

# MAINTENANCE INSTRUCTION

1210

ELECTRO-MOTIVE DIVISION  
GENERAL MOTORS CORPORATION • LA GRANGE, ILLINOIS, U. S. A.

## RUBBER DRAFT GEARS

### GENERAL DESCRIPTION

Three types of rubber draft gears are applied to EMD locomotives. The three types are essentially the same, differing only in size and arrangement. The draft gear consists of a wedge block, two or more rubber pads, a wedge and any shims that may be necessary to bring the draft gear to a standard size. These parts are built up into an assembly and inserted into the yoke. The yoke and draft gear assembly are then put into a pocket that has been constructed on the underside of the locomotive frame. After the carrier irons have been bolted in place, the coupler is then attached to the yoke to complete the whole draft gear and coupler assembly on the locomotive.

The draft gear assembly used on FT, F2 and F3 locomotives is part #8082639. This draft gear assembly uses four rubber pads, two on each side of the wedge.

Passenger and road-switcher locomotives use draft gear assembly, part #8101279. This draft gear assembly uses two rubber pads, one on each side of the wedge.

Switcher locomotives use two draft gear assemblies, part #8080369, each using two rubber pads, one on each side of wedge, and the two draft gear assemblies are mounted in tandem in one yoke.

The opening in the yoke nearest the coupler end is  $1/8$ " smaller in length than the opening at the rear end of the yoke. The recesses in the pocket

are both the same size. When the draft gear and yoke assemblies are placed in the pocket, the end sections of the rear draft gear will fit closely in the pocket while the end sections of the front draft gear will have  $1/8$ " clearance in the front pocket.

The effect of this arrangement is to provide a two step compression of the draft gears when the locomotive is pulling. As the locomotive begins to exert tractive effort, the gear farthest from the coupler will transmit the force.

The other draft gear will receive no force due to the  $1/8$ " clearance in the pocket. As the tractive effort increases, the rubber pads in the rear gear will compress.

When the compression reaches  $1/8$ ", the yoke comes against the front draft gear and it starts to compress, completing the second stage of compression. If the locomotive is pushing, both gears compress simultaneously, but the force of the impact is taken by the front draft gear, preventing any possible distortion of the yoke.

### MAINTENANCE

#### Frequency Of Inspection

Rubber draft gears, as used on EMD locomotives do not require periodic inspection, and maintenance is necessary only when indicated by compliance with I.C.C. Bureau of Locomotive Inspection, Rule 212, governing the operation of motive power equipment.

Visual inspection of rubber draft gears can be very misleading. Separation of the rubber from the steel plates, and the rubber cracking and breaking off in small pieces, (shredding) is a natural condition and occurs when the draft gear is in heavy service.

If, upon inspection, the rubber is found to be completely loose from the steel plates, it will not be necessary to remove draft gear immediately, unless locomotive happens to be due for maintenance work at this time. The draft gear may be retained in service, as cushioning capacity is still available, but the gear should be changed out at the earliest convenient time, as the steel plates the rubber had been bonded to have a tendency to creep out of the wedge block.

#### Removing Draft Gear From Locomotive

If the total slack in the whole draft gear, yoke and coupler assembly exceeds 1/2" the draft gear will have to be removed, in accordance with I.C.C. Regulation 212F. Bar coupler and draft gear back as far as it will go. With coupler knuckle closed, measure from outer face of knuckle to a point on locomotive.

Bar coupler and draft gear out as far as it will go. Again measure from the same point on locomotive to the outer coupler face. If this exceeds 1/2" longer than first measurement, draft gear will have to be removed and slack taken up.

Do not use another locomotive for this purpose, as the draft gear will be compressed showing a false slack indication. It is imperative that the gear is not compressed at this time.

On passenger locomotives the whole retractable gear is removed from the front end of locomotive, placed on the

floor, and the draft gear is then removed from this retractable gear assembly. The draft gear at rear of passenger locomotive is jacked down after carrier irons and coupler have been removed.

When removing the draft gear from a switcher locomotive the whole locomotive will have to be raised enough to disengage the center castings. If no other truck work is to be done at this time, block solid under the journal boxes to the pedestal tie bar all around on both trucks. The truck springs will remain compressed, lessening the distance the locomotive will have to be raised. Pinch the truck toward the fuel tank, and remove carrier plate. With the coupler still attached to the yoke, extended jacks are placed under draft gear. Remove coupling pin and coupler. Let jacks down slowly, keeping draft gear level as it comes down out of pocket. When draft gear clears pocket, skid it out from under locomotive where it can be built up to standard. This procedure is reversed to apply draft gear to locomotive.

When removing the draft gear from the FT locomotive, place extended jacks under draft gear. Remove coupler and carrier irons, and lower jacks carefully. The gear should come down out of the pocket by it's own weight as jacks are lowered. There is no need for raising locomotive, as the draft gear will clear truck end sill.

When the draft gear is to be removed from the F2 or F3 locomotives, the locomotive has to be raised and the truck or trucks removed completely. If an overhead crane is to be used for lifting, lift locomotive clear of trucks and set it on pedestals. If jacking and cribbing is to be used to raise locomotive, and no truck work is to be done at this time, block solid under the journal boxes to save jacking height.

Place extended jacks under draft gear and remove coupler. Knock keys out of centering device and roll centering device forward out of the way. Remove

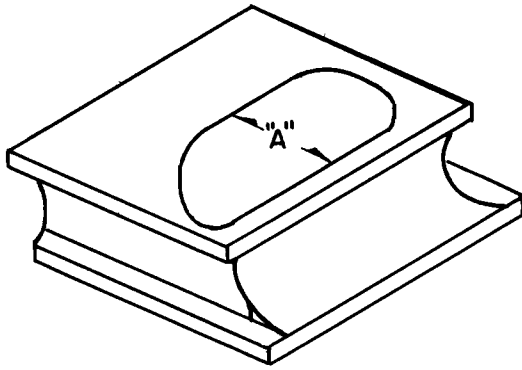


Fig. 1 - Limiting Dimension Of Bonding locking keys and carrier irons and jack draft gear down out of pocket. With the draft gear and yoke assembly on the floor, remove the draft gear from the yoke.

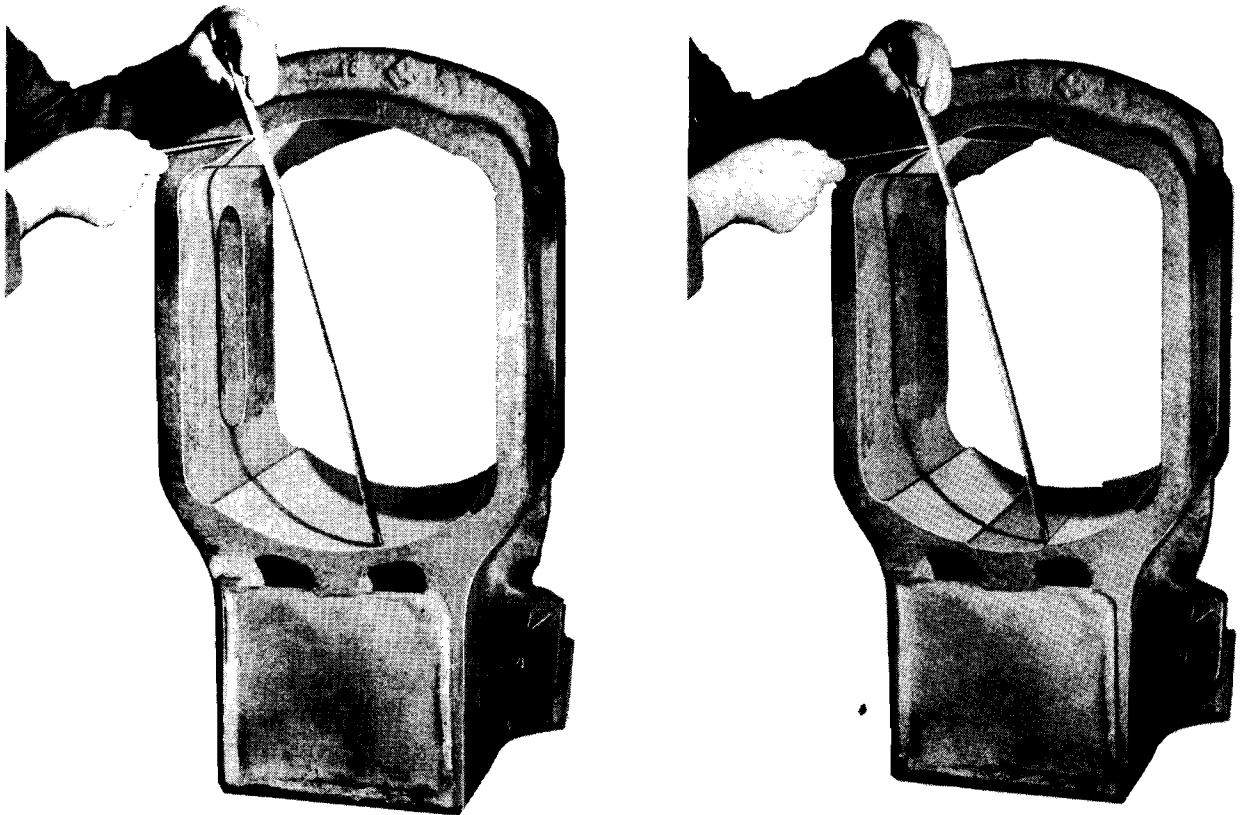
Check rubber pads for their condition. Place a thin steel scale between the rubber and the steel plate, then mark this on top of the plate. By going completely around the rubber pad, measuring about every inch, and then connecting these marks with chalk, a pattern of the bonding is drawn out on

the steel plate. A fairly definite pattern generally occurs, Fig. 1, and this can be used as a guide to determine if the pads are fit for further service, or if they should be replaced. This check applies to all types of draft gear pads.

Never use old and new pads together. Pads that are oil soaked should be replaced even though there is no slack in the gear. This applies to both natural rubber and synthetic rubber pads. Oil soaked pads will expand, taking up any slack that may exist, but the rubber has lost all its resiliency and the gear will be damaged with its continued use. Remove cause of oil getting onto rubber pads to prevent its recurrence. Pads made of natural rubber can be recognized, as a corner is cut off each of the steel plates.

#### Checking Yoke For Length

With draft gear removed from yoke, check opening in yoke for length. Figs. 2, 3, and 4 shows place where measure-



Figs. 2 and 3 - Checking Yoke For Length

ments are taken, and table, Fig. 5, gives worn limits and restored limits. If shims are necessary to restore yoke to standard, Fig. 5, do not use shims less than 1/8" thick. Shims are welded to front or coupler end of yoke.

Check draft gear pocket on underside of locomotive for length.

Illustration shows place where measurements are taken for pocket length. Table shows worn and restored limits. Shims not less than 1/8" thickness are welded to the rear wear surfaces of the pocket, Fig. 6.

### Assembling Draft Gear

Place wedge block on two cradle blocks. Place rubber pads in wedge block, Fig. 7, taking care that lower edges of steel plates are resting on shoulders in bottom of wedge block. Place wedge onto rubber pads, Fig. 8. With the gear thus assembled, put about 150 pounds weight on top of the wedge, a man standing on wedge will do.

Measure with calipers the overall height of gear assembly, Fig. 9. The total overall assembled height should be 1/8" to 3/16" greater than the inside diameter of the yoke, if old rubber pads are being reapplied, and 3/16" to 1/4" greater if new rubber pads are used. If the gear does not come up to proper height, remove wedge and rubber pads.

Place 1/16" thick shims in wedge block, Fig. 10, but no more than 3 shims on each side, as the steel plates on the rubber pads will no longer rest firmly on the shoulders at the bottom of wedge block. It must be remembered that one 1/16" shim on each side of the wedge block will raise the height of draft gear approximately 1/8".

If the draft gear cannot be brought up to height with three 1/16" shims, remove the shims from the wedge block. Weld one 3/16" shim on each side of

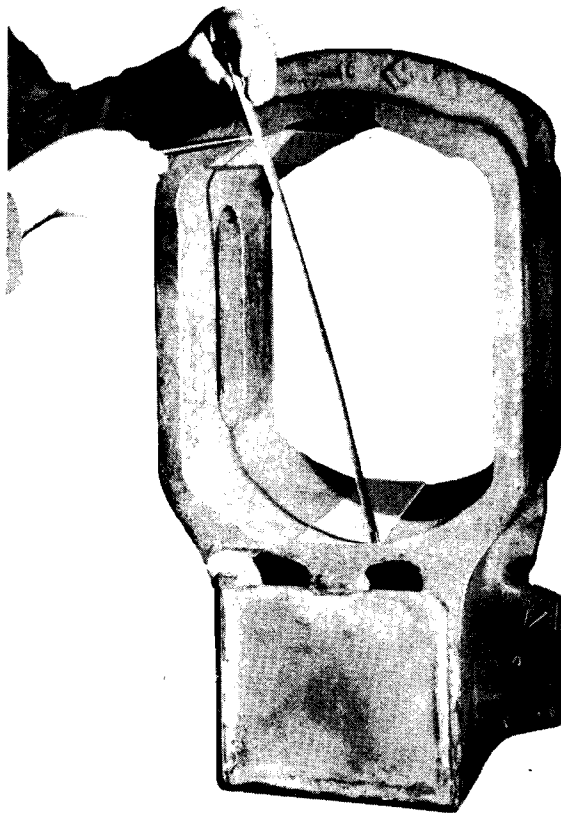
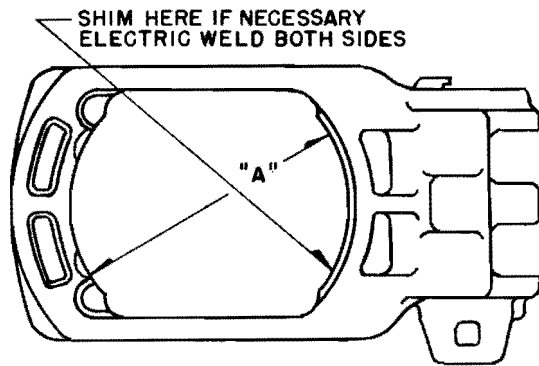


Fig. 4 - Checking Yoke Length

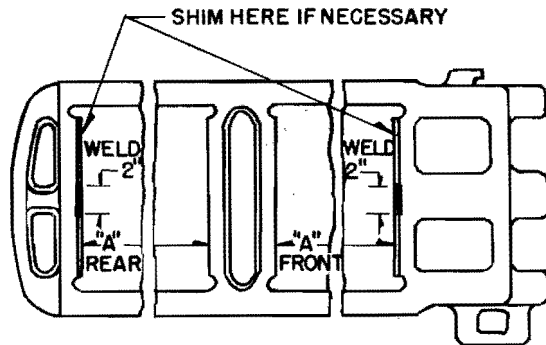
wedge, and then bring gear to proper height by adding 1/16" shims to the wedge block. When proper height of gear has been obtained, tack weld shims to wedge block. Shims should not be used next to wedge if required height can be obtained by shims in wedge block.

The gear assembly should be moved to a press, Fig. 11, and two preliminary loadings of about 50,000 pounds each should be applied to properly seat gear. Compress gear assembly enough to place clamps over ends of gear to hold this compressed position. A long bolt is put through the center hole of wedge block to hold clamps in place.

With the clamps in place, insert draft gear into the yoke opening, being sure that wedge block is placed at coupler end of yoke. Placed in this manner, the wedge block will not be continually moving and wearing on the carrier irons when locomotive is pulling. If the wear surface of the pocket has



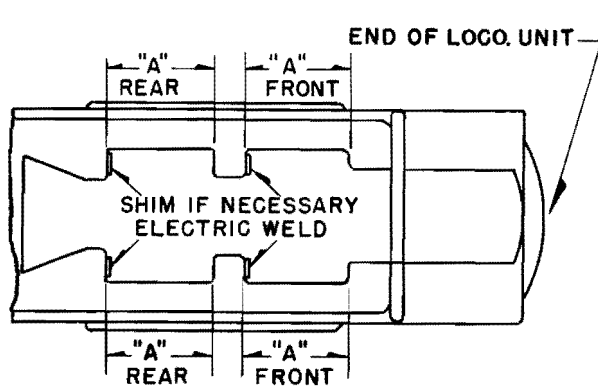
SHIMMING OF YOKE, NO'S. 8082639 & 8101279



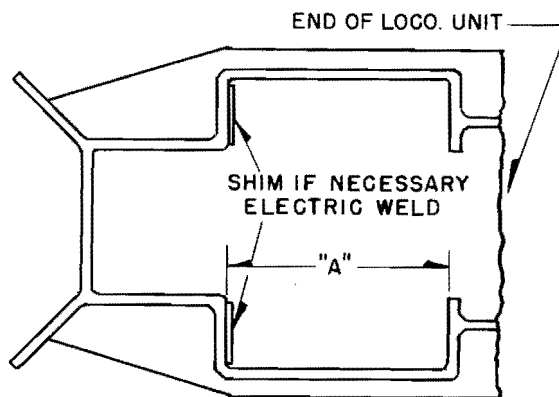
SHIMMING OF YOKE, NO. 8080369

TYPE	"A" YOKE WORN LIMIT		"A" YOKE RESTORED LIMIT		SHIM SIZE		
	WIDTH	LENGTH	WIDTH	LENGTH	WIDTH	LENGTH	RADIUS
8101279	14-31/32"		14-13/16 + 1/16"		5-1/2"	9-1/2"	7-1/2"
8080369	FRONT	10-1/2"	10-7/16	+ 0 / - 1/8"	5-1/2"	8	
	REAR	10-11/16"	10-9/16	+ 1/8 / - 0"	5-1/2"	8	
8082639	16-27/32"		16-11/16 + 1/16 / - 0"		TO FIT WEAR SURFACE 10"		8-3/8"

Fig. 5 - Worn And Restored Limits For Draft Gear Yoke



POCKET FOR DRAFT GEAR, NO. 8080369



POCKET FOR DRAFT GEARS NO. 8082639 & 8101279

TYPE	POCKET WORN LIMIT		POCKET RESTORED LIMIT		SHIMS		
	WIDTH	LENGTH	WIDTH	LENGTH	WIDTH	LENGTH	
8101279	11-11/16"		11-17/32 + 1/16"		3"	10"	
8080369	FRONT	10-5/8"	10-9/16	+ 1/16 / - 1/16"	2-1/4"	7-1/2"	
	REAR	10-5/8"	10-9/16	+ 1/16 / - 1/16"	2-1/4"	7-1/2"	
8082639	13-27/32"		13-11/16 + 1/16 / - 0"		4"	11"	

Fig. 6 - Worn And Restored Limits For Draft Gear Pockets

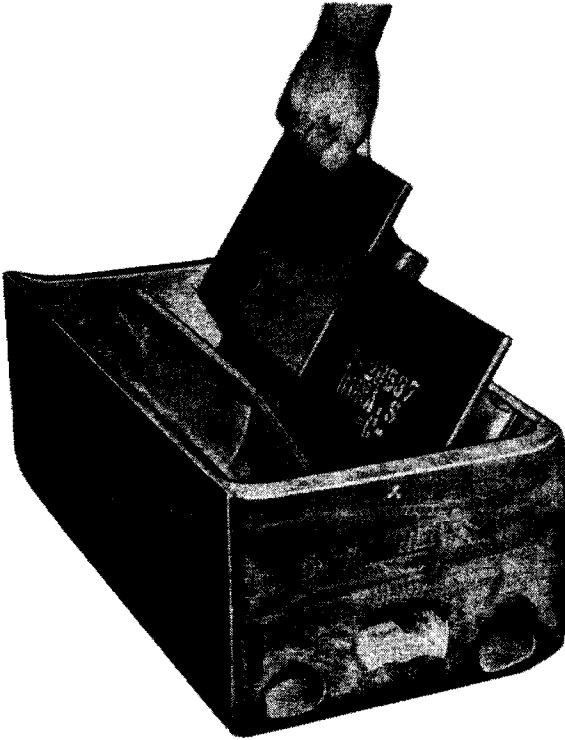


Fig. 7 - Inserting Pads In Wedge Block

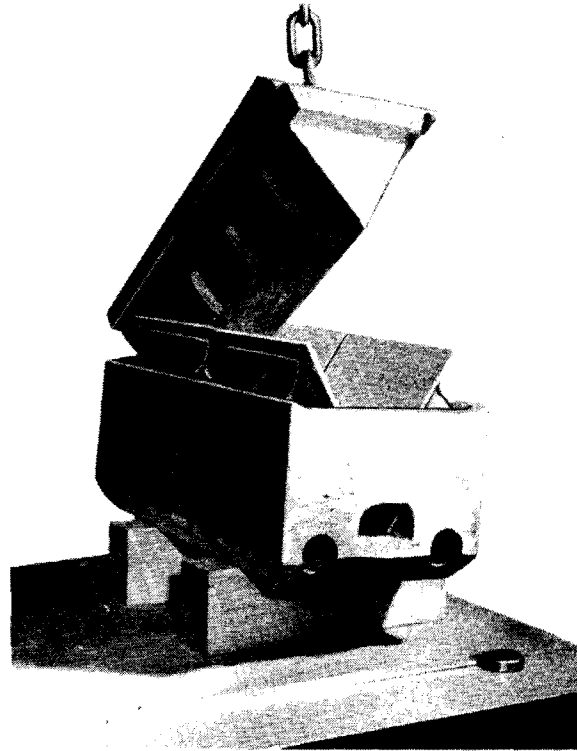


Fig. 8 - Inserting Wedge Into Wedge Block

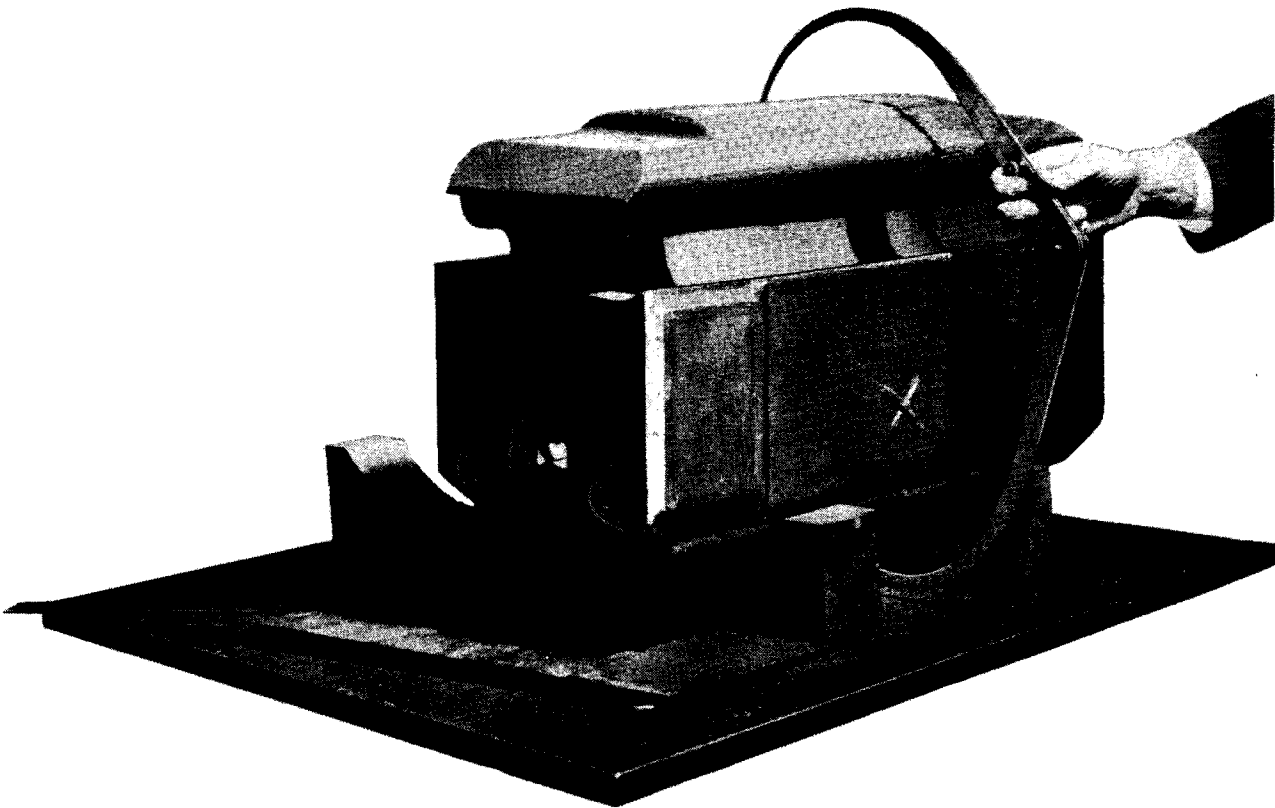


Fig. 9 - Measuring Overall Height Of Gear Assembly With Calipers

been shimmed and the opening in the yoke was not shimmed, the gear assembly may be a tight fit and be hard to enter into the pocket. It is advisable to place a small nut between the wedge block and the front of yoke opening. Remove clamps and the nut will hold the gear slightly compressed, allowing the gear to go into the pocket easily. The nut will fall out on the first heavy pull the locomotive makes. After carrier irons have been replaced, draft gear is ready for service.

A holder, Fig. 12, for the draft gear assembly can be made up from EMD drawing #8107525. This holder will facilitate handling the assembled and clamped draft gear when inserting gear assembly into yoke, Fig. 13. It is so constructed that assembled draft gear hangs horizontal and gear can be inserted into yoke very easily. The one holder will suffice for all draft gears. About 1-1/2" will have to be cut off the ends of the plates under the eye at the top of holder for its use on gear #8082639 for F2 and F3 locomotives. Different clamps and bolts will be required for

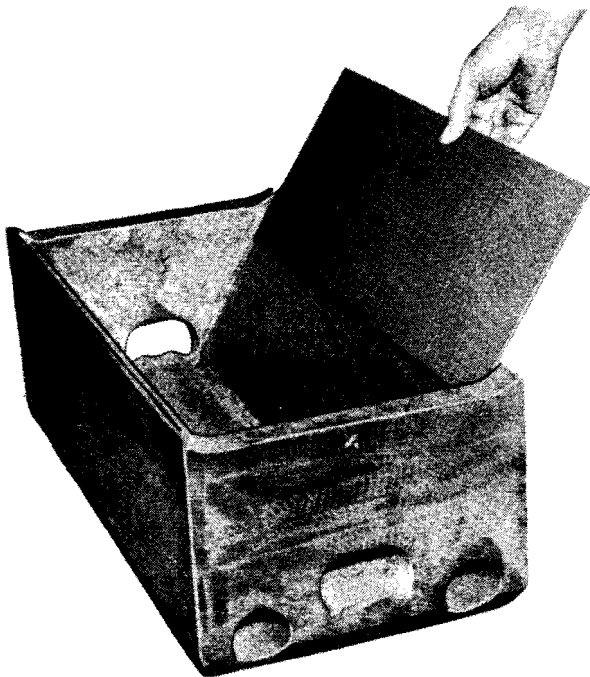


Fig. 10 - Installing Shims In Wedge Block

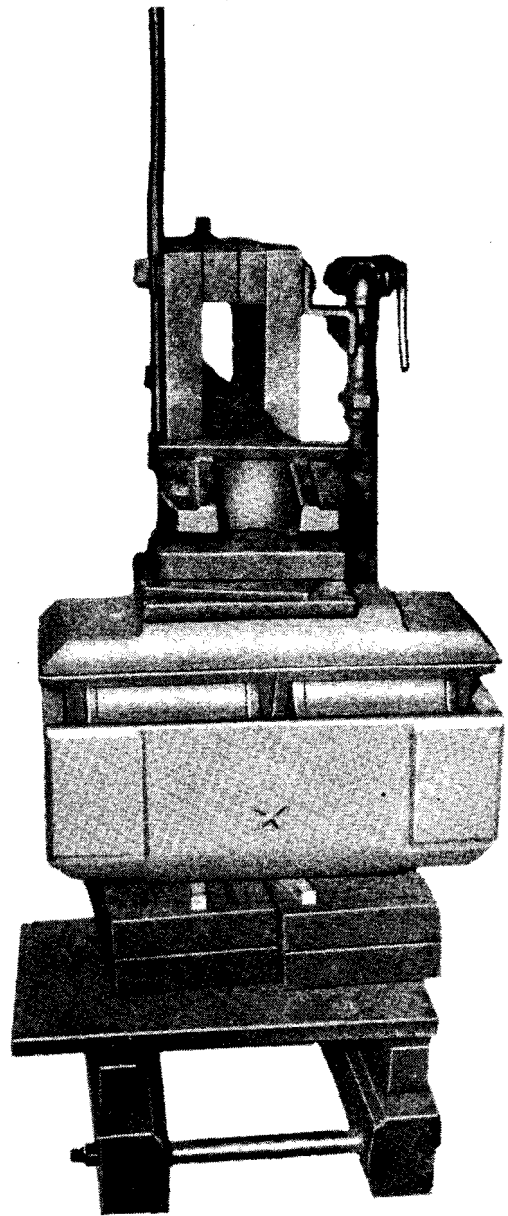


Fig. 11 - Compressing Wedge Into Wedge Block

each different type of gear.

No clamps are necessary when assembling the draft gear assemblies, (part #8080369) as used on switcher locomotives. Two heavy steel straps long enough to fit over the draft gear and two 1" bolts with about 3" thread will do. Mount straps across the width of draft gear assembly and tighten nuts until draft gear will enter opening in yoke. After assembly has entered yoke, release straps and either drive or press assembly to its proper position in the yoke.

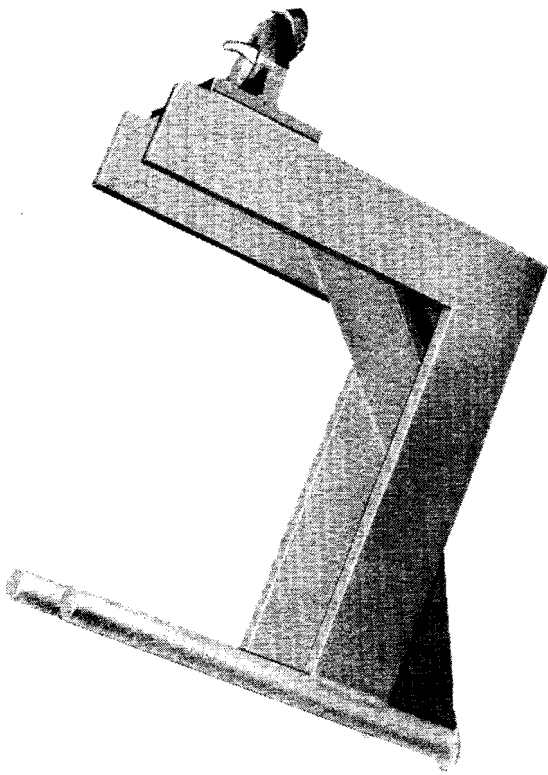


Fig. 12 - Draft Gear Lifting Fixture

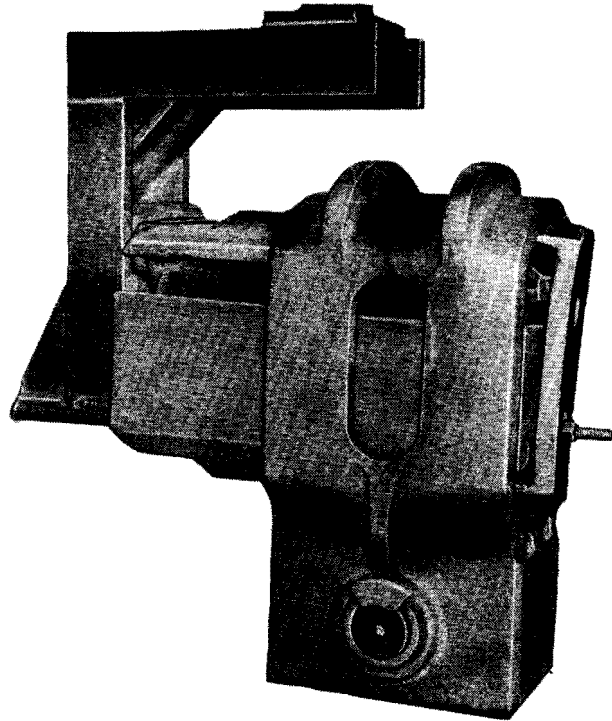


Fig. 13 - Inserting Draft Gear Into Yoke

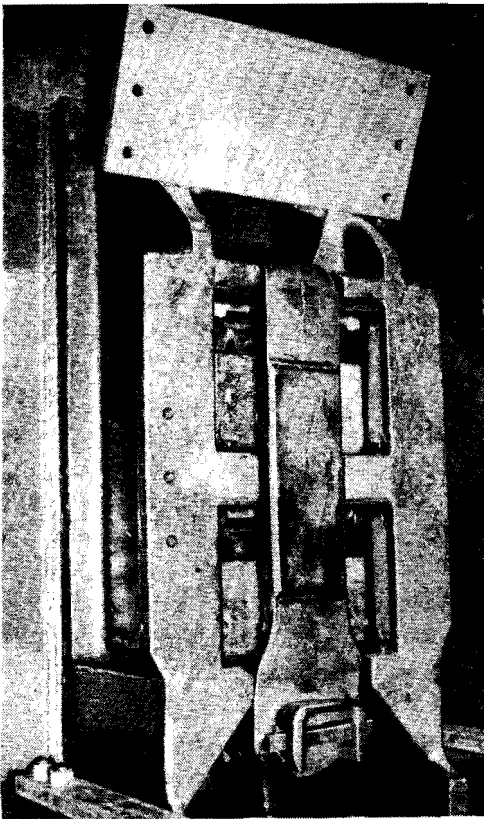


Fig. 14 - Inverted View  
Switcher Application

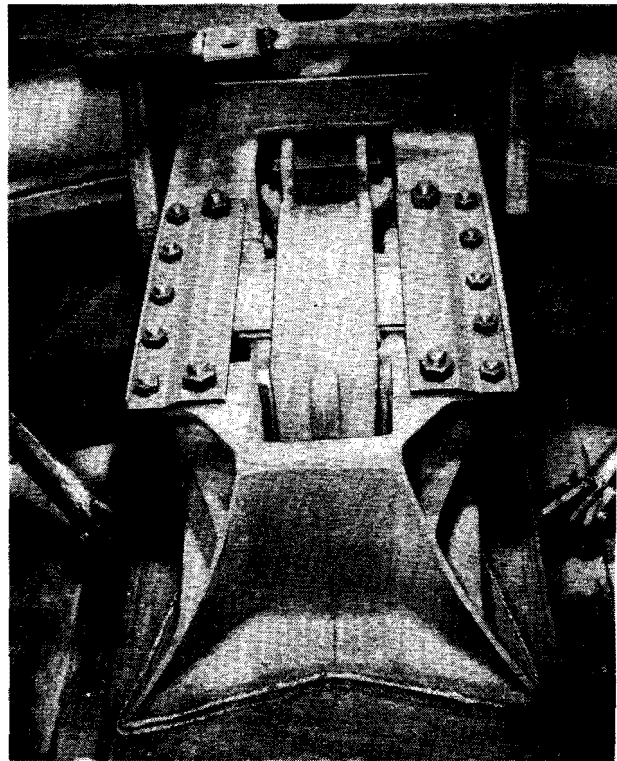


Fig. 15 - Inverted View  
Passenger Application



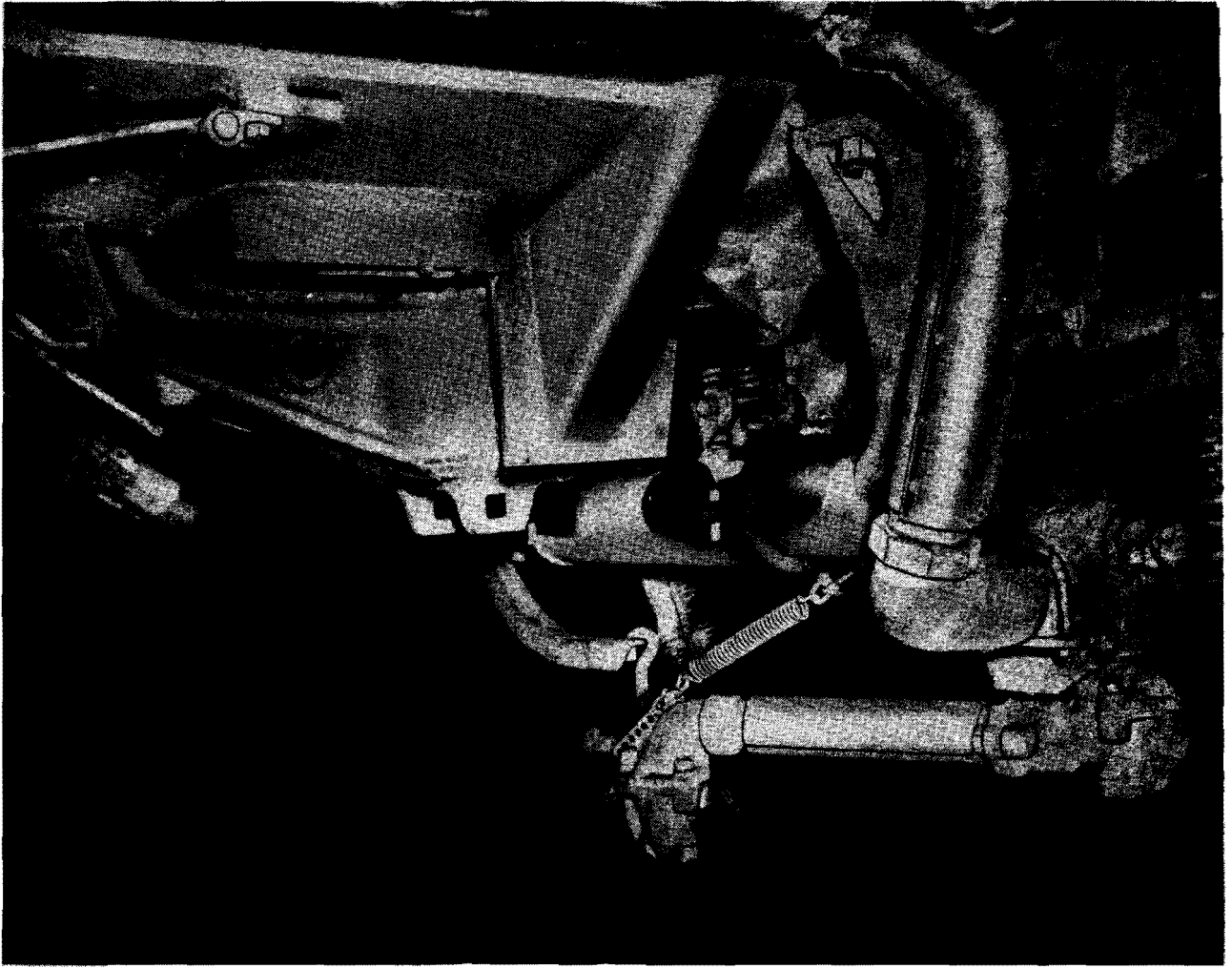


Fig. 16 - Application On F2 And F3 Locomotives