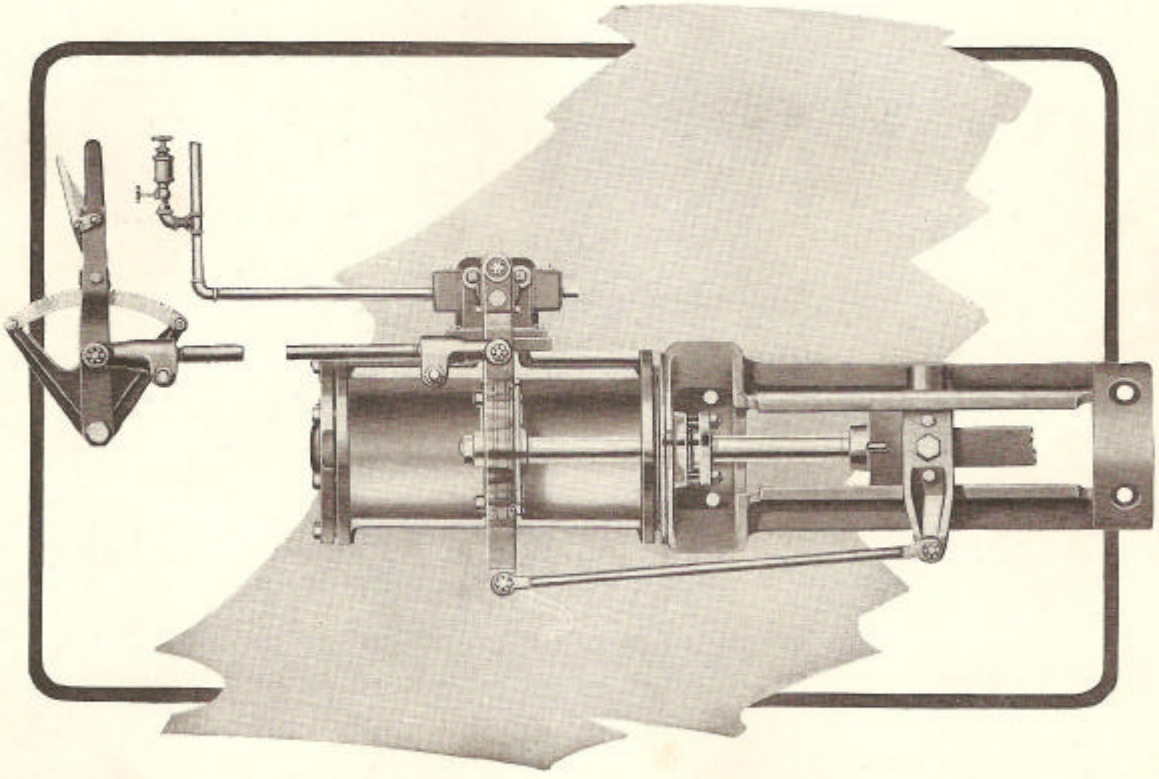
# ALCO REVERSE GEAR

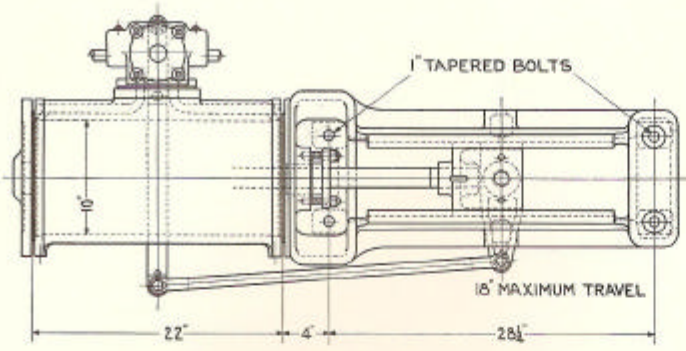
BULLETIN

No. 2018

M. E. Childs



American Locomotive Company




ALCO REVERSE GEAR TYPE "G"

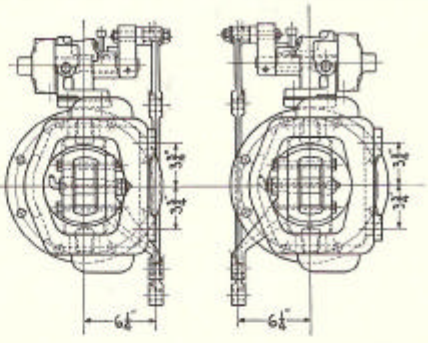
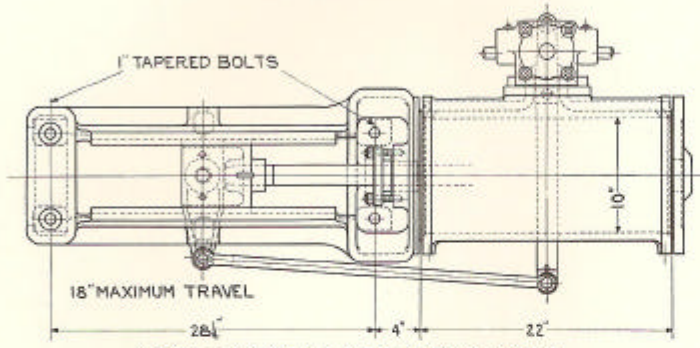



Figure 1




Figure 2

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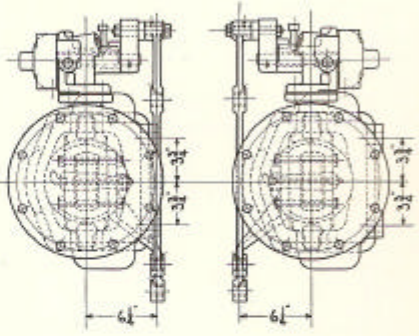
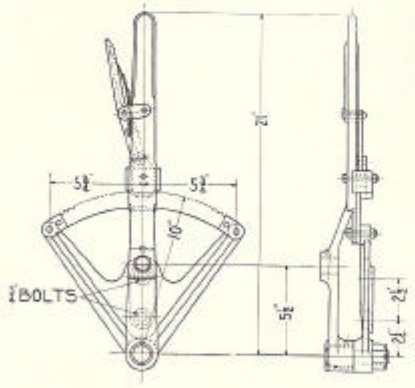



Figure 3

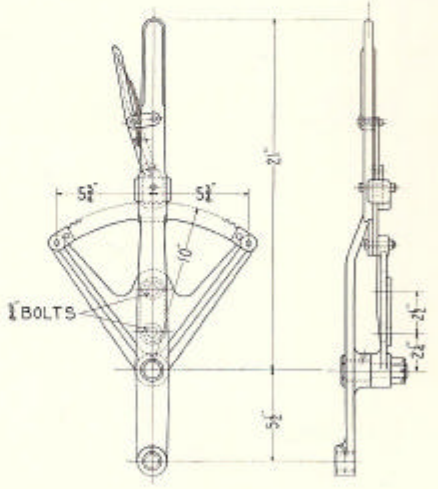



Figure 4




**STANDARD REVERSE LEVER—Style 1**

This lever will be furnished with all gears unless otherwise specified. With this reverse lever the crosshead moves in the same direction as lever.




**SPECIAL REVERSE LEVER—Style 2**

This reverse lever is used to obtain a movement of the crosshead in a direction opposite to that obtained with the standard reverse lever.

## DIRECTIONS FOR ORDERING

WHEN ordering, specify type of gear and assembly desired. State whether style one or style two reverse lever is required.

EXAMPLE—10 ALCO Type "G" gears, assembly one, style one lever.

ALCO Gears were designed and are recommended for air operation but may also be operated by steam. The Gears are adapted for all classes of service. A suitable Crosshead supported by rigid guides insures minimum Piston Rod Packing maintenance. The desired cut-off is maintained under all conditions of service and is accurately indicated by the position of the Reverse Lever.

All parts other than the valve and Cylinder are exact duplicates on the Types "E" and "G" Gears. On the Type "G" Gear, the Valve and Cylinder have been re-designed to eliminate the pipes between the Valve and ends of Cylinder, thus more easily allowing the removal of Valve for repairs, and also simplifying the change from one assembly to another as illustrated by Figures 1 to 4.

To change the Type "G" Gear from Assembly 1 to Assembly 2, turn Valve and Crosshead. It is not necessary to remove Cylinder from Guide.

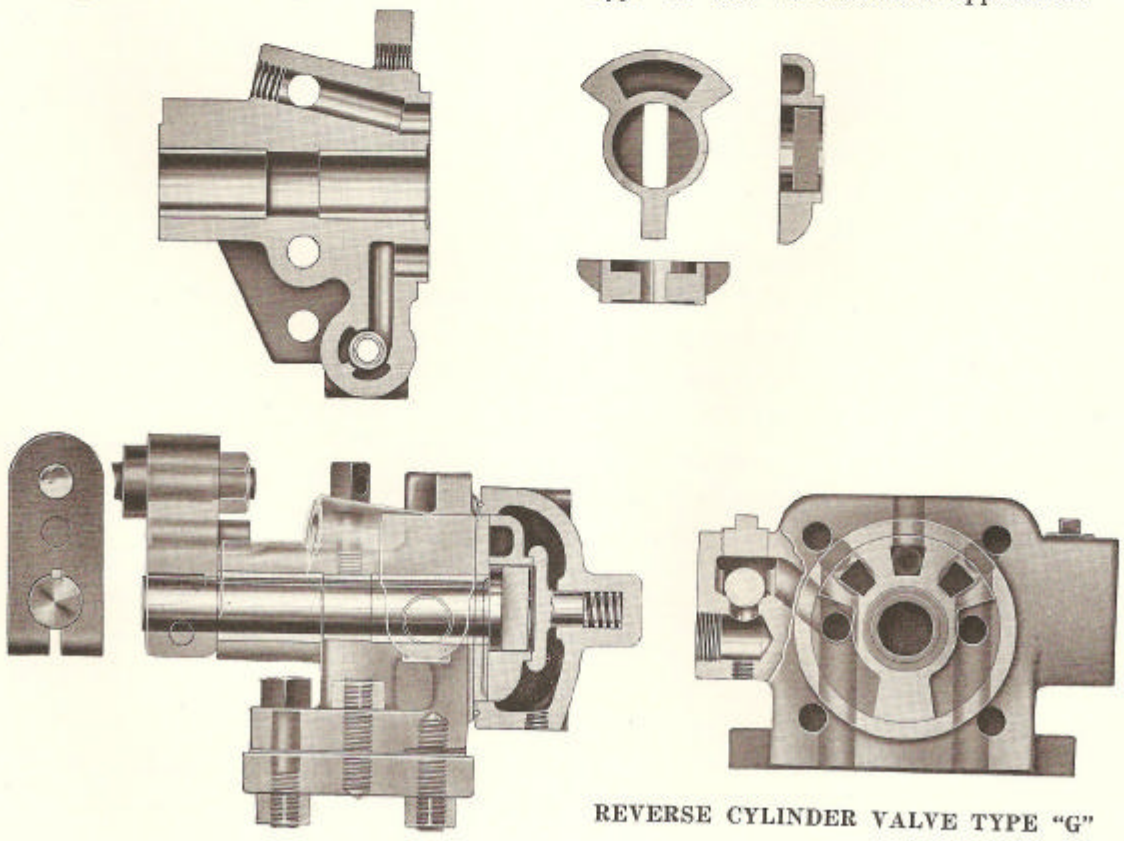
To change the Type "G" Gear from Assembly 1 to Assembly 4, disconnect Guide from Cylinder. Turn Cylinder half around without removing Piston from Cylinder. Turn Crosshead over. Drill oil hole in guide.

Assembly No. 1 may be changed to Assembly No. 3 in a similar manner.

All Types "E" and "G" Gears can be assembled with operating valve below Cylinder. This change in assembly requires a change in the oil hole drilling of the floating lever and the operating-valve cap must be turned in order to have the drain cock below the Valve. However, these applications should only be used when the angle of the rod to cab is not too severe.

All ALCO gears are controlled by a flat rotary type valve. The efficiency of this type of valve has long been demonstrated in air brake operation. It is very sensitive to slight movement of the reverse lever or crosshead, is easy to operate, and eliminates the necessity of a stuffing box on the valve stem. The entire valve may be easily and quickly removed for grinding or repairs.

This valve is not rigidly connected to the valve stem, and therefore, seating properly at all times, there is no tendency toward faulty action of the gear through the valve lifting. The Valve Body has brass bushings to permit the taking up of excess lost motion. The Type "G" Gear is much faster than the Type "E". If too fast, bush the exhaust port. Instructions for increasing the speed of the Type "E" Gear will be sent on application.



REVERSE CYLINDER VALVE TYPE "G"

# Operation

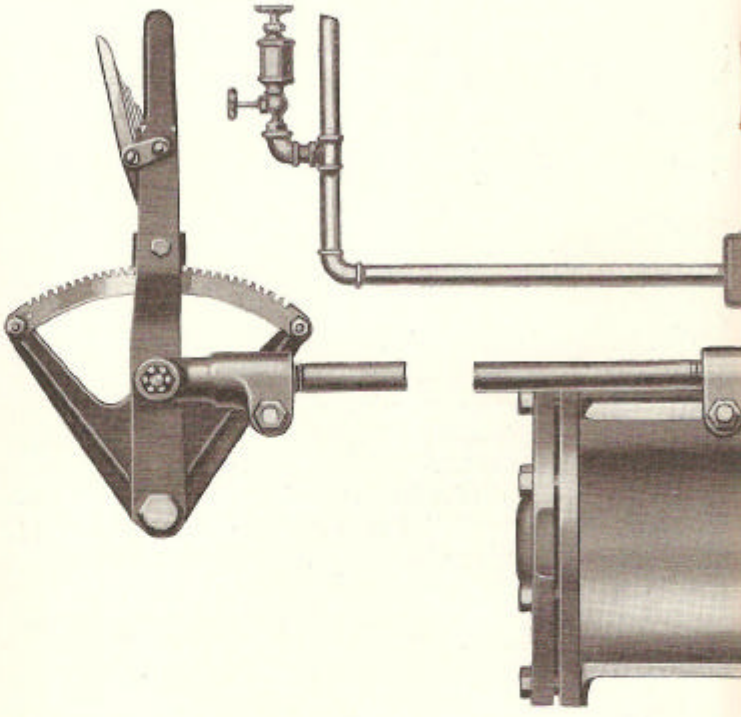
THE Alco Reverse Gear is a pressure operated gear. It is operated by a small hand lever in the cab connected with an auxiliary or floating lever mounted on the gear. This floating lever is so connected to the control valve as to automatically insure a cut-off position of the valve motion corresponding to the position indicated by the hand lever.

Both sides of the piston are constantly under pressure when gear is at rest. Operation of the gear is obtained by exhausting the required amount of air from one side of the piston. In this way the air consumption is kept at a minimum, as the only air required is the equivalent of the amount exhausted.

To reverse the engine or change the cut-off, the reverse lever is shifted in the required direction. This movement opens the valve, thereby exhausting the air from one end of the cylinder, and admitting air to the opposite end of the cylinder. The crosshead will then move to the desired position. This movement of the crosshead, when the reverse lever is at rest, causes the valve, by means of the floating lever and rod, to return to its central position, thereby closing the exhaust and bringing the crosshead to rest.

It will be seen that for any position of the reverse lever there is a corresponding position of the crosshead. Any slight movement of the crosshead due to the pull of the valve motion while working will be corrected promptly by the automatic opening and closing of the rotary valve through the floating lever.

The movement of the rotary valve is limited by stops on the valve body. When the reverse lever is shifted sufficiently to bring



the valve arm against the stop, any further travel of the reverse lever is delayed until the movement of the crosshead starts the valve towards it central position. These stops limit the travel of the reverse lever when there is no pressure in the cylinder, and prevent a false indication of the position of the crosshead.

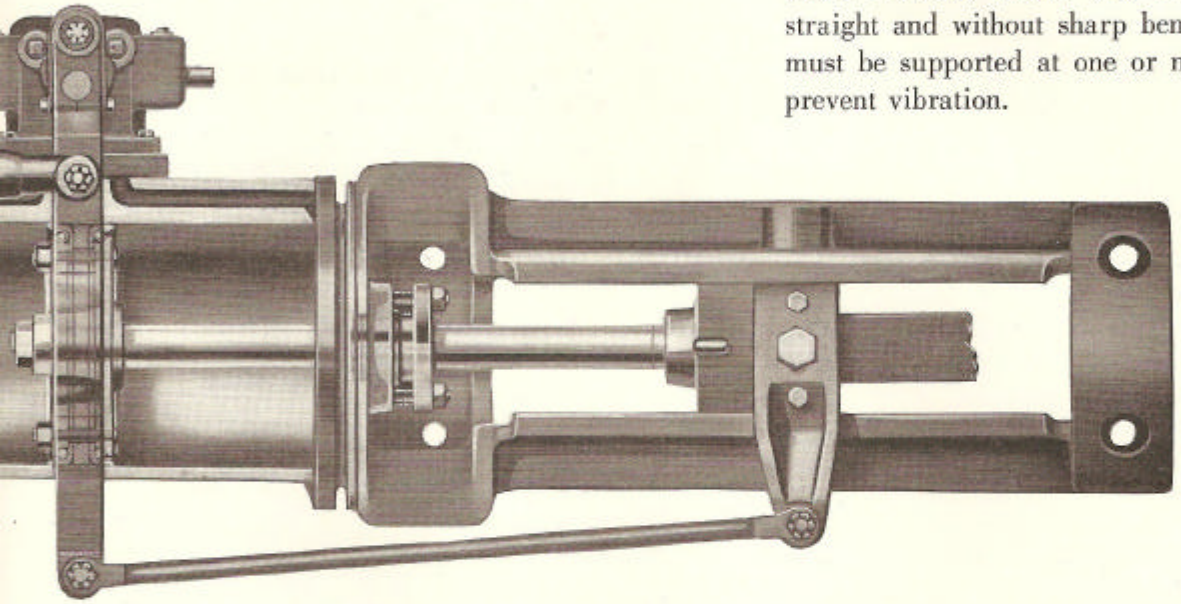
When the valve arm is against the stop, further movement of the reverse lever will result in straining the parts, and should be guarded against.

The pressure supply should never be shut off while the locomotive is moving. If there

is no pressure in the reverse gear cylinder the crosshead may move to a point where damage to the locomotive would result.

## APPLICATION

ALCO Gears should be securely fastened to the boiler shell by a suitable bracket in such a position that the reach rod will be practically in line with the center of the reverse gear crosshead.



When applying gear to locomotive, have Floating Lever and Valve Arm vertical. This will bring Crosshead and Piston in center of their travel. Then apply Reach Rod of proper length between Valve Motion Lift Shaft Arm and Crosshead of Reverse Gear. Next, place Reverse Lever vertical when locomotive is hot (if locomotive is not hot make allowance for expansion). Then connect Reverse Lever to Floating Lever with 1″ extra heavy pipe.

After setting locomotive valves, locate stops on Reverse Lever Quadrant in order to limit movement of Reverse Lever and Crosshead to the amount necessary to provide for the engine valve travel.

Usually the stop must be changed or length of rod adjusted between Reverse Lever and Floating Lever, when Gear is removed from one locomotive and applied to another.

It is very important to have the Rod between Reverse Lever and Floating Lever straight and without sharp bends. This Rod must be supported at one or more places to prevent vibration.

Locate oil cup at an accessible place in the cab.

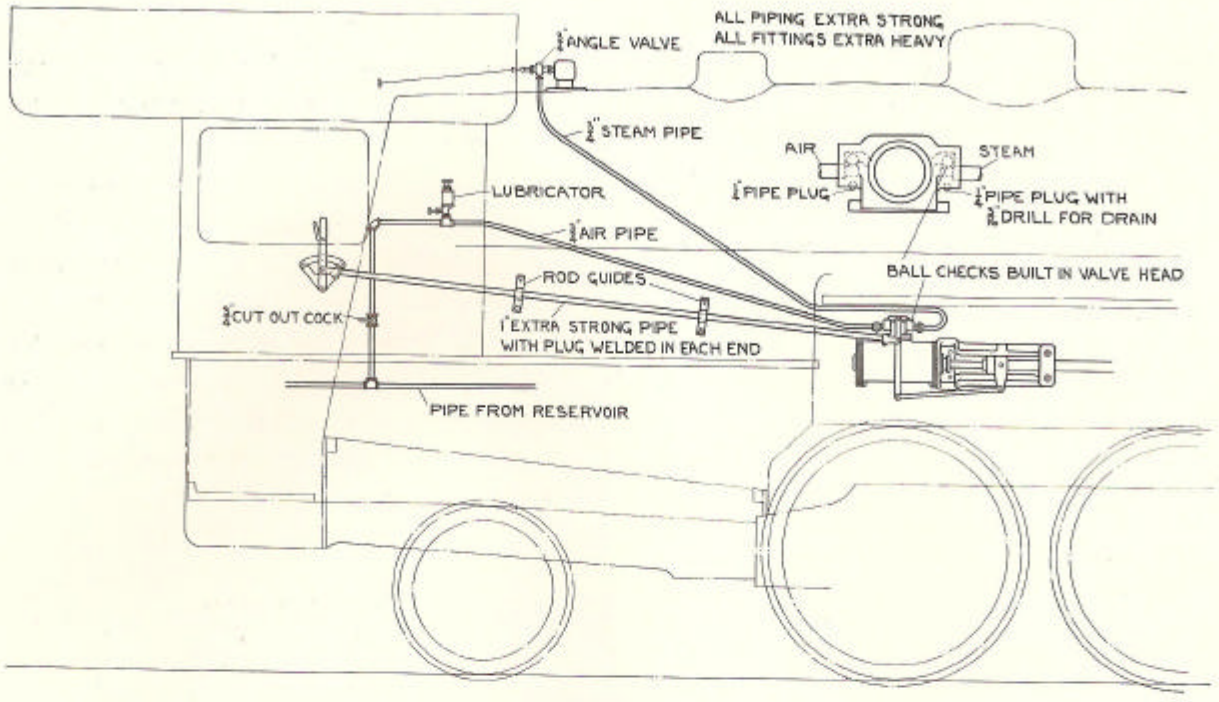
Locate reverse lever in a vertical position convenient for the engineer.

All ALCO Gears should be secured to bracket by 1″ finished bolts.

For piping follow instructions as illustrated on page six.

## LOCATION OF GEAR

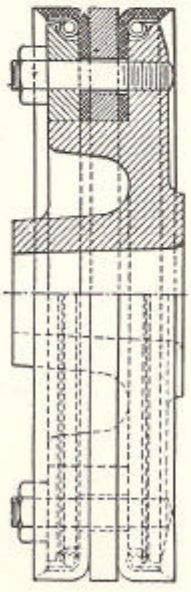
Upon application the American Locomotive Company will submit sketches showing recommended location of gear when elevation and section drawings of the locomotive are available.




PIPING DIAGRAM

To avoid damage to operating valve blow out all scale and dirt from piping before connecting up gear.

Turn air on slowly to avoid damage to reverse lever latch.



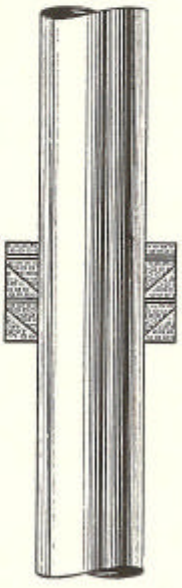
## PISTON PACKING

ALCO Reverse Gears are equipped with cup packing.

The cup packing was developed especially for ALCO gears, and, because of its ease of maintenance and satisfactory operation, has been adopted by the American Locomotive Company as standard for air operated gears.

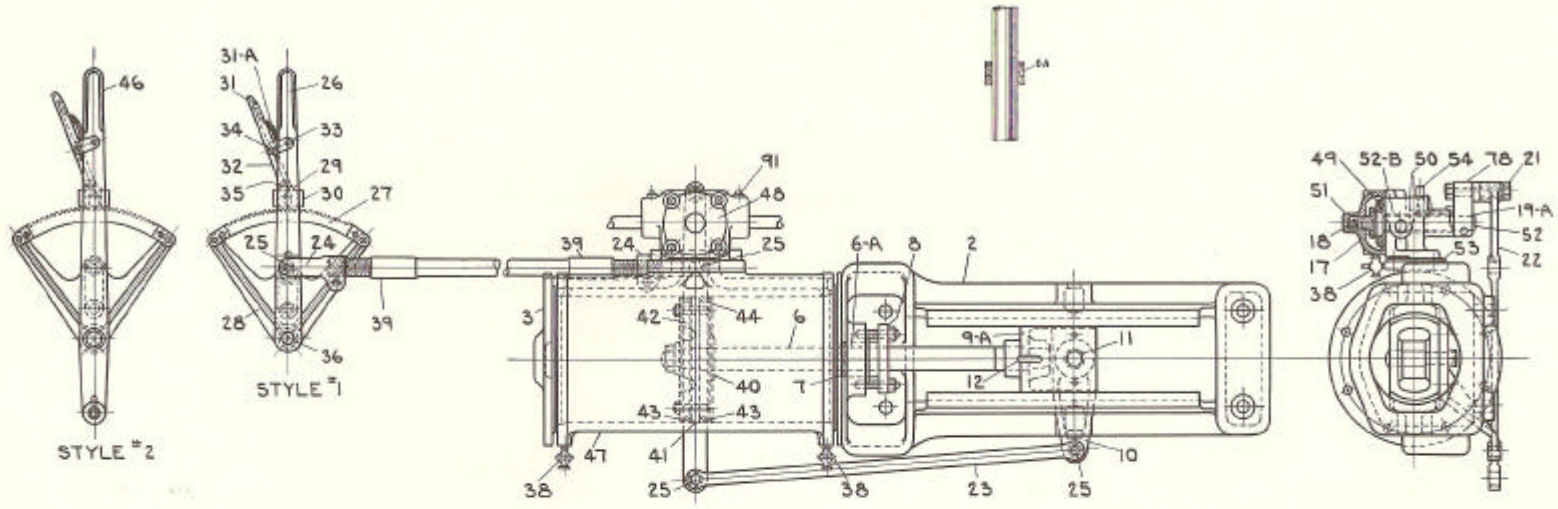
## PISTON ROD PACKING

ALL ALCO Reverse Gears are equipped with Style No. 449S piston rod packing. This packing is a combination of a flat ring and diagonal rings which work on the principle of a ball and socket joint.



SPECIAL GEARS

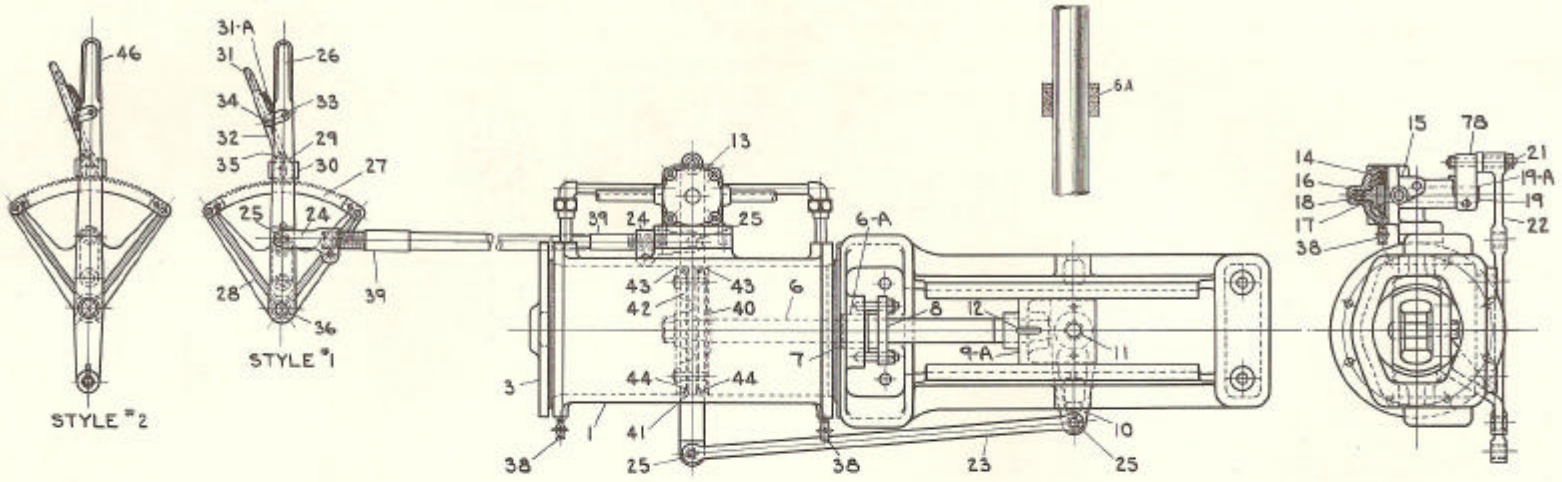
**Information regarding Alco Type "H" Gear with 12" cylinders, steam or special types of gears with cylinder bolting lugs will be furnished upon application.**




## LIST OF PARTS—Type "G" Gear

| Part No. | NAME OF PART | Pieces per Gear |
|---|---|---|
| 2 | Guides and Cylinder Head—Front | 1 |
| 3 | Cylinder Head—Back | 1 |
| 6 | Piston Rod with Nut | 1 |
| 6a | Piston Rod Packing No. 449 S | 1 set |
| 7 | Stuffing Box Ring | 1 |
| 8 | Stuffing Box Gland | 1 |
| 9 | Crosshead—Cast Iron | 1 |
| 9a | Crosshead—Cast Steel | 1 |
| 10 | Crosshead Arm with Bushings | 1 |
| 11 | Crosshead Wrist Pin, Complete with Nut | 1 |
| 12 | Crosshead Key | 1 |
| 17 | Reverse Cylinder Valve Follower | 1 |
| 18 | Reverse Cylinder Valve Spring | 1 |
| 19a | Reverse Cylinder Valve Stem Key | 1 |
| 21 | Reverse Cylinder Valve Arm Pin, Complete with Nuts, Washer and Bushing | 1 |
| 22 | Floating Lever with Bushings | 1 |
| 23 | Floating Lever Rod | 1 |
| 24 | Rod Jaws with Bolt and Nut | 2 |
| 25 | Rod Jaw Pins, Complete with Nuts and Bushings | 4 |
| 26 | Reverse Lever only, Bushings Inserted, Style No. 1 | 1 |
| 26a | Reverse Lever Complete, Style No. 1 (Parts Nos. 26 to 36 Inc., Assembled) | 1 |
| 27 | Reverse Lever Quadrant | 1 |
| 28 | Reverse Lever Quadrant Support | 1 |
| 29 | Reverse Lever Latch | 1 |
| 30 | Reverse Lever Latch Guide | 1 |
| 31 | Reverse Lever Latch Handle | 1 |
| 31a | Spring for Reverse Lever Latch Handle | 1 |
| 32 | Reverse Lever Latch Link | 1 |
| 33 | Reverse Lever Latch Handle Pin | 1 |
| 34 | Reverse Lever Latch Link Pin | 1 |
| 35 | Reverse Lever Latch Pin | 1 |
| 36 | Reverse Lever Fulcrum Pin | 1 |
| 37 | Reverse Gear Oil Cup | 1 |
| 38 | Reverse Gear Drain Cocks | 3 |
| 39 | Rod Ends for Rod to Cab | 2 |
| 40 | Piston Head | 1 |
| 41 | Piston Filler Plate | 1 |
| 42 | Piston Follower | 1 |
| 43 | Piston Packing Cups | 2 |
| 44 | Piston Packing Expander Rings | 2 |
| 46 | Reverse Lever only, Bushings Inserted, Style No. 2 | 1 |
| 46a | Reverse Lever Style No. 2 Complete (Parts Nos. 46 and 27 to 36 Inc., Assembled) | 1 |
| 47 | Cylinder Type G | 1 |
| 48 | Reverse Cylinder Valve Type G Complete with Arm No. 78 (Parts Nos. 49 to 54 inc., 17, 18, 21, 38 and 78—Assembled) | 1 |
| 49 | Reverse Cylinder Valve Only | 1 |
| 50 | Reverse Cylinder Valve Body | 1 |
| 51 | Reverse Cylinder Valve Body Cap | 1 |
| 52 | Reverse Cylinder Valve Stem | 1 |
| 52a | Reverse Cylinder Valve Stem Washer | 1 |
| 52b | Reverse Cylinder Valve Stem Bushing | 2 |
| 53 | Reverse Cylinder Valve Gasket | 1 |
| 54 | Reverse Cylinder Valve Stem Oil Cup | 1 |
| 78 | Reverse Cylinder Valve Arm | 1 |

Repair parts are carried in stock. When ordering, state the type and serial number of gear if possible, also name and number of part. All parts of Types "G" and "E" gears are duplicates where lists show same part number.




## LIST OF PARTS—Type "E" Gear

| Part No. | NAME OF PART | Pieces per Gear |
|---|---|---|
| 1 | Cylinder | 1 |
| 2 | Guides and Cylinder Head—front | 1 |
| 3 | Cylinder Head—back | 1 |
| 6 | Piston Rod with Nut | 1 |
| 6a | Piston Rod Packing No. 449 S | 1 set |
| 7 | Stuffing Box Ring | 1 |
| 8 | Stuffing Box Gland | 1 |
| 9 | Crosshead—Cast Iron | 1 |
| 9a | Crosshead—Cast Steel | 1 |
| 10 | Crosshead Arm with Bushing | 1 |
| 11 | Crosshead Wrist Pin, Complete with Nut | 1 |
| 12 | Crosshead Key | 1 |
| 13 | Reverse Cylinder Valve, Complete with Arm No. 78 (parts Nos. 14 to 21 and 78 assembled) | 1 |
| 14 | Reverse Cylinder Valve—Only | 1 |
| 15 | Reverse Cylinder Valve Body | 1 |
| 16 | Reverse Cylinder Valve Body Cap | 1 |
| 17 | Reverse Cylinder Valve Follower | 1 |
| 18 | Reverse Cylinder Valve Spring | 1 |
| 19 | Reverse Cylinder Valve Stem (Specify Whether Standard or Oversize Desired) | 1 |
| 19a | Reverse Cylinder Valve Stem Key | 1 |
| 21 | Reverse Cylinder Valve Arm Pin, Complete with Nuts, Washer and Bushing | 1 |
| 22 | Floating Lever with Bushings | 1 |
| 23 | Floating Lever Rod | 1 |
| 24 | Rod Jaws, with Bolt and Nut | 2 |
| 25 | Rod Jaw Pins, Complete with Nuts and Bushings | 4 |
| 26 | Reverse Lever only, Bushings Inserted, Style No. 1 | 1 |
| 26a | Reverse Lever Complete, Style No. 1 (parts Nos. 26 to 36 inc., assembled) | 1 |
| 27 | Reverse Lever Quadrant | 1 |
| 28 | Reverse Lever Quadrant Support | 1 |
| 29 | Reverse Lever Latch | 1 |
| 30 | Reverse Lever Latch Guide | 1 |
| 31 | Reverse Lever Latch Handle | 1 |
| 31a | Spring for Reverse Lever Latch Handle | 1 |
| 32 | Reverse Lever Latch Link | 1 |
| 33 | Reverse Lever Latch Handle Pin | 1 |
| 34 | Reverse Lever Latch Link Pin | 1 |
| 35 | Reverse Lever Latch Pin | 1 |
| 36 | Reverse Lever Fulcrum Pin | 1 |
| 37 | Reverse Gear Oil Cup | 1 |
| 38 | Reverse Gear Drain Cocks | 3 |
| 39 | Rod Ends for Rod to Cab | 2 |
| 40 | Piston Head | 1 |
| 41 | Piston Filler Plate | 1 |
| 42 | Piston Follower | 1 |
| 43 | Piston Packing Cups | 2 |
| 44 | Piston Packing Expander Rings | 2 |
| 46 | Reverse Lever Only, Bushings Inserted, Style No. 2 | 1 |
| 46a | Reverse Lever Style No. 2 Complete (parts Nos. 46 and 27 to 36 inc., assembled) | 1 |
| 78 | Reverse Cylinder Valve Arm | 1 |

Repair parts are carried in stock. When ordering, state the type and serial number of gear if possible, also name and number of part. All parts of Types "G" and "E" gears are duplicates where lists show same part number.