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Instruction Pamphlet No. T 5008

Piping
for
Traction Brake
Equipments

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Piping.

STRAIGHT-AIR BRAKE EQUIPMENT.

The system of piping, as illustrated in Fig. 2, Instruction Pamphlet No. T 5001, may be divided into four parts, viz.:

(a) The Supply Pipe, which conveys the compressed air from the compressor to the reservoir.

(b) The Reservoir Pipe, which is simply a continuation of the reservoir up to the operating valves.

(c) The Train Pipe, which conveys the air pressure to the brake cylinders during an application of the brakes, and from the brake cylinders to the atmosphere during release.

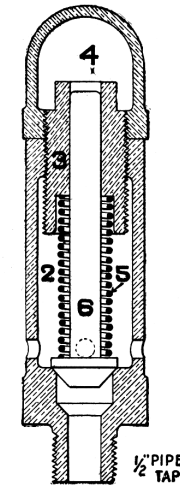
(d) The Governor Pipe, which keeps reservoir pressure supplied to the pressure chamber of the governor.

The Supply Pipe connects the discharge opening of the compressor to the reservoir, and is always under reservoir pressure. In this pipe, at a point about two feet from the compressor, is placed a short length of hose to provide a flexible connection between the piping which is rigidly secured to the car, and the compressor which is subject to more or less vibration. This hose should be inclined as much as practicable that the oil discharged by the compressor may not be pocketed in it.

The Reservoir Pipe connects the reservoir with the operating valves and is also always under reservoir pressure. In it at a point near the reservoir is the Safety Valve, described later, which is set for a pressure slightly higher than that at which the governor is set to stop the compressor. Thus, if for any reason, the governor should fail to act, the pressure in the brake system may not be

(3)

FIGURE 1.



SAFETY VALVE.

(4)

come excessive. In this pipe, cut-out cocks should also be placed where convenient of access, by means of which the reservoir may be cut off from the operating valves whenever it is necessary to examine or remove the latter.

The Train Pipe connects the operating valves to the brake cylinder. In this pipe, near the brake cylinder, a union should be connected. This union should be placed to one side of the cylinder, so that when the head is removed the piping will not obstruct the withdrawing of the piston. In cases where trailer cars are to be used, the train pipe has, at each end of the car, a cut-out cock and flexible hose coupling of the standard Westinghouse type, so that when reservoir pressure is admitted to the train pipe, it will be conveyed to both motor-car and trailer cylinders. These couplings are interchangeable with those used on steam railroads, unless a smaller size is specially ordered.

The Governor Pipe connects the reservoir to the compressor governor. In it, near the governor, is an insulating joint which effectively insulates the governor from the piping that might be grounded. A cut-out cock is also provided that the governor may be examined or removed without loss of air pressure, there being a union between them.

The exhaust port of the operating valve is connected by a pipe leading through the vestibule floor to an Exhaust Muffler underneath the platform. This muffler is a cylindrical chamber having a diameter several times that of the pipe, thereby forming a sudden enlargement of the passage, which dissipates the exhaust pressure and muffles the sound as the air escapes to the atmosphere.

Safety Valve.

The safety valve has a conical valve 6 (Fig. 1) held to its seat by a spring 5, the tension of which is adjusted by the regulating nut 3. When the pressure below the valve exceeds the force with which the spring holds it on its seat, it is raised and air escapes to the atmosphere through the holes in the spring case. This escape to the atmosphere will continue until the pressure in the piping system is reduced to an amount which will allow the spring to reseat the valve.

Installation of Piping.

STRAIGHT-AIR BRAKE EQUIPMENT.

The train pipe connecting the brake cylinder with the operating valves should be standard $\frac{1}{2}$ " pipe, unless very long, due to the use of trailers, when it should be $\frac{3}{4}$ ". For reservoir pipes, in most cases $\frac{1}{2}$ " is large enough, although, when convenient, it is best to use $\frac{3}{4}$ " to reduce friction, insure prompt action, and increase the reservoir volume. Use $\frac{3}{8}$ " pipe for pump governor and whistle connections. All piping should be so arranged that there are no sags or pockets in which moisture may collect.

Wherever possible use long beds in the pipe rather than elbows. The friction due to a $\frac{1}{2}$ " elbow, with radius equal to five-eighths of its diameter, is equal to 4 feet of straight pipe. All pipe so bent must, however, be thoroughly blown out by steam or compressed air before it is put in place. The joints should be threaded with sharp dies and made up with either shellac or Japan varnish, putting it on the male thread only; never inside of the fittings. We do not recommend the use of red or white lead. If proper care is used, the piping is easily made bottle tight.

When all the piping has been completed, the maximum pressure should be pumped up in the reservoir with the operating-valve handles at the release position. The cocks in the reservoir pipe at the operating valves and governor should then be closed and the pipe disconnected at these points. The reservoir pipe should then be thoroughly blown out by opening these cocks, the piping having been previously sprung to one side to give free exit to the air. It would be well to exhaust a full tank of air through each one of these cocks. These joints should then be reconnected and the above cocks opened, while the pipe leading to the brake cylinder should be disconnected at the union placed near the cylinder. With both operating valve handles in release position, full pressure should be pumped up in the reservoir and discharged through this disconnected union by applying the brake in full emergency at *both operating valves simultaneously*. If only one valve were open at a time, chips might readily blow past the orifice of the branch leading to the brake cylinder and consequently not be discharged from the pipe. Having blown out the piping, pump up full pressure throughout the system and test every joint by applying soap suds. When all leaks have been stopped the piping must be securely clamped to the car to avoid vibration.

THE SAFETY VALVE should be screwed into a Tee in the reservoir line leading to the operating valve at a point near the reservoir. It must be placed vertically, and should not open until a pressure has been attained that is 10 pounds above that at which the governor should cut the compressor out of action.

Piping.

AUTOMATIC AIR BRAKE EQUIPMENT.

The system of piping as illustrated in Fig. 1, Instruction Pamphlet T. 5010, gives the general arrangement as applied to this equipment, and is seen at a glance to differ very slightly from that for the Straight Air Brake Equipment, and may be divided into the same four parts.

The Supply Pipe connects the discharge opening of the compressor to the main reservoir, and should have installed in it about two feet from the compressor the short length of hose provided as a flexible connection between the compressor and reservoir.

The Reservoir Pipe connects the main reservoir with the brake valves, and is otherwise exactly similar to the equipment for the Straight Air; it should have cut-out cocks placed in it, by means of which the reservoir may be cut off from the brake valves whenever it is necessary to examine or remove the latter.

The Train Pipe, although connecting the brake valves to the brake cylinder, does so under somewhat different conditions, inasmuch as the train pipe in this equipment is usually under pressure. This pipe does not connect directly with the brake cylinder, but makes connection with the bottom part of the triple valve, and through it connects with either the brake cylinder or the auxiliary reservoir, depending on the position of the triple valve. As this equipment is generally applied to trains of two or more cars, it is almost always accompanied with flexible hose couplings for the train pipe at each end of the car for coupling up to other cars in a train.

The Governor Pipe connects the main reservoir to the compressor governor, and in it near the governor

should be placed an insulating joint and a cut-out cock with union, the former to insulate the governor from any part of the piping that might be grounded, and the latter to provide a means for examining or removing the governor without loss of pressure.

The exhaust opening of the brake valve should be connected by a pipe through the vestibule floor to an exhaust muffler underneath the platform. The muffler used is identical with that described in the Straight-Air Apparatus.

When a safety valve is used, it is applied to the piping in exactly the same manner and position as indicated above for the Straight-Air Apparatus, but relative to the main reservoir.

Installation of Piping.

AUTOMATIC BRAKE EQUIPMENT.

The train pipe connecting the triple valve with the brake valve is usually $\frac{3}{4}$ " standard pipe, although when the car is used with trains of considerable length it is advisable that it should be 1" pipe. The reservoir pipe is also usually $\frac{3}{4}$ ", but when convenient we also recommend the use of 1" pipe to reduce friction, insure prompt action and increase the reservoir volume. For governor pipe and whistle connections use $\frac{3}{8}$ " standard pipe. All piping should be arranged so that there are no sags or pockets in which moisture may collect. The same care should be used in installing the piping as indicated in what was said above concerning the Straight Air Equipment.

If a Conductor's Valve is used, it should be placed on the end of the car inside, and high enough to be unnoticed by the passengers, but within reach of the conductor in case of emergency. It is a good plan to run

a special colored cord from the handle of this valve to each platform and so placed that it cannot be mistaken for the signal, or bell cord, and that the conductor can reach it from any point of the car. The $\frac{3}{4}$ " pipe to this valve should connect with the train pipe at its nearest point.

We also recommend a thorough cleaning and testing of the pipes after installation, as mentioned on page 6.

Axle-Driven Compressor Equipments.

The general directions given before in this pamphlet will apply to these equipments with equal force. It will only be necessary to modify the arrangement to include the different style of compressor. In this case the reservoir pipe is very short and made up, as a rule, in large part, by a flexible hose connection, as the compressor is located on the truck and the reservoir is generally fastened to the car framing.

The Regulator Pipe must, for the same reason, also have a flexible connection between the compressor and the regulator, otherwise the arrangement and method of installing the piping is practically the same, and no further description or instructions will be necessary.

Storage Air Brake Equipment.

The modifications of the piping necessary to adapt it to a Storage Air Brake System are as follows:

First, a high-pressure supply pipe, having charging-coupling fitting on each side of the car, should connect these two fittings together and to one of the two storage reservoirs. The two storage reservoirs should be connected together in series in such a manner that the air has to pass through both before reaching the brake sys-

tem, therefore the high-pressure supply pipe should enter one end of the first storage reservoir; the opposite end of this storage reservoir, and the similar end of the second storage reservoir should be connected by piping of the same size. The remaining end of the second storage reservoir should be connected directly to the reducing valve, which should be placed so as to feed the air directly into the service reservoir.

The reservoir pipe connects the service reservoir with the operating valve, and in it, near the service reservoir, should be placed the safety valve, which should be set to open at 10 pounds above the pressure to which the reducing valve is adjusted.

The train pipe is the same as in the ordinary Straight Air Brake Apparatus.

The governor pipe is replaced in this set by the high-pressure gauge pipe, which connects the second storage reservoir with a high-pressure gauge placed near the operating valves in full view of the motorman.

The high-pressure supply pipe is usually 1", also the pipe connecting the storage reservoirs and that connecting the second storage reservoirs with the reducing valve. The reservoir pipe and train pipe are usually standard $\frac{1}{2}$ " pipe, and the high-pressure gauge pipe $\frac{3}{8}$ " standard pipe.

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