

WESTINGHOUSE TRACTION BRAKE COMPANY

PITTSBURGH, PA.

Descriptive Leaflet
No. 2455
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SA-2, M-35, MD-35, MA-35 and M-36 Self-Lapping Brake Valves

THE term "self-lapping" describes a class of brake valve which automatically laps off the flow of air when the brake cylinder pressure builds up to a pressure corresponding to brake valve handle position. Service position embraces approximately a 90° arc of handle movement from full release to full service position and brake cylinder pressure obtainable varies directly with the distance the handle is moved through this arc. No "fanning" of the brake valve handle is required as the lapping function is an automatic feature. If lower cylinder pressure is desired, the handle is moved to the left; if greater, to the right—the cylinder pressure immediately falls or rises an amount corresponding to the movement.

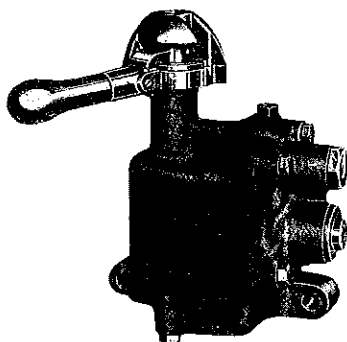


Fig. 1 SA-2 Self-Lapping Brake Valve—Straight Air Service

Three types of self-lapping brake valves are available: the SA-2 for simple straight air brake equipment, the M-36 for semi-automatic equipment with emergency feature, and the M-35 with door control for Safety Car Control Equipment; the latter, when provided with selector valve for selective door control, is designated the MD-35; and when selector valve also provides control for treadle operated center exit door, the designation is MA-35.

As will be noted from the illustrations the self-lapping portion is identical for all three classes of brake valve. This portion has high capacity of air flow, making it possible, under certain conditions, to obtain application and release times approximating those had with the E Relay Valve. The self-lapping portion of the brake valve is very sensitive to slight changes of handle position and the relay valve immediately responds to slight variations in the straight air pipe, this combination permitting very accurate control of brake cylinder pressure.

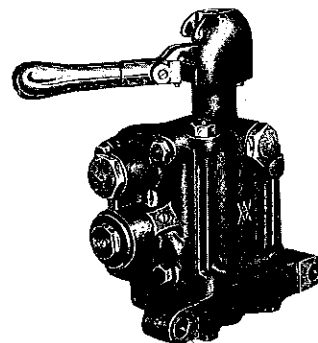


Fig. 2 M-36 Self-Lapping Brake Valve Semi-Automatic Service

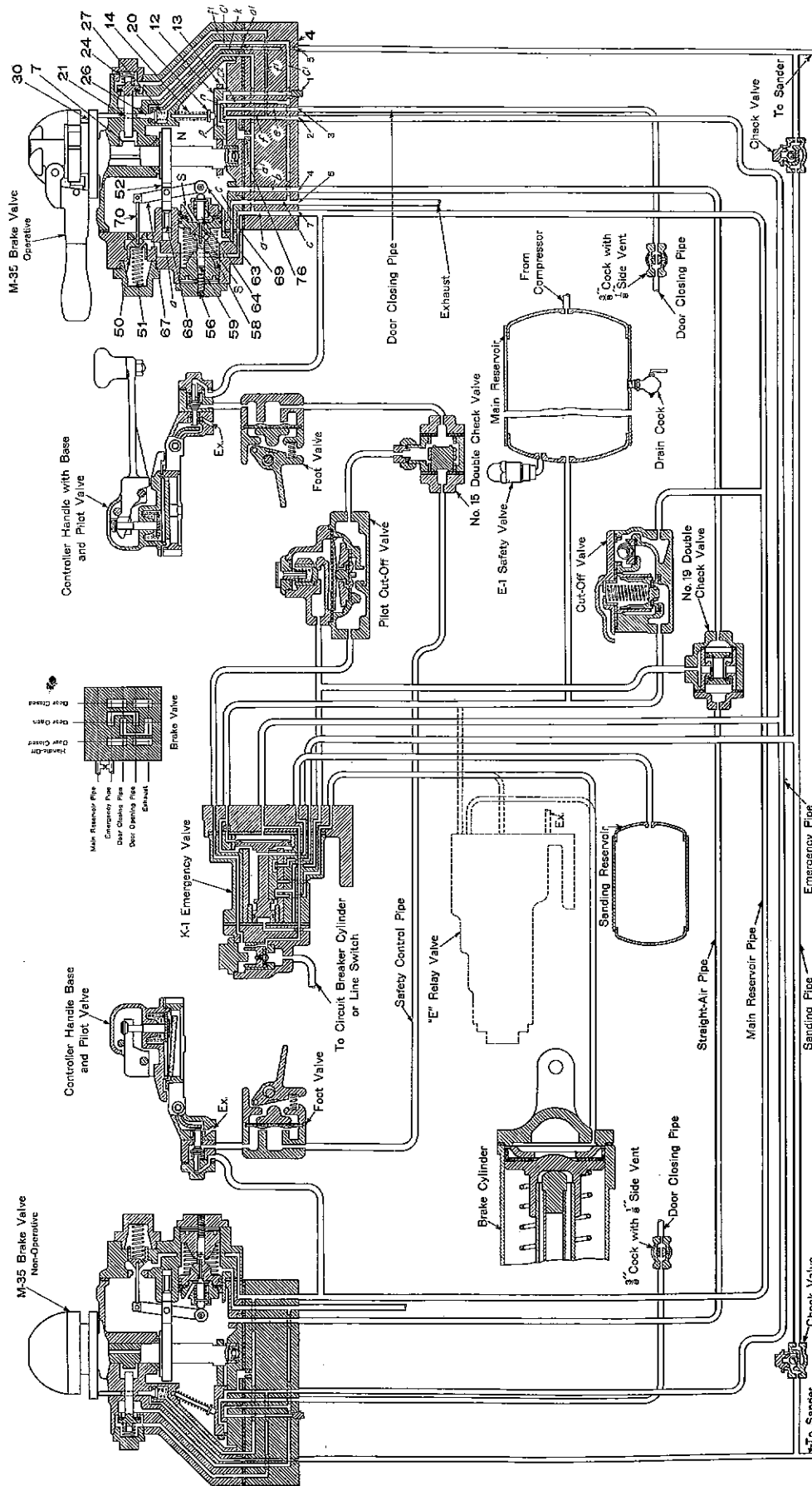


Fig. 3 Diagrammatic View of Safety Car Control Equipment with M-35 Self-Lapping Brake Valve

Operation of Self-Lapping Portion M-35 Brake Valve

Fig. 3

The operative end of Fig. 3 shows the M-35 brake valve in release, the non-operative end in handle off position. A cam is mounted on handle shaft 7 and a cam dog 52 (Section A-A Fig. 5) is interposed between the cam and the pusher pin 68. A balance lever 67 is pivoted on the pusher pin 68, its lower end carrying a roller 69 in contact with exhaust valve 64, and its upper end carrying push rod 70 which is in contact with inlet valve 50.

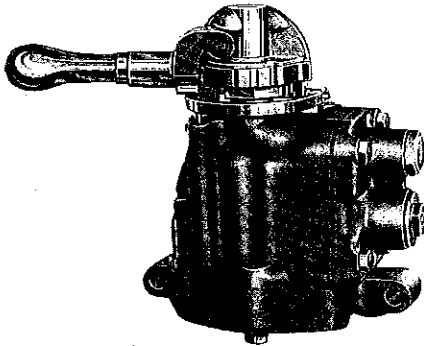


Fig. 4
M-35 Self-Lapping
Brake Valve for Safety
Car Control
Equipment

Exhaust valve 64 is held unseated by spring 63 thereby opening the straight air pipe to atmosphere through passage b in the bracket, cavity N within the brake valve body, through ports S in the exhaust valve seat to passage c, leading to the exhaust. Spring 51 seats the inlet valve and spring 58 holds the piston 59 in release. The piston is equipped with a felt packing 60 which lubricates the cylinder, and a packing cup 61 which seals the application and exhaust sides of the piston from each other.

When the brake valve handle is moved to application position the cam forces the dog 52 and pusher 68 outward. The latter carries the balance lever 67 and, since inlet valve spring 51 is heavier than exhaust valve spring 63, the lever fulcrums at its upper end, the roller 69 on the bottom end being

tilted against the exhaust valve 64 which is forced to its seat, closing the straight air pipe off from the exhaust. Closing of the exhaust as described, occurs quickly, leaving the lever fulcrumed at the bottom end since piston spring 58 is heavy and resists any movement beyond that necessary to close the exhaust valve. With the balance lever now fulcrumed on the exhaust valve further handle movement forces the inlet valve 50 open, allowing main reservoir pressure to flow from passage a into cavity N thence to the straight air pipe.

As pressure builds up on the face of piston 59, the latter is moved to a new position, compressing spring 58 an amount equivalent to the application. Exhaust valve 64 moves with the piston and lever 67 likewise follows the movement, maintaining its contact on the exhaust valve and holding the latter seated while the upper arm of the lever is tilted back allowing spring 51 to seat inlet valve 50, closing off the supply. This leaves the lever balanced as at the first movement of the handle. Should higher pressure be necessary a further movement of the handle will again upset this balance and cause a repetition of the piston movement to again balance the lever at the higher pressure; if lower pressure is desired the handle is moved to the left, thereby moving the cam away from the pusher 68 and relieving the pressure on the lever. Exhaust valve spring 63 then unseats the exhaust valve, allowing pressure from the straight air pipe or brake cylinder to flow to the atmosphere. As the pressure is reduced in cavity N the piston spring 58 forces the piston back, carrying exhaust valve 64 into contact with roller 69 which again fulcrums against the valve, seating it and closing off exhaust. Full re-

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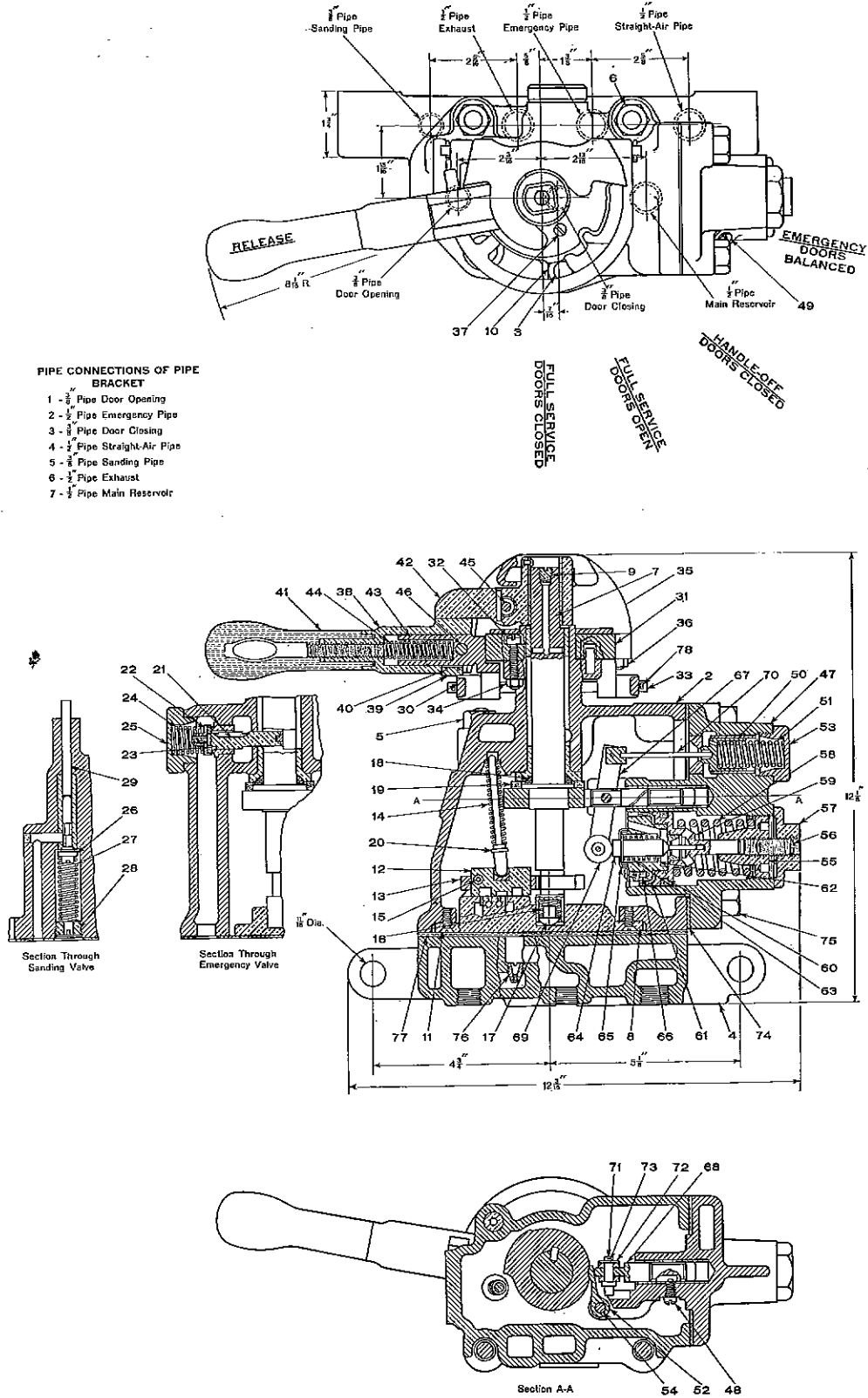


Fig. 5 M-35 Self-Lapping Brake Valve, Assembly

Operation of Self-Lapping Portion

(Continued)

lease removes all cam pressure from the balance lever and effects complete release of straight air pressure.

It will be noted that the only force exerted through the brake valve handle is that required to upset beam balance. There are no comparatively large frictional pressure areas operating directly against handle movements as in a rotary type brake valve. The brake valve, therefore, is very sensitive in all handle positions making it possible to control cylinder pressure to an accurate degree.

FULL SERVICE (DOORS CLOSED) position provides full service brake cylinder pressure in accordance with the value of the regulating spring 58. Two springs are available, one with maximum value of 50 pounds, the other 65 pounds, whichever local conditions require. Adjustment of the spring to the setting is obtained by turning in or backing off adjusting nut 55.

FULL SERVICE (DOORS OPEN). When the handle is moved over to this position, a second cam at the base of the stem engages a pusher 13 which carries slide valve 12 to door open position in which cavity p connects passage e to the exhaust, removing pressure from the door closing pipe, allowing the door engine (differential type) to open the doors.

HANDLE OFF (DOORS CLOSED). In this position the cam has an abrupt lift (See Section A-A Fig. 5) which forces the inlet valve 50 wide open, introducing full main reservoir pressure to the brake cylinder. This position is shown at the non-operative end, Fig. 3. Piston 59 has reached its maximum travel with its stem hitting adjusting screw 56, creating a positive fulcrum at the lower end of the beam so that the abrupt lift of the cam forces the inlet valve wide open. Maximum main reservoir pressure thus resulting in the straight air pipe on the non-operative end of a double end car ensures that the No. 19 Double Check Valve (Fig. 3) will remain closed, leaving the operative end in complete control at all times.

The pusher returns the slide valve 12 to door closed position in which cavity p connects passages f and e, introducing emergency pipe pressure to the door closing pipe which causes the doors to close.

EMERGENCY position is at the extreme right, bringing a cam on the upper end of the handle shaft into engagement with emergency valve stem 21 which is unseated, venting the emergency pipe from passage f1 to atmosphere through passage c1 to cause an emergency application of the emergency valve. This also removes emergency pipe pressure from the door closing pipe, balancing the doors so that they may be pushed open by hand.

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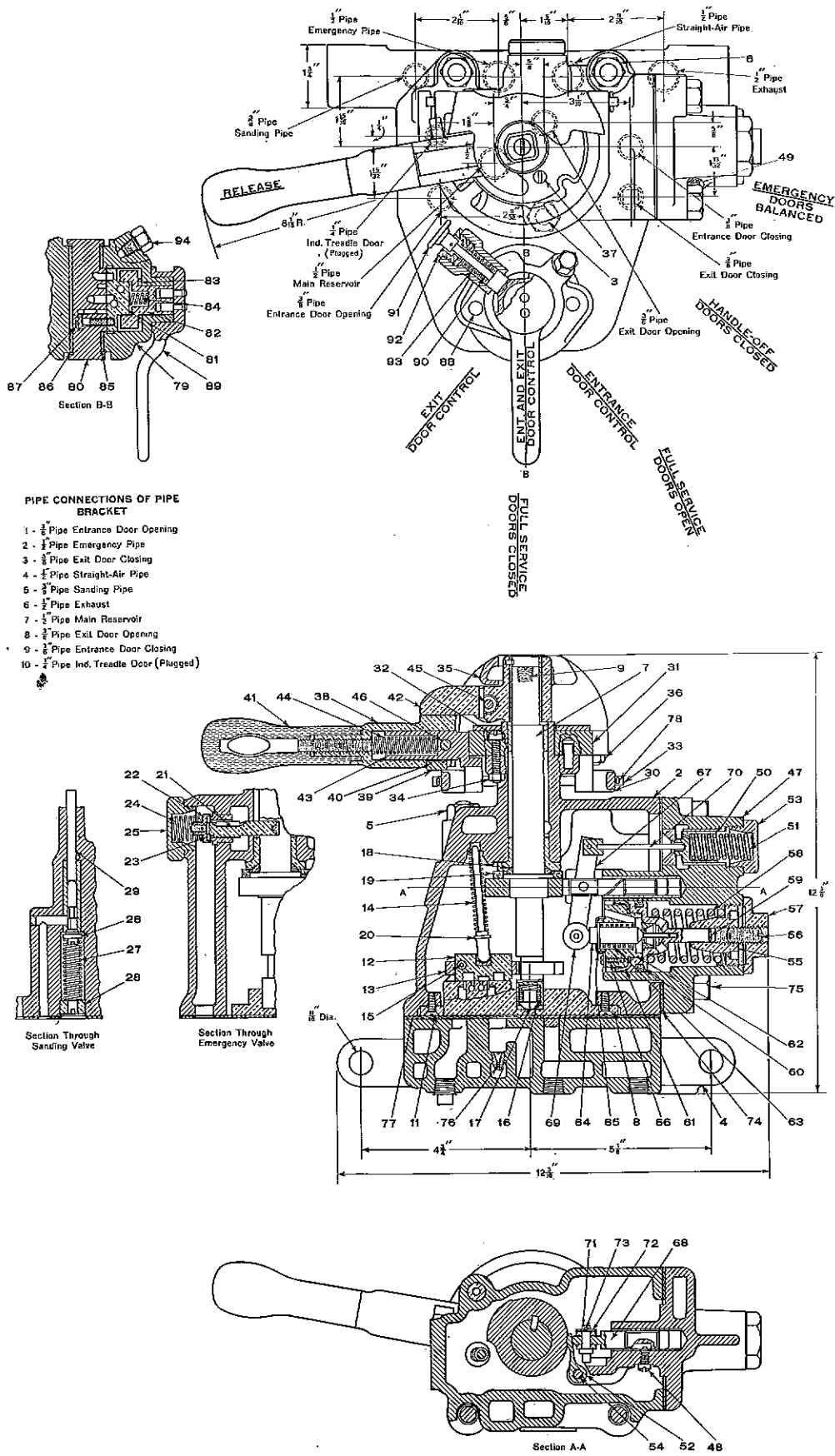


Fig. 6 MD-35 Self-Lapping Brake Valve, Assembly

MD-35 Self-Lapping Brake Valve

This brake valve, Fig. 6, is the same as the M-35 with the addition of a selector valve by which it is possible to control separate entrance and exit doors independently of each other or together as circumstances may demand.

With the selector valve, movement of the brake valve handle does not directly control door movements. This is done by the selector valve. The operator leaves the selector valve handle in the desired position, depending on whether he wishes to open both doors or either independently of the other, and then moves the brake valve handle to Full Service (Doors Open) position.

There are three selector valve handle positions: left to right Fig. 6, Exit Door Control, Entrance and Exit Door Control, and Entrance Door Control. As long as the brake valve handle is in Release, Handle Off, or any Service (Doors Closed) position emergency pipe pressure is passed through cavity p in the slide valve 12 to passage g, thence to the selector valve rotary through which it is introduced to both entrance and exit door closing pipes in all three positions of the selector valve handle; therefore, both doors are held closed.

In Full Service (Doors Open) position of the brake valve handle slide valve 12 is moved so that cavity p connects passage g to passage c2; if the selector valve handle is in middle position the rotary valve is in the position shown by Fig. 7, cavity h connecting the exit and entrance door closing pipes to exhaust through passage g to cavity p, c2, c1 and c and both doors are, therefore, opened; if the selector valve is in first position, the rotary will connect the exit door closing pipe to the brake valve exhaust, opening the exit door, and maintain connection between emergency pipe to the entrance door closing pipe to keep entrance

door closed; if the selector valve handle is in third position just the opposite action takes place, the rotary valve connecting the entrance door closing pipe to atmosphere, opening the entrance door, and maintaining emergency pipe pressure to the exit door closing pipe to keep the exit door closed.

To close all doors at the same time the brake valve handle is moved back to Full Service (Doors Closed) position. When the brake valve handle is moved to Emergency position all pressure is removed from the emergency pipe and consequently from the door closing pipes, regardless of selector position and from the separate differential feed pipe to door engines, maintained from emergency pipe. This leaves the doors balanced, permitting easy opening by hand.

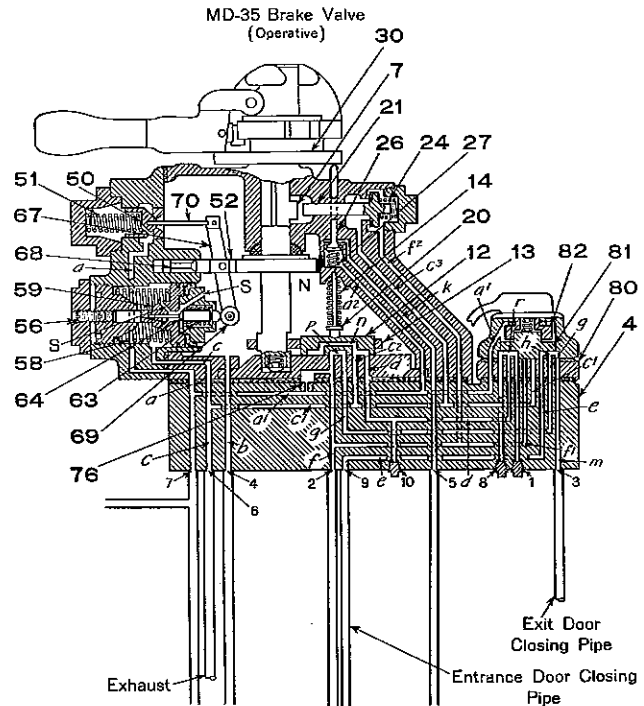


Fig. 7 Diagrammatic View of MD-35 Self-Lapping Brake Valve
(Brake Valve Handle in Release (Doors Closed) and Selector Valve Handle in Entrance and Exit Door Control Position)

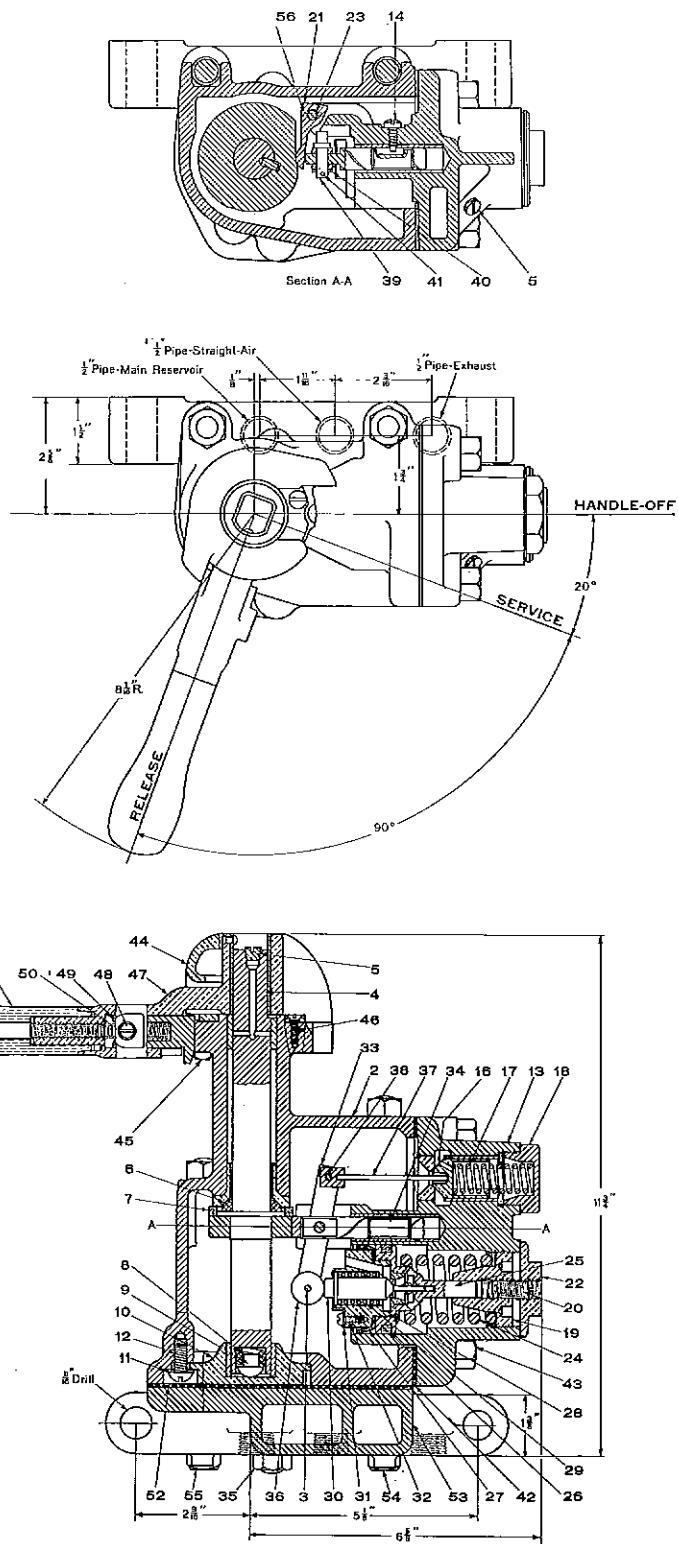


Fig. 8 SA-2 Self-Lapping Brake Valve, Assembly

MA-35 Self-Lapping Brake Valve

This brake valve is the same as the MD-35 previously described except that the selector valve has a fourth handle position, LAP, in which a treadle operated center exit door is controlled. This extra position is located at the extreme right of the quadrant beyond Entrance Door Control position. Referring to Fig. 7, the connection to exit treadle door is made at pipe connection No. 10; in all Doors Closed positions of the brake valve handle cavity n in slide valve 12 connects treadle pipe 10 to brake valve exhaust and the treadle door is inoperative; in Full Service (Doors Open) position the slide valve is moved, cavity n then connecting emergency pipe pressure through passages f and d to the treadle pipe and the treadle door becomes operative regardless of selector handle position. If it is desired to operate the treadle door independently of the front doors the selector valve handle is left in LAP position in which the rotary valve maintains emergency pipe connection to both front door closing pipes, keeping front entrance and exit doors closed so that when the brake valve handle is moved to Full Service (Doors Open) position the treadle exit door alone will open.



SA-2 Self-Lapping Brake Valve

This brake valve, Fig. 8, is a simple straight air brake valve without the door control and emergency features as described for the M-35. The self-lapping operation is identical with that of the M-35. It has three handle positions, Release, Service and Handle Off.

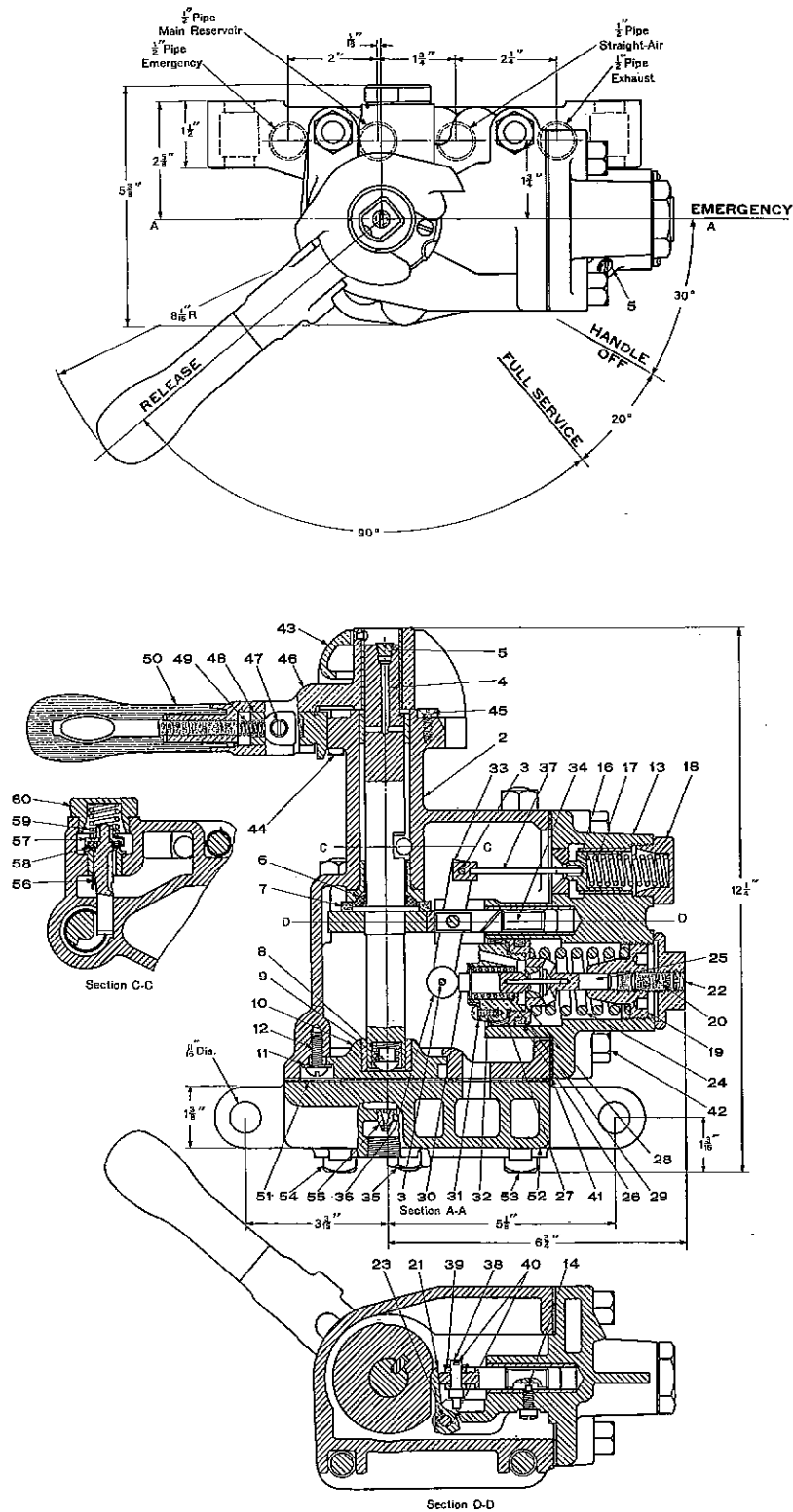


Fig. 9 M-36 Self-Lapping Brake Valve, Assembly

M-36 Self-Lapping Brake Valve

The M-36, Fig. 9, is a semi-automatic self-lapping brake valve having four handle positions, Release, Service, Handle Off, and Emergency. It is like the SA-2 with the addition of the emergency poppet valve 56 which is operated in Emergency position to produce emergency application just as described for the M-35. The self-lapping portion is identical with that described for the M-35.

Lubrication of Self-Lapping Brake Valves

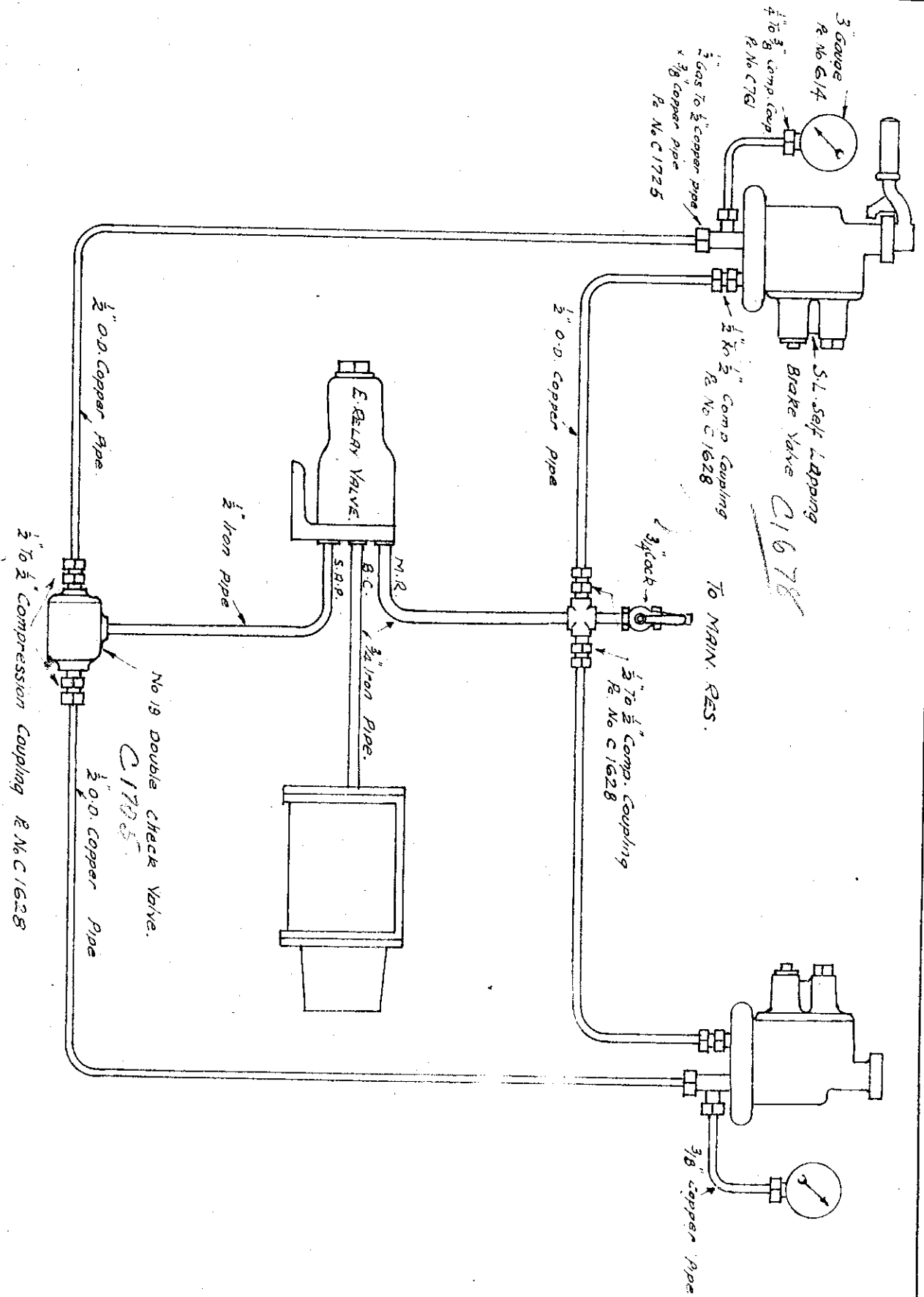
Brake valves should be lubricated at regular car inspection periods. The air should be exhausted from the valve. The oil plugs (See Fig. 5), 9 of the oil way in the handle shaft, and 49 of the oil port in the self-lapping portion which leads to the oil retainer 60, should be removed and the passages filled with a good grade of anti-friction oil, following which the oil plugs should be securely replaced. The same procedure should be followed for the oil plug 94 which lubricates the rotary valve selector valve of the MD-35 brake valve (Fig. 6).

At regular intervals the brake valve should be dismantled, cleaned and lubricated as follows:

Packing cup 61 lubricated with standard graphite grease.

Slide valve 12, its face and seat, lubricated with a high grade of very fine, dry, pure graphite, rubbing it in until the slide valve and seat show a dark copper color and leaving no free graphite on face or seat.

On the MD-35, the selector rotary lubricated with graphite grease, sparingly applied.



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PIPING DIAGRAM OF STRAIGHT AIR BRAKE EQUIP'T WITH S.L. SELF LAPPING BRAKE VALVE.

Westinghouse Traction Brake Company

Pittsburgh, Pa., U. S. A.

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