

General Electric Company

Schenectady, N.Y.

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COMBINED STRAIGHT AND AUTOMATIC AIR BRAKE EQUIPMENT

The combined straight and automatic air brake equipment has been generally adopted as standard for high speed interurban cars which are operated part of the time singly and part of the time in trains.

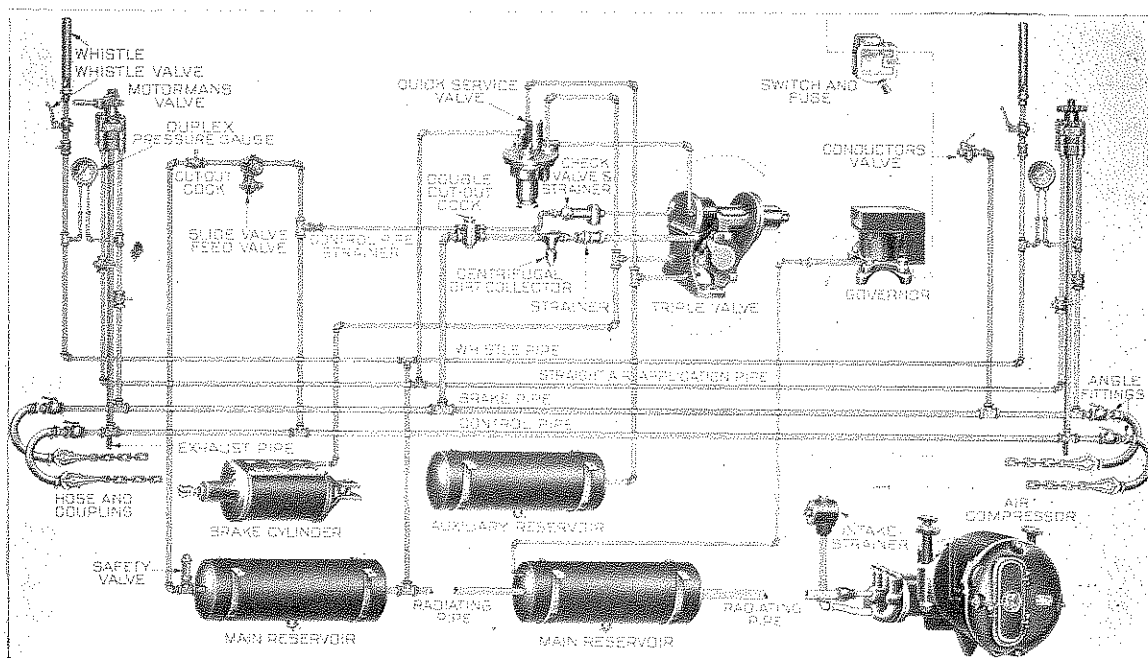
This type of equipment is frequently used on light electric locomotives.

Pressure Regulating Equipment

- Air compressor governor
- Insulating connection
- Feed valve mounted on bracket
- Safety valve

Cab Equipment

- Motorman's valves



PIPING DIAGRAM OF AIR BRAKE EQUIPMENT

The straight air feature provides the necessary flexibility for handling single cars, and the automatic feature provides the necessary degree of safety for train operation.

The following apparatus constitutes a complete equipment for a double end motor car:

Compressor and Auxiliaries

- Motor-driven air compressor
- Intake strainer
- Suspension set

- Motorman's valve handle
- Duplex pressure gauges
- 3/4-in. cutout cocks
- 1/2-in. by 3/8-in. 3-way cocks
- Combined switch and fuse

Brake Details

- Brake cylinder complete with push rod
- Auxiliary reservoir
- Reservoir hangers
- Drain cock
- Triple valve (variable release type)

NOTE.—Data subject to change without notice.
* Supersedes Bulletin No. A-4127.
Class No. 11.

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- Triple valve bracket and gasket
- Quick service valve
- Conductor's valve

Brake Pipe Attachments

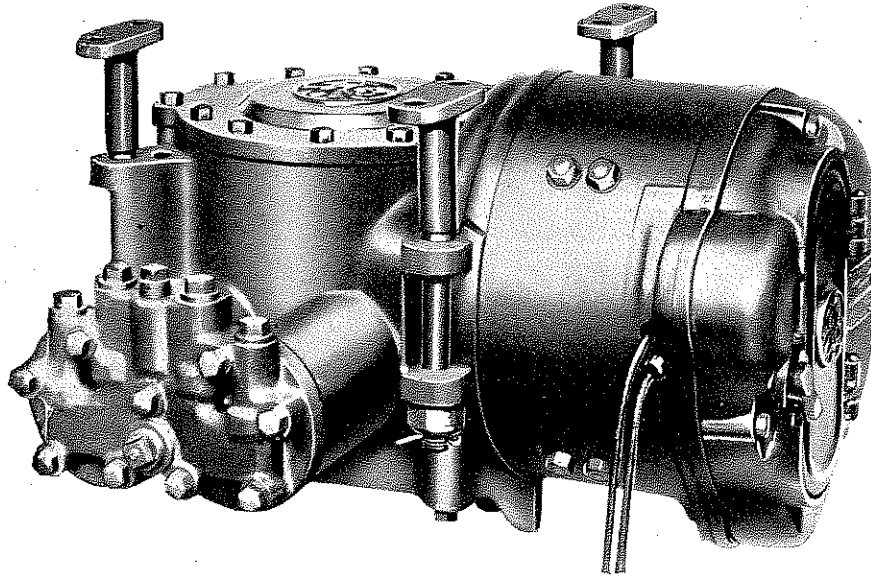
- Centrifugal dirt collector
- Branch pipe strainer
- 1-in. cutout cocks
- 1-in. angle fittings
- 1-in. hose and couplings
- Dummy couplings

Control Pipe Attachments

- Control pipe strainer

pipes. From this diagram it will be noted that two pipe lines are connected between the cars by the usual hose and couplings, thus making them continuous throughout the train.

These pipes (brake pipe and control pipe) provide a means for operating the automatic part of the equipment. A third pipe line (straight air application pipe) connects together the motorman's valves and quick service valve and provides for the straight air operation of the equipment.



AIR COMPRESSOR

- Double cutout cock
- Combined check valve and strainer
- 3/4-in. cutout cocks
- 3/4-in. angle fittings
- 3/4-in. hose and couplings
- Dummy couplings

Main Reservoir and Accessories

- Main reservoirs
- Reservoir hangers
- Drain cocks
- Cutout cock

Whistle Equipment

- Deep tone whistles
- Whistle valves
- Cutout cocks

The piping diagram on page 1 shows the arrangement of the apparatus and connecting

AIR COMPRESSOR

The compressor is of the enclosed type and all parts are thoroughly protected from dust and water, and, therefore, no external enclosing box or other covering is needed. It has duplex horizontal cylinders and herring-bone gear drive.

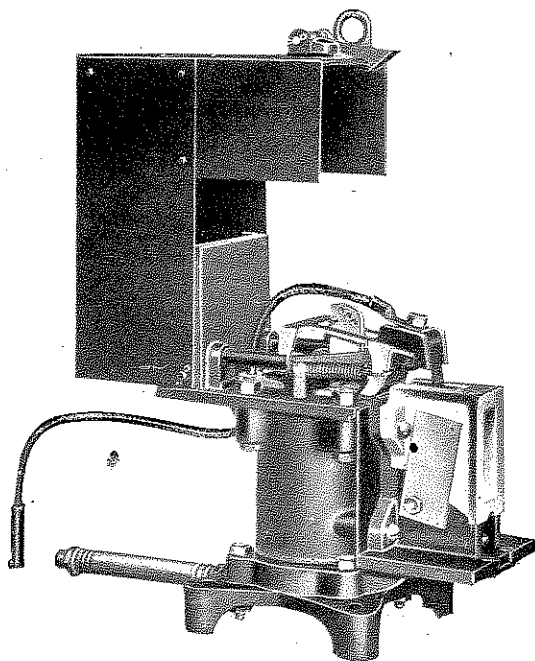
In every mechanical and electrical detail, the compressor is designed strictly in accordance with the General Electric Company's standard railway motor practice.

All bearings and working parts are automatically lubricated from one source—a well formed in the compressor frame immediately below the gear. This oil well is supplied through the oil filler, consisting of a projecting elbow fitted with a handle plug so designed

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that any dirt collected around it is lifted off when it is unscrewed, thus preventing dirt from entering the oil hole. This oil filler is immediately accessible from the side of the car, and of such a height as to insure the proper oil level in the crank case. The driving gear picks up oil from the well and

Compressors of this type are manufactured in several sizes to meet the requirements of all classes of railway service. Although primarily designed for installation on electrically operated cars, these compressors are perfectly adapted for any class of work requiring the use of compressed air.



AIR COMPRESSOR GOVERNOR

throws it in a steady stream into an oil pan on the underside of the crank chamber cover. Oil distribution to bearings is effected through large channels formed in the oil pan, from which the oil flows to the various bearings.

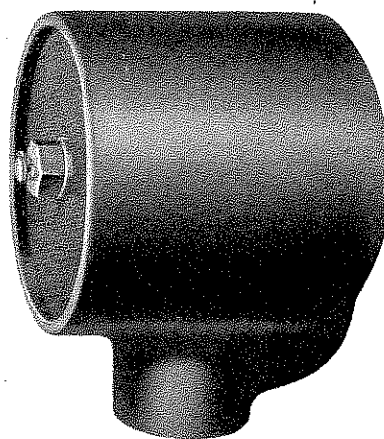
No oil waste or oil rings are used, and there are no pipes or small holes to clog with sediment or thick oil.

The oiling system is positive in action and continuously delivers oil to the bearings which flows back into the well after doing its work. So long as oil remains in the well, all parts of the compressor are perfectly lubricated.

These compressors which are the latest design, have been developed after long experience in the building of air compressors. They are generally considered as surpassing all competing makes in accessibility, simplicity and the general balanced design.

INTAKE STRAINER

The supply of air is drawn into the cylinders through an intake pipe which has a strainer containing curled hair on the end furthest from the air compressor. This



INTAKE STRAINER

strainer when practicable should be placed inside the car.

AIR COMPRESSOR GOVERNOR

The governor is essentially a single-pole switch of the contactor type, operated by means of a rubber diaphragm, a piston, and a set of levers. The operating mechanism is simple, compact, and reliable. The construction of this governor is such that air does not pass through, or come in contact with the operating mechanism, but is restricted to a chamber below the diaphragm, hence troubles resulting from condensation are eliminated.

The essential points of advantage in this type of governor are:

Interrupting switch provided with an arc chute of highly refractory material, an effective magnetic blowout, and easily renewable

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contacts. Arc chute can be quickly removed for inspection or repairs without disturbing any other part or any electrical connections.

Operating mechanism arranged so as to maintain constant pressure on contact tips until point of tripping is reached, insuring a quick break of the contacts when opening the circuit.

A wiping action takes place between the contact tips when the compressor circuit is opened or closed. This action prevents pitting and materially increases the life of the tips.

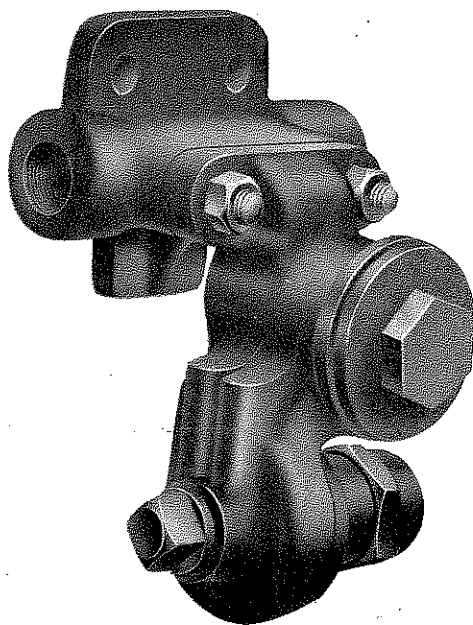
All principal bearings are provided with hardened knife edges to reduce friction and to insure a quick snap action.

Provision is made for quickly changing the range or difference between opening and closing pressures.

FEED VALVE

The feed valve maintains a constant pressure in the control pipe that supplies the air required for braking purposes. This valve is attached to a bracket to which pipe connections are made, thus making it unnecessary to break any pipe joints when it is desired to remove the valve for cleaning.

This feed valve is of the well known slide valve type and is interchangeable with feed valves of other manufacture.



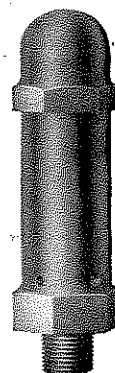
FEED VALVE

It responds quickly to small reductions of pressure, and maintains a constant pressure in the control pipe.

The adjustment of the valve can be readily changed by means of an adjusting screw provided for that purpose.

SAFETY VALVE

The safety valve is similar in construction to the pop safety valve used in steam practice and can be readily adjusted by removing the cap on the upper part of the valve and turning the adjusting screw. This valve is adjusted to open at 110 lb. per square inch.



SAFETY VALVE

MOTORMAN'S VALVE

The motorman's valve is of the rotary type. The principal parts are the body, valve seat, bonnet, stem and rotary valve. The rotary valve operates on a raised surface formed on the upper part of the valve seat. The ports in the rotary valve and valve seat are machined accurately to size and position, and are located so as to perfectly balance the valve and reduce wear to a minimum.

A gasket is clamped between the lower surface of the valve seat and the upper surface of the body, making an air tight joint between these parts. This construction allows the valve and its seat to be removed for repairs without breaking any pipe joints.

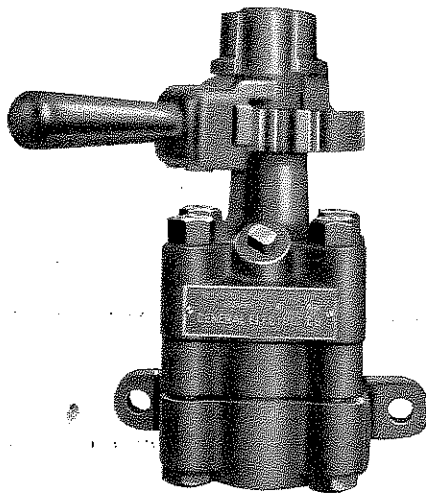
The stem is steel, case hardened and is provided at the base with a ball seat which prevents leakage between the stem and bonnet. The bonnet is provided with a

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bushing of composition material which serves as a bearing for the stem and can be renewed when worn.

The positions of the valve handle and the functions performed are as follows:

RELEASE POSITION: Connection is made between control pipe and brake pipe and between straight air application pipe and exhaust pipe.



MOTORMAN'S VALVE

RETAIN POSITION: Connection is made between control pipe and brake pipe through a restricted port.

STRAIGHT AIR APPLICATION POSITION: Connection is made between control pipe and straight air application pipe, and between control pipe and brake pipe through a restricted port.

LAP POSITION: All ports are blanked. This is the only position in which the handle can be removed.

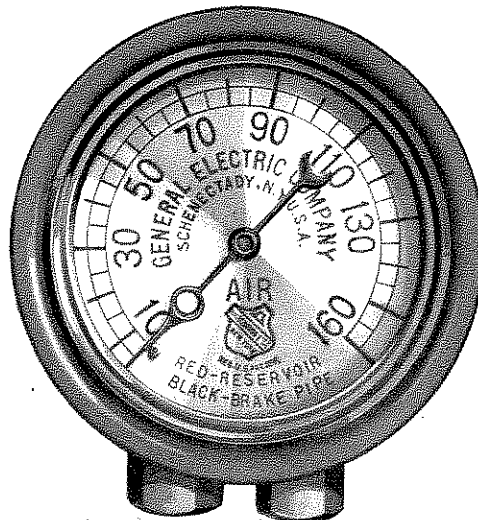
AUTOMATIC SERVICE POSITION: Connection is made between brake pipe and exhaust pipe through a series of small ports.

EMERGENCY POSITION: In this position the handle is at the extreme right. Connection is made between brake pipe and exhaust pipe through a large port and between control pipe and straight air application pipe.

PRESSURE GAUGES

Duplex pressure gauges are furnished with this type of equipment. These gauges are

especially adapted for this class of service, and are constructed in such a manner that they will retain their calibration indefinitely, and are not affected by temperature changes. When desired an attachment for illuminating the dial can be provided.



PRESSURE GAUGE

COMBINED SWITCH AND FUSE

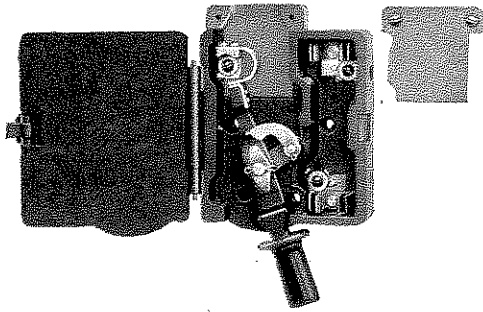
The combined switch and fuse is of fire-proof construction and is so designed that it is capable of positively opening the circuit under all conditions.

All the current carrying parts are enclosed in moulded insulation, and a powerful magnetic blowout is provided for extinguishing the arc. The fuse being of the well known enclosed type is placed in a separate compartment which is isolated from the switch by barriers of insulation. Both the switch and fuse are readily accessible by opening the cover, which is held closed by a simple latch.

BRAKE CYLINDER

The brake cylinders furnished with these equipments are designed with a view of incorporating such features as have been found to be most satisfactory in the past, and which therefore have become almost universally standard. The packing leathers are treated by a special process which renders

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COMBINED SWITCH AND FUSE

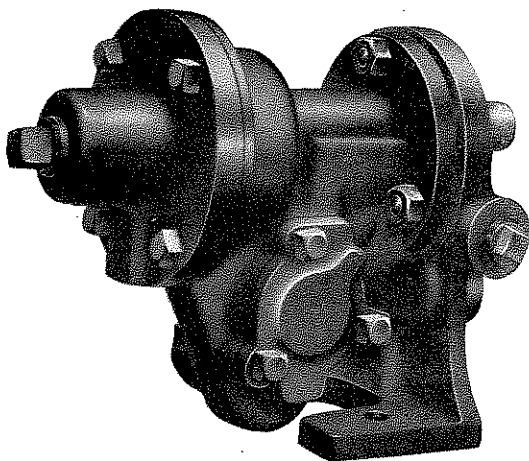
them air tight. The pressure head of the cylinder is provided with a boss to which malleable iron brackets are attached for receiving the dead cylinder lever. When desired a slack adjuster of approved type can be furnished with these cylinders and can be attached to the boss in place of the brackets.

Cylinders are fitted with a tubular piston rod which surrounds the push rod attached to the live cylinder lever. This construction permits of the brakes being applied by hand without moving the brake cylinder piston.

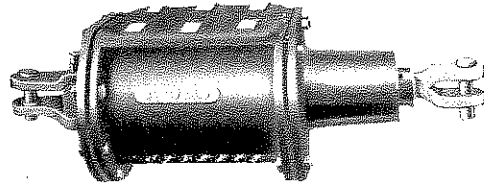
TRIPLE VALVE

The triple valve is of the pipeless type and is bolted to a bracket or the pressure head of the brake cylinder. It can, therefore, be removed for cleaning without breaking any pipe connections.

This triple valve has the following advantageous features:



TRIPLE VALVE AND BRACKET



BRAKE CYLINDER

Quick re-charge of auxiliary reservoir from two sources, namely, the brake pipe and control pipe whereby a maximum braking pressure is always available after a number of successive brake applications.

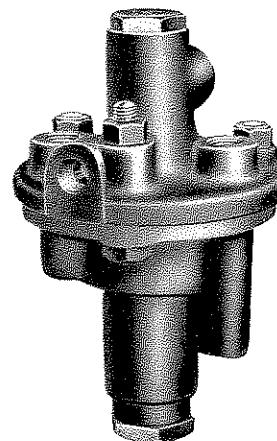
Quick service whereby serial operation of the brakes is obtained. This is accomplished by venting a small amount of brake pipe air to the brake cylinder in service application.

Graduated release which permits of a full or partial release of the brakes as desired.

High brake cylinder pressure in emergency. This is obtained by venting through a large port some of the air contained in the brake pipe. Brake cylinder pressure is thereby increased above the maximum that can be obtained in service application.

QUICK SERVICE VALVE

The primary use of the quick-service valve is to provide a means for admitting air to the brake cylinder when a straight air application is made without reducing the safety factor of the automatic equipment. A further purpose of this valve is to prevent the triple valve creeping over and closing the exhaust port when a straight air application is made.

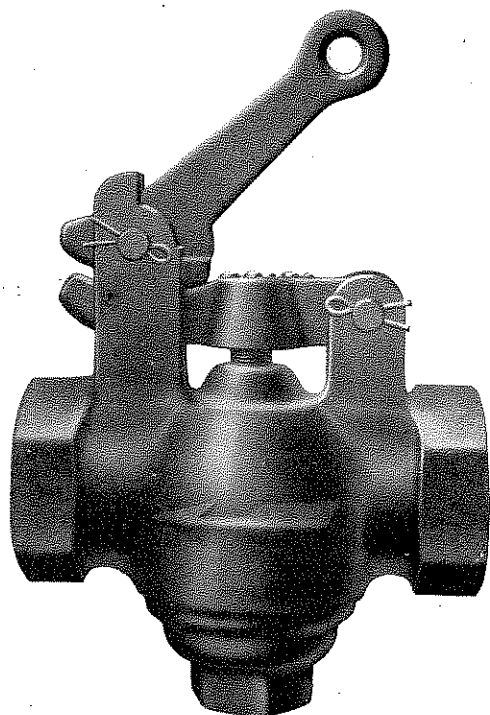


QUICK SERVICE VALVE

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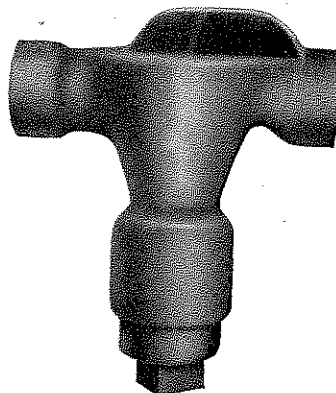
The principal parts of this valve are a bracket to which the pipe connections are made, a check valve located in the bracket and a valve body which contains the application piston and the application valve.

When a straight air application is made, air is admitted to the chamber above the application piston. This piston is then moved downward unseating the application valve, admitting auxiliary reservoir air to the chamber below the application piston which is connected to the brake cylinder.



CONDUCTOR'S VALVE

The downward movement of the application piston uncovers leakage grooves which establishes communication around the piston between the upper and lower chamber. When a straight air application of the brake is made, part of the air admitted to the brake cylinder is taken from the control pipe through the motorman's valve and the straight air application pipe, and part is taken from the auxiliary reservoir. Admitting air from the auxiliary reservoir to the brake cylinder in this way insures the triple valve remaining in the release position and provides at all times for a prompt release of the brakes.



CENTRIFUGAL DIRT COLLECTOR

A spring is located on the lower side of the application piston which prevents brake cylinder pressure building up to full control pipe pressure.

CONDUCTOR'S VALVE

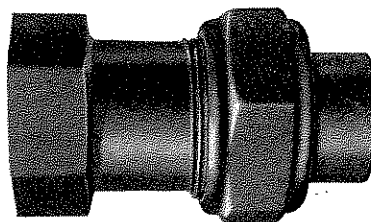
The conductor's valve is of the lift type and is provided with a rubber seat. This valve is operated by means of a lever to which is attached a cord extending throughout the car.

It is of the non-self-closing type, and when opened must be closed by hand.

CENTRIFUGAL DIRT COLLECTOR AND STRAINERS

A centrifugal dirt collector, branch pipe strainer and control pipe strainer are furnished for preventing the entrance of dirt and pipe scale into the triple valve.

These parts are of standard design and are interchangeable with those manufactured by other companies.



BRANCH PIPE STRAINER

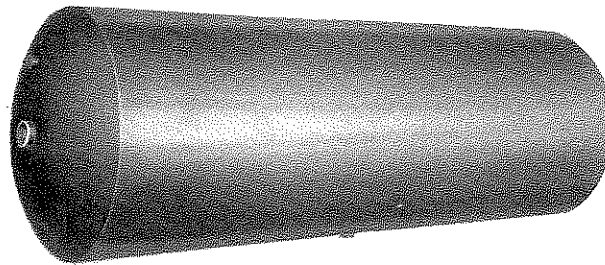
COMBINED STRAINER AND CHECK VALVE

A combined strainer and check valve is furnished and is located in the control pipe near the triple valve.

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This combined strainer and check valve prevents the loss of auxiliary reservoir pressure and consequently braking power in case of damage to the control pipe or connections.

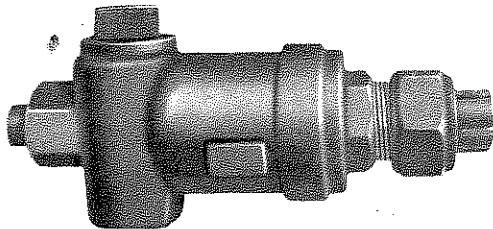
in the main reservoir for a separate connection to the air compressor governor. Reservoir hangers are supplied for attaching to the car body.



RESERVOIR

HOSE AND COUPLINGS

The hose and couplings for connecting the control pipe and brake pipe between the cars are of standard design, and are interchangeable with those used by other manufacturers.



COMBINED STRAINER AND CHECK VALVE

WHISTLES

The whistles furnished with these equipments are the General Electric Company's deep tone organ type, possessing agreeable tone and great carrying power.

The whistles are operated by means of a whistle valve placed in the motorman's cab. The stem of the valve is provided with a stuffing box which prevents leakage of air around the stem when the valve is in the open position.

Cutout cocks are provided for disconnecting any whistle when required.

CUTOUT COCKS

All cutout cocks are of strong and substantial design. The key is held on its seat by a compression spring in the valve cap. Malleable iron handles are attached to the square end of the key by a pin, and can be easily removed when regrinding is necessary.

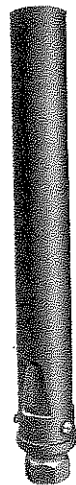
RESERVOIRS

Reservoirs are made of a special grade of steel to give maximum strength with minimum weight. A 1/2-in. drain cock of substantial construction with a large opening is furnished with each reservoir. Reservoirs are tapped at the ends for the pipe connections to the parts of the air brake equipment. Provision is made

MATERIAL AND WORKMANSHIP

Special attention is given to the character of workmanship and material entering into the construction of all air brake equipment parts. Each piece of apparatus is subjected to rigid inspection and test during the process of manufacture and after it is completed.

The wide experience in the manufacture of high class electric railway apparatus is a guarantee that the air brake equipments placed on the market by the General Electric Company embody all the best features of design, thus insuring safety, reliability and efficiency.



AIR WHISTLE

General Electric Co., Schenectady, N. Y.
Sales Offices in all Large Cities