

(No Model.)

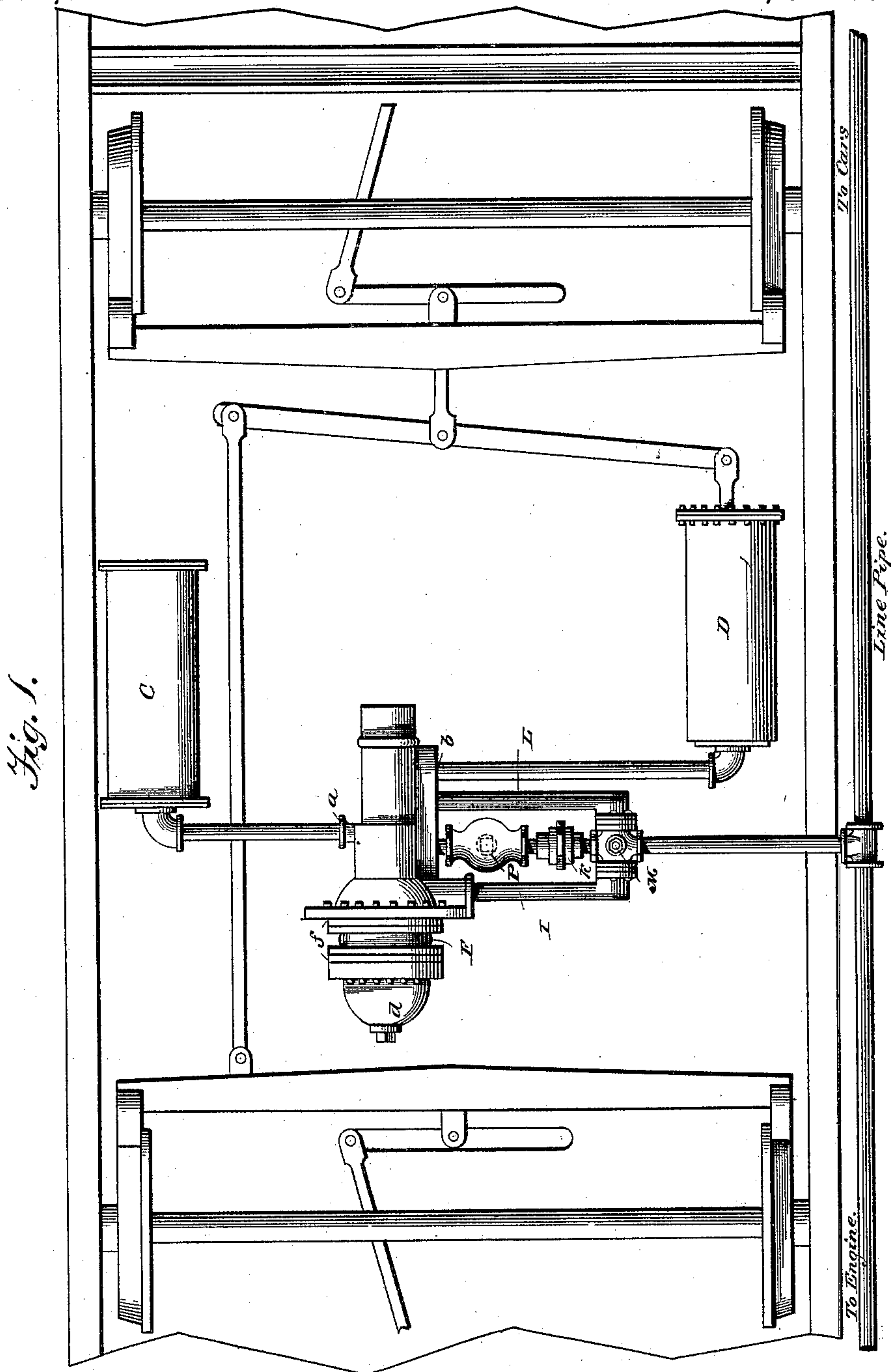
2 Sheets—Sheet 1.

A. R. BOLUSS.

AIR BRAKE.

No. 398,310.

Patented Feb. 19, 1889.



Witnesses:

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T. C. Durbin

Inventor:

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(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

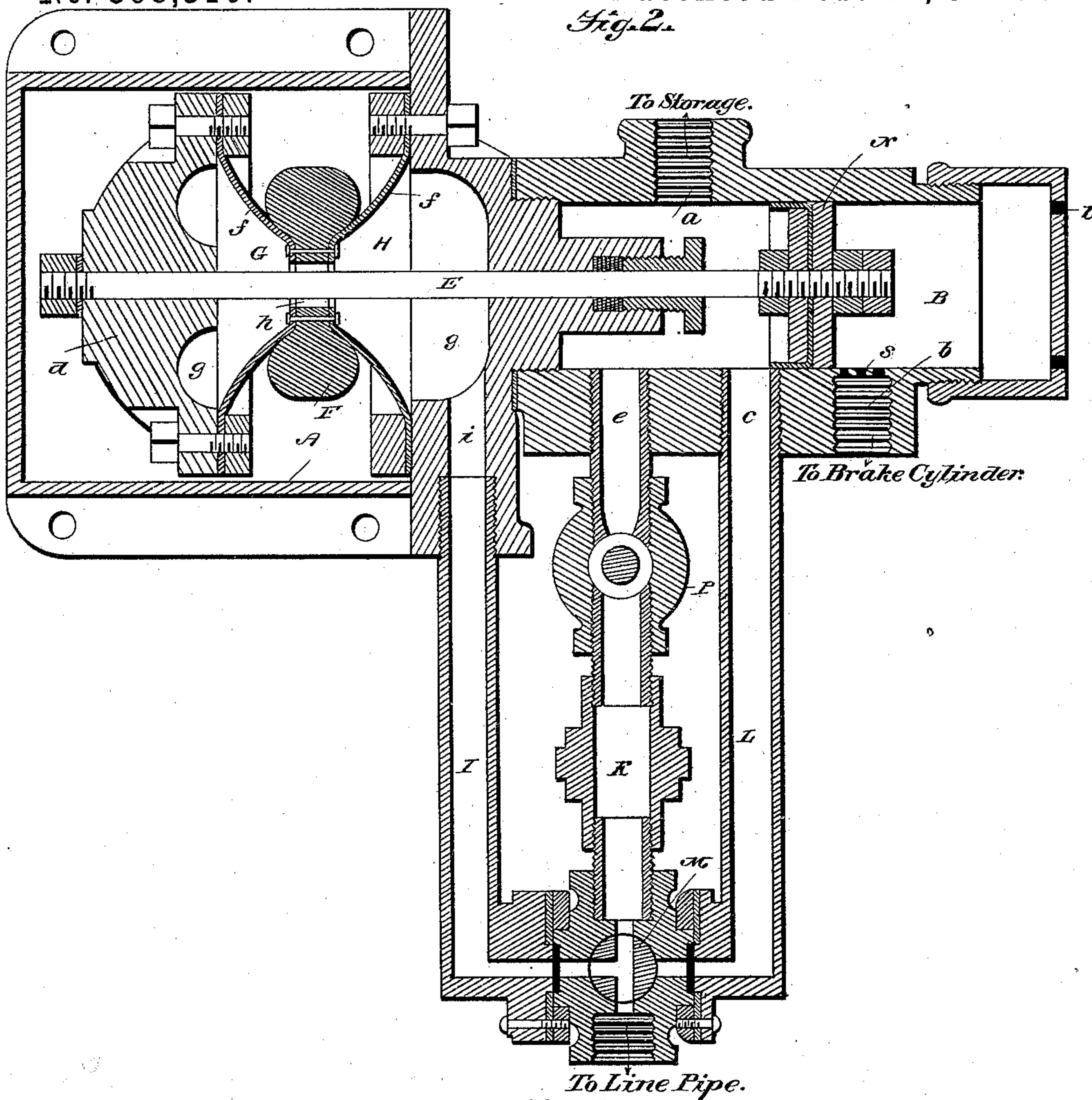


Fig. 3.

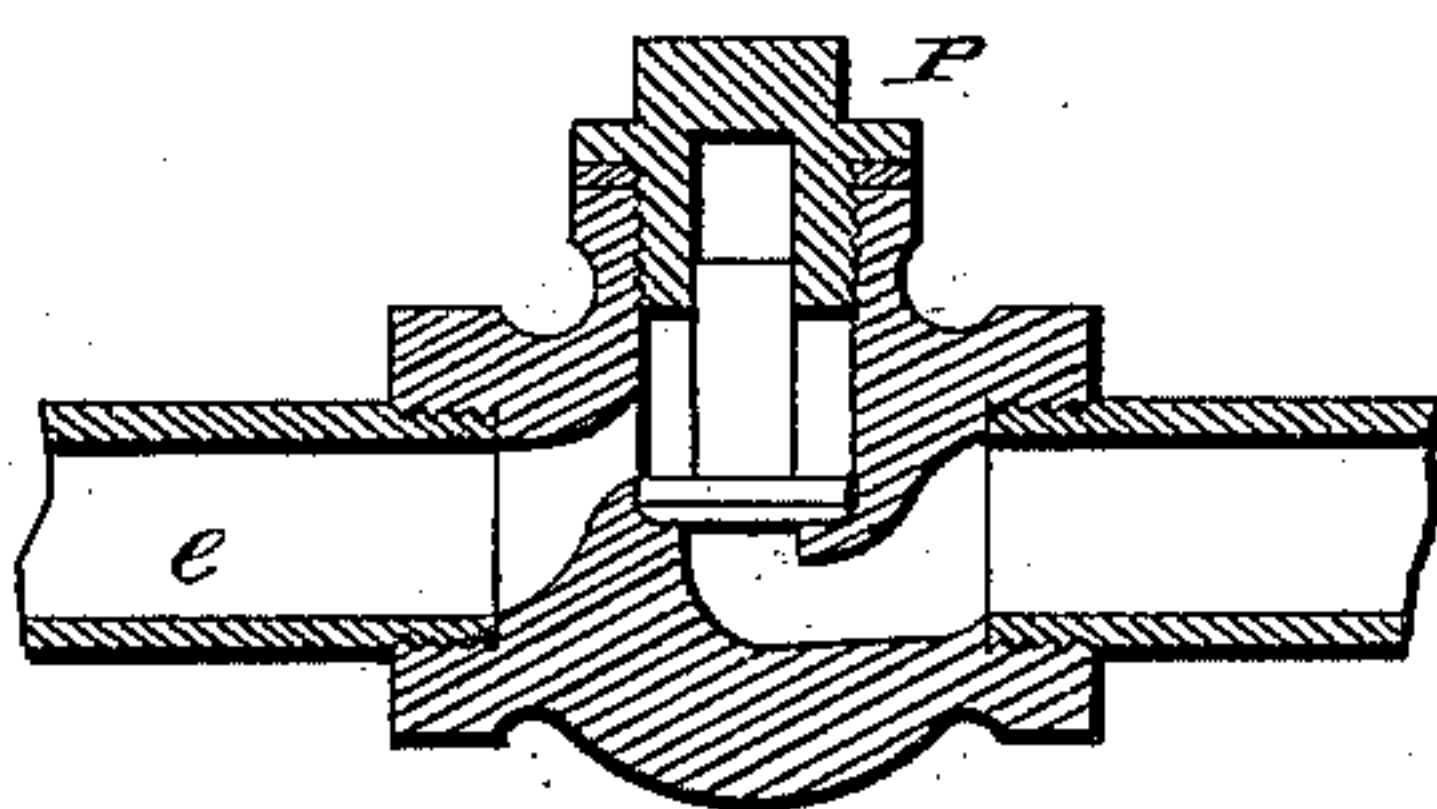
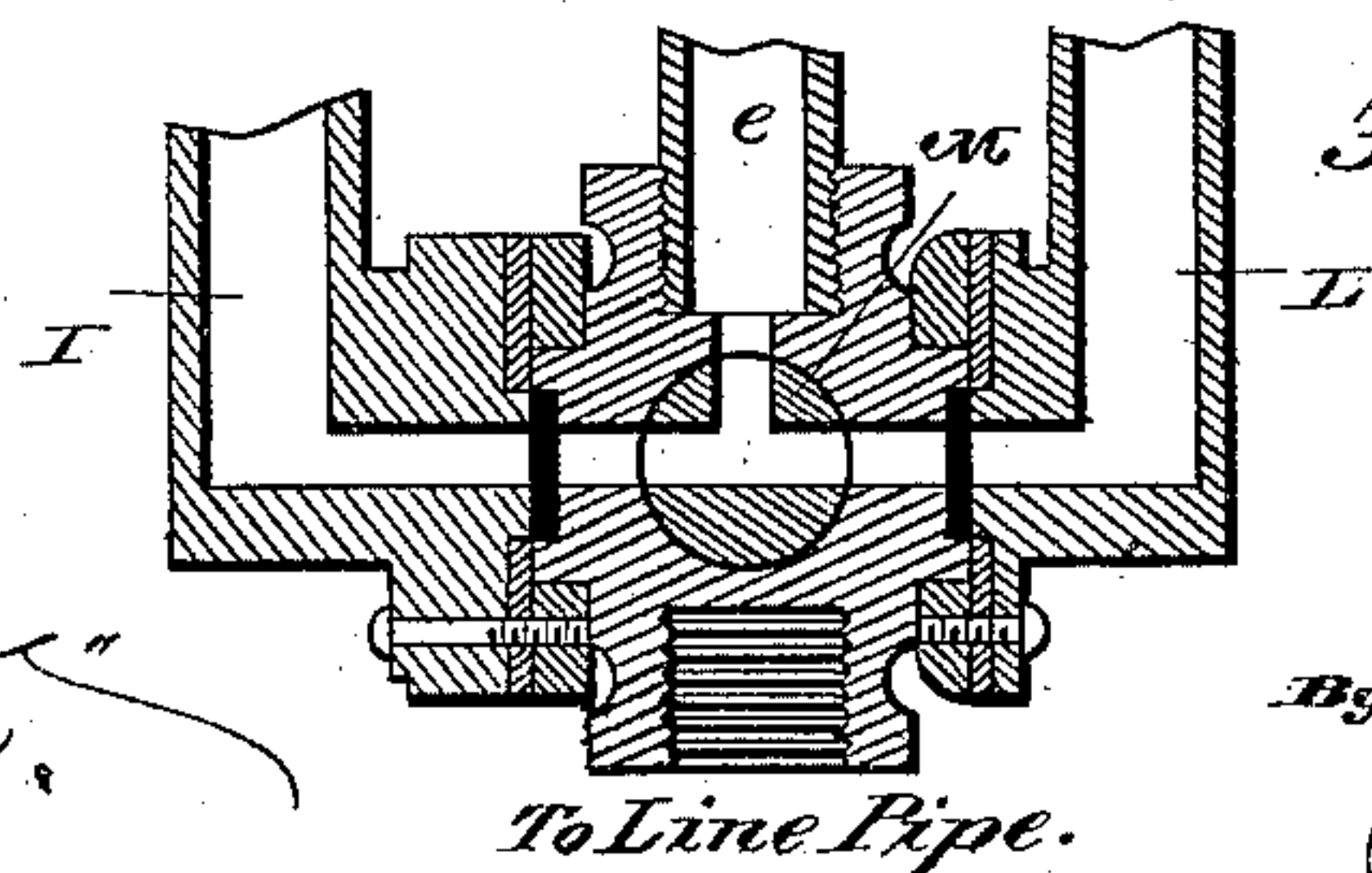


Fig. 4.



Witnesses:

"Ashes"
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UNITED STATES PATENT OFFICE.

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AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 398,310, dated February 19, 1889.

Application filed August 27, 1888. Serial No. 283,820. (No model.)

To all whom it may concern:

Be it known that I, ALFRED R. BOLUSS, a citizen of the United States, residing at Norwood, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Air-Brakes; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it ap-
10 pertains to make and use the same.

This invention has relation to improvements in regulating devices for automatic pneumatic brakes, and the invention will be fully understood from the following description and claims.
15

An important desideratum in this class of devices has been to provide means whereby the brakes may be instantaneously and positively applied to the wheels of a car-truck or
20 train of cars, the brakes of one or more cars momentarily released, and in case of an accident in which the engineer may be cut off from control of the train to render each car capable of operation, so that an attendant on the car or cars may quickly and easily take
25 charge of the car thus presumably disabled, and by the aid of the auxiliary storage carried by such car successfully apply and release the brakes.

A further desideratum has been to provide a simple and inexpensive means whereby the engineer may take entire control of a train of cars and positively and quickly apply and
30 release the brakes on all of the cars simultaneously.

A still further desideratum has been to positively apply the brakes or brake to one or more cars from the main source of supply without the dependence on valves and auxiliary valves, which have been so often found
40 to become inoperative, or, as is commonly known, to hang in operation; and a still further desideratum has been to render each car capable of operation, whereby the brakes
45 may be applied on a car a number of times after being disconnected from the train, such apparatus to be so constructed and the parts adapted to utilize the atmospheric pressure and return it to the storage or auxiliary reservoir after acting upon the plunger which
50 actuates the working parts.

These several objects are accomplished by the mechanism shown and illustrated in the accompanying drawings, in which the objectionable springs and like elements are dispensed with. 55

In the said drawings, Figure 1 is an inverted plan view of a portion of a car, showing my improvements applied. Fig. 2 is a horizontal sectional view of my improved device, taken
60 through the valve-chamber or piston-chamber and the plunger-chamber. Fig. 3 is a sectional detail view showing the position of the check-valve; and Fig. 4 is a sectional detail view showing the position of the three-way
65 cock for controlling the supply of atmospheric pressure to the auxiliary storage and brake cylinder, as well as to the "automatic pneumatic device," as I have termed my flexible
70 piston or plunger.

Referring by letter to the said drawings, A indicates the main case, which contains the flexible plunger or automatic device, which may be formed from any suitable number of parts properly united by screws or other fast-
75 ening devices, or such case may be formed in a single piece.

B indicates the cylinder in which the piston is operated. This cylinder is connected with the main case A, preferably by a screw-
80 joint and suitable packing. The said cylinder is furthermore provided at one side with a screw-tapped port, *a*, to connect by a suitable pipe with the storage-cylinder C, a port, *b*, to connect by a suitable pipe with the
85 brake-cylinder D, a port, *c*, to connect with a line-pipe, and a port, *e*, to connect by means of a pipe carrying a check-valve with the said main or line pipe.

E indicates the piston, carrying at one end
90 and within the main case A a flexible device, which I shall now describe in detail. This flexible device comprises a head, *d*, secured to the end of a piston-rod within the case A by means of a nut or other fastening device and
95 a set of flexible diaphragms, *f*, one of which is secured at its margin to the marginal portion of the movable head *d*, and the opposite one secured at its margin to the forward wall of the said chamber. The opposite or inner edges
100 of these diaphragms are secured to a flanged ring, F, which is arranged loosely upon the

piston-rod E. The movable head *d*, as well as the forward head or inner wall of the main face, is annularly recessed, as shown at *g*, the object of which is to receive the flanges of the ring and the diaphragms drawn over them when this automatic device or flexible plunger has been collapsed. The ring F has its eye for the reception of the piston-rod E sufficiently large, as shown at *h*, to form a communication between the chambers G and H. The plunger or piston-rod E passes from the chamber A into the cylinder B, which is of a much less capacity than the said chamber A, and the atmospheric pressure should be shut off from direct communication therewith. By having this chamber or cylinder B of a less capacity or internal area than the chamber A, as will be presently understood, the said flexible device will always predominate over the cylinder B, and consequently control the movements of its piston-head.

The main case or chamber A is provided with an inlet-port, *i*, which is designed to normally receive the air-pressure from the main source of supply delivered through the line-pipe, there being a valve provided between this port and the said line-pipe.

I indicates the pipe which leads from the case A, L a pipe which leads from the cylinder B, and K a pipe which also leads from the said cylinder and is provided with a check-valve, whereby the air may enter the cylinder B and pass to the storage-cylinder, but will be prevented from returning. These three pipes I, K, and L communicate at one end and also communicate with the port to the line-pipe, being provided at their junction with a three-way cock, M, so that by turning in one position (being that shown in Fig. 2) the air from the main supply will be free to pass through the pipe I to the chamber A and through the pipe K, having the check-valve, to the cylinder B, and thence to the storage-cylinder. When this valve M is in the position shown in Fig. 4 of the drawings, communication is shut off between the main source of supply and my improved apparatus and communication opened between the cylinder B and the chamber A, and consequently the storage-cylinder. It will therefore be seen that as the check-valve in the pipe K prevents any return of the air from the cylinder B through the port *e* the air thus stored when a car has been cut off from a line through an accident or other cause will first act to apply the brakes by passing through the brake-cylinder. Now, when it is desirable to release the brake the three-way valve M is turned, so as to form a communication between the chamber A and the cylinder B, when the flexible plunger will again expand, so as to draw back the piston-head N on the rod E behind the port *b*, thereby allowing the air from the brake-cylinder to return to the said cylinder B and exhaust through the ports *l* in advance of the piston-head. When the cock M is again turned to exhaust the air

from the case A, the supply in the storage-tank will be again delivered through the cylinder B as the plunger has been advanced through the port *b* into the brake-cylinder to apply the brake. When it is desirable by the engineer to apply or release the brakes directly and positively, the cock M is turned so as to form a communication between the line-pipe, the pipe having the check-valve, and the pipe L. In this case the air will not pass through the case A, but directly into the cylinder B, forcing forward the piston-head, and pass to the brake-cylinder, when by turning the valve M to communicate with the cylinder A the air from the storage-cylinder will act upon the flexible plunger, withdraw the piston, and release the brakes.

It should be here observed that but very little air is wasted in the operation of my apparatus, and that no cock or other means is employed between the storage-cylinder and the cylinder B, so as to be always ready to act automatically, the air in the said storage being always free to act both to apply and release the brakes, and I attach importance to this feature of construction. It should also be observed that I dispense with the objectionable use of springs in this class of devices, which have been found so objectionable.

The check-valve (shown in Fig. 3 of the drawings and indicated by the letter P) may be of the usual construction.

It will be seen that I employ a packing-gland on the piston between the chamber A and the cylinder B, so as to prevent communication between the two chambers or the admission of air from one to the other through the passage for the said piston-rod.

By reference to Fig. 2 of the drawings it will be seen that the port *b* is provided with a plurality of apertures, *s*, the one next to the exhaust *l* being largest and the others decreasing in diameter. The object of this construction is to allow the brake a more rapid movement in the start of releasing and to move gradually thereafter.

Having described my invention, what I claim is—

1. In a fluid-pressure brake, the combination of a cylinder having ports for attachment with a brake-cylinder and storage-cylinder, respectively, a flexible diaphragm arranged in a case, a piston-rod having one end secured to a diaphragm and having its opposite end secured to a piston-head in the cylinder, a pipe connecting the case with the cylinder and carrying a three-way cock, and a pipe connecting the cylinder with the pipe leading from the cylinder to the diaphragm-case, and having a check-valve, substantially as specified.

2. The combination, with a case, such as A, of a cylinder, such as B, the latter being of much less internal area than the former, the piston-rod working in the respective chambers, having at one end a head and at the opposite end within the case A a flexible device

for driving the same, a pipe, such as K, having a check-valve, and a pipe, such as L, both leading from the cylinder B, and a pipe, such as I, connected with the main case A, the said 5 pipes communicating at their outer ends and also communicating with the line-pipe, and a three-way cock arranged at the junction of the respective pipes, substantially as specified.

3. The combination, in a fluid-pressure 10 brake, substantially as described, of the cylinder B, having the exhaust-ports at its outer end, and the port connecting with the brake-cylinder, the latter port having graduated apertures s, and the piston-rod having a head 15 whereby the action of the brake in releasing will be rapid at the start and then gradual.

4. In a pneumatic brake, the combination, with the main case having a single communicating aperture, of the piston-cylinder having 20 a less internal area than said case, a rigid piston-rod passing through a gland in the case, so that one end will extend into the cylinder, a flexible device, constructed as shown, secured to the end of the piston-rod within the

case and a head secured to the opposite end 25 thereof, a pipe leading from the only port of the case to the interior of the cylinder, so that fluid may be carried to and from the case by the same pipe, and a three-way cock arranged in the pipe at a point where the same connects with a line-pipe, substantially as specified. 30

5. In a fluid-pressure brake, a piston-cylinder, such as described, having an exhaust at its outer end and a port in rear of the exhaust to connect with a brake-cylinder, said 35 port having a plurality of apertures which vary in size, whereby in the backward stroke of the piston or valve rod the largest port will be first uncovered to the exhaust, so that the 40 action of the brake will be rapid at the start and then gradual, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

ALFRED R. BOLUSS.

Witnesses:

EMMA M. GILLETT,
JOHN G. KROHR.