

No. 658,524.

Patented Sept. 25, 1900.

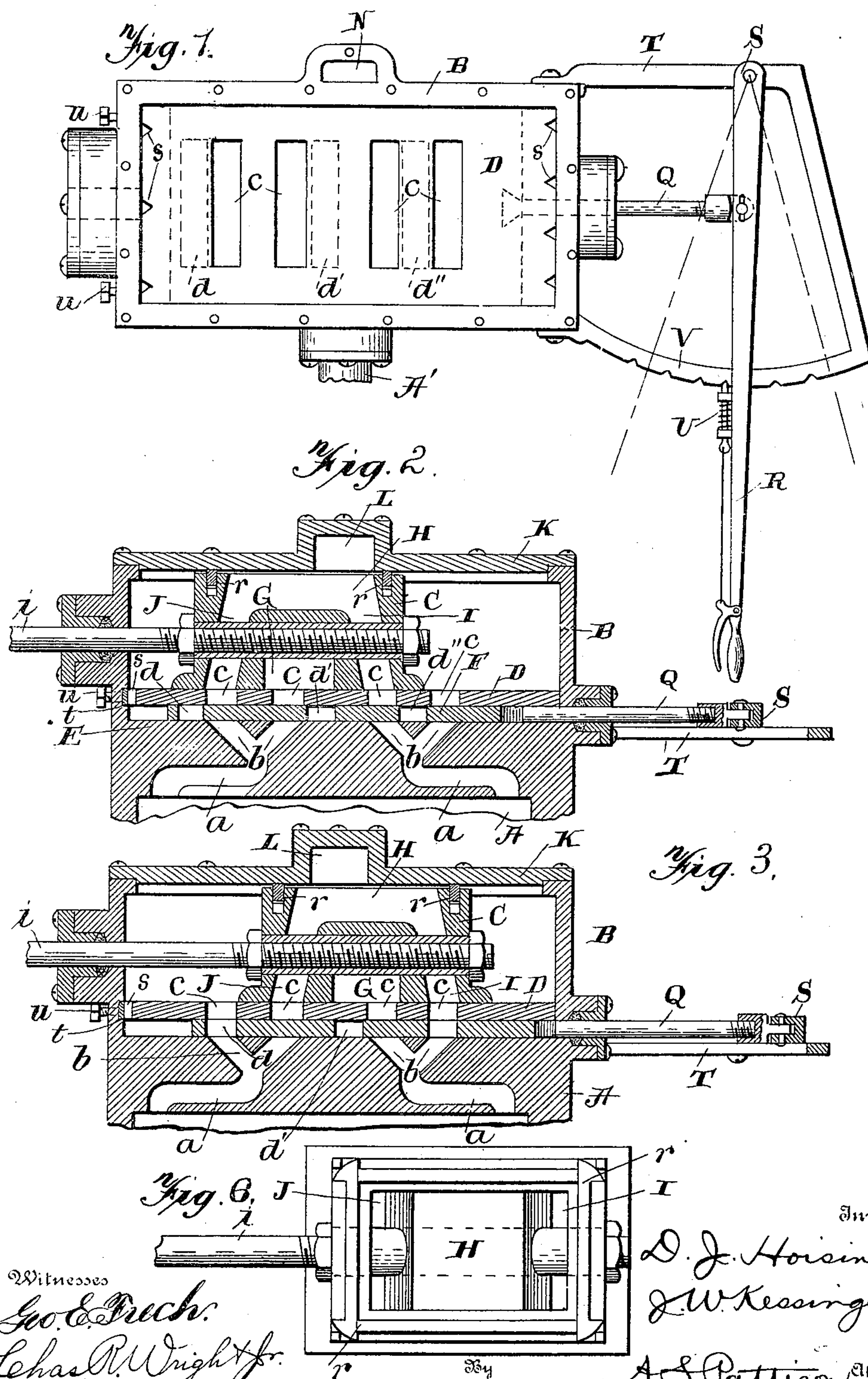
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REVERSING VALVE.

(Application filed June 30, 1900.)

(No Model.)

2 Sheets—Sheet 1.



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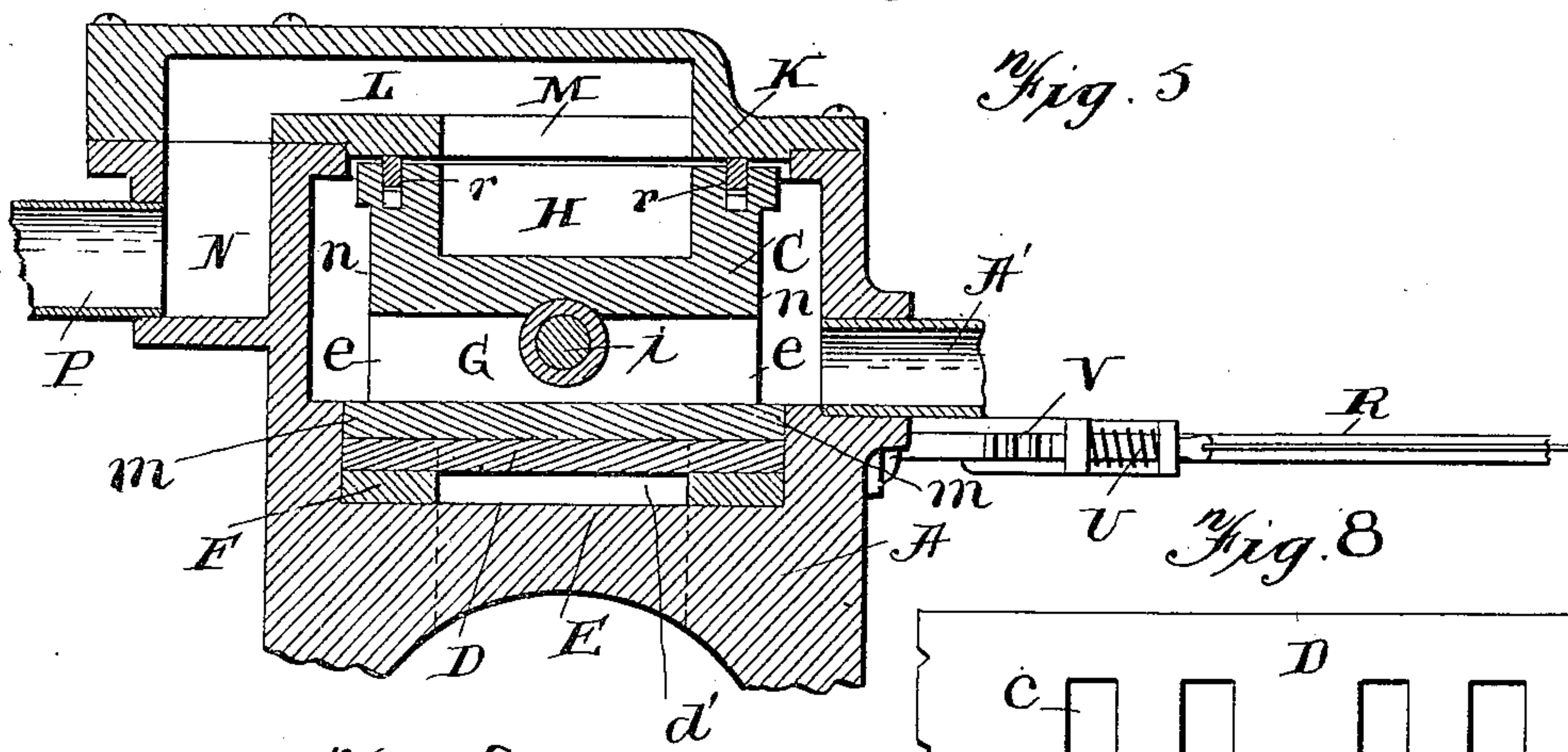
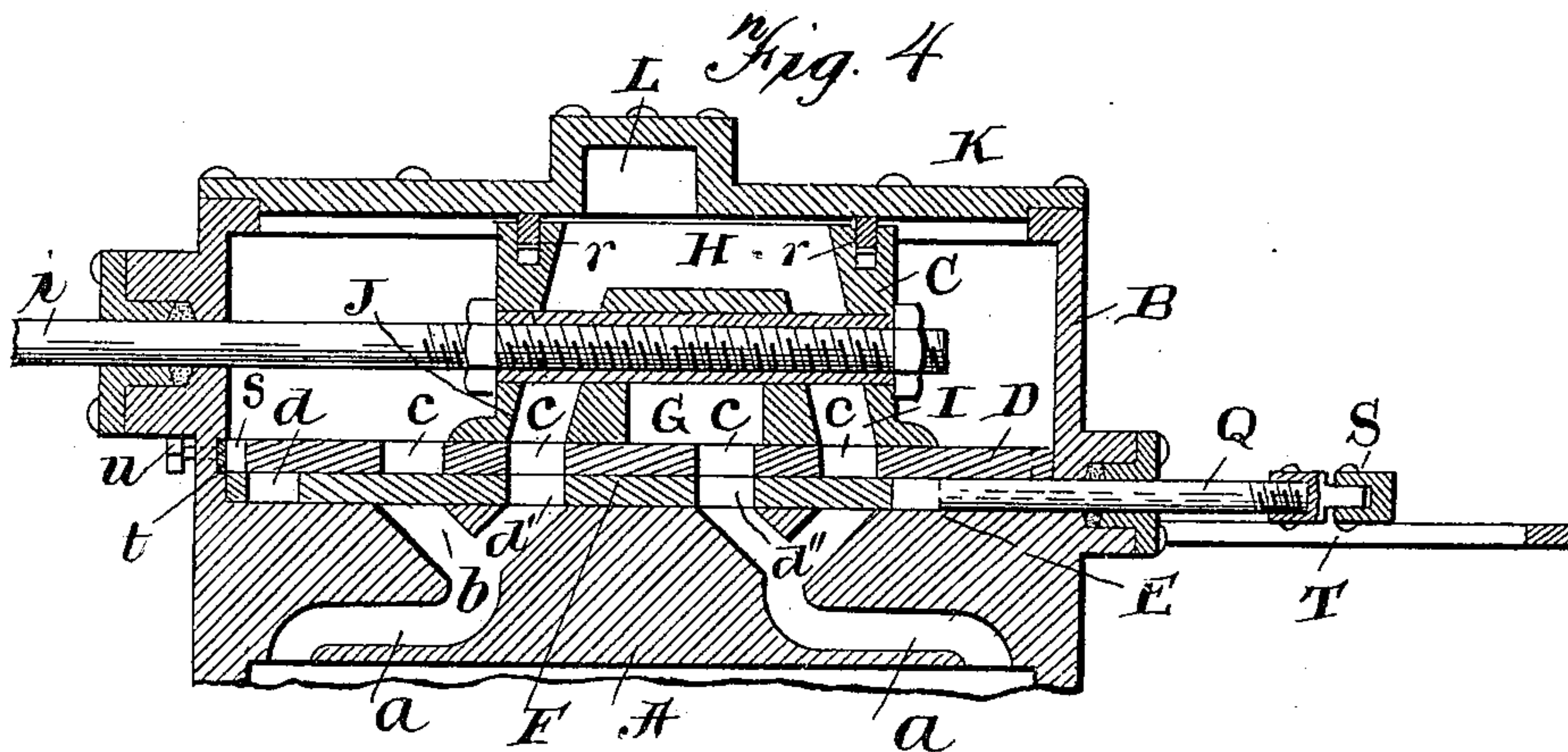


Fig. 7.

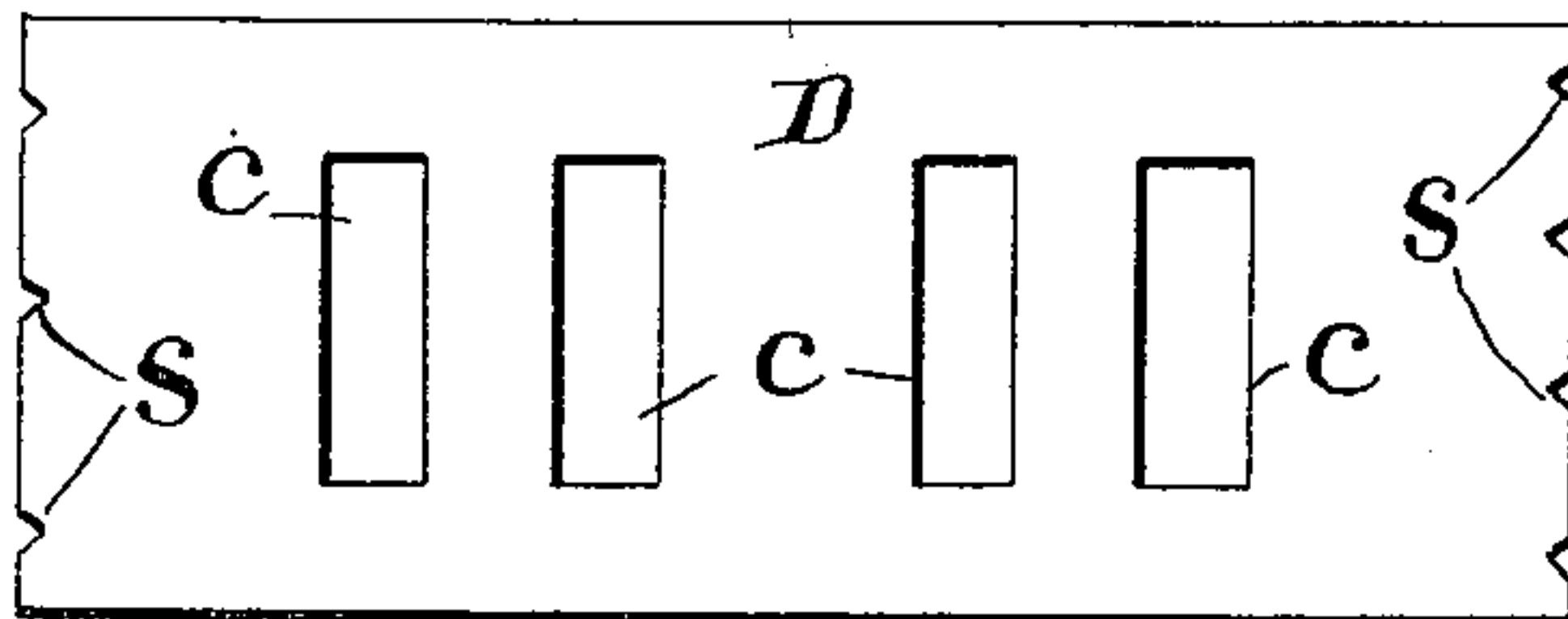
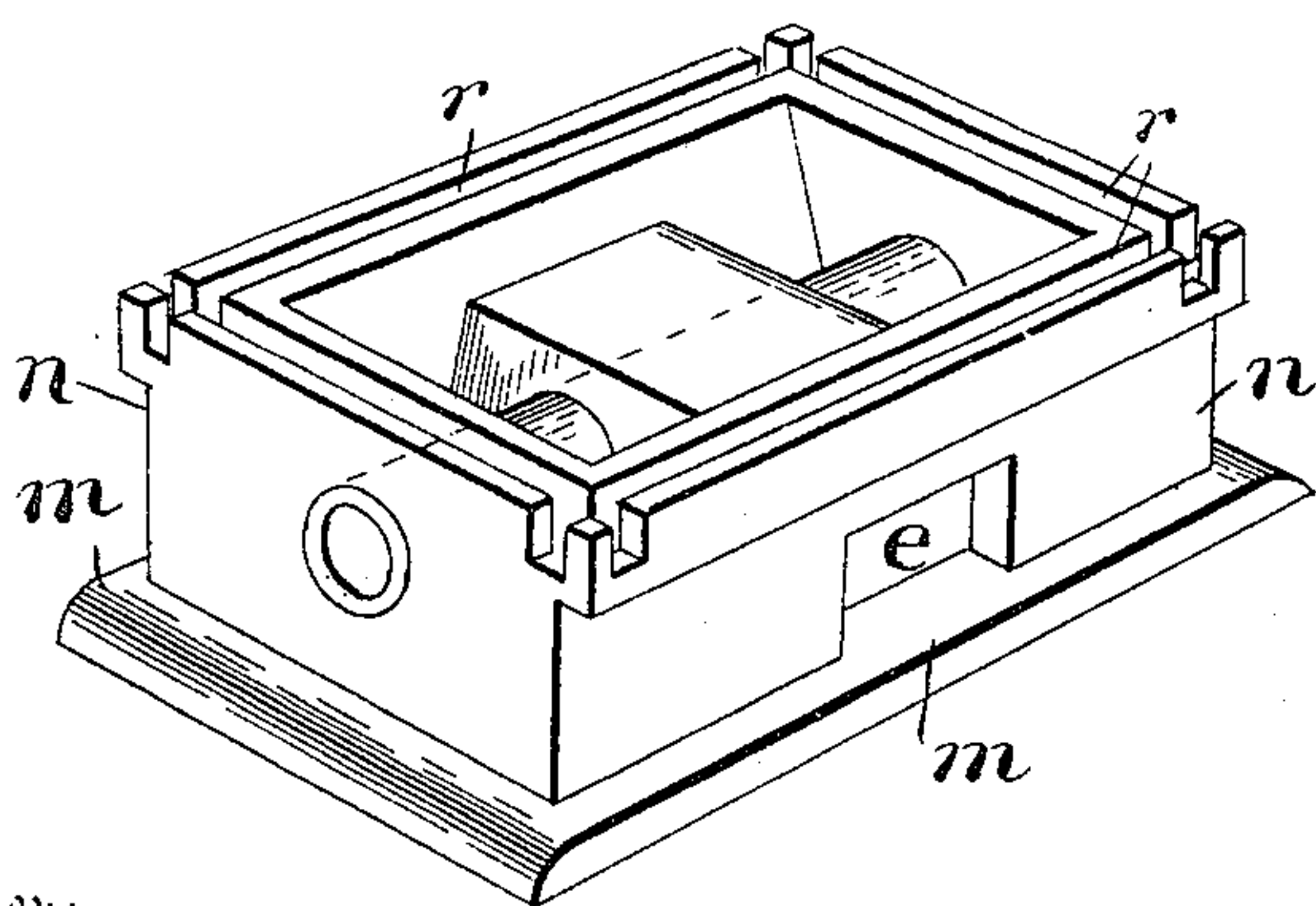
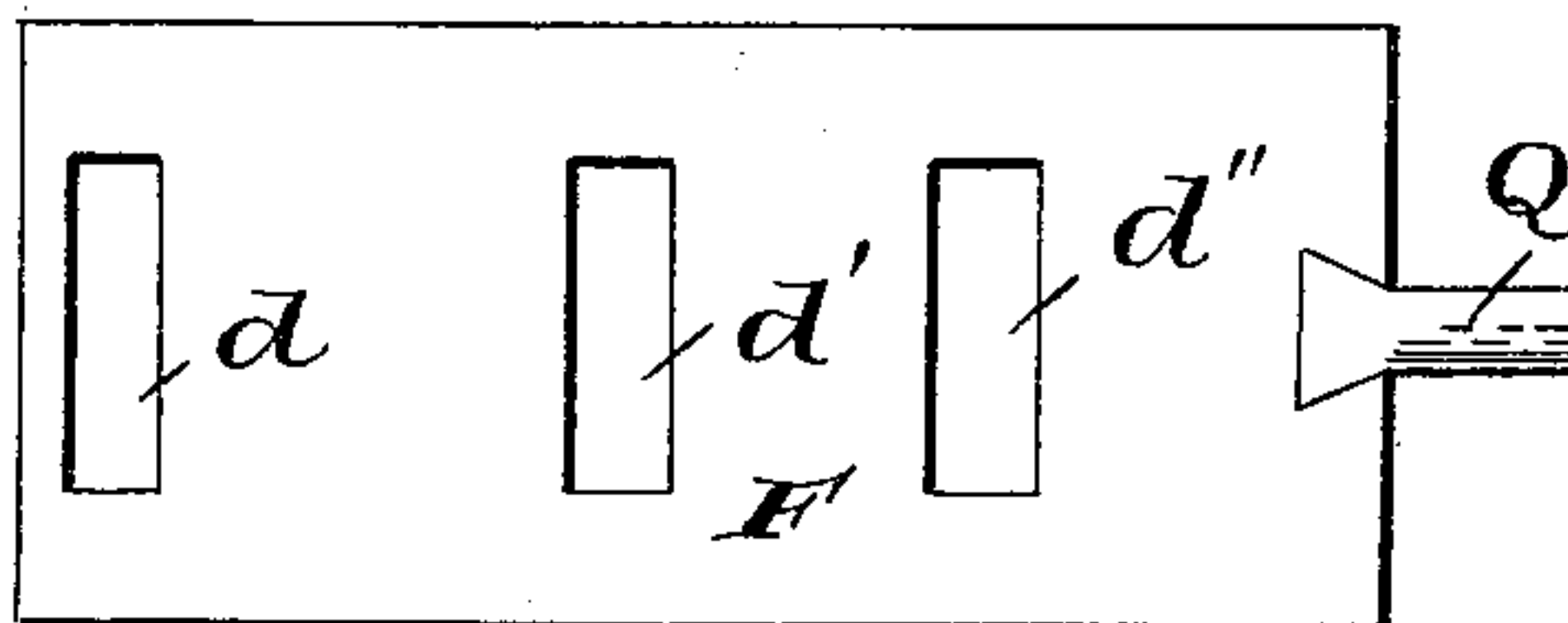


Fig. 9.



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# UNITED STATES PATENT OFFICE.

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## REVERSING-VALVE.

SPECIFICATION forming part of Letters Patent No. 658,524, dated September 25, 1900.

Application filed June 30, 1900. Serial No. 22,186. (No model.)

*To all whom it may concern:*

Be it known that we, DANIEL J. HOISINGTON and JOHN W. KESSINGER, citizens of the United States, residing at Crescent, in the county of Logan and Territory of Oklahoma, have invented new and useful Improvements in Reversing-Valves, of which the following is a specification.

Our invention relates to improvements in reversing-valves, and pertains to a reversing-valve adapted for use in connection with a steam-engine, whereby the engine can be quickly and readily reversed independent of the valve itself, all of which will be fully described hereinafter, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is an internal plan view of the steam-chest embodying our invention, the top of the steam-chest and the valve being removed. Fig. 2 is a vertical longitudinal sectional view through our steam-chest, showing a portion of the power-cylinder, the reversing plate or valve being shown in a closed position. Fig. 3 is a view similar to Fig. 2 with the reversing plate or valve in position for driving the engine in one direction. Fig. 4 is a view similar to Fig. 3, showing the reversing plate or valve in the position for driving the engine or piston in the opposite direction from that given it by the position of the valve in Fig. 3. Fig. 5 is a vertical cross-sectional view on the line 5 5 of Fig. 2. Fig. 6 is a detached top plan view of our valve. Fig. 7 is a detached perspective view of our valve. Fig. 8 is a top plan view of the stationary slide-plate within the steam-chest upon which the valve rests and moves. Fig. 9 is a similar view of the reversing plate or valve.

Referring now to the accompanying drawings, A is an engine-cylinder of the usual construction and which is provided with the usual steam-ports *a*, having communication, respectively, with the opposite ends of the said cylinder.

B is our improved steam-chest, in which is situated our improved valve C. Placed within the steam-chest B and just below the valve C and forming a slide-support for the lower portion or bottom of the said valve is a plate

D. Situated and longitudinally movable between the plate D and the bottom E of the steam-chest is the reversing valve or plate F.

The bottom E of the steam-chest is provided with two sets or pairs of inclined ports *b*, the outer port of each pair inclined inwardly and the inner port of each pair inclined outwardly. Attention is directed to the fact that the two ports *b*, being constructed in the specific manner just described and shown in our drawings, provides the two ports of the two pairs of exactly the same length, which has a specific object in view, as will appear more fully hereinafter.

The valve-supporting and slide plate D is provided with the four transverse passage-ways or openings *c*, which are situated, respectively, directly above the ports *b* in the bottom of the steam-chest.

The reversing valve or plate F is provided with the three transverse passage-ways *d d' d''*, which are adapted to be made to register, respectively, with the inner and outer ports *b* of each pair of the ports *b*, situated at opposite sides of the center of the bottom of the steam-chest and at opposite sides of the center of the top of the power-cylinder A.

Referring now to our improved valve C, it will be noticed that the valve is provided with a transverse passage-way G, having open ends *e* and an open bottom, as shown in Figs. 2, 3, 4, and 5. This passage-way G is an inlet passage-way, in contradistinction to the usual central exhaust passage-way heretofore provided in valves. This valve C is also provided with a horizontal chamber H in its top, the said horizontal chamber or space having an open top or upper end, as clearly shown in the aforesaid figures of the drawings, and passing downward at opposite ends of this horizontal chamber or recess H and at opposite ends of the said valve are the passage-ways I and J. These passage-ways have open lower ends, as clearly illustrated, and establish communication with opposite ends of the power-cylinder A, as shown in Figs. 3 and 4, and the space or recess H, and which constitute exhaust-passages within the said valve.

The top K of our improved steam-chest is



provided at its center with an upwardly-disposed and laterally-projecting passage-way L, having its inner end M open and in constant communication with the recess or chamber H, formed in the upper face of the valve C. The outer end of this horizontal passage-way L is in communication with a chamber N, situated at one side of the steam-chest, and this chamber N is connected with the exhaust-pipe P. The advantage of this construction is that the exhaust-pipe P being often connected with a heater or other stationary object, it would interfere with the ready removal of the top K of our steam-chest if connected therewith. By connecting it in the manner here shown the top K of our steam-chest can be readily removed without in any manner interfering with the exhaust-pipe P and its connection, which is found to be of great practical advantage.

In Fig. 1 we show the means for moving the reversing valve or plate F, which consists in connecting with the said plate a piston-rod Q, which has its outer end connected with a lever R, the said lever having one end S pivotally connected with a suitable bracket T and its opposite end carrying a spring-catch U, adapted to engage in the notches of the segment V. By means of this construction the reverse valve or plate F can be readily and quickly carried to the reversing position for reversing the engine or carried to the intermediate point shown in Fig. 1, which will entirely cut off the steam from the working cylinder and cause the engine to stop or be carried to any intermediate point and serve as means to regulate the flow of steam to the working cylinder, thus avoiding the necessity of using a throttle or controlling valve, or carried to the extreme of its movement in either direction for reversing the engine, as may be desired.

When the reversing valve or plate is in the position shown in Fig. 3, the engine will move in one direction, the live steam passing through the two end passage-ways *c* of the valve-supporting plate D and through the end ports *b* to the passages *a*, respectively, connecting with opposite ends of the working cylinder A according to the position of the valve C as being manipulated by the usual eccentric, with which the valve piston or rod *i* is connected in the usual way.

When the engine is to be reversed from the direction in which it is being driven by the position of the valve or plate shown in Fig. 3, the said plate or valve is moved to the position shown in Fig. 4, which will carry the central passage-ways *d'* *d''* of the said valve or plate in communication, respectively, with the inner ports *b* of the two end pairs of the said ports, and these passages are also in communication with the two inner passages or ports *c'* of the plate D, upon which the valve C rests. This position of the reversing valve or plate F causes the communication for the live-steam or inlet ports to be thrown in communication

alternately with the end passage-ways I and J and the chamber H and from thence through the exhaust-passages L, M, and N. This position of the reversing valve or plate also carries the said passage-ways *d'* and *d''* alternately in communication with the transverse passage-way G of the valve C, the open ends *e* of the said passage-way being in communication with the interior of the steam-chest B, the steam being supplied thereto through the inlet-pipe A'. Thus it will be seen that when the engine is running in one direction the valve C has both inlet and exhaust ports, which control the movement of the steam into and out of the working cylinder, while when the engine is running in the other direction the central inlet-port or passage-way G of the valve ceases to perform any function, and the steam-inlet is at the ends of the valve, as shown in Fig. 3, and the exhaust is through the passage-ways I and J of the said valve C.

It should be noted, as before briefly stated, that the ports *b* are of the same length and have their ends communicating with the passage-ways *a* of the power-cylinder. This is very advantageous over the usual construction of having one of these ports longer than the other. Where one of these ports is longer than the other, the steam has longer to travel when passing through one of the ports to the ports *a* of the power-cylinder, and which in practice we find very perceptibly effects the operation of the engine by causing it to work more slowly when the longer passage-ways are in operation. By our construction, the passage-ways *b* being of the same length, the engine will have the same power and the same speed when working in either direction.

By reference to Fig. 7 it will be seen that the lower edge or bottom of the valve C is provided with a laterally-projecting flange *m*, which serves to hold the sides *n* of the said valve away from the inner sides of the steam-chest, and to thus constitute a passage-way between the sides of the said valve and the sides of the steam-chest for the steam to enter through the ends *e* of the transverse passage-way G and from thence into the cylinder, as before described.

The upper edge of the valve C is provided with a suitable packing *r* at its ends and sides for the purpose of making a steam-tight joint between the top of the said valve and the under side of the top K of the steam-chest B, so as to keep the exhaust passage-way entirely out of communication with the interior of the steam-chest, which is very essential, as will be readily understood. This packing may be of the well-known spring type or of any other desired or suitable form.

For the purpose of preventing pressure of the steam within the steam-chest upon the plate D and in turn upon the reversing-plate F we provide the ends of the plate D with notches *s*, which constitute passages for the steam under the plate D, which serves to balance the plate and to prevent undue friction



upon the reversing-plate, which, as will be readily understood, would otherwise occur. By this simple means, however, we prevent any pressure caused by the steam within the steam-chest from binding the shifting plate in its movements and which will permit the shifting plate to be readily moved for reversing the engine.

In the use of the valve it is possible that the plate D might have endwise wear, which would be very objectionable, and in order to provide against any looseness on this account we provide one end of the steam-chest with a groove, which contains an adjustable strip *t*, against which a set screw or screws *u* impinge for the purpose of carrying the strip *t* against the adjacent edge of the plate D. By this means we are enabled to adjust the strip *t* in a way to prevent any looseness of the plate D, while at the same time we allow the plate a free movement up and down, as may be required, to prevent any binding action upon the reversing-plate D.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. A reversing-valve comprising a steam-chest having a stationary plate therein provided with exhaust and inlet ports, a reversing-plate situated therebelow and having passage-ways adapted to register with the said passage-ways of the stationary plate, a power-cylinder having ports in communication with the said reversing-plate passage-ways, a valve situated within the steam-chest and having its bottom provided with inlet and exhaust ports, and the steam-chest having inlet and exhaust passage-ways in communication respectively and independently with the said exhaust and inlet passage-ways of the said valve, substantially as described.

2. A reversing-valve comprising a steam-chest having a stationary plate therein provided with inlet and exhaust ports, a power-cylinder situated adjacent thereto and having ports in communication with opposite ends thereof, a reversing-plate situated between the stationary plate and the said power-cylinder ports and having passage-ways adapted to register with the said ports and with the said passage-ways in the stationary plate, a valve situated in the steam-chest and movable upon the said stationary plate, the said valve having a centrally transversely arranged inlet-port in communication with the interior of the steam-chest, and with end exhaust passage-ways, the said steam-chest having a laterally-extending exhaust passage-way in communication with the said exhaust-ports of the valve and separate from the communication of the inlet-port of the said valve, substantially as described.

3. A reversing-valve comprising a steam-chest having a stationary plate therein provided with inlet and exhaust passage-ways, a power-cylinder adjacent thereto having ports in communication respectively with opposite

ends of the said cylinder, a reversing-plate situated and movable between the said stationary plate and the power-cylinder ports, the reversing-plate having passage-ways adapted to register with the said ports and with the passage-ways in the stationary plate, a valve within the steam-chest having its sides out of contact with the sides of the steam-chest, the said valve having a transverse inlet-port with open ends in communication with the space between the sides of the valve and the sides of the said chest, the top of the steam-chest having a laterally-projecting exhaust-port, and the said valve having at opposite ends exhaust-ports having their lower ends adapted to register with the openings of the stationary plate and their upper ends in communication with the exhaust-ports of the top of the steam-chest, substantially as described.

4. A reversing-valve comprising a steam-chest having a stationary plate therein provided with inlet and exhaust ports, a power-cylinder having ports in communication with opposite ends thereof, a reversing-valve movable between the stationary plate and the said power-cylinder ports and having passage-ways adapted to control the said ports of the power-cylinder and the passage-ways in the stationary plate, a valve within the said steam-chest, the valve having a centrally-arranged inlet passage-way having open ends and an open bottom, the open bottom adapted to register with the said passage-ways of the stationary plate, the said valve having also end exhaust-ports with open lower ends and a horizontal recess or chamber in its upper side with which the upper ends of the exhaust-ports communicate, the top of the said chest having a laterally-extending exhaust passage-way in communication with the recess in the said valve, the said laterally-extending exhaust-port of the top of the steam-chest having an outlet-opening at one side of the steam-chest, substantially as described.

5. A steam-engine valve comprising a steam-chest, the bottom of the steam-chest having inlet and exhaust ports in communication with opposite ends of the power-cylinder, a valve within the steam-chest having exhaust passage-ways with open upper and lower ends, the top of the steam-chest having a laterally-extending exhaust passage-way with its outer end projecting beyond the side of the steam-chest, the side of the steam-chest having a downwardly-extending passage-way in communication with the projecting end of the said laterally-projecting passage-way of the top of the steam-chest, substantially as described.

6. A valve for reversing mechanisms having a recess in its top, a transverse inlet-port below the said recessed top, the said transverse port having open ends and an open bottom, and vertically-arranged exhaust-ports situated at opposite sides of the said transverse inlet-port, the ends of the exhaust-ports



being open and communicating respectively with the recessed top and the working-cylinder ports, substantially as described.

7. A reversing-valve comprising a steam-  
5 chest, a stationary plate situated therein and having inlet and exhaust ports, a working cylinder having ports communicating with its opposite ends, a shifting plate situated between the stationary plate and the said work-  
10 ing-cylinder ports, the reversing-plate having passage-ways, a valve situated above and resting upon the stationary plate, the sta-

tionary plate having steam passage-ways to permit the steam to pass therebelow independent of the said inlet and exhaust ports 15 thereof, substantially as described.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

DANIEL J. HOISINGTON.  
JOHN W. KESSINGER.

Witnesses:

J. H. STURGES,  
A. J. CRESS.