

No. 705,224.

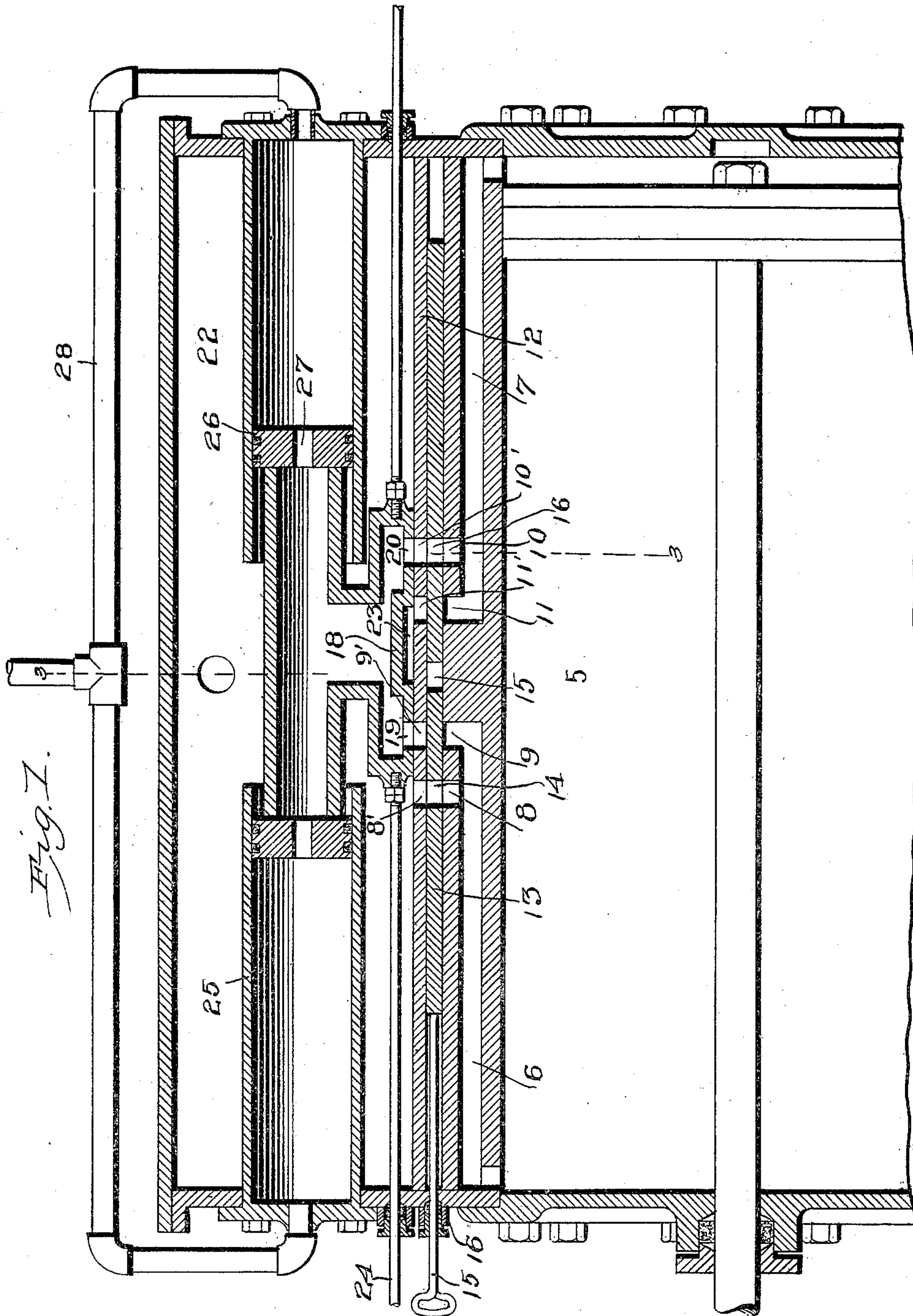
Patented July 22, 1902.

E. U. DOWN.  
VALVE FOR ENGINES.

(Application filed Jan. 11, 1902.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses  
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*Jno. C. Parker*

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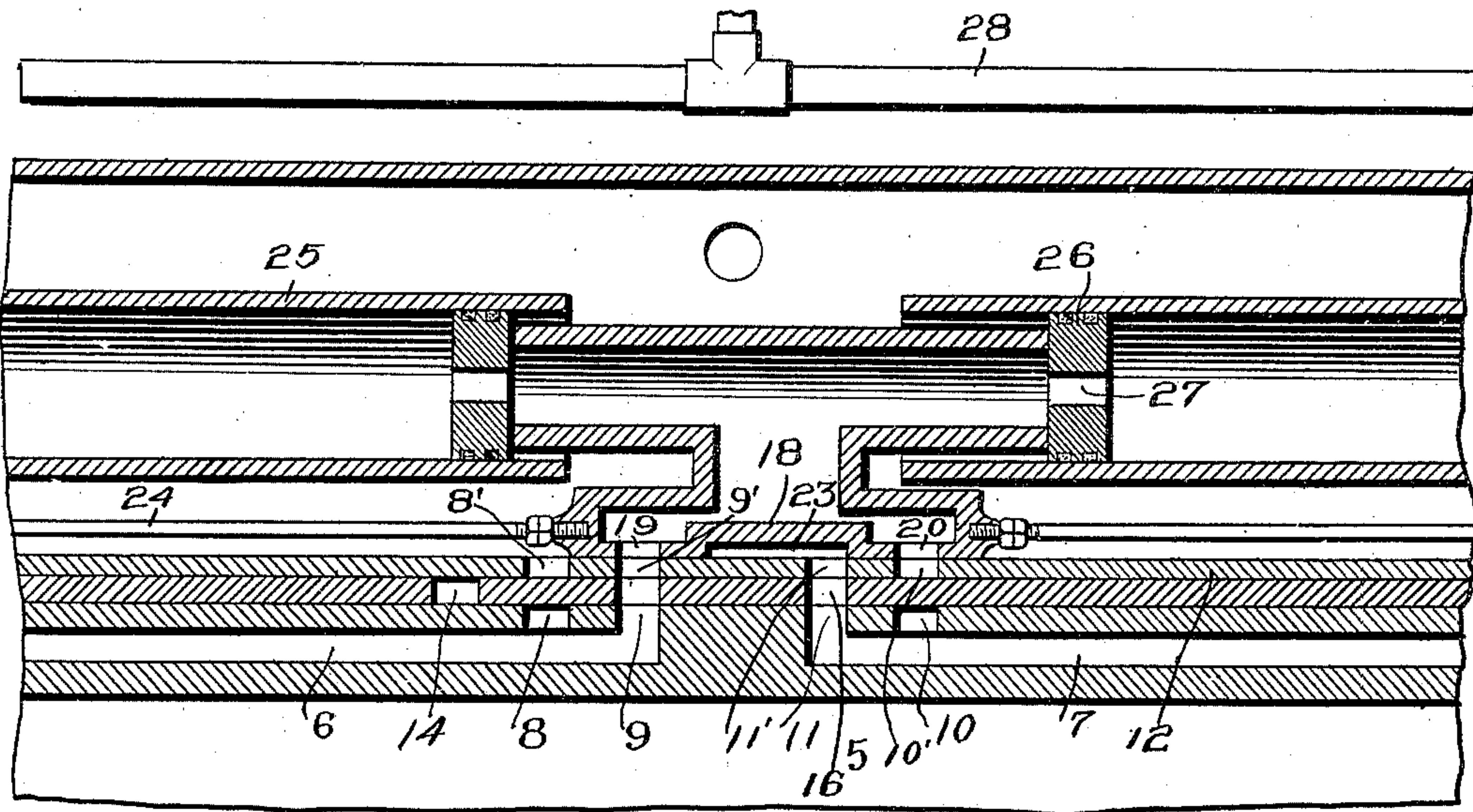


Fig. 2.

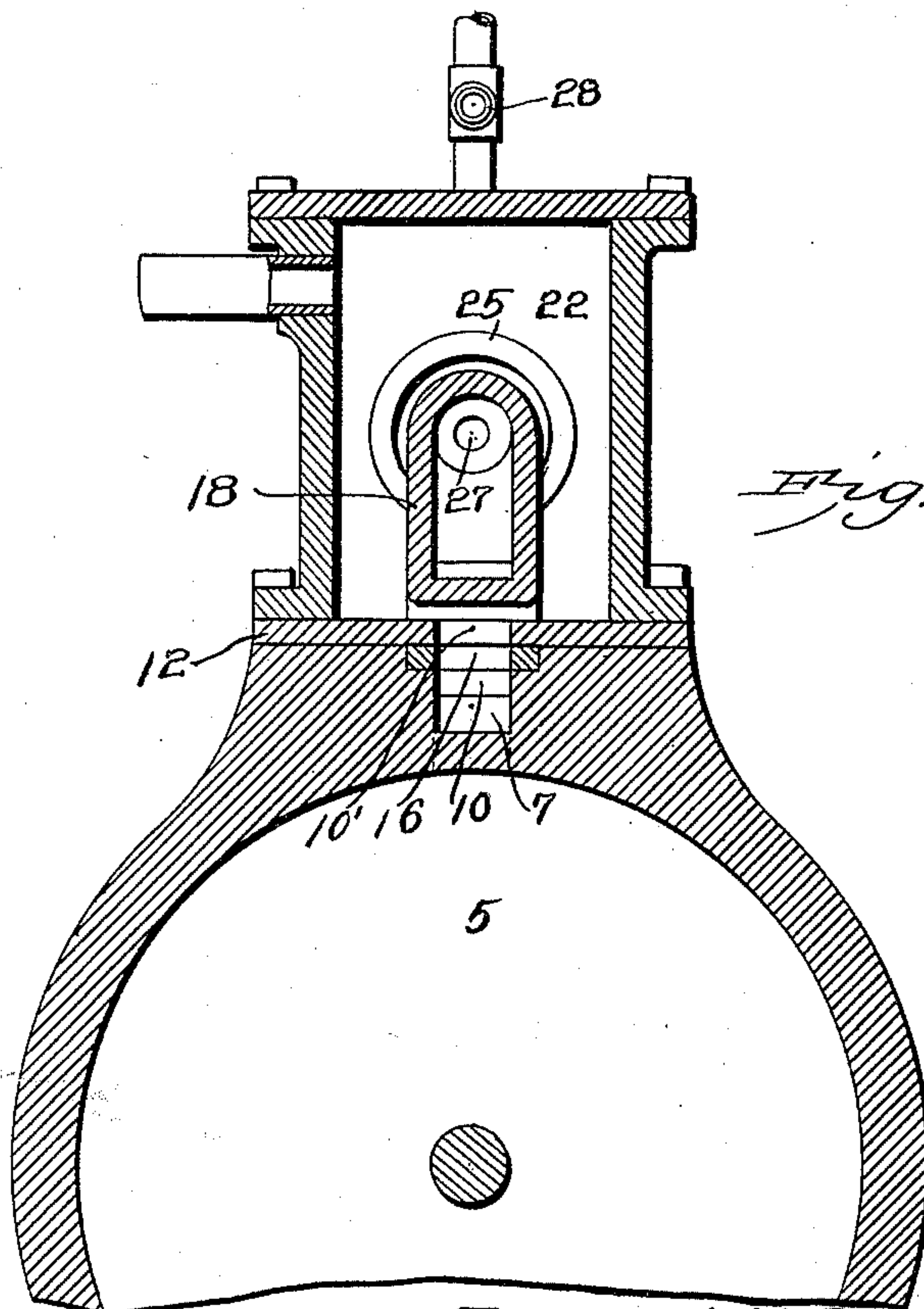


Fig. 3.

Witnesses  
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# UNITED STATES PATENT OFFICE.

EARNEST ULYSSIS DOWN, OF HASKINS, OHIO, ASSIGNOR OF ONE-FOURTH  
TO AUGUST C. BEIL, OF WATERVILLE, OHIO.

## VALVE FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 705,224, dated July 22, 1902.

Application filed January 11, 1902. Serial No. 89,338. (No model.)

*To all whom it may concern:*

Be it known that I, EARNEST ULYSSIS DOWN, a citizen of the United States, residing at Haskins, in the county of Wood and State of Ohio, have invented a new and useful Valve for Engines, of which the following is a specification.

My invention relates to certain improvements in steam-engines, and has for its principal object to provide an improved form of balanced valve by which the friction between the face of the valve and the seat will be materially reduced and permit of the easier operation of the valve.

A further object of the invention is to provide in connection with the valve an improved reversing mechanism located wholly within the steam-chest, and thus protected from exposure to dust and dirt.

A still further object of the invention is to so construct the valve as to permit of the circulation of the exhaust-steam around the exterior of the valve and in a measure prevent the condensation of the live steam entering the valve on its way to the cylinder.

With these and other objects in view the invention consists of the construction of valve and reversing mechanism as hereinafter described and illustrated in the accompanying drawings.

In the drawings, Figure 1 is a longitudinal sectional elevation of a steam-cylinder and steam-chest, illustrating the construction of valve, reversing mechanism, and their connected parts constructed and arranged in accordance with my invention. Fig. 2 is a similar view of a portion of the steam-chest, illustrating the reversing-slide in a different position. Fig. 3 is a transverse sectional elevation of the steam chest and cylinder, taken on the line 3 3 of Fig. 1.

Similar numerals of reference are employed throughout the several views.

The cylinder 5 may be of any desired size and may form part of a steam or other engine in which a fluid under pressure is employed as an actuating medium. The cylinder is provided with longitudinal ports 6 7, extending from the ends of the cylinder to a point near the center of one wall of the cylinder in the usual manner, each port, how-

ever, terminating in two openings instead of the single opening usually employed. From the port 6 extend two openings 8 and 9, and from the port 7 extend two openings 10 and 11, all of said openings being in direct alinement with similar openings 8', 9', 10', and 11', formed in a suitable plate 12, which is arranged at a slight distance above the face of the cylinder, the space between the face of the cylinder and the adjacent face of the plate 12 being occupied by a reversing-slide 13, having suitable ports 14, 15, and 16, which may be moved into alinement with the various openings leading to the cylinder-ports, the slide being moved to the position shown in Fig. 1 or to that illustrated in Fig. 2 by means of a suitable rod 15, connected to the slide and extending out through a suitable stuffing-box 16. The outer end of the rod may be provided with a suitable handle for convenience in manipulation or may be connected to a reversing-lever of the usual character and provided with a locking-catch and segment. The upper face of the plate 12 is finished and is adapted to receive a hollow slide-valve 18, having two ports 19 20, which as the valve is reciprocated are alternately brought into alinement with the openings leading to the cylinder-ports in order to admit steam to the cylinder and permit the exhaust-steam to enter the steam-chest 22. On the bottom face of the valve is a centrally-disposed port 23, which is traveled into alinement with the openings 9' and 11' alternately and serves to permit the exhaust-steam to pass from the cylinder-ports to the steam-chest when the reversing-slide is moved to the position shown in Fig. 3. When the engine is running in the normal direction, steam passes from the interior of the valve through the ports 19 and 20 and the passages 8' and 10' and the alining openings into the cylinder and escapes directly into the steam-chest when the end of the valve uncovers said openings. This operation takes place when the reversing-slide is adjusted to the position illustrated in Fig. 1. The valve is reciprocated by any suitable valve-operating mechanism—as, for instance, an ordinary eccentric, which may be connected to a valve-rod 24



in the usual manner. In the opposite ends of the steam-chest are formed suitable openings for the reception of open-ended cylinders 25, which project into the steam-chest, said cylinders being in horizontal alinement and each being adapted for the reception of a small piston 26, having suitable packing-rings and provided with a port or passage 27 to permit steam to pass from the cylinders to the interior of the valve. Steam is conveyed from any suitable source of supply through a pipe 28, connected to both cylinders, and as the cylinders are of equal diameters the pressure on each of the small pistons will be the same. The upper portion of the valve is tubular in form, its opposite ends projecting into the open ends of the cylinders 25 and fitting snugly against the inner faces of the pistons in said cylinders, the contact-faces of the pistons and the end of the valve being perfectly true in order to form a practically steam-tight joint and to permit the valve being pressed against its seat by the pressure of the exhaust-steam in the main body of the steam-chest without exerting any downward pressure on the said small cylinders and pistons. As the available area of the small pistons exposed to the pressure of steam in the small cylinders is much greater on the outer than on the inner surface, the small pistons will be held snugly against the ends of the valve, preventing the escape of steam between the ends of the valve and the pistons, and as the pressure on the outer faces of the pistons is equal the valve may be freely moved by the eccentric or other operating device.

In operating the engine, when the reversing-slide 13 is in the position illustrated in Fig. 1, steam enters the hollow valve and passes through the port 20 and the alining passages 10', 16, and 10 to the cylinder-port 7 to one end of the cylinder, the exhaust-steam passing through the cylinder-ports 6 and the alining ports or passages 8, 14, and 8' to the steam-chest, from whence it may escape through a port 30. The exhaust-steam will to some extent be retained within the main body of the steam-chest, heating the exterior surfaces of the valve and the small cylinders and preventing condensation of the live steam as it passes to the cylinder of the engine. The engine may be instantly reversed by moving the slide 13 to the position illustrated in Fig. 3, the inner set of passages 9, 9', 11, and 11' then coming into play and serving to permit of the passage of steam from the valve to the cylinder and the escape of exhaust-steam from the cylinder to the steam-chest. The steam may be throttled to any desired extent by shifting the reverse-slide in such manner as to reduce the area of the steam-passage, or said reverse-slide may be so moved as to entirely close communication between the cylinder and the valve, and thus stop the engine.

The valve in the present instance may have

a fixed limit of movement, so that the wear will be equal, and the formation of any ridges in the contact-faces will be prevented, lap or lead being provided for to any desired extent, and the position of the various ports being so arranged as to permit of the accurate operation of the valve in either directions of movement of the engine.

While the construction herein described and illustrated presents the preferred form of engine, it is obvious that many changes in the form, proportions, size, and minor details of construction may be made without departing from my invention.

Having thus described my invention, what I claim is—

1. In an engine, the combination of the cylinder having a pair of steam-ports each terminating at the steam-chest end in a plurality of openings, a plate mounted above the ports and provided with openings alining with those of the steam-ports, a reversing-slide disposed below said plate and having ports or passages movable into alinement with either set of openings, and a hollow ported valve adapted to reciprocate on said plate.

2. The combination in an engine, of the cylinder and steam-chest, cylinder-ports extending from each end of the cylinder to the steam-chest and terminating at the steam-chest end in a plurality of openings, a fixed plate arranged in the lower portion of the steam-chest and forming the valve-support, said plate having openings alining with those leading to the cylinder-ports, a reversing-slide disposed below the plate and having three ports movable into alinement with the said openings to change the direction of the flow of steam, and a hollow ported valve disposed on said plate and having an internal steam-supply, substantially as specified.

3. A valve comprising a hollow ported body having cylindrical extensions, a pair of open-ended cylinders into which said cylindrical extensions project, and loose pistons adapted to said cylinders, said pistons being pressed snugly against the ends of the valve by steam-pressure and permitting independent movement of the valve toward its seat.

4. The combination of the alining cylinders, loose pistons arranged in said cylinders and having steam-passages and a hollow ported valve having end portions in contact with the adjacent faces of said pistons.

5. The combination of the steam-chest, a pair of alining cylinders arranged therein, loose pistons adapted to said cylinders and provided with steam-passages, a ported valve having its body portion extending laterally into the respective cylinders and adapted for contact with the pistons therein, and means for reciprocating said valve.

6. The combination of the steam-chest having end openings, a pair of removable cylinders arranged therein and connected to a source of steam-supply, pistons adapted to said cylinders and provided with steam-pas-



sages, a ported valve having portions extend-  
ing laterally into the respective cylinders and  
adapted for contact with the pistons therein,  
and exhaust-ports leading from the cylinder  
5 to the body of the steam-chest and entirely  
surrounding the cylinders, substantially as  
specified.

In testimony that I claim the foregoing as  
my own I have hereto affixed my signature in  
the presence of two witnesses.

EARNEST ULYSSIS DOWN.

Witnesses:

JOSEPH F. REED,  
CHAS. R. NEARING.