(No Model.) 2 Sheets—Sheet 1.

J. F. CARPENTER.

AUTOMATIC VALVE COCK.

No. 405,694. Patented June 25, 1889.

Fig: 1.

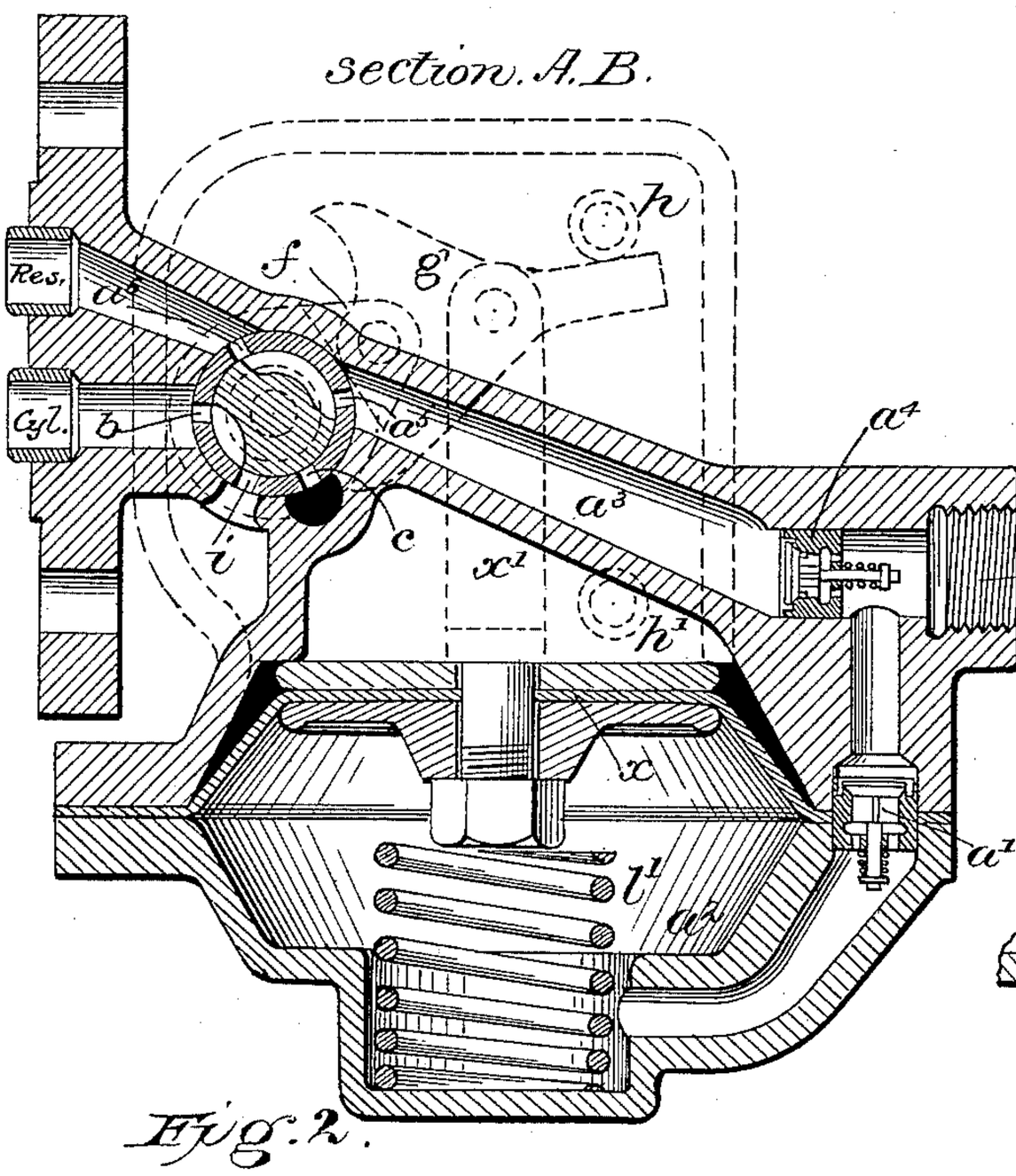


Fig: 2.

Fig: 3.

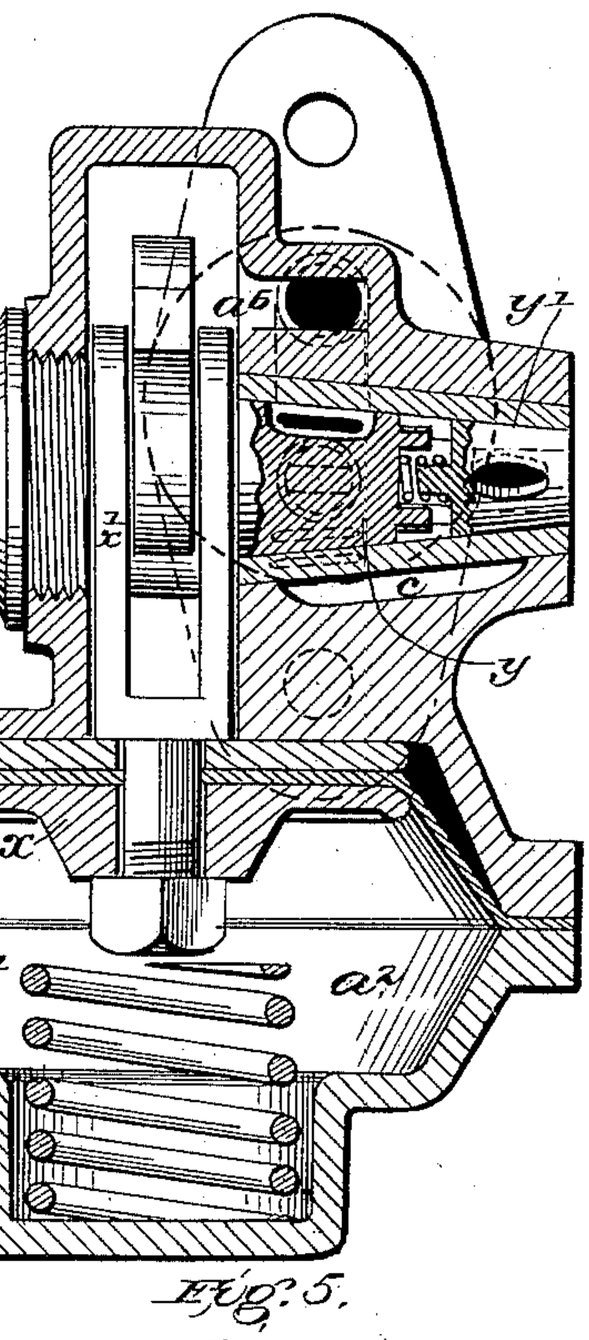
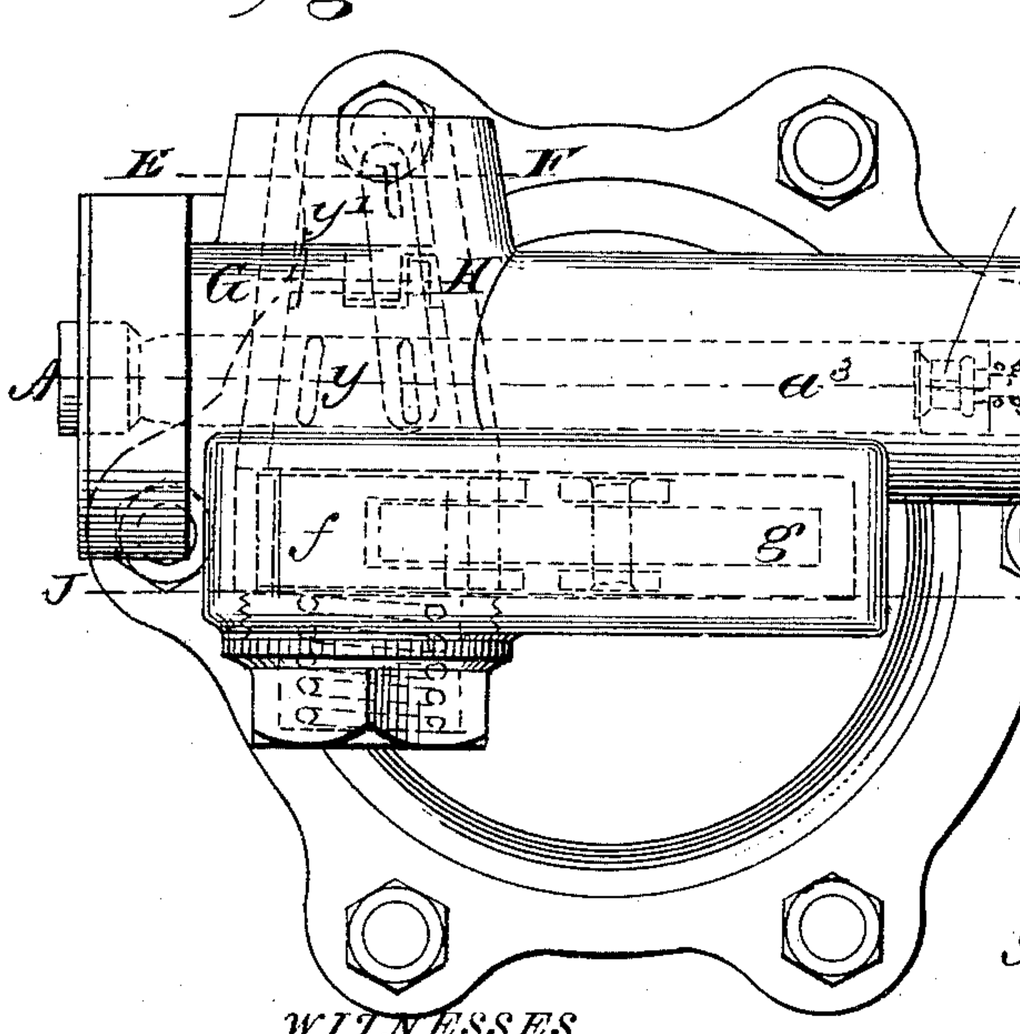


Fig: 5.



Section G.H

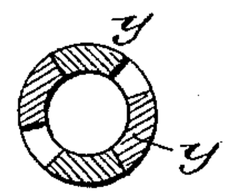
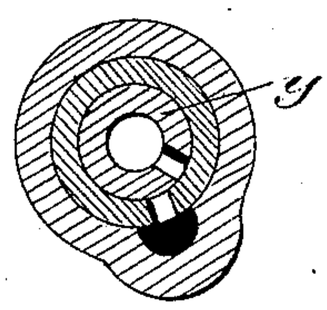


Fig: 4.

Section E. F.



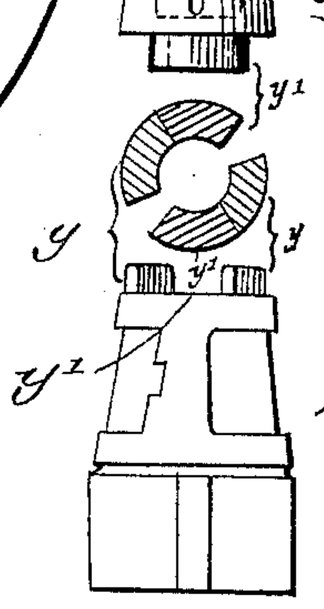


Fig: 4a

WITNESSES

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(No Model.) 2 Sheets—Sheet 2.

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AUTOMATIC VALVE COCK.

No. 405,694. Patented June 25, 1889.

Fig: 6.

Section J. K.

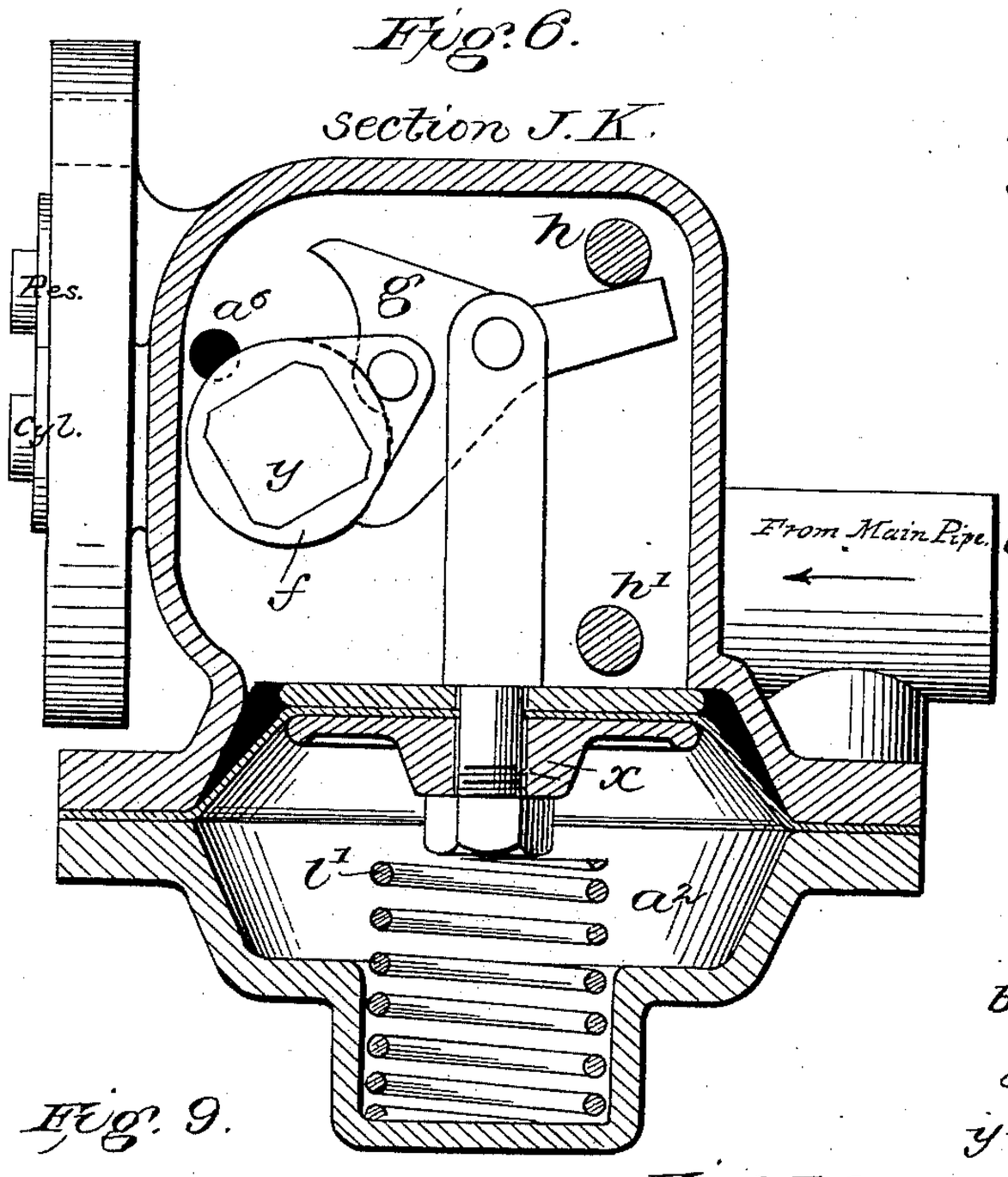


Fig: 9.

Fig: 7.

brake off

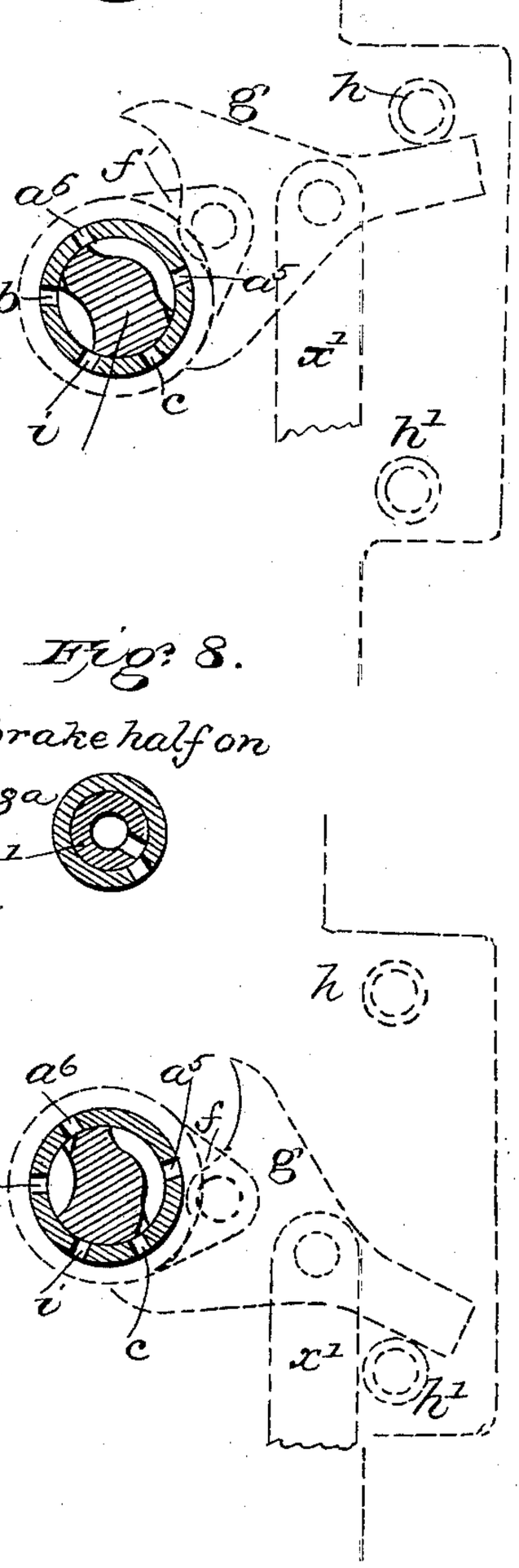
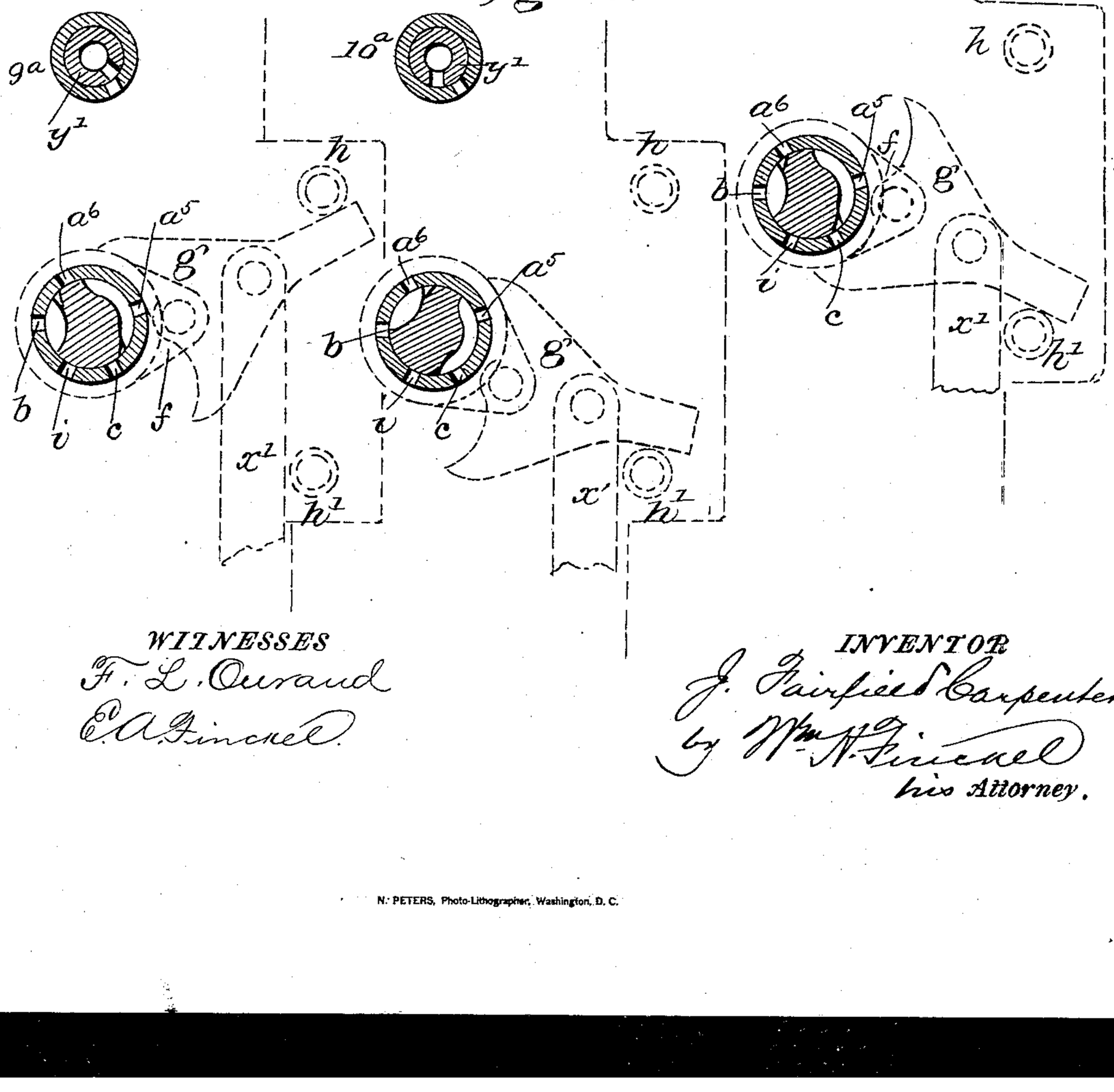


Fig: 8.

brake half on

Fig: 10.



WITNESSES

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UNITED STATES PATENT OFFICE.

JESSE FAIRFIELD CARPENTER, OF BERLIN, GERMANY.

AUTOMATIC VALVE-COCK.

SPECIFICATION forming part of Letters Patent No. 405,694, dated June 25, 1889.

Application filed August 6, 1888. Serial No. 282,080½. (No model.)

To all whom it may concern:

Be it known that I, JESSE FAIRFIELD CARPENTER, a citizen of the United States of America, but at present residing in the city of Berlin, German Empire, have invented new and useful Improvements in Automatically-Worked Valve-Cocks, of which the following is a specification.

My invention relates to the working automatically of various objects at a distance from a central point of action—such as railroad switches, signals, crossing-gates—or to the working of car-brakes or other railroad-train mechanisms. Air-pressure, vacuum, or other fluids may be employed as the transmitting agent and actuating force. A cylinder of common form with piston moving therein is used to apply said force to the special mechanism in each case.

This invention differs from that shown in Letters Patent No. 386,523, granted to me July 24, 1887, in important details, and these alone are here more particularly described and claimed.

The automatic valve-cocks are attached at intervals to the main conduit or pipe, and serve to operate each its own special set of apparatus, be it switch, gate, or other mechanism, as above mentioned, the office of this valve-cock being to automatically open and close certain parts, as will be fully described.

The objects of my invention are, first, to operate at great distances from a single point one or a large number of such cocks, automatically opening or closing the same, through or by means of variations in the pressure (of air, vacuum, or other fluid) which is maintained in the main conduit passing along the whole distance and joining each automatic valve-cock fixture in the series, and, secondly, in order to more fully effect this, to so construct each cock-fixture that the operation of the one next the central point will alone cause the next cock in series to act, and so on indefinitely for any distance, as will be further shown.

The improvements made in this valve-cock construction consist, first, instead of the diaphragm or piston which turns the plug acting on a simple lever, as in my before-referred-to patent, said diaphragm in this invention acts on a compound lever having automatically-varying fulcrums and lengths of arm, so that the power employed in working the valve-cock is automatically greatly increased and decreased at certain fixed points, and thus these points cannot be passed without materially varying the actuating pressure in the main pipe, and, second, in substituting a second plug operated directly by the first plug (at certain portions of its stroke only) for the independently-acting automatic valve in the former application.

Passing now to a detailed description of the apparatus claimed, Figure 1 is a vertical section taken in the plane of line A B of Fig. 2. Fig. 2 is a plan showing in dotted lines parts inside. Fig. 3 is a section taken in the plane of line C D, Fig. 2. Fig. 4 is a vertical section taken in the plane of line E F, and Fig. 5 is a similar view taken in the plane of line G H, Fig. 2. Fig. 4^a shows the cocks y and y' in detail. Fig. 6 is a sectional elevation taken in the plane of line J K, Fig. 2; and Figs. 7, 8, 9, and 10, with the added views 7^a, 8^a, 9^a, and 10^a of the cock y', show the various operative positions of the two cocks and the compound lever.

In this description air-pressure will be considered as the actuating force. In using vacuum or other fluid no material change of construction is necessary.

The main pipe or conduit is connected at a. Air passing a small hole of the check-valve a', fills the chamber a^2 under the diaphragm X and forces X up into the position shown. Air-pressure passes, by means of the canal a^3 past the check-valve a^4 to the cock-port a^5, whence passing through the cock-plug y it fills the chamber a^6, from whence it can pass to the accumulator attached to each apparatus, and is there stored for use. From a^6 air can also pass at all times to the chamber above the diaphragm X and act on the latter. (See Figs. 2 and 3.) The cylinder and accumulator, as well as the other apparatus for working the switches, gates, &c., being of usual form and being not here claimed, are not shown.

To operate this mechanism the air-pressure is reduced in the main conduit a at the central point by letting a little pressure escape into the atmosphere. This reduces the pressure in the main conduit a and thereby the pressure in the chamber a^2, under the diaphragm X, and the check-valve a^4 being self-

closing and the pressure already in the accumulator being held there and now free to act on the upper side of the diaphragm X, will force it downward, turning the attached plug-cock y from the position shown in Figs. 1 and 4 to the position shown in Fig. 7, if the reduction of pressure in the main conduit is considerable. (If a less reduction of pressure has been made, the plug may be turned only as far as shown in Fig. 5.) In either case communication is now open from a^6 to b. Assuming that the automatic cock is arranged in an air-brake system comprising an auxiliary reservoir, brake-cylinder, and other fixtures, as usual, the cock is now in position to let the pressure pass from the accumulator (or reservoir) a^6 to the cylinder (brake-cylinder) b, and operate the mechanism by pressing out a piston contained in said cylinder, in the usual way. At the same time that the passages a^6 and b are fully connected by the turning of the plug y, Fig. 1, the passages c and a^5 are also joined together, as shown in Fig. 7. Now the passage c is in connection with the passage a^5—that is, with the main conduit a—(see Fig. 1) and the passage c is connected with the atmosphere through the second plug-cock y', so that when these two passages c and a^5 are connected the air-pressure from the main conduit can continue to pass out to the atmosphere even after the cock at the central station has been closed by the operator. In this way the working of the first cock in the series causes an increased reduction of pressure in the main pipe or conduit and brings the next cock y into action thereby, and so on, *ad infinitum*, through a series of any number of automatic valve-cocks, which may be attached to a main conduit of any length.

It may be remarked that in working these automatic cocks more or less reductions of pressure may be given, according to the degree of force it is wished to use in the cylinders. If this force is to be very slight, only a trifling reduction of pressure is made at the central station, and in such cases the diaphragm X may not be pressed down to the bottom of the chamber a^2, but only part way till it starts compressing the spring l'. In such cases the plug-cock y' is also turned part way, as shown in Fig. 5. Where the passages b and a^6 are not fully connected, the other passages a^5 and c are also not fully open, so that although the pressure can pass from accumulator to cylinder and do a certain amount of work it does not do this with full force, and the passages a^5 and c do not allow as much air-pressure to escape out of the pipe as if they were fully open, and in this way a moderate application of the brake is secured, which may be increased or decreased at will. Just here occurs the radical difference between this and other valve constructions, the great difficulty in practice being to control a long series of these valves at great distances from the engine, and while applying the brake slightly at the rear of a train to avoid its application with full force at the front.

A strong line of demarkation between what reduction of air-pressure in the main pipe is required to put the brake partly on or full on is the principal object claimed here. Instead of the diaphragm X being attached through its stem x' by a simple lever to the plug y, I use compound levers f and g, Figs. 1 and 2, the former being rigidly attached to plug y and the latter being jointed to the former, and also pivoted to the stem x' of the diaphragm and extended to the other side of the stem from the plug to co-operate at stated intervals with one or the other of the stops h and h'. g has a limited motion in each direction, at the end of which it is stopped by the fixed points h h'. These points become its fulcrum, (instead, as formerly, the axis of the plug y,) and the result is the diaphragm X can exert only a small part of the force on the plug y that it formerly did, the leverage being greatly decreased, or, in other words, a further large amount of air must be let out of the main pipe to pass from the position of moderate braking to that of full power. The second plug y' is moved at the last part of the stroke of y, and thus closes the escape of air from the main pipe through c, which would otherwise continue as long as the brake remains on. In releasing the brake the last part of the reverse stroke of X and y returns y' to the open position, so that c is again open to the atmosphere.

What I claim is—

1. The combination of a piston or diaphragm having a stem, a lever pivoted to said stem and movable by the piston or diaphragm, fixed projections which become the fulcrums for said lever at opposite ends of the throw of the piston or diaphragm, and a plug and lever extended therefrom and connected to the first-named lever, all arranged to operate substantially as and for the purposes described.

2. The plug y and the plug y', loosely connected to and operated by the first-named plug, combined with a piston or diaphragm and a compound lever connected therewith and with the plug y and attaining its fulcrums at opposite ends of the throw of the piston or diaphragm, substantially as and for the purposes described.

3. The combination, with an automatic valve, of substantially the character described, for railroad-brake systems and other purposes, of a compound lever, a piston or diaphragm having a stem connecting the lever and piston or diaphragm, fixed projections for shifting the lever as thrown by the piston or diaphragm, and a connection between the valve and lever, substantially as described.

J. FAIRFIELD CARPENTER.

Witnesses:
B. ROI,
F. VON VERSEN.