

(No Model.)

2 Sheets—Sheet 1.

W. H. WORTHEN.

VALVE FOR AIR AND GAS COMPRESSORS.

No. 333,096.

Patented Dec. 22, 1885.

Fig. 3.

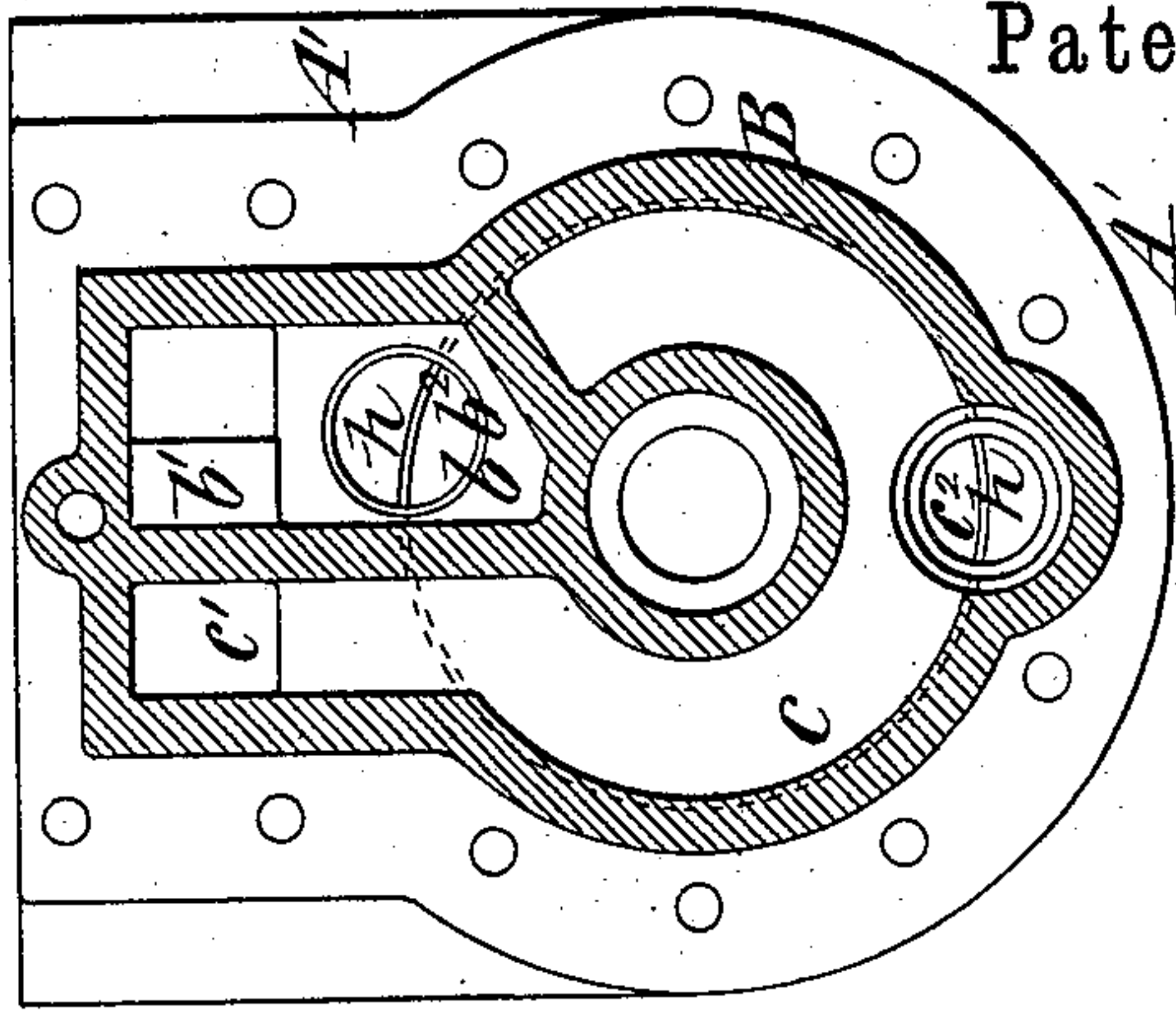


Fig. 2.

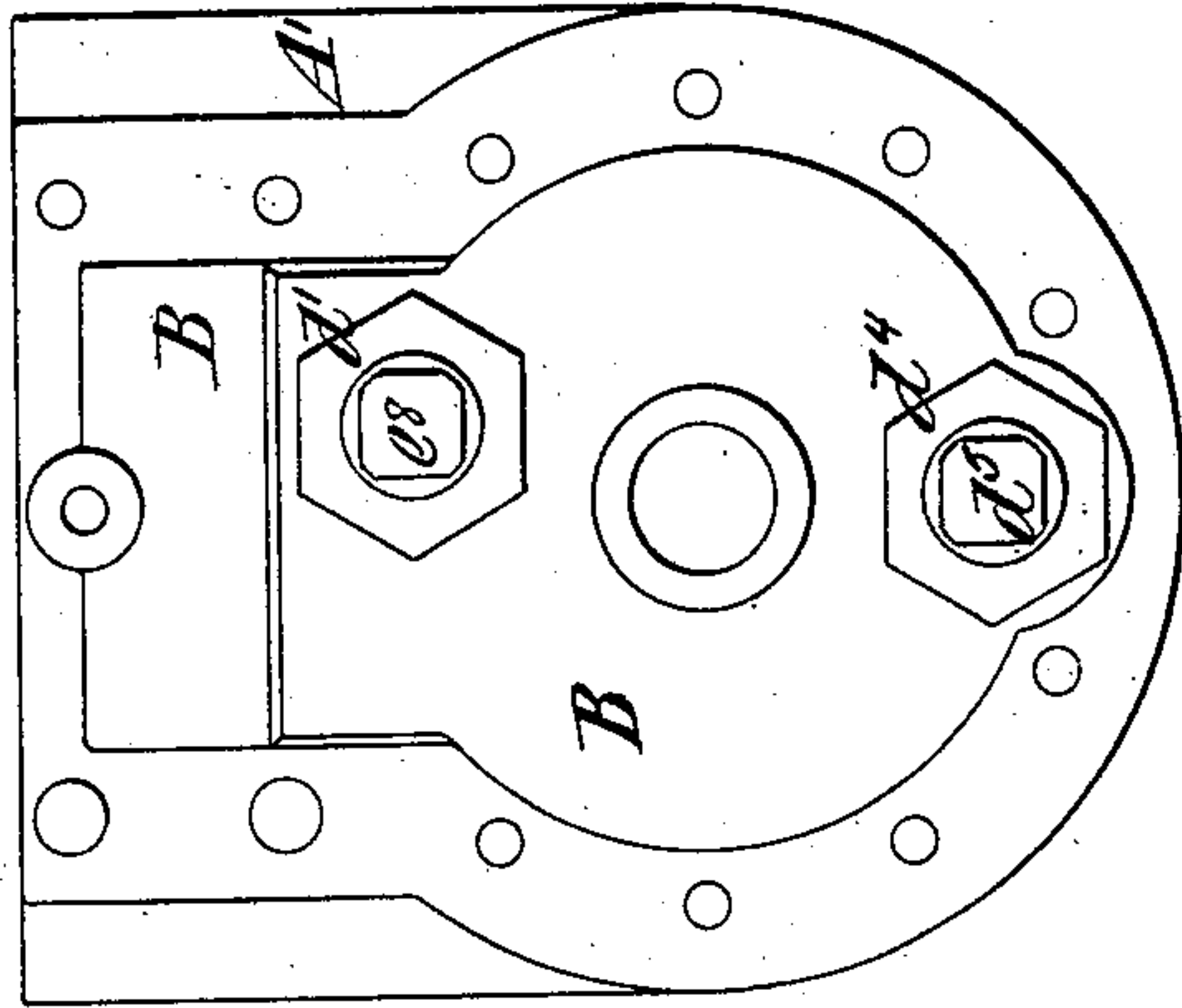
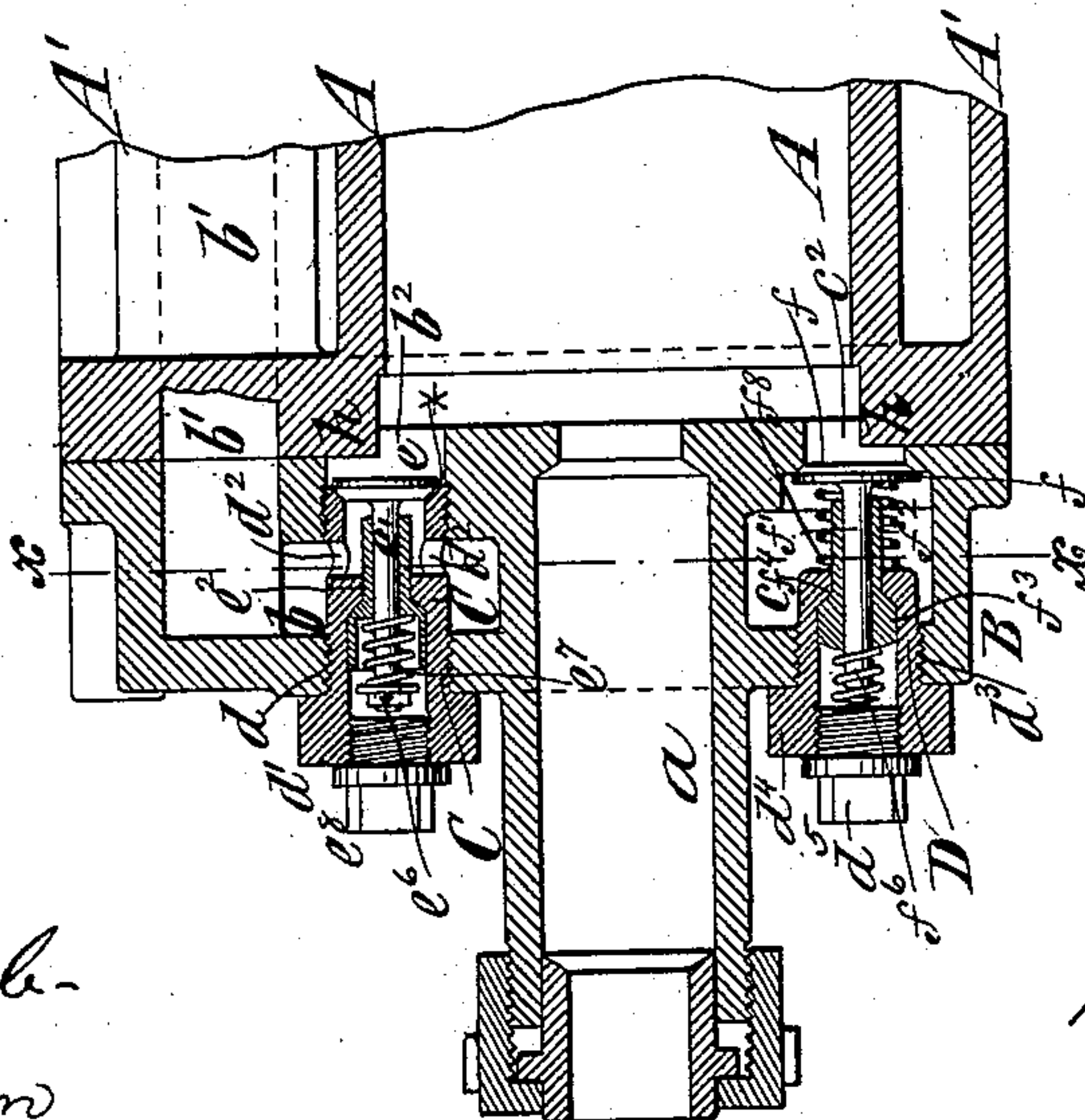


Fig. 1.



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(No Model.)

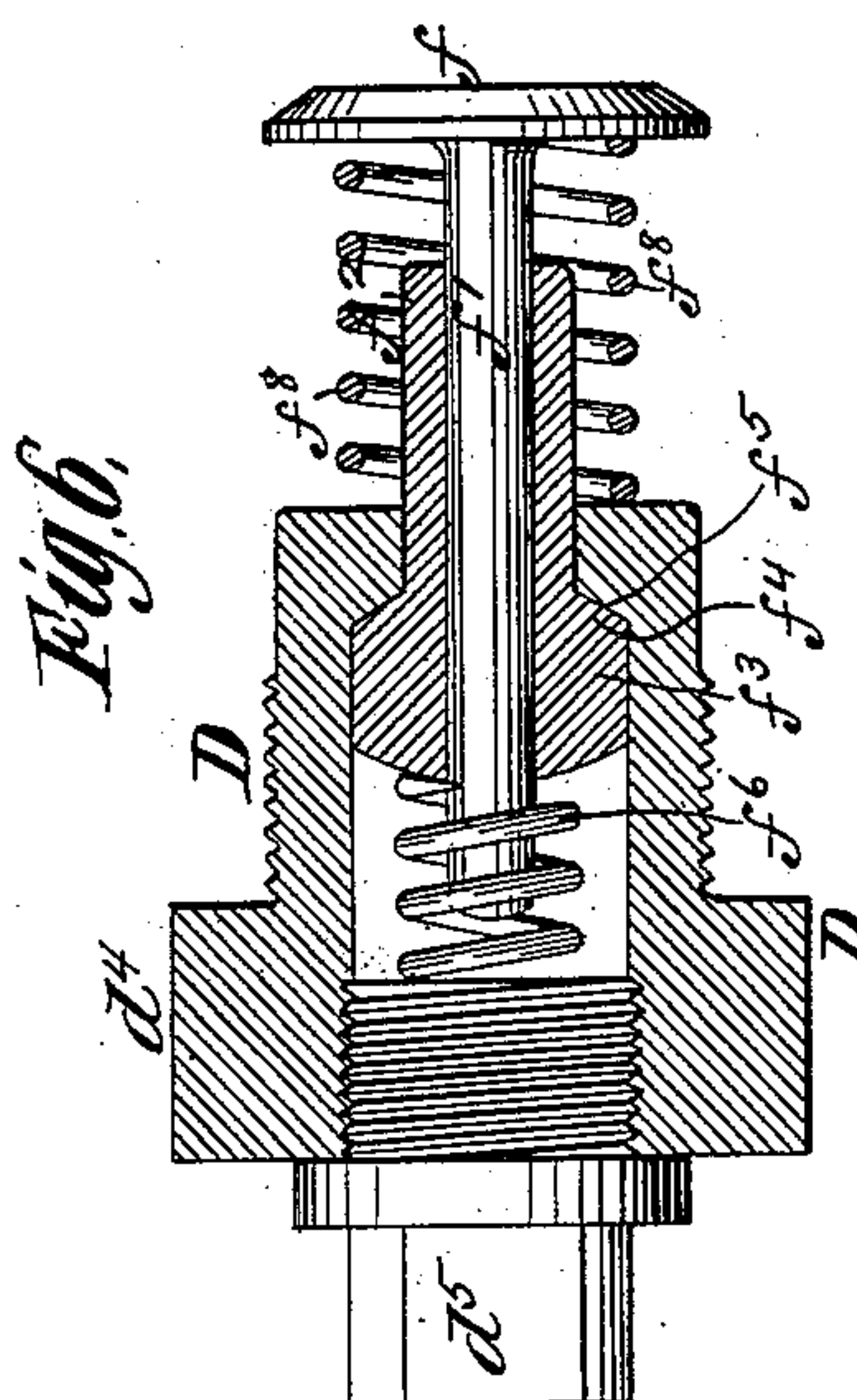
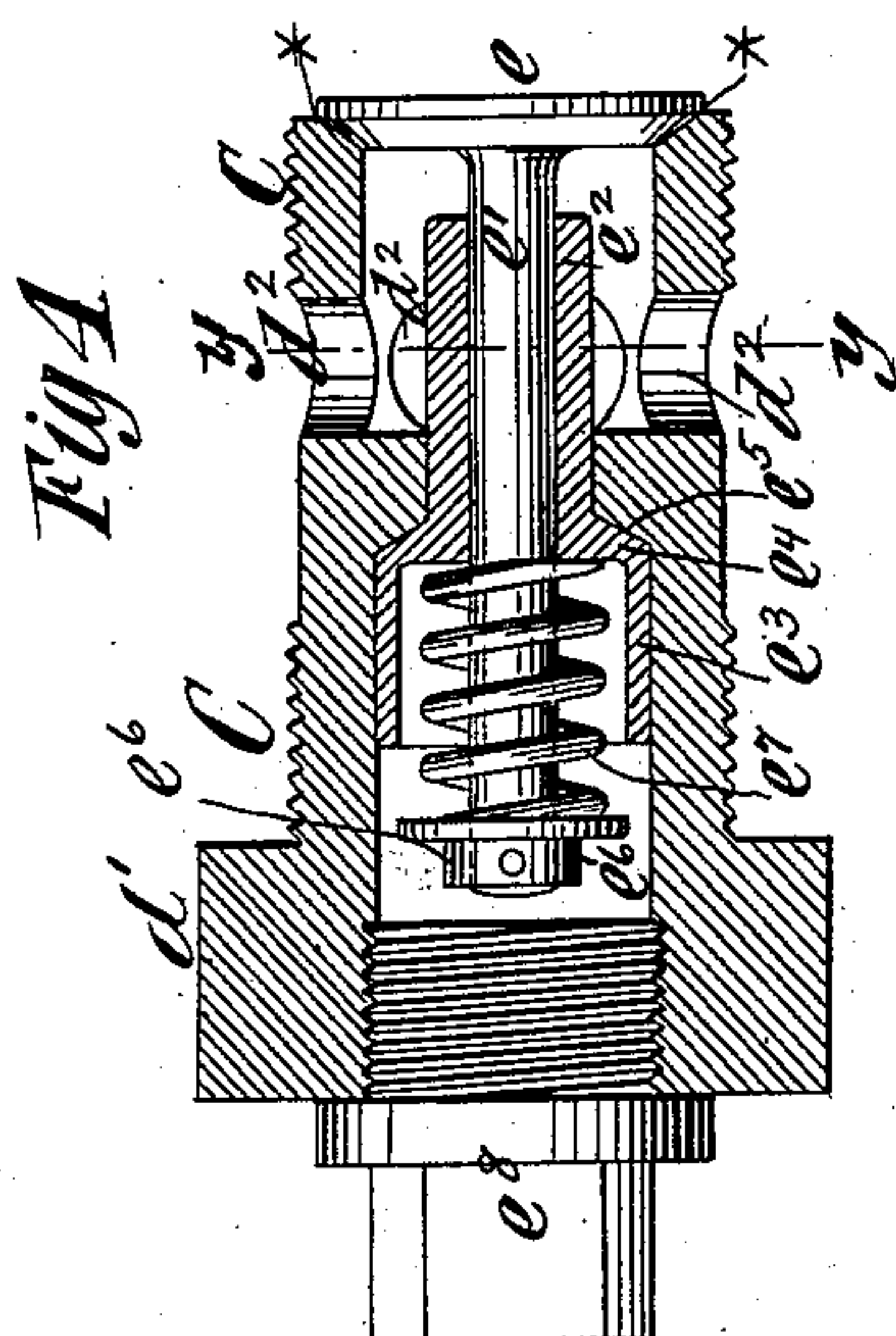
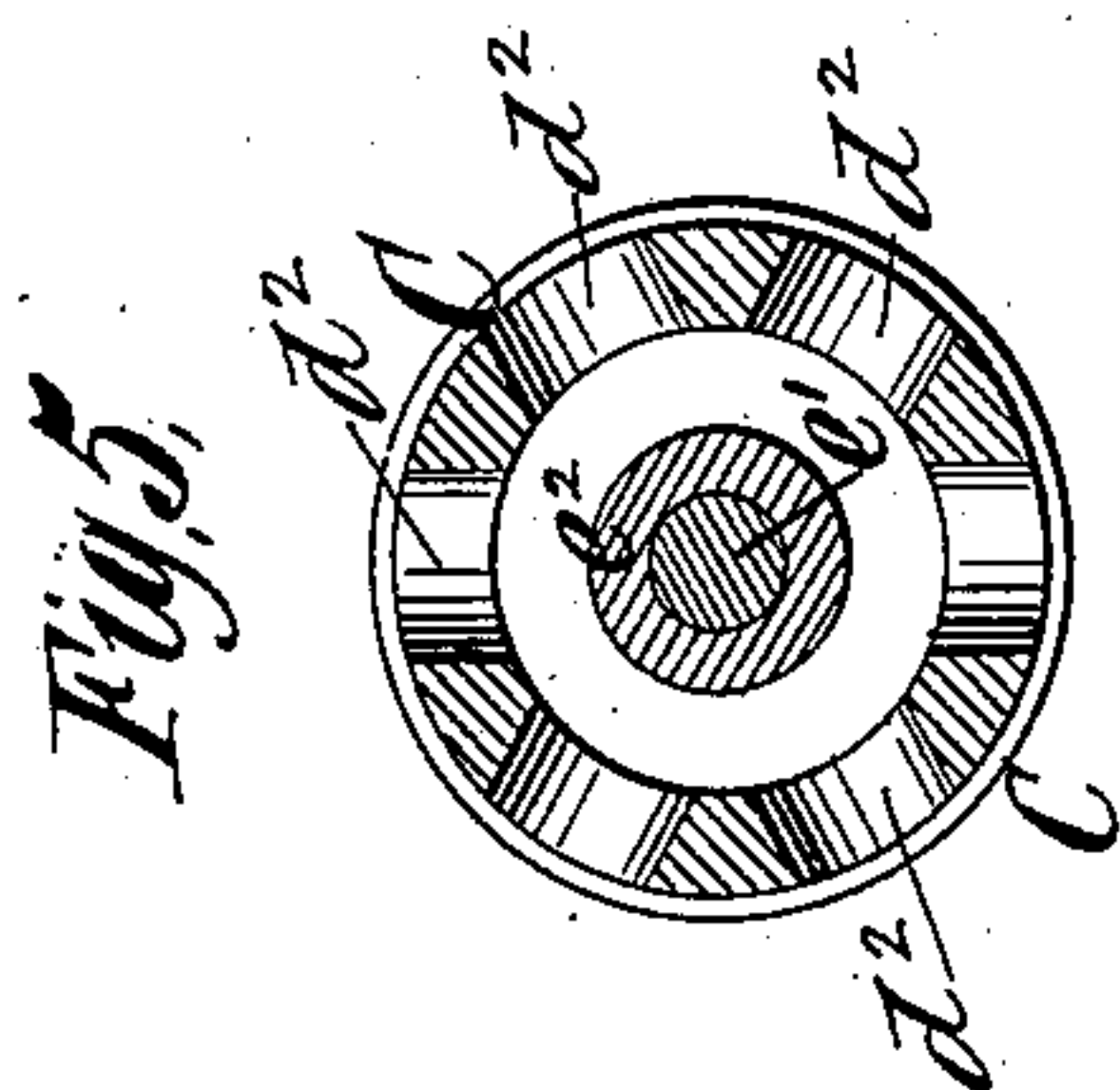
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VALVE FOR AIR AND GAS COMPRESSORS.

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Inventor:
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UNITED STATES PATENT OFFICE.

WILLIAM H. WORTHEN, OF BROOKLYN, NEW YORK, ASSIGNOR TO GUILD
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VALVE FOR AIR AND GAS COMPRESSORS.

SPECIFICATION forming part of Letters Patent No. 333,096, dated December 22, 1885.

Application filed March 31, 1884. Serial No. 126,247. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. WORTHEN, of the city of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Valves for Air and Gas Compressors, of which the following is a specification.

My invention is applicable to those compressors in which an inlet or suction valve and an outlet or discharge valve are arranged in each head of the compressor-cylinder, and in which the cylinder-heads have formed in them suction and discharge chests.

The invention relates to compressors of the kind above described, in which the suction and discharge valves are contained in valve-boxes which are inserted into the head from the outer side thereof, and are at the outer ends closed by plugs or bonnets, and particularly relates to valves having their stems fitted to and guided in sleeves and guides which are removably secured in the valve-boxes, so that when the valve stems and sleeves and guides become worn by use the valves and their sleeves and guides can be readily removed from the valve-boxes and renewed without the necessity of renewing the valve-boxes.

In compressors for ammonia-gas it is necessary that all parts should work very closely and tightly, and that the valve sleeves and guides should be exactly concentric with the valve-seats. The difficulty of working to exact sizes when making parts which are interchangeable is well understood by mechanics; and the object of my invention is to so construct the valve-boxes and the removable sleeves and guides that the sleeves and guides will be absolutely self-centering when placed in the valve-boxes, and will be automatically adjusted and held in a position concentric with the valve-seats.

To this end the invention consists in novel details in the construction of the valve box and sleeve and guide and in the manner of combining them together, as particularly hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a longitudinal section of a portion of a com-

pressor-cylinder and its front head, the valves therein being shown in sectional view. Fig. 2 is a front view of the cylinder with the head in place. Fig. 3 is a transverse vertical section on the dotted line $x x$, Fig. 1, the valves being removed. Fig. 4 is a longitudinal section, on a larger scale, of a suction or inlet valve and its appurtenances embodying my invention. Fig. 5 is a transverse section on the plane of the dotted lines $y y$, Fig. 4, and Fig. 6 is a longitudinal section, upon a larger scale, of one of the discharge-valves embodying the invention.

Similar letters of reference designate corresponding parts in all the figures.

A designates the cylinder, which is surrounded by a water-jacket, A' , and to the end of which is secured the front head, B. From this head projects the stuffing-box a , and the head is divided by partitions, so as to form two chambers or chests, $b c$. The chest b constitutes a suction-chest and communicates, by a passage, b' , with the air or gas inlet to the compressor-cylinder. The chest c constitutes a discharge-chest and communicates, by a passage, c' , with the air or gas outlet from the compressor-cylinder. The corresponding suction and discharge chests in the back head, which are not shown, will communicate with the opposite ends of the suction and discharge passages $b' c'$. From the suction-chest b an opening, b^2 , leads into the cylinder, and from the cylinder an opening, c^2 , leads into the discharge-chest c . The openings $b^2 c^2$ are not wholly within the inner circumference of the cylinder, but are placed at such distance from the axial center of the head B that they will be obstructed or closed to the extent of about one-half by the end of the cylinder. This is best shown in Figs. 1 and 3, and its purpose will be hereinafter explained.

I will first describe the suction or inlet valve and its appurtenances, such valve being shown in Figs. 1, 4, and 5.

Opposite the opening b^2 into the cylinder a hole or opening, d , is formed in the outer wall of the head, and both said holes are preferably screw-threaded. The valve-box C is externally screw-threaded to enter the holes $d b^2$,

and has a polygonal head, d' , by which it may be turned. At the inner end of the valve-box C is the seat x for the inlet or suction valve e , and in rear of said seat are openings d^2 in the valve-box for the passage of air from the suction-chest b into and through the valve-box and into the cylinder. The valve or valve-head e is rigid upon its stem e' , and said stem works in a sleeve or guide, e^2 , inserted in the valve-box C. The outer portion of the valve-box is bored out to a larger size than that portion in which the sleeve or guide e^2 fits, and said sleeve or guide has an outer cup-shaped portion, e^3 , which is received in the enlarged portion of the bore of the valve-box C, and is joined to the smaller portion by a conical shoulder, e^4 , which fits against a conical seat, e^5 , in the valve-box, and so properly centers the sleeve and guide e^2 e^3 . To the outer end of the stem e' is applied a nut or collar and a washer, e^6 , and between the head thus formed and the bottom of the cup-shaped portion e^3 of the sleeve and guide is placed a spiral spring, e^7 , which not only serves to close the valve, but also serves to hold the sleeve and guide e^3 e^2 tightly against the conical seat e^5 . The open outer end of the valve-box C is closed by a removable screw-threaded plug, e^8 , or bonnet. When it is desired to remove the sleeve and guide, for renewal or any other purpose, all that is necessary is to remove the plug or bonnet e^8 , take off the nut or collar and washer e^6 and spring e^7 from the stem e' , and the sleeve and guide e^2 e^3 can then be removed.

I will now describe the outlet or discharge valve and its appurtenances, reference being had to Figs. 1 and 6.

The valve-seat is formed in the head B at the inner end of the hole or opening c^2 , and on the seat the discharge or outlet valve f seats. In the outer wall of the head B, and opposite the hole c^2 , is an opening or screw-threaded hole, d^3 , in which the valve-box D is screwed fast, said valve-box having a polygonal head, d^4 , whereby it may be turned, and the outer end of the box being closed by a plug, d^5 , or bonnet. Within the valve-box D is fitted a sleeve and guide, f^2 , comprising a longer portion, f^3 , which is joined thereto by a conical shoulder, f^4 , bearing against a conical seat, f^5 , in the valve-box D. In the sleeve and guide f^3 f^2 works the valve-stem f' , on which is the rigid valve-head or valve proper, f , and between the end of the sleeve and guide f^3 f^2 and the plug d^5 is a spring, f^6 , through which the stem f' works, and which holds the sleeve and guide f^3 f^2 , with its shoulder f^4 , snugly against the seat f^5 , thereby providing for its ready removal when it or the valve-stem are worn out. The discharge-valve is aided in closing by a spring, f^8 .

By the arrangement of the opening b^2 partly beyond the bore of the cylinder the end of the cylinder is made to form a guard, h , to prevent the suction-valve e from dropping

into the cylinder in case it breaks off its stem. The arrangement of the opening c^2 partly beyond the bore of the cylinder, and at the bottom thereof enables all grease and refuse matter to drain from the cylinder. The arrangement of these openings as described I do not here claim.

The construction of the valve-boxes with the conical seats e^5 f^5 , and the construction of the sleeves and guides with conical shoulders e^4 f^4 bearing on said seats, is very advantageous, as the sleeves and guides will, by the pressure of their springs e^7 f^6 , be automatically and accurately centered in the valve-boxes and relatively to the valve-seats.

The only other construction which would insure the concentric position of the sleeves and guides relatively to the valve-seats would be to make the cylindric portions of the sleeves and guides to fit with extreme accuracy in the portions of the valve-boxes which receive them. Although the sleeves and guides and valve-boxes are intended to be interchangeable, slight variations in size are liable to occur by reason of the wear of tools, and any such variations in size would destroy the concentric position of the sleeve and guide relatively to the seat to such an extent as to produce leakage where the compressor is used for ammoniacal gas.

In carrying out my invention I do not attempt to make the cylindric portions of the sleeves and guides fit snugly in the valve-boxes, but desire to have them a loose fit therein, and then when the sleeve and guide is placed in position in the valve-box, with its spring acting thereon, the conical shoulder e^4 or f^4 will be pressed against the conical seat e^5 or f^5 , and will thereby be automatically centered relatively to the valve-seat.

I do not claim, broadly, a valve-box having a removable sleeve and guide for the valve-stem, but desire to limit my invention to a sleeve and guide having a conical shoulder and a valve-box having a conical seat and extending through the outer side of the head.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with the head of a compression-cylinder having an air-chest formed therein, of a valve-box inserted into the head and extending from the outer side of said head inward, and having two portions of different internal diameter joined by an annular conical seat, a valve and its stem, a sleeve and guide receiving the valve-stem through it and having portions of different external diameter, and a conical shoulder whereby it is made to fit the valve-box, a spring whereby said sleeve and guide is held in place and centered by its conical shoulder bearing against said conical seat, and a plug or bonnet closing the outer end of the valve-box, substantially as herein described.

2. The combination, with the inlet-valve box C, having the conical annular seat e^5 , and

the portions of different internal diameter joined by said seat, of the sleeve and guide consisting of the portion e^2 and the cup-shaped portion e^3 , of larger diameter, joined by
5 the conical shoulder e^4 , the valve e , and stem e' , having at the outer end a head, e^6 , and a spring, e^7 , surrounding the stem and bearing at one

end on the stem-head and at the other end in the cup-shaped portion e^3 of said sleeve and guide, substantially as herein described.

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Witnesses:

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