

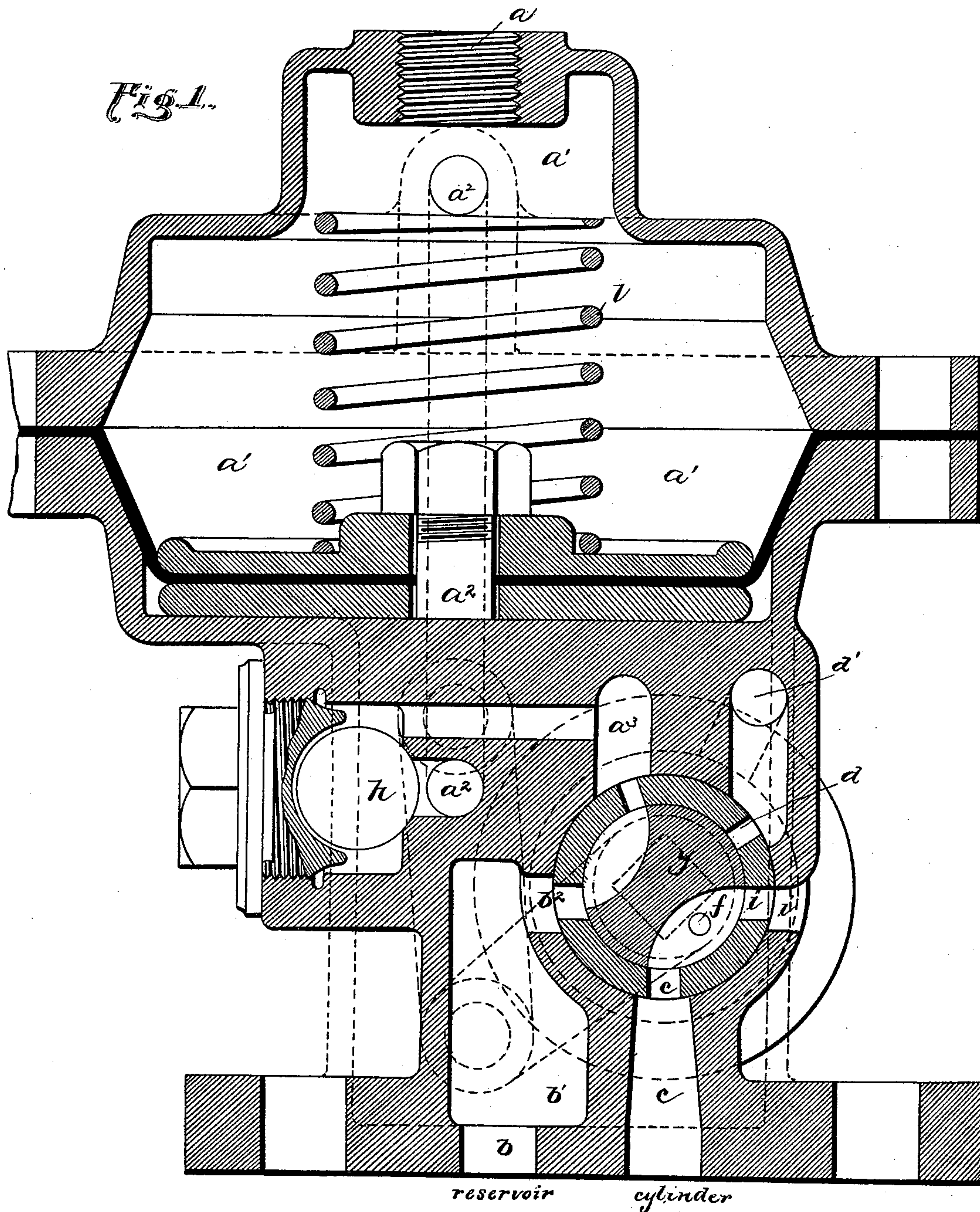
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3 Sheets—Sheet 1.

J. F. CARPENTER.  
AUTOMATIC COCK VALVE.

No. 386,523.

Patented July 24, 1888.



WITNESSES,  
*Franck L. Ourand.*  
*Edwin A. Finckel.*

INVENTOR,  
J. Fairfield Carpenter,  
by Wm. F. Finckel,  
his Attorney.

(No Model.)

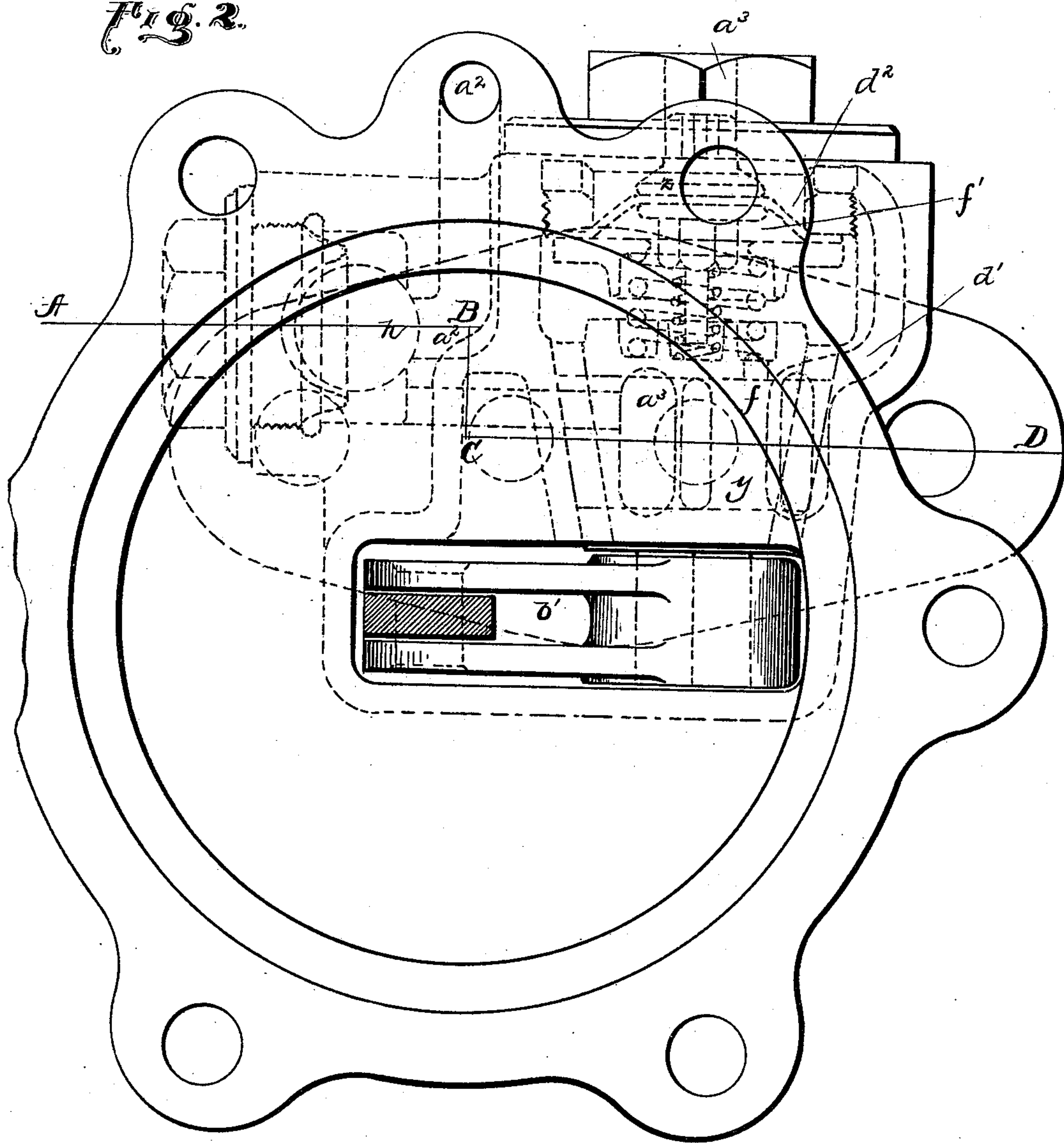
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*Fig. 2.*



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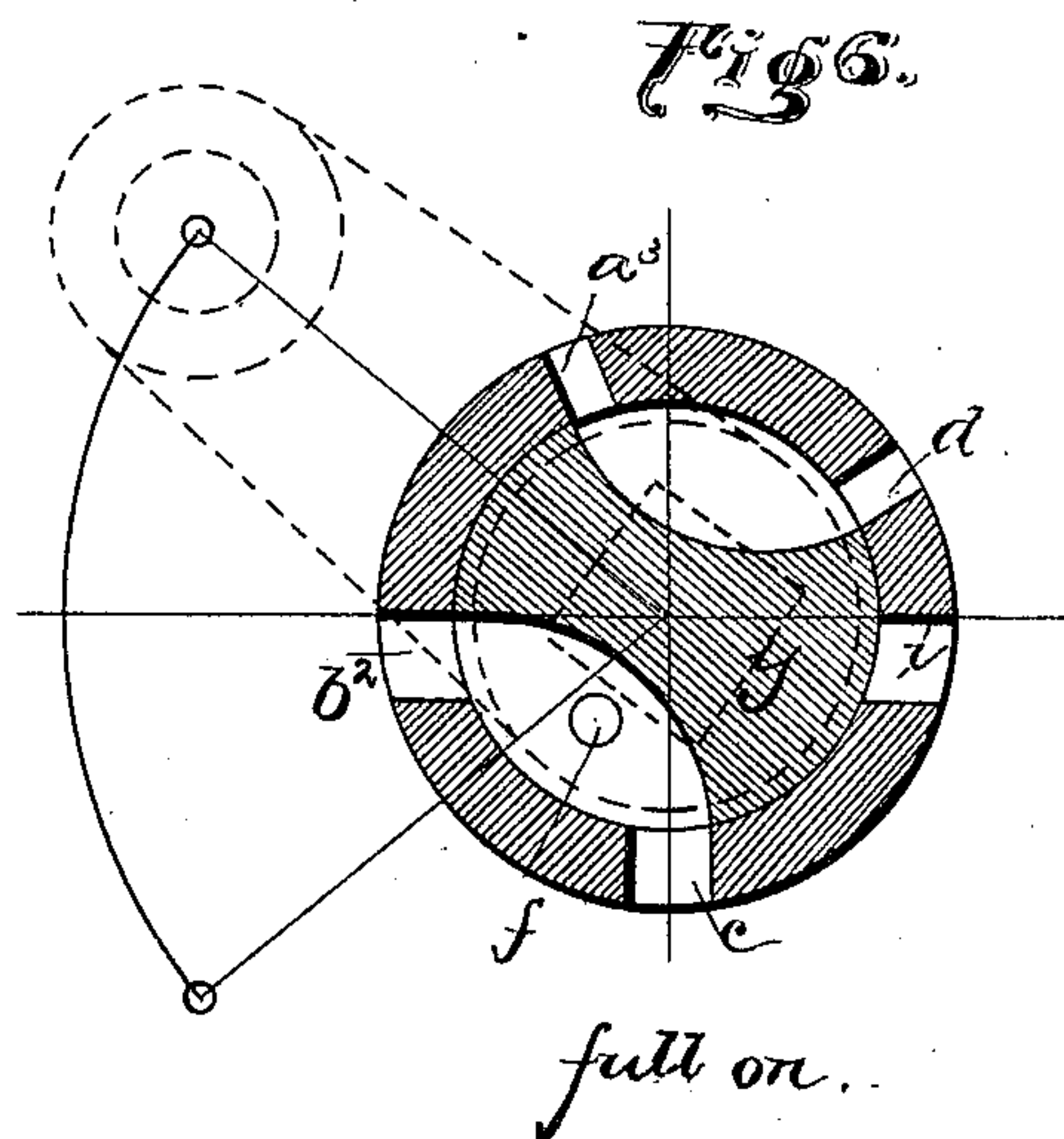
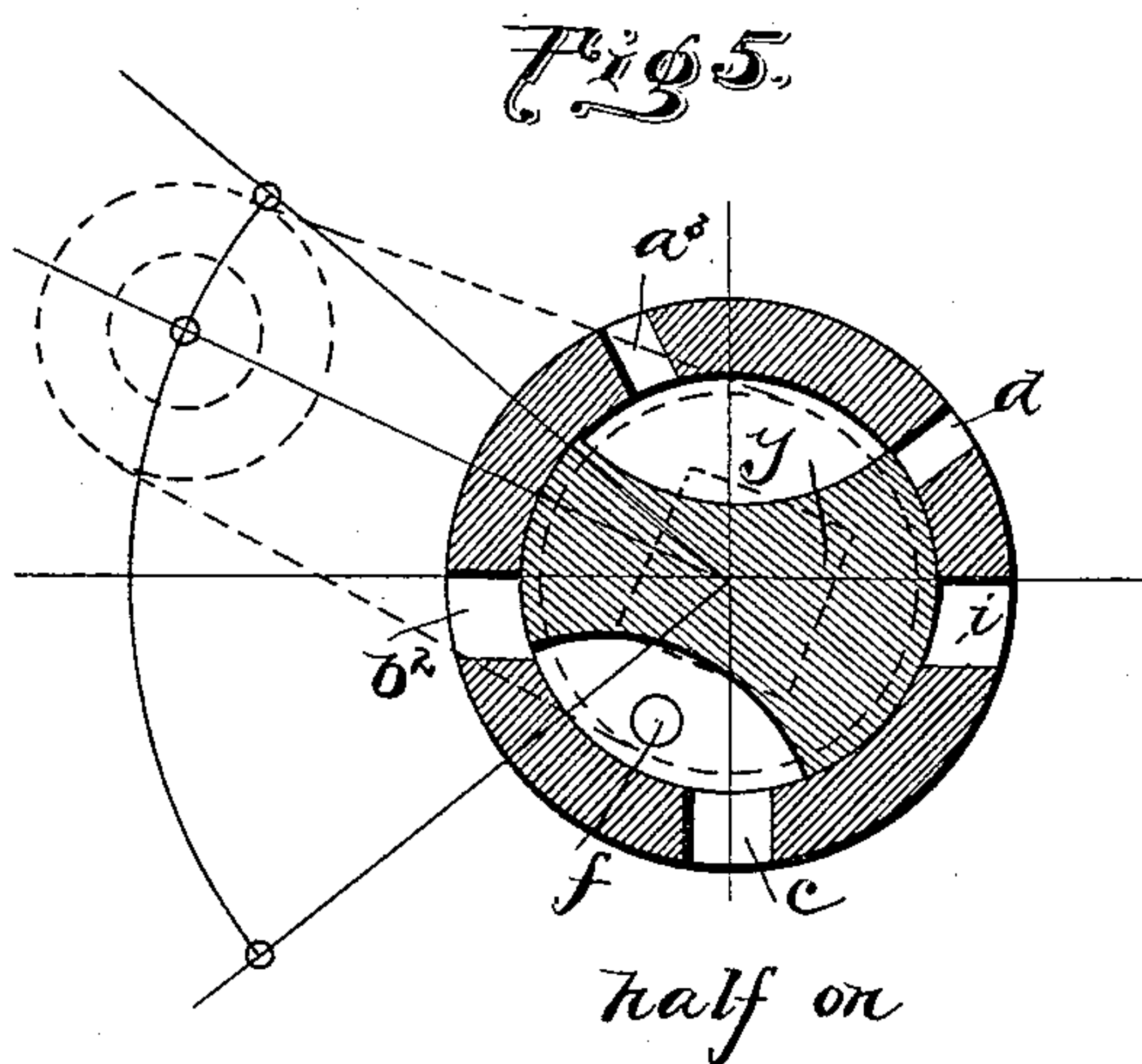
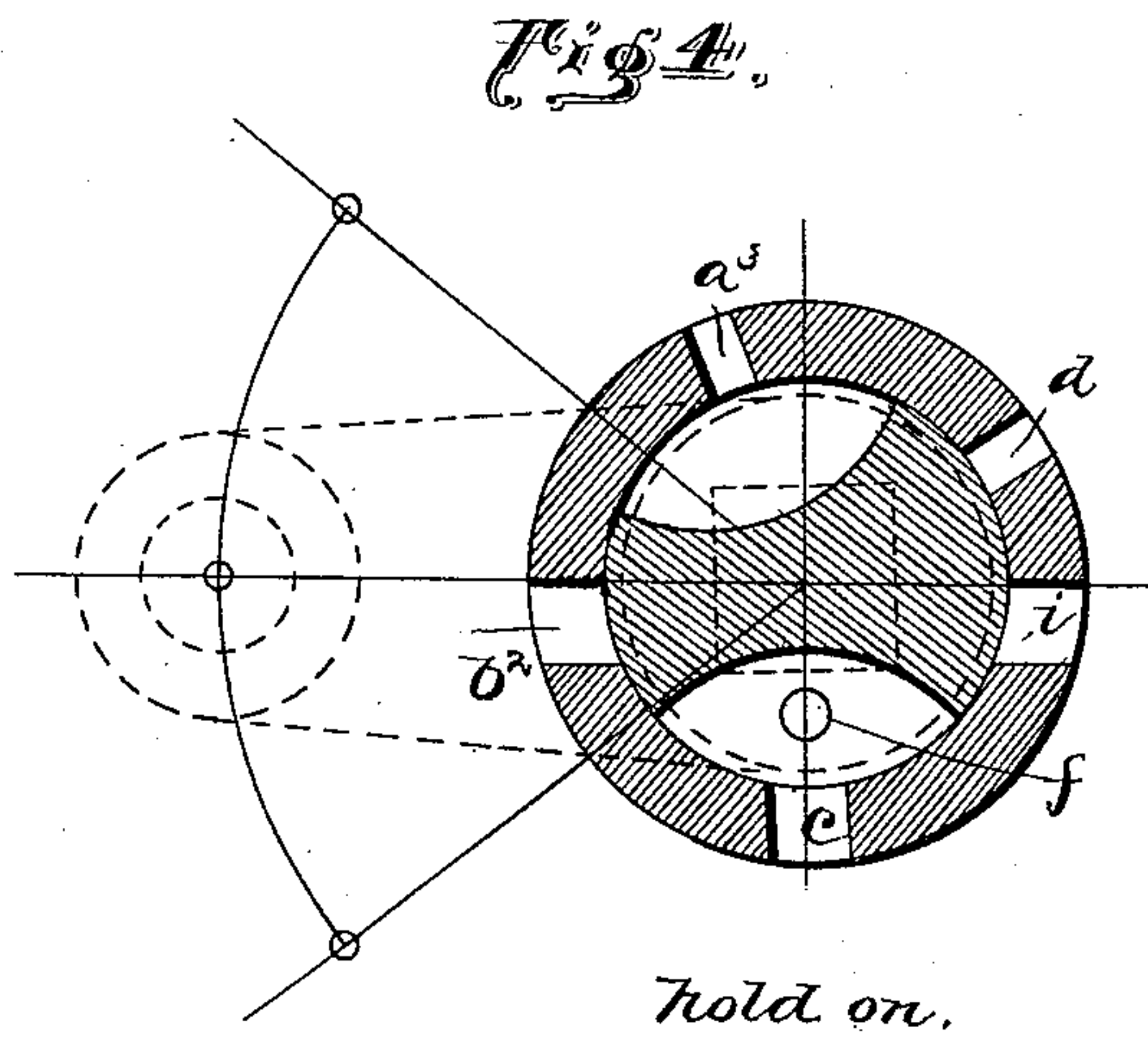
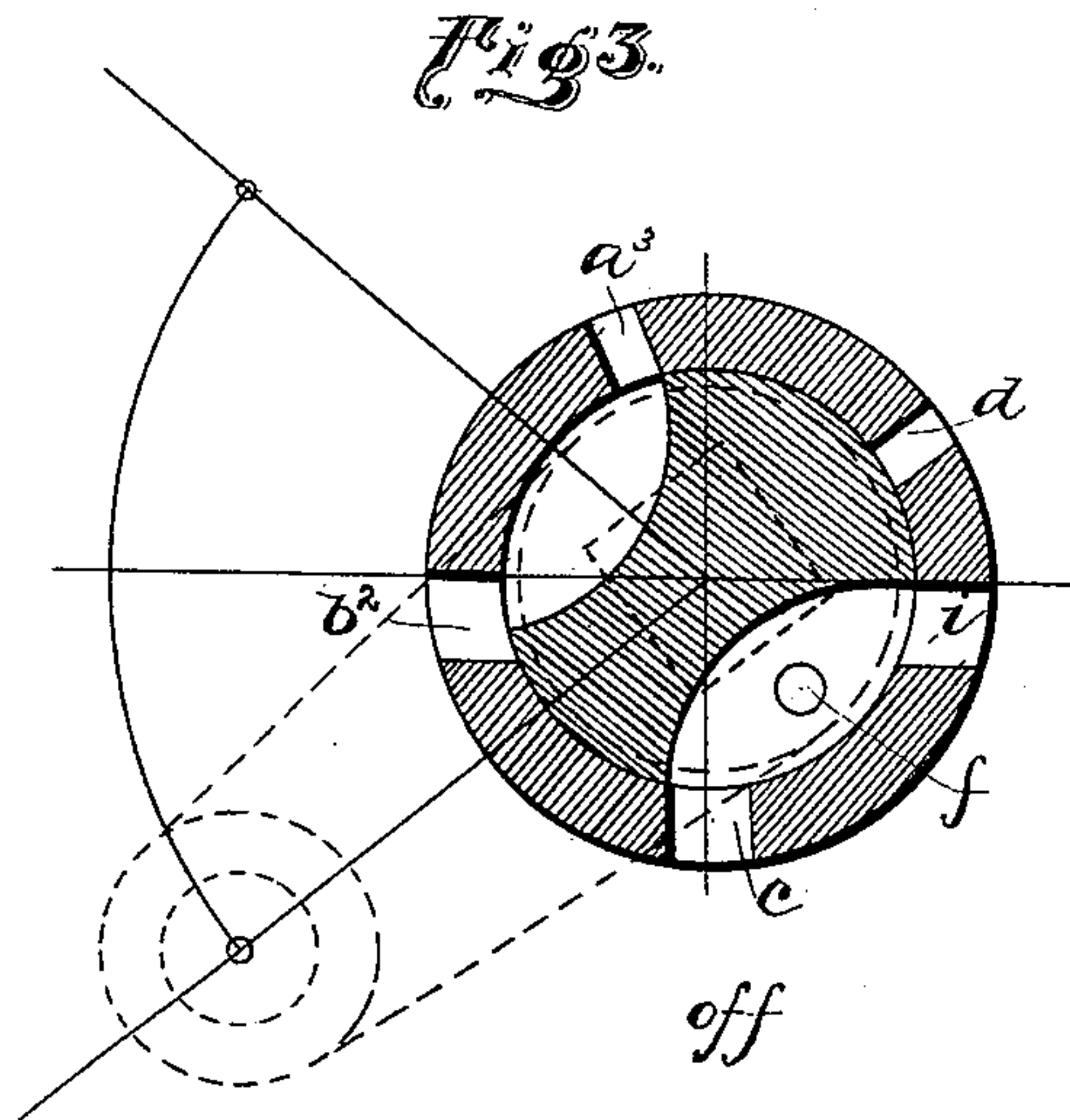
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# UNITED STATES PATENT OFFICE.

J. FAIRFIELD CARPENTER, OF BERLIN, GERMANY.

## AUTOMATIC COCK-VALVE.

SPECIFICATION forming part of Letters Patent No. 386,523, dated July 24, 1888.

Application filed February 7, 1888. Serial No. 263,294. (No model.)

*To all whom it may concern:*

Be it known that I, J. 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 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 ear-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.

As the automatic cock is the foundation of this invention, said cock mechanism alone will be particularly described and claimed.

These automatic 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 cock being to automatically open and close certain ports, 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 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.

Passing now to a detailed description of the cock apparatus claimed, Figure 1 is a general view in sectional elevation, the plane of the section being in line A B C D, Fig. 2. Fig. 2 is a plan view of the lower case or body with details dotted therein. Figs. 3, 4, 5, and 6 are sections, showing the plug of cock in its different positions of action.

In this description air-pressure will be con-

sidered 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*, filling the chamber *a'* 55 above the diaphragm *x* with air-pressure, and forcing *x* down into the position shown. Air-pressure passes by means of the canal *a''*, lifting the check-valve *h* to the cock-port *a'''*, whence, passing through the cock-plug *y*, it enters the passage *b''*, and thence it passes through the chamber *b'* and the passage *b* to the accumulator attached to each cylinder apparatus, and is there stored for use. The chamber *b'* is connected in its upper part with the under 65 side of the diaphragm *x*. (See plan, Fig. 2.)

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. 70

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'* above the diaphragm *x*, and the check-valve *h* being self-closing, and the pressure already in the accumulator being held there and now free to act on the under side of the diaphragm *x*, will force it upward, turning the attached plug-cock *y* from the position shown in Fig. 1 and Fig. 3 to the position shown in Fig. 6, if the reduction of pressure in the main conduit is considerable. If a less reduction of pressure has been made, 85 the plug may be turned only as far as shown in Fig. 5. In either case communication is now open from *b''* to *c*. 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) to the cylinder, (brake-cylinder,) and operate the mechanism by pressing out a piston contained in said cylinder in the usual way. At the same time 95 that the passages *b''* and *c* are fully connected by the turning of the plug *y*, Fig. 1, the passages *d* and *a'''* are also joined together, as shown in Fig. 6. Now, the passage *d* is in connection 100 with the passage *a'''*—that is, with the main conduit *a*, (see Fig. 1)—and the passage *d'* is



connected with the atmosphere through the balanced valve,  $z$ , so that when these two passages  $d$  and  $a^3$  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 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 rise to the top of the chamber  $a'$ , 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, although the passages  $b^2$  and  $c$  are connected, the other passages,  $a^3$  and  $d$ , are not yet 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 as the passages  $a^3$  and  $d$  are not open no air passes at this time from the main conduit to the atmosphere, so that the distance from the central point from which the cock-valves may be worked is more limited. It may also be observed that even in the former case, where considerable reduction was made in the main conduit, and where the cock  $y$  was turned to its full position, as in Fig. 6, so as to connect the passages  $b^2$  and  $c$  and  $a^3$  and  $d$ —that is, to allow the pressure to escape from the main conduit to the atmosphere—such escape is again regulated by the balanced valve  $z$ , for on the other side of this valve-diaphragm is a passage,  $f f'$ , in the plug  $y$ , which leads in this position, Fig. 6, of the plug only, to the cylinder, so that cylinder-pressure now lies on one side of the diaphragm-valve  $z$  and the main conduit-pressure on the other side. The cock  $y$  being now in position, Fig. 6, the cylinder will soon fill to a high pressure through  $b^2$  and  $c$ , so that after a time the cylinder-pressure here—that is, behind  $z$ —will equal or exceed the pressure in the main conduit now

on the other side,  $d^2$ , and the valve  $z$  will be closed through the excess of pressure behind it from the cylinder, so that even if the cock  $y$  remains any length of time open in position, Fig. 6, the main conduit-pressure does not all escape into the atmosphere, but is stopped by the automatic closing of the valve  $z$ , which in its turn is entirely independent of any motion of the main cock or diaphragm  $x$ , so that the reduction of pressure in the main pipe, which takes place at each valve, is also automatically stopped at each valve separately at the required point—that is, when full force has been attained in the cylinder—and the diaphragm  $x$ , being now in equilibrium, so far as the air-pressure is concerned, will be forced gently down to about its middle position, as seen in cock-section, Fig. 4, where all the passages are completely cut off from each other, and the whole apparatus is in a state of inaction. Finally, to restore everything to its prior position, the pressure in the main conduit is increased at the central point, filling in a higher pressure through  $a$  the chamber  $a'$  above the diaphragm, and as the pressure under this diaphragm is now less, owing to the quantity drawn off in the cylinder, said diaphragm  $x$  will be forced down into its original position, as shown in Fig. 1, and section, Fig. 3. In this position the reservoir can again be recharged through  $a^3$  and  $b^2$ , and, as will be seen, the passage  $c$  from the cylinder is now in connection with the atmosphere through  $i$ , and the cylinder will be exhausted, completing the full operation which this apparatus has to perform.

What I claim is—

1. An automatic cock apparatus comprising a plug-cock,  $y$ , having various passages  $a^3$ ,  $b^2$ ,  $c$ ,  $d$ ,  $i$ , and  $f$ , substantially as and for the purposes described, in combination with a diaphragm,  $x$ , used to turn said plug-cock  $y$  through different degrees of a circle by means of variations of pressure induced on opposite sides of said diaphragm.

2. In combination with a plug-cock,  $y$ , and the adjoining passages  $d'$ ,  $d^2$ ,  $d^3$  and  $f f'$ , the balance-valve  $z$ , for the purpose of automatically regulating the exhaust of the main conduit  $a$  by means of the pressure then in the cylinder.

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Witnesses:

B. ROY,

F. VON VERSEN.