

Fig. 6. S-6-A Electric Compressor Governor  
(Cut No. 11521)

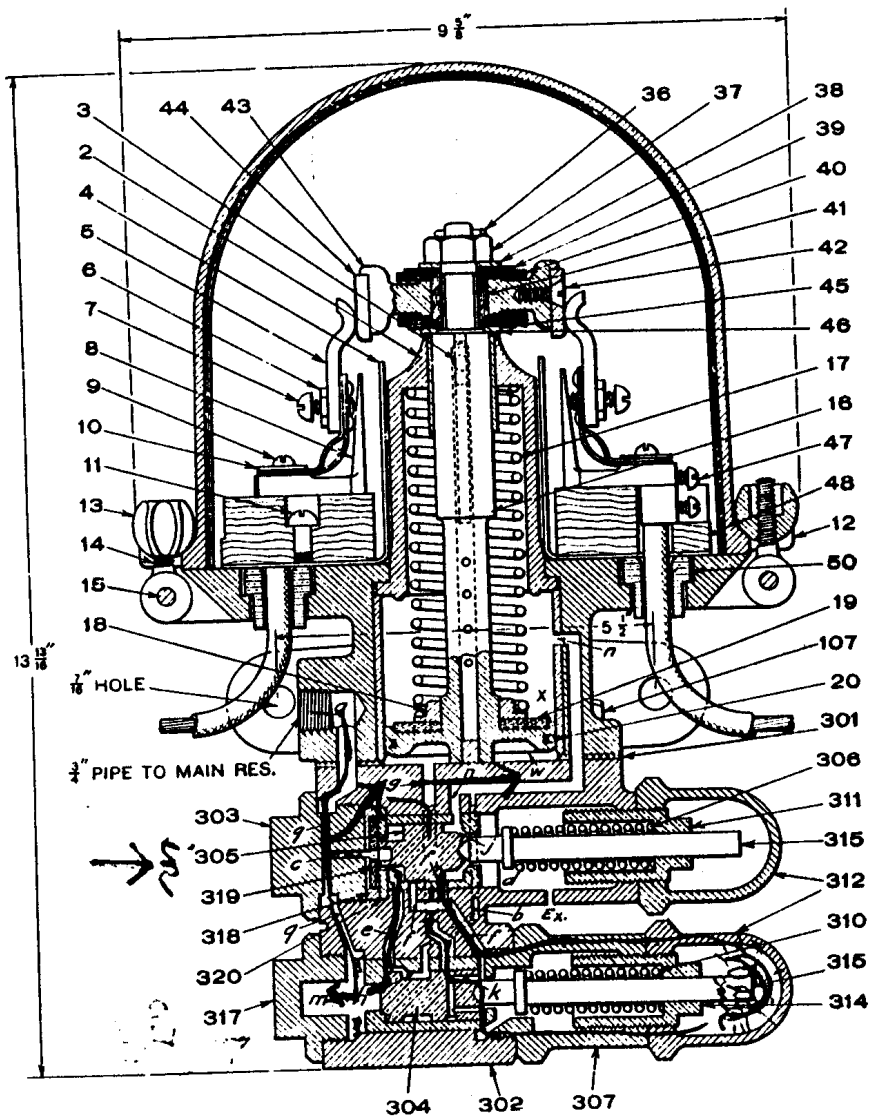
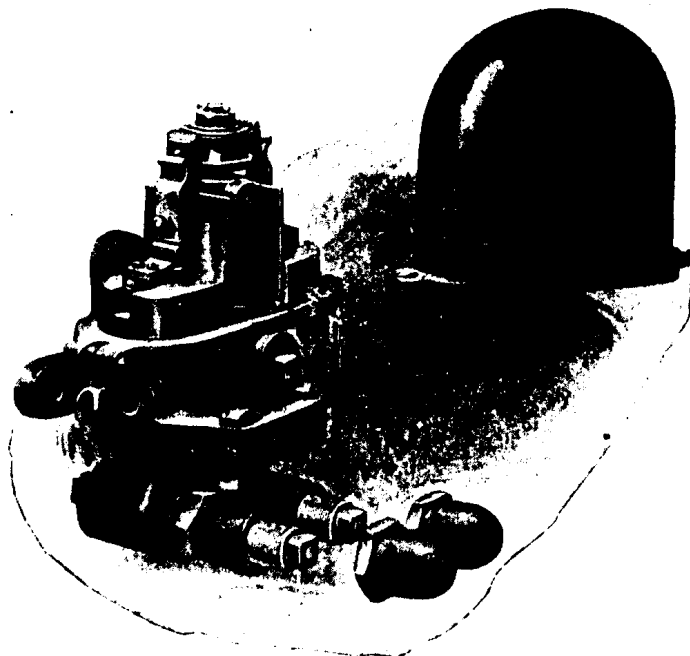


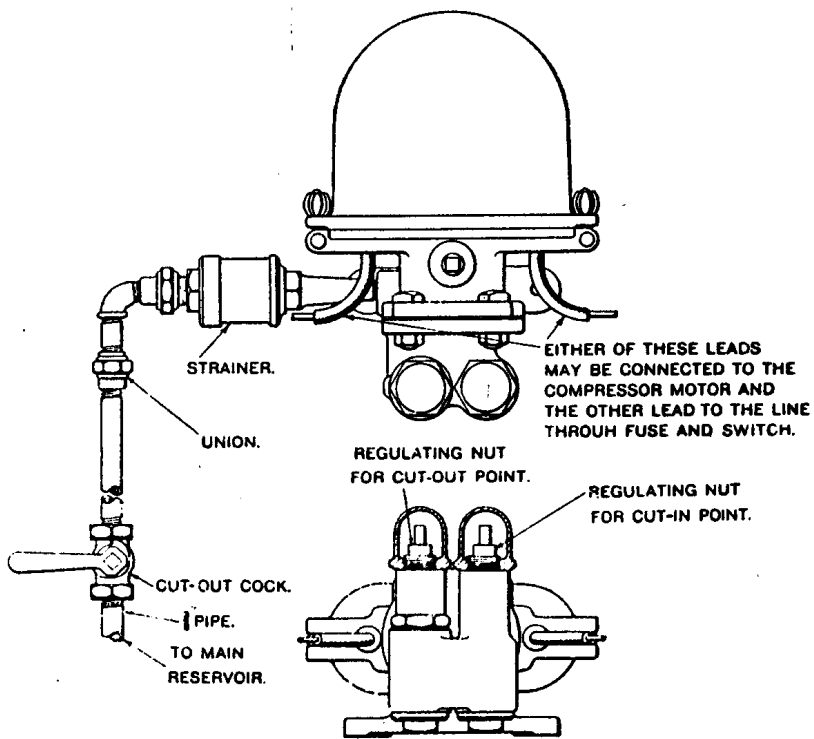
Fig. 3. S-6-B Electric Compressor Governor  
 (Cut No. 11522)



**Fig. 1. S-6-B Electric Compressor Governor  
(Cut No. 11637)**



**Fig. 2. S-6-B Electric Compressor Governor  
Cover and Jam Nuts Removed  
(Cut No. 13128)**



**Fig. 7. S-6-B Electric Compressor Governor  
Views showing Regulating Nuts and  
Connections  
(Cut No. 10151)**

9th May, 1955.

No. 2412.DESCRIPTION OF WESTINGHOUSE S-6-A AND  
S-6-B ELECTRIC COMPRESSOR GOVERNORS

The S-6-A and S-6-B Electric Compressor Governors are of the pneumatic double safety valve type and are designed to automatically control the operation of motor driven air compressors between predetermined minimum and maximum air pressures. This is accomplished by automatically making and breaking the electric circuit to the motor as the air pressure falls below or rises above the limits for which the governor is set.

These governors are intended for use with either direct current or single-phase alternating current motor driven air compressors requiring a current not to exceed 30 amperes, 600 volts.

They possess the features of reliability, durability, ease of access to working parts, strong electrical construction, ease of adjustment, quick and positive movement in opening and closing contacts, and simple compact and rugged construction.

The switch portion is well protected from dust and dirt by a thin iron casing which can be quickly and readily removed to permit of inspection and repairs if necessary.

These governors may be placed in any position and will operate satisfactorily at pressure variations between cutting-in and cutting-out points as low as 10-lbs. and as high as 25-lbs.

The ordinary range in street car service is 15-lbs. With straight-air brake equipments and SME equipments (straight-air with automatic emergency feature), the cutting-in point is usually 50-lbs. and the cutting-out point 65-lbs. With automatic equipments the cutting-in point is usually 85-lbs. and the cutting-out point 100-lbs. (70-lbs. brake pipe pressure).

A strainer is required in the supply pipe to the governor to protect against the entrance of dirt, etc. A separate curled hair air strainer is furnished with the S-6-B governor, one end of the strainer being screwed directly into the governor and the other being connected to the supply pipe. In order, however, to insure that the strainer will not for any reason be detached from the governor and therefore permit dust and dirt to enter the governor, the S-6-A governor is provided with a strainer which is integral with the governor. This is in the form of a filler piece inserted between the switch portion and the regulating portion.

(contd.)

## CONSTRUCTION AND OPERATION

Referring to Figs. 1, 2, 3, 4, 5 and 6, it will be seen that both governors have a switch portion, with removable cover and a pneumatic regulating portion and that the S-6-A has, in addition, the strainer filler piece, as already stated.

### SWITCH PORTION

The electric circuit from the trolley to the air compressor is made or broken by the switch portion of the governor, which consists, essentially, of a switch spider 43, rigidly attached to the switch piston and rod 16 and forming the connection between the finger contacts 5 when the governor is in "Cut-in" position as shown in Figs. 3 and 6. An ingenious arrangement of the air cylinder and cut-out details affords a pneumatic blow-out of unusual efficiency so that no coils are necessary to provide a magnetic blow-out. For this reason, the governor can be used for either direct or alternating current and may be placed in either the positive or negative side of the circuit.

The electric portion of this device is confined entirely to one end and is insulated thoroughly from the parts with which it comes in contact. The cover can be quickly and easily removed after loosening the thumb nuts 13. The terminal blocks and screws are all readily accessible when the cover is removed (Fig. 2) and are entirely protected when it is in place.

### REGULATING PORTION

The admission of air to and exhaust from the air cylinder W (Figs. 3 and 6) is controlled by the regulating portion. Air from the main reservoir enters at the pipe tap marked "To Main Reservoir" and flows through passages g, q and e to the seat of the cut-in valve 305; also to chamber m and the seat of the cut-out valve 304. Suppose the tensions of the springs 306 and 310 are equal. The area of cut-out valve 304 exposed to main reservoir pressure in cavity m is greater than the area of cut-in valve 305 exposed to main reservoir pressure in passage g. Consequently, as main reservoir pressure rises, cut-out valve 304 will be unseated before cut-in valve 305.

The shape of the seat of cut-out valve 304 is such that as soon as the valve leaves the seat in bushing, the area exposed to main reservoir pressure is greatly increased so that the valve moves quickly to its extreme position, stopping against spring box 307. As the cut-out valve moves from its

seat, it uncovers port g in the bushing leading to annular space around cut-in valve 305. The area of cut-in valve 305 thus exposed to main reservoir pressure added to that exposed by passage g is sufficient to overcome the tension of spring 306 and cut-in valve 305 quickly moves to its extreme position, seating at j, thus preventing the escape of air to chamber d and to the exhaust EX.

When cut-in valve 305 moves from its seat 319, it uncovers port f and main reservoir pressure then flows to the cut-out spring box, thus equalizing the pressure on both sides of cut-out valve 304. With the pressure thus equalized, cut-out valve spring 310 promptly moves cut-out valve 304 to its original position. Cut-in valve 305 is now open, so that main reservoir pressure flows from port g through ports f, k and g to the switch cylinder W, forcing switch piston 16 to its cut-out position, breaking the circuit and stopping the compressor.

The parts will remain in the cut-out position until the main reservoir pressure has fallen to a point where the area of the cut-in valve 305 exposed to chamber d multiplied by the main reservoir pressure, is slightly less than the pressure exerted by spring 306. The cut-in valve will then leave its seat at j. This allows the pressure in switch cylinder W to flow through passage n past seat i and into chamber d more quickly than it can escape through exhaust port "ex". Thus the pressure on both sides of cut-in valve 305 tends to equalize and the spring quickly moves the valve 305 to its seat on 319. Then in addition to flowing from the switch cylinder W through passages n and i, chamber d and exhaust "ex" the air flows back through passages k, f, past seat j to chamber d and to exhaust "ex" until all of the air is released from the switch cylinder W. The switch piston then returns to its cut-in position, starting the compressor and the operation previously described is repeated.

A groove in the bushing of the cut-out valve connects port e with the annular groove h in cut-out valve 304, which in turn connects with passage b leading to passage n. From passage n any accumulated air pressure due to leakage when the governor is in cut-in position can escape either past seat i to chamber d and exhaust "ex", or to the atmosphere through port n to chamber d and past the switch piston. The grooves and ports just mentioned insure that atmospheric pressure will be present in annular space around cut-in valve 305 at all times when the valve is seated on 319, thus preventing slight leakages past the cut-in valve and cut-out valve seats from causing any erratic action or premature operation of the governor.

### REGULATION AND ADJUSTMENT.

Remove check nuts 312 and screw cut-out regulating nut 314 down until the desired cutting-out point is reached. At the same time cut-in regulating nut 311 to as nearly the same tension as can be judged under ordinary observation. Each time a trial is made to determine the proper setting of the governor, check nuts 312 should be replaced as they will affect the cutting-in and cutting-out points of the governor. If, when the cutting-out point is reached, the range is not as desired, remove the check nut from the cutting-in portion and screw the cut-in regulating nut 311 down to raise the cutting-in point or to decrease the range and back it off to lower the cutting-in point or to increase the range.

### INSTALLATION AND MAINTENANCE.

The Type S-6-A and S-6-B governors can be installed in either vertical or horizontal position, as previously stated. We recommend that it be placed inside the car where the temperature is always above freezing, since the expansion of the air when passing through it must necessarily precipitate moisture. Three  $\frac{3}{8}$ " bolts, or lag screws, are required to instal the governor, and the pipe connections are tapped for  $\frac{3}{8}$ " pipe. Under no circumstances should an automatic governor be connected to the discharge pipe of a compressor, but should have a connection to the outlet from the main reservoir or if two reservoirs are used, from the second main reservoir.

These governors need very little attention after being properly adjusted except to be cleaned and oiled at some stated interval, say once a year. When cleaning and oiling the governor, a few drops of good oil should be placed on the surface passed over by the cutting-in and cutting-out valves. See also that the exhaust opening in the cutting-in valve spring chamber is free from dirt or gum.

Wilmerding, Pa.,  
September 20, 1916.

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