

No. 896,439.

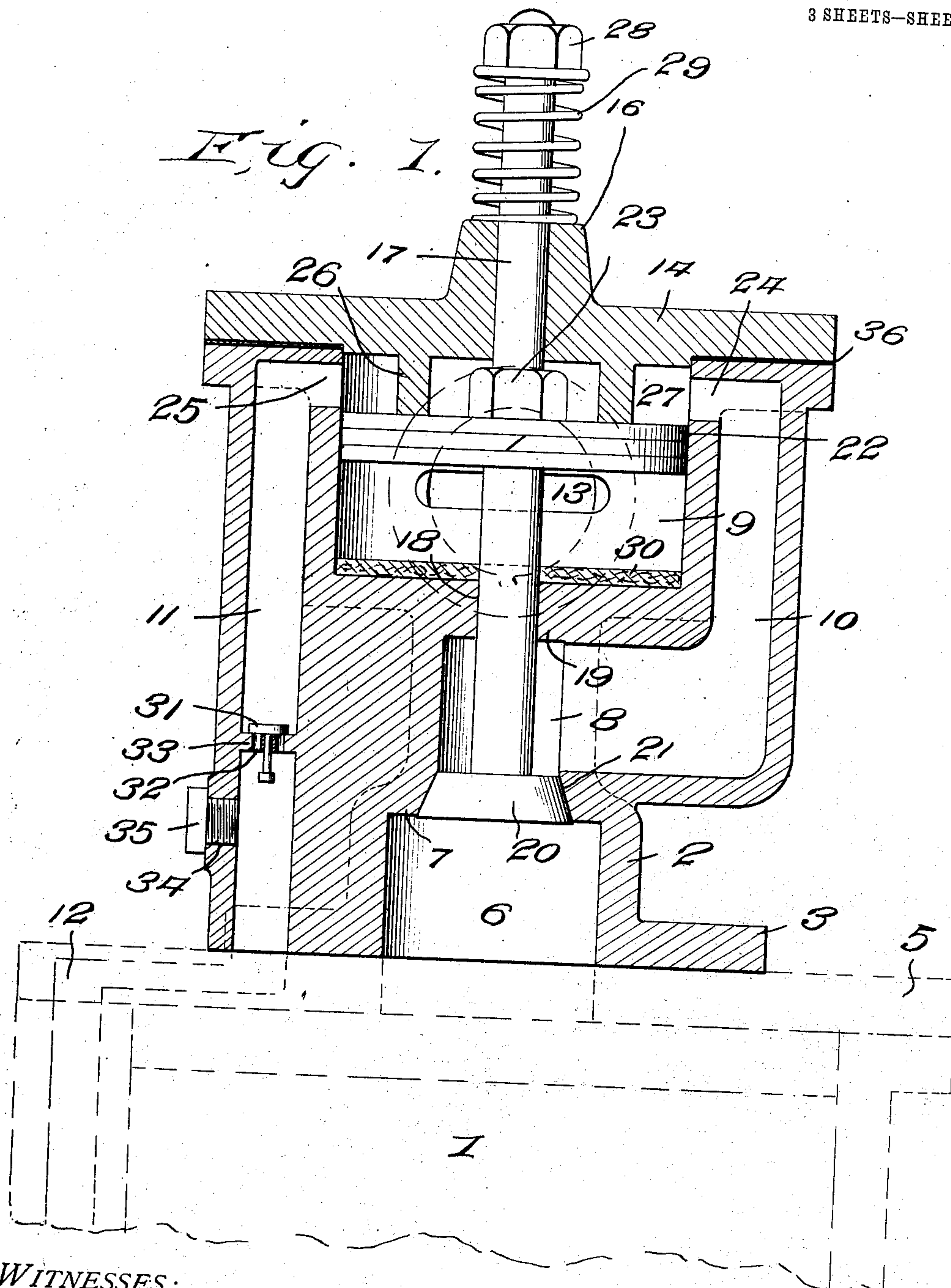
PATENTED AUG. 18, 1908.

H. J. CRINER.

VALVE.

APPLICATION FILED SEPT. 13, 1907.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

Fig. 2.

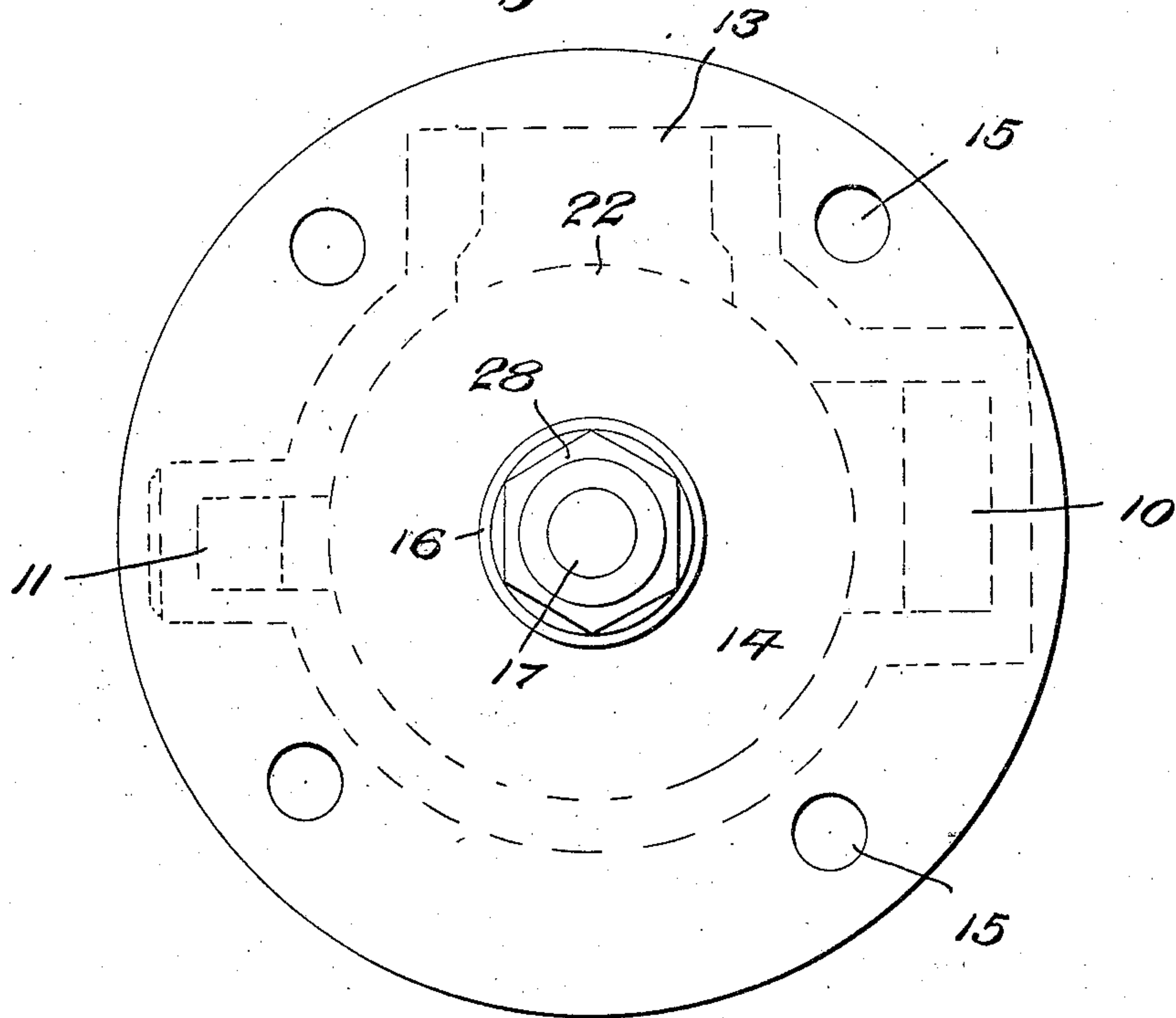
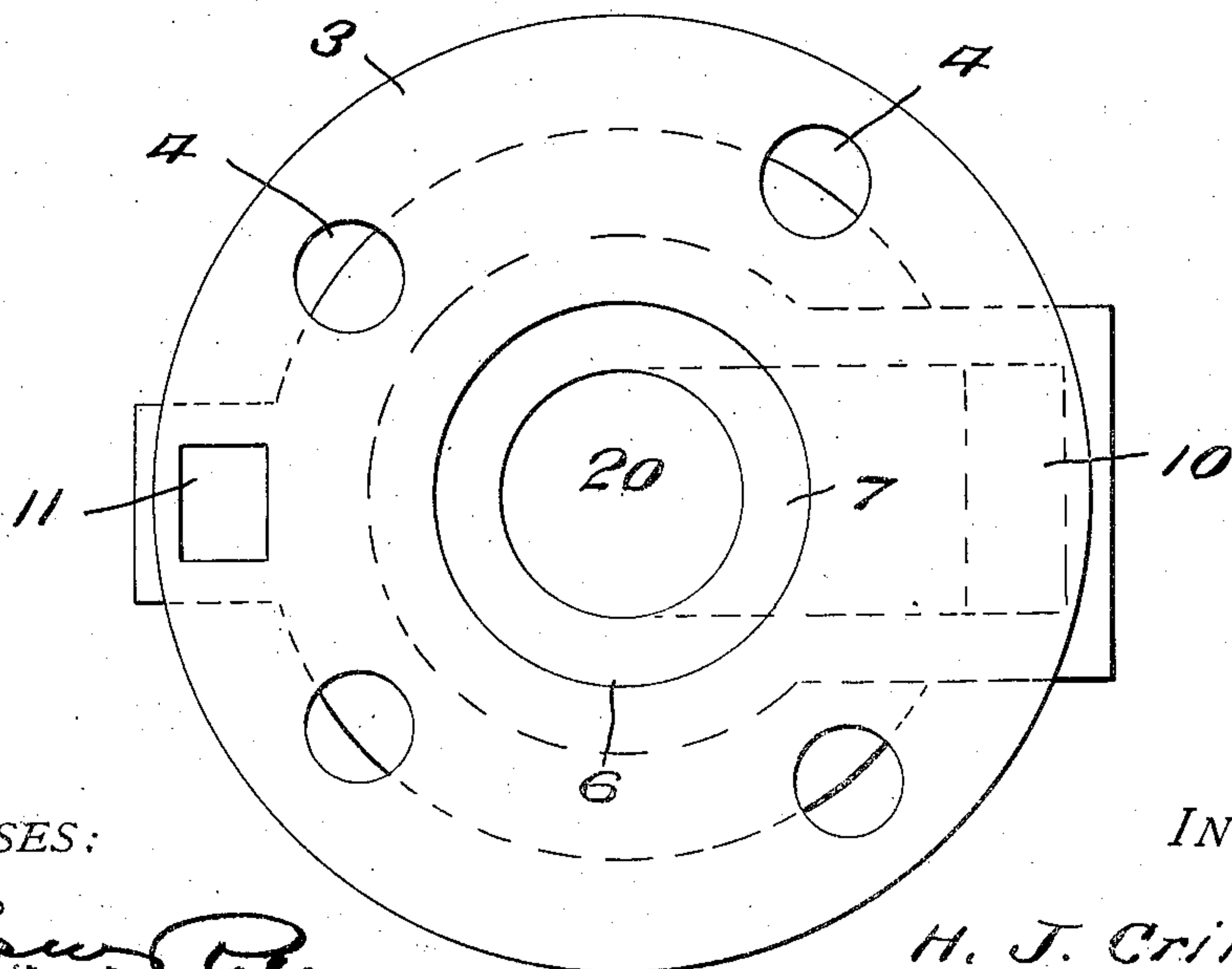


Fig. 3.



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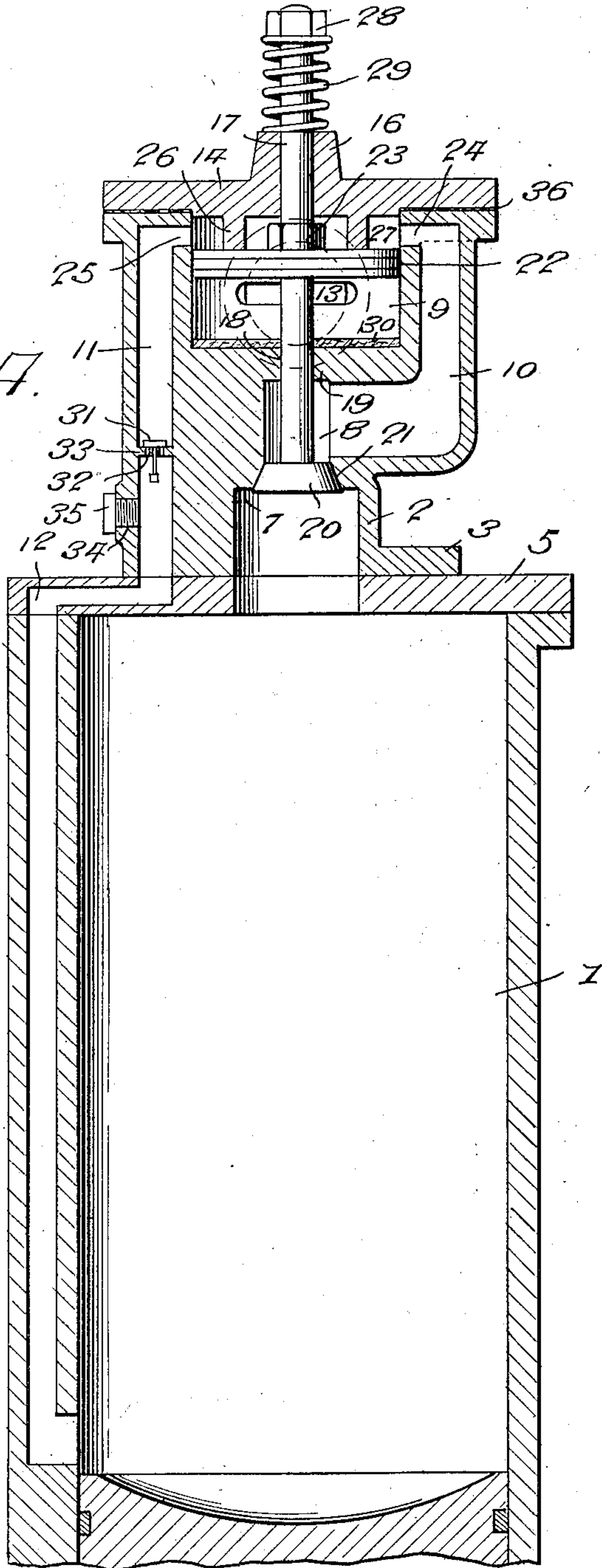
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3 SHEETS—SHEET 3.

Fig. 4.



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UNITED STATES PATENT OFFICE.

HARRY J. CRINER, OF BURLINGTON, IOWA, ASSIGNOR OF ONE-HALF TO FRED S. HOLSTEEN, OF BURLINGTON, IOWA.

VALVE.

No. 896,439.

Specification of Letters Patent.

Patented Aug. 18, 1908.

Application filed September 13, 1907. Serial No. 392,743.

To all whom it may concern:

Be it known that I, HARRY J. CRINER, a citizen of the United States, residing at Burlington, in the county of Des Moines and State of Iowa, have invented certain new and useful Improvements in Valves; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to new and useful improvements in exhaust valves, and more particularly to that class adapted to be used in connection with what is known as four cycle engines, and my object is to provide a valve of this class which will be operated by the pressure of the exhaust thereon.

A further object is to provide means for attaching the valve to any form or make of engine.

A still further object is to provide means for returning the parts of the valve to their initial position after the exhaust is completed, and a still further object is to provide a cushion for parts of the valve, whereby the jar coincident to the stroke thereof will be eliminated.

Other objects and advantages will be hereafter referred to and more particularly pointed out in the claims.

In the accompanying drawings which are made a part of this application, Figure 1 is a central sectional view through the improved exhaust valve, the parts of the engine to which it is secured being shown by dotted lines. Fig. 2 is a top plan view of the valve. Fig. 3 is a bottom plan view thereof, and Fig. 4 is a central sectional view through my improved exhaust valve and a cylinder to which the same is attached.

Referring to the drawings in which similar reference numerals designate corresponding parts throughout the several views, 1 indicates the cylinder of an engine which may be of the usual or any preferred form, but preferably of the four cycle type, to the upper end of which is secured my improved form of exhaust valve casing 2, said valve casing being provided with a circular base 3 through which extends openings 4 to receive bolts (not shown) and by which means the valve casing is secured to the head 5 of the cylinder.

Extending through the base 3 and the

head 5 is a bore 6 at the upper end of which is a shoulder 7, while extending upwardly from the shoulder and concentric with the axis of the bore 6, is an auxiliary bore 8. Communicating at one end with the auxiliary bore 8 and at its upper end with a chamber 9 is a port 10, the chamber 9 being likewise concentric with the axis of the bores 6 and 8 and is adapted to receive the exhaust direct from the cylinder.

Preferably diametrically opposite the port 10 is an exhaust port 11 which communicates at its upper end with the chamber 9 while the lower end thereof communicates with a channel 12 in the head 5 and wall of the cylinder 1, said channel extending substantially the full length of the cylinder and communicating with the interior thereof adjacent the lower end of the cylinder, or at a point slightly above the position of the piston in the cylinder when it has completed its downward stroke so that the exhaust from the cylinder will pass from the channel into the exhaust port and from thence into the chamber 9.

Extending through one wall of the chamber 9 and at a point approximately at the longitudinal center of said chamber is an elongated port 13 through which the exhaust from the chamber 9 may pass to the outer atmosphere or to any suitable point desired.

The upper end of the chamber 9 is covered by means of a cap 14, said cap having openings 15 therein through which bolts (not shown) are introduced to secure the cap in position on the exhaust valve, said cap having a gland 16 extending upwardly from its central portion, through which extends a piston rod 17 the lower portion of the piston rod passing through a bore 18 in the wall between the auxiliary bore 8 and the chamber 9, the lower end of said piston rod having an exhaust valve 20 secured thereto, the walls of which are preferably tapered to engage a tapered seat 21 between the bores 6 and 8 so that when the exhaust valve 20 is closed the exhaust will be excluded from the port 10. That portion of the piston rod extending through the chamber 9 is provided with a piston 22 which is mounted upon the rod in any preferred manner and is held in its adjusted position by means of a locking nut 23.

The piston 22 is so located on the rod 17 that when the exhaust valve 20 is resting in its seat the piston 22 will be above the elon-

gated port 13, thereby excluding the exhaust from said port, while the upper edge of the piston 22 is immediately below the openings 24 and 25 at the upper ends of the ports 10 and 11 respectively, the upward movement of the piston 22 being limited by means of a collar 26 depending from the lower face of the cap 14, the collar being of less diameter than the diameter of the piston, thereby forming an auxiliary chamber 27 at the upper end of the chamber 9 when the piston 22 is resting against the collar 26.

The upper end of the piston rod 17 is extended beyond the gland 16 and has at its upper end an adjusting nut 28 between which and the end of the gland 16 is interposed a spring 29 and it will be seen that the pressure on the spring may be increased or decreased by adjusting the nut 28 downwardly or upwardly on the piston shaft 17.

In operation when the piston in the cylinder 1 starts on its downward stroke the driving medium is drawn into the cylinder through the usual form of carbureter (not shown) and on its return stroke compresses the driving medium between the piston in the cylinder and the head 5 so that when the piston in the cylinder reaches a certain point or is ready for its return stroke, the propelling medium is exploded in the usual or any preferred manner, thereby forcing the cylinder piston downwardly and as soon as the stroke of the piston has passed beyond the open lower end of the channel 12 the exploded propelling medium will pass into said channel through the exhaust port and into the auxiliary chamber 27, the force of the exhaust being sufficient to overcome the pressure of the spring 29, thereby forcing the piston 22 downwardly and below the port 13, and allowing the exhaust to pass out of the exhaust valve 20. If for any reason all of the exhaust has not passed through the channel 12 and exhaust port 11 the return of the piston to the upper end of the cylinder will force the remaining exhaust through the bores 6 and 8 and port 10, the piston 22 remaining open as long as the pressure is sufficient to overcome the tension of the spring 29, thereby clearing the cylinder 1 of all exhaust matter. As soon as the pressure of the exhaust is removed from the piston 22 or when the piston in the cylinder has reached its upward stroke, the tension of the spring 29 will immediately return the piston 22 to the upper end of the chamber 9 and close the port 13, and at the same time seating the exhaust valve 20 on its seat 21, the tension of the spring 29 being sufficient to overcome the suction caused by the descending piston in the cylinder 1 as when said piston is drawing a new charge of driving medium into the cylinder.

In order to prevent injury to the parts of the valve by the rapid descent of the piston 22, when the exhaust is directed into engage-

ment therewith, a cushion 30 is placed on the upper face of the wall 19 against which the piston 22 strikes when it descends into the chamber 9, thereby eliminating the jar and noise such as would be occasioned by the piston striking the wall 19 were the cushion 30 not employed.

In order to prevent the return of the exhaust through the ports 11 and 12 a check valve 31 may be located at a suitable point in the port 11, said check valve being arranged to readily move off of its seat to allow the exhaust to pass through openings 32 in the seat 33 when the exhaust is passing upwardly through the exhaust port 11 and to descend and cover the openings 32 when the pressure of the exhaust is removed from the check valve. It will also be understood that when the exhaust valve is attached to cylinders not provided with the channel 12 the wall of the exhaust valve immediately over the exhaust port 11 may be tapped as shown as 34, and a pipe (not shown) secured in the tap and extended to the exhaust port at the lower end of the cylinder 1, said tap 34 being closed by means of a stud bolt 35 when the exhaust valve is being employed with a cylinder of the construction herein shown.

In order to prevent leakage between the joints of the several parts of the exhaust valve suitable sealing gaskets 36 are interposed between the meeting faces of the several parts so that when the parts are clamped together leakage around the joints will be prevented.

This form of exhaust valve casing may be employed in connection with engines using gas, gasoline, oil or vapor for propelling purposes, and while I have described the same as being used in connection with four cycle engines it will be understood that it can be as successfully employed with other forms of engines, and it will further be seen that the valve may be readily connected to any form of engine whether prepared with a channel to convey the exhaust to the valve or not, and said valve will also serve to partially muffle the sound of the exhaust passing from the cylinder.

What I claim is:

1. In an exhaust valve of the class described, the combination with a cylinder; of an exhaust valve casing, said exhaust valve casing having a bore in its lower end, an auxiliary bore communicating therewith and a chamber at the upper end of the exhaust valve casing, a port extending from the auxiliary bore to the upper end of the chamber, a piston slidably mounted in said chamber, a rod for said piston, a valve at the lower end of the piston adapted to close the passage between the bores at the lower end of the exhaust valve, a port in the wall of said chamber and in a plane below the piston when the piston is in its elevated position, a collar

adapted to limit the upward movement of the piston, said collar and piston forming an auxiliary chamber at the upper end of the main chamber, means to yieldingly hold the piston
5 against said collar, and additional means to convey the exhaust from the lower end of the cylinder to the chamber at the upper end of the exhaust valve.

2. In an exhaust valve of the class described, comprising the combination with a
10 base having a bore therein and an auxiliary bore communicating with the main bore, a shoulder between said bores, a seat on said shoulder, a chamber at the upper end of the
15 exhaust valve, said chamber having a port in one wall thereof adjacent its longitudinal center, a port communicating with the auxiliary bore and the upper end of the chamber, an exhaust port communicating with the up-

per end of said chamber, and a check valve in
20 said exhaust port; of a piston slidably mounted in said chamber, a rod for said piston, a valve at the lower end of shaft adapted to coöperate with the seat on the shoulder, a
25 collar at the upper end of said chamber adapted to limit the upward stroke of the piston, means to normally hold said piston in engagement with the collar and above the
port in the wall of the chamber, and a cushion
at the lower end of the chamber adapted to
30 receive the piston on its downward stroke.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HARRY J. CRINER.

Witnesses:

EFFIE HOLLINGSWORTH,
H. COOPER.