THE BRAKE TEST TRUCK

Code for Testing Brakes on Cars in Yards and on Repair Tracks

INSTRUCTION PAMPHLET

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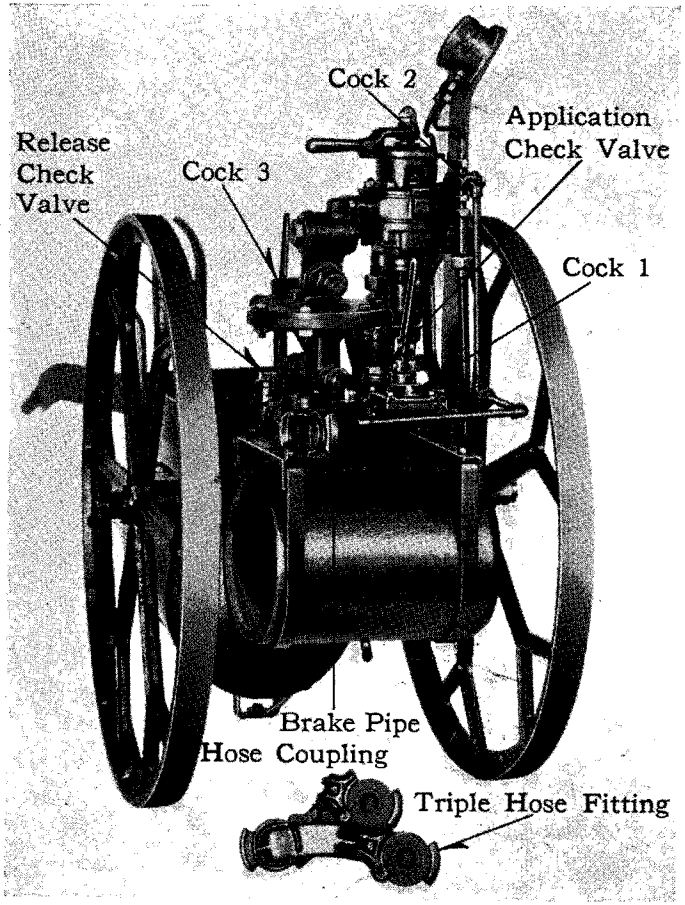

Fig. 1. End View of the Brake Test Truck with Check Valves and Quick Opening Diaphragm Cocks

The Brake Test Truck

The brake test truck is intended primarily to use in testing train brakes for the purpose of locating car operating valves that are not in condition to operate satisfactorily in service. When located, such valves must be removed, repaired and cleaned, and tested on the *standard test rack* before being returned to service. Leakage to the extent of requiring repairs contained in the following devices and pipes may also be determined.

Brake Cylinder, Brake Pipe, Release Valve, Auxiliary Reservoir, Retaining Valve, Retaining Valve Pipe of Triple Valve, Conductor's Valve, Signal Pipe, Car Discharge Valve.

Freight cars (with $1\frac{1}{4}$" brake pipe not over 45 feet in length) may be coupled and tested in trains of up to 50 cars providing the brake pipe leakage is not more than 7 pounds per minute.

The test truck may be used in connection with an air supply from a yard air plant or a locomotive, but the air supply should be at least 15 pounds higher than the brake pipe pressure with which the brakes will be tested and operated in service.

In testing brakes it is very important that the method of operating the test truck should be perfectly understood.

The term "car operating valve" as used in this pamphlet applies equally to Triple Valves, Universal Valves, AB Valves and the D-22 Type Passenger Control Valves.

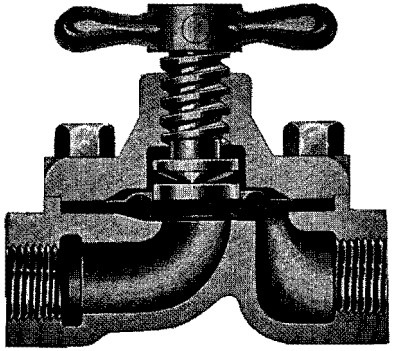

Fig. 2. Sectional View of the ½″ Diaphragm Cock with Screw Type Handle

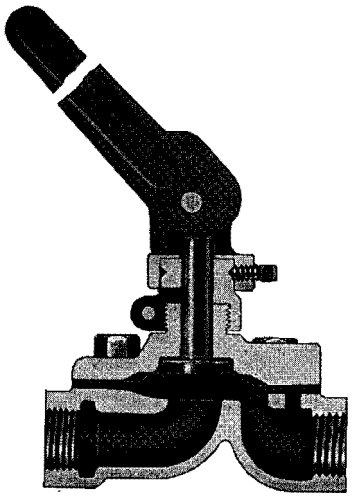

Fig. 3. Sectional View of the ¾″ Quick Opening Diaphragm Cock with Lever Type Handle

Brake Test Truck with Diaphragm Cocks

Figures 4 and 6 are photographic illustrations of the standard brake test truck which incorporates certain improvements over the older designs. A ¾″ diaphragm cock and two check valves have been substituted for the two key type cocks in the brake pipe known as control valve cocks (No. 1). A ⅜″ diaphragm cock is used in place of the key type cock known as cock 3. The use of the diaphragm type cock eliminates trouble encountered in service due to cock key leakage as well as reduces the cost of maintenance, which in the case of diaphragm cocks and check valves consists only of replacing diaphragms in the cocks and WABCO seats in the check valves, without the necessity of breaking any pipe joints.

Care should be exercised in operating the diaphragm type cocks in order to realize the benefits to be derived from the use of this improved type cock; that is, eliminating leakage (thereby giving consistent and dependable test results) and obviating the delay and annoyance incident to reseating, lubricating, and replacing cock keys.

When the test truck is not in use, all diaphragm cocks should be *open*. This practice will prolong the life of the diaphragm by preventing permanent set as the diaphragm is in normal position with the cock open, see illustrations.

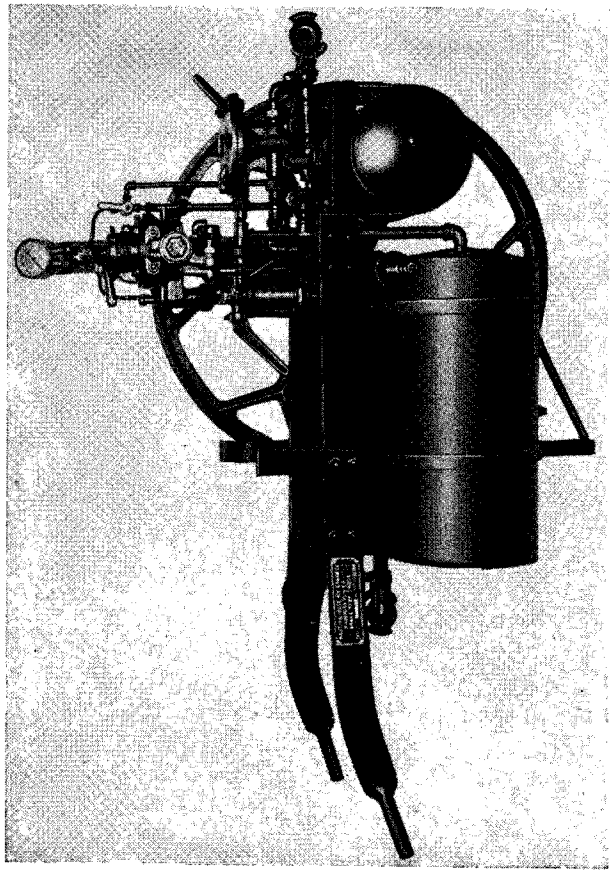

Fig. 4. Front Side View of Test Truck with Check Valves and Quick Opening Diaphragm Cocks. Wheel removed to show details.

When closing the diaphragm cock with screw type handle, the handle should be turned only until slight resistance is felt. Heavy pressure on the diaphragm is not required to make a seal, and further turning of the handle after the diaphragm seals will result only in injury to the diaphragm.

The distinctive features of the improved diaphragm cock (now supplied as standard with the test truck) are: (a) the quick opening lever type handle, the radial position of which is adjustable to any angle, and (b) controlled diaphragm deflection, by means of an adjustment which regulates the amount of travel of the parts transmitting handle movement to the diaphragm.

To adjust the diaphragm tension (or deflection), loosen the cap screw which serves to clamp the split coupling on the threaded portion of the cover and screw down or back off the coupling to increase or decrease the diaphragm deflection until the force imparted to the diaphragm by the cam portion of the handle (through the medium of plunger and disc) is just sufficient to prevent leakage past the diaphragm with the handle in closed position.

The clamping cap screw should be tightened when the desired tension on the diaphragm is obtained. The handle position can then be adjusted to the desired angle by loosening three set screws in the handle fulcrum and rotating handle and fulcrum around the clamped coupling. The three set screws must be re-tightened to hold the handle in place and to permit proper operation of the diaphragm.

Fig. 5 illustrates the Control Valve in section, the pipe connections being indicated thereon. Its functions

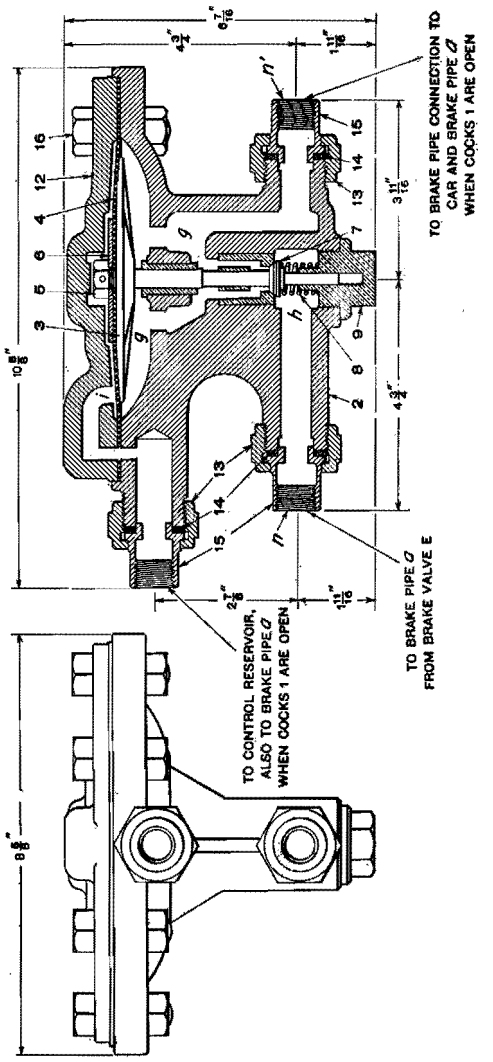

Fig. 5. Outline and Sectional Views of the Automatic Control Valve

are to automatically maintain brake pipe pressure at the amount to which it has been reduced when making a brake cylinder leakage test, and to automatically increase brake pipe pressure at a slow rate when making a release test. These functions are performed irrespective of any reasonable variations in amount of brake pipe volume or leakage.

The operating parts of control valve are the diaphragm 4 and valve 7.

Plate 1 is a diagrammatic view showing the pipe connections, valves, cocks, control valve reservoir and hose couplings, their relation to each other, and the reference numbers and figures.

Referring to Plate 1, it will be noted that the "1" Brake Pipe" has two connections to the control valve—one branch (left) leading to passage *h* of the control valve, and the other branch (right) leading through cock 1 to passage *n* of the control valve and also to the brake pipe coupling. Valve 7 cuts off communication between these two pipes through the control valve except when the control valve is being used to supply air to the brake pipe of the car under test. This pipe then contains feed valve (brake pipe) pressure during tests in which the control valve is employed.

Again referring to Plate 1, cock 1 and pipes leading to passage *n* and through the release check valve to the upper connection of the control valve are provided to avoid high differential pressure on the diaphragm and thus prevent possible rupture, also to insure equal pressures in chambers *g* and *i* on opposite sides of the diaphragm at the beginning of all tests in which the control

valve is used. When cock 1 is open, the brake pipe is connected to chamber *g* under the diaphragm, and at the same time the control valve reservoir and chamber *i* above the diaphragm are connected to the brake pipe through the check valves, thus insuring the same pressure in all portions of the apparatus below the brake valve.

Control cock 1 must be open at all times except when using the control valve to feed air to the brake pipe of the car under test, as when making the Piston Travel and Brake Cylinder Leakage Test and Release Test.

The control valve reservoir is at all times in direct communication with chamber *i* above the diaphragm, and the reservoir and chamber are in communication with the brake pipe both directions with cock 1 open, and one direction only with cock 1 closed (from reservoir to brake valve through application check valve). When cocks 1 and 3 are closed, following a service reduction, and with the brake valve handle in Release position, no increase of pressure takes place in the control valve reservoir and chamber *i*.

When cock 1 is closed and cock 3 open, with the brake valve handle in Release position, air passes through a No. 70 drill choke in cock 3, causing a slow rise of pressure in the control valve reservoir and chamber *i*.

In making the Piston Travel and Brake Cylinder Leakage Test with a 15 pound service reduction, the pressure in the control valve reservoir and chamber *i* is reduced equally with that in the piping connecting to passages *h* and *n* and consequently chamber *g* of the control valve. Then with cocks 1 and 3 closed, there is a balance of pressure on the two sides of the diaphragm, and with the brake valve handle in Release position,

main reservoir pressure is free to flow from the brake valve to the chamber under valve 7 through the pipe connecting to port *h* of the control valve. The pressure in the control valve reservoir and chamber *i* is now bottled and remains constant, and if any slight reduction of pressure from leakage occurs in chamber *g*, the slightly higher pressure then in chamber *i* deflects the diaphragm downward, opening valve 7 to the extent of permitting sufficient air to flow past the valve to offset leakage and thereby maintain brake pipe pressure at the amount to which it was reduced when the brake application was made.

In making the Release Test, choke cock 3 must be open. Following a 15 pound service reduction, first close cock 1, then place the brake valve handle in Running position. Under these conditions, the pipe between the brake valve and passage *h* (connecting to the chamber under valve 7) contains feed valve pressure. Choke cock 3 being open then permits a slow flow of air from the pipe containing feed valve pressure to the control valve reservoir and chamber *i*, this flow being restricted by the choke to about 6 pounds per minute. The slow rise in chamber *i* causes a slightly higher pressure in that chamber than exists in chamber *g* under the diaphragm, which unseats valve 7, causing the pressure in chamber *g* and connected piping to increase uniformly with, and at the same rate as the rise of pressure in the control valve reservoir and chamber *i*.

The centrifugal dirt collector drain cock should be opened frequently and all foreign matter blown out. By so doing the brake valve rotary valve and feed valve, the No. 70 drill choke and valve 7 will be protected from dirt

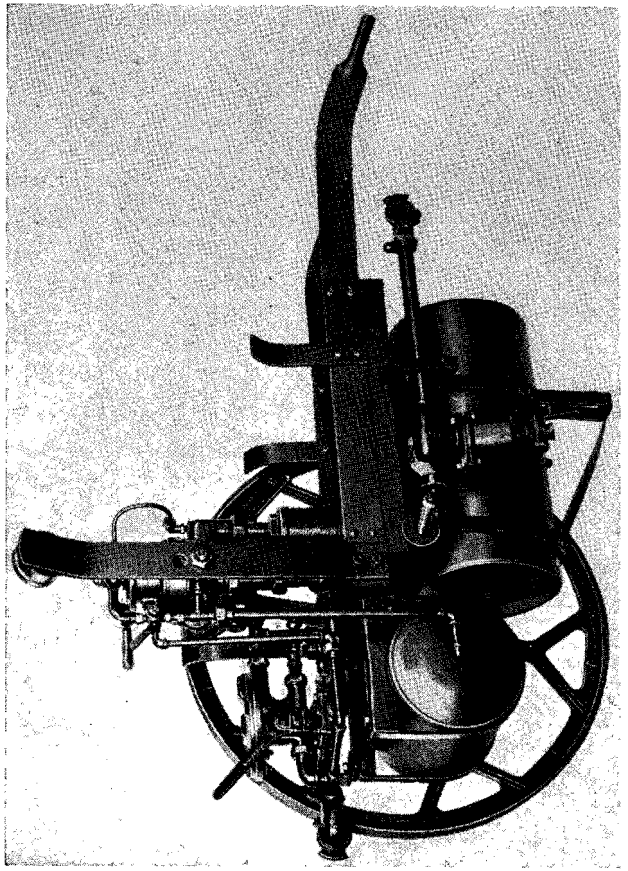

Fig. 6. Rear View of Test Truck with Check Valves and Quick Opening Diaphragm Cocks. Wheel removed to show details.

which would seriously interfere with their proper operation.

Functions of the Cocks, Couplings and Triple Hose Fittings

Cock 1—The control valve diaphragm cock controls communication between brake valve, control valve and brake pipe.

Cock 2—Connects the equalizing reservoir to the black hand of air gage when handle is in vertical position; connects the brake pipe to the black hand of air gage when handle is in horizontal position.

Cock 3—Controls communication between the brake pipe and the control valve reservoir through the choke (.028″ diameter No. 70 drill).

Drain Cock—For centrifugal dirt collector.

Triple Hose Fitting—Connects front coupling to both the brake pipe and signal pipe of a car.

FS-4 Hose Couplings—(Rear) Connects to main reservoir supply air.

(Front) Connects to brake pipe of car.

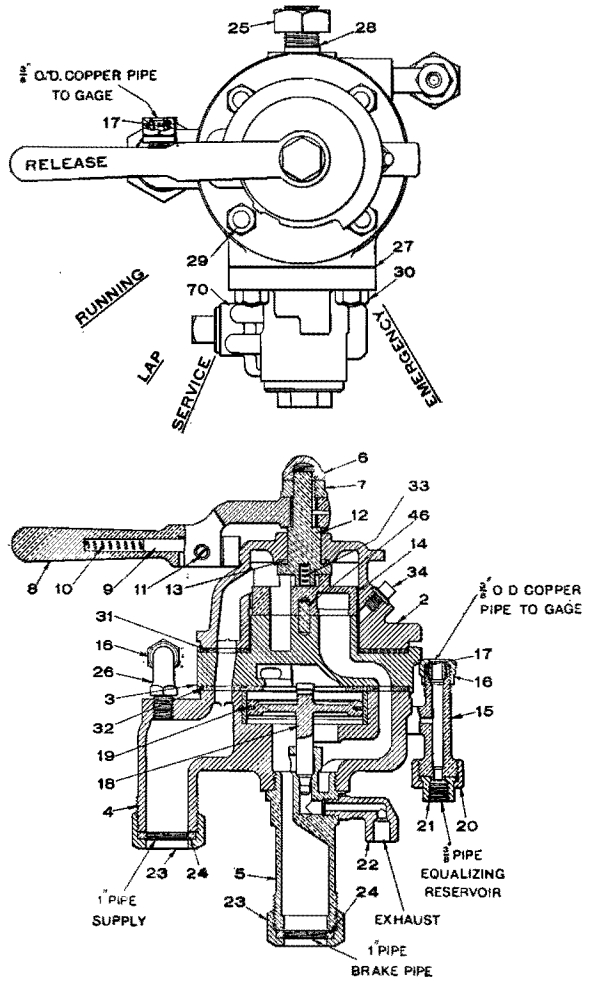

Fig. 7. Plan and Sectional Views of the G-6 Brake Valve

Functions of the Valves

Brake Valve—*Release Position:* Direct connection from Main Reservoir and all pipes of Test Truck supply air to Reservoirs.

Running Position: Direct opening from Main Reservoir supply air to Brake Pipe is closed; air supply to brake pipes and Reservoirs passes through the C-6 feed valve.

Lap Position: All ports in Brake Valve closed.

Service Application Position: Equalizing reservoir air discharged to the atmosphere through the preliminary exhaust port; Brake Pipe exhaust open to the atmosphere through the angle fitting.

Emergency Position: Full and direct opening from the brake pipe to the atmosphere.

Control Valve—Automatically maintains brake pipe pressure at the amount to which it was reduced in making the Piston Travel and Brake Cylinder Leakage Test and increases Brake Pipe pressure at a slow rate when making the Release Test.

Release Check Valve—Allows air to enter the control valve Reservoir from the brake pipe, but prevents any return flow into the brake pipe.

Application Check Valve—Allows control valve reservoir pressure to reduce when a reduction in brake pipe pressure is initiated, but prevents the entrance of brake pipe air into the control valve reservoir.

Testing the Brake Test Truck

The Brake Test Truck should be carefully inspected and tested at such intervals as will insure its being maintained in good condition.

(**A**) Coat the joints in the piping and devices with soapsuds while under pressure to detect external leakage. The control valve reservoir and control valve, also the piping, check valves, and cocks containing control valve reservoir air *must* be kept *absolutely* tight.

(**B**) While making Piston Travel and Brake Cylinder Leakage Test No. 2, turn the handle of three-way cock 2 to horizontal position which connects the black hand of the air gage with the brake pipe, and note if the brake pipe pressure remains constant. If the brake pipe pressure increases, either air is leaking past the application check valve seal into the control valve reservoir, or the diaphragm of cock 1 is ruptured, allowing air to enter the brake pipe from the supply line, or valve 7 of the control valve (Fig. 5), is leaking supply pipe air into the car brake pipe faster than the brake pipe leakage can discharge it. If the latter, increase the brake pipe leakage and note if brake pipe pressure falls to the original amount, *i. e.*, to the pressure which was bottled up in the control valve reservoir at the time of closing cock 1, where the brake pipe pressure will then be maintained by the automatic action of the control valve.

If brake pipe pressure decreases and it has been proved by soapsuds test that the piping and devices containing control valve reservoir air are free from external leakage, the control valve diaphragm is ruptured.

*A ruptured diaphragm directly connects the control valve reservoir and brake pipe, permitting control valve reservoir air to equalize into the brake pipe, thus rendering the control valve inoperative.

(**C**) While making Test No. 5, turn the handle of three-way cock 2 to a horizontal position and note by the black hand of the gage if brake pipe pressure increases at the rate of about six (6) pounds per minute.

Having proven by Tests A and B that the apparatus is free from leakage, if the brake pipe pressure does not increase at the desired rate, either the supply air pressure is low, thereby reducing the driving head of pressure against the opening in choke cock 3 or the choke opening is obstructed. Leakage past the release check valve seal from control valve reservoir pipe into brake pipe may also cause the brake pipe pressure increase at too low a rate.

The main reservoir or supply air pressure should be at least fifteen pounds higher than the adjustment of the feed valve on the brake valve and it is desirable that this pressure be reasonably uniform, as excessive variation produces a similar change in the driving head of pressure against the feed choke and thereby also affects the rate of flow into the control valve reservoir and correspondingly, the increase of pressure into the car brake pipe.

(**D**) Remove the pipe plugs from the equalizing and control valve reservoirs, also open drain cock in the bottom of the centrifugal dirt collector at frequent intervals to prevent the accumulation of water and dirt.

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*NOTE—To insure reliable operation of the control valve, special moulded diaphragms, furnished by the Air Brake Manufacturers, must be used for repairs.

Code of Tests

KEEP COCK 1 OPEN EXCEPT WHEN THE CONTROL VALVE IS BEING USED TO MAINTAIN OR GRADUALLY INCREASE BRAKE PIPE PRESSURE. This will prevent a high differential pressure on the control valve diaphragm which may rupture it, also it will insure the same pressure in all parts of the apparatus below the brake valve.

When preparing to test brakes in trains or on shop or repair track: the feed valve on the brake valve must be adjusted to the pressure with which the brakes will be operated in service; the control valve cock 1 open; the handle of three-way cock 2 in vertical position, connecting equalizing reservoir air to the black hand of the air gage; choke pipe cock 3 closed; the brake valve handle in *Running* position; brake pipe coupling (front) connected to the car or cars to be tested; angle cock on car open; supply hose coupling (rear) connected to the source of air supply; then cut in the air supply to the truck to charge the brakes. When a number of cars are to be tested the charging of brakes may be hastened by placing the brake valve handle temporarily in *Release* position.

TEST No. 1

General Inspection and Release Leakage In Trains or on Shop or Repair Tracks

When the brake pipe gage shows 50 pounds pressure, begin inspection for leakage. While inspecting for leakage, see that the brake pipe is securely clamped and that the brake cylinder and auxiliary reservoir are rigidly attached to the car frame. Also shake retaining valve pipe adjacent to pipe joints to detect loose joints, unions and clamps, and note whether the retaining valves are vertical and well secured.

To locate leakage, apply soapsuds with a brush to car operating valves, pipe joints, cocks, and air hose, including the rear hose, which should be opened to the brake pipe after applying a dummy coupling.

Defects found should be corrected before proceeding with other tests. Brake pipe leakage must conform to the A.A.R. requirements.

TEST No. 2

Piston Travel and Brake Cylinder Leakage In Trains or on Shop or Repair Tracks

With brakes fully charged, open cock 3, handle of three-way cock 2 in a vertical position, make a 15 pound service reduction; allow 30 seconds for pressure equalization; then close cocks 1 and 3, and immediately move the brake valve handle to *Release* position. Then starting from the brake test truck, quickly measure and record the piston travel, noting at the same time whether

the brake shoes are held solid on the wheels, as brakes will often be found partially released by cylinder leakage; also, whether brake cylinders leak badly enough to permit the easy and quick detection of leakage by sound, or return movement of the piston, and whether any of the rods or levers foul. Under the conditions of this test, *i. e.*, with brake pipe pressure maintained, the brake cylinder leakage should never be sufficient to permit brake shoes to be moved side ways on the wheels in less than five (5) minutes after the handle of the brake valve has been moved to *Release* position. When trying brake shoes for looseness, to detect a brake that has partially leaked off, brake shoes which are not in contact with wheel flanges must be selected.

If a brake releases through the triple valve exhaust port during the piston travel and brake cylinder leakage test, it is probably caused by leakage of air from the auxiliary reservoir to the atmosphere or into the brake cylinder. In this test, the control valve automatically maintains brake pipe pressure at the amount to which it was reduced; therefore, a further flow of air from the auxiliary reservoir to the brake cylinder is prevented and the volume of air to leak from the brake cylinder is limited to that admitted to it during the brake application, thereby providing a uniform leakage test for all brake cylinders.

At the completion of the piston travel and brake cylinder leakage tests, release and recharge the brakes by moving the brake valve handle to *Running* position and opening cock 1; then make all necessary repairs, adjust piston travel and turn up the handles of the retaining valves.

TEST No. 3

Shop and Repair Track, Retaining Valve

NOTE—Before testing retaining valves, the caps should be removed and the parts and ports examined and cleaned, giving special attention to the condition of the valve seat or seats, and size of the vent port. A metal instrument should be used for opening up stopped or restricted vent ports, but must be of such size and shape as will not increase the size of the port.

With the handles of retaining valves turned up, cock 1 open, and brake valves fully charged, make a 20 pound service reduction, and when the brake pipe exhaust ceases, move the brake valve handle to *Release* position and return it to *Running* position.

The combined exhaust and leakage of air from the brake cylinder should not be sufficient within a period of three (3) minutes after starting the release of brakes to permit brake shoes, which are not in contact with the wheel flanges, to be moved with the foot sideways on the wheels.

Immediately after starting the release of brakes, note whether there is a discharge from the vent ports of retaining valves, as there should be, until the brake cylinder pressure is reduced to the retaining valve closing point. The upright section of the retaining valve pipe may then be jarred slightly to assist in seating the valve.

If the brake does not hold, the retaining valve, its pipe joints and the exhaust plug in the closed car operating valve exhaust port should be inspected for leakage before brake cylinder pressure has time to reduce materially. If the defect is not located, re-apply and release the brake and repeat the inspection for leakage while the brake cylinder pressure is high.

When a retaining valve is provided with a connection for an air gage, attach gage and turn the handle of the retaining valve down. If, after the car operating valve is in *Release* position, the brake cylinder pressure exceeds 45 pounds, reduce it to this amount by turning the retaining valve handle alternately up and down but leaving it in the latter position. Cylinder pressure should not leak down from 45 pounds to less than 40 pounds in one minute; if it does, inspect for leakage as previously described. After the cylinder and pipe leakage is known to be within the prescribed limits, turn the retaining valve handle up and jar the upright section of the pipe slightly to assist the valve in seating. When the discharge of air ceases, turn valve handle down and observe if the proper pressure is retained in the brake cylinder.

TEST No. 4

Road, Terminal or Grade

The brake test on a train at terminals or preparatory to its control on a descending grade may be made with either a locomotive or the test truck, but when the test truck is used, open cock 1 before coupling to the cars, leaving it open during the retaining valve test.

After charging the train, stopping leakage from brake pipe, adjusting piston travel, etc., and turning up the retaining valve handles, station one or more men along the train to make the inspection. The man operating the brake valve should apply the brakes with a 12 pound service reduction and release as soon as the brake valve exhaust ceases, recharging by placing the brake valve handle in full *Release*, then returning promptly to *Running* position. In 2½ minutes after the release has started again apply the brakes with a 12 pound reduction and then release as before, repeating this operation, as stated, until the inspection has been completed and defects marked or repaired.

During this time, the inspector should note when the brakes start to release as indicated by a discharge at the retaining valve and make repeated or continued efforts to move a brake shoe on one wheel of each of two cars alternately. The brake shoes selected for this test must not be in contact with the wheel flanges.

If a brake shoe can be moved in less than two (2) minutes after the car operating valve moves to *Release* position, the minimum time permissible to insure reasonably efficient brakes on heavy grades, the brake cylinder, retaining valve, retaining valve piping, and the car operating valve exhaust plug should be inspected while under pressure to locate the defect. This procedure should be followed from car to car and the defects corrected.

TEST No. 5

Release

With the brakes fully charged and choke pipe cock 3 open, make a 15 pound service reduction by moving the brake valve handle to *Service* position. Then move the handle of cock 2 to horizontal position. Allow the pressure to settle for 30 seconds, then close cock 1 and move the brake valve handle to *Running* position, leaving it

there; then when the brake pipe pressure has increased about four pounds, producing a differential with which the car operating valves should release, start inspecting the brakes to locate any that failed to release. A car operating valve which fails to release the brake before the brake pipe is fully recharged should be condemned.

Under these conditions, the control valve automatically increases brake pipe pressure at a slow rate which will condemn a car operating valve if the condition of its packing ring is such as is likely to cause similar trouble under ordinary service operation.

TEST No. 6

Emergency and Release after Emergency

With the brakes fully charged and cock 3 closed, move the brake valve handle to *Emergency* position. A prompt emergency application should be obtained. Wait approximately 1 minute then move the brake valve handle to *Running* position. The brakes must release promptly.

Train Signal Pipe Leakage

When testing brakes on passenger equipment trains, connect the brake and signal hose on the car to the brake pipe coupling of the truck by means of the triple hose fitting and open the signal pipe cut-out cock which will permit the signal pipe to be charged to 45 pounds. Return the brake valve handle to *Lap* position; then proceed as in Test No. 1, including inspection of signal pipe, and note the leakage on the gage. The drop in signal pipe pressure, due to leakage, should not exceed three pounds per minute from standard signal pipe pressure.

This test must also include opening the signal cut-out cock at the rear end of train, the hose coupling having been closed with a dummy; a leakage test of the signal hose and cocks; and opening all car discharge valves to determine if air discharges freely through them.

Defective signal valves should be tested on the standard signal valve test rack in accordance with the code of tests covered by Instruction Leaflet No. 2377 for old style signal valves or Instruction Leaflet No. 2377-1 for Type "C" signal valves.

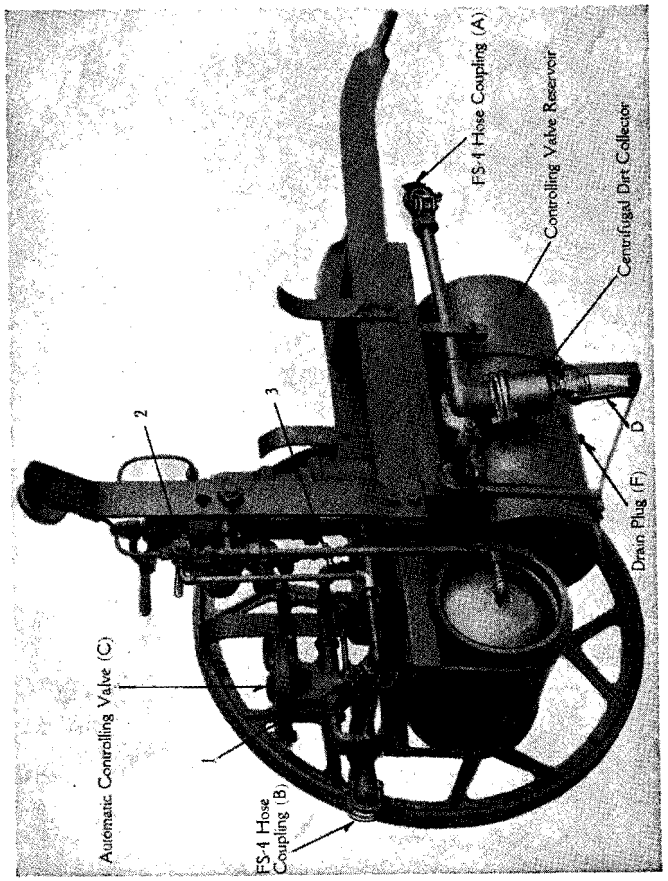

Fig. 8. Brake Test Truck with Key Type Cocks. One wheel removed to show details.

Brake Test Truck with Key Type Cocks

Testing the Brake Test Truck

The Brake Test Truck should be carefully inspected and tested at such intervals as will insure its being maintained in good condition.

(**A**) Coat the joints in the piping and devices with soapsuds while under pressure to detect external leakage. The control valve reservoir and control valve *C*, also the piping and cocks containing control valve reservoir air *must* be kept *absolutely* tight.

(**B**) While making Piston Travel and Brake Cylinder Leakage Test No. 2, turn the handle of three-way cock 2 to horizontal position which connects the black hand of the air gage with the brake pipe, and note if the brake pipe pressure remains constant. If the brake pipe pressure increases, either the key or choke pipe cock 3 or cock 1, in pipe *c*, Plate 2, which latter is operated by the extension rod from the handle on cock 1, is leaking supply pipe air into the control valve reservoir; or, valve 7, Fig. 5, of the control valve, or cock 1 in pipe *b*, Plate 2, is leaking supply pipe air into the brake pipe *a'* faster than the brake pipe leakage can discharge it. If the latter, increase the brake pipe leakage and note if brake pipe pressure falls to the original amount, *i. e.*, to the pressure which was bottled up in the control valve reservoir at the time of closing cock 1, where the brake pipe pressure will then be maintained by the automatic action of the control valve.

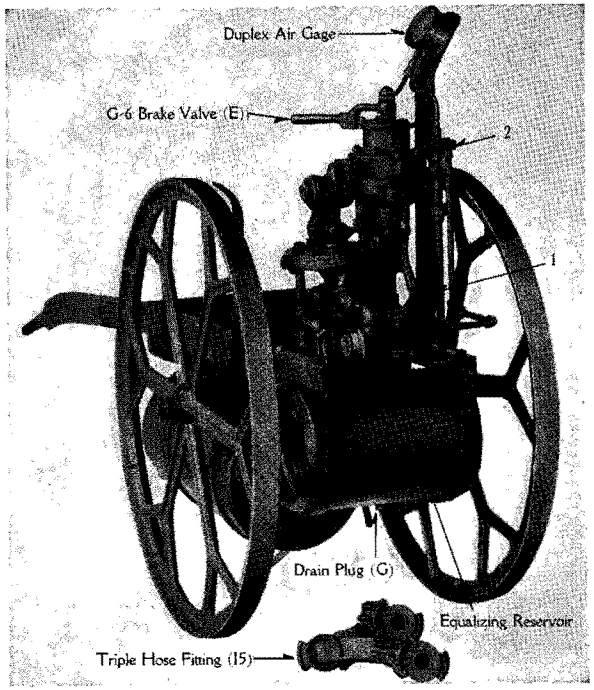

Fig. 9. Front View of the Brake Test Truck with Key Type Cocks

If brake pipe pressure decreases and it has been proved by soapsuds test (A) that the piping and devices containing control valve reservoir air are free from external leakage, the control valve diaphragm is ruptured. *A ruptured diaphragm directly connects the control valve reservoir and brake pipe, permitting control valve reservoir air to equalize into the brake pipe, thus rendering the control valve inoperative.

(C) While making Test No. 5, turn the handle of three-way cock 2 to a horizontal position and note by the black hand of the gage if brake pipe pressure increases at the rate of about six (6) pounds per minute.

Having proven by Tests A and B that the apparatus is free from leakage, if the brake pipe pressure does not increase at the desired rate, either the supply air pressure is low, thereby reducing the driving head of pressure against the opening in choke cock 3, or the choke opening is obstructed.

The main reservoir or supply air pressure should be at least fifteen (15) pounds higher than the adjustment of the feed valve on brake valve *E* and it is desirable that this pressure be reasonably uniform, as excessive variation produces a similar change in the driving head of pressure against the feed choke and thereby also affects the rate of flow into the control valve reservoir and correspondingly, the increase of pressure in brake pipe *a'*.

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*NOTE—To insure reliable operation of the control valve, special moulded diaphragms, furnished by the Air Brake Manufacturers, must be used for repairs.

(D) Remove the plugs *G* and *F* from the equalizing and control valve reservoirs, also open cock *D* in the bottom of the centrifugal dirt collector at frequent intervals to prevent the accumulation of water and dirt.

Code of Tests

KEEP CONTROL VALVE COCKS 1, FIG. 8, OPEN EXCEPT WHEN THE CONTROL VALVE C IS BEING USED TO MAINTAIN OR GRADUALLY INCREASE BRAKE PIPE PRESSURE. This will prevent a high differential pressure on the control valve diaphragm which may rupture it, also it will insure the same pressure in all parts of the apparatus below the brake valve.

When preparing to test brakes in trains or on shop and repair tracks: the feed valve on brake valve *E* should be adjusted to the pressure with which the brakes will be operated in service; the control valve cocks 1, open; the handle of three-way cock 2 in vertical position, connecting equalizing reservoir air to the black hand of the air gage; choke pipe cock 3 closed; the handle of brake valve *E* in *Running* position; brake pipe coupling *B* connected to the car or cars to be tested; angle cock on car open; supply hose coupling *A* connected to the source of air supply; then cut in the air supply to the truck to charge the brakes. When a number of cars are to be tested the charging of brakes may be hastened by placing the handle of brake valve *E* temporarily in *Release* position.

TEST No. 1

General Inspection and Release Leakage In Trains or on Shop or Repair Tracks

When the brake pipe gage shows 50 pounds pressure, begin inspection for leakage. While inspecting for leakage, see that the brake pipe is securely clamped and that the brake cylinder and auxiliary reservoir are rigidly attached to the car frame. Also shake retaining valve pipe adjacent to pipe joints to detect loose joints, unions and clamps, and note whether the retaining valves are vertical and well secured.

To locate leakage, apply soapsuds with a brush to car operating valves, pipe joints, cocks, and air hose, including the rear hose, which should be opened to the brake pipe after applying a dummy coupling.

Defects found should be corrected before proceeding with other tests.

TEST No. 2

Piston Travel and Brake Cylinder Leakage In Trains or on Shop or Repair Tracks

With brakes fully charged and choke pipe cock 3 closed and handle of three-way cock 2 in a vertical position, make a 15 pound service reduction with brake valve *E*; close cocks 1, and immediately move the handle of brake valve *E* to *Release* position. Then, starting from the brake test truck, quickly measure and record the piston travel, noting at the same time whether the brake

shoes are held solid on the wheels, as brakes will often be found partially released by cylinder leakage; also, whether brake cylinders leak badly enough to permit the easy and quick detection of leakage by sound, or return movement of the piston, and whether any of the rods or levers foul. Under the conditions of this test, *i. e.*, with brake pipe pressure maintained, the brake cylinder leakage should never be sufficient to permit brake shoes to be moved side ways on the wheels in less than five (5) minutes after the handle of brake valve *E* has been moved to *Release* position. When trying brake shoes for looseness, to detect a brake that has partially leaked off, brake shoes which are not in contact with wheel flanges must be selected.

If a brake releases through the car operating valve exhaust port during the piston travel and brake cylinder leakage test, it is probably caused by leakage of air from the auxiliary reservoir to the atmosphere or into the brake cylinder. In this test, control valve *C* automatically maintains brake pipe pressure at the amount to which it was reduced; therefore, a further flow of air from the auxiliary reservoir to the brake cylinder is prevented and the volume of air to leak from the brake cylinder is limited to that admitted to it during the brake application, thereby providing a uniform leakage test for all brake cylinders.

At the completion of the piston travel and brake cylinder leakage tests, release and recharge the brakes by moving the handle of brake valve *E* to *Running* position and opening cocks 1; then make all necessary repairs, adjust piston travel and turn up the handles of the retaining valves.

TEST No. 3

Shop, Repair Track, Retaining Valve

NOTE—Before testing retaining valves, the caps should be removed and the parts and ports examined and cleaned, giving special attention to the condition of the valve seat or seats, and size of the vent port. A metal instrument should be used for opening up stopped or restricted vent ports, but must be of such size and shape as will not increase the size of the port.

With the handles of retaining valves turned up, cocks 1 open, and brakes fully charged, make a 20 pound service reduction with brake valve *E*, and when the brake pipe exhaust ceases, move the brake valve handle to *Release* position and return it to *Running* position.

The combined exhaust and leakage of air from the brake cylinder should not be sufficient within a period of three (3) minutes after starting the release of brakes to permit brake shoes, which are not in contact with the wheel flanges, to be moved with the foot sideways on the wheels.

Immediately after starting the release of brakes, note whether there is a discharge from the vent ports of retaining valves, as there should be, until the brake cylinder pressure is reduced to the retaining valve closing point. The upright section of the retaining valve pipe may then be jarred slightly to assist in seating the valve.

If the brake does not hold, the retaining valve, its pipe joints and the exhaust plug in the closed car operating valve exhaust port should be inspected for leakage before brake cylinder pressure has time to reduce materially. If the defect is not located, re-apply and release the brake and repeat the inspection for leakage while the brake cylinder pressure is high.

When a retaining valve is provided with a connection for an air gage, attach gage and turn the handle of the retaining valve down. If, after the car operating valve is in *Release* position, the brake cylinder pressure exceeds 45 pounds, reduce it to this amount by turning the retaining valve handle alternately up and down but leaving it in the latter position. Cylinder pressure should not leak down from 45 pounds to less than 40 pounds in one minute; if it does, inspect for leakage as previously described. After the cylinder and pipe leakage is known to be within the prescribed limits, turn the retaining valve handle up and jar the upright section of the pipe slightly to assist the valve in seating. When the discharge of air ceases, turn valve handle down and observe if the proper pressure is retained in the brake cylinder.

TEST No. 4

Road, Terminal or Grade

The brake test on a train at terminals or preparatory to its control on descending grade may be made with either a locomotive or the test truck, but when the test truck is used, open cocks 1 before coupling to the cars, leaving them open during the retaining valve test.

After charging the train, stopping leakage from brake pipe, adjusting piston travel, etc., and turning up the retaining valve handles, station one or more men along the train to make the inspection. The man operating the brake valve should apply the brakes with a 12 pound service reduction and release as soon as the brake valve

exhaust ceases, recharging by placing the brake valve handle in full *Release*, then returning promptly to *Running* position. In 2½ minutes after the release has started again apply the brakes with a 12 pound reduction and then release as before, repeating this operation, as stated, until the inspection has been completed and defects marked or repaired.

During this time, the inspector should note when the brakes start to release as indicated by a discharge at the retaining valve and make repeated or continued efforts to move a brake shoe on one wheel of each of two cars alternately. The brake shoes selected for this test must not be in contact with the wheel flanges.

If a brake shoe can be moved in less than two (2) minutes after the car operating valve moves to *Release* position, the minimum time permissible to insure reasonably efficient brakes on heavy grades, the brake cylinder, retaining valve, retaining valve piping, and the car operating valve exhaust plug should be inspected while under pressure to locate the defect. This procedure should be followed from car to car and the defects corrected.

TEST No. 5

Release

With the brakes fully charged and choke pipe cock 3 open, make a 15 pound service reduction; close cock 1 and move the handle of brake valve *E* to *Running* position, leaving it there; then when the brake pipe pressure has increased about four pounds, producing a differential with which the car operating valves should release and which may be determined by temporarily moving the handle of three-way cock 2 to horizontal position, start inspecting the brakes to locate any that may fail to release. A car operating valve which fails to release the brake before the brake pipe is fully recharged should be condemned.

Under these conditions, the control valve *C* automatically increases brake pipe pressure at a slow rate which will condemn a car operating valve if the condition of its packing ring is such as is likely to cause similar trouble under ordinary service operation.

Test No. 6

Emergency and Release after Emergency

With the brakes fully charged, cock 3 closed and cock 1 open, move the brake valve handle to *Emergency* position. A prompt emergency application must be obtained. Wait approximately 1 minute then move the brake valve handle to *Running* position. The brake must release promptly.

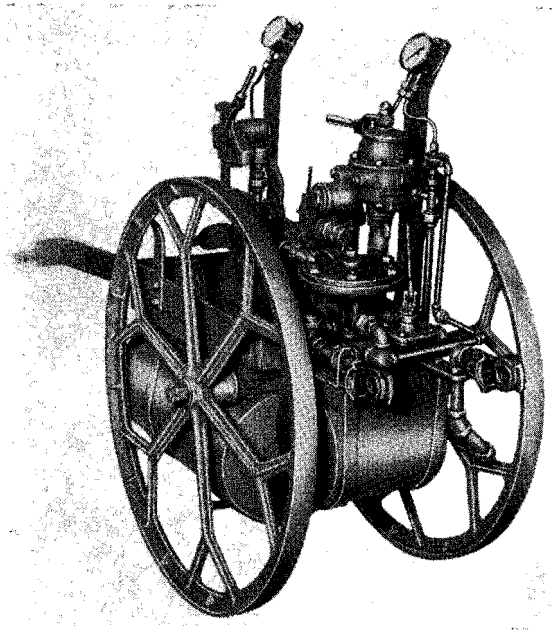


Fig. 10. View from Front End of Test Truck with Diaphragm Cocks and Straight-Air Feature

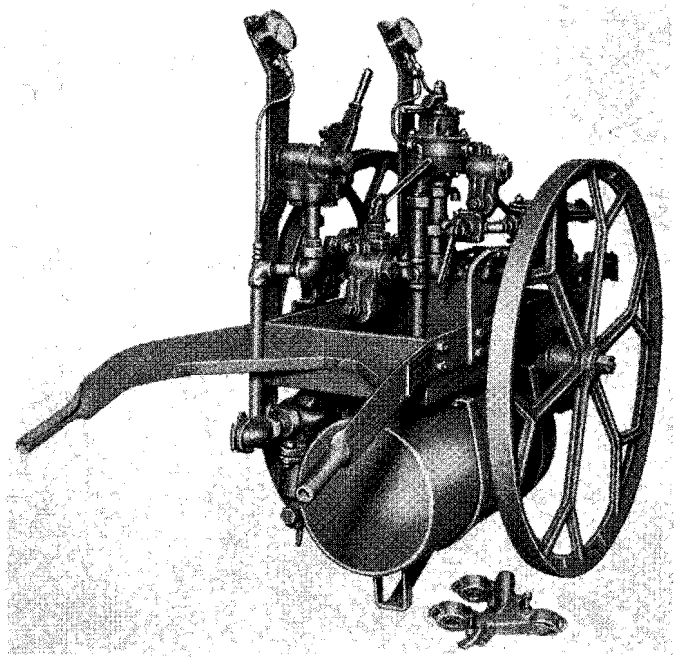


Fig. 11. View from Handle End of Test Truck with Diaphragm Cocks and Straight-Air Feature

Straight Air Test

For testing cars equipped with combined automatic and straight-air brake, additional apparatus must be installed on the test truck as follows:

¾″ Cut-out Cock (Cock 4)
C-6 Feed Valve
S-3 Straight-Air Brake Valve
Single Pointer Air Gage
HS-4 Hose Coupling

Test trucks so equipped are illustrated by Figs. 10, 11, 12 and 13 which are photographic views, and Plate 2 which shows the diagrammatic piping arrangement.

The automatic part of the brake must be tested and pass all tests before beginning the straight-air tests. Then with brakes released and the automatic brake valve handle in *Running* position, move the straight-air brake valve handle to *Release* position and open cock 4. The straight-air supply feed valve must be adjusted to the highest brake cylinder pressure used in service on the equipment under test.

Connect the HS-4 Coupling to the straight-air line of the train and make a full service application with the straight-air brake valve. Inspect all brake cylinders for piston travel and note that the brake shoes are held firmly on the wheels.

Coat all pipe joints and connections as well as cocks with soapsuds to detect leakage. At completion of the test move the straight-air brake valve handle to *Release* position.

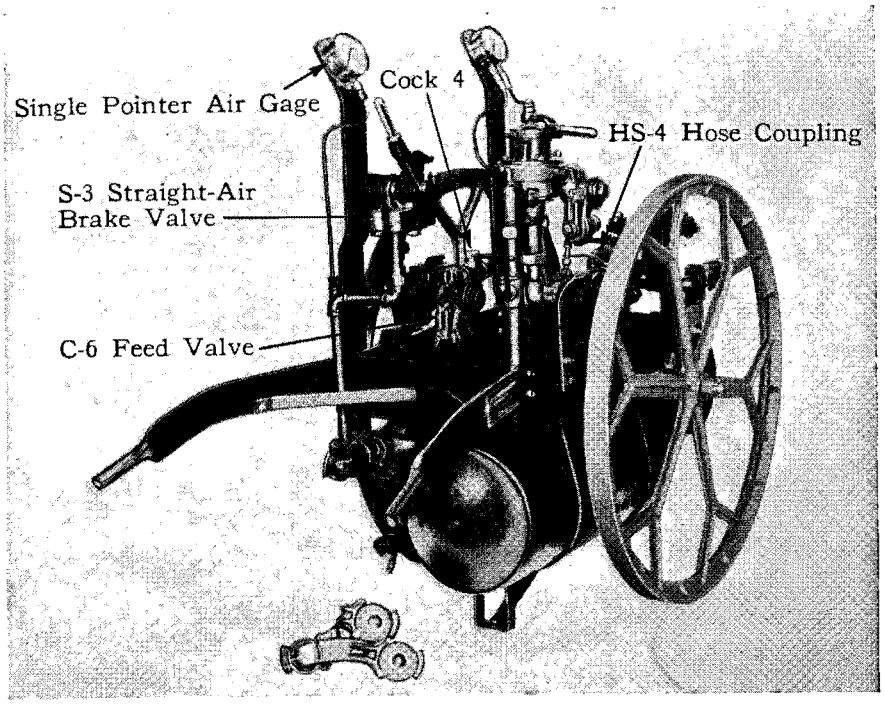


Fig. 12. View from Handle End of Brake Test Truck with Key Type Cocks and Straight-Air Feature

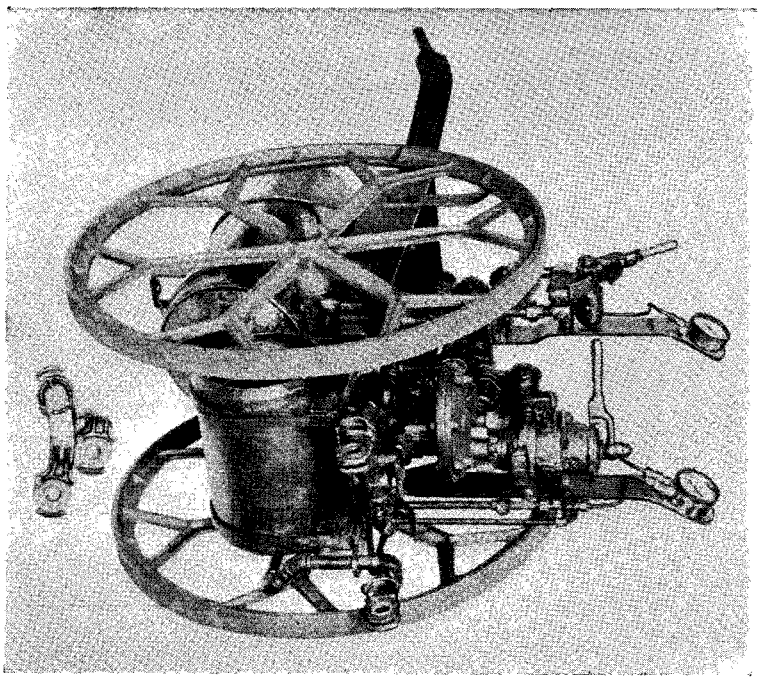


Fig. 13. Front View of Brake Test Truck with Key Type Cocks and Straight-Air Feature

DESCRIPTION OF COCKS

Cock 1—¾" Diaphragm Cock, Pc. 83270

Cock 2—¼" Three-way Cock, Pc. 55449

Cock 3—⅜" Diaphragm Cock, Pc. 85817

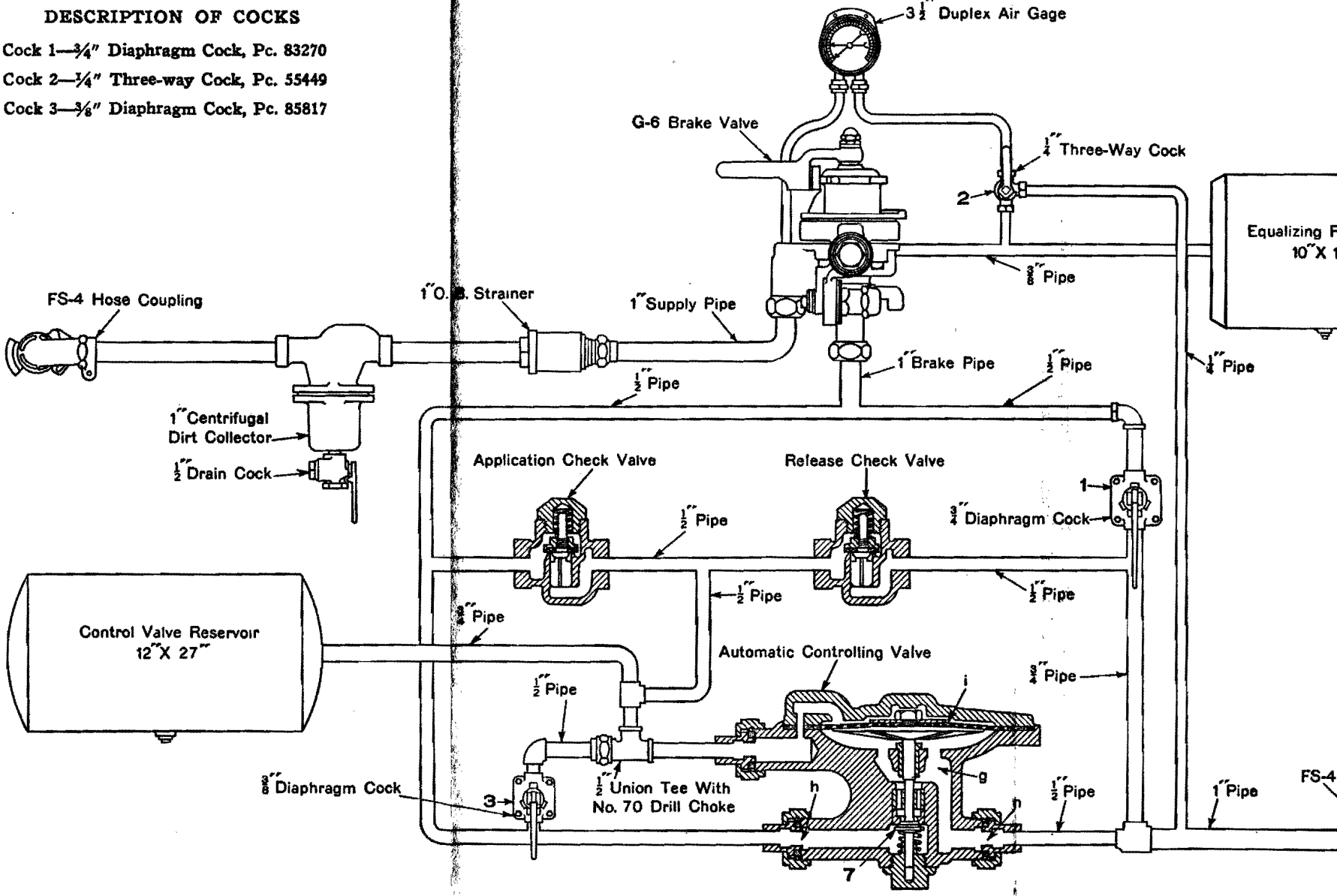
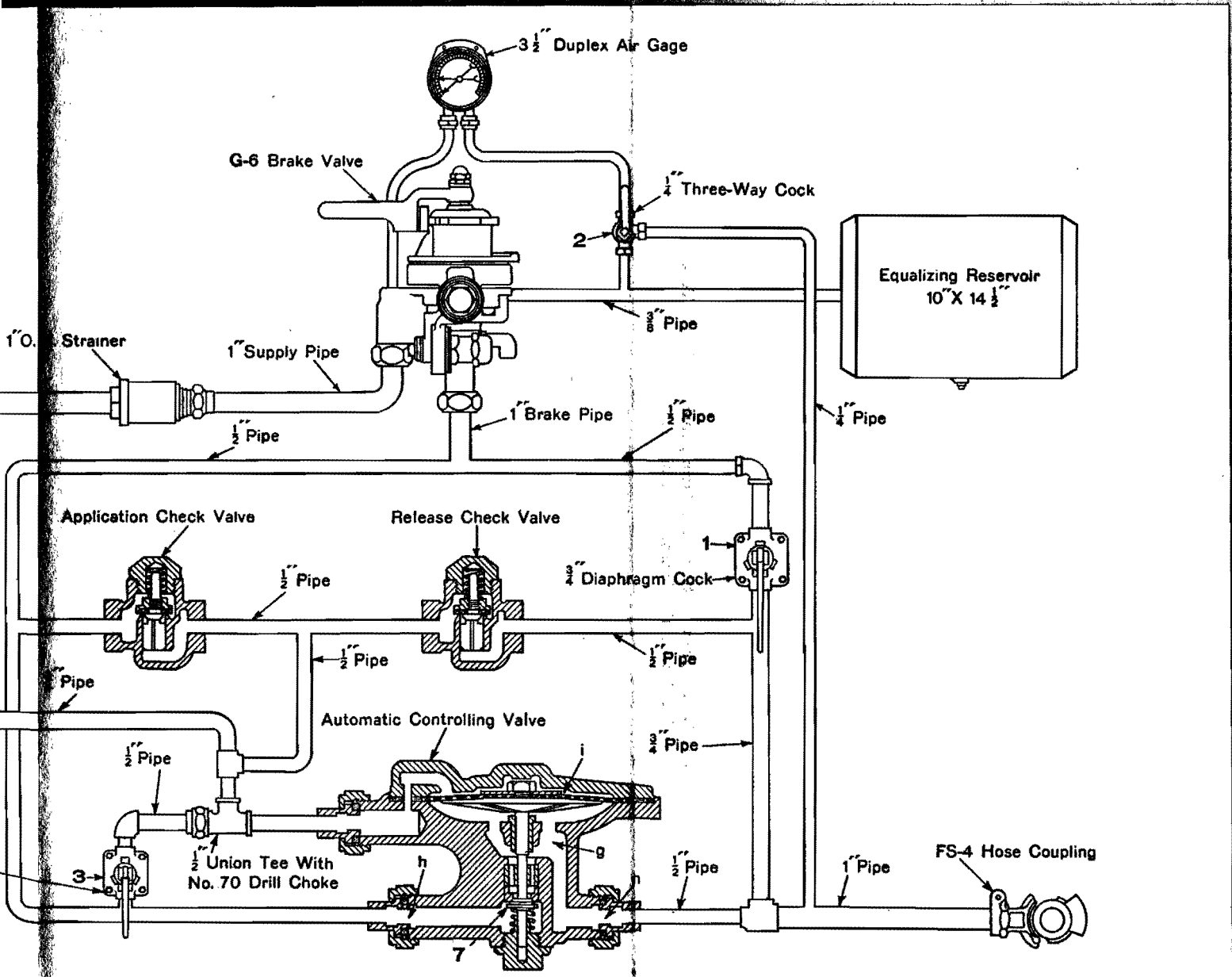


Plate 1. Diagrammatic Piping Arrangement of Brake Test Truck with Diaphragm Cocks and Check Valves



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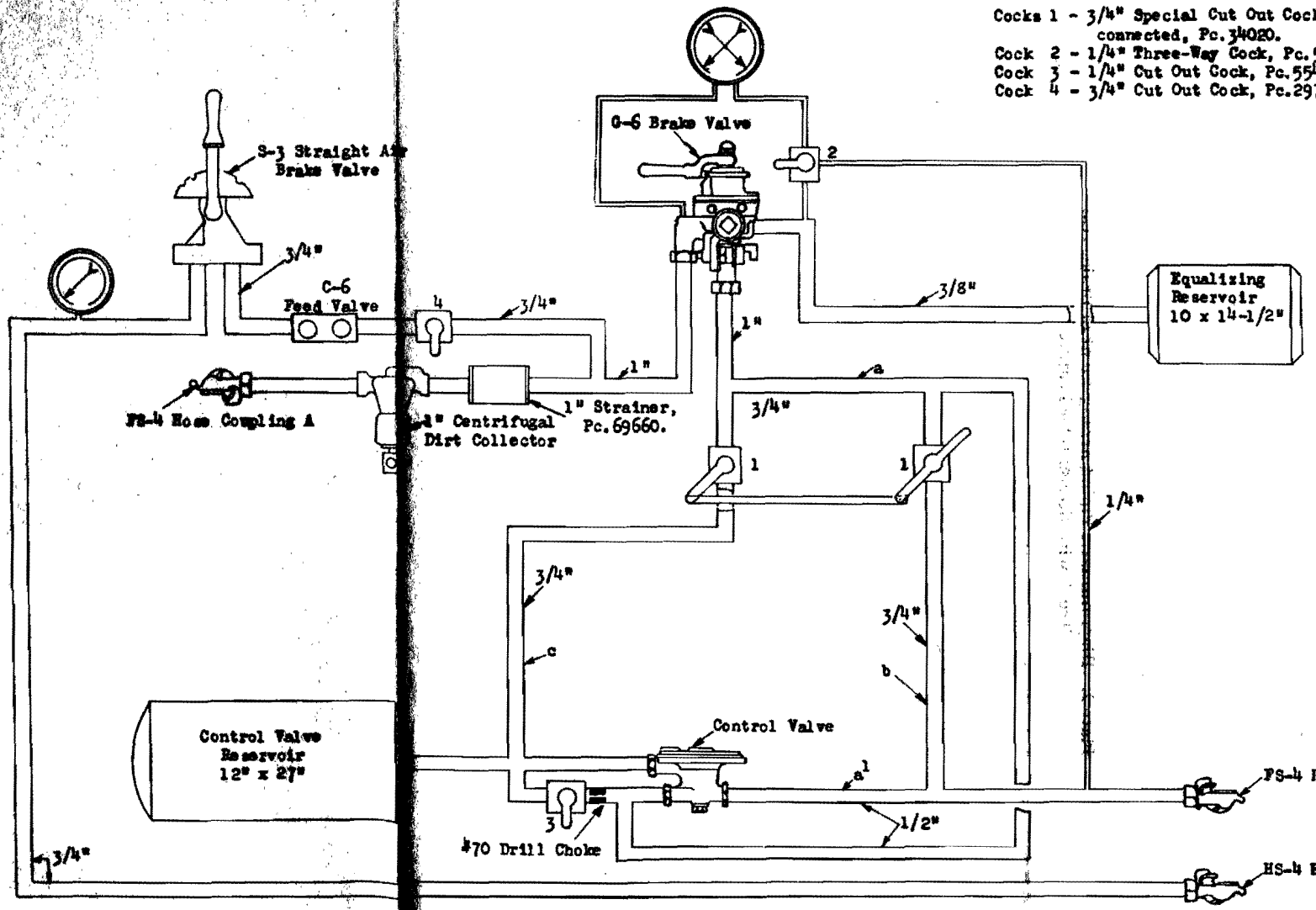
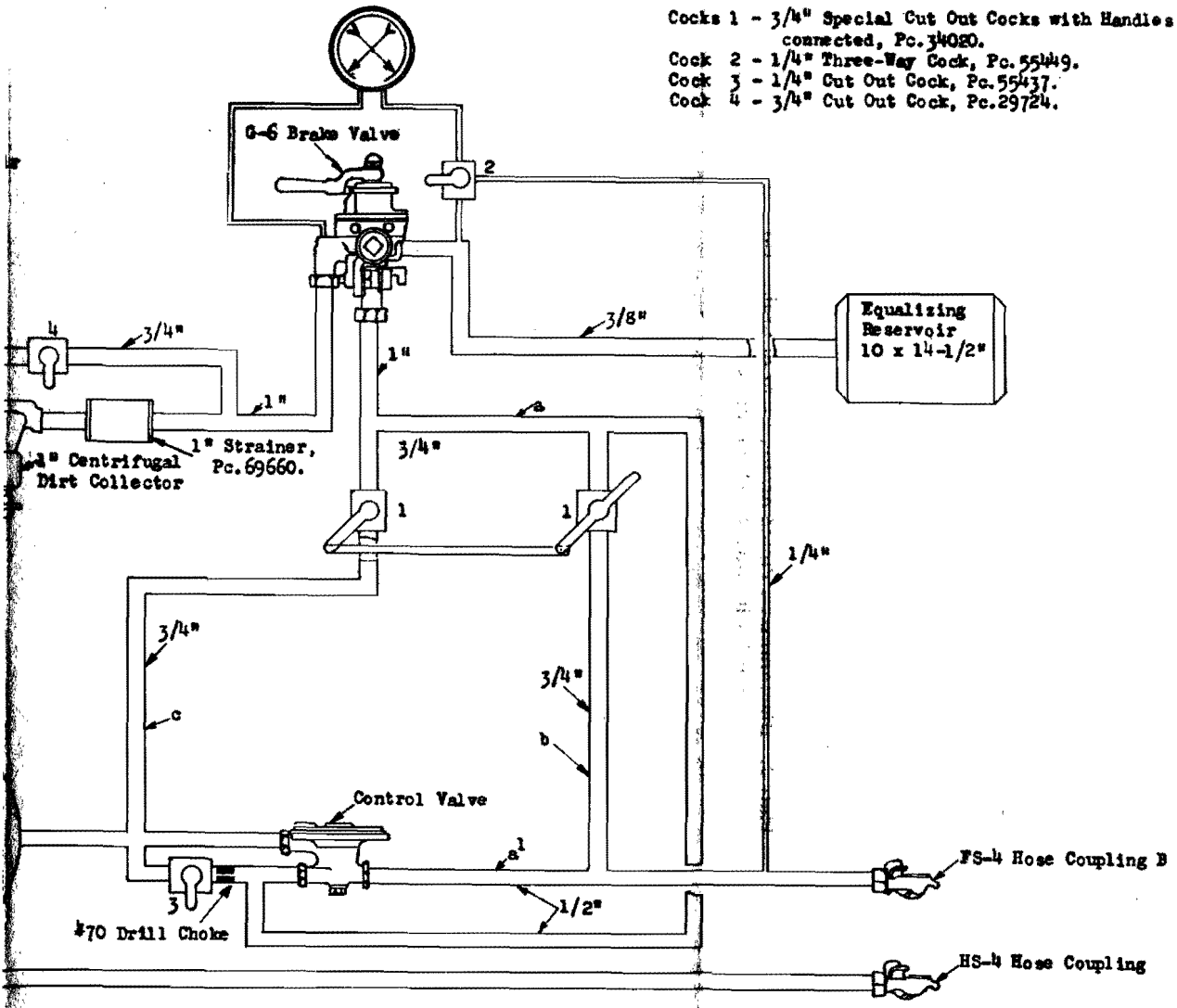


Plate 2. Diagrammatic Piping Arrangement of Brake Test Truck with Straight-Air Feature



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