

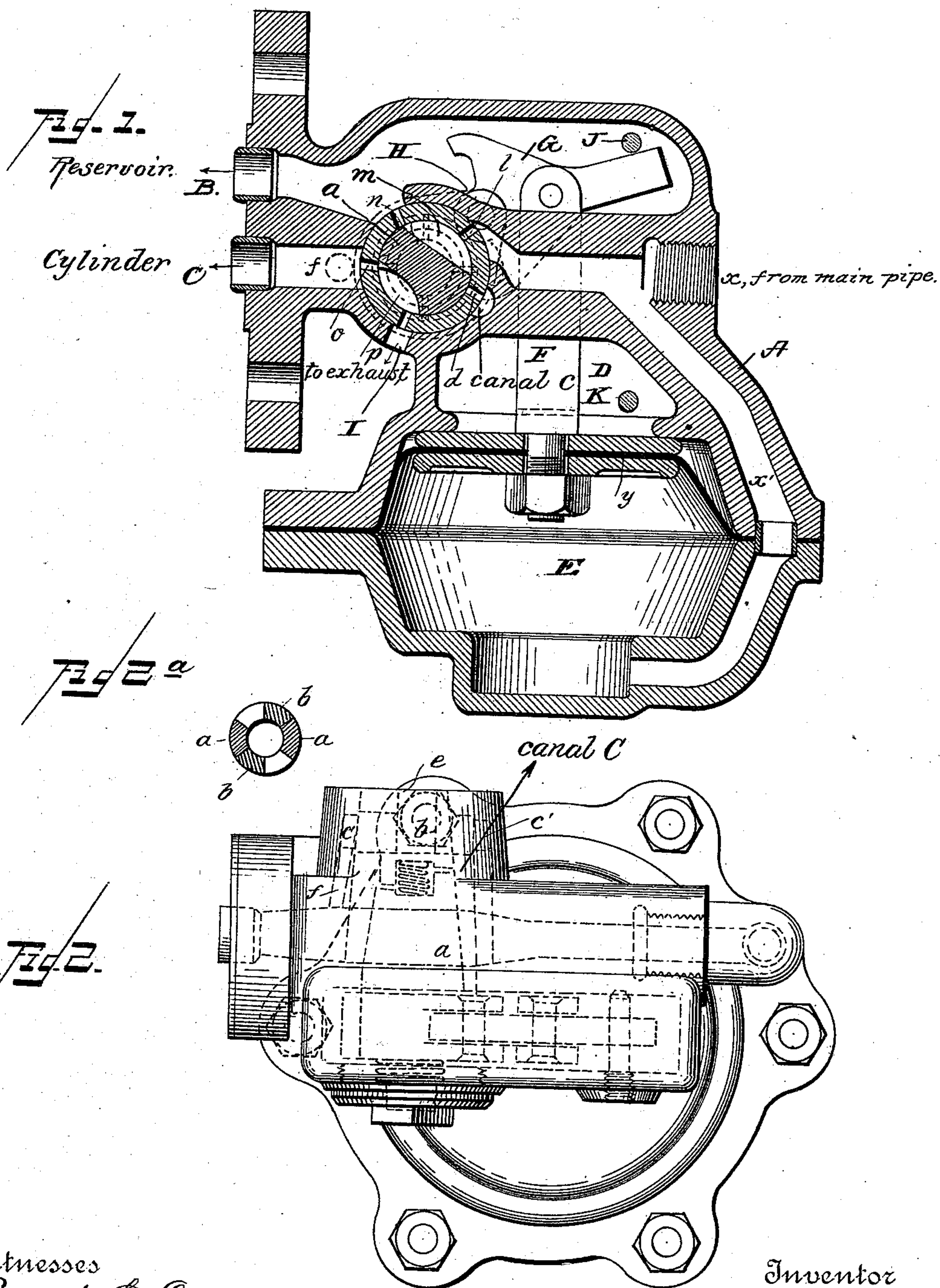
(No Model.)

2 Sheets—Sheet 1.

J. F. CARPENTER.
AUTOMATIC COOK VALVE.

No. 412,463.

Patented Oct. 8, 1889.



Witnesses
Franck L. Curand,
E. A. Kinckel,

Inventor
Jesse Fairfield Carpenter
by Wm. H. Luedel
his Attorney.

(No Model.)

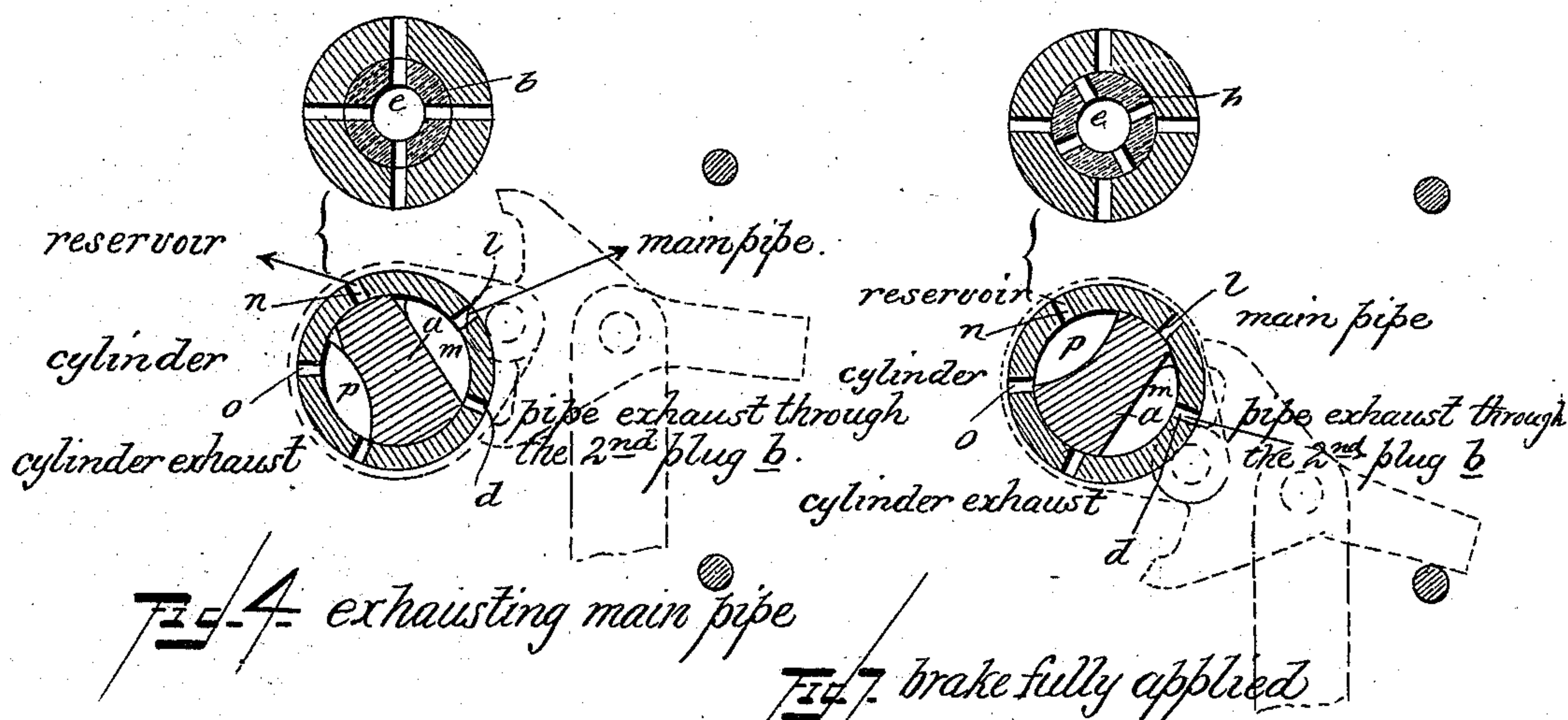
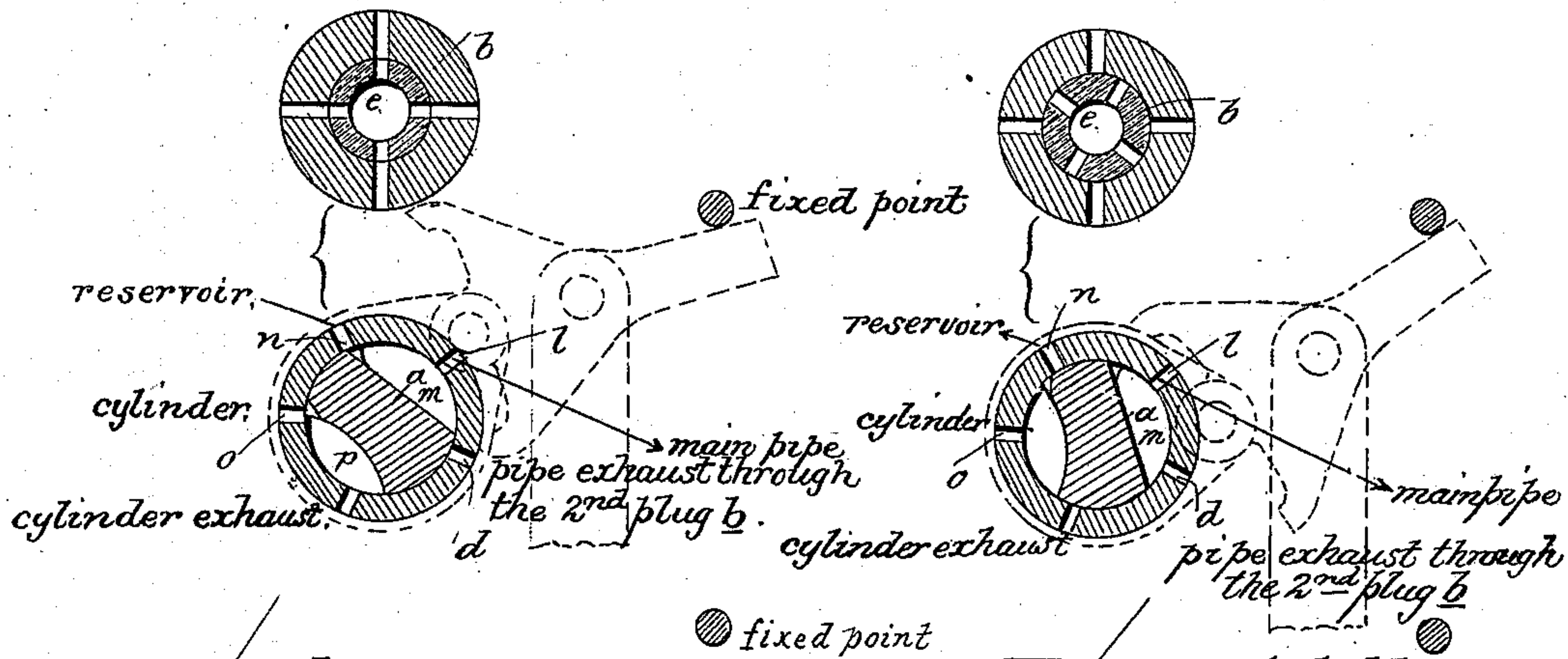
2 Sheets—Sheet 2.

J. F. CARPENTER.

AUTOMATIC COCK VALVE.

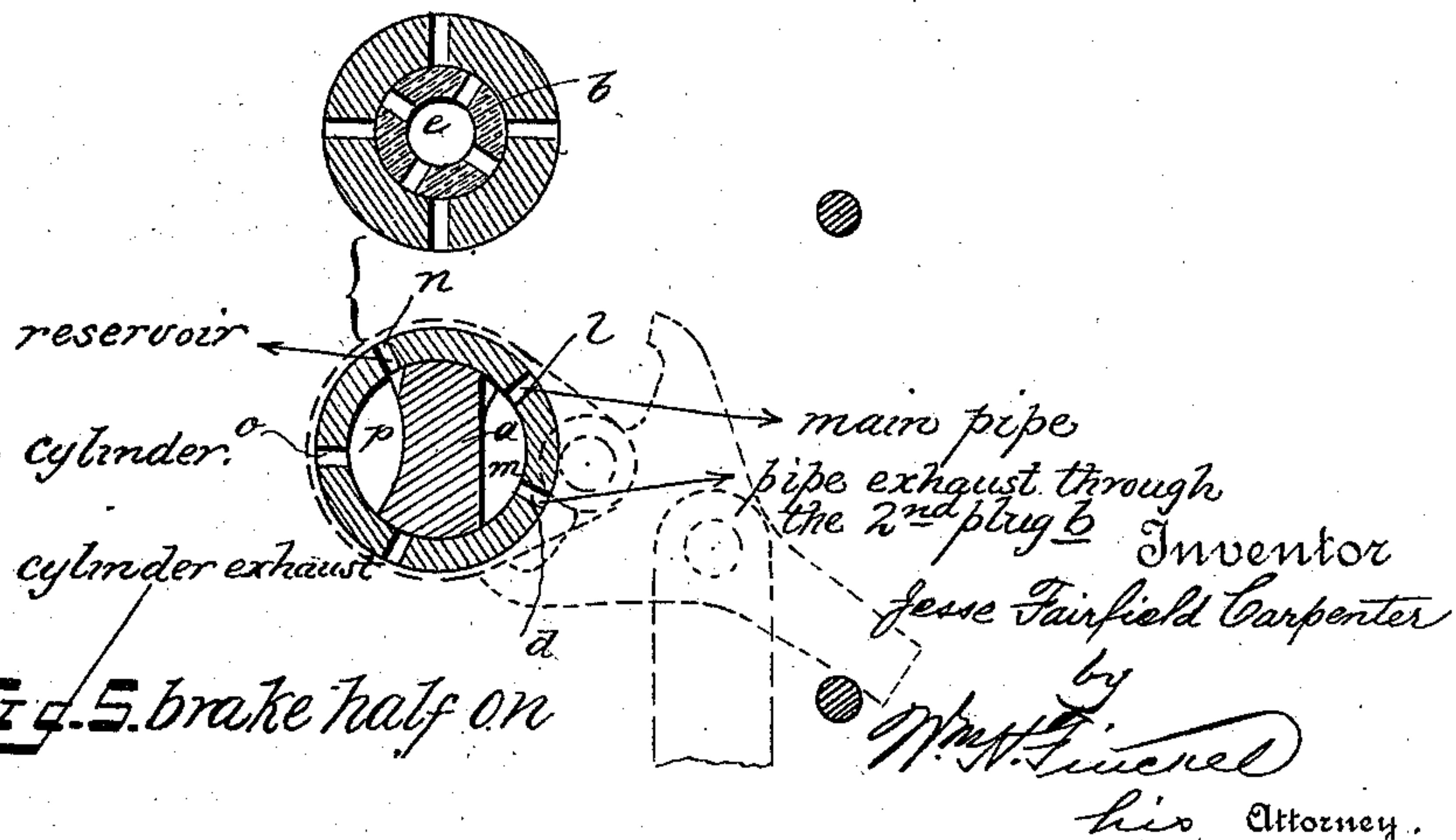
No. 412,463.

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Witnesses
Ed. Finckel
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Fig. 5. brake half on



Inventor
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by
Wm. H. Finckel
his Attorney.

UNITED STATES PATENT OFFICE.

JESSE FAIRFIELD CARPENTER, OF BERLIN, GERMANY.

AUTOMATIC COCK-VALVE.

SPECIFICATION forming part of Letters Patent No. 412,463, dated October 8, 1889.

Application filed June 11, 1889. Serial No. 313,945. (No model.)

To all whom it may concern:

Be it known that I, JESSE FAIRFIELD CARPENTER, a citizen of the United States of America, residing at Berlin, Prussia, German Empire, have invented certain new and useful Improvements in Automatic Cock-Valves, of which the following is a full, clear, and exact description.

This invention relates to various improvements in automatic cock-valves such as have been already described and shown in my patents No. 386,523, dated July 24, 1888, and No. 405,694, dated June 25, 1889.

The special improvements which I wish to claim in the present case are, first, the elimination of the stop or check valves heretofore interposed in the passages in the valve-box leading from the main air-pipe and the substitution therefor of a groove or passage in the plug-valve; second, the rearrangement of the ports of the plug-valve so as to give a materially large increase of effectiveness and rapidity of action. These changes effect new and important improvements of operation, as will presently appear.

The invention will be described first and then particularly pointed out in the claims.

In the accompanying drawings, illustrating my invention, in the several figures of which like parts are similarly designated, Figure 1 is a vertical section showing the plug-cock mechanism in its case complete. Fig. 2 is a top plan view showing the various details dotted in. Fig. 2^a is a cross-section showing the lugs for connecting a two-part plug-cock. Figs. 3, 4, 5, 6, and 7 show, in vertical section and in dotted outline, the various positions of the plug-cock and its operating-lever respectively, as clearly expressed in the words set opposite said figures, as hereinafter described.

The apparatus is designed to work automatically a series of pistons which operate in cylinders situated at considerable distances from a central point, herein designated the "power appliance." The operative agent used may be compressed or rarefied air or other fluid, which is conveyed to the various apparatus in series through a conduit hereinafter called the "main air-pipe." At the central or end point a three-way cock (not shown,

but which may be of ordinary construction) is situated in the main pipe, and serves to control the whole series of valve mechanisms.

Each valve mechanism comprises a box A, having an inlet x for the main pipe, and outlets B and C, which, in the example shown, lead, respectively, to a reservoir in which the operative fluid is stored and to a cylinder containing the piston for applying the power to the mechanism to be controlled. The description herein relates more particularly to air-brakes for railway-cars. The box A has chambers D and E, which are separated by a diaphragm y , and this diaphragm carries a stem F, to which stem is pivoted a lever G. This lever in turn is pivoted to an arm H, made fast to the plug-valve a , which plug-valve is arranged in the passage-ways leading from the inlet x to the reservoir and cylinder outlets and to the passage communicating with the chambers D and E and the exhausts c and I to the atmosphere. The lever G is a floating compound lever, as more particularly described in my patent, No. 405,694. Upper and lower stops J K, respectively, limit the respective movements of the said lever G.

Other details of construction will appear from the following description of the operation of the apparatus; but I wish to note here particularly that in this apparatus all check-valves, such as those designated a' and a'' in my patent, No. 405,694, are rendered unnecessary in the operation of the apparatus:

Operation: In working order this valve-cock mechanism is connected at x to a main pipe, which is filled with compressed air or other motive agent. This compressed air passes first through the port l to the space or groove m in the cock-plug a to the port n , and thence to the reservoir, filling the same with air at a high pressure. At the same time that this reservoir is filling, the air-pressure also fills, through port n , the upper chamber D of the valve-box, and exerts its force upon the upper side of the diaphragm y . At the same time the air passes through the passage x' into the chamber e , below the diaphragm, even quicker than it can pass by the small passage n to the upper side; but the pressure being equal the whole mechanism is in balance or equilibrium. To work

the apparatus it is necessary to turn the plug-cocks *a* and *b* to the various positions shown in Figs. 3 to 7. The plug-cocks *a* and *b* may be connected as in Patent No. 405,694. The operation of these cocks is effected by disturbing the equilibrium previously obtained on the diaphragm *y*. By momentarily opening the three-way cock, previously mentioned as situated in the end of the main pipe, the air-pressure is allowed to escape slightly from both sides of the diaphragm; but inasmuch as the passage *x'* is the larger the air will escape more rapidly and freely, and the consequence will be that the equilibrium will be disturbed, because the air on the upper side of the diaphragm is retarded. The difference in pressure will result in immediately forcing the diaphragm downward from the position shown in Figs. 1 and 3 to the position shown in Fig. 4, the diaphragm carrying with it the stem *f* and the lever *g*, and rotating the plug-cock. In this position of parts there is an open passage from the main pipe through the port *d*, groove *m*, and port *l* into the port *c'*, valve *b*, and port *e* to the atmosphere at each valve apparatus and independently of further movement of the three-way cock. A further reduction of pressure now takes place rapidly under the diaphragm of each valve apparatus in the series, causing the same to move farther down to the third position. (Shown in Fig. 5.) In this position of parts a passage through port *n*, groove *p* in plug *a*, and port *o* from the reservoir to the cylinder is partly open, allowing a portion of the air-pressure of the reservoir to expand into the cylinder and move its piston out, and thus perform the work required with moderate force, or, as indicated opposite Fig. 5, to put the brakes half on. In this position the lever *G* will come in contact with the lower stop *K* and arrest further opening of the passage from the reservoir to the cylinder, and unless a large reduction of pressure is made at first in the main pipe at the first opening of the three-way cock a slight passage of pressure from the reservoir to the cylinder will restore the equilibrium of the diaphragm *y*, and it will rise to the position shown in Fig. 6, where all the various passages are closed to each other, so that the pressure in the brake-cylinder is confined therein and the brakes are held on. If, instead of a slight reduction of pressure, there had been at first a large reduction of pressure in the main pipe through the three-way cock, the disturbance of equilibrium on the diaphragm would be sufficient to force it to the lowest position, Fig. 7, where the passage from the reservoir to the cylinder is fully open and the full force of the pressure in the reservoir will be exerted on the cylinder-piston. In either case the plug-cock returns to the position, Fig. 6. By introduction of fresh pressure into the main pipe from a central station the parts will be restored to the position shown in Figs. 1 and 3, and the various apparatus in the series will

be recharged. The cylinder will be in connection with the exhaust-passage, so as to release its pressure when the parts are thus restored.

The radical difference between this apparatus and all others to me known is that the automatic exhaust takes place at each valve at the first part of the movement of the valve mechanism and before the first application of the reservoir-pressure to the cylinder-piston. This results in materially increasing the rapidity of action in a long series of apparatus, and insures great regularity of force and degree of application on all the pistons. This preliminary exhaust, however, is possible only in a valve mechanism where the exhaust-ports are mechanically controlled by the main diaphragm. Mechanisms having check and balance valves worked by difference of pressure between the cylinder and main pipe do not admit of this preliminary exhaust; but the automatic exhaust on each mechanism can only take place after the position shown in Fig. 5 has been obtained, for the reason that the apparatus could not be graduated in its action and must work with full force at each application, for until then the check or balance valve employed could not close against the main-pipe pressure with the cylinder-pressure acting on the other side.

In using this mechanism it is immaterial whether the automatic exhaust on each valve takes place through the passages *l m d c c' b e* to the atmosphere, or through the passages *l m b c c' f* to the brake-cylinder. In the first case the passage *e* would be omitted, and in the latter case the passage *f* would be omitted. The importance of this preliminary automatic exhaust on each valve mechanism is very great, and is especially so in service-stops on railroads where the brake is seldom fully applied.

What I claim is—

1. A valve mechanism comprising a box, a diaphragm dividing the same into two chambers and in open communication by means of a main pipe with a primary source of fluid-pressure on both of its sides, and also in communication with a secondary source of fluid-pressure on one side and a valve mechanism interposed between this secondary source of fluid-pressure, and one side of the diaphragm, and also interposed between both sources of fluid-pressure, and an apparatus for utilizing the motive fluid for the application of force, and provided with an outlet to the atmosphere, all constructed and arranged substantially as described, whereby the main pipe may be automatically exhausted at each valve apparatus of a series at the first part of the stroke and before the first slight application of force to the power appliance, substantially as set forth.

2. A valve-box having a pressure-chamber, a diaphragm arranged in said chamber, a stem rising from such diaphragm, a lever pivoted to such stem, a valve pivotally connected

to such lever, a secondary container of pressure, and a power-applying apparatus, the valve having suitable ports for controlling the passages from the main pipe to the secondary container and to the atmosphere, and other passages leading from the secondary container to the power appliance, and other passages leading from the power appliance to the atmosphere, all combined and arranged substantially as described, whereby upon reduction of pressure at the main station the main pipe at each valve apparatus will be exhausted

automatically at the first part of the stroke and before the first slight application of power by the power appliance and without the intervention of check-valves or equivalent medium, substantially as set forth. 15

In testimony whereof I have hereunto set my hand this 23d day of May, A. D. 1889.

JESSE FAIRFIELD CARPENTER.

Witnesses:

GEO. H. MURPHY,
B. ROY.