

(No Model.)

M. L. E. DUVAL.
PRESSURE REGULATOR FOR AIR BRAKES.

No. 510,635.

Patented Dec. 12, 1893.

Fig. 1.

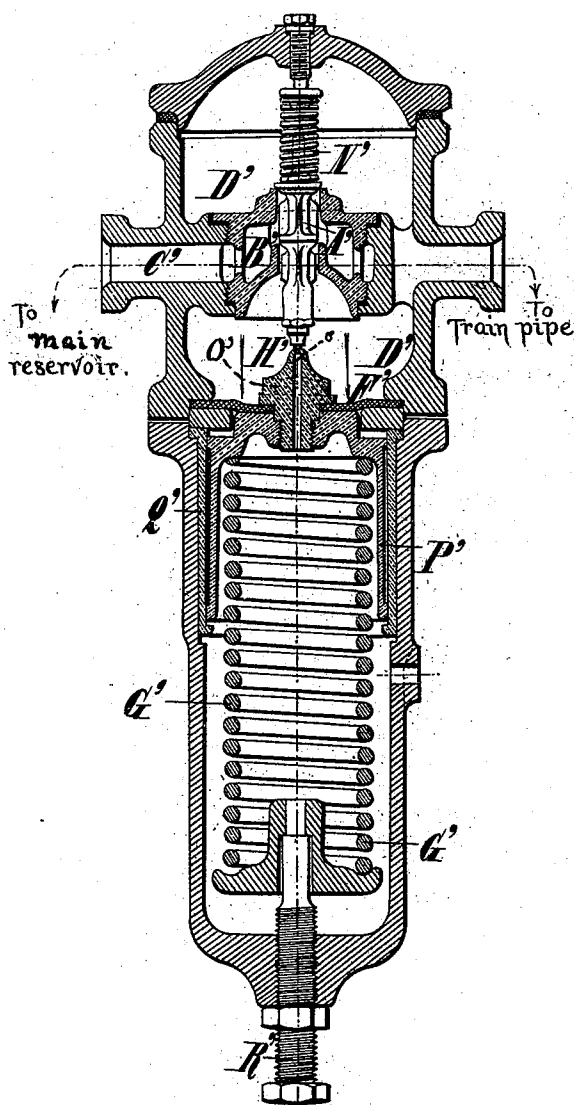
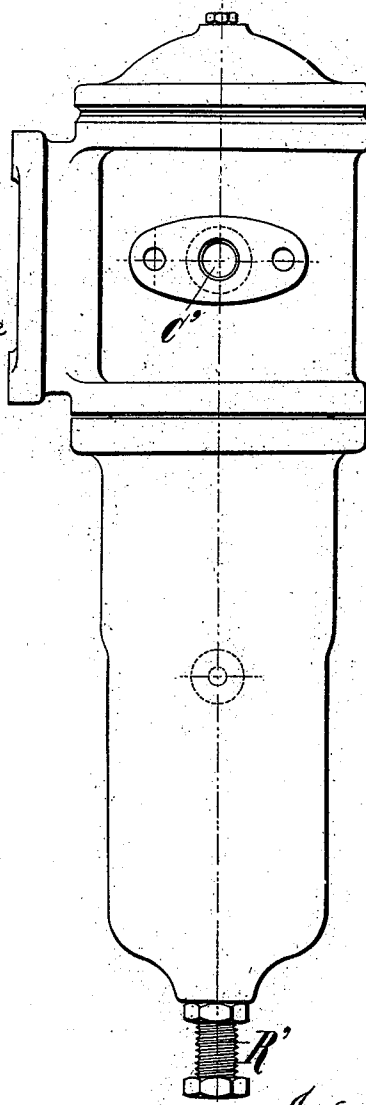


Fig. 2.



Attest.
Geo. T. Smallwood.
Per Lewis.

Inventor:
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by J. H. Mears
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UNITED STATES PATENT OFFICE.

MARTIN LÉONARD EDMOND DUVAL, OF PARIS, FRANCE, ASSIGNOR TO THE
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PRESSURE-REGULATOR FOR AIR-BRAKES.

SPECIFICATION forming part of Letters Patent No. 510,635, dated December 12, 1893.

Application filed February 9, 1893. Serial No. 461,665. (No model.) Patented in France July 18, 1892, No. 223,047

To all whom it may concern:

Be it known that I, MARTIN LÉONARD EDMOND DUVAL, of Paris, (Seine,) France, have invented certain new and useful Improvements in Pressure-Regulators for Air-Brakes, which invention is fully described in the following specification, and which was patented in France July 18, 1892, No. 223,047.

The present invention relates to regulators for air-brakes.

My improvement patented November 22, 1892, No. 486,703, permits the obtaining upon long trains of cars of the simultaneous action of the air-brakes. In order that the advantages which result should have their full effect it is necessary that there should be in the train pipe, when the train is in motion and the brakes off, a constant pressure or a pressure that varies within very narrow limits, since every fluctuation may give rise to an untimely application of the brakes. In order to insure as much as possible this constant pressure many regulators have been devised, whose operation is satisfactory when applied to trains of from twenty to twenty-five carriages, (of the small size used on European railways) but which allow fluctuations of pressure when the trains are composed of a larger number of vehicles.

The object of the present invention is to overcome this objection, or at least to modify it to a great extent. This object is accomplished by the construction shown in the accompanying drawings, in which—

Figure 1 is a vertical section of my improvement, and Fig. 2, is a side elevation.

The regulator is composed essentially of a two-seated valve A', whose opening establishes a communication between chamber B' (which is in constant communication with the main reservoir on the locomotive by pipe C') and chamber D' (to which the train-pipe is connected); a diaphragm F' receiving air-pressure from the train-pipe; a spring G' which opposes the pressure in chamber D' and is of such length that its tension shall not be subject to material fluctuation under the movements of the diaphragm; and a valve H' for the escape into the atmosphere of the air in excess in the train pipe, when the pressure therein ac-

cidentally exceeds the normal pressure. The valve H' comprises a single small contracted opening *o* (from one to two millimeters in sectional area) in the plug O' said opening being normally covered by the lower end of the stem of valve A'. For convenience of manufacture valve A' has its upper seat a little larger than its lower seat, and it follows that the air pressure from the main reservoir has a tendency to lift this valve. The difference of pressure on the two faces of the valve is compensated by the spring N', the force of which is properly regulated in view of this difference and the mean pressure in the train-pipe, always greater than that of the auxiliary reservoir which it supplies. Plug O' carried by its diaphragm is screwed into sleeve P' which is free to slide in a cylinder Q' fitted into the main casting forming the spring-chamber.

The operation is as follows:—When the air contained in the train-pipe is at its normal pressure, valve A' is closed, as well as the small relief valve H'. As soon as a fall of pressure occurs in the pipe, the diaphragm F' is forced upward by spring G', opening the admission valve A' and holding it open until the normal pressure of the train pipe is restored, when the diaphragm returns, closing the admission valve, the relief valve remaining closed during the operation described. In case the pressure in the train-pipe rises above the normal by leakage of the admission valve the diaphragm would continue to descend, further compressing the spring. Valve H' would then open and the air in excess would escape into the atmosphere until the normal pressure is restored, permitting the diaphragm to rise and close the relief valve, the valve A' remaining also closed. It is essential however to the successful operation of the valve H' and consequently the relieving of excessive pressure in the train-pipe, that the opening *o* in said valve should be sufficiently small to cause a very gradual reduction of the pressure in the train-pipe, otherwise a sudden reduction of pressure would involve a rush of air to the air exit and consequently a fluctuation of pressure likely to cause an untimely application of the brakes.

The tension of the main spring G' must be regulated properly according to the pressure acting on the diaphragm F' when the apparatus is in its normal condition. To regulate this tension an adjusting screw R' is provided. The diaphragm may be metallic or of rubber or other flexible substance, or (as is common) may be replaced by a piston.

Having thus described my invention, what I claim is—

In a regulator for air-brake systems, the combination of a casing containing two chambers, the first being in constant communication with the main air-reservoir and the other with the train-pipe, a main-valve between the two casings, a flexible diaphragm in the second or low-pressure chamber, a spring acting upon said diaphragm in opposition to the

pressure in said chamber in communication with the train pipe for opening the main valve when such train pipe pressure falls, a vent of smaller sectional area than that of the main-valve, said vent establishing when open a communication through the diaphragm between the train-pipe and the atmosphere, and a relief valve formed by the stem of the main-valve and normally closing said vent, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

MARTIN LÉONARD EDMOND DUVAL.

Witnesses:

ROBT. M. HOOPER,
JEAN VICTOR BARBANCE.