

(No Model.)

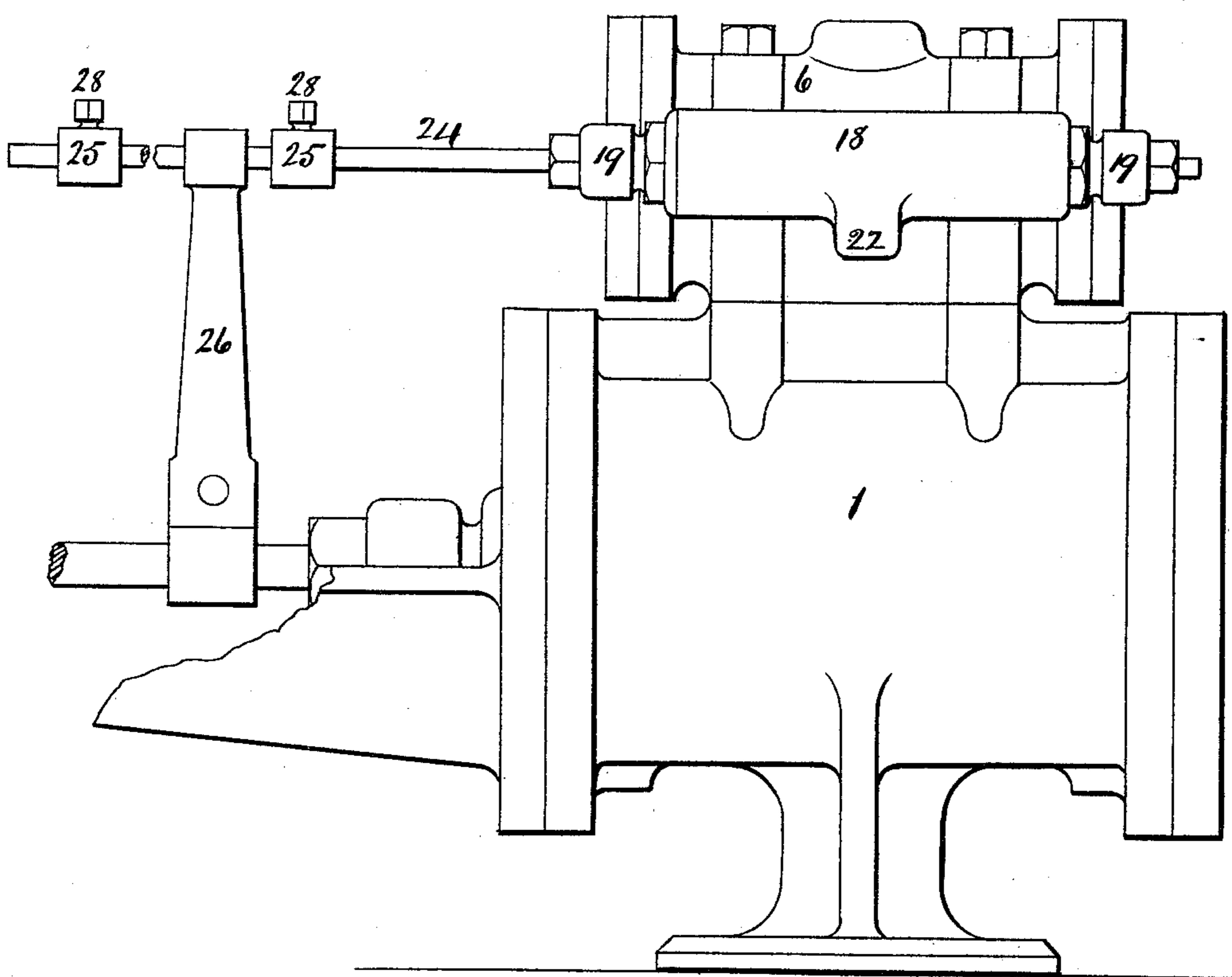
2 Sheets—Sheet 1.

C. L. MAHNICKE.
STEAM PUMPING ENGINE.

No. 414,156.

Patented Oct. 29, 1889.

Figure 1.



Witnesses:

J. C. Dreht
Howell Zettle

Inventor:

Charles Ludwig Mahnicke
By J. H. Johnson
his Attorneys.

(No Model.)

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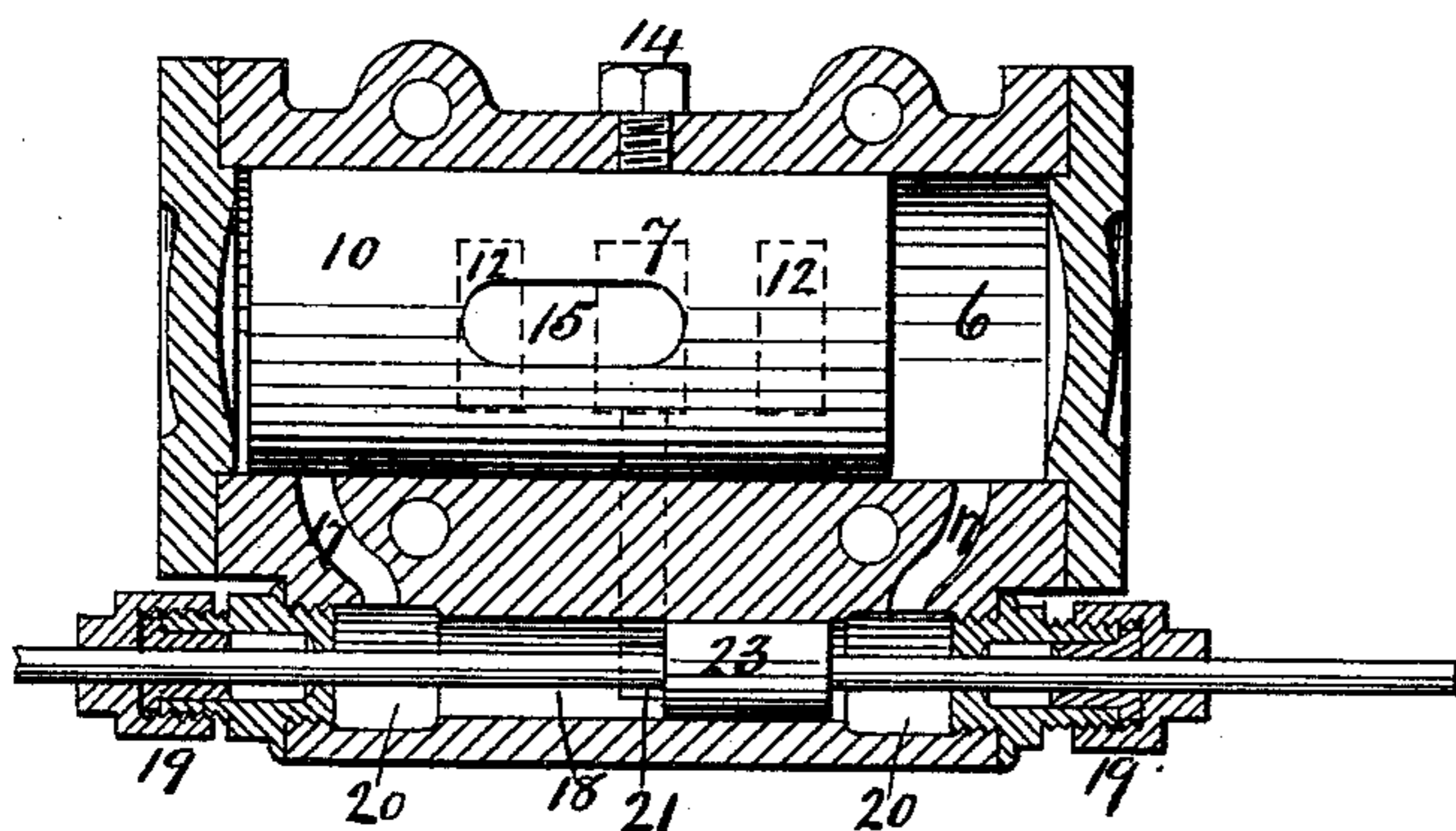


Figure 3.

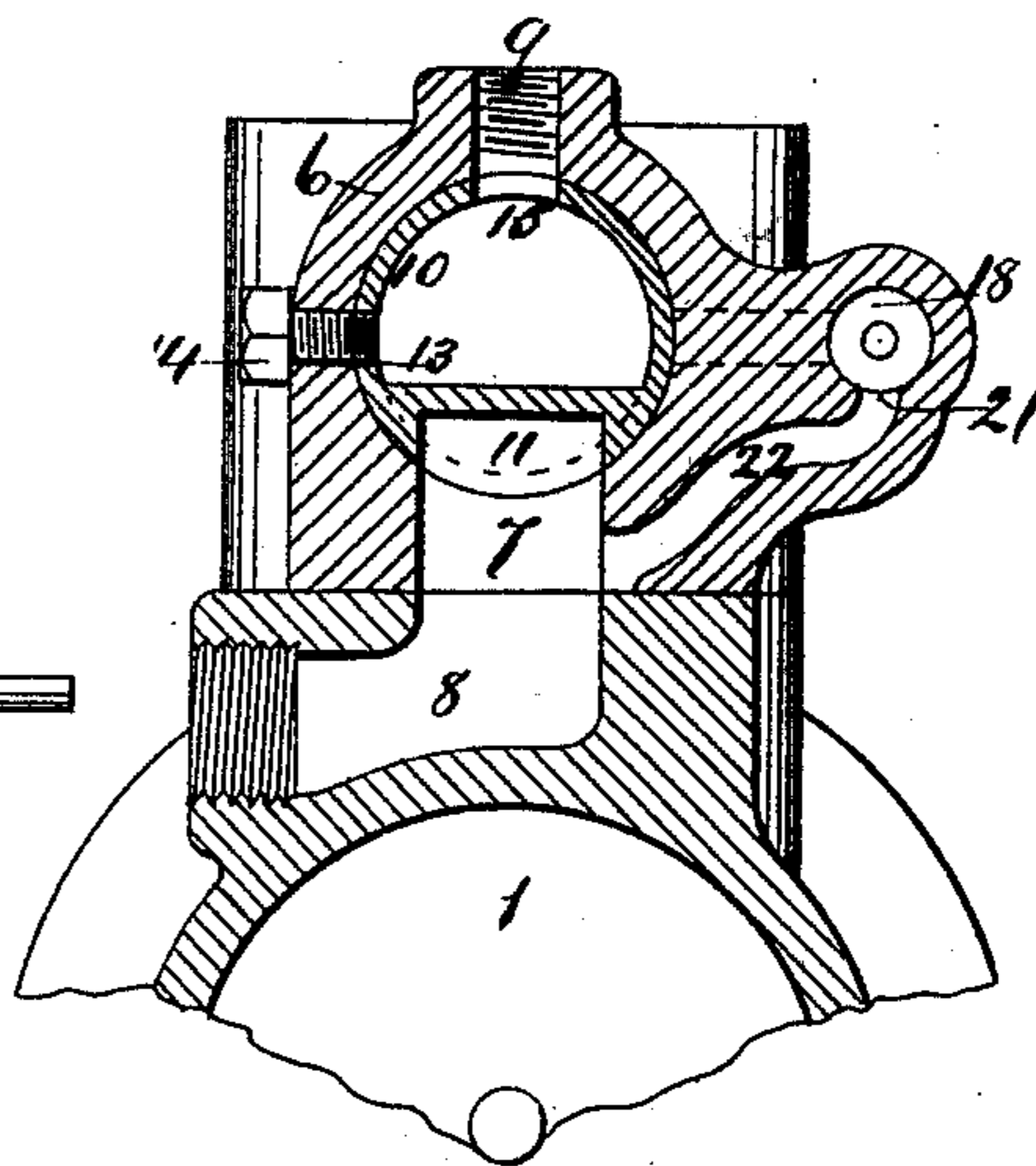


Figure 2.

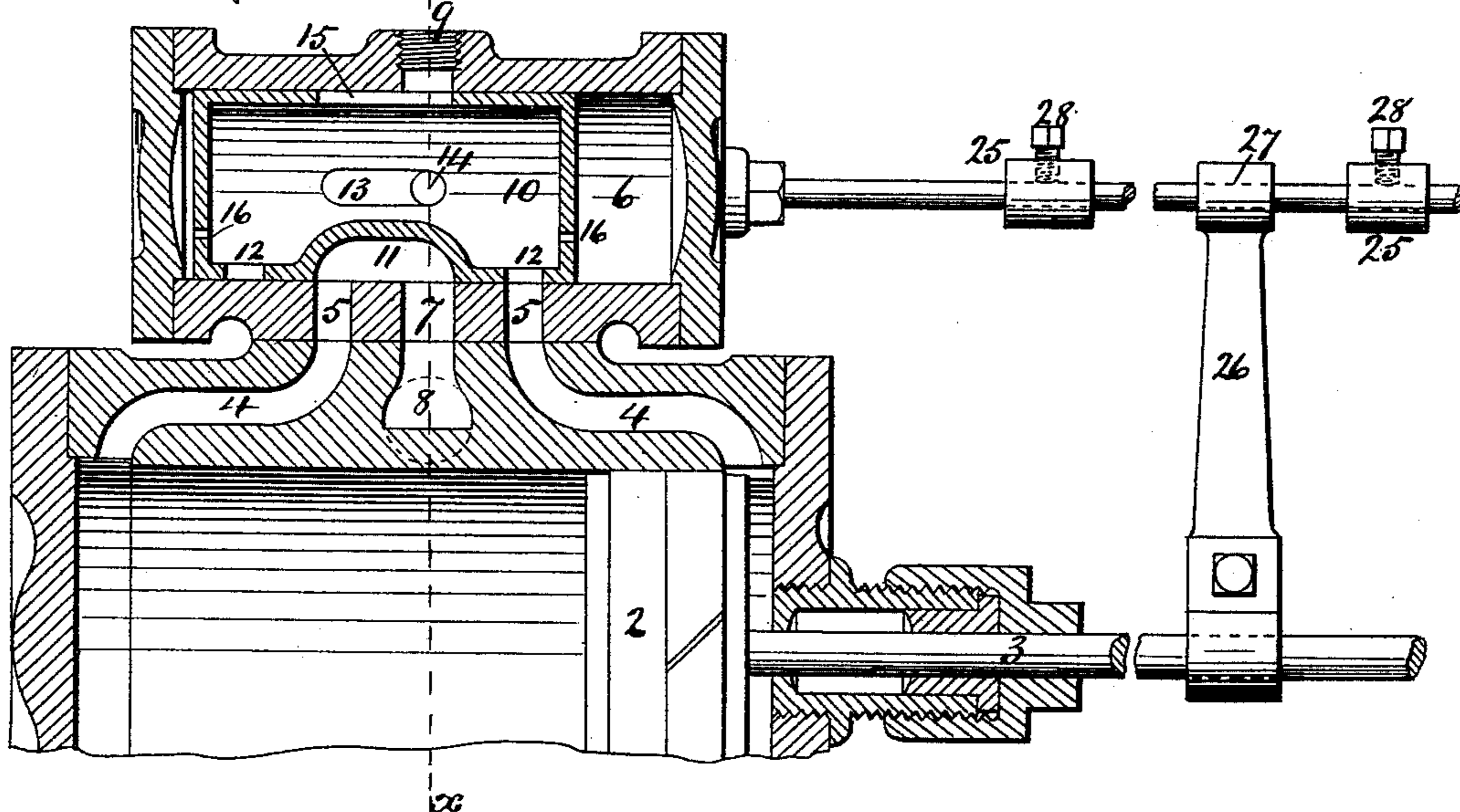


Figure 5.

Witnesses:

J. C. Brecht
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Inventor:

Charles Ludwig Mahnicke
By Johnson & Johnson
his Attorneys

UNITED STATES PATENT OFFICE.

CHARLES LUDWIG MAHNICKE, OF COLUMBUS, OHIO, ASSIGNOR OF TWO-THIRDS TO JOHN D. WELLS AND WM. N. WEINMAN, BOTH OF SAME PLACE.

STEAM PUMPING-ENGINE.

SPECIFICATION forming part of Letters Patent No. 414,156, dated October 29, 1889.

Application filed July 16, 1889. Serial No. 317,710. (No model.)

To all whom it may concern:

Be it known that I, CHARLES LUDWIG MAHNICKE, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented a new and useful Improvement in Steam Pumping-Engines, of which the following is a specification.

My invention relates to steam pumping-engines; and my improvement consists in the construction and arrangement or combination of parts hereinafter fully disclosed in the description, drawings, and claim.

The object of my improvement is to simplify the construction of the pump in the provision of a single solid plug-valve adapted to operate the exhaust-channels within the auxiliary valve-chest and directly connected to the operating parts of the engine, whereby the auxiliary valve is operated by a positive motion working in conformity with the piston of the pump. This is the precise improvement which I claim in connection with the hollow distributing-valve provided with holes in its ends for the admission of steam to the ends of the valve-chest.

Figure 1 represents a side elevation of the steam-cylinder, steam-chest, valve, and piston-rod of my improved pumping-engine; Fig. 2, a vertical longitudinal section of the same, showing the lower part of the steam-cylinder broken off and removed; Fig. 3, a vertical cross-section on the line $x x$ of Fig. 2; Fig. 4, a horizontal longitudinal section of the valve-chest and the governing-valve, and Fig. 5 a view of the governing-valve.

In the drawings, the numeral 1 indicates the steam-cylinder, in which the piston 2, having the piston-rod 3, slides in the usual manner. The usual steam-channels 4 extend from the ends of the cylinder and open with their ports 5 in the valve-chest 6. The exhaust-port 7 is located between said ports and communicates with the exhaust-channel 8. The live steam enters through a port 9 in the top of the valve-chest. A hollow distributing-valve 10 fits and slides within the valve-chest, being shaped to conform to the interior form of said valve-chest, and has an inward bulge 11 upon its under side, which is sufficiently large to cover and connect one steam-port 5 and the exhaust-port 7 at one time. Said hol-

low valve is provided with main ports 12 in its under side and near the ends, and one of said ports may alternately be brought to register with one of the steam-ports 5 when the valve is reciprocated. A longitudinal guide-slot 13 is formed in the side of the hollow valve, and the inner end of a screw 14 projects into said slot, said screw being inserted through the side of the valve-chest. The valve will be prevented from turning within the valve-chest by said screw and slot, the valve and chest being preferably cylindrical, and said screw and slot will also serve to guide and limit the stroke of the valve, as the slot is of the exact length of the stroke. A longitudinal slot 15 is formed in the upper side of the valve and registers with the live-steam port 9 of the valve-chest, being of about the same length as the stroke of the valve, and consequently registering at all times with said live-steam port, forming a live-steam port for said valve. Small holes 16 are formed in the ends or heads of the hollow valve and admit of steam entering the spaces in the ends of the valve-chest between the heads of the latter and of the valve. Two steam-channels 17 extend from near the ends of the valve-chest to a smaller auxiliary or governing valve-chest 18, located upon the side of the main valve-chest 6. Said smaller valve-chest is cylindrical, is formed with two axial stuffing-boxes 19 at its ends and with two enlargements 20 in the ends of its bore, and has an exhaust-port 21 at its middle, which communicates with the exhaust-channel 8 through a channel 22. A solid cylindrical valve 23 slides within said smaller valve-chest, and is secured with its axial bore upon a valve-rod 24, which slides in the boxes 19 of the valve-chest. Said valve is preferably secured upon said rod by driving said rod through the axial bore of the valve, said bore being just sufficiently large to fit snugly and securely upon the rod. Two stops 25 are secured upon the outer portion of the valve-rod, and an arm 26 is secured upon the piston-rod of the engine and slides with a bore 27 in its upper end upon the valve-rod between said stops. The stops are so adjusted upon the valve-rod that they will be alternately struck by the arm at the ends of the stroke of the piston-rod, being secured

upon the valve-rod by set-screws 28 or similar fastenings, and their adjustment upon said valve is such that the valve within the smaller valve-chest will alternately cut off communication between one steam-channel 17 and the exhaust-port 21 and uncover said port for communication between it and the other channel 17.

The operation of the pumping-engine is as follows: Live steam is admitted to the main valve-chest 6 through the live-steam port 9 and enters the hollow valve through the longitudinal slot or port 15 in the same. Assuming the distributing-valve 10 to be in the position shown in the drawings, the live steam will pass through the port of the valve and port and channel of the cylinder into the end of the cylinder to the right of the piston, driving the latter from right to left and forcing the exhaust-steam out of the cylinder through the steam-channel and exhaust port and channel. The steam within the hollow valve has also escaped through the hole in the right head of the valve, and has kept said valve in its position in the left end of the valve-chest by its pressure between the right heads of the valve and valve-chest. When the piston and piston-rod arrive at the end of their stroke to the left, the arm 26 will strike the left stop 25 and force the valve-rod and governing-valve 24 and 23 to the left, leaving free exhaust of steam from the right end of the valve-chest and shutting off exhaust from the left end of the same. This will cause the pressure between the left heads of the main valve and valve-chest to be greater than between the right heads of the same and will force the valve to the right, when live steam will be admitted to the left end of the cylinder and exhaust will take place from the right end. The piston and piston-rod will now move from left to right, shift the governing-valve at the end of the stroke, and thus continue the reciprocation of the piston and piston-rod.

It will be seen by reference to the above description and to the drawings that the supply of live steam may be cut off at any part of the stroke of the piston, so as to admit of the steam operating by expansion, by adjusting the stops 25 upon the valve-rod so as to slide or shift said rod and its valve at any part of the stroke of the piston and rod.

The main valve is balanced from within and without by the steam within it and the steam which escapes through the holes in the ends of the same, so that said valve may be

reciprocated without binding and jamming in the valve-chest, and the steam which escapes between the heads of the valve and valve-chests through the holes in the former will cushion the stroke of the valve and prevent it from hammering either its own heads or the heads of the valve-chest at the ends of its stroke.

The entire engine is simply and durably constructed. Only three ports and a solid valve are employed for governing the stroke of the main valve, and said solid smaller valve is made without packing-rings or other packing, as its function to uncover the small exhaust-port in the smaller valve-chest does not necessarily require a perfect steam-tight fit of the same.

I am aware that in steam pumping-engines of this class steam-actuated distributing-valves have been used for controlling the movements of the main distributing-valve, and also that steam-actuated distributing-valves have been controlled by smaller reciprocating valves actuated from the pump or engine; but I am not aware that a single plug or solid cylindrical valve and the arrangement of channels and ports shown in connection therewith have been employed in engines of this class—a construction which is simple and effective; and therefore, although I make no claim, broadly, for combining a hollow steam-actuated distributing-valve with a smaller valve for controlling it,

I do claim as new—

In a steam pumping-engine, the combination, with a main valve-chest having live-steam ports and an exhaust-port and a hollow valve within the same provided with main steam-ports and having holes in its ends, of a smaller auxiliary valve-chest 18, having channels 17 at its ends, which connect with the ends of said valve-chest and one exhaust-channel 22 at its middle, which directly connects with the exhaust-channel of the main valve-chest, and a solid cylindrical valve 23 within said auxiliary valve-chest and provided with a rod 24, directly connected to the operating parts of the engine to be reciprocated by the same, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CHARLES LUDWIG MAHNICKE.

Witnesses:

C. S. BELL,
ARTHUR S. FELCH.