

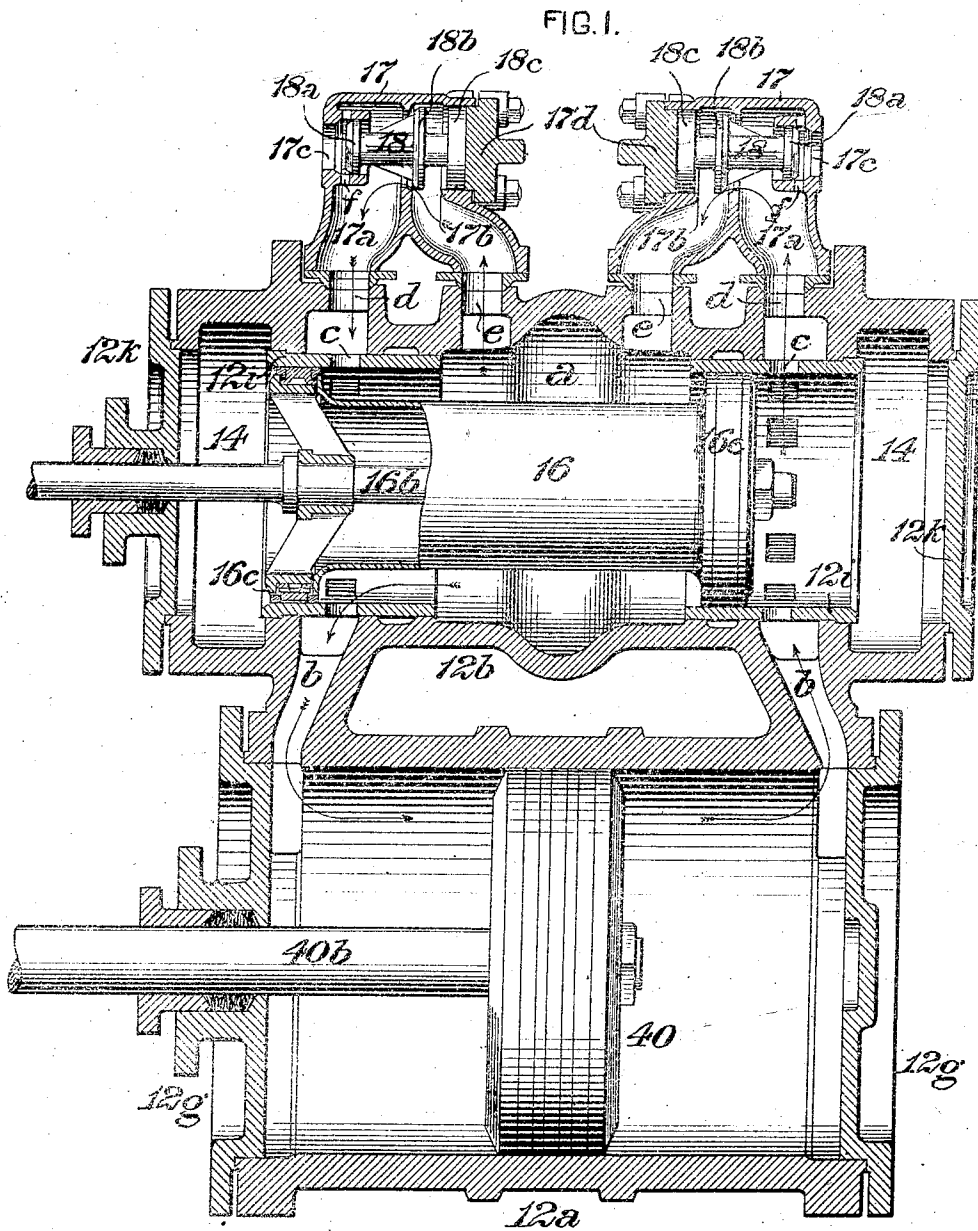
No. 877,868.

PATENTED JAN. 28, 1908.

J. E. SAGUE & F. J. COLE.
BY PASS VALVE FOR LOCOMOTIVES.

APPLICATION FILED MAR. 28, 1906.

2 SHEETS—SHEET 1.



WITNESSES

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2 SHEETS—SHEET 2.

FIG. 2.

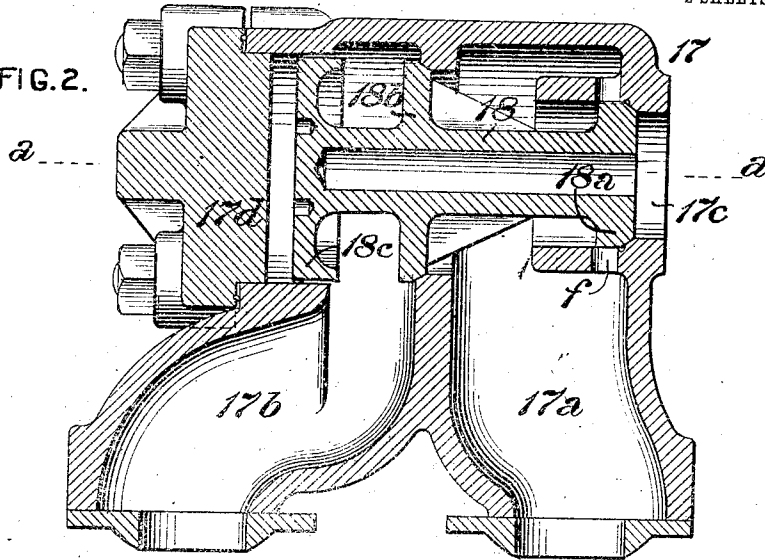


FIG. 3.

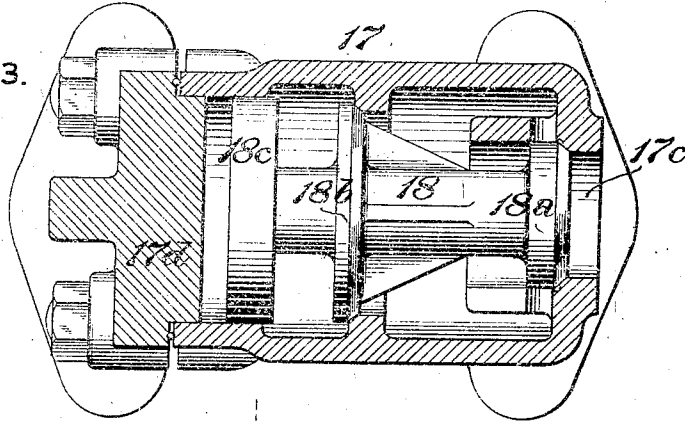
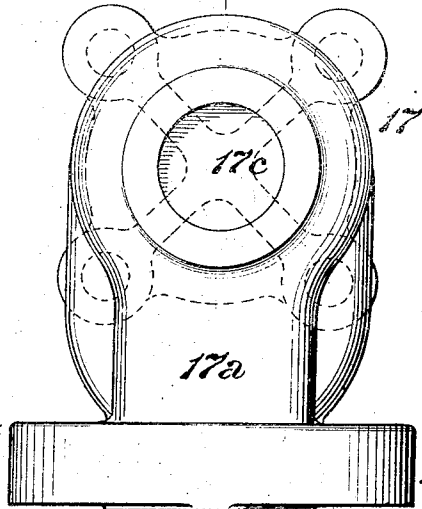


FIG. 4.



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UNITED STATES PATENT OFFICE.

JAMES E. SAGUE AND FRANCIS J. COLE, OF NEW YORK, N. Y., SAID COLE ASSIGNOR TO AMERICAN LOCOMOTIVE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

BY-PASS VALVE FOR LOCOMOTIVES.

No. 877,868.

Specification of Letters Patent.

Patented Jan. 28, 1908.

Application filed March 28, 1906. Serial No. 308,440.

To all whom it may concern:

Be it known that we, JAMES E. SAGUE and FRANCIS J. COLE, both of the borough of Manhattan, in the city and State of New York, have invented a certain new and useful Improvement in By-Pass Valves for Locomotives, of which improvement the following is a specification.

The object of our invention is to provide means, of simple and inexpensive construction, and ready applicability in locomotive engines of the various present standard types, whereby the formation of a vacuum in the valve chests, and the objectionable results of expansion and compression in the cylinders, when the engine is "drifting", or running with a closed throttle on a descending grade, may be effectually prevented, without necessitating the use of special air admission valves operating independently of those which provide for circulation in the steam and exhaust passages and cylinders.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings: Figure 1 is a longitudinal central section through one of the cylinders, and its valve chest, of a locomotive engine, illustrating the application of our invention thereto; Fig. 2, a vertical central section, on a larger scale, through one of the by pass valve mechanisms and its chest; Fig. 3, a horizontal section on the line *a a* of Fig. 2; and, Fig. 4, an end view of a by pass valve chest.

Our invention is herein exemplified in connection with a locomotive engine cylinder, 12^a, in which is fitted a piston, 40, fixed upon a piston rod, 40^b, and which communicates by induction and eduction ports, *b, b*, adjacent to its ends, with a valve chest, 12^b, having a central steam space, *a*, which is in constant communication with a steam supply passage leading from the boiler, and end exhaust spaces, 14, which are in constant communication with an exhaust passage. The supply and exhaust of steam to and from the cylinder are effected by a distribution valve, which is of the internal admission piston type, and comprises a hollow or tubular body, 16, and two end pistons, 16^c, fixed upon a valve stem, 16^b, and reciprocated by any suitable valve gear in the ordinary manner. The end pistons, 16^c are fitted truly to traverse in bushings or linings, 12^d, fixed in the valve chest and provided with ports, *c, c*,

which communicate with the cylinder ports, *b, b*, and through which, by the movements of the distribution valve, each of the cylinder ports is alternately put into communication with the steam space, *a*, of the valve chest, and with the adjacent exhaust space, 14, thereof, respectively. The ends of the cylinder are closed by heads, 12^e, and those of the valve chest by heads, 12^f, and the construction thus far described is one which is well known and extensively used.

In the practice of our invention, we connect to the valve chest, 12^b, adjacent to each of its ends, a chest or casing, 17, having two channels or passages, 17^a, 17^b, one of which, 17^a, is in all positions of the distribution valve, in communication, through a port, *d*, in the valve chest, with the ports, *c*, of the adjacent valve chest bushing 12^d, and through the annular space around the valve bushing, 12^d with the adjacent cylinder port, *b*. The other passage, 17^b, is in constant communication, through a port, *e*, in the valve chest, with the central steam space, *a*, thereof. Communication between the passages, 17^a, and 17^b, of each chest, and between the passage, 17^a, and the atmosphere is controlled by an automatically operating valve mechanism comprising a body or stem, 18, a valve, 18^a, on one end thereof, seating around and controlling a port, 17^c, to the atmosphere, at one end of the chest, a valve, 18^b, of larger diameter, seating around and controlling a port in the wall between the passages, 17^a, and 17^b, and an end piston, 18^c, fitting a cylindrical chamber in the valve casing, which chamber is closed by a removable head, 17^d, to permit the insertion and removal of the valve mechanism. The valves, 18^a, and 18^b, are of the lift or poppet type, and the valve, 18^a, works in a cylindrical guide in the chest, in which are formed ports, *f*, for the admission of air to the chest passage, 17^a, when the valve is unseated. The cylindrical chamber in which the end piston, 18^c, is fitted, serves as a cushion chamber which prevents undue shocks in the operation of the valves. The piston, 18^c, is balanced by the leakage past it through an ordinary loose fit, which is in practice about .007 of an inch, and is indicated, on an enlarged scale, in Fig. 2.

As is well known to those familiar with the operation of locomotive engines, the movements of the pistons and valves, when

steam is shut off and the engine is "drifting", induce substantially objectionable results, due to expansion and compression in the valve chests and cylinders and their pipe and passage connections, among which are the introduction into the cylinders of hot gases from the fire-box and smoke and cinders from the smoke box, caused by the formation of a partial vacuum in the cylinders and valve chests at certain points in the travel of the pistons, and excessive compression on the advancing sides of the pistons, which latter objection, especially in the large low pressure cylinders of compound engines, frequently becomes so great as to seriously affect the economical operation of the locomotive.

In the operation of our invention, the by pass valve mechanisms are automatically actuated by atmosphere pressure acting upon the outer sides of the valves, 18^a, and unseating and holding open said valves and the connected valves, 18^b, immediately upon the production of a partial vacuum in the steam supply pipe and central steam space, *a*, of the valve chest, when the engine is drifting. Communication is thereby opened between said space and the cylinder ports, *b*, permitting circulation as indicated by the arrows in Fig. 1, and a sufficient supply of air to prevent the formation of a vacuum is admitted through the ports, 17^c. Suction from the smoke box, through the exhaust pipe and passages, and compression in the cylinders, with their attendant objections above noted, are thereby prevented. Upon the readmission of steam to the cylinders upon the opening of the throttle, the valves are seated by the action of the steam pressure upon the inner sides of the valves, 18^b, and the distribution functions are thereupon performed in the ordinary manner.

We claim as our invention and desire to secure by Letters Patent:

45 1. A by pass and air admission mechanism

for locomotive cylinders, comprising a chest or casing having an air admission port at one of its ends and two adjacently located channels or passages leading from one of its sides, each adapted for direct connection to a valve chest port, and a body or stem carrying a valve which controls the air admission port and a valve of larger diameter controlling communication from one to the other of the adjoining valve chest port passages or channels.

2. A by pass and air admission mechanism for locomotive cylinders, comprising a chest or casing having a cushion chamber at one of its ends and an air admission port at the other and two intermediate lateral channels or passages adapted for connection to a valve chest, a removable head closing the end of the cushion chamber, and a body or stem carrying a valve which controls the air admission port, a valve of larger diameter controlling communication between the lateral passages or channels, and a piston fitting in the cushion chamber.

3. The combination, with a locomotive engine cylinder and its valve chest, of a chest or casing having two passages, one of which communicates with an exhaust space of the valve chest and is provided with a port leading to the atmosphere, and the other of which communicates with a steam space of the valve chest, a valve controlling a port to the atmosphere and exposed, on its outer side, to atmospheric pressure, a connected valve controlling communication between the two passages of the chest or casing and exposed, on its inner side, to the pressure in the steam space, and a connected piston, working in a cushion chamber in the chest or casing.

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