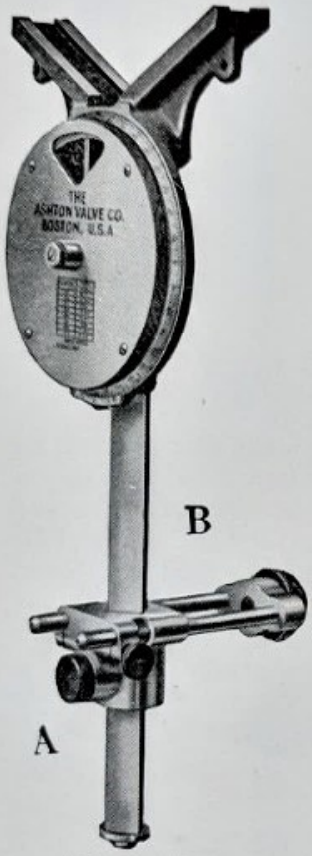
Orders should specify operating pressure.

DIMENSIONS IN INCHES

Diameter of Bell.	**5**	**6**
Size Steam Pipe	**1¼**	**2**

Ashton Locomotive Driving Wheel Quartering Gage

Improved



No. 110-B

Patented

The gage illustrated is a time-saving device designed to supply a long recognized requirement in railroad shops and engine houses where a quick and accurate means of testing out crank pin irregularities is desired.

The present old and unreliable method of using plumb lines and straight edges, or removing wheels and transporting them to a quartering machine, wastes valuable time which can be saved by using the Ashton Gage. A mechanic can readily test pins for quartering in any position of the drivers without removing them from the frames, requiring but a few minutes per pair of wheels (Figure 1), whereas the old method takes a mechanic and helper several hours.

This instrument may also be used as a means to check the quartering of the pins before setting the eccentric or crank arms of the valve motion. (See Figure 2.)

It is likewise of great advantage when applying new axles to old wheel centers. By pressing one wheel on its axle and then starting the opposite wheel, a gage reading can be taken which will accurately indicate whether the wheel is in proper position, and if not, the necessary amount that it should be moved before it is fully pressed on. The quickness with which this operation can be performed will, in a very short time, save the initial cost of the gage.

The present gage is an improvement over the previous model, the design allowing for a more rugged construction, and by the use of vernier, a greater accuracy in the reading of the dial scale.

The gage is adjustable, and will take care of a variation in stroke from 18 to 32 inches, within the following pin dimensions

18-inch stroke.

Minimum diameter pin, 2½ inches.

Maximum diameter pin, 4 5/16 inches.

32-inch stroke.

Minimum diameter pin, 4 inches.

The gage is operated in the following manner (see Figure 1). The slide (A) is first adjusted to the stroke, the hemispherical center fitting the axle center hole with the yoke pressed out against the crank pin as shown. Any variation in the depth of axle center is taken care of by adjustment at (B). The casing (C) is then revolved until the hand appears in the opening at (D). Align the hairline (E) on the hand with hairline (F) on the casing. The gage may then be removed and a reading taken from the scale and vernier at (G). This operation is repeated on the other side, and if the sum of the two readings is more or less than 90 degrees the pins are out of quarter. The deviation from the standard of 90 degrees is the error.

A table on the casing of each gage gives the linear variation corresponding to 1 degree of angular variation for the different strokes 18 to 32 inches.

The vernier is graduated to every 6 minutes or 1/10 of one degree. Each space upon the dial indicates one degree. Each space upon the vernier scale is 6 minutes shorter than one space on the dial scale.

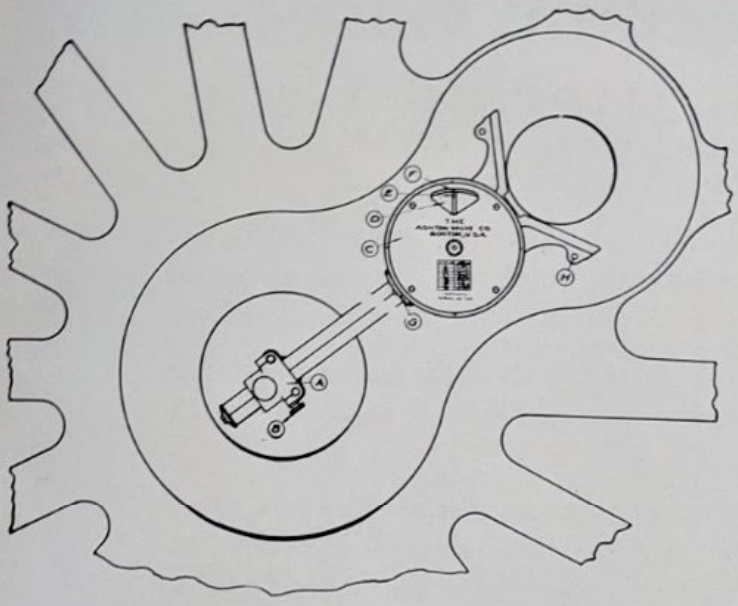


Fig. 1

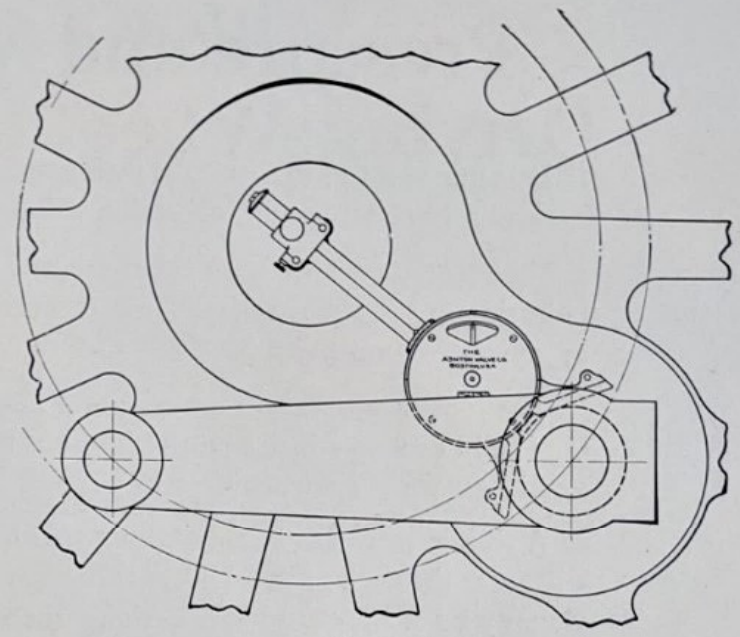
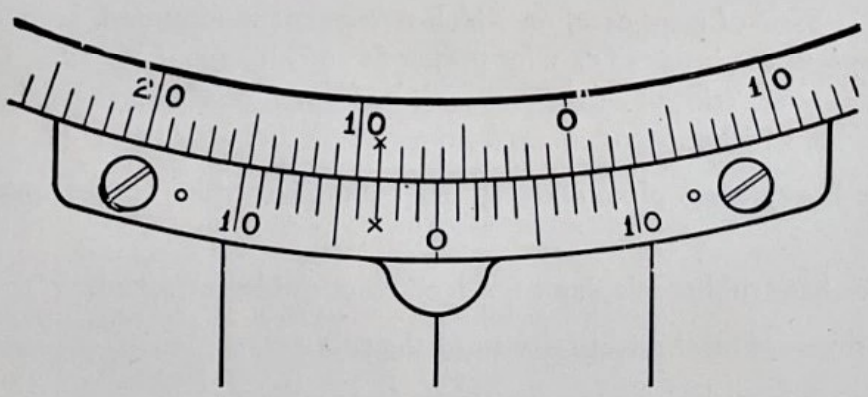


Fig. 2

When the zero line marked 0 on the vernier scale coincides with the zero line marked 0 on the dial scale, the instrument is standing horizontally. When the dial is moved so that the graduation or line on the vernier scale next to the zero line coincides with the graduation next to the zero graduation on the dial scale, the included angle of the center line of instrument and the horizontal center line has changed 1/10 of one degree or 6 minutes. To read the setting of the instrument, read directly from the dial scale, the number of whole degrees between the zero line, and the zero line of the vernier scale. Then count in the same direction, the number of graduations from the zero of the vernier scale to a graduation that coincides with a graduation on the dial scale; multiplying this number by 6 gives the number of minutes to be added to the number of whole degrees.



For example: Reading to the left as shown in the cut, the dial has moved 6 whole degrees from the zero on the vernier scale, and reading in the same direction the third graduation on the vernier scale coincides with a graduation on the dial scale as shown at X, indicating a total angle of 6 3/10 degrees or 6 degrees and 18 minutes.

As shown in Figure 1 the gage is drilled at (H) providing a means of suspending the gage from the pin by the use of a coil spring or strap.

Each gage is made of duralumin and bronze neatly and accurately finished and provided with a substantial box to protect it from injury.

Weight of instrument, 7⅝ pounds. Total weight, 12½ pounds.

Pressure and Vacuum Gages

It is our aim to put out only such goods as the best material combined with skilled workmanship and careful inspection will produce.

The seamless drawn brass tubes are well seasoned to prevent set, and subjected to a pulsating or whip test at 100% above working pressure, which removes stresses set up in process of forming.

The pinions and arbors are of nickel silver, noncorrodible, and the entire movement is of solid construction, having phosphor bronze sector and bushings in sizes 3½ inch and larger for pressures above 15 pounds.

A siphon must invariably be used with all steam gages so that nothing but water will enter the gage tube. Unless the steam gage is so protected it cannot be guaranteed. Gages used for pressure applications where there is no appreciable heat do not need a siphon.

Ashton Pressure and Vacuum Gages are made in many designs to meet the varied requirements of stationary and marine practice, hydraulic work, air, gas, etc. Some have a single Bourdon spring, while others are made with the Lane double spring and Bourdon movement. The latter combination reduces the vibration of the hand when used with fluctuating pressures, and also prevents freezing by automatically draining.

Gage connections are ¼ inch standard pipe size for 3½ to 12 inch, inclusive.

On smaller sizes they are ⅛ inch except Nos. 59, 59 A., 59 C., 96 and 97 which are ¼ inch. All are male thread except No. 61 which is female.

On 18 and 24 inch No. 51, all sizes Nos. 55, 100, 100A., 100 A.C., 101, 101 A. and 101 A. C., they are ½ inch pipe size.

The inside back of gage case, on which movement is mounted, is machined; also tops of dial posts and inside of case for proper fit and alignment of dial. This machine work insures perfect relation of the parts. The front edge of case is finished, affording an even bearing which prevents glass from coming loose.

Dials are heavy brass plate allowing deep stamping which insures permanency of filling.

Dull black hard rubber telephone finish on cases can be furnished.

All cast rings are machined to size to fit the case.

No cocks are furnished for pressures over 500 pounds.

When gages are to be mounted on tablet and threaded rings are required there is an extra charge on iron case gages. Brass case gages are so furnished.

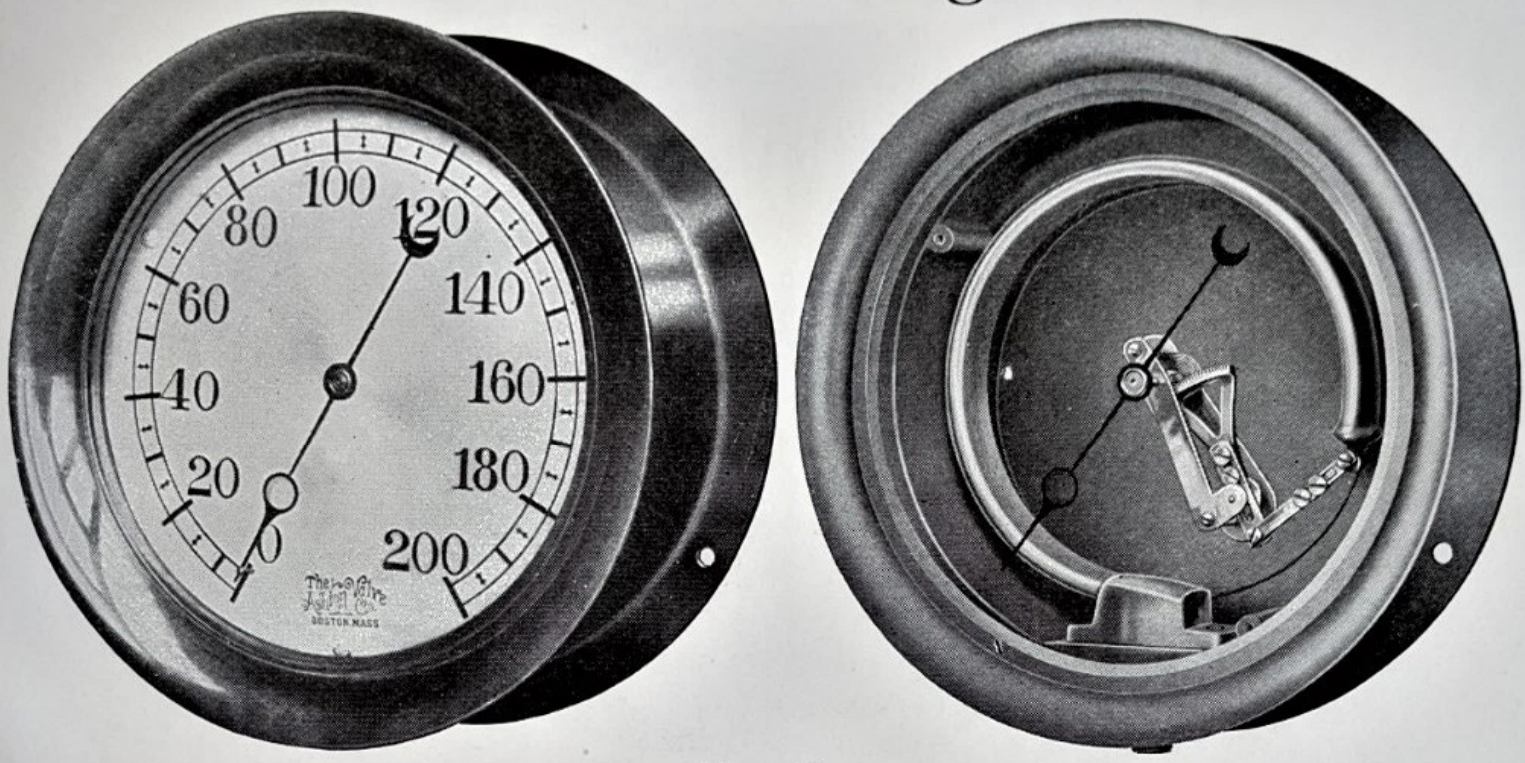
When gages are flush mounted, O. G. ring is standard.

The following pages point out the special features, to assist in selecting an Ashton gage suited to conditions.

For standard dial graduations of Ashton Gages and approximate weights see page 156.

For General Instructions for the application, care, and maintenance of gages see page 160.

Ashton Single Spring Pressure Gage



No. 51

A high-grade, single-spring pressure gage specially adapted and most commonly used for stationary boilers, pressure tanks, etc. It has movement of noncorrodible metal, spring of seamless drawn brass tubing.

Movement has nickel silver pinion and shafts, phosphor bronze sector and bushing except for 15 pounds pressure and less, and 2½ and 3 inch sizes.

Graduated to any desired pressure up to 1500 pounds. There is an extra charge for pressures over 500 pounds and no cock is furnished.

When gages are to be mounted on tablet and threaded rings are required there is an extra charge on iron case gages. Brass case gages are so furnished.

Dial is silvered.

For size of connection see page 124.

Orders should specify style number of gage, size, style of case, maximum pressure.

Siphons must be used with all steam gages.

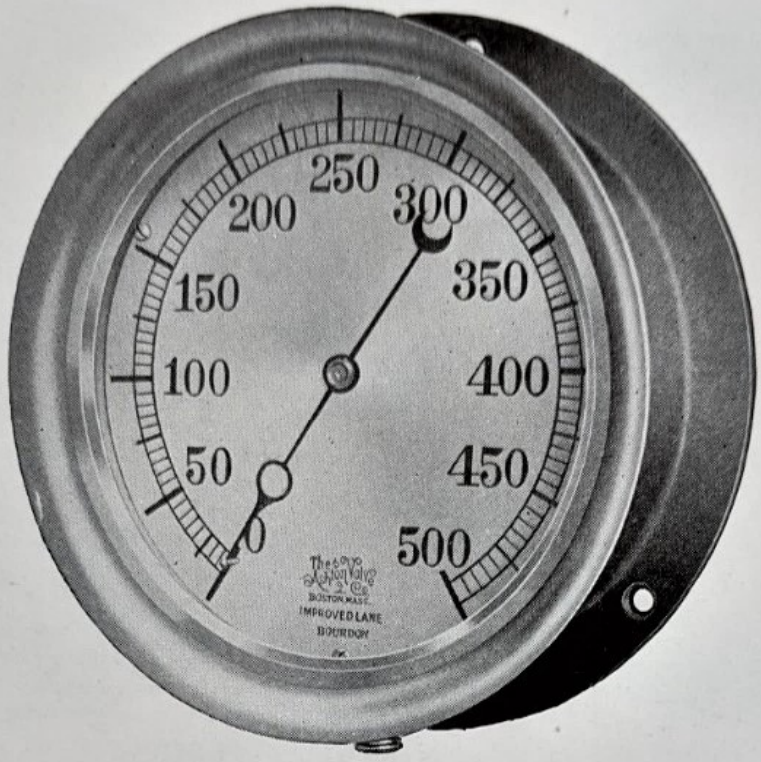
LIST PRICES, INCLUDING COCK

Size	Iron Case, Brass Ring	Iron Case, N. P. Ring	Brass Case	N. P. Case	Brass Deep Case, O. G. Ring	N. P. Deep Case, O. G. Ring
*24 inch Dial	$200.00	$206.00	$260.00	$280.00		
*18 inch Dial	110.00	113.00	155.00	167.50		
‡12 inch Dial	50.00	51.50	75.00	79.00	$80.00	$84.00
‡10 inch Dial	32.00	33.00	40.00	43.00	44.00	47.00
‡ 8½ inch Dial	22.00	22.75	30.00	32.50	33.50	36.00
‡ 6¾ inch Dial	16.00	16.60	20.00	22.00	23.00	25.00
† 6 inch Dial	13.00	13.50	16.00	17.50	18.50	20.00
† 5 inch Dial	8.00	8.20	11.00	12.00		
† 4½ inch Dial	8.00	8.20	10.00	11.00		
† 3½ inch Dial	7.00	7.18	9.00	9.75		
* 3 inch Dial	6.00	6.15	8.00	8.60		
* 2½ inch Dial	6.00	6.15	8.00	8.60		

Subject to Discount

For [illegible] list of parts and prices see page 174

Ashton Double Spring Pressure Gage



No. 52 L.B.D.
(Stationary Style)

Extensively used in stationary, marine, pump, and water service, this gage is a distinct improvement over the ordinary single-spring gage. The double spring construction minimizes vibration and permits tubes to be drained to prevent freezing. The movement, which has nickel silver pinion and shafts, phosphor bronze sector and bushings, is very durable.

Dial is silvered.

Connection is ¼ inch pipe thread male.

Siphons must be used with all steam gages.

Orders should specify style number of gage, size, style of case and maximum pressure.

Graduated to any desired maximum pressure up to 1500 pounds per square inch, with an extra charge and without cock for pressures over 500 pounds.

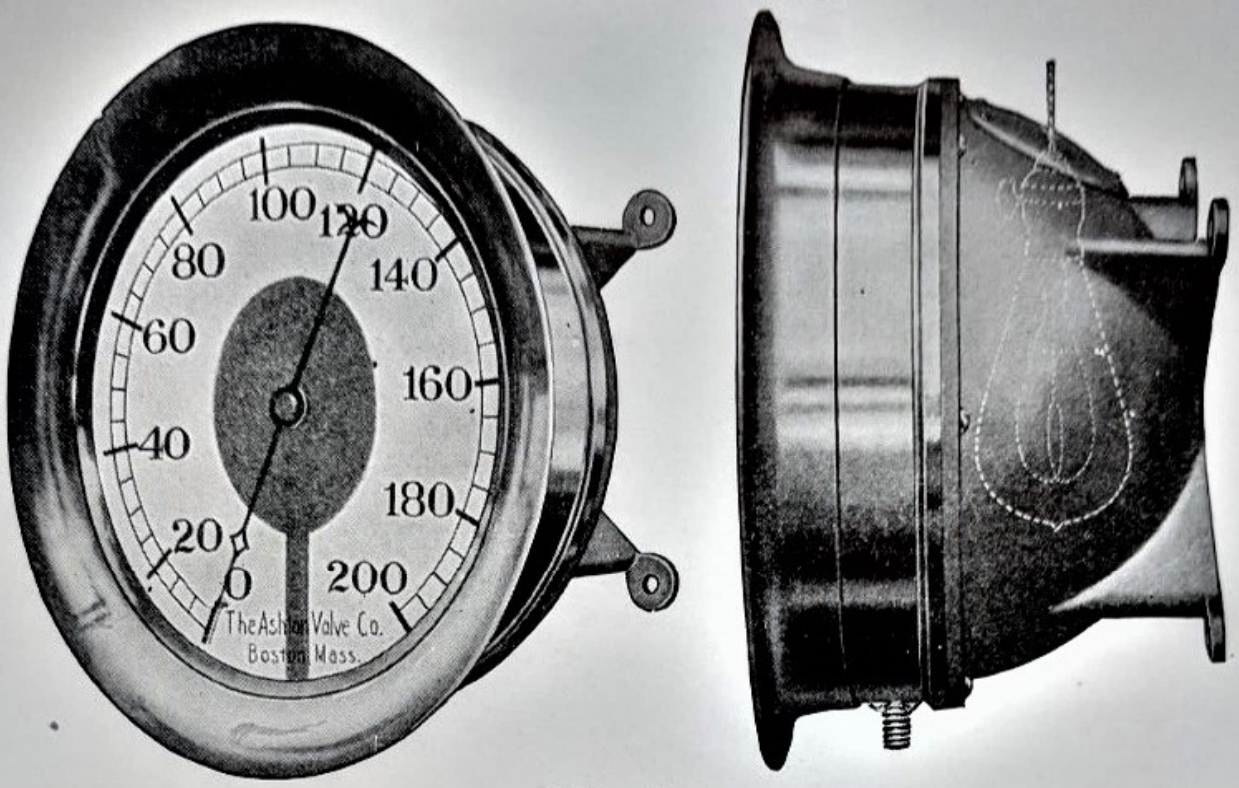
LIST PRICES, INCLUDING COCK

Size	Iron Case, Brass Ring	Iron Case, N. P. Ring	Brass Case	N. P. Case	Brass Deep Case, O. G. Ring	N. P. Deep Case, O. G. Ring
‡12 inch Dial	$55.00	$56.50	$80.00	$84.00	$35.00	$39.00
‡10 inch Dial	37.00	38.00	45.00	48.00	49.00	52.00
‡ 8½ inch Dial	25.00	25.75	34.00	36.50	37.50	40.00
‡ 6¾ inch Dial	18.00	18.60	22.00	24.00	25.00	27.00
† 6 inch Dial	15.00	15.50	18.00	19.50	20.75	22.25
† 5 inch Dial	11.00	11.20	13.00	14.00		
† 4½ inch Dial	10.00	10.20	12.00	13.00		

Subject to Discount

For reference list of parts and prices see page 175.
For standard graduations and weights see page 156.
For dimensions and style of ring

Ashton Illuminated Dial Pressure Gage



No. 69

This gage is designed especially for dark boiler rooms, and for use when the steam plant is operated at night.

The incandescent electric light is placed within the bowl back of the gage case, as shown above. The light illuminates the interior and reflects onto the ground-glass dial whereby the position of the gage hand and the pressure graduations show plainly.

The gage is attached to the wall or bracket by means of the lugs on the casing, and the steam pipe is connected in the usual way.

Movement has phosphor bronze bushings and sector, nickel silver pinion and shafts.

Graduated to any desired pressure up to 800 pounds per square inch, with extra charge over 500 pounds.

For larger illuminated dial gages see pages 128 to 131.

Connection is ¼ inch pipe size, male. Ring is style "B".

Siphons must be used with all steam gages.

Orders should specify style number of gage, size, style of case and maximum pressure.

LIST PRICES, INCLUDING COCK‡
Single Spring, Bourdon Style

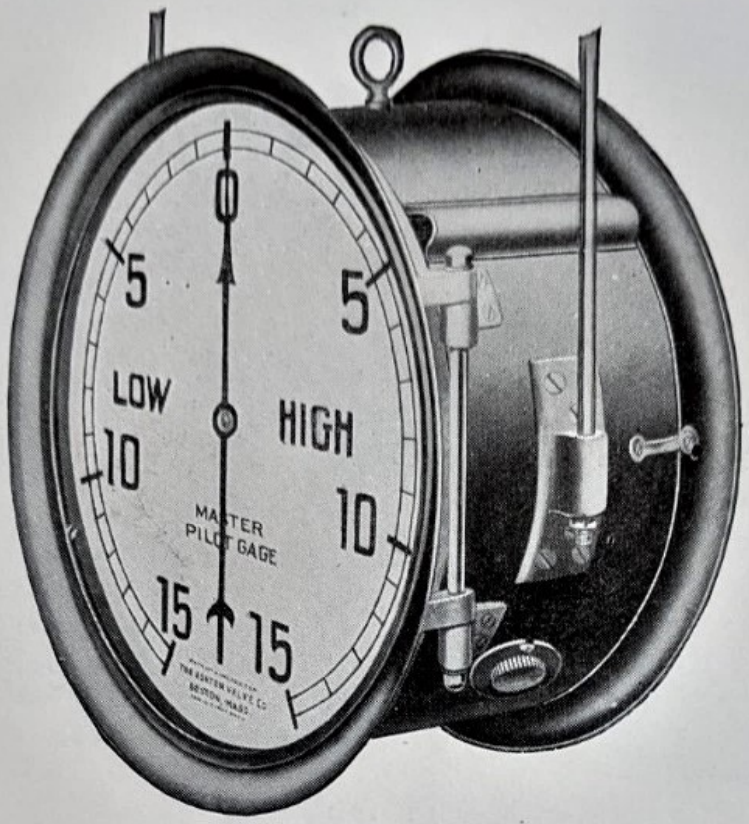
Size	Iron Case Brass Ring	Iron Case N. P. Ring	Brass Case	N. P. Case
12 inch Dial	$77.00	$79.00	$86.00	$90.00
10 " "	67.00	68.50	74.00	77.00
8½ " "	60.00	61.00	66.00	68.00

LIST PRICES, INCLUDING COCK‡
Double Spring, Lane Style

Size	Iron Case Brass Ring	Iron Case N. P. Ring	Brass Case	N. P. Case
12 inch Dial	$81.00	$83.00	$90.00	$94.00
10 " "	71.00	72.50	78.00	81.00
8½ " "				73.00

Ashton Master Pilot Pressure Gage

With Double Pilot Dials



No. 100AC
Patented and Trademark Registered

This gage is designed for installation in large power plants. By its use the steam pressure indicated may be seen at a distance from any part of the boiler room. It is intended to be connected direct to the main steam header, for use as the firing gage for the entire battery of boilers. The limited dial graduation, shown in the above cut, with the working pressure at top of dials, permits of unusually coarse graduations and large figures, so that the slightest variation of pressure may be readily observed.

The economy in operation of a power plant equipped with this pilot gage is obviously apparent, when it is considered that standard size boiler pressure gages with their smaller dials, and necessarily finer graduations, are not easily read, do not show small pressure fluctuations, and indicate only boiler pressure and not the more important pressure in the main header.

All Master Pilot Pressure Gages have special multiple tube and operating mechanism, also hand calibrating adapter. The O at the top of dial represents the working pressure. The dials are graduated through a range of 15 (or 30) lbs. LOW and 15 (or 30) lbs. HIGH.

It has heavy translucent glass dials illuminated by electric lamps, spaced around the inside of the case. Electric connection is made to flush receptacle on outside of case. Also furnished non-illuminated.

Special large size siphon must be used.

For smaller illuminated gage and smaller non-illuminated pilot gage see pages 127 and 132.

Connection is ½" pipe size, male.

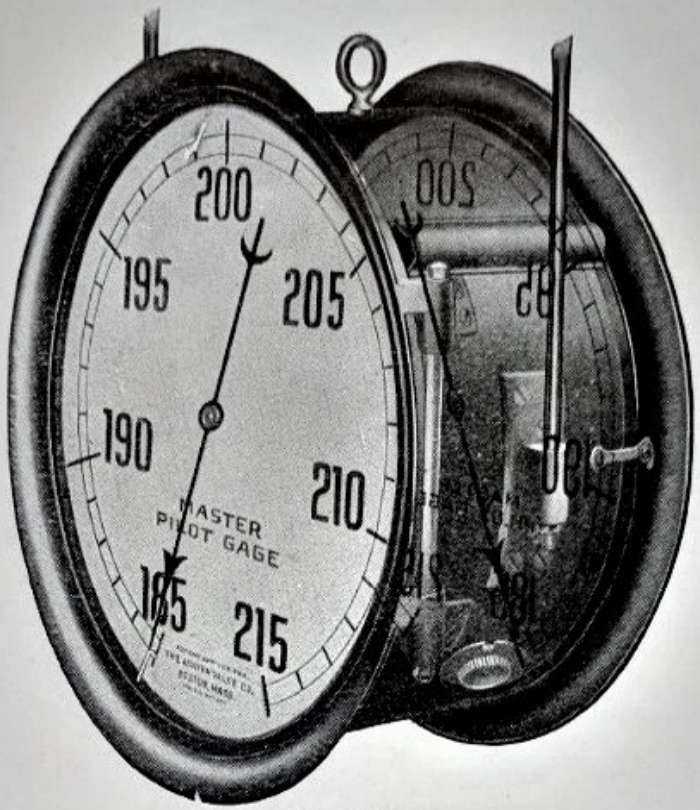
Orders should specify style number of gage, size, illuminated or non-illuminated dials, range of pressure, maximum boiler pressure, and mean working pressure represented by O.

List prices are same as No. 100A shown on page 129.

List prices apply to gages for pressures up to and including 500 pounds. An extra charge will be made for pressures exceeding 500 pounds on both Master and Master Pilot Gages. Also a further additional charge will be made when the maximum

Ashton Master Pilot Pressure Gage

With Double Dials



No. 100A
Patented and Trademark Registered

This gage is provided with heavy translucent glass dials illuminated by electric lamps, spaced around the inside of the case. Electric connection is made to flush receptacle on outside of case. Also furnished non-illuminated.

Special large size siphon must be used. For smaller non-illuminated pilot gage see page 132.

Standard range of pressure is 15 (or 30) pounds below and 15 (or 30) above working pressure which should be specified. Connection is ½ inch pipe size, male.

Orders should specify style number of gage, size, illuminated or non-illuminated dials, range of pressure, maximum boiler pressure, style of case and ring.

LIST PRICES Nos. 100A. and 100A.C.

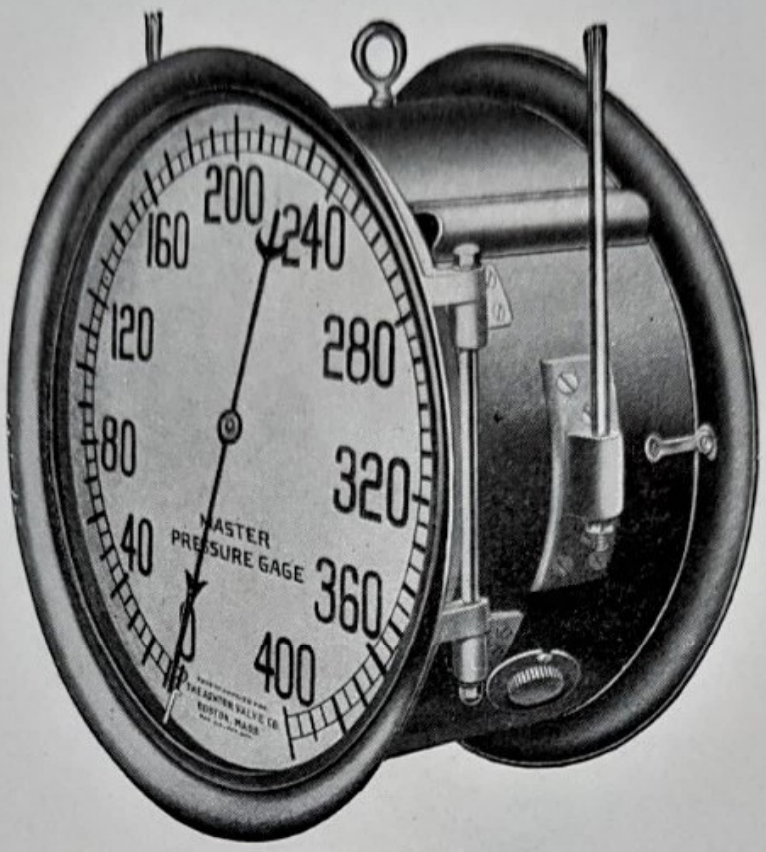
Size inches	40		30		24		18	
	Illuminated	Non-Illuminated	Illuminated	Non-Illuminated	Illuminated	Non-Illuminated	Illuminated	Non-Illuminated
Iron Case with Polished Brass or Aluminum Rings	$850	$735	$560	$520	$370	$345	$320	$300
Brass Case with Polished Brass or Aluminum Rings	990	950	675	635	470	440	390	370
Add for Nickel Plated Rings	$25.00		$15.00		$10.00		$8.00	

Subject to Discount

We particularly recommend Aluminum Rings for the 40- and 30-inch sizes to reduce weight. When specified, rings will be furnished with dull black hard rubber finish, without extra charge.

List prices apply to gages for pressures up to and including 500 pounds. An extra charge will be made for pressures exceeding 500 pounds on both Master and Master Pilot Gages. Also a further additional charge will be made when the maximum pres-

With Double Dials



No. 100
Patented and Trademark Registered

This gage is similar to the Master Pilot Gages with large dials but shows all the graduations and figures from zero to the maximum. It is for use in large power houses where it is desired to have dials with prominent graduations and figures, by which the boiler pressure may readily be observed from a distance. Dials should be graduated to double the working pressure so hand will be vertical.

Dials are heavy translucent glass, illuminated by lamps spaced around the inside of the case. Electric connection is made to flush receptacle on outside of case. Also furnished non-illuminated.

All Master Pressure and Pilot Gages have a lug on each side of the case for supporting rods, an eye bolt at the top of the case for convenience in installation, hinged rings for convenience in adjusting and a hand calibrating adaptor by which the indicating hand may be adjusted to the correct pressure while the gage is in service and without the necessity of removing it.

Special large siphon must be used. Connection is ½ inch pipe size, male.

For smaller illuminated and non-illuminated gages see pages 127 and 132.

Orders should specify style number of gage, size, illuminated or non-illuminated dials, maximum pressure, style of case and ring.

LIST PRICES

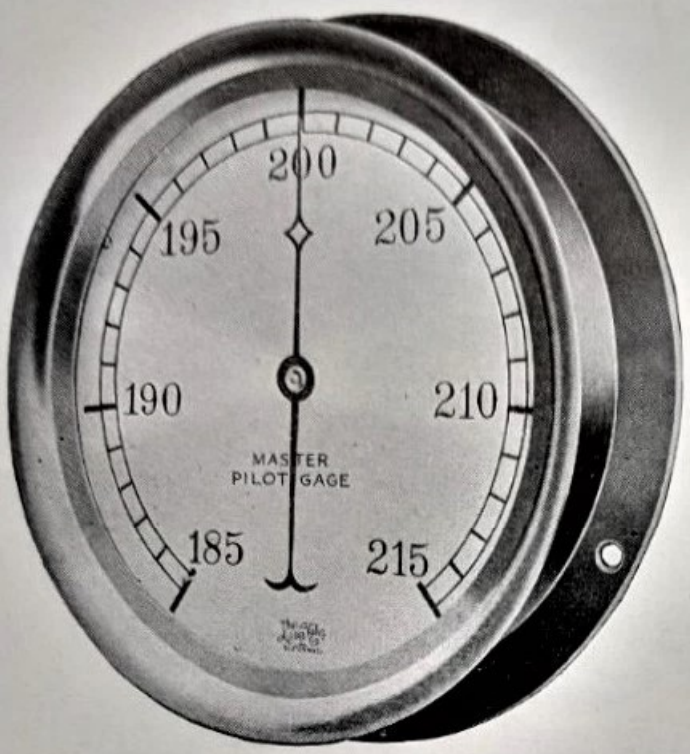
Size, inches	40		30		24		18	
	Illuminated	Non-Illuminated	Illuminated	Non-Illuminated	Illuminated	Non-Illuminated	Illuminated	Non-Illuminated
Iron Case with Polished Brass or Aluminum Rings	$800	$760	$450	$410	$340	$315	$290	$270
Brass Case with Polished Brass or Aluminum Rings	940	900	565	525	440	410	360	340
Add for Nickel Plated Rings	$25.00		$15.00		$10.00		$8.00	

Subject to Discount

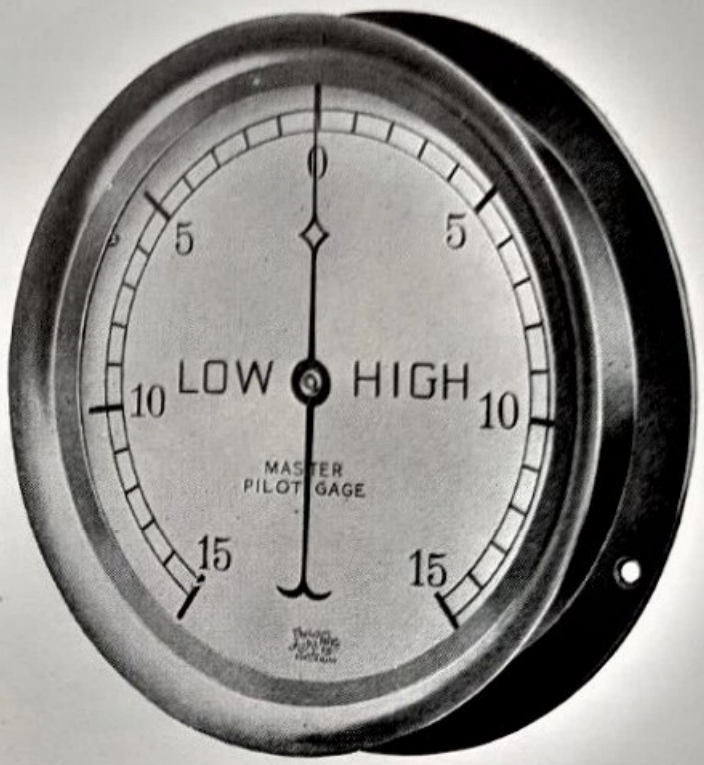
We particularly recommend Aluminum Rings for the 40 inch and 30 inch

Ashton Pilot Pressure Gage

Small Pattern



No. 51 H.



No. 51 H.C.

Patents Pending and Trademark Registered

These gages are the same in construction as the Nos. 100A., 100 A. C. and 101 A. shown on pages 128, 129 and 131 but in smaller sizes and with silvered dials.

They are regularly made in sizes 8½, 10 and 12 inch, in iron or brass case, graduated as specified up to 500 pounds working pressure with a minimum range of 15 pounds on each side, up to 300 pounds; 30 pounds on each side from 300 to 500 pounds.

Higher graduations can be furnished at an extra charge.

The movement has phosphor bronze sector and bushings, nickel silver pinion and sector shaft.

Multiple spring is of seamless drawn brass tubing.

Special large size siphon must be used.

Iron case gages have cast brass slip ring, style "B," held on by screws.

When gages are to be mounted on tablet and threaded rings are required there is an extra charge on iron case gages.

Brass case gages have cast brass threaded ring, style "A."

Connection is ¼ inch pipe size, male.

Lever handle union cock is furnished.

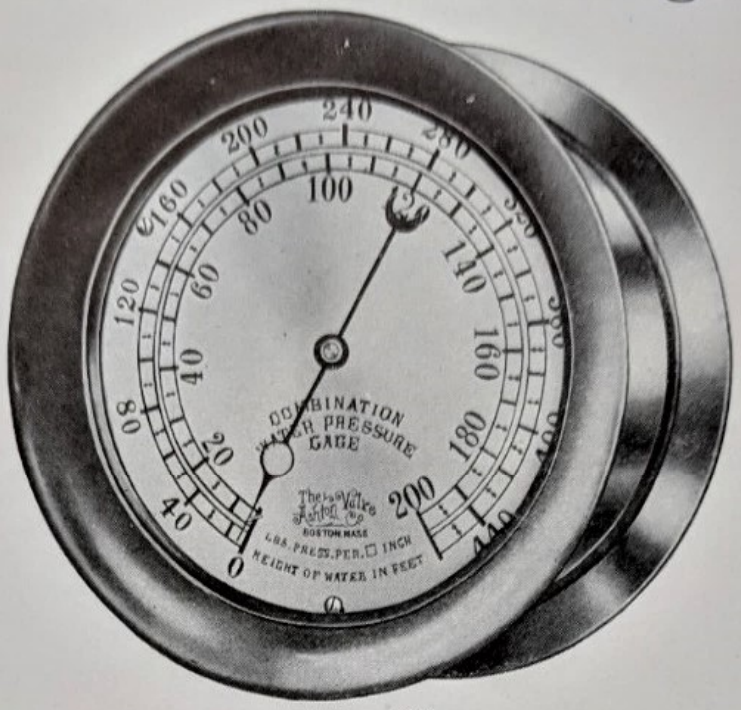
Orders should specify style number of gage, size, marking on dial, style of case, maximum boiler pressure and if style No. 51 H. C., the pressure corresponding to 0 on dial.

LIST PRICES, INCLUDING COCK

Size	Iron Case, Brass Ring	Iron Case, N. P. Ring	Brass Case	N. P. Case
12 inch Dial	$62.50	$63.75	$87.50	$91.00
10 inch Dial	56.25	57.00	78.75	81.25
8½ inch Dial	52.50	53.00	72.50	74.50

Subject to Discount

Ashton Combination Water Pressure Gage



No. 56

This gage is used principally in pumping stations, water works, on service pipes, etc. It has double graduated dial showing pressure in pounds per square inch and corresponding height of water column.

Graduated for any pressure with an extra charge over 500 pounds. In ordering, give maximum pressure or maximum height of water.

Aside from the graduation this gage is of the same general construction as No. 51.

When gages are to be mounted on tablet and threaded rings are required there is an extra charge on iron case gages. Brass case gages are so furnished.

Care must be used to keep connection pipe free from air; otherwise indications will be incorrect.

Connection is ¼ inch pipe size, male.

Orders should specify style number of gage, size, style of case and maximum pressure.

LIST PRICES, INCLUDING COCK

Size	Iron Case, Brass Ring	Iron Case, N. P. Ring	Brass Case	N. P. Case	Brass Deep Case, O. G. Ring	N. P. Deep Case, O. G. Ring
‡12 inch Dial	$60.00	$61.50	$80.00	$84.00	$85.00	$89.00
‡10 inch Dial	40.00	41.00	50.00	53.00	54.00	57.00
‡ 8½ inch Dial	30.00	30.75	40.00	42.50	43.50	46.00
‡ 6¾ inch Dial	20.00	20.60	25.00	27.00	28.00	30.00
† 6 inch Dial	16.00	16.50	20.00	21.50	23.00	24.50
†4½ or 5 inch Dial	12.00	12.20	14.00	15.00		

Subject to Discount

To raise a column of mercury 2.04 inches, or to raise a column of water 27.71 inches, requires one pound pressure — at 60° F.

For weights see page 156.

For dimensions and style of ring see pages 153 and 158.

†T handle cock.

‡Lever handle union cock.

No. 53

In this gage the spring and movement are the same as in our single-spring pressure gage No. 51; but the spring is reversed to indicate vacuum. Ordinarily this gage is graduated to 30 inches of mercury.

When specified it will be graduated to pounds equivalent to inches of mercury.

When gages are to be mounted on tablet and threaded rings are required, there is an extra charge on iron case gages. Brass case gages are so furnished.

For size of connection see page 124.

Orders should specify style number of gage, size, style of case and maximum graduation.

LIST PRICES, INCLUDING COCK

Size	Iron Case, Brass Ring	Iron Case, N. P. Ring	Brass Case	N. P. Case	Brass Deep Case, O. G. Ring	N. P. Deep Case, O. G. Ring
‡12 inch Dial	$50.00	$51.50	$75.00	$79.00	$80.00	$84.00
‡10 inch Dial	32.00	33.00	40.00	43.00	44.00	47.00
‡ 8½ inch Dial	22.00	22.75	30.00	32.50	33.50	36.00
‡ 6¾ inch Dial	16.00	16.60	20.00	22.00	23.00	25.00
† 6 inch Dial	13.00	13.50	16.00	17.50	18.50	20.00
† 5 inch Dial	8.00	8.20	11.00	12.00		
† 4½ inch Dial	8.00	8.20	10.00	11.00		
† 3½ inch Dial	7.00	7.18	9.00	9.75		
* 3 inch Dial	6.00	6.15	8.00	8.60		
* 2½ inch Dial	6.00	6.15	8.00	8.60		

Subject to Discount

For weights see page 156.
For dimensions and style of ring see pages 153 and 158.
*No cock furnished.

Ashton Compound Pressure and Vacuum Gage

No. 54

This gage indicates either pressure or vacuum and is graduated in pounds per square inch for pressure and inches of mercury for vacuum. Regularly graduated to 15 pounds pressure and 30 inches vacuum, but can be graduated to any pressure or vacuum specified.

Aside from the graduation this gage is of the same general construction as the No. 51.

When gages are to be mounted on tablet and threaded rings are required there is an extra charge on iron case gages. Brass case gages are so furnished.

Connection is ¼ inch pipe size, male.

Siphons must be used with all steam gages.

Orders should specify style number of gage, size, style of case and maximum pressure.

LIST PRICES, INCLUDING COCK

Size	Iron Case, Brass Ring	Iron Case, N. P. Ring	Brass Case	N. P. Case	Brass Deep Case, O. G. Ring	N. P. Deep Case, O. G. Ring
‡12 inch Dial	$60.00	$61.50	$80.00	$84.00	$85.00	$89.00
‡10 inch Dial	40.00	41.00	50.00	53.00	54.00	57.00
‡ 8½ inch Dial	30.00	30.75	40.00	42.50	43.50	46.00
‡ 6¾ inch Dial	20.00	20.60	25.00	27.00	28.00	30.00
† 6 inch Dial	16.00	16.50	20.00	21.50	23.00	24.50
† 5 inch Dial	14.00	14.25	16.00	17.25		
† 4½ inch Dial	12.00	12.20	14.00	15.00		
† 3½ inch Dial	10.00	10.18	12.00	12.75		

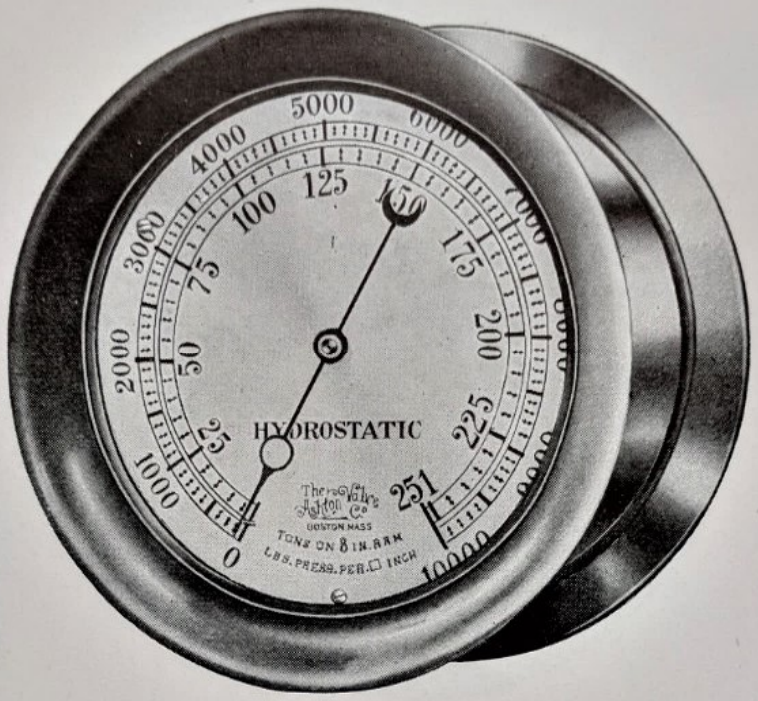
Subject to Discount

For weights see page 156.
For dimensions and style of ring see pages 153 and 158.

†T handle cock.

‡Lever handle union cock.

Ashton Hydraulic Wheel Press Gage



No. 55

This gage with special bored tool steel spring is for indicating higher pressures up to 25,000 pounds. This gage is accurate and durable.

When ordering give exact diameter of ram for "tons on ram."

Steel spring is rustproofed to prevent corrosion.

Connection is ½ inch pipe size, male.

Ring is style "A."

Orders should specify style number of gage, size, style of case and maximum pressure.

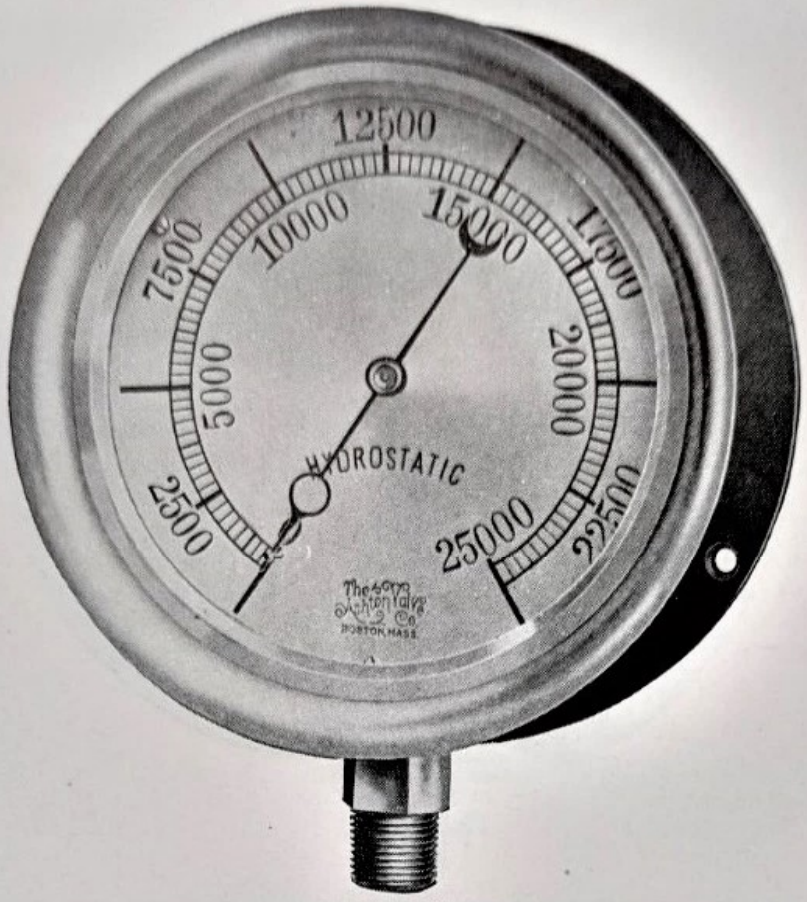
LIST PRICES, WITHOUT COCK

Size	Iron Case, Brass Ring	Iron Case, N. P. Ring	Brass Case
12 inch Dial	$110.00	$111.50	$125.00
10 inch Dial	90.00	91.00	100.00
8½ inch Dial	70.00	70.75	80.00
6¾ inch Dial	50.00	50.60	60.00
6 inch Dial	35.00	35.50	40.00
5 inch Dial	30.00	30.50	35.00
4½ inch Dial	25.00	25.50	30.00

Subject to Discount

For maximum hand add $5.00 to list price.
For pressures 1500 pounds and less see page 125.
Maximum pressure on 4½ and 5 inch sizes is 10,000 pounds.
For Hydraulic Cocks and Check Valves see page 162.
For weights see page 156.
For dimensions see page 158.

Ashton Hydraulic Pressure Gage



No. 55C.

This gage with special bored tool steel spring is for indicating higher pressures up to 25,000 pounds. This gage is accurate and durable.

Steel spring is rustproofed to prevent corrosion.

Connection is ½ inch pipe size, male.

Ring is style "A."

Orders should specify style number of gage, size, style of case and maximum pressure.

LIST PRICES, WITHOUT COCK

Size	Iron Case, Brass Ring	Iron Case, N. P. Ring	Brass Case	N. P. Case
12 inch Dial	$107.50	$109.00	$122.50	$126.50
10 inch Dial	87.50	88.50	97.50	100.50
8½ inch Dial	67.75	68.50	77.75	80.25
6¾ inch Dial	47.75	48.35	57.75	59.75
6 inch Dial	33.00	33.50	38.00	39.50
5 inch Dial	28.00	28.50	33.00	34.00
4½ inch Dial	23.25	23.75	28.25	29.25

Subject to Discount

For maximum hand add $5.00 to list price.

For pressures 1500 pounds and less see page 125.

Maximum pressure on 4½ and 5 inch sizes is 10,000 pounds.

Ashton Ammonia Gage

No. 57

Made especially for use with ammonia or any other gas or liquid which attacks the brass spring of ordinary gages. The spring is of steel, rustproofed to prevent corrosion, movement has phosphor bronze sector and bushings, nickel silver pinion and shafts and is nickel plated.

Socket is drop forged steel.

Ring is same as on No. 51.

Dial is silvered.

Connection is ¼ inch pipe size, male.

When gages are to be mounted on tablet and threaded rings are required there is an extra charge on iron case gages. Brass case gages are so furnished.

When specified, this gage will be graduated to indicate both pressure and vacuum on the same dial, but ordinarily it shows pressure only.

Orders should specify style of case, maximum pressure, whether vacuum graduation and back or bottom connection is desired.

LIST PRICES, WITHOUT COCK

Size	Iron Case, N. P. Ring	Brass Case	N. P. Case
12 inch Dial	$79.50	$98.00	$102.00
10 inch Dial	58.00	68.00	71.00
8½ inch Dial	45.75	55.00	57.50
6¼ inch Dial	40.60	45.00	47.00
6 inch Dial	35.50	39.00	40.50
5 inch Dial	30.50	33.00	34.25
4½ inch Dial	25.50	27.00	28.00

Subject to Discount

For weights see page 156.

Ashton Pyrometer Steam Gage

No. 58

The inner circle on the dial of this gage is graduated in pounds per square inch in the usual way and the outer circle shows corresponding temperature, Fahrenheit. This is convenient wherever both pressure and temperature should be read simultaneously.

Aside from the graduation, this gage is of the same general construction as the No. 51.

When gages are to be mounted on tablet and threaded rings are required there is an extra charge on iron case gages. Brass case gages are so furnished.

Connection is ¼ inch pipe size, male.

Siphons must be used on all steam gages.

Orders should specify style number of gage, size, style of case and maximum pressure.

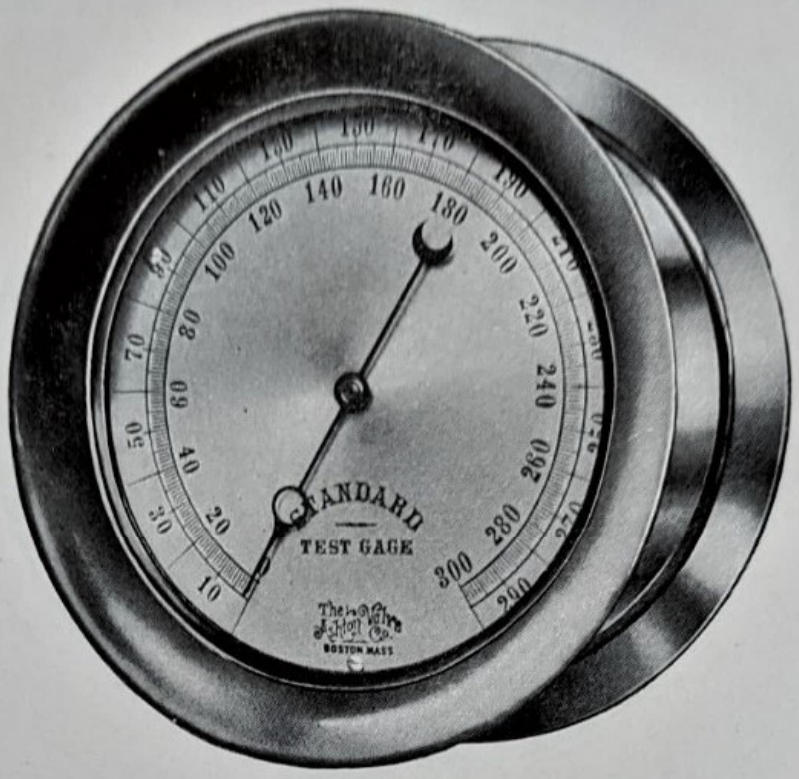
LIST PRICES, INCLUDING COCK

Size	Iron Case, Brass Ring	Iron Case, N. P. Ring	Brass Case	N. P. Case	Brass Deep Case, O. G. Ring	N. P. Deep Case, O. G. Ring
‡12 inch Dial	$60.00	$61.50	$80.00	$84.00	$85.00	$89.00
‡10 inch Dial	40.00	41.00	50.00	53.00	54.00	57.00
‡ 8½ inch Dial	30.00	30.75	40.00	42.50	43.50	46.00
‡ 6¾ inch Dial	20.00	20.60	25.00	27.00	28.00	30.00
† 6 inch Dial	16.00	16.50	20.00	21.50	23.00	24.50

Subject to Discount

For standard graduations and weights see page 156.

Ashton Standard Test Gage



No. 59

The Ashton Standard Test Gage is constructed for extreme accuracy and sensitiveness, and can be relied upon, whether used for testing other gages or for indicating pressure under conditions calling for extreme precision.

Every care is exercised both in workmanship and selection of material; each gage is tested by Dead Weight Gage Tester and graduated as shown below.

Regularly graduated to 300 pounds, but can be graduated to any desired pressure.

An extra charge is made for pressures over 500 pounds and increment marks arranged according to pressure.

Movement has phosphor bronze sector and bushings, nickel silver pinion and shafts.

Ring is cast brass, threaded, O.G. style "A," except 3 inch, which is style "Q".

Connection is ¼ inch pipe size, male. Dial is silvered.

Siphons must be used with all steam gages.

Orders should specify style of case and maximum pressure.

LIST PRICES, INCLUDING COCK

Size	Brass Case	N. P. Case	Graduations up to 300 lbs.
‡10 inch Dial	$50.00	$53.00	1 pound marks
‡ 8½ inch Dial	40.00	42.50	
‡ 6¾ inch Dial	30.00	32.00	
† 6 inch Dial	25.00	26.50	
† 5½ inch Dial	20.00	21.25	
† 4½ inch Dial	16.00	17.00	2 pound marks
† 3½ inch Dial	14.00	14.75	
* 3 inch Dial	14.00	14.60	

Subject to Discount

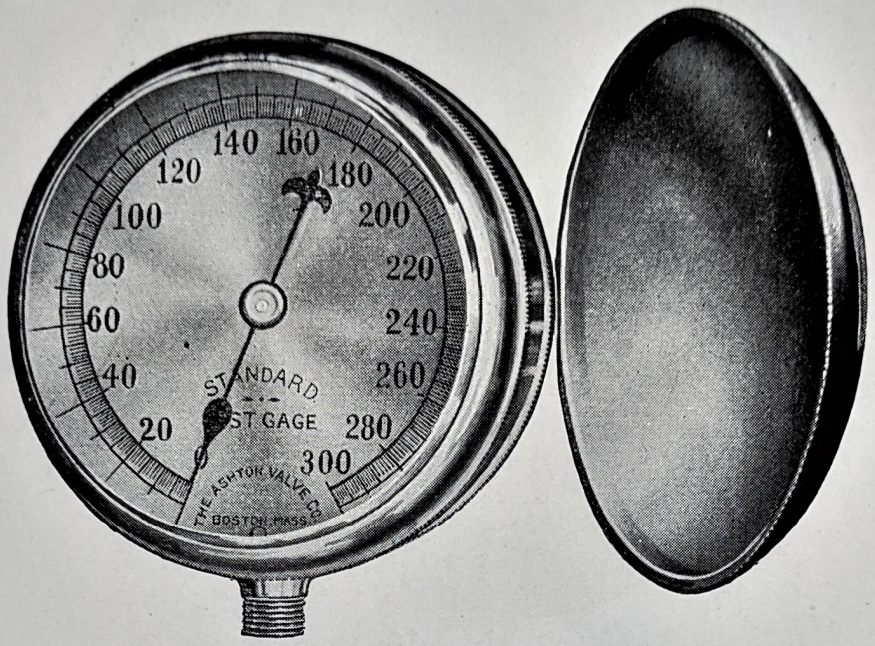
For small Pocket Test Gages see next page. For weights see page 156.
For dimensions and style of ring see pages 153 and 158.

*No cock furnished.

†T handle cock.

‡Lever handle union cock.

Ashton Standard Pocket Test Gage



No. 59A.

This neat, light test gage is adapted for boiler inspectors, chief engineers, master mechanics, and air brake inspectors. It has Ashton quality throughout — spring of seamless drawn brass tubing, noncorrodible movement, and hand-graduated dial.

A bevel plate glass front with cover insures perfect protection whether carried in the pocket or in the tool box.

It is made in 3 inch size, graduated for any pressure up to and including 500 pounds, with brass, nickel-plated, or aluminum case and cover. Can be furnished for higher pressures at an extra charge.

The 3 inch diameter of dial limits the graduations as follows:

160 pounds maximum.....1 pound marks
300 pounds maximum.....2 pound marks
500 pounds maximum.....5 pound marks

Ring is cast brass, threaded, style "Q."

Dial is silvered.

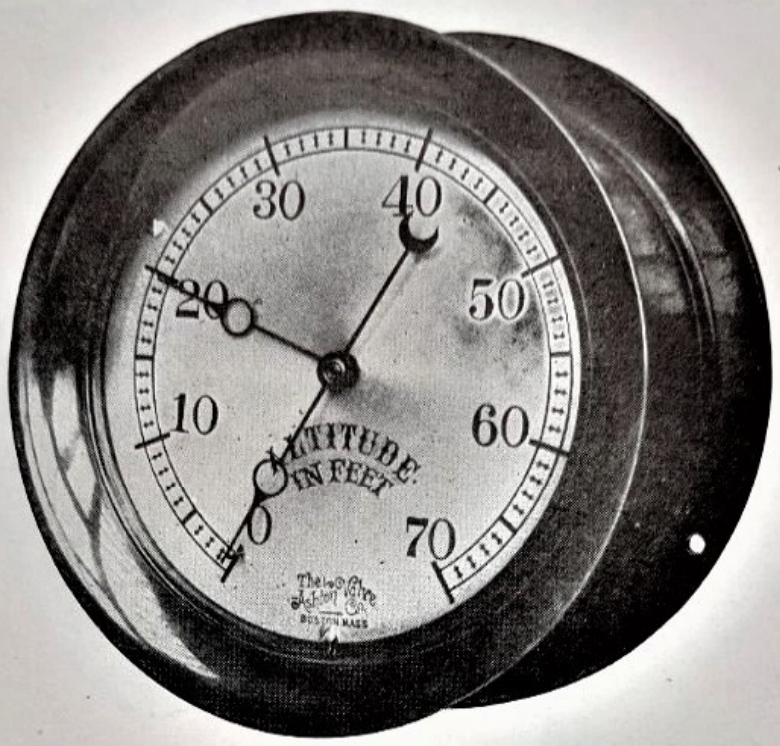
Connection is ¼ inch pipe size, male.

Orders should specify style number of gage, style of case, maximum pressure.

LIST PRICES, WITHOUT COCK

Size	Brass Case	N. P. Case	Aluminum Case
3 inch Dial	$14.00	$14.60	$15.50
Weight ounces	16	16	10

Ashton Altitude Gage



No. 60

Designed for indicating both the actual and desired water level in tanks, standpipes, reservoirs, and the expansion tanks of hot-water heating systems.

The red hand, called the index or lazy hand, is fixed when the gage is put in place and shows the water level that should be maintained. The black hand, operated by the gage spring and mechanism, shows the actual height of water and the fluctuations. The red hand is independent of the movement of the black hand.

The dial is graduated in feet of water.

Aside from the graduation and index hand this gage is of the same general construction as the No. 51.

When gages are to be mounted on tablet and threaded rings are required there is an extra charge on iron case gages. Brass case gages are so furnished.

Care must be used to keep connection pipe free from air; otherwise indications will be incorrect.

When connected to discharge of a pump, No. 120 Retard Device should be used to reduce pulsations.

Connection is ¼ inch pipe size, male.

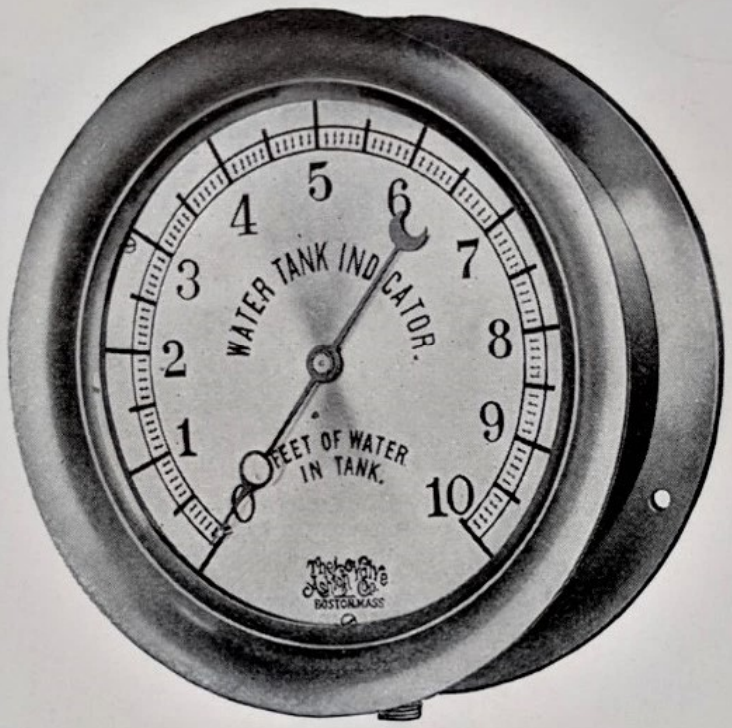
Orders should specify style number of gage, size, style of case and maximum graduation.

LIST PRICES, INCLUDING COCK

Size	Iron Case, Brass Ring	Iron Case, N. P. Ring	Brass Case	N. P. Case	Brass Deep Case, O. G. Ring	N. P. Deep Case, O. G. Ring
‡12 inch Dial	$60.00	$61.50	$80.00	$84 00	$85.00	$89.00
‡10 inch Dial	40.00	41.00	50.00	53.00	54.00	57.00
‡ 8½ inch Dial	30.00	30.75	40.00	42.50	43.50	46.00
‡ 6¾ inch Dial	20.00	20.60	25.00	27.00	28.00	30.00
† 6 inch Dial	16.00	16.50	20.00	21.50	23.00	24.50
†4½ or 5 in. "	12.00	12.20	14.00	15.00	....	....

Ashton Water Tank Indicator

Altitude Gage



No. 60 A.

The special design altitude gage, as above illustrated, is particularly adapted for use on standpipes, reservoirs, or similar installations where it is desired to have an indicator gage that will show the exact height of water in feet and inches at any time.

This gage will register the height of water in the tank or reservoir. This is accomplished by means of a slide adjustment of the gage-operating mechanism, whereby the difference in elevation between the location of the gage and that of the tank is equalized. The gage hand does not operate until the water rises above the bottom of the tank or reservoir.

In ordering this type of gage it is necessary to specify the exact height that the bottom of the tank or reservoir is located above the gage and also in order to have the dial properly graduated the maximum height of water level in tank should be given.

This gage is not recommended for use when the ratio of elevation of tank above gage to maximum depth of water in tank exceeds ten to one. Minimum head, 40 feet.

Care must be used to keep the pipe between gage and tank free from air; otherwise indications will be incorrect.

If subjected to any fluctuation of pressure, No. 120 Retard Device should be used to reduce pulsations. On account of its narrow range, this gage must not be subjected to over pressure.

Connection is ¼ inch pipe size, male.

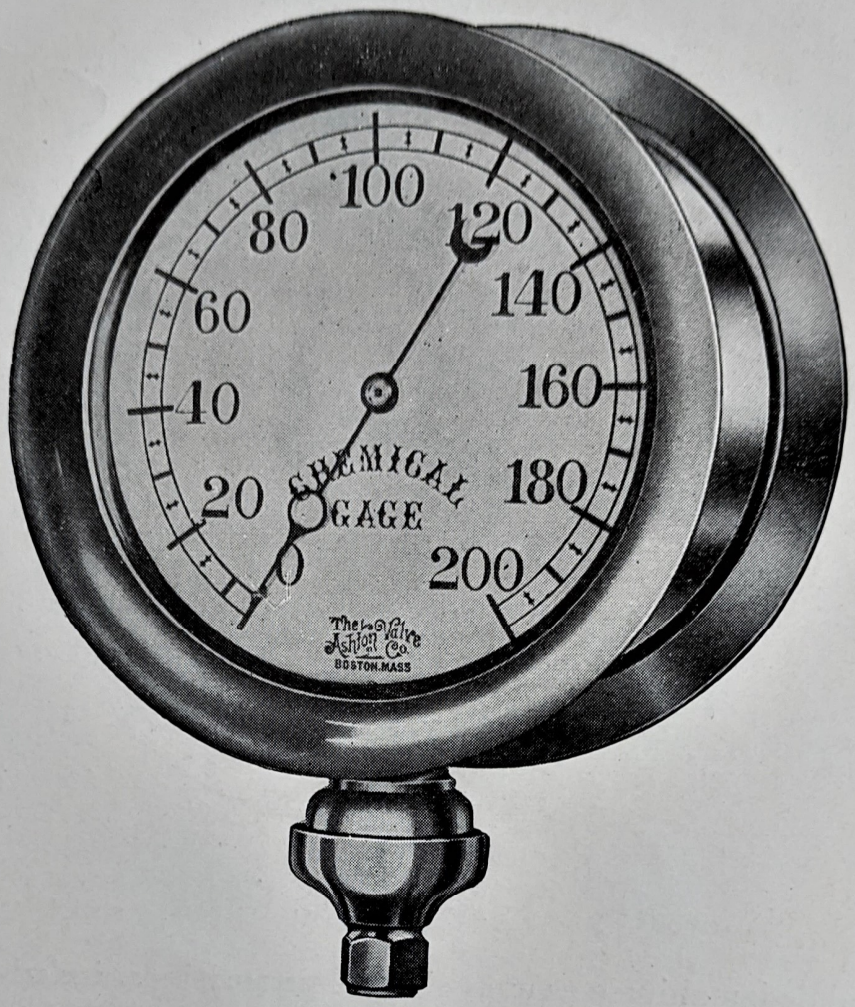
LIST PRICES, INCLUDING COCK

Size	Iron Case, Brass Ring	Iron Case, N. P. Ring	Brass Case	N. P. Case
10 inch Dial	$56.25	$57.10	$78.75	$81.25
8½ inch Dial	52.50	53.10	72.50	74.60

Subject to Discount

For weights see page 156.

Ashton Chemical Pressure Gage



No. 61

This gage is designed especially for service where the springs of ordinary gages require protection from the corroding action of liquids and chemicals.

The pressure acts on an elastic diaphragm which protects the movement from direct contact with destructive liquids or gases.

Aside from the protecting device, this gage is of the same general construction as the No. 51.

Connection is ¼ inch pipe size, *female*.

Orders should specify style number of gage, size, style of case and maximum graduation.

LIST PRICES, WITHOUT COCK

Size	Iron Case, Brass Ring	Iron Case, N. P. Ring	Brass Case	N. P. Case
12 inch Dial	$78.00	$79.50	$98.00	$102.00
10 inch Dial	57.00	58.00	68.00	71.00
8½ inch Dial	45.00	45.75	55.00	57.50
6¾ inch Dial	40.00	40.60	45.00	47.00
6 inch Dial	35.00	35.50	39.00	40.50
5 inch Dial	30.00	30.50	33.00	34.25
4½ inch Dial	25.00	25.50	27.00	28.00

Ashton Improved Alarm Gage

No. 78 C. Patented

The Ashton Improved Alarm Gage is made for either pressure or vacuum, and is fitted with an electric circuit closing device that is easily adjusted to establish positive contacts at any desired high and low points, for operating a signal or bell located at a distance from the gage. When desired the gage is constructed with only single contact to operate at either high or low point.

This gage is adapted for use on dry pipe sprinkler systems and takes the place of the usual air gage. By its use a timely warning is given of over or under pressure, thus limiting the damage and loss caused by unnecessary flooding, due to leaks or accidents when there is no fire.

It is also extensively used in connection with automatic pumping systems, digesters, vulcanizers, vacuum dryers, ammonia refrigerating and cooling plants, etc., where an automatic alarm is desired for either high or low pressure or both.

This gage may be used to operate a bell from a low voltage battery of dry or storage cells or from the secondary of a bell ringing transformer whose voltage does not exceed 15 volts. The current should not exceed ½ ampere. In case it is desired to operate a light from 110 or 220 volts this may be done by employing a relay, the actuating element of which may be excited from one of the low voltage sources mentioned above.

Ring is style "A."

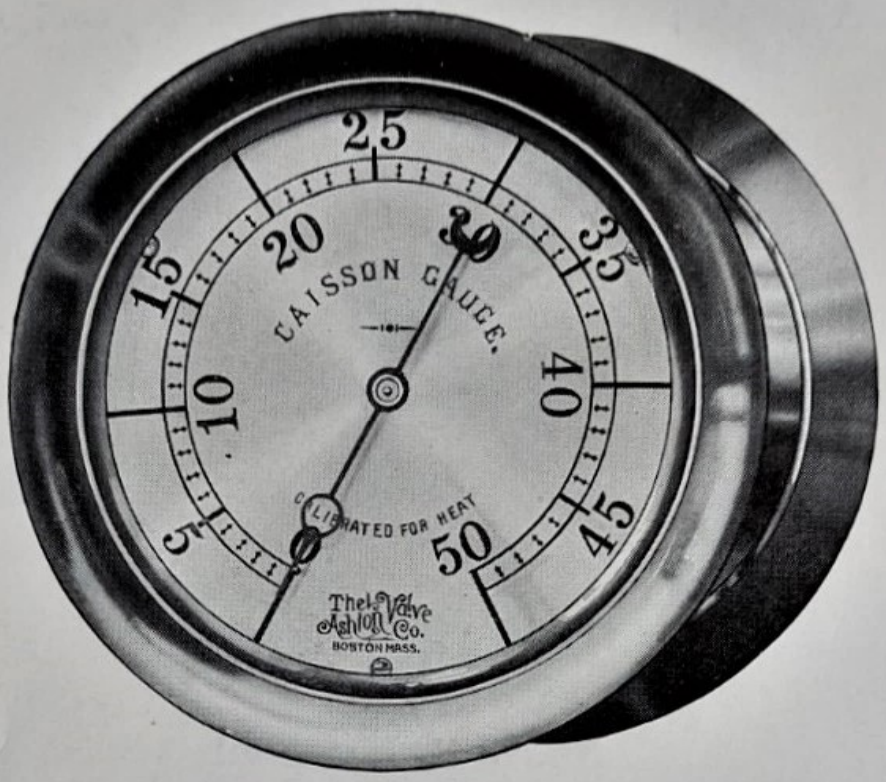
Orders should specify working pressure and maximum graduation of dial, which we recommend should be double the working pressure; also the pounds pressure for high and low alarm contacts.

LIST PRICES, WITHOUT COCK

Size	Iron Case, Brass Ring	Brass Case	Nickel-Plated Case
5 inch Dial	$31.25	$35.00	$36.25

Subject to Discount

Ashton Caisson Pressure Gage



No. 95

This gage is an exclusive Ashton production, especially adapted to caisson service, indicating the air pressure maintained. It is carefully calibrated to give accurate readings.

It does not require any piping connection, being self-contained and operated entirely by the air pressure surrounding it. Its location may therefore be at any convenient place in the caisson.

The spring and movement are of Ashton quality and the dial figures are large and prominent for easy reading from a distance, making it possible to place the gage at any suitable location.

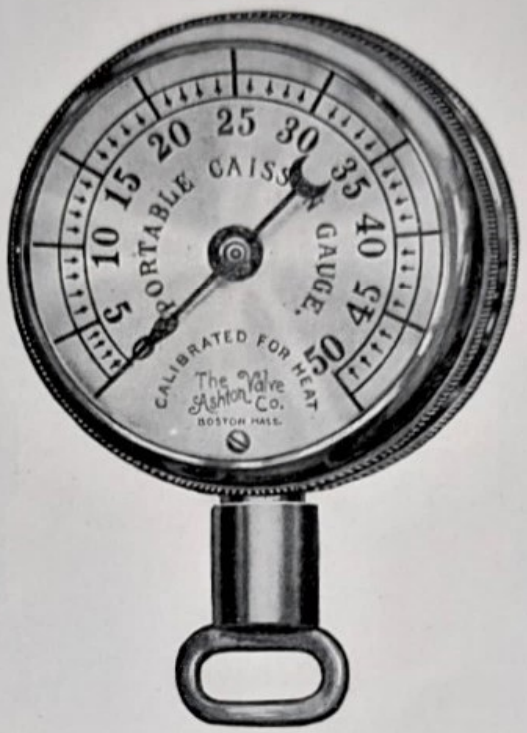
Dial is silvered. Ring is style "A."

Orders should specify style number of gage, style of case and maximum pressure. 50 pounds is standard.

PRICES

Size	Brass Case	Nickel-Plated Case	Aluminum Case
6 inch Dial	$31.00	$32.50	$35.00
Weight, pounds	6	6	4

Ashton Pocket Caisson Pressure Gage



No. 95 A.

This special design of Caisson Gage, with bevel glass and flush case, is fitted with loop holder, by means of which it may be conveniently hung around the neck of the workman, thus leaving both hands free. This gage may also be carried in the pocket and is free from projecting parts which may catch on the clothing.

It is a miniature of Caisson Gage No. 95 and is made in the 2½ inch dial size only, in brass, nickel plated, or aluminum case, and is accurately adjusted.

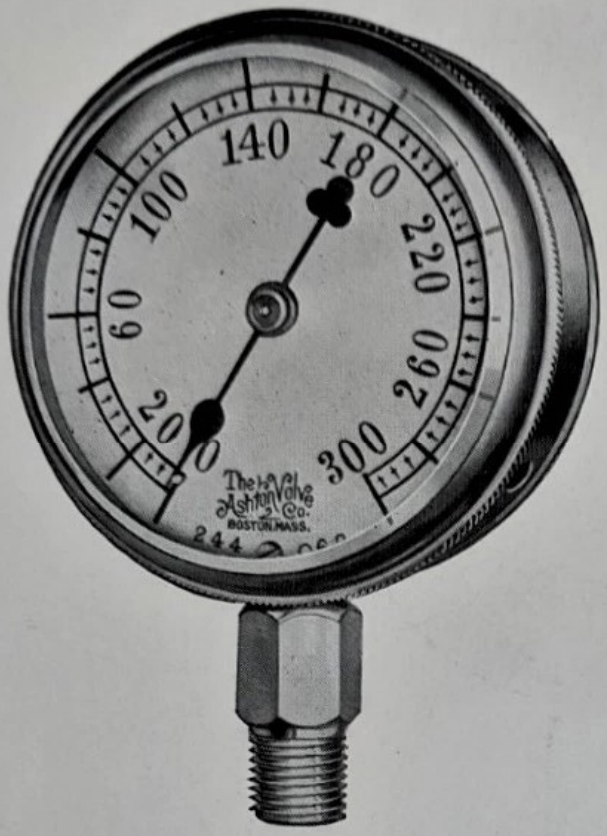
Dial is silvered. Ring is style "Q." See page 153.

Orders should specify style number of gage, style of case, and maximum pressure. 50 pounds is standard.

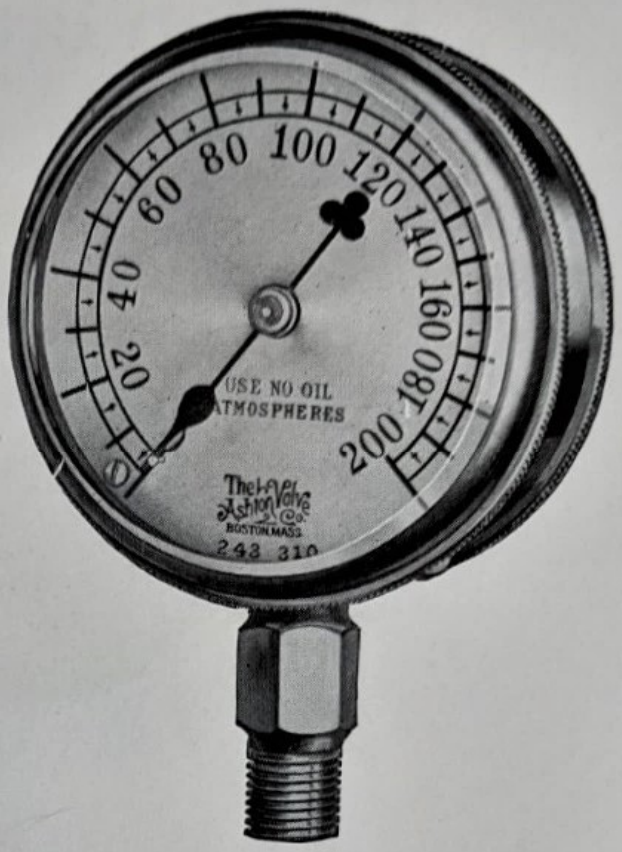
PRICES

Size	Brass Case	Nickel-Plated Case	Aluminum Case
2½ inch Dial	$18.00	$18.75	$20.00
Weight	1 pound	1 pound	7 ounces

Ashton Oxy-Acetylene Gas Pressure Gages



No. 96
For Acetylene



No. 97
For Oxygen

The two styles of pressure gages above shown are those commonly required for oxy-acetylene apparatus. They are durable in construction, accurately graduated, and embody the best quality of material and workmanship. They are made with heavy hexagon sockets ¼ inch size, making it easily possible to screw them tightly into their connections without straining the gage case.

Style No. 96 is graduated in pounds pressure per square inch to any desired maximum for the reduced pressure line.

Style No. 97 is for high cylinder pressure service, with dial graduated in atmospheres, as above shown, and if desired with corresponding pounds pressure per square inch or to show the equivalent in cubic feet of gas in the cylinder.

Both gages are made with vented cases to prevent any appreciable accumulation of pressure within the gage in the event of leak in the tube. The No. 97 style has special spring safety back, giving enlarged vent, and is also furnished, if desired, with celluloid instead of glass face.

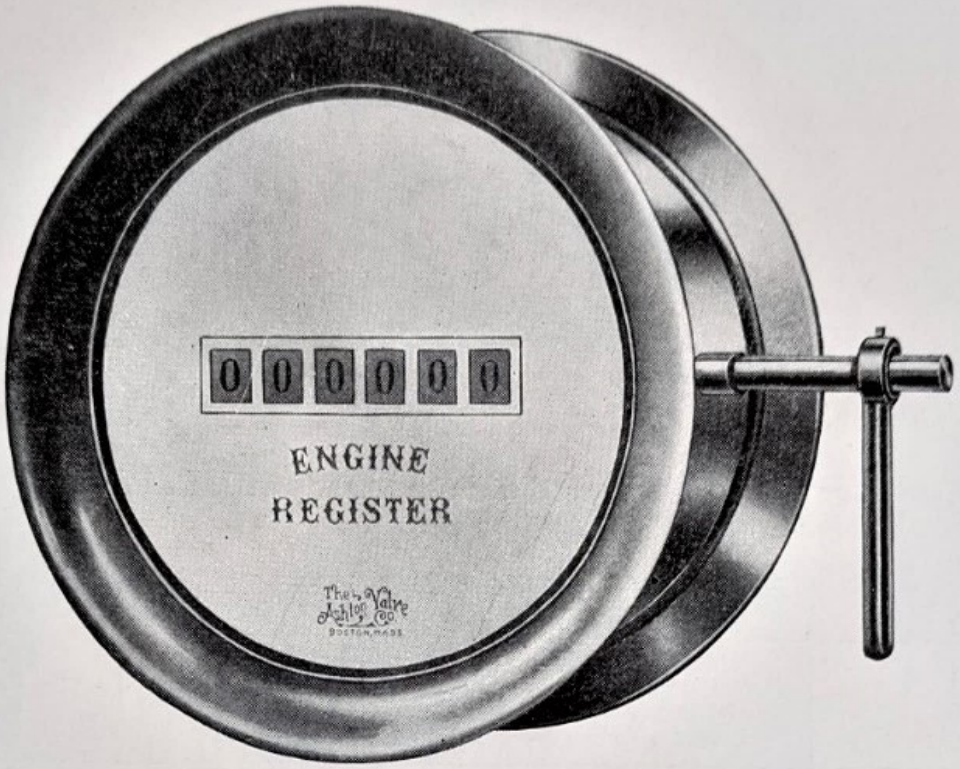
Gages should be graduated to double the highest working pressure to insure greatest durability. To avoid danger the oxygen gage, No. 97 should be thoroughly cleaned from oil on the connection as well as interior parts.

Rings are style "Q"; see page 153.

LIST PRICES, WITHOUT COCK

No. 96 Style			No. 97 Style		
Size	Brass Case	N. P. Case	Size	Brass Case	N. P. Case
3 inch Dial	$10.50				

Ashton Improved Engine Register



No. 64

These instruments work equally well under varying lengths of stroke or revolving motions.

They are driven from the right-hand side only, by a lever, as shown in the cut.

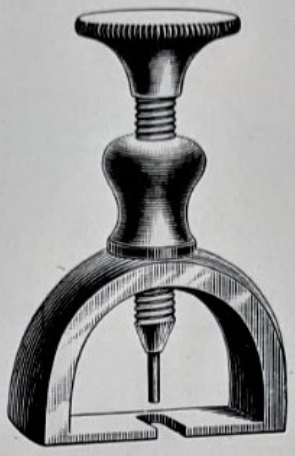
This style register has positive movement, is durable, accurate, and reliable when speed does not exceed 200 R. P. M.

Ring is style "D."

LIST PRICES

Size	Brass Case	N. P. Case, O. G. Ring
10 inch 8 wheels	**$166.25**	**$170.00**
8½ inch 8 wheels	**153.75**	**156.85**
6¾ inch 6 wheels	**137.50**	**140.00**

The Ashton Gage Hand Puller

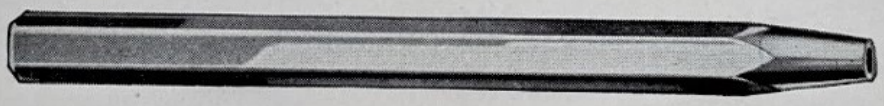


No. 94

The Ashton Gage Hand Puller is a valuable and handy little tool for easily taking off gage hands. It is made in four sizes, as follows:

No.	Description	Range	Price
94	Small	Up to 6 in.	$2.75
94A	Large	6¾ to 12 in.	3.65
94B	Jumbo	18, 24, 30 in.	5.00
94C	Extra Large	40 in. and over	7.00

Hand Set



No. 127

PRICE, $0.75

APPROXIMATE WEIGHTS OF ASHTON STANDARD IRON AND BRASS CASE PRESSURE AND VACUUM GAGES

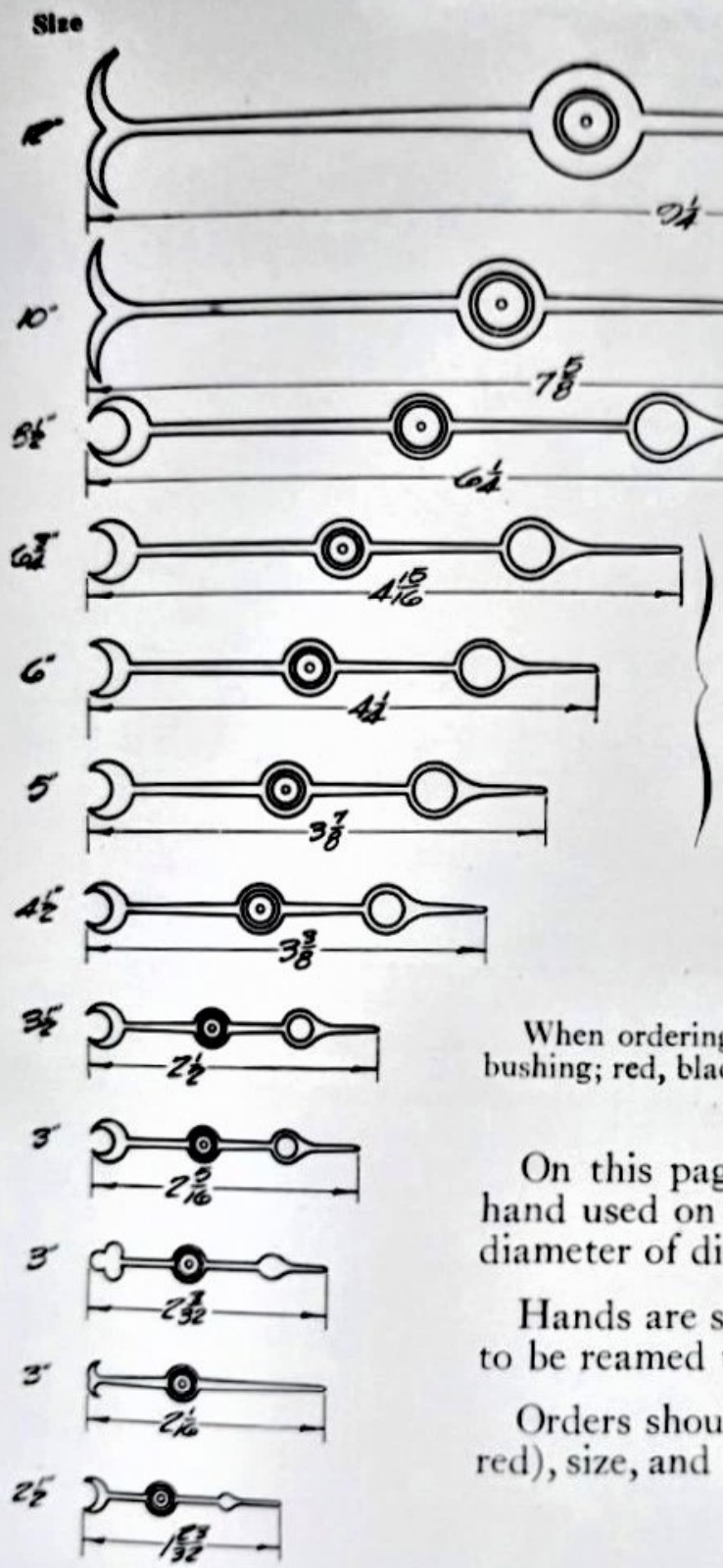
2½ inch Gage . . 1 pound	5 inch Gage . . 4 pounds	10 inch Gage . . 16 pounds
3 inch Gage . . 1½ pounds	6 inch Gage . . 6½ pounds	12 inch Gage . . 23 pounds
3½ inch Gage . . 2½ pounds	6¾ inch Gage . . 8 pounds	. . . . .
4½ inch Gage . . 3 pounds	8½ inch Gage . . 12 pounds	. . . . .

STANDARD GRADUATIONS FOR ASHTON PRESSURE GAGES

The table following shows the Standard Maximum Graduations of Gage Dials for Ashton Pressure Gages. Gages with dials graduated to different maximum pressures will be charged extra, and will be subject to more delay than standard graduations.

Max. Dial Grad., lbs.	15	30	60	100	160	200	250	300	400	500	600	800	1000	1200	1500
Intervals of Figures, lbs.	3	5	10	10	20	20	25	40	50	50	100	100	100	200	300
Intermediate Lines, lbs.	½	1	1	2	5	5	5								

Gage Hands



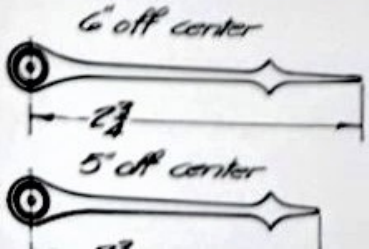
When ordering for duplex gages specify large or small bushing; red, black or white finish.

When ordering for duplex gages specify large or small bushing; red, black or white finish.

On this page are shown length and style of hand used on each size gage as determined by diameter of dial.

Hands are sent with small holes in bushings, to be reamed to fit pinions.

Orders should specify color (black, white, or red), size, and length if for 3, 5 or 6 inch gage.

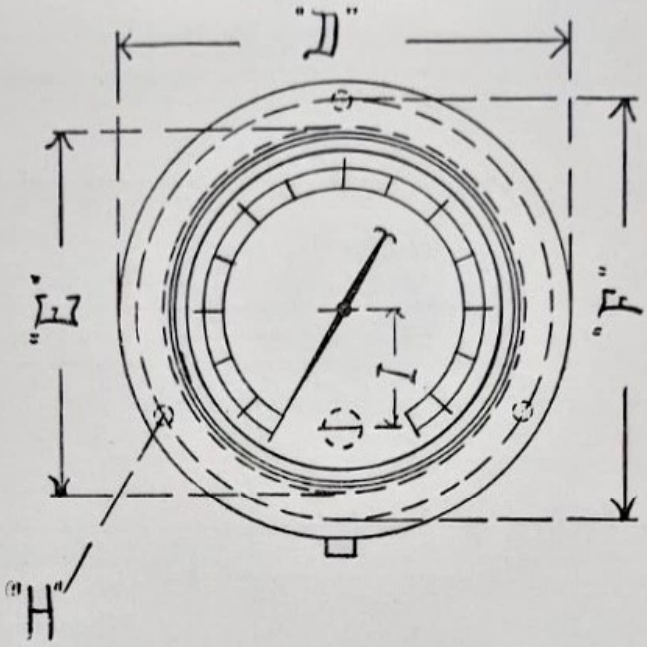


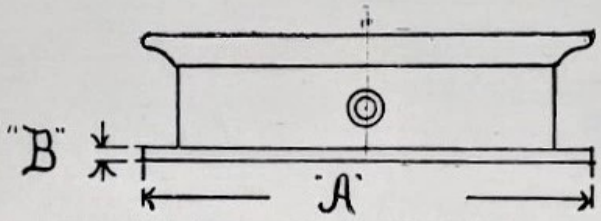
PRICES, EACH

SIZE	
2½ to 4½ inch inclusive	$0.15
5 to 6¾ inch inclusive	.20
8½ inch	.30
10 inch	.40
12 inch	.50

Ashton Gages, Clocks, and Engine Registers

Dimension Sheet





BRASS OR NICKEL PLATED CASE AND RING

Size, inches	2½	3	3½	4½	5	6	6¾	8½	10	12	18	24
Diam. of Back Flange "A"			4 5/8	5 7/8	6 5/16	7 5/8	8 1/2	10 3/4	12 1/2	15	21	27 3/4
Thickness of Flange "B"			1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/4	5/16
Diameter of Ring "D"	2 15/16	3 13/32	4 3/8	5 13/16	6 5/16	7 3/8	8 1/4	10 1/4	11 7/8	13 7/8	21 1/4	27 7/8
Diameter of Dial "E"	2½	3	3½	4½	5	6	6¾	8½	9 7/8	12	18	24
Diameter of Bolt Circle "F"			4 1/8	5 3/8	5 7/8	7	7 3/4	9 3/4	11 1/2	13 3/4	20 1/8	26
Size of Hole "H"			3/16	3/16	3/16	1/4	1/4	1/4	1/4	1/4	1/4	5/16
Location of Back Conn. "I"		1 3/32	1 1/8	1 1/2	1 3/4	2 1/4	2 1/2	3 1/2	4	5	7 1/16	10 1/8

IRON CASE WITH BRASS OR NICKEL PLATED RING

Size, inches	2½	3	3½	4½	5	6	6¾	8½	10	12	18	24
Diam. of Back Flange "A"			4 5/8	5 7/8	6 3/8	7 5/8	8 1/2	10 3/4	12 1/2	15	21	27 3/4
Thickness of Flange "B"			1/8	1/8	1/8	1/8	1/8	1/8	5/32	3/16	1/4	5/16
Diameter of Ring "D"	3	3 3/16	4 7/16	5 9/16	6 3/16	7 1/8	8 1/4	10 1/4	11 7/8	13 7/8	21 1/4	27 7/8
Diameter of Dial "E"	2½	3	3½	4½	5	6	6¾	8½	9 7/8	12	18	24
Diameter of Bolt Circle "F"			4 1/8	5 3/8	5 7/8	7	7 3/4	9 3/4	11 1/2	13 3/4	20 1/8	26
Size of Hole "H"			3/16	3/16	3/16	3/16	1/4	1/4	1/4	1/4	1/4	5/16
Location of Back Conn. "I"		1 3/32	1 1/8	1 1/2	1 3/4	2 1/4	2 1/2	3 1/2	4	5	7 1/16	10 1/8

All dimensions in inches.

RINGS — IRON CASES

2½ to 6 inch inclusive — O. G. spun, style "C" except 3 inch which has flush spun, style "J." 6¾ to 12 inch inclusive — Cast slip, held on with screws, style "B." 18 and 24 inch — Cast, hinged, style "D."

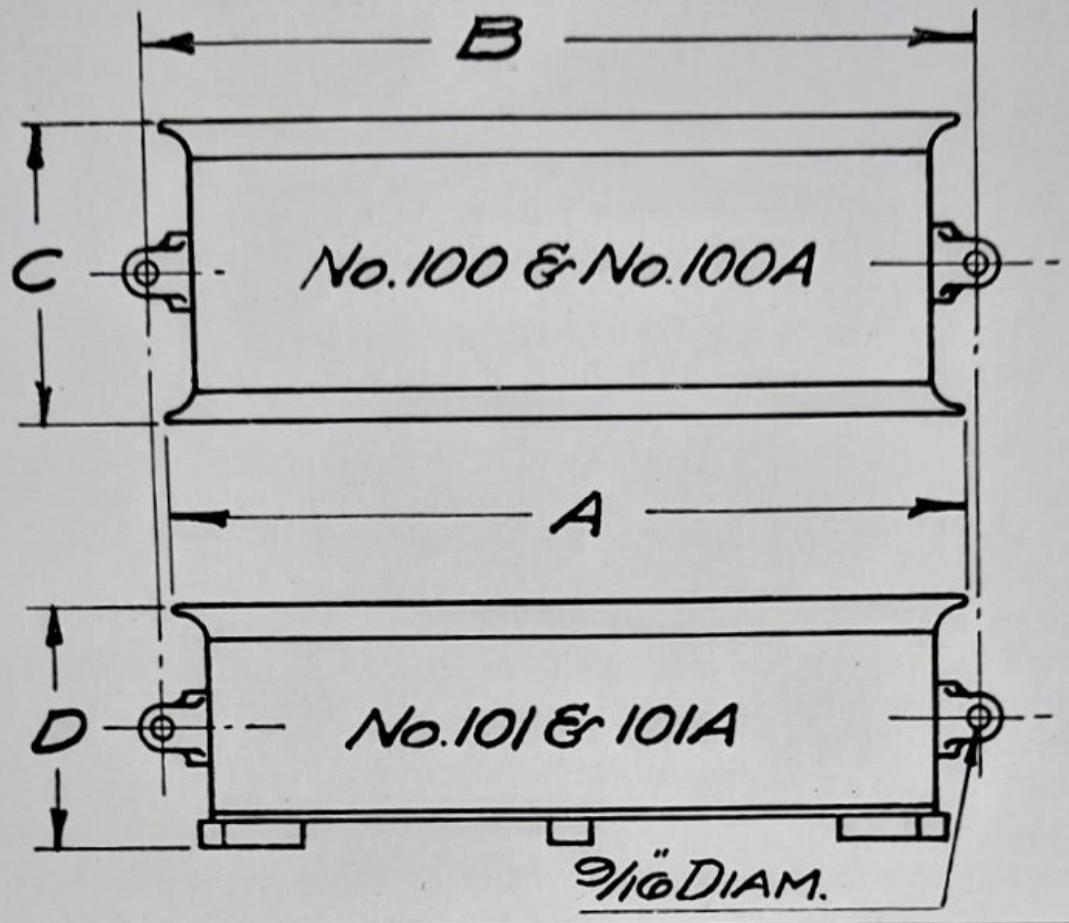
RINGS — BRASS CASES

3½ to 12 inch inclusive — Cast, threaded, style "A." 18 and 24 inch — Cast, hinged, style "D." All 3½ to 24 inch cast rings are O.G. 2½ and 3 inch iron cases have no back flanges. 2½ and 3 inch brass cases have no back flanges and have bevel rings.

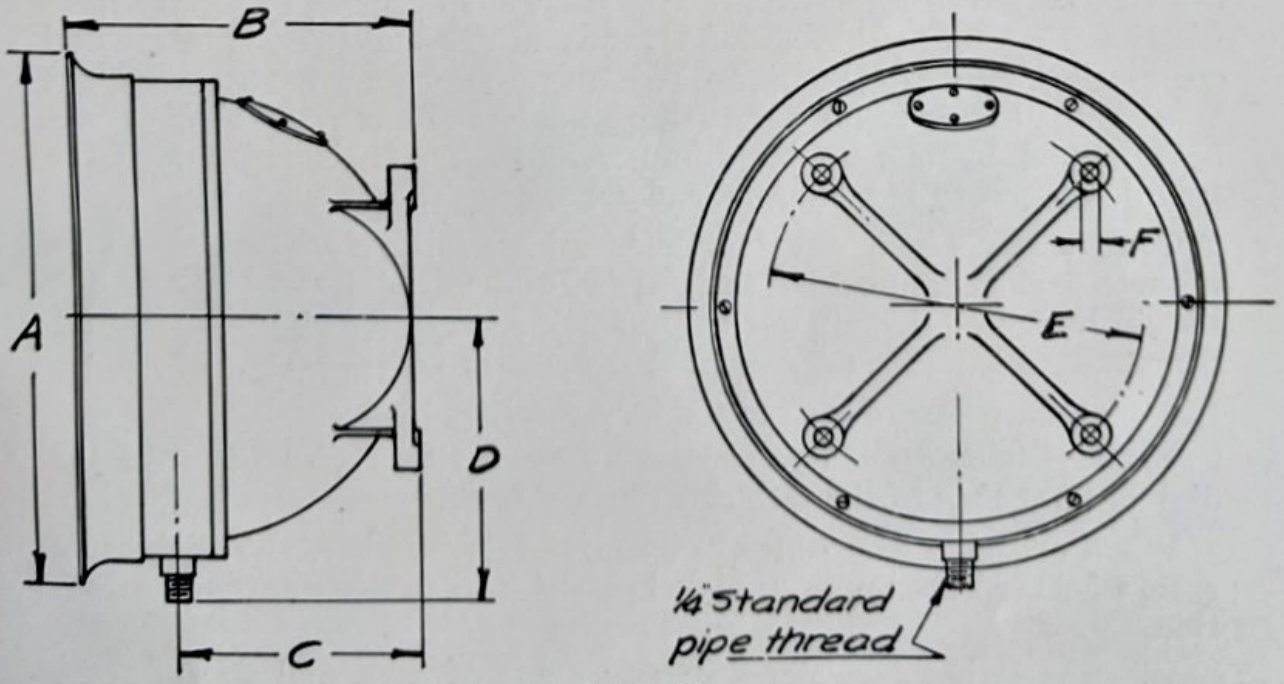
The above dimensions and specifications apply to numbers 51, 52L, B, D, stationary, 53, 54, 56, 57, 58, 59, 60, 62

Ashton Master Gages

Dimension Sheet



Size	Double Dials, Nos. 100 and 100A				Single Dial, Nos. 101 and 101A			
	A	B	C	Weight	A	B	D	Weight
40	43 5/8	42 3/4	14 3/8	305	43 5/8	42 3/4	12 7/8	300
30	33 5/8	32 3/4	14 3/8	215	33 5/8	32 3/4	12 7/8	205
24	27 7/8	26 11/16	14 9/16	175	27 7/8	26 11/16	13	160
18	21 1/4	19 3/4	13 11/16	130	21 1/4	19 3/4	12 7/16	120



No. 69

Size	A	B	C	D	E	F

General Instructions

For the Application, Care, and Maintenance of Ashton Pressure and Vacuum Gages

All gages used on steam must be protected by a water siphon of sufficient capacity to fill the gage tube, and thus prevent any steam from entering the tube, the heat from which would otherwise anneal it and render it useless. Joints between the siphon and gage must be absolutely tight to prevent leaking of water from the siphon. Gages should be protected from external heat exposure as far as possible. A gage that is unduly heated will register inaccurately, due to expansion of the various parts of its operating mechanism. Boiler gages should be piped direct to the steam drum, or main steam chamber, with the smallest number of intervening fittings.

Gages that are correct will frequently be found to register a few pounds heavy, due to the weight of the column of water, or other liquid, accumulated in the gage pipe. To correct this on such an installation the gage hand requires resetting to compensate for the added pressure caused by the weight of the liquid.

Care should be used in attaching gages to pipes, or other connections, to prevent any strain on the gage by being screwed on too tight. When attached to brackets, or other holdings, by means of screws through the back flange of the gage case, the bearing surface must be smooth and flat, so that the gage case will not be distorted when properly fastened to it, otherwise the gage will not register accurately.

Gages are usually made with from two to five pounds take-up, which holds the hand firmly against the stop pin, and thus prevents it from being jarred loose from the spindle in shipment, or when otherwise handled. For this reason there is an unequal spacing in the dial graduation between the stop pin and the first pressure marking. When gage hands require resetting to correct inaccuracy they should be removed by a gage hand puller and afterwards refitted to the spindle by a very light hammer blow.

Gage tubes which develop defects in service, such as cracks or pinhole leaks, cannot be satisfactorily repaired by soldering, but should be replaced.

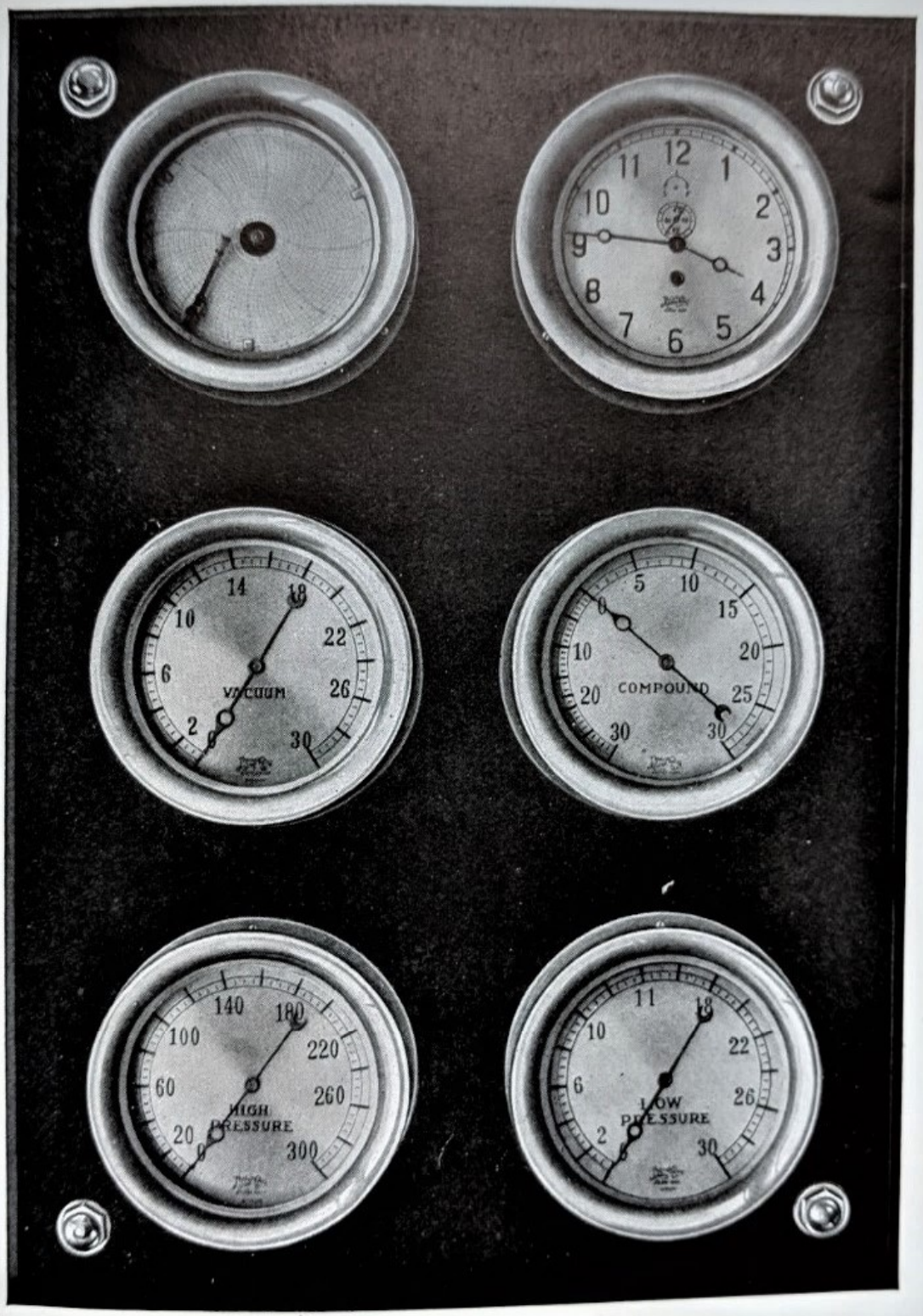
The maximum graduation of gages should be approximately twice the working pressure for satisfactory results and durability.

The size of gages is determined by measuring the diameter of the dial and not that of the face ring or gage back.

When ordering gages always specify style number, size dial, style case, whether iron, brass, or nickel plated, and maximum dial graduation.

When ordering gage parts specify name of part, dial size of gage, style number, maximum graduation, and serial number of gage, as stamped on bottom of the dial.

Ashton Marble or Slate Tablets

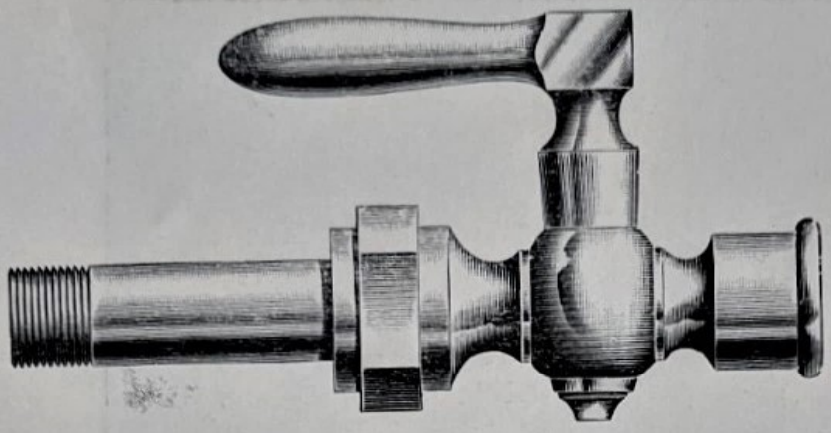


We are prepared to furnish gage tablets of marble or slate, of any design desired to suit specifications, with or without nameplates. These tablets are particularly attractive and are extensively used in engine rooms.

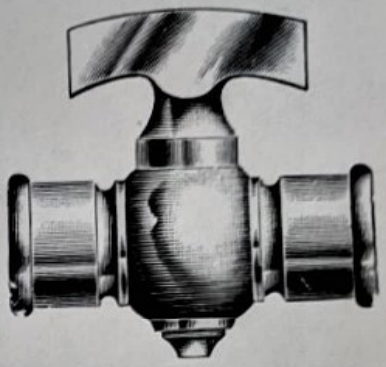
When gages are to be mounted on tablet and threaded rings are required, there is an extra charge on iron case gages. Brass case gages are so furnished.

PRICES ON APPLICATION

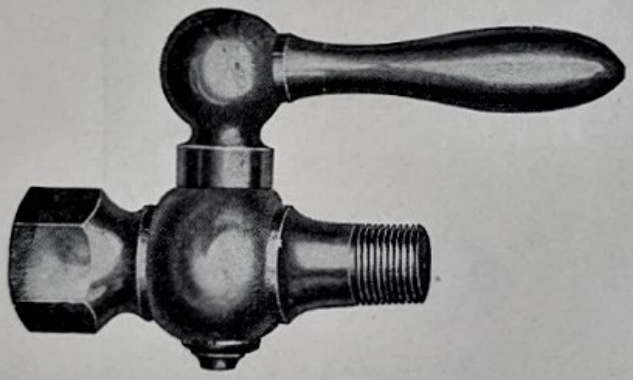
Ashton Siphons and Cocks



Lever Handle
Union Steam Gage Cock
No. 116A, 116C

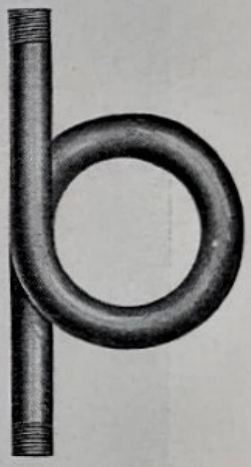


T Handle
Steam Gage Cock
No. 116B, 116D



Hydraulic Cock
No. 116

Hydraulic Check Valve
No. 109A.
No. 109B.

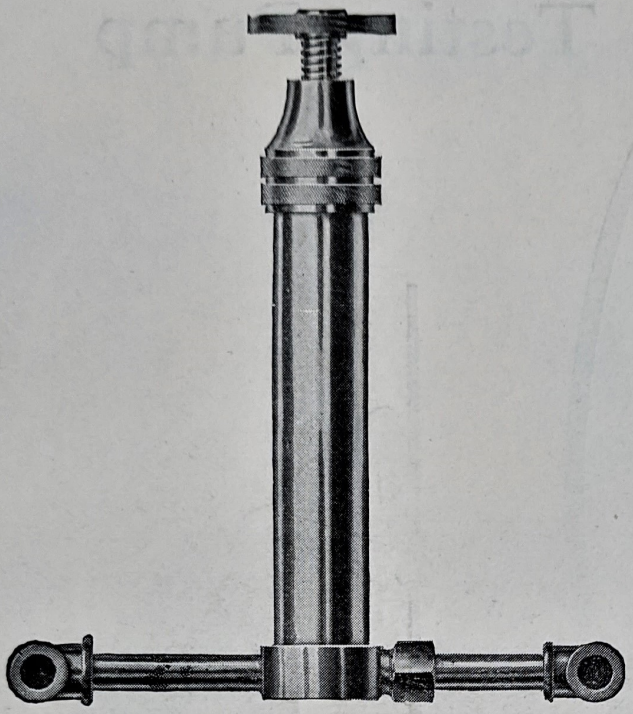


Pipe Siphon

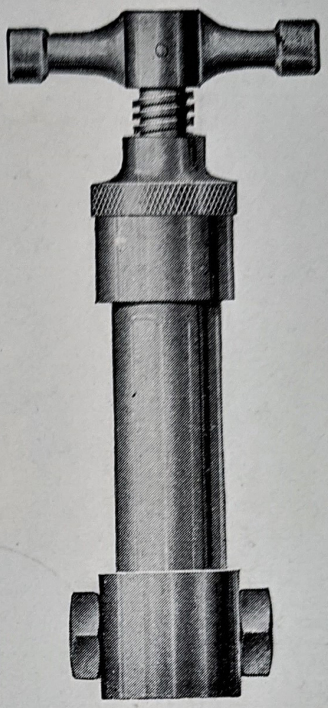
PRICES

	Size Inch	Iron	Brass	Nickel Plated
Lever Handle Union Steam Gage Cock heavy No. 116C	1/8	.....	$1.00	$1.10
	1/4	.....	1.10	1.20
	3/8	.....	1.55	1.65
Lever Handle Union Steam Gage Cock light No. 116A	1/8	.....	.95	1.05
	1/4	.....	1.00	1.10
T Handle Steam Gage Cocks light No. 116B	1/8	.....	.35	.45
	1/4	.....	.45	.55
T Handle Steam Gage Cocks heavy No. 116D	1/4	.....	.80	.90
Hydraulic Check Valve, single, No. 109A. Maximum pressure, 500 pounds	1/4	.....	3.15	3.25
	3/8	.....	4.15	4.25
	1/2	.....	5.20	5.30
Hydraulic Check Valve, double, No. 109B. Maximum pressure, 500 pounds	1/4	.....	3.60	3.70
	3/8	.....	4.65	4.75
	1/2	.....	5.75	5.85
Hydraulic Cock, No. 116. Maximum pressure, 5000 pounds	1/4	.....	13.50	13.75
	3/8	.....	14.25	14.50
	1/2	.....	15.00	15.25

Ashton Screw Test Pumps



No. 3



No. 3A.
No. 3A.A.
No. 3A.B.

These screw test pumps are extensively used in testing pressure gages. They are compact, light, and durable.

The No. 3 is made of bronze, and nickel plated if desired.

The No. 3 A., short pattern, has aluminum body and is much lighter.

The No. 3 A.A., short pattern, is made of bronze, polished or nickel plated.

The No. 3 A.B., short pattern, has quick opening top, often preferred by boiler inspectors, and is made of bronze, polished or nickel plated.

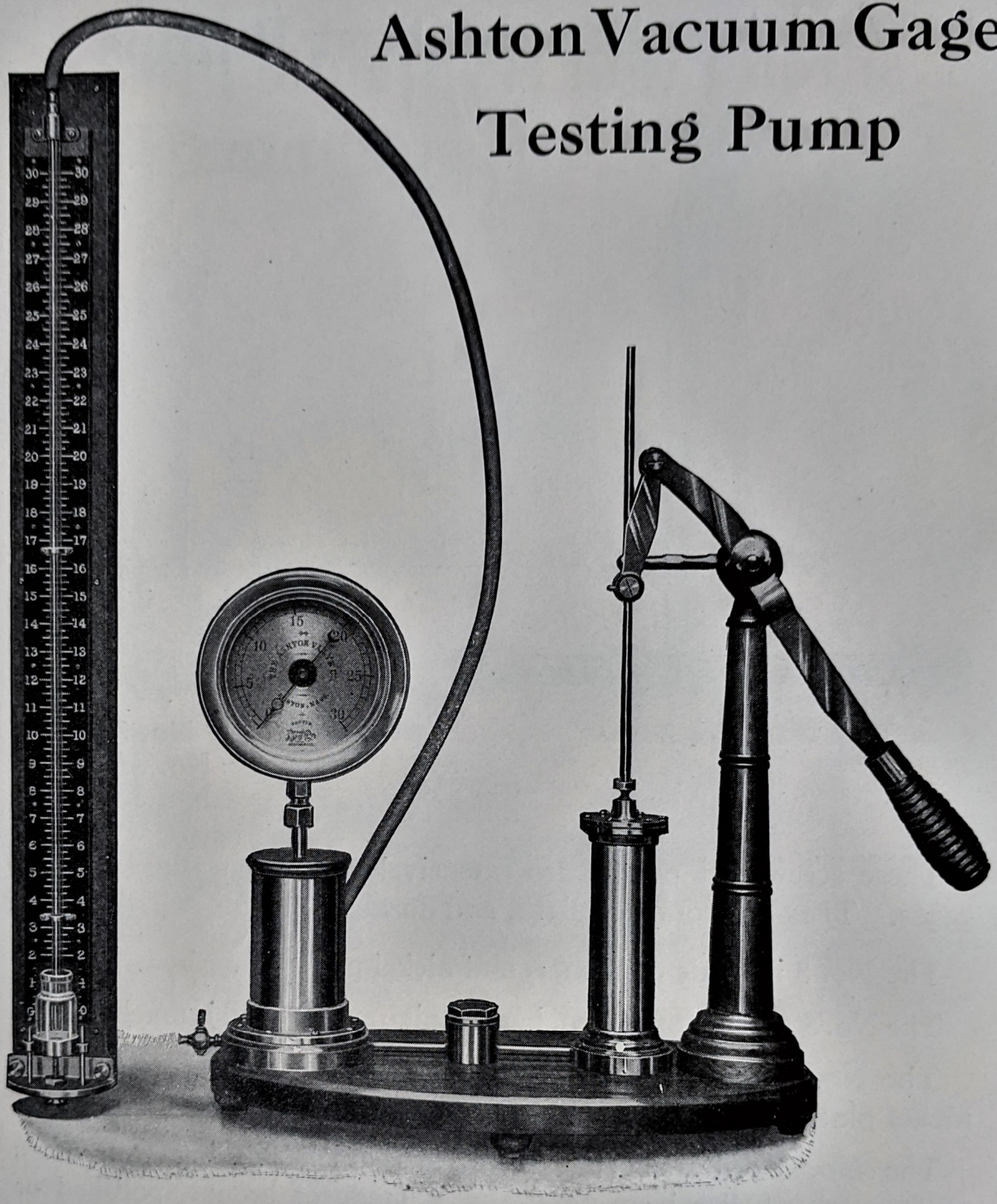
LIST PRICES

	Bronze	Nickel Plated	Aluminum	Length, Closed	Weight, Pounds
No. 3	$38.75	$40.00	$37.00	9¼ in.	3½
No. 3A				7 in.	1½
No. 3 A.A.	30.00	31.25		7 in.	4
No. 3 A.B.	35.00	36.25		7¼ in.	4¼

Subject to Discount

With these pumps we recommend the use of our No. 59 A. Standard Pocket Test Gages, page 141.

Ashton Vacuum Gage Testing Pump



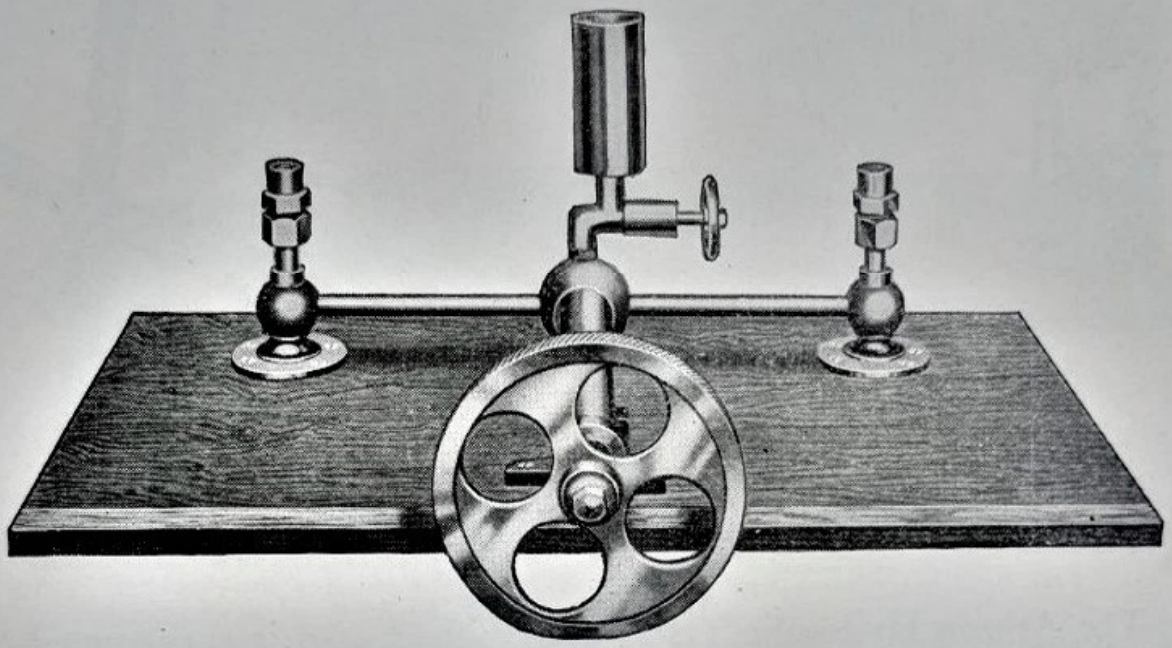
No. 87

The outfit above illustrated is particularly designed for testing the accuracy of Vacuum Gages in comparison with a Mercury Column. It consists of a Hand Vacuum Pump mounted on wood base, with rubber tube connecting with a Mercury Column. The gage shown in cut is not furnished. The Mercury Column consists of a metal scale, accurately graduated in inches of mercury, glass tube, and adjustable pot of mercury, all mounted on wood panel. A wood shield with glass front, hinged to the wood panel for protecting the Mercury Column, is furnished at an extra charge.

PRICE LIST

Vacuum Gage Testing Outfit, complete with pump and mercury column	
Vacuum Gage Testing Outfit, complete with pump, mercury column and shield	$250.00

Ashton Light Hydraulic Pressure Gage Test Pump



No. 85

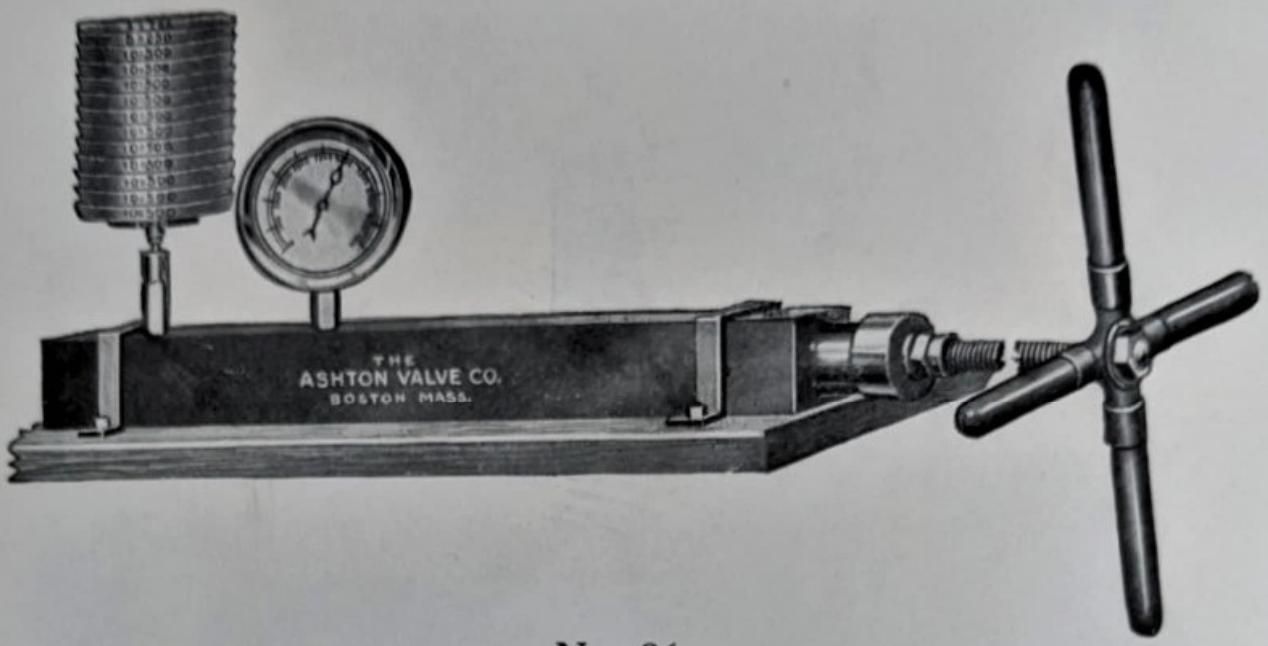
The Ashton Hydraulic Gage Test Pump above shown is designed for testing high pressure gages up to 7,000 pounds pressure per square inch, and is easily operated by means of a large handwheel. This test pump is made of our high-grade bronze, with extra heavy fittings, and mounted on a substantial wood base that can be readily clamped or bolted to bench. Weight complete, approximately twelve pounds.

PRICE, $125.00

For ... with pump, see page 137.

Ashton Hydraulic Dead-Weight Pressure Gage Tester

For Extreme High Pressure



No. 86

The Ashton Hydraulic Tester above illustrated is constructed on the same principle as our regular Dead-Weight Gage Tester, on page 113, but specially designed for testing gages at extreme high pressures.

The body is three and one-half inches square and is made from a solid bar of steel. The weight plunger is of tool steel hardened, accurately ground and lapped into the cylinder. The tester is easily operated at the highest pressures, by means of extra long iron pipe crossbar handles.

The gage shown in cut is not furnished, but is merely an illustration of a gage as applied for test.

PRICES

No. 86D Style for testing to 3,000 lbs.	$400.00
No. 86E Style for testing to 5,000 lbs.	410.00
No. 86 Style for testing to 10,000 lbs.	430.00
No. 86A Style for testing to 15,000 lbs.	465.00
No. 86B Style for testing to 20,000 lbs.	500.00
No. 86C Style for testing to 25,000 lbs.	535.00

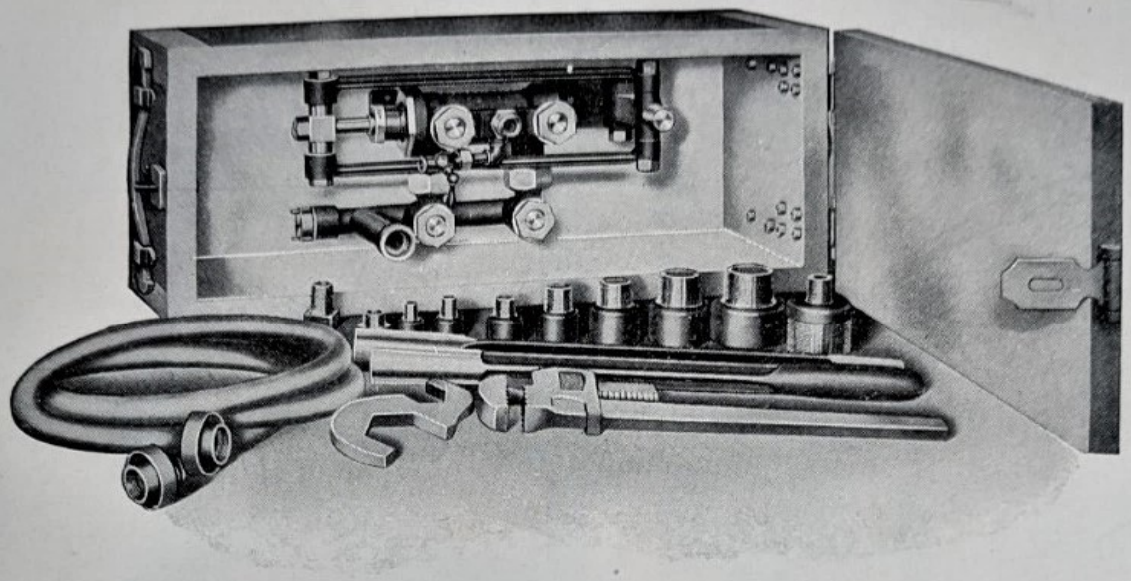
NET WEIGHTS

Pump, without weights	150 lbs.
Weights, for No. 86, 10,000 lbs.	199 lbs.

For each 500 pounds on gage add or subtract 10 pounds from weights.

For Hydraulic Ga...

Ashton Portable Boiler Test-Pump Outfit



No. 88

Specially adapted for making hydrostatic tests on locomotive and stationary boilers at outlying points, and extensively used by State and Boiler Insurance Inspectors.

The above cut shows the Ashton Portable Boiler Test-Pump, with complete outfit of hose and all necessary fittings, as usually required, packed in a substantial iron-bound locked case. The following special features of construction of practical value are embodied in this equipment.

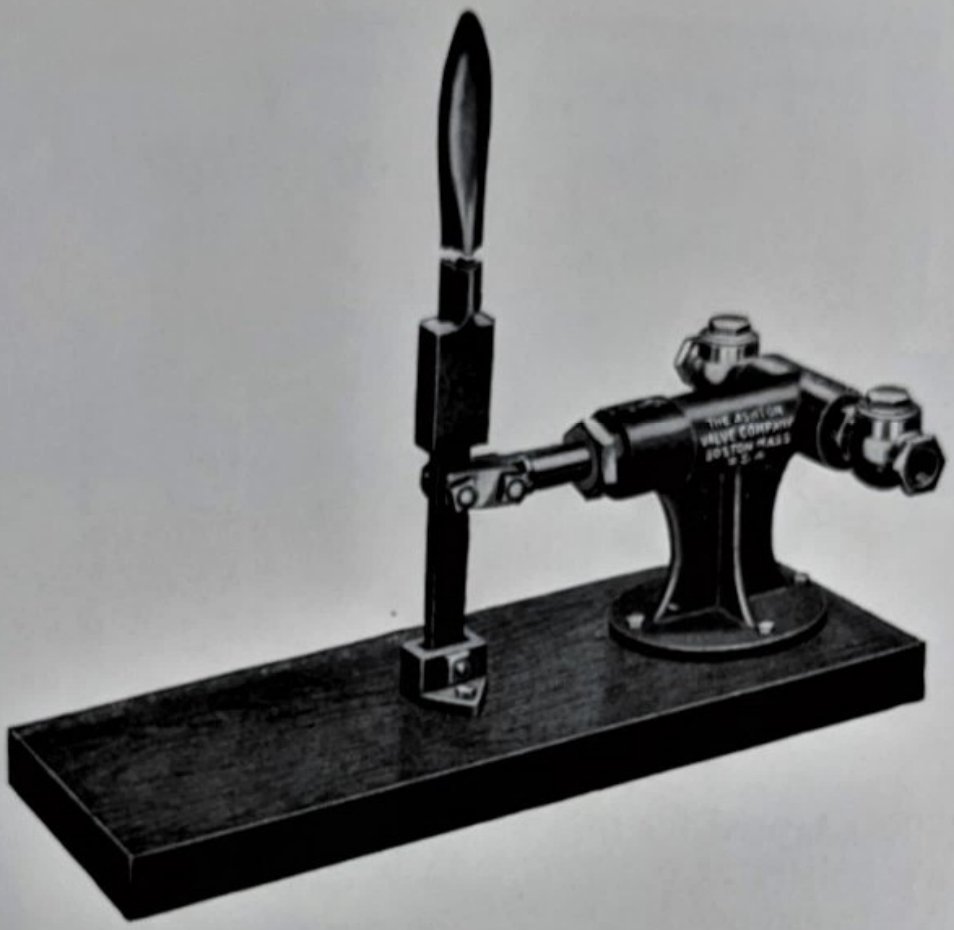
The case is metal lined and watertight, therefore can be used as a reservoir for the pump to draw from. The pump has a supplementary water-service connection which can be used for the supply instead of the tank.

There are no interior parts of iron to rust, the pump being made entirely of high-grade bronze. The suction valves can be taken out for repairs and the piston or rod repacked without removing the pump body.

Size of pump piston, 1¾ inches; length of stroke, 3 inches, double acting; capacity 300 pounds per square inch. Size of case: width, 10½ inches; height, 11½ inches; length, 26 inches; weight, complete with fittings, 95 pounds.

Stillson is furnished only when specified and at an extra charge

The Ashton Improved Boiler Test Pump



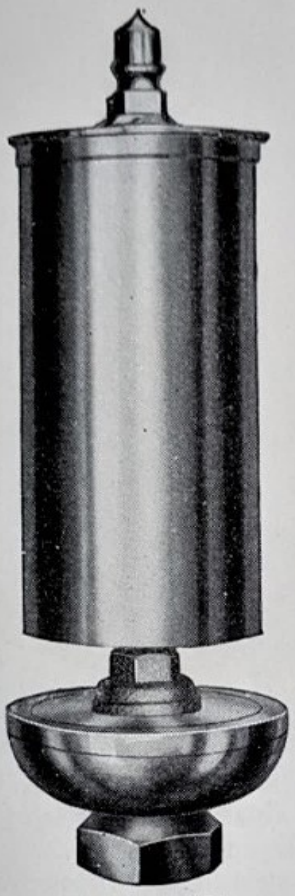
No. 89

The Ashton Boiler Test Pump above shown is a compact, convenient size pump of the outside packed plunger style, having a 5 inch stroke and 1¼ inch diameter cylinder. It is made with a long, upright lever, which is handily operated from a standing position, and which can be readily disconnected at its lower socket end and set aside when not in use.

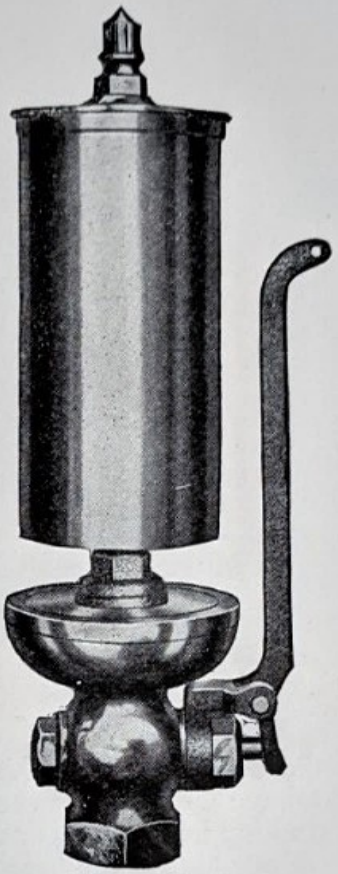
Being mounted on a hardwood base, it can be held firmly in position by the feet while in use, and afterwards easily removed, awaiting future requirements.

The pump body is made of high grade cast iron and fitted with brass plunger and check valves. The total weight is approximately 65 pounds and the maximum service capacity 500 pounds pressure per square inch.

Ashton Improved Plain Steam Whistles



No. 90 C.
Without Valve



No. 90 D.
With Valve

Ashton Whistles are designed for high pressures. The bottoms are heavily constructed and the bells are made of seamless drawn brass tubing, in length about twice the diameter.

PRICES

Diameter of Bell, inches	Steam Pipe Inches	No. 90 C.	No. 90 D.
2	¾	$23.50	$45.50
3	1	32.75	56.50
4	1¼	40.00	65.50
5	1½	47.50	74.50
6	1½	63.50	91.00
8	2	98.00	125.50
10	2½	153.00	182.00
12	3	227.00	.....

Orders should specify style number, diameter of bell, and the working pressure.
For Whistle Valves see page 173.

Ashton Plain Whistle

With Extra Long Bell

No. 90 A.

To meet the demand for a whistle with deep, far-reaching tone, to suit special conditions, we have brought out the whistle above illustrated. It is of the single bell type with extra long bell which is adjustable for different pressures.

It is made of our high grade bronze, with bronze spindle, seamless drawn brass bell, and extra heavy base, to stand extreme hard service.

For marine service, large factories, and other installations where a whistle with an individual, deep penetrating tone is required, we recommend that the length of the bell be four times the diameter.

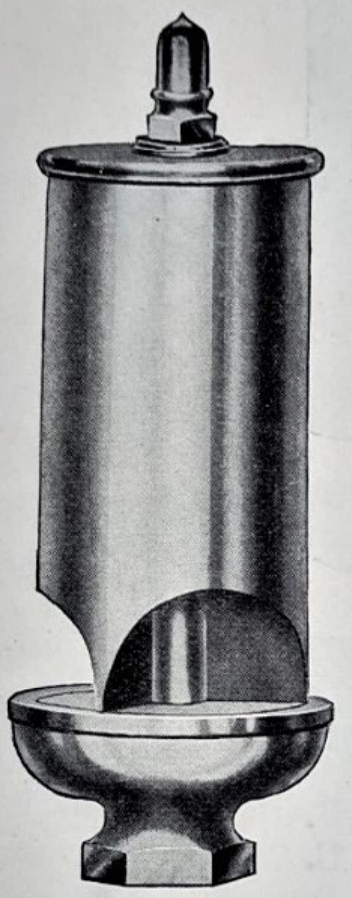
With these whistles, for high pressures or in the large sizes, we particularly recommend the use of a balanced whistle valve, page 173.

We do not recommend the use of this whistle for pressures under 180 pounds.

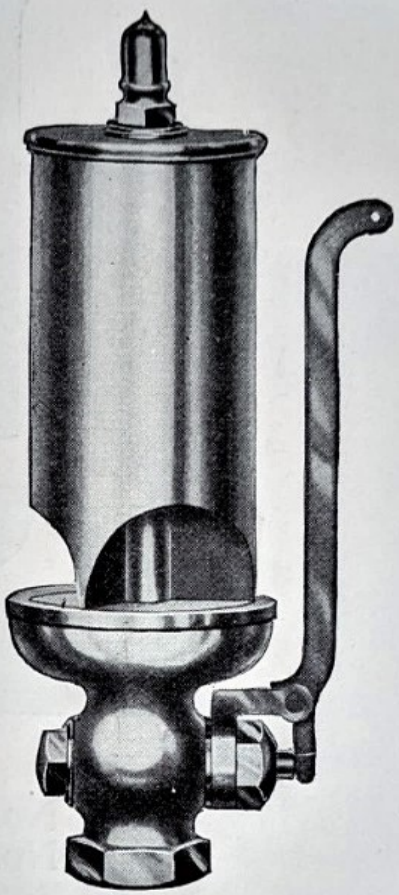
PRICES

Diam. of Bell Inches	Size of Steam Pipe Inches	Length of Bell Inches	Screwed	Flanged
6	2	14	$68.50	$73.00
6	2	16	71.00	76.50
6	2	18	74.50	80.00
6	2	20	80.00	85.50
6	2	24	87.25	93.00
8	2½	18	109.00	115.00
8	2½	20	116.50	122.00
8	2½	22	123.75	129.50
8	2½	24	131.00	136.50
8	2½	28	138.00	144.00
8	2½	30	145.75	151.25
8	2½	32	153.00	158.50
10	2½	25	209.50	216.25
10	2½	30	227.50	234.50
10	2½	35	254.50	262.00
10	2½	40	291.00	298.00
12	3	30	300.00	309.00
12	3	36		

Ashton Improved Single Bell Chime Whistles



No. 91 C.
Without Valve



No. 91 D.
With Valve

Ashton Chime Whistles are heavily constructed throughout of best steam metal, and designed for pressures up to 250 pounds.

They are adjusted to produce most agreeable and yet penetrating tones in contrast to the harshness of the Plain Whistle.

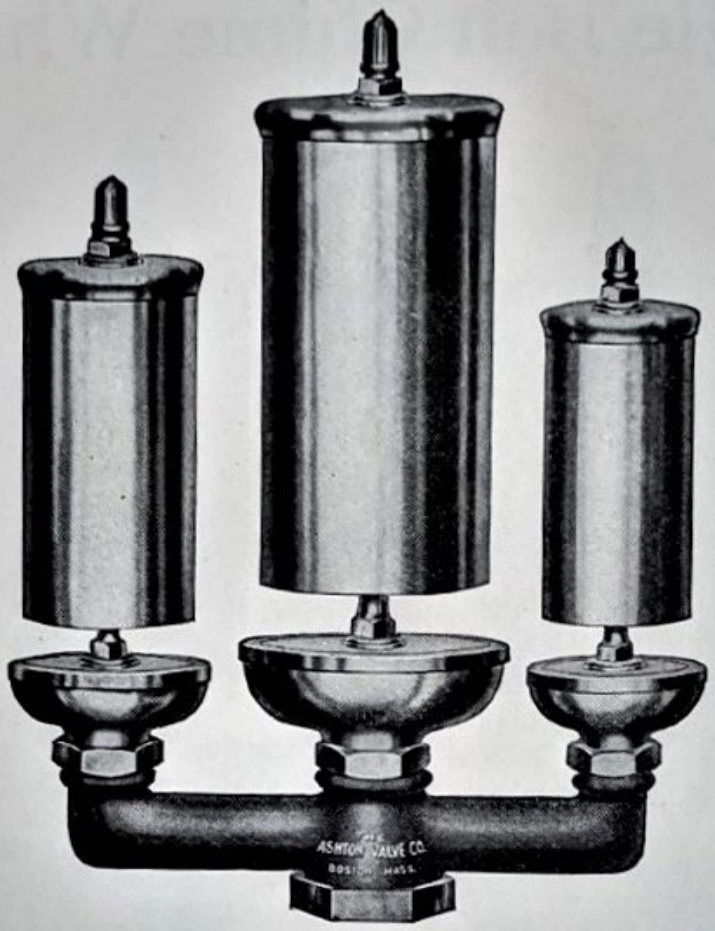
PRICES

Diameter of Bell, Inches	Steam Pipe Inches	No. 91 C.	No. 91 D.
2	¾	$31.00	$52.75
3	1	38.00	62.00
4	1¼	45.50	71.00
5	1½	53.00	80.00
6	1½	69.00	98.00
8	2	104.00	133.00
10	2½	160.00	202.00
12	3	236.50	.....

Orders should specify style number, diameter of bell, and the working pressure.

For Whistle Valves see page 173

Ashton Three-Bell Chime Whistle



No. 91 A.B.
No. 91 A.C.

This type of whistle produces the most far-reaching tone of any chime whistle of equal size. Each combination is made up of three individual No. 90 C. Plain Steam Whistles, page 169 all mounted on one yoke with single connection, and all are adjusted to produce the most agreeable and penetrating tone.

COMBINATION B: Consists of one each 3, 4, and 5 inch diameter bell No. 90C Plain Steam Whistles, mounted on yoke with 1½ inch pipe connection.

Price **$145.00**

COMBINATION C: Consists of one each 5, 6, and 8 inch diameter bell No. 90C Plain Steam Whistles, mounted on yoke with 3 inch pipe connection.

Price, **$245.00**

The bells of the above individual whistles have a length about twice the diameter. Orders should specify working pressure.

Ashton Whistle Valves

No. 90 B.
Plain Style

No. 91 B.
Balanced Style

The No. 90 B. Plain Whistle Valve is more particularly designed for use in connection with small high pressure or large low pressure whistles. It is fitted with a lever that is adjustable to any desired position, contains a minimum number of parts, and is suitable for 200 pounds working pressure. Made of bronze with seat that may be reground.

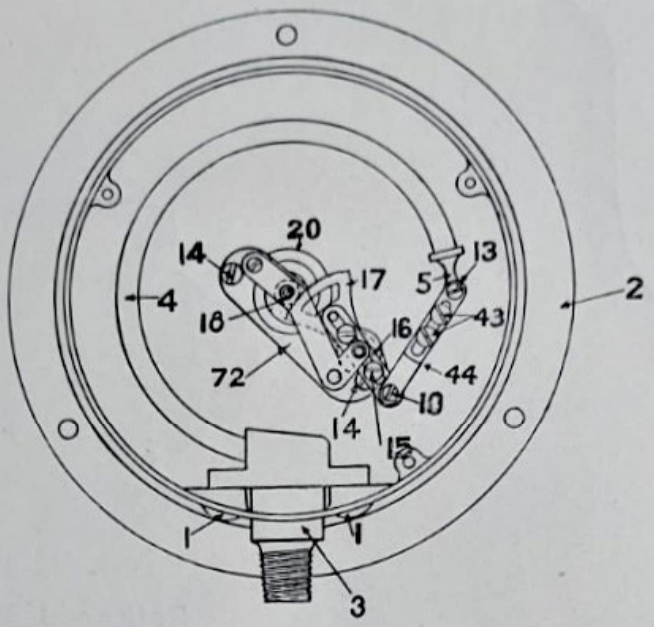
The No. 91 B. Balanced Whistle Valve is recommended for large and high pressure whistles. The principles upon which this valve is constructed make it easy to operate. It is heavily constructed of bronze, with either screwed or flanged connections, is suitable for 200 pounds working pressure and has adjustable lever.

Balanced valves for higher pressure can be furnished. Prices on application.

LIST PRICES

Size, inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3
Plain Valve, No. 90 B. . . .	$2.00	$2.00	$2.50	$3.00	$4.40	$5.60	$7.40	$14.00	$18.00	$29.50
Balanced Valve, No. 91 B, Screwed Connections					18.00	22.20	26.60	35.50	44.40	62.20
Balanced Valve, No. 91 B, Flanged Inlet, Screwed Outlet					21.40	26.00	31.80	41.80	51.00	74.80
Balanced Valve, No. 91 B, Flanged Inlet and Outlet . .					22.20	27.50	33.60	43.80	53.20	77.00

Ashton
Pressure and Vacuum Gages

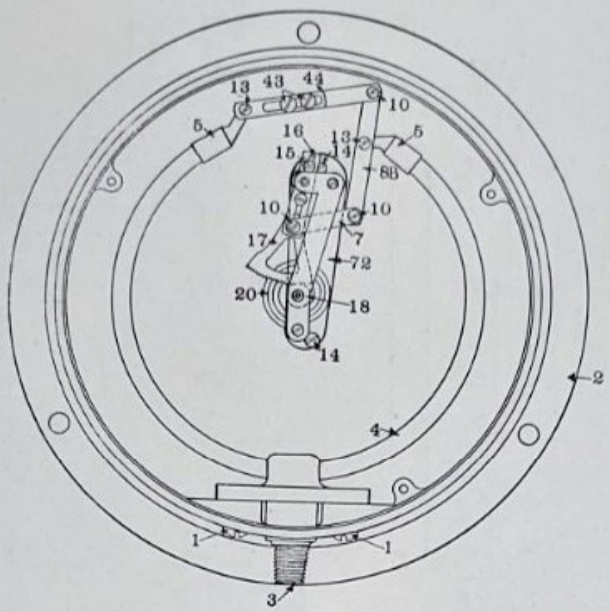


Price List of Parts

Style Nos.		51, 53, 54, 56, 58 and 60									
Size Inches		2½	3	3½	4½	5	6	6¾	8½	10	12
Name of Part	Fig.	PRICE EACH									
Socket Screw {Iron	1	$.08	$.08	$.08	$.08	$.08	$.08	$.08	$.08	$.08	$.08
Socket Screw {Brass	1	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10
Case, Iron For Spun or Slip Ring	2	.75	.75	1.00	1.15	1.50	1.90	2.25	3.00	4.00	5.50
Case, Brass—Threaded	2	1.50	1.75	4.00	4.75	5.50	6.25	8.25	12.00	23.75	30.00
Socket Spring & Tip Complete, not furnished separately, note below	3–4–5	1.00	1.25	1.50	1.60	1.75	2.00	2.25	2.75	3.50	4.00
Connection Screw	10	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10
Tip Connection Screw	13	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10
Movement Case Screws	14	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10
Adjusting Slide, Lock Screw	15	.08	.08	.08	.08	.08	.08	.08	.08	.08	.08
Adjusting Slide	16	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10
Sector	17	.40	.60	.60	.60	.60	.60	.60	.60	.60	.60
Pinion	18	.40	.40	.40	.40	.40	.40	.40	.40	.40	.40
Hair Spring	20	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
Dial, Silvered, No. 51, 53, 60 Styles only, note below, not shown	24	1.30	1.35	2.00	2.00	2.30	2.80	3.00	3.50	4.25	5.00
Dial, Silvered, No. 54, 56, 58 Styles only, note below, not shown	24	...	...	2.15	2.15	2.45	3.00	3.20	3.75	4.50	5.25
Ring, Threaded, with bevel glass style "E", not shown	25	2.00	2.50	...	...	...	...	...	...	...	...
Ring, O. G., For Iron Cases only, Spun, Style "C", not shown	25	.65	*2.70	.75	.80	.85	.90	...	...	...	...
Ring O. G., For Iron Cases only, Slip, Style "B", not shown	25	...	...	...	...	...	...	4.00	6.25	8.00	9.50
Ring, O.G., For Brass Cases only, Threaded, Style "A", not shown	25	2.25	2.35	2.50	2.50	2.75	3.00	3.50	6.50	8.50	10.00
Dial Screw, not shown	26	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05
Hand, not shown	27	.15	.15	.15	.15	.20	.20	.20	.30	.40	.50
Glass, not beveled, not shown	34	.15	.15	.15	.15	.15	.20	.20	.25	.30	.40
Adjustment Screw	43	...	...	...	.10	.10	.10	.10	.10	.10	.10
Adjustable Link, Complete	44	*1.15	*1.15	*1.15	.45	.45	.50	.50	.50	.50	.50
Stop Pin, for hand, not shown	75	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05
Glass, Beveled 2½ and 3 in. only, not shown	72	.25	.25	...	...	...	...	...	...	...	...
Movement Complete, note below		1.00	1.00	1.50	1.50	1.50	1.80	1.80	1.80	1.80	1.80

When ordering Springs (3–4–5) or Dials (24) it is necessary to specify the maximum
It is more economical to order complete new mov
*1—Solid link (7) in 3½" and

Ashton Double Spring Pressure Gage



No. 52 L.B.D.
(Stationary Style)

Price List of Parts

Size Inches		4½	5	6	6¾	8½	10	12
Name of Part	Fig.	PRICE EACH						
Socket Screw, Iron	1	.08	.08	.08	.08	.08	.08	.08
Socket Screw, Brass	1	.10	.10	.10	.10	.10	.10	.10
Case, Iron	2	1.50	2.00	3.00	3.50	4.50	5.50	6.50
Case, Brass	2	4.00	4.50	5.50	6.50	12.00	24.00	30.00
Socket, Spring & Tip Complete, not furnished separately, Note Below	3–4–5	2.00	2.50	2.80	3.00	3.25	3.75	4.25
Movement Connection Arm	7	.10	.10	.10	.10	.10	.10	.10
Lever	8B	.20	.20	.20	.20	.20	.20	.20
Connection Screw	10	.10	.10	.10	.10	.10	.10	.10
Tip Connection Screw	13	.10	.10	.10	.10	.10	.10	.10
Movement Case Screw	14	.10	.10	.10	.10	.10	.10	.10
Adjusting Slide Lock Screw	15	.08	.08	.08	.08	.08	.08	.08
Adjusting Slide	16	.10	.10	.10	.10	.10	.10	.10
Sector	17	.60	.60	.60	.60	.60	.60	.60
Pinion	18	.40	.40	.40	.40	.40	.40	.40
Hair Spring	20	.20	.20	.20	.20	.20	.20	.20
Dial, Silvered, Note Below Not Shown	24	2.00	2.30	2.80	3.00	3.50	4.25	5.00
Ring, O. G., For Iron Cases only, Spun, Style "C" Not Shown	25	.80	.85	.90	..	...	..	...
Ring, O. G., For Iron Cases only, Slip, Style "B" Not Shown	25				4.00	6.25	8.00	9.50
Ring "A" O.G., Threaded Not Shown	25	2.50	2.75	3.00	3.50	6.50	8.50	10.00
Dial Screw Not Shown	26	.05	.05	.05	.05	.05	.05	.05
Hand Not Shown	27	.15	.20	.20	.20	.30	.40	.50
Glass Not Shown	34	.15	.15	.20	.20	.25	.30	.40
Adjustable LinkScrew	43	.10	.10	.10	.10	.10	.10	.10
Adjustable LinkComplete	44	.45	.45	.50	.50	.50	.50	.50
Hand Stop Pin Not Shown	75	.05	.05	.05	.05	.05	.05	.05
Movement Complete, Note Below	72	1.50	1.50	1.80	1.80	1.80	1.80	1.80

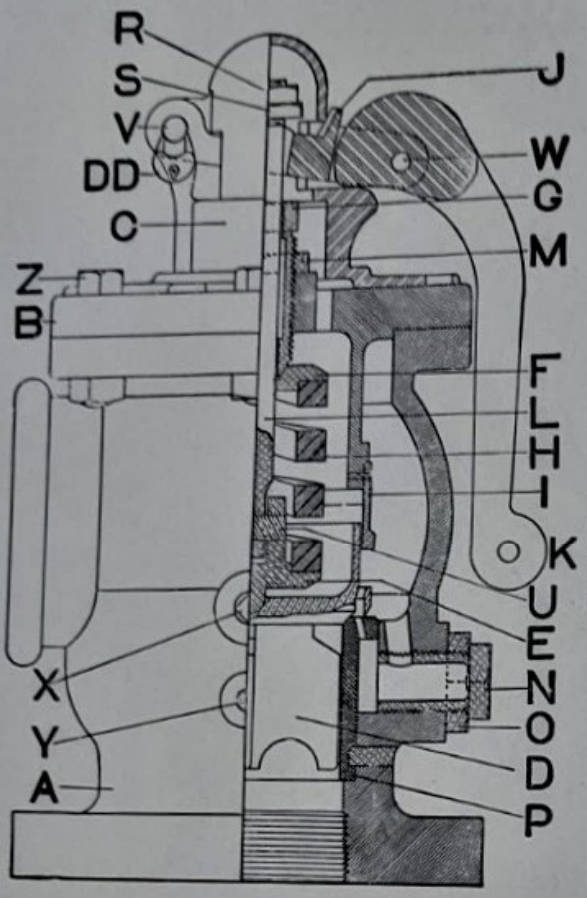
When ordering Springs (3–4–5) or Dials (24) it is necessary to specify the maximum pressure.

For style of Hands see page 157.

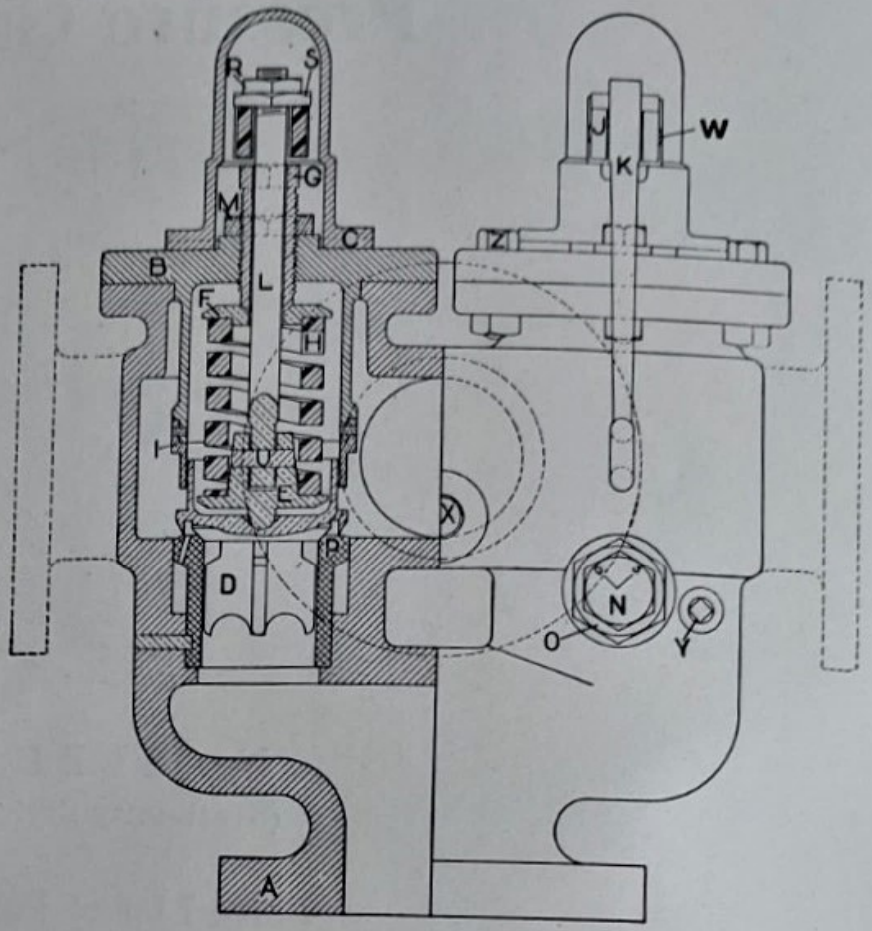
It is more economical to order complete new movements (72) than their component parts for reassembling.

Ashton Pop Safety Valves

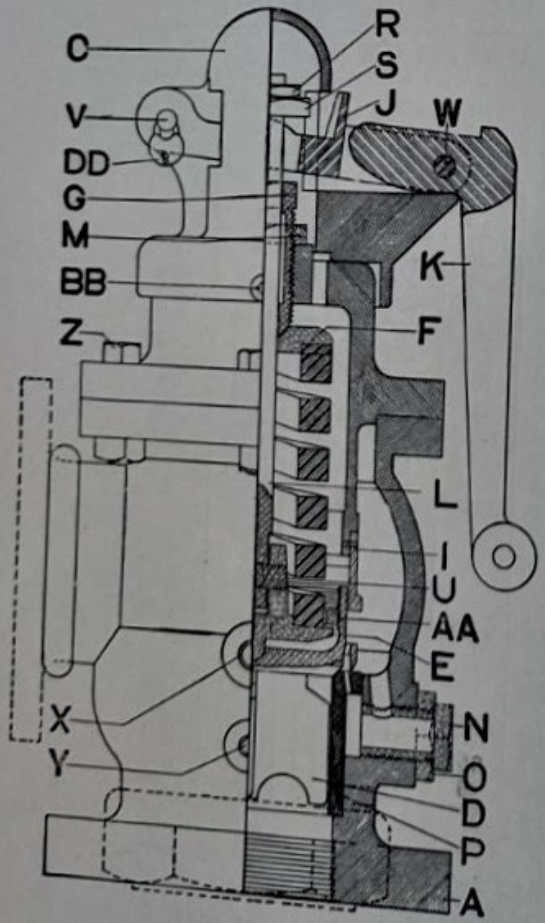
Reference List of Parts
Old Style

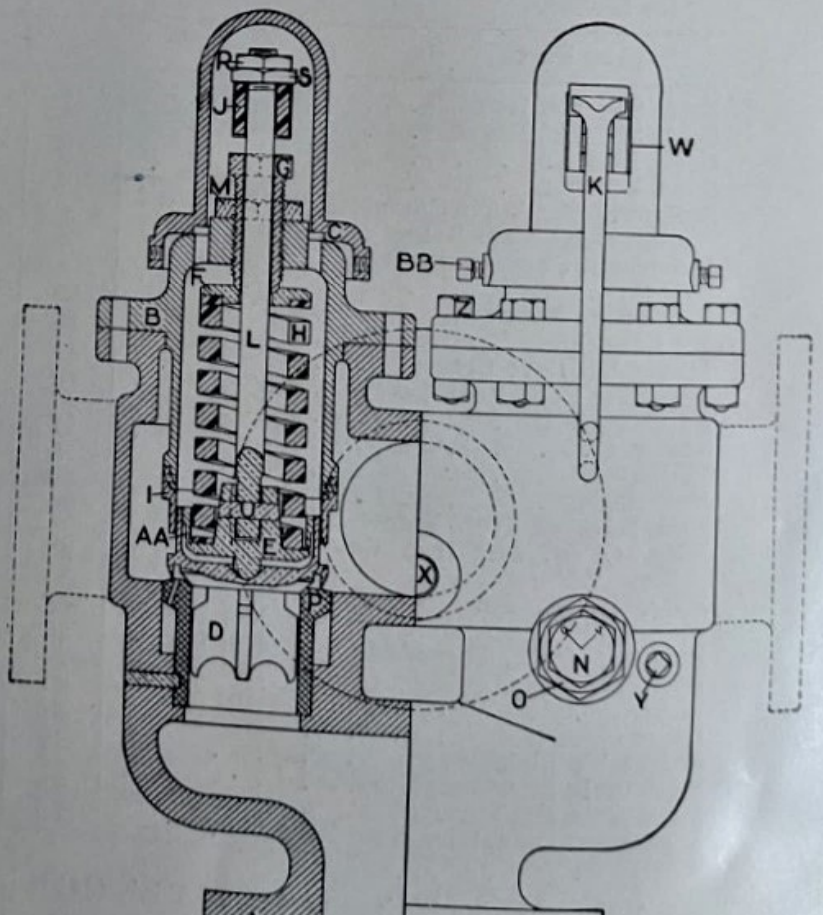


No. 3



No. 5 (Duplex)

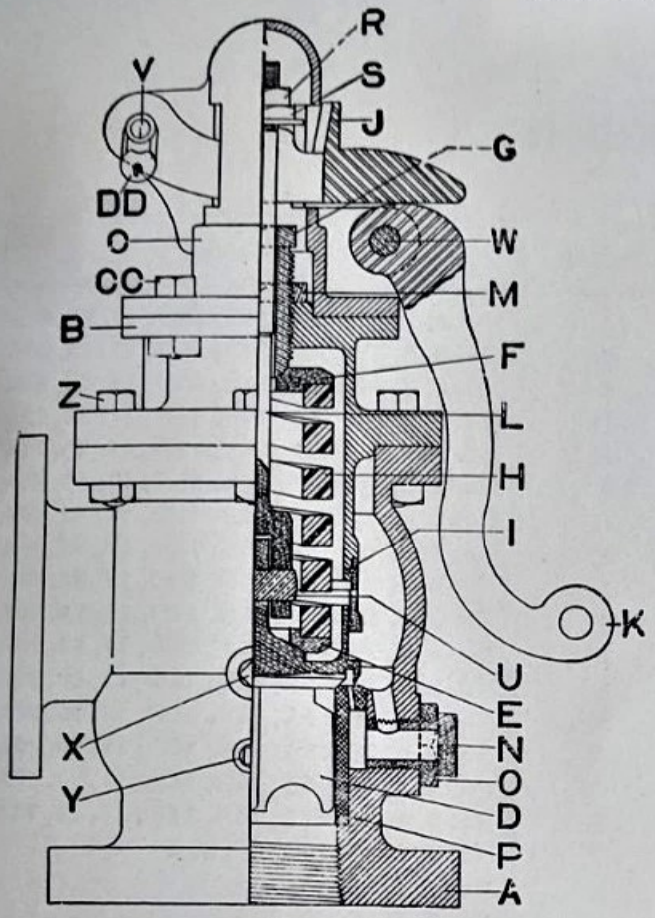




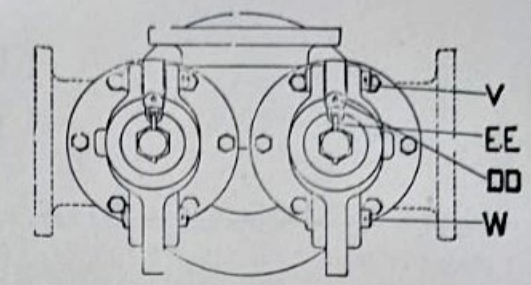
Ashton Pop Safety Valves

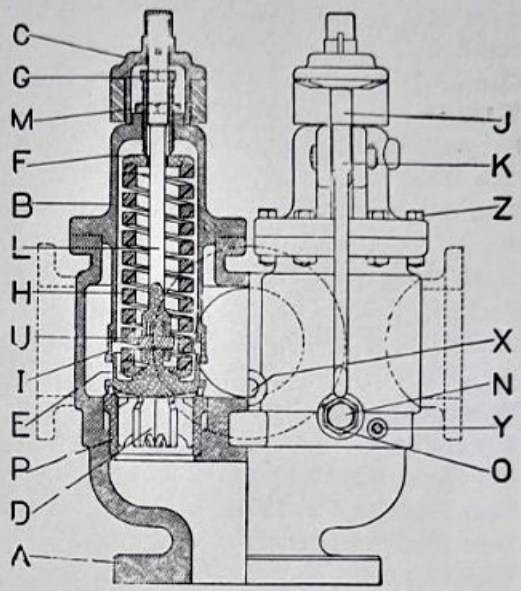
Reference List of Parts

OLD STYLE



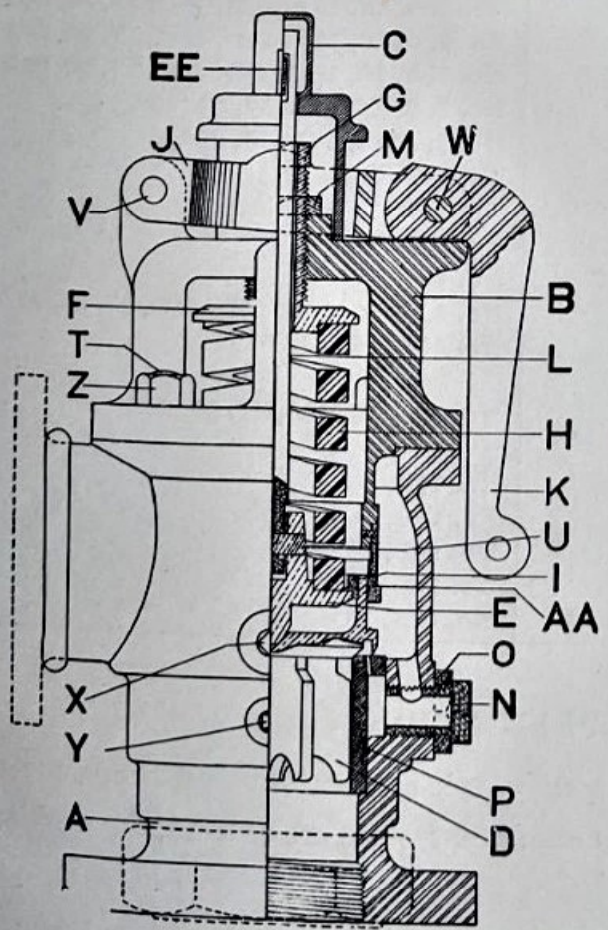
No. 16



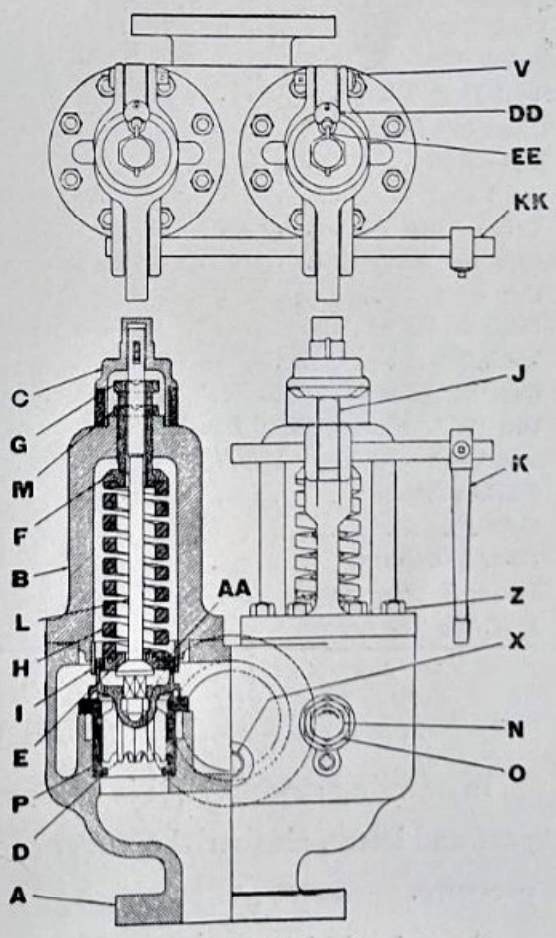


No. 16A (Duplex)

For Marine Boilers



No. 17



No. 16B, No. 16D. (Duplex)

Ashton Pop Safety Valves

List of Parts

Old Style

Name of Part	Letter	Style of Valve
Base	A	No. 3, 5, 16, 16A, 16B, 16D, 17, 20, 20A
Head	B	No. 3, 5, 16, 16A, 16B, 16D, 17, 20, 20A
Cap	C	No. 3, 5, 16, 16A, 16B, 16D, 17, 20, 20A
Wing Valve	D	No. 3, 5, 16, 16A, 16B, 16D, 17, 20, 20A
Bottom Disc	E	No. 3, 5, 16, 16A, 16B, 16D, 17, 20, 20A
Top Disc	F	No. 3, 5, 16, 16A, 16B, 16D, 17, 20, 20A
Pressure Screw	G	No. 3, 5, 16, 16A, 16B, 16D, 17, 20, 20A
Spring	H	No. 3, 5, 16, 16A, 16B, 16D, 17, 20, 20A
Head Ring	I	No. 3, 5, 16, 16A, 16B, 16D, 17, 20, 20A
Fork	J	No. 3, 5, 16, 16A, 16B, 16D, 17, 20, 20A
Lever	K	No. 3, 5, 16, 16A, 16B, 16D, 17, 20, 20A
Spindle	L	No. 3, 5, 16, 16A, 16B, 16D, 17, 20, 20A
Pressure Screw Check Nut	M	No. 3, 5, 16, 16A, 16B, 16D, 17, 20, 20A
Regulator	N	No. 3, 5, 16, 16A, 16B, 16D, 17, 20, 20A
Regulator Check Nut	O	No. 3, 5, 16, 16A, 16B, 16D, 17, 20, 20A
Seat Bushing (Nickel)	P	No. 3, 5, 16, 16A, 16B, 16D, 17, 20, 20A
Seat Bushing (Bronze)	P	No. 3, 5, 16, 16A, 20, 20A
Upper Spindle Nut	R	No. 3, 5, 16, 20, 20A
Lower Spindle Nut	S	No. 3, 5, 16, 20, 20A
Stud	T	No. 16B, 16D, 17
Spindle Pin	U	No. 3, 5, 16, 16A, 17, 20, 20A
Fork Pin	V	No. 3, 5, 16, 16A, 16B, 16D, 17, 20, 20A
Lever Pin	W	No. 3, 5, 16, 16A, 16B, 16D, 17, 20, 20A
Seat Drip Plug	X	No. 3, 5, 16, 16A, 16B, 16D, 17, 20, 20A
Chamber Drip Plug	Y	No. 3, 5, 16, 16A, 17, 20, 20A
Base Bolt	Z	No. 3, 5, 16, 16A, 20, 20A
Stud Nut	Z	No. 16B, 16D, 17
Valve Ring	AA	No. 16B, 16D, 17, 20, 20A
Cap Set Screw	BB	No. 20, 20A
Cap Bolt	CC	No. 16
Lock and Key	DD	No. 3, 5, 16, 16A, 16B, 16D, 17, 20, 20A
Lock Pin	EE	No. 16A, 16B, 16D, 17
Cap "C" complete with Fork "J"; Pin "V"; Lever "K"; Pin "W" and Lock and Key "DD."		No. 3, 5, 16, 16A, 17, 20, 20A
Rocker Shaft	KK	No. 16B, 16D
Cam		No. 16B, 16D
Cam Set Screw		No. 16B, 16D
Lever Set Screw		No. 16B, 16D
Bushing Set Screw		No. 16B, 16D

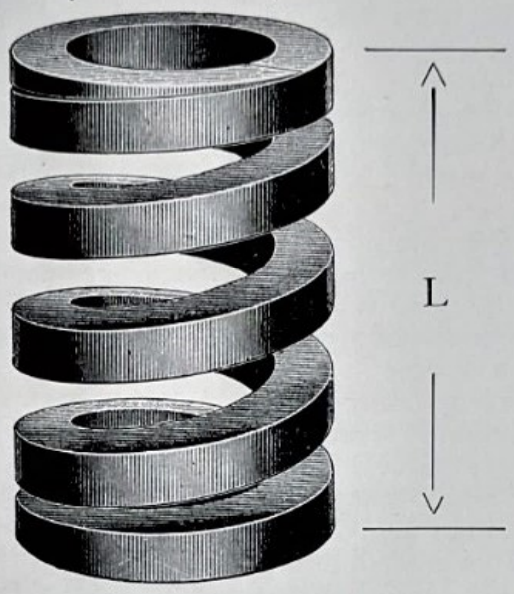
PRICES ON APPLICATION

In ordering new parts, it is necessary to specify style number of valve, size, name of part and letter, also serial number of valve, and if new springs are ordered, the working pressure.

Care should be used in ordering as parts for old valves are made to order and cannot be exchanged.

Ashton Safety and Relief Valve Springs

Old Style



The springs used in Ashton Valves are of a superior quality and workmanship and are essentially different from those of ordinary commercial manufacture. They are made of special high grade steel.

Each spring is drawn to a uniform temper, accurately squared up on both ends, and when completed is subjected to a cold compression test closing it solid. They are guaranteed against defects and to give entirely satisfactory service.

VALVE SPRING PRICES

DIMENSIONS—LENGTH × ARBOR (I. D.)

Style No.	SIZE, INCHES								
	2	2½	3	3½	4	4½	5	5½	6
3	3⅛ x 1½	3⅜ x 1½	3¾ x 1¾	4 x 1¾	4½ x 1¾	5 x 1¾	6 x 2	.....	6½ x2
	$4.35	$4.80	$5.70	$6.15	$6.40	$6.60	$8.75	.....	$10.20
5	....	....	5 x 1¾	4 x 1¾	7 x 1¾	.....	....	.....	.....
	....	....	6.60	6.15	7.75	.....	.....	.....	.....
16	5¾ x 1⅜	5⅜ x 1¾	6 x 1¾	6¼ x 2	6¾ x 2¼	7⅜ x 2½	9¼ x 2¾	11 x 2¾	12 x 2¾
	6.40	6.85	7.30	9.70	13.40	15.90	20.50	30.75	31.90
16A	5¾ x 1⅜	6½ x 1¾	8 x 1¾	9 x 2	11½ x 2¼	11½ x 2½	....	.....	.....
	6.40	7.50	8.55	13.65	25.00	27.30	....	.....	.....
16B	5¾ x 1⅜	6½ x 1¾	8 x 1¾	8½ x 2	9 x 2	9 x 2¼	....	.....	.....
	6.40	7.50	8.55	13.10	13.65	16.50	....	.....	.....
	....	....	8¾ x 2¼	9 x 2¼	8¾ x 2¼	12 x 2¾	....	.....	.....
16D	....	....	16.00	16.50	16.00	31.90	....	.....	.....
	6 x 1¾	7 x 2	9 x 2½	9 x 2½	9 x 2½	12 x 3	....	.....	.....
	7.30	11.35	17.05	17.05	17.05	34.20			
17	4¾ x 1¼	5 x 1½	5¼ x 1½	6 x 1¾	7 x 2	8½ x 2	8½ x 2	.....	.....
	5.70	6.15	6.40	7.30	11.35	13.10	13.10	.....	.....
20	4¾ x 1¼	5 x 1½	5 x 1½	6 x 1¾	7 x 2	8½ x 2	8½ x 2	.....	.....
	5.70	6.15	6.15	7.30	11.35	13.10	13.10	.....	.....
20A	5 x 1¼	6 x 1½	6 x 1½	6 x 1¾	8½ x 2	8½ x 2	10 x 2	12¼ x 2¾	12¼ x 2¾
	5.70	6.85	6.85	7.30	13.10	13.10	15.90	32.50	32.50

In ordering new springs it is necessary to specify style number of valve, size, serial number of valve, and the *working pressure.* Care should be used in ordering, as parts for old valves are made to order and cannot be exchanged.

Extracts from A. S. M. E. Boiler Construction Code
Edition of 1927

SAFETY VALVES

P-269. SAFETY VALVE REQUIREMENTS. Each boiler having more than either 500 sq. ft. of water-heating surface, or in which the generating capacity exceeds 2,000 lbs. per hour, shall have two or more safety valves.

P-270. The safety valve capacity for each boiler shall be such that the safety valve or valves will discharge all the steam that can be generated by the boiler without allowing the pressure to rise more than 6 per cent above the maximum allowable working pressure, or more than 6 per cent above the highest pressure to which any valve is set.

P-271. One or more safety valves on the boiler proper shall be set at or below the maximum allowable working pressure. The remaining valves may be set within a range of 3 per cent above the maximum allowable working pressure, but the range of setting of all of the valves on a boiler shall not exceed 10 per cent of the highest pressure to which any valve is set.

P-272. Safety valves may be of the direct spring-loaded pop type, with seat and bearing surface of the disk inclined at any angle between 45 deg. and 90 deg. inclusive, to the center line of the spindle. The maximum rated capacity of a safety valve shall be determined at a pressure of 3 per cent in excess of that at which the valve is set to blow and with a blow down of not more than 4 per cent of the set pressure, the blow down to be in no case less than 2 lbs.

Dead-weight or weighted-lever safety valves shall not be used.

P-273. Each safety valve ½ in. size and larger shall be plainly marked by the manufacturer in such a way that the markings will not be obliterated in service.

P-274. The minimum aggregate relieving capacity of all of the safety valve or valves required on a boiler shall be that determined on the basis of 6 lb. of steam per hour per sq. ft. of boiler heating surface for water-tube boilers. For all other types of power boilers, the minimum aggregate relieving capacity shall be that determined on the basis of 5 lb. of steam per hour per sq. ft. of boiler heating surface for boilers with maximum allowable working pressure above 100 lb. per sq. in., and on the basis of 3 lb. of steam per hour per sq. ft. of boiler heating surface for boilers with maximum allowable working pressures at or below 100 lb. per sq. in.

The heating surface shall be computed for that side of the boiler surface exposed to the products of combustion, exclusive of the superheating surface. In computing the heating surface for this purpose, only the tubes, fireboxes, shells, tube sheets and the projected area of headers need be considered. The minimum number and size of safety valves required shall be determined on the basis of the aggregate relieving capacity and the relieving capacity marked on the valves by the manufacturer. Where the operating conditions are changed, or additional heating surface such as water screens or water walls is connected to the boiler circulation, the safety-valve capacity shall be increased, if necessary, to meet the new conditions and be in accordance with Par. P-270.

P-275. If the safety valve capacity cannot be computed, or if it is desirable to prove the computations, it may be checked in any one of the three following ways, and if found insufficient, additional capacity shall be provided:

(*a*) By making an accumulation test; that is, by shutting off all other steam discharge outlets from the boiler and forcing the fires to the maximum. The safety valve equipment shall be sufficient to prevent an excess pressure beyond that specified in Par. P-270.

(*b*) By measuring the maximum amount of fuel that can be burned and computing the corresponding evaporative capacity upon the basis of the heating value of the fuel (see Appendix, Pars. A-11 to A-17).

(*c*) By determining the maximum evaporative capacity by measuring the feed water. The sum of the safety valve capacities marked on the valves, shall be equal to or greater than the maximum evaporative capacity of the boiler.

P-277. The safety valve or valves shall be connected to the boiler independent of any other steam connection, and attached as close as possible to the boiler, without any unnecessary intervening pipe or fitting. Such intervening pipe or fitting, if used, shall not be longer than the face to face dimension (A-A) of the American Extra-Heavy iron flanged tee fitting of corresponding size. Every safety valve shall be connected so as to stand in an upright position, with

between the required safety valve or valves and the boiler, nor on the discharge pipe between the safety valve and the atmosphere. When a discharge pipe is used, the cross-sectional area shall be not less than the full area of the valve outlet or of the total of the areas of the valve outlets discharging thereinto, and shall be as short and straight as possible and so arranged as to avoid undue stresses on the valve or valves.

All safety-valve discharges shall be so located or piped as to be carried clear from running boards or platforms. Ample provision for gravity drain shall be made in the discharge pipe, at or near each safety valve, and where water of condensation may collect. Each valve shall have an open gravity drain through the casing below the level of the valve seat.

P-279. If a muffler is used on a safety valve it shall have sufficient outlet area to prevent back pressure from interfering with the proper operation and discharge capacity of the valve.

P-280. When a boiler is fitted with two or more safety valves on one connection, this connection to the boiler shall have a cross-sectional area not less than the combined areas of inlet connections of all the safety valves with which it connects and shall also meet the requirements of Par. P-278.

P-281. Safety valves shall operate without chattering and shall be set and adjusted as follows: To close after blowing down not more than 4 per cent of the set pressure but not less than 2 lb. in any case. For spring-loaded pop safety valves operating on pressures up to and including 300 lb. per sq. in. the blow down shall not be less than 2 per cent of the set pressure.

P-282. To insure the valve being free, each safety valve on boilers with maximum allowable working pressures up to and including 200 lb. per sq. in., shall have a substantial lifting device by which the valve disk may be positively lifted from its seat at least $\frac{1}{16}$ in. when there is no pressure on the boiler. For boilers with working pressures above 200 lb. per sq. in., the safety-valve lifting device need not provide for lifting the valve disk $\frac{1}{16}$ in. except at such times as there is at least 75 per cent of the full working pressure upon the boiler. Except at times of general inspection, the valve should not be lifted, unless there is sufficient steam pressure on the boiler to blow the dirt and scale clean from the seat.

P-283. The seats and disks of safety valves shall be of suitable material to resist corrosion.

P-284. Springs used in safety valves shall not show a permanent set exceeding $\frac{1}{16}$ in. ten minutes after being released from a cold compression test closing the spring solid.

P-285. The spring in a safety valve shall not be used for any pressure more than 10 per cent above or 10 per cent below that for which it was designed.

P-286. A safety valve over 3 in. size, used for pressures greater than 15 lb. per sq. in. gage, shall have a flanged inlet connection. The dimensions of flanges subjected to boiler pressure not exceeding 250 lb. per sq. in. shall conform to the American Extra-Heavy Standard given in Table A-6 of the Appendix, except that the face of the safety valve flange and the nozzle to which it is attached may be flat and without the raised face.

P-288. Every superheater shall have one or more safety valves near the outlet. The discharge capacity of the safety valve or valves on an attached superheater may be included in determining the number and size of the safety valves for the boiler, provided there are no intervening valves between the superheater safety valve and the boiler, and provided the discharge capacity of the safety valve or valves on the boiler, as distinct from the superheater, is at least 75 per cent of the aggregate valve capacity required.

P-289. Every safety valve used on a superheater, discharging superheated steam, shall have a casing, including the base, body, bonnet and spindle, of steel, steel alloy, or equivalent heat-resisting material. The valve shall have a flanged inlet connection, and shall have the seat and disk of nickel composition or equivalent material, and the spring fully exposed outside of the valve casing so that it shall be protected from contact with the escaping steam.

The term "horse power" as applied to boilers, is not sufficiently definite for ordering safety valves but the maximum evaporating capacity should be given.

Thirty pounds of water per hour sometimes used as a basis of horse power, is only one half the quantity obtained by using 10 square feet of heating surface and 6 pounds (P-274) of water per square foot of heating surface per hour. The A. S. M. E. Code does not use the term "horse power" in describing safety valve requirements.

Appendix

A-11 METHOD OF COMPUTING DISCHARGE CAPACITY. The required discharge capacity of a safety valve or valves for a boiler may be based either on the heat units in the fuel consumed or on the amount of steam generated.

The number of heat units in the fuel that each safety valve will handle per hour, for valves of the ordinary types in which the discharge capacity is proportioned to the lift, may be obtained as follows:

$U = 161{,}000 \times P \times D \times L$ for Bevel Seats at 45 degrees.

The amount of steam that a valve will discharge in pounds per hour, may be found as follows:

$W = 110 \times P \times D \times L$ for Bevel Seats at 45 degrees. Where

U = Number of heat units in the fuel that a safety valve will handle per hour, B.T.U.

W = Quantity of steam that a safety valve will handle per hour, lb.

P = Absolute boiler pressure = gage pressure + 14.7 lb. per sq. in.

D = Inside diameter of valve seat, in.

L = Vertical lift of valve disk, measured with 3 per cent excess pressure, in.

Method of Checking the Safety Valve Capacity by Measuring the Maximum Amount of Fuel that can be Burned.

A-12. The maximum quantity of fuel C that can be burned per hour at the time of maximum forcing is determined by a test. The maximum number of heat units per hour, or $C \times H$ is then determined, using the values of H given in Par. A-17. The weight of steam generated per hour is found by the formula:

$$W = \frac{C \times H \times 0.75}{1100}$$

where

W = weight of steam generated per hour, lb.

C = total weight or volume of fuel burned per hour at time of maximum forcing, lb. or cu. ft.

H = heat of combustion of fuel, B.T.U. per lb. or per cu. ft. (see Par. A-17).

The sum of the safety valve capacities marked on the valves shall be equal to or greater than W.

A-13 Example 1: A boiler at the time of maximum forcing uses 2150 lbs. of Illinois coal per hour of 12,100 B.T.U. per lb. Boiler pressure, 225 lb. per sq. in. gage.

$C \times H = 2150 \times 12{,}100 = 26{,}015{,}000.$

$W = C \times H \times 0.75 \div 1100 = 17{,}740.$

A 3½ in. bevel-seated valve with 0.11 in. lift would discharge in heat units.

$U = 161{,}000 \times 239.7 \times 3\frac{1}{2} \times 0.11 = 14{,}858{,}000.$

and in weight of steam

$W = 110 \times 239.7 \times 3\frac{1}{2} \times 0.11 = 10{,}150.$

From which it can be seen that either method indicates that two such valves will give the proper relieving capacity.

A-17. For the purpose of checking the safety valve capacity as described in Par. A-12, the following values of heats of combustion of various fuels may be used:

	H = B.T.U. per lb.
Semi-bituminous coal	14,500
Anthracite	13,700
Screenings	12,500
Coke	13,500
Wood, hard or soft, kiln dried	7,700
Wood, hard or soft, air dried	6,200
Wood shavings	6,400
Peat, air dried, 25 per cent moisture	7,500
Lignite	10,000
Kerosene	20,000
Petroleum, crude oil, Penn.	20,700
Petroleum, crude oil, Texas	18,500

	H = B.T.U. per cu. ft.
Natural gas	960
Blast-furnace gas	100
Producer gas	150
Water gas, uncarbureted	

Flanges

American Standard 125 lb. Cast Iron

Size	2	2½	3	3½	4	4½	5	6	8
Dia. flange	6	7	7½	8½	9	.....	10	11	13½
Dia. bolt circle	4¾	5½	6	7	7½	.....	8½	9½	11¾
No. bolts	4	4	4	8	8	.....	8	8	8
Dia. bolts	⅝	⅝	⅝	⅝	⅝	.....	¾	¾	¾

AMERICAN STANDARD 250 lb. Cast Iron

Size	2	2½	3	3½	4	4½
Dia. flange	6½	7½	8¼	9	10	10½
Dia. bolt circle	5	5⅞	6⅝	7¼	7⅞	8½
No. bolts	8	8	8	8	8	8
Dia. bolts	⅝	¾	¾	¾	¾	¾

AMERICAN STANDARD 400 lb. Steel

Dia. flange	6½	7½	8¼	9	10	10½
Dia. bolt circle	5	5⅞	6⅝	7¼	7⅞	8½
No. bolts	8	8	8	8	8	8
Dia. bolts	⅝	¾	¾	⅞	⅞	⅞

AMERICAN STANDARD 600 lb. Steel

Dia. flange	6½	7½	8¼	9	10¾	11½
Dia. bolt circle	5	5⅞	6⅝	7¼	8½	9¼
No. bolts	8	8	8	8	8	8
Dia. bolts	⅝	¾	¾	⅞	⅞	1

AMERICAN STANDARD 900 lb. Steel

Dia. flange	8½	9⅝	9½	10¾	11½	13
Dia. bolt circle	6½	7½	7½	8½	9¼	10½
No. bolts	8	8	8	8	8	8
Dia. bolts	⅞	1	⅞	1	1⅛	1⅛

NOTE: — As the A. S. M. E. Boiler Code is revised from time to time we suggest consulting the latest edition.

USEFUL INFORMATION

FOR THE CIRCUMFERENCE OF A CIRCLE, multiply diameter by 3.1416.

FOR THE DIAMETER OF A CIRCLE, multiply the circumference by .31831.

FOR THE AREA OF A CIRCLE, multiply square of diameter by .7854.

FOR THE SIDE OF AN EQUAL SQUARE, multiply diameter by .8862.

CAPACITIES OF PIPES ARE IN PROPORTION TO THE SQUARES OF THE DIAMETERS. Friction of liquids in pipes increases as the square of the velocity.

A GALLON OF WATER (United States standard) weighs (approximately) 8⅓ pounds, and contains 231 cubic inches. A cubic foot of water weighs (approximately) 62½ pounds and contains 1728 cubic inches, or 7½ gallons (approximately).

ORDINARY SPEED TO RUN PUMPS is 100 feet of piston per minute. To find quantity of water elevated in one minute running at 100 feet of piston per minute: Square the diameter of water cylinder in inches and multiply by 4. Example: Capacity of a five-inch cylinder is desired; the square of the diameter (5 inches) is 25, which multiplied by 4 gives 100 ,which is gallons per minute (approximately).

THE AREA OF THE STEAM PISTON, multiplied by the steam pressure, gives the total amount of pressure exerted. The area of the water piston multiplied by the pressure of water per square inch gives the resistance. A margin must be made between the power and resistance to move the pistons at the required speed, usually reckoned at about 50 per cent.

TO FIND THE AREA OF A REQUIRED PIPE, the volume and velocity of water being given, multiply the number of cubic feet of water by 144, and divide the product by the velocity in feet per minute. The area being found, it is easy to get the diameter of pipe necessary.

TO FIND THE CAPACITY OF A CYLINDER IN GALLONS: Multiplying the area in inches by the length of stroke in inches will give the total number of cubic inches; divide this amount by 231 (which is the cubical contents of a gallon in inches), and the quotient is the capacity in gallons.

To Find the Diameter of a Pump Cylinder to Move a Given Quantity of Water per Minute (100 feet of piston being the speed), divide the number of gallons by 4, then extract the square root, and the result will be the diameter in inches.

To Find the Pressure in Pounds per Square Inch of a Column of Water, multiply the height of the column in feet by .4330. (Approximately every foot elevation is called equal to one-half pound pressure per square inch.)

To Find the Velocity in Feet per Minute Necessary to Discharge a Given Volume of Water in a Given Time, multiply the number of cubic feet of water by 144, and divide the product by the area of the pipe in inches.

The Rate of Combustion in a Furnace is computed by the pounds of fuel consumed per square foot of grate per hour.

French or Metric Measures

The metric unit of length is the meter = 39.37 inches.
The metric unit of weight is the gram = 15.432 grains.
The following prefixes are used for subdivisions and multiples:
Milli = .001, Centi = .01, Deci = .1, Kilo = 1,000.

French and British (and American) Equivalent Measures

MEASURES OF LENGTH

French		British and U. S.
1 meter	=	39.37 inches, or 3.28083 feet, 1.09361 yards.
.3048 meter	=	1 foot.
1 centimeter	=	.3937 inch.
2.54 centimeters	=	1 inch.
1 millimeter	=	.03937 inch, or 1-25 inch nearly.
25.4 millimeters	=	1 inch.
1 kilometer	=	1093.61 yards, or .62137 mile.

MEASURES OF WEIGHT

French		British and U. S.
1 gramme	=	15.432 grains.
.0648 gramme	=	1 grain.
28.35 grammes	=	1 ounce avoirdupois.
1 kilogramme	=	2.2046 pounds.
.4536 kilogramme	=	1 pound.
1 tonne or metric ton	=	.9842 ton of 2,240 pounds.
1000 kilogrammes	=	19.68 cwts.
	=	2204.6 pounds.
1.016 metric tons	=	1 ton of 2,240 pounds.
1016 kilogrammes	=	1 ton of 2,240 pounds.

MEASURES OF CAPACITY

French		British and U. S.
1 liter (= 1 cubic decimeter)	=	61.023 cubic inches.
	=	.03531 cubic foot.
	=	.2642 gallon (American).
3.785 liters	=	2.202 pounds of water at 62° F.
	=	1 gallon (American).

WEIGHT AND PRESSURE PER UNIT OF AREA

French		British and U. S.
1 gramme per square millimeter	=	1.422 lbs. per square inch.
1 kilogramme per square millimeter	=	1422.32 lbs. per square inch.
1 kilogramme per square centimeter	=	14.223 lbs. per square inch.
1.0335 kilogrammes per square centi		

Properties of Saturated Steam

Pressure, Lb. per Sq. in.		Temperature, Degrees F	Volume, Cu. Ft. per Lb.	Weight, Lb. per Cu. Ft.	Heat Content in B.T.U.		Latent Heat in B.T.U.	
Gage	Absolute				of Liquid	of Vapor	of Vaporization	Internal
0.3	15	213.0	26.30	0.03802	181.0	1152.2	971.2	898.1
10.3	25	240.1	16.32	0.0613	208.2	1162.1	953.8	878.4
20.3	35	259.3	11.91	0.0840	227.7	1168.7	941.0	863.9
30.3	45	274.4	9.41	0.1062	243.1	1173.6	930.5	852.2
33.3	48	278.4	8.86	0.1129	247.2	1174.8	927.7	849.1
37.3	52	283.5	8.22	0.1217	252.3	1176.4	924.1	845.1
41.3	56	288.2	7.67	0.1304	257.1	1177.8	920.7	841.4
45.3	60	292.7	7.18	0.1392	261.7	1179.1	917.4	837.8
49.3	64	296.9	6.76	0.1479	266.1	1180.3	914.3	834.3
53.3	68	301.0	6.39	0.1566	270.2	1181.5	911.2	831.1
57.3	72	304.8	6.05	0.1652	274.2	1182.5	908.3	827.9
61.3	76	308.5	5.75	0.1738	278.0	1183.5	905.5	824.9
65.3	80	312.0	5.48	0.1824	281.6	1184.4	902.8	821.9
69.3	84	315.4	5.23	0.1910	285.1	1185.3	900.2	819.1
73.3	88	318.7	5.01	0.1996	288.5	1186.1	897.7	816.3
77.3	92	321.8	4.805	0.2081	291.7	1186.9	895.2	813.7
81.3	96	324.8	4.617	0.2166	294.8	1187.7	892.8	811.1
85.3	100	327.8	4.442	0.2251	297.9	1188.4	890.5	808.6
89.3	104	330.7	4.279	0.2337	300.9	1189.0	888.2	806.1
93.3	108	333.4	4.128	0.2422	303.7	1189.7	885.9	803.8
97.3	112	336.1	3.988	0.2508	306.5	1190.3	883.7	801.4
101.3	116	338.7	3.857	0.2593	309.2	1190.8	881.6	799.2
105.3	120	341.3	3.735	0.2678	311.9	1191.4	879.5	796.9
109.3	124	343.7	3.620	0.2762	314.4	1191.9	877.5	794.8
113.3	128	346.2	3.513	0.2847	316.9	1192.4	875.4	792.6
117.3	132	348.5	3.412	0.2931	319.4	1192.9	873.5	790.5
121.3	136	350.8	3.316	0.3016	321.8	1193.3	871.5	788.5
125.3	140	353.1	3.226	0.3100	324.2	1193.7	869.6	786.4
129.3	144	355.3	3.140	0.3184	326.5	1194.1	867.7	784.5
133.3	148	357.4	3.059	0.3269	328.7	1194.5	865.8	782.5
137.3	152	359.5	2.982	0.3353	330.9	1194.9	864.0	780.6
141.3	156	361.6	2.909	0.3438	333.1	1195.3	862.3	778.7
145.3	160	363.6	2.839	0.3522	335.2	1195.7	860.5	776.9
149.3	164	365.6	2.773	0.3606	337.3	1196.0	858.7	775.1
153.3	168	367.5	2.710	0.3691	339.3	1196.3	857.0	773.3
157.3	172	369.4	2.649	0.3775	341.3	1196.6	855.3	771.5
161.3	176	371.3	2.591	0.3859	343.3	1196.9	853.6	769.8
165.3	180	373.1	2.536	0.3943	345.2	1197.2	852.0	768.0
169.3	184	374.9	2.483	0.4027	347.1	1197.5	850.4	766.4
173.3	188	376.7	2.432	0.4111	349.0	1197.8	848.7	764.7
177.3	192	378.5	2.383	0.4196	350.9	1198.0	847.1	763.0
181.3	196	380.2	2.337	0.4280	352.7	1198.2	845.6	761.4
185.3	200	381.9	2.292	0.4364	354.5	1198.5	844.0	759.8
195.3	210	386.0	2.186	0.457	358.8	1199.0	840.2	755.9
205.3	220	390.0	2.090	0.478	363.0	1199.5	836.5	752.1
215.3	230	393.8	2.002	0.499	367.1	1199.9	832.8	748.3
225.3	240	397.5	1.921	0.521	371.0	1200.3	829.3	744.7
235.3	250	401.1	1.846	0.542	374.9	1200.6	825.8	741.2
245.3	260	404.5	1.777	0.563	378.6	1201.0	822.4	737.7
255.3	270	407.9	1.713	0.584	382.2	1201.2	819.1	734.4
265.3	280	411.2	1.654	0.605	385.7	1201.5	815.8	731.1
275.3	290	414.4	1.598	0.626	389.1	1201.7	812.6	727.9
285.3	300	417.5	1.545	0.647	392.4	1201.9	809.4	724.7
295.3	310	420.5	1.496	0.668	395.7	1202.0	806.4	721.6
305.3	320	423.4	1.450	0.690	398.9	1202.2	803.3	718.5
315.3	330	426.3	1.407	0.711	402.0	1202.3	800.3	715.6
325.3	340	429.1	1.366	0.732	405.0	1202.4	797.4	712.6
335.3	350	431.9	1.327	0.753	408.0	1202.5	794.5	709.7
345.3	360	434.6	1.291	0.775	410.9	1202.5	791.6	706.9
355.3	370	437.2	1.256	0.796	413.7	1202.6	788.8	704.1
365.3	380	439.8	1.223	0.817	416.5	1202.6	786.1	701.4
375.3	390	442.3	1.192	0.839	419.3	1202.6	783.3	698.7
385.3	400	444.8	1.162	0.860	422.0	1202.5	780.6	695.9
405.3	420	449.6	1.107	0.903	427.2	1202.4	775.2	690.7
425.3	440	454.2	1.056	0.947	432.3	1202.3	770.0	685.6
445.3	460	458.7	1.010	0.990	437.2	1202.1	764.9	680.6
465.3	480	463.1	0.968	1.033	442.0	1201.9	759.9	675.6
485.3	500	467.2	0.928	1.077	446.6	1201.7	755.0	670.9
585.3	600	486.5	0.770	1.30	468.0	1199.8	731.8	648.5
685.3	700	503.4	0.656	1.52	487.1	1197.4	710.3	627.9
785.3	800	518.5	0.570	1.76	504.3	1194.4	690.1	608.8
885.3							670.8	590.8

Circumferences and Areas of Circles

Diam., inches	Circum., inches	Area, sq. inches
1/8	.39270	.012272
1/4	.78540	.049087
3/8	1.1781	.110447
1/2	1.5708	.19635
5/8	1.9635	.306796
3/4	2.3562	.441787
7/8	2.7489	.601322
1	3.1416	.7854
1/8	3.5343	.99402
1/4	3.9270	1.2272
3/8	4.3197	1.4849
1/2	4.7124	1.7671
5/8	5.1051	2.0739
3/4	5.4978	2.4053
7/8	5.8905	2.7612
2	6.2832	3.1416
1/8	6.6759	3.5466
1/4	7.0686	3.9761
3/8	7.4613	4.4301
1/2	7.8540	4.9087
5/8	8.2467	5.4119
3/4	8.6394	5.9396
7/8	9.0321	6.4918
3	9.4248	7.0686
1/8	9.8175	7.6699
1/4	10.210	8.2958
3/8	10.603	8.9462
1/2	10.996	9.6211
5/8	11.388	10.3206
3/4	11.781	11.0447
7/8	12.174	11.7933
4	12.566	12.5664
1/8	12.959	13.3641
1/4	13.352	14.1863
3/8	13.744	15.033
1/2	14.137	15.9043
5/8	14.530	16.8002
3/4	14.923	17.7206
7/8	15.315	18.6655
5	15.708	19.635
1/8	16.101	20.629
1/4	16.493	21.6476
3/8	16.886	22.6907
1/2	17.279	23.7583
5/8	17.671	24.8505
3/4	18.064	25.9673
7/8	18.457	27.1086
6	18.850	28.2744
1/8	19.242	29.4648
1/4	19.635	30.6797
3/8	20.028	31.9191
1/2	20.420	33.1831
5/8	20.813	34.4717
3/4	21.206	35.7848
7/8	21.598	37.1224
7	21.991	38.4846
1/8	22.384	39.8713
1/4	22.776	41.2826
3/8	23.169	42.7184
1/2	23.562	44.1787
5/8	23.955	45.6636
3/4	24.347	47.1731
7/8	24.740	48.7071
8	25.133	50.2656
1/8	25.525	51.8487
1/4	25.918	53.4563
3/8	26.311	55.0884
1/2	26.704	56.7451
5/8	27.096	58.4264
3/4	27.489	60.1322
7/8	27.882	61.8625
9	28.274	63.6174
1/8	28.667	65.3968
1/4	29.060	67.2008
3/8	29.452	69.0293
1/2	29.845	70.8823
5/8	30.238	72.7599
3/4	30.631	74.6621
7/8	31.023	76.5888
10	31.416	78.54
1/8	31.809	80.5158
1/4	32.201	82.5161
3/8	32.594	84.5409
1/2	32.987	86.5903
5/8	33.379	88.6643
3/4	33.772	90.7628
7/8	34.165	92.8858
11	34.558	95.0334
1/8	34.950	97.2055
1/4	35.343	99.4022
3/8	35.736	101.6234
1/2	36.128	103.8691
5/8	36.521	106.1394
3/4	36.914	108.4343
7/8	37.306	110.7537
12	37.699	113.098
1/8	38.092	115.466
1/4	38.485	117.859
3/8	38.877	120.277
1/2	39.270	122.719
5/8	39.663	125.185
3/4	40.055	127.677
7/8	40.448	130.192
13	40.841	132.733
1/8	41.233	135.297
1/4	41.626	137.887
3/8	42.019	140.501
1/2	42.412	143.139
5/8	42.804	145.802
3/4	43.197	148.49
7/8	43.590	151.202
14	43.982	153.938
1/8	44.375	156.7
1/4	44.768	159.485
3/8	45.160	162.296
1/2	45.553	165.13
5/8	45.946	167.99
3/4	46.338	170.874
7/8	46.731	173.782
15	47.124	176.715
1/8	47.517	179.673
1/4	47.909	182.655
3/8	48.302	185.661
1/2	48.695	188.692
5/8	49.087	191.748
3/4	49.480	194.828
7/8	49.873	197.933
16	50.265	201.062
1/8	50.658	204.216
1/4	51.051	207.395
3/8	51.444	210.598
1/2	51.836	213.825
5/8	52.229	217.077
3/4	52.622	220.354
7/8	53.014	223.655
17	53.407	226.981
1/8	53.800	230.331
1/4	54.192	233.706
3/8	54.585	237.105
1/2	54.978	240.529
5/8	55.371	243.977
3/4	55.763	247.45
7/8	56.156	250.948
18	56.549	254.47
1/8	56.941	258.016
1/4	57.334	261.587
3/8	57.727	265.183
1/2	58.119	268.803
5/8	58.512	272.448
3/4	58.905	276.117
7/8	59.298	279.811
19	59.690	283.529
1/8	60.083	287.272
1/4	60.476	291.04

Telegraph Cipher

CODE FOR THE ASHTON VALVE COMPANY

161 First Street, Cambridge, Boston, Mass., U. S. A.

Numerical, by Pages

Cable Address: "ASHTON," BOSTON

SPECIAL NOTICE

When ordering goods, use plain English words or figures for the NUMBER or QUANTITY WANTED.

Use "WESTERN UNION," A B C or "Bentley's Code" for general information, directions, and instructions.

PRELIMINARY

Revocable.	At what price, what quantity, and how soon can you ship?
Roofing.	Ship all you possibly can by quickest route.
Roofless.	Ship at first opportunity by cheapest route.
Roominess.	Ship at once by express.
Ropewalk.	Ship at once by fast freight.
Rose	Ship at once by parcel post.
Rosin	Ship at once by parcel post, special delivery.
Rotate.	Hold shipment Order No. —; await particulars by mail.
Restless.	Advise regarding shipment of our Order No.
Roving.	Trace shipment of our Order No.

Always order by NUMBER of Valve, give PRESSURE to set Valve, and state whether FLANGED or SCREW end.

PAGE	NUMBER AND DESCRIPTION	CODE WORD
8	C.I. Valve . . .	Argentina
8	C.I.M. Valve . .	Alberta
9	C.S. Valve . . .	Australia
9	C.S.M. Valve . .	Angola
12	C.I.-10 Valve . .	Argentinian
12	C.I.M.-10 Valve .	Albertanian
13	C.S.-10 Valve . .	Austrania
13	C.S.M.-10 Valve .	Angolian
14	C.S.H. 3 and 4 in. Valve	Alaskanian
14	C.S.H. 1 and 2 in. Valve	Anam
20	5 Testing Clamps	Turkey
21	11A Yoke, C.I. .	Ceylon
21	11B Yoke, C.S. .	Curacoa
22	4 Muffler	America
24	D.I. Valve . . .	Danishian
24	D.I.-11 Valve . .	Danishaft
25	D.I.-10 Valve . .	Dahomian
25	D.I.-12 Valve . .	Dahomshaft
32	A.C. Valve . . .	Natal
33	B.C. Valve . . .	Nigeria
34	B.C.-10 Valve . .	Norway
35	B.C.-11 Valve . .	Nubia
38	31 Valve	Persia
38	32 Valve	Poland
39	34 Valve	Caucasia
40	14 Valve	Costa
41	14B Valve . . .	Crete
42	22 Valve	Germany
44	21 Valve	Gambia
45	18R Valve . . .	Greenland
46	G.C. Valve . . .	Haiti
47	G.C.-10 Valve . .	Hawaii
48	25 Valve	Ireland
49	25B Valve . . .	Italy
50	23 M.A. Valve . .	India
50	23 M.B. Valve . .	Jamaica
51	23E Valve . . .	Japan
51	23C Valve . . .	Java
52	23 Valve	Greece
53	23D Diffuser . .	Holland
56	28 M.M. Valve .	Malta
56	28 M.M.B. Valve	Madagascar
57	30 M.M. Valve .	Monaco
57	30 M.M.B. Valve	Manitoba
58	28 I.L. Valve . .	Montenegro
58	28 I.L.A. Valve .	Mongolia
59	30 I.L. Valve . .	Morocco
59	30 I.L.A. Valve .	Monrovia
60	28 U.S. Valve . .	Madeira
68	37 Dome Connections.	Panama
69	38 Dome Connections	Portugal
70	B.C.-12 Valve .	Paraguay
	Screw Ends . . .	Rome
	Flanged Inlet . .	Russia
	Flanged Outlet .	Siberia
	Nickel Seated . .	Spain

STYLE OF CASES, RINGS, DIALS, ETC., FOR GAGES AND CLOCKS

	CODE WORD		CODE WORD
Iron Case, Brass Ring	Arthur	Flush Ring	Sally
Iron Case, Nickel Plated Ring	Benny	O.G. Ring	Susan
Brass Case	Charlie	Black Dial	Mary
Nickel Plated Case	Jennie	Silvered Dial	Nancy
Aluminum Case	Janet	White Enameled Dial	Sarah
Brass Deep Case, O.G. Ring	Kate	Name on Dial	Monogram
Nickel Plated Deep Case, O.G. Ring	Louise	Single Plain Dial	Theodosia
		Double Plain Dial	Viola
		Single Illuminated Dial	Vivian
		Double Illuminated Dial	Winifred

Note. — When ordering Gages be particular to state Style of Case, Diameter of Dial, and Maximum Graduations.

PAGE	NUMBER AND DESCRIPTION	CODE WORD
73	52 L.B.D.A. Locomotive Gage	Arlington
74	52 L.B.D. Locomotive Gage	Ashburn
75	66 Locomotive Gage, Vert. Reading	Eutaw
76	52 U.S. Locomotive Gage	Auburn
77	62 B.B. Locomotive Gage Master Pilot	Abingdon
78	52 D.I. Locomotive Gage Double Dial, Illuminated	Albion
79	52D Locomotive Gage Double Dial	Aledo
80	62 B.A. Locomotive Duplex Back Pressure Gage	Alton
80	62 B.A.A., No. 62 B.A., with Lazy Hand	Amboy
81	62 B.P. Locomotive Duplex Back Press. and Vacuum Gage.	Arcola
81	62 B.P.A. Locomotive Duplex Back Press. and Vacuum Gage	Ardmore
82	62 B.O. Locomotive Duplex Back Pressure Gage	Ashland
82	62 B.O.A., No. 62 B.O., with Lazy Hand	Astoria
83	62 B.A.I., No. 62 B.A., Illuminated	Atlanta
83	62 B.O.I., No. 62 B.O., Illuminated	Augusta
83	62 B.P.I., No. 62 B.P., Illuminated	Aurora
83	62 B.B.I., No. 62 B.B., Illuminated	Albany
85	52A Locomotive Steam Heat Gage	Akron
86	52 U.S. Locomotive Steam Heat Gage	Athens
87	62B Fig. 1, Duplex Air Brake Gage	Allentown
87	62B Fig. 2, Duplex Air Brake Gage	Danbury
88	62 Q.I. Quadruplex Air Brake Gage, Illuminated	Danville
89	62Q Quadruplex Air Brake Gage	Dedham
90	51B Single Air Brake Gage	Deshler
91	51C Special Caboose Air Brake Gage	Dunbar
92	52C Duplex Locomotive and Steam Heat Gage	Bristol
93	62C Duplex Air Brake Gage	Dennison
94	62 B.R. Duplex Air Brake Test Gage	Dalton
95	51E Single Spring Locomotive Feed Water Heater Gage	Danvers
95	51S Single Spring Locomotive Feed Water Heater Gage	Dartmouth
96	52 L.B.D.B. Main Steam, Stoker Gage	Deerfield
96	62 B.U. Steam Jet Stoker Gage	Dracut
107	120 Pulsation Retard Device	Dudley
108	59A Inspector's Pocket Test Gage	Cincinnati
109	59C Protected Dial Pressure Gage	Dunkirk
110	68 Air Brake Inspector's Test Gage	Fargo
111	45 Inspector's Testing and Proving Outfit	Mansfield
112	75 Three Speed Air Brake Recording Gage	Milton
113	80 Dead Weight Gage Tester, 2,000 lbs.	Marietta
113	80A Dead Weight Gage Tester, 1,500 lbs.	Millen
113	79 Dead Weight Gage Tester, 1,000 lbs.	Macon
113	79A Dead Weight Gage Tester, 500 lbs.	Maroa
113	79B Dead Weight Gage Tester, 300 lbs.	Milford
113	79C Dead Weight Gage Tester, 200 lbs.	Moline
118	46 Wheel Press Recording Gage	Milan
121	90D Plain Whistle (Locomotive)	Malden
121	91D Chime Whistle (Locomotive)	Magnolia
122	110B Locomotive Driving Wheel Quartering Gage	Modena

PAGE	NUMBER AND DESCRIPTION	CODE WORD
126	52 L.B.D. Double Spring Pressure Gage	Altoona
127	69 Illuminated Dial Pressure Gage	Galveston
128	100 A.C. Master Pilot Pressure Gage, Double Dial	Gatesville
128	101 A.C. Master Pilot Pressure Gage, Single Dial	Giddings
129	100A Master Pilot Pressure Gage, Double Dial	Chatham
130	100 Master Pressure Gage, Double Dial	Clifton
131	101 Master Pressure Gage, Single Dial	Cambridge
131	101A Master Pilot Pressure Gage, Single Dial	Canton
132	51H Master Pilot Pressure Gage, Single Dial	Chelsea
132	51 H.C. Master Pilot Pressure Gage, Single Dial	Chelmsford
133	56 Combination Water Pressure Gage	Brunswick
134	53 Improved Vacuum Gage	Boston
135	54 Compound Pressure and Vacuum Gage	Bangor
136	55 Hydraulic Wheel Press Gage	Baltimore
137	55C Hydraulic Pressure Gage	Belair
138	57 Ammonia Gage	Braintree
139	58 Pyrometer Steam Gage	Chicago
140	59 Standard Test Gage	Columbia
141	59A Standard Pocket Test Gage	Cincinnati
142	60 Altitude Gage	Concord
143	60A Water Tank Indicator Gage	Madrid
144	61 Chemical Pressure Gage	Melrose
145	78C Improved Alarm Gage	Hartford
146	95 Caisson Pressure Gage	Medway
147	95A Pocket Caisson Pressure Gage	Mineola
148	96 Oxy-Acetylene Gas Pressure Gage	Nashville
148	97 Oxy-Acetylene Gas Pressure Gage	Newburg
149	73 Improved Pressure Recording Gage	Guthrie
150	74 Improved Pressure Recording and Indicating Gage	Grafton
154	63 Engine Room and Marine Clocks	Decatur
155	64 Improved Engine Register	Elyria
156	94 Gage Hand Puller, Small	New York
156	94A Gage Hand Puller, Large	Norwich
156	94B Gage Hand Puller, Jumbo	Norfolk
156	94C Gage Hand Puller, Extra Large	Northport
156	127 Hand Set	Newark
157	Gage Hands	Olean
161	Gage Tablet	Lowell

NOTE.—Specify Marble, Slate or Marbleized Slate and Size Dial

162	Siphons	Needham
162	Cocks	Norwood
162	109A Hydraulic Check Valve	Northboro
162	109B Hydraulic Check Valve	Northbridge
163	3 Screw Test Pump, Bronze	Medford
163	3 A.A. Screw Test Pump, Bronze, N.P.	Methuen
163	3A Screw Test Pump, Aluminum	Merrick
164	87 Vacuum Gage Testing Pump	Morton
165	85 Light Hydraulic Pressure Gage Test Pump	Manor
166	86 Hydraulic Dead Weight Pressure Gage Test Pump	Millville
167	88 Portable Boiler Test Pump Outfit	Orleans
168	89 Improved Boiler Test Pump	Oxford
169	90C Plain Steam Whistle	Manchester
169	90D Plain Steam Whistle with Valve	Maynard
170	90A Plain Whistle, Extra Long Bell	Quincy
171	91C Single Bell Chime Whistle	Natick
171	91D Single Bell Chime Whistle with Valve	Newton
172	91 A.B. Three Bell Chime Whistle, Combination "B"	Roanoke
172	91 A.C. Three Bell Chime Whistle, Combination "C"	Rochester
173	90B Whistle Valve, Plain	Ridgeway
173	91B Whistle Valve, Balanced	Riverside

Where Several Figures or Styles are mentioned in Catalogue.

SIZE IN INCHES OF DIAMETER OF FLANGES, DIALS OF GAGES AND CLOCKS, BELL OF WHISTLE, AND INCHES OF VACUUM

	CODE WORD
1/8 in.	Adams
1/4 "	Buchanan
3/8 "	Cleveland
1/2 "	Fillmore
3/4 "	Grant
1 "	Garfield
1 1/4 "	Hayes
1 1/2 "	Harrison
2 "	Jackson
2 1/2 "	Johnson
3 in.	Jefferson
3 1/2 "	Lincoln
4 "	Madison
4 1/2 "	Monroe
5 "	McKinley
5 1/2 "	Polk
6 "	Roosevelt
6 3/4 "	Taylor
7 "	Tyler
8 in.	Tilden
8 1/2 "	Van
9 "	Buren
10 "	Washington
12 "	Wilson
18 "	Wellington
24 "	Watkins
30 "	Weston
40 "	Westinghouse

PRESSURE IN POUNDS OF VALVES AND GAGES

5 lbs.	Antonio
10 "	Arkansas
15 "	Ausable
20 "	Bay
25 "	Champlain
30 "	Cheyenne
35 "	Chippewa
40 "	Colorado
45 "	Congo
50 "	Connecticut
55 "	Danube
60 "	Delta
65 "	Elba
70 "	Firth
75 "	Ganges
80 "	Housatonic
85 "	Hudson
90 "	Humber
95 lbs.	Huron
100 "	Indus
105 "	Lena
110 "	Mackenzie
115 "	Mackinaw
120 "	Maumee
125 "	Mississippi
130 "	Missouri
135 "	Mohawk
140 "	Nile
145 "	Ohio
150 "	Ontario
155 "	Ottawa
160 "	Potomac
165 "	Rhine
170 "	Rio
175 "	Rouge
180 lbs.	Saranac
185 "	Savannah
190 "	Seine
195 "	Tennessee
200 "	Thames
225 "	Waco
250 "	Winnipeg
300 "	Wurtemburg
350 "	Wabash
400 "	Cabinet
450 "	Ware
500 "	Cakes
550 "	Warren
600 "	Caldron
650 "	West
800 "	Camera
900 "	Westport

HYDRAULIC PRESSURE

	CODE WORD
1,000 lbs.	Dagger
1,200 "	Damage
1,500 "	Dandy
2,000 "	Danger
2,500 "	Dauphin
3,000 "	Doctor
3,500 "	Donor
4,000 lbs.	Doric
5,000 "	Dormer
10,000 "	Dowry
15,000 "	Drab
20,000 "	Drape
25,000 "	Draw

Specify tons and size of ram in plain English.

OLD STYLE ITEMS USED FOR REPAIRS

PAGE	NUMBER AND DESCRIPTION	CODE WORD
178	3 Valve	Bulgaria
178	5 Valve	Bolivia
178	16 Valve	Denmark
178	16A Valve	Dahomey
178	16B Valve	Danish
178	17 Valve	Alaska
178	20 Valve	Africa
178	20A Valve	Arabia
64, 65	28 Valve	Mexico
64, 65	30 Valve	Peru
97, 106	52 Original Style Lane Gage	Edgartown
97, 106	52J Same as 52, with Dust Proof Case	Everett
97, 106	52R Same as 52 but with Adjustable Link	Fairhaven
97, 106	52 R.A. Same as 52R with Dustproof Case	Falmouth
97, 103	52 L.B. Original Lane Bourdon	Fiskdale
97, 106	52 L.B.E. Same as 52 L.	

Telegraph Cipher

CODE FOR THE ASHTON VALVE COMPANY

161 First Street, Cambridge, Boston, Mass., U. S. A.

Alphabetical, by Code Words

Cable Address: "ASHTON," BOSTON

CODE WORD	NUMBER AND DESCRIPTION	PAGE
Abingdon	No. 62B.B. Locomotive Gage, Master Pilot	77
Adams	⅛ inch	——
Africa	No. 20 Valve	178
Akron	No. 52A Locomotive Steam Heat Gage	85
Alaska	No. 17 Valve	178
Alaskanian	No. C. S. H. 3 and 4 inch Valve	14
Albany	No. 62 B. B. I., No. 62 B. B. Illuminated	83
Alberta	No. C.I.M. Valve	8
Albertinian	No. C.I.M. - 10 Valve	12
Albion	No. 52 D.I. Locomotive Gage, Dbl. Dial, Illuminated	78
Aledo	No. 52 D. Locomotive Gage, Double Dial	79
Allegheny	No. 51 Single Spring Pressure Gage	125
Allentown	No. 62B, Fig. 1, Duplex Air Brake Gage	87
Alton	No. 62 B.A. Locomotive Gage, Duplex Back Pressure	80
Altoona	No. 52 L.B.D. Double Spring Pressure Gage	126
Amboy	No. 62 B.A.A., No. 62 B.A. with Lazy Hand	80
America	No. 4 Muffler	22
Anam	No. C.S.H. 1 and 2 inch Valve	14
Angola	No. C.S.M. Valve	9
Angolian	No. C.S.M. - 10 Valve	13
Antonio	5 lbs.	——
Arabia	No. 20A Valve	178
Arcola	No. 62 B.P. Loco. Duplex Back Pressure and Vacuum Gage	81
Ardmore	No. 62 B.P.A. Loco. Duplex Back Pressure and Vacuum Gage	81
Argentina	No. C.I. Valve	8
Argentinian	No. C.I. - 10 Valve	12
Arkansas	10 lbs.	——
Arlington	No. 52 L.B.D.A. Locomotive Gage	73
Arthur	Iron Case Brass Ring	——
Ashburn	No. 52 L.B.D. Locomotive Gage	74
Ashland	No. 62 B.O. Locomotive Duplex Back Pressure Gage	82
Astoria	No. 62 B.O.A., No. 62 B.O. with Lazy Hand	82
Athens	No. 52 U.S. Locomotive Steam Heat Gage	86
Atlanta	No. 62 B.A.I., No. 62 B.A. Illuminated	83
Auburn	No. 52 U.S. Locomotive Gage	76
Augusta	No. 62 B.O.I., No. 62 B.O. Illuminated	83
Aurora	No. 62 B.P.I., No. 62 B.P. Illuminated	83
Ausable	15 lbs.	——
Australia	No. C.S. Valve	9
Austrania	No. C.S. - 10 Valve	13
Baltimore	No. 55 Hydraulic Wheel Press Gage	136
Bangor	No. 54 Compound Pressure and Vacuum Gage	135
Bay	20 lbs.	——
Belaire	No. 55C Hydraulic Pressure Gage	137
Benny	Iron Case, Nickel Plated Ring	——
Bolivia	No. 5 Valve	178
Boston	No. 53 Improved Vacuum Gage	134
Braintree	No. 57 Ammonia Gage	138
Bristol	No. 52C Duplex Locomotive and Steam Heat Gage	92
Brunswick	No. 56 Combination Water Pressure Gage	133
Buchanan	¼ inch	——
Bulgaria	No. 3 Valve	178
Buren	9 inch	——
Cabinet	400 lbs.	——
Cakes	500 lbs.	——
Caldron		

CODE WORD	NUMBER AND DESCRIPTION	PAGE
Cambridge	No. 101 Master Pressure Gage, Single Dial	131
Camera	800 lbs.	—
Canton	No. 101A Master Pilot Pressure Gage, Single Dial	131
Caucasia	No. 34 Valve	39
Ceylon	No. 11A Yoke, C.I.	21
Champlain	25 lbs.	—
Charlie	Brass Case	—
Chatham	No. 100A Master Pilot Pressure Gage, Double Dial	129
Chelmsford	No. 51 H.C. Master Pilot Pressure Gage, Single Dial	132
Chelsea	No. 51 H. Master Pilot Pressure Gage, Single Dial	132
Cheyenne	30 lbs.	—
Chicago	No. 58 Pyrometer Steam Gage	139
Chippewa	35 lbs.	—
Cincinnati	No. 59A Inspectors Pocket Test Gage	108, 141
Cleveland	⅜ inch	—
Clifton	No. 100 Master Pressure Gage, Double Dial	130
Colorado	40 lbs.	—
Columbia	No. 59 Standard Test Gage	140
Concord	No. 60 Altitude Gage	142
Congo	45 lbs.	—
Connecticut	50 lbs.	—
Costa	No. 14 Valve	40
Crete	No. 14B Valve	41
Curacoa	No. 11B Yoke, C.S.	21
Dagger	1,000 lbs.	—
Dahomey	No. 16A Valve	178
Dahomian	No. D.I. - 10 Valve	25
Dahomshaft	No. D.I. - 12 Valve	25
Dalton	No. 62 B.R. Duplex Air Brake Test Gage	94
Damage	1,200 lbs.	—
Danbury	No. 62B, Fig. 2, Duplex Air Brake Gage	87
Dandy	1,500 lbs.	—
Danger	2,000 lbs.	—
Danish	No. 16B Valve	178
Danishaft	No. D.I. - 11 Valve	24
Danishian	No. D.I. Valve	24
Danube	55 lbs.	—
Danvers	No. 51E Spl. Sgl. Spring, Loco. Feed Water Heater Gage	95
Danville	No. 62 Q.I. Quadruplex Air Brake Gage, Illuminated	88
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Donor	3,500 lbs.	—
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Dormer	5,000 lbs.	—
Dowry	10,000 lbs.	—
Drab	15,000 lbs.	—
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Jennie	Nickel Plated Case	——
Johnson	2½ inches	——
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Lena	105 lbs.	——
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Louise	Nickel Plated Deep Case, O.G. Ring	——
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Maumee	120 lbs.	——
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Monaco	No. 30 M.M. Valve	57
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Monogram	Name on Dial	——
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Panama	No. 37 Dome Connections	68
Paraguay	No. B.C. - 12 Valve	70
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Polk	5½ inches	——
Portugal		

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Potomac	160 lbs.	——
Quarto	Figure 4 or Style 4	——
Quincy	No. 90A Plain Whistle, Extra Long Bell	170
Restless	Advise regarding shipment of our Order No.	——
Revocable	At what price, what quantity, and how soon can you ship?	——
Rhine	165 lbs.	——
Ridgeway	No. 90B Whistle Valve, Plain	173
Rio	170 lbs.	——
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Rochester	No. 91 A.C. Three Bell Chime Whistle, Combination C	172
Rome	Screw Ends	——
Roofing	Ship all you possibly can by quickest route	——
Roofless	Ship at first opportunity by cheapest route	——
Roominess	Ship at once by express	——
Roosevelt	6 inches	——
Ropewalk	Ship at once by fast freight	——
Rose	Ship at once by parcel post	——
Rosin	Ship at once by parcel post, special delivery	——
Rotate	Hold shipment Order No. ——; await particulars by mail	——
Rouge	175 lbs.	——
Roving	Trace shipment of our Order No.	——
Russia	Flanged Inlet	——
Sally	Flush Ring	——
Sarah	White Enameled Dial	——
Saranac	180 lbs.	——
Savannah	185 lbs.	——
Seine	190 lbs.	——
Siberia	Flanged Outlet	——
Spain	Nickel Seated	——
Susan	O.G. Ring	——
Taylor	6¾ inches	——
Tennessee	195 lbs.	——
Thames	200 lbs.	——
Theodosia	Single Plain Dial	——
Tilden	8 inches	——
Trio	Figure 3 or Style 3	——
Turkey	No. 5 Testing Clamps	——
Tyler	7 inches	20
Uno	Figure 1 or Style 1	——
Van	8½ inches	——
Viola	Double Plain Dial	——
Vivian	Single Illuminated Dial	——
Wabash	350 lbs. pressure	——
Waco	225 lbs. pressure	——
Ware	450 lbs. pressure	——
Warren	550 lbs. pressure	——
Washington	10 inches	——
Watkins	24 inches	——
Wellington	18 inches	——
West	650 lbs. pressure	——
Westinghouse	40 inches	——
Weston	30 inches	——
Westport	900 lbs. pressure	——
Wilson	12 inches	——
Winifred	Double Illuminated Dial	——
Winnipeg	250 lbs. pressure	——
Wurtemburg	300 lbs. pressure	——

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