

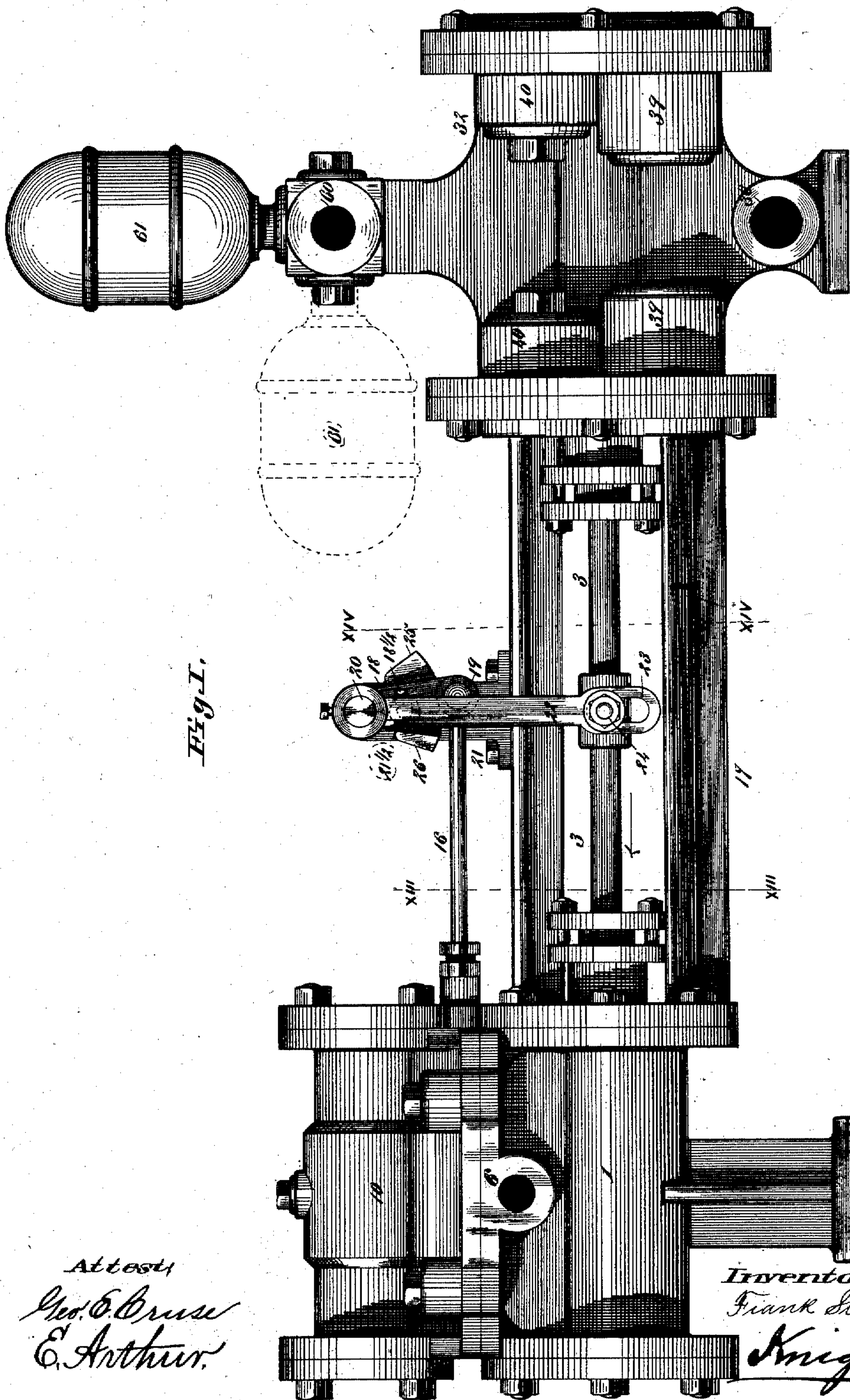
(No Model.)

4 Sheets—Sheet 1.

F. STEINMANN.
STEAM PUMPING ENGINE.

No. 400,877.

Patented Apr. 2, 1889.



Attest
Geo. C. Cruise
E. Arthur.

Inventor
Frank Steinmann
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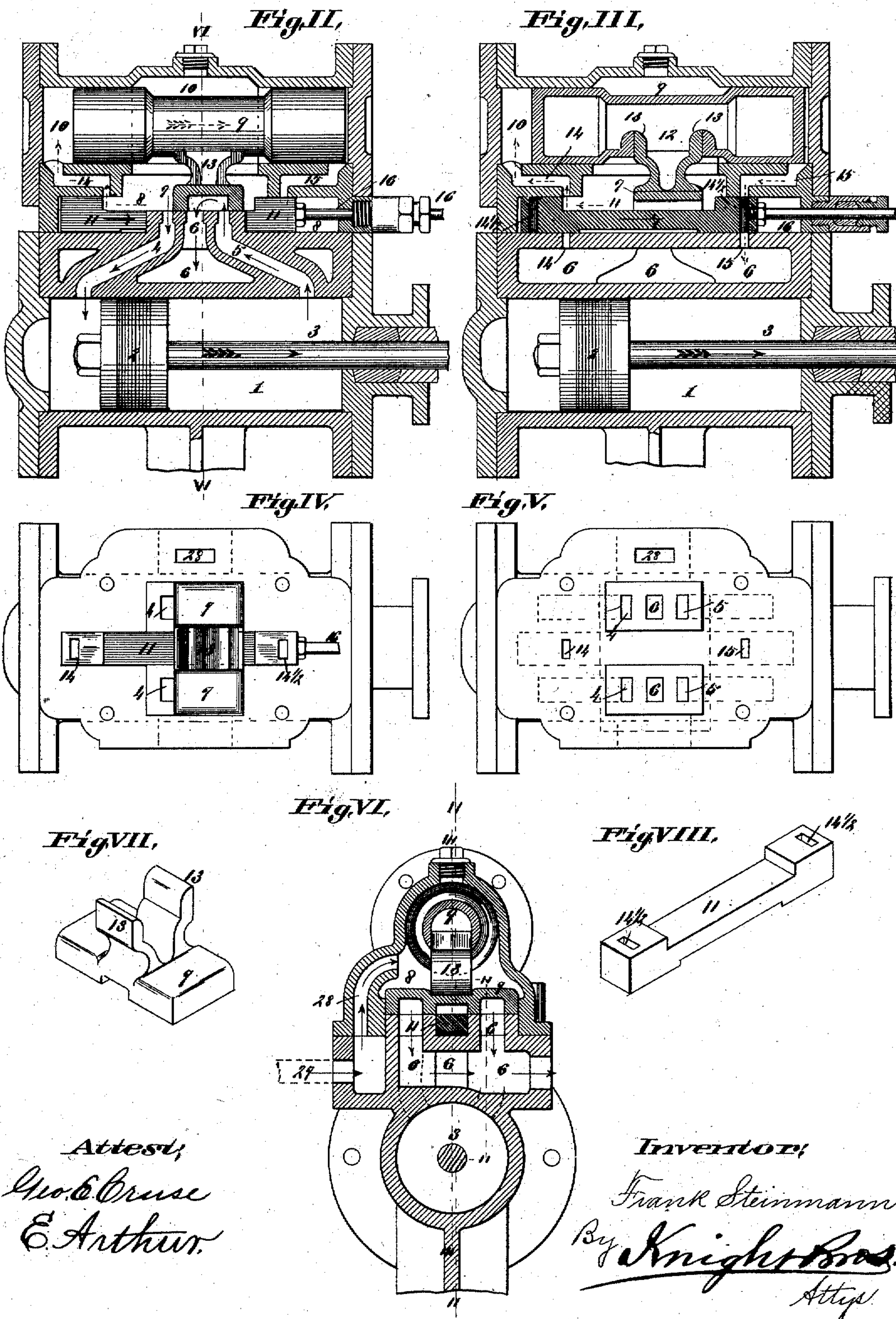
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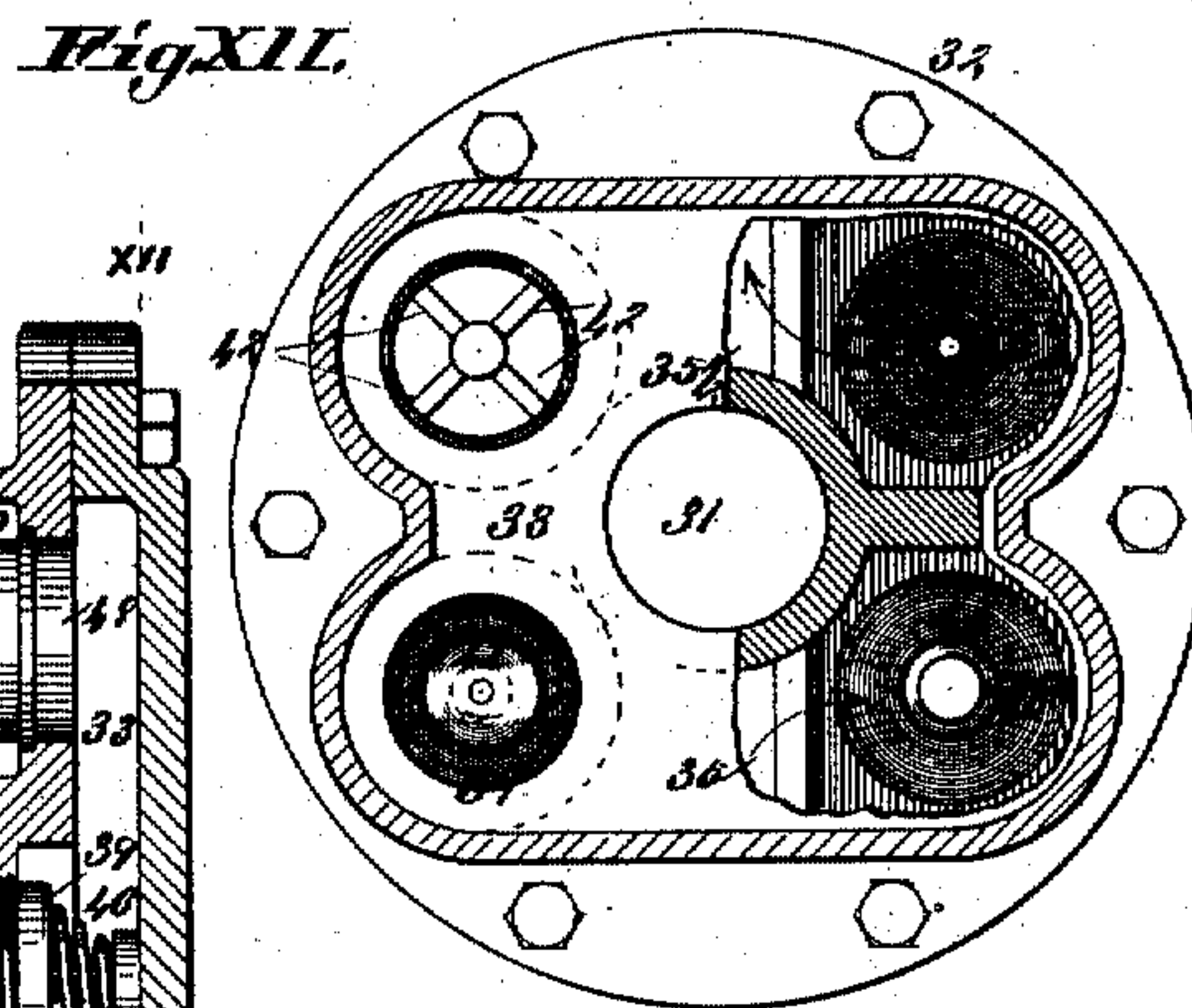
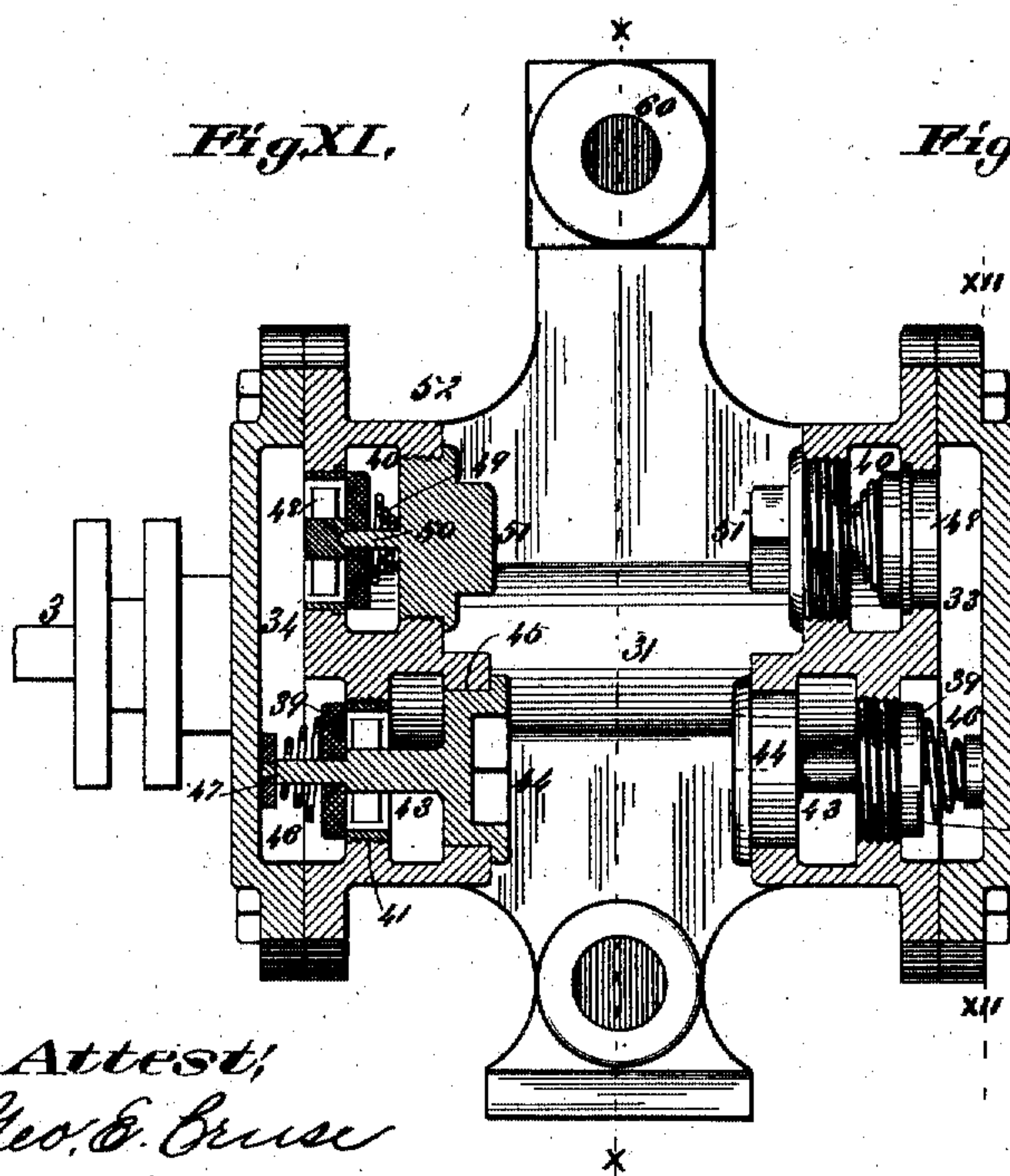
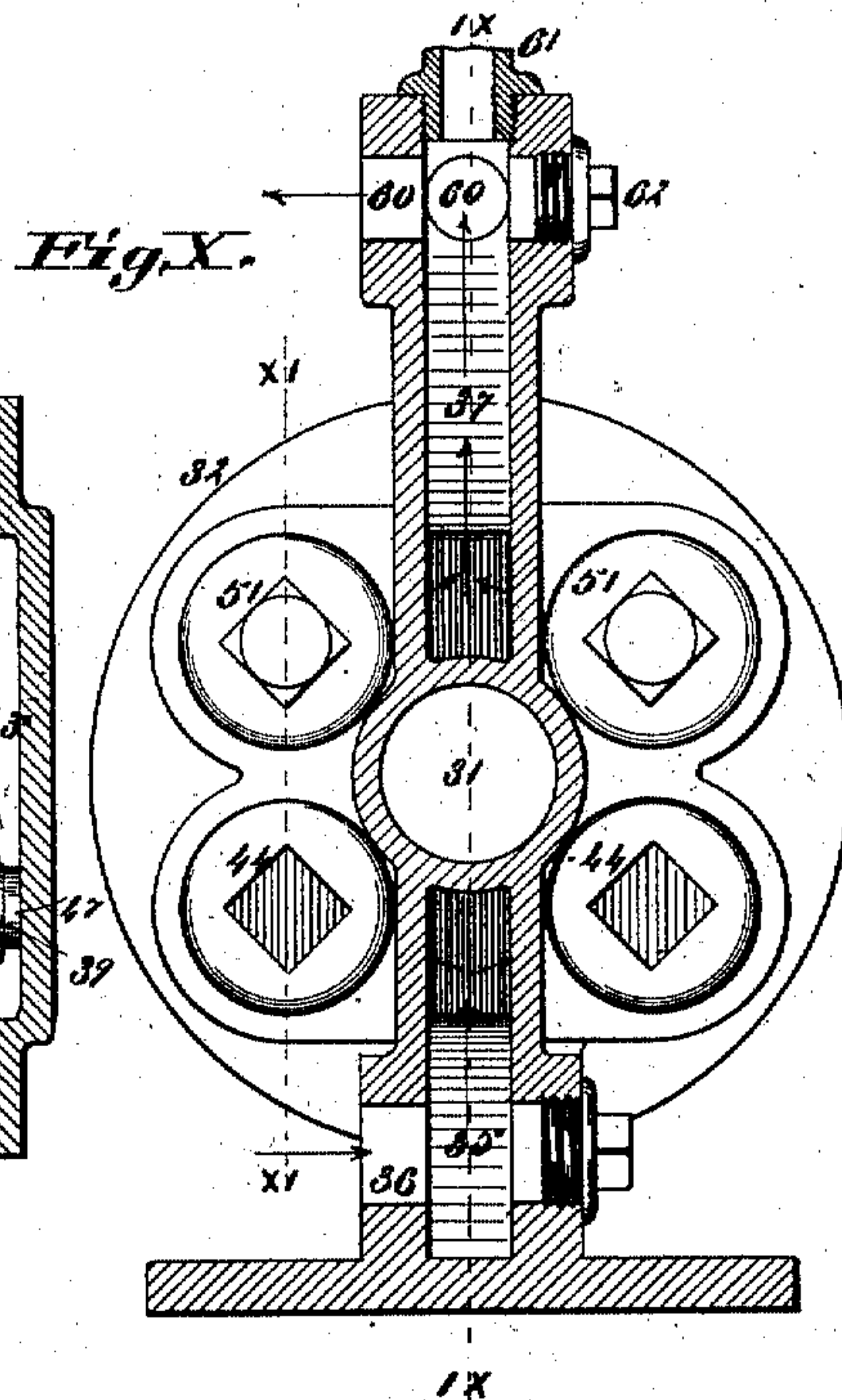
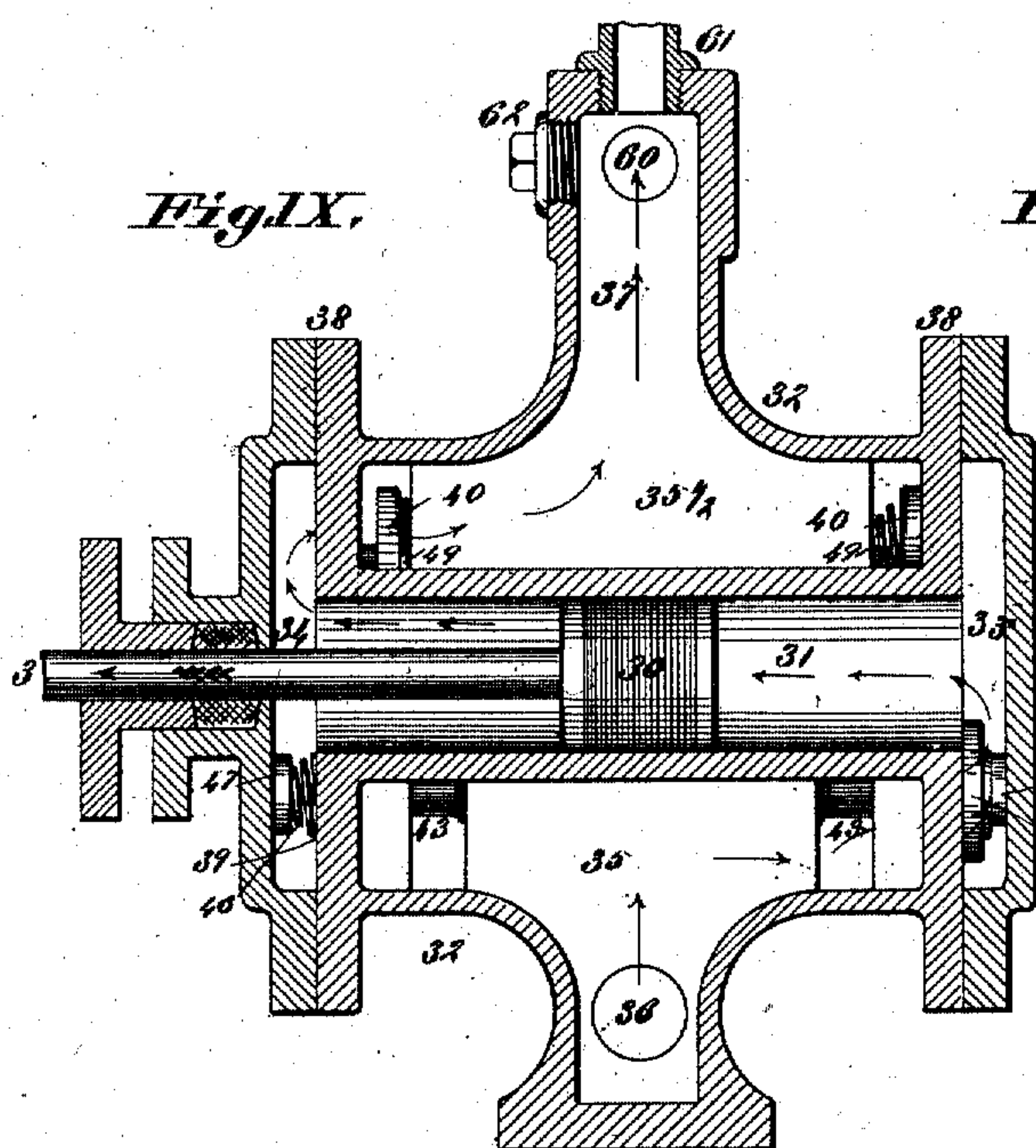
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Fig. XIII,

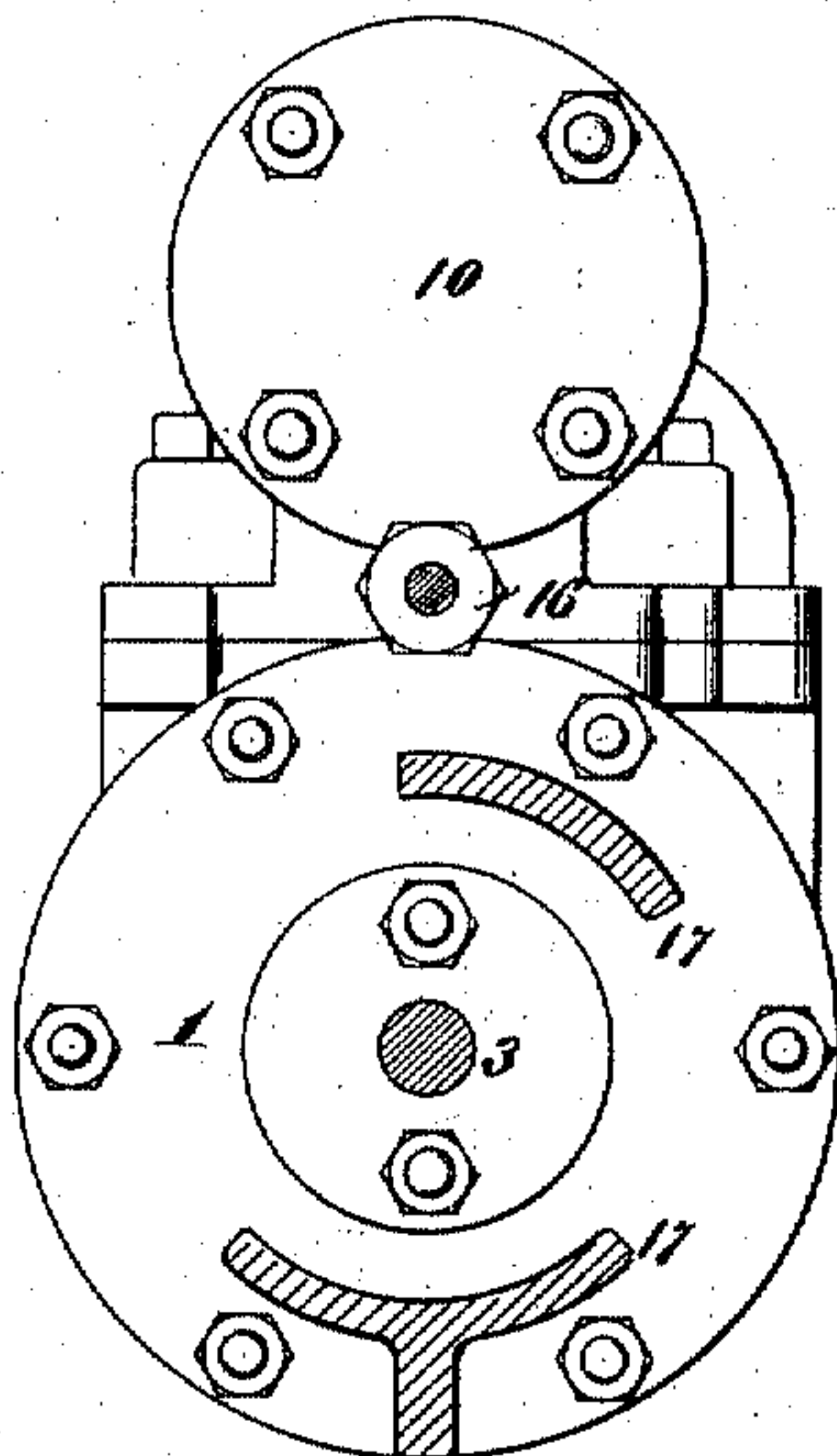


Fig. XIV,

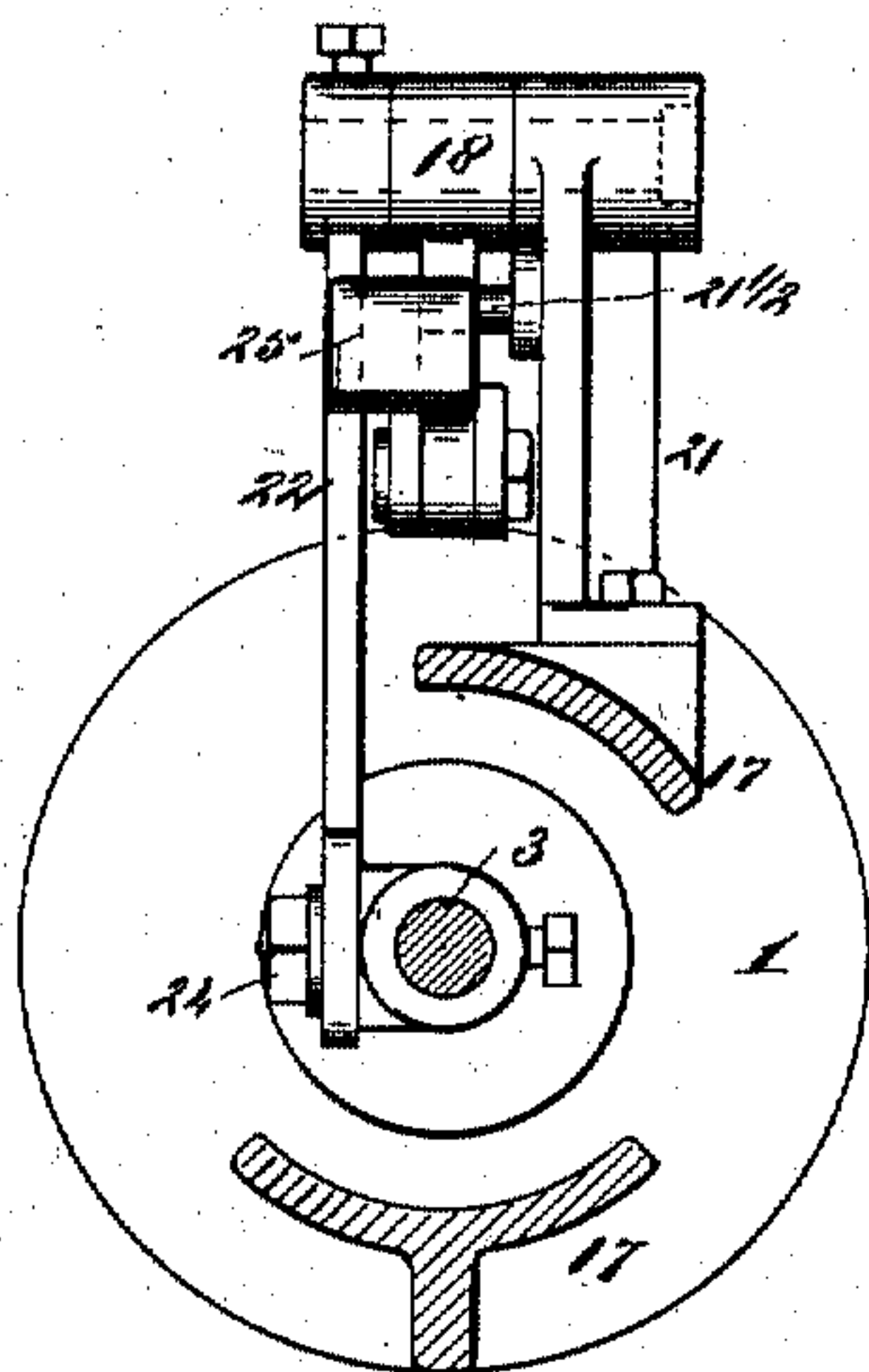
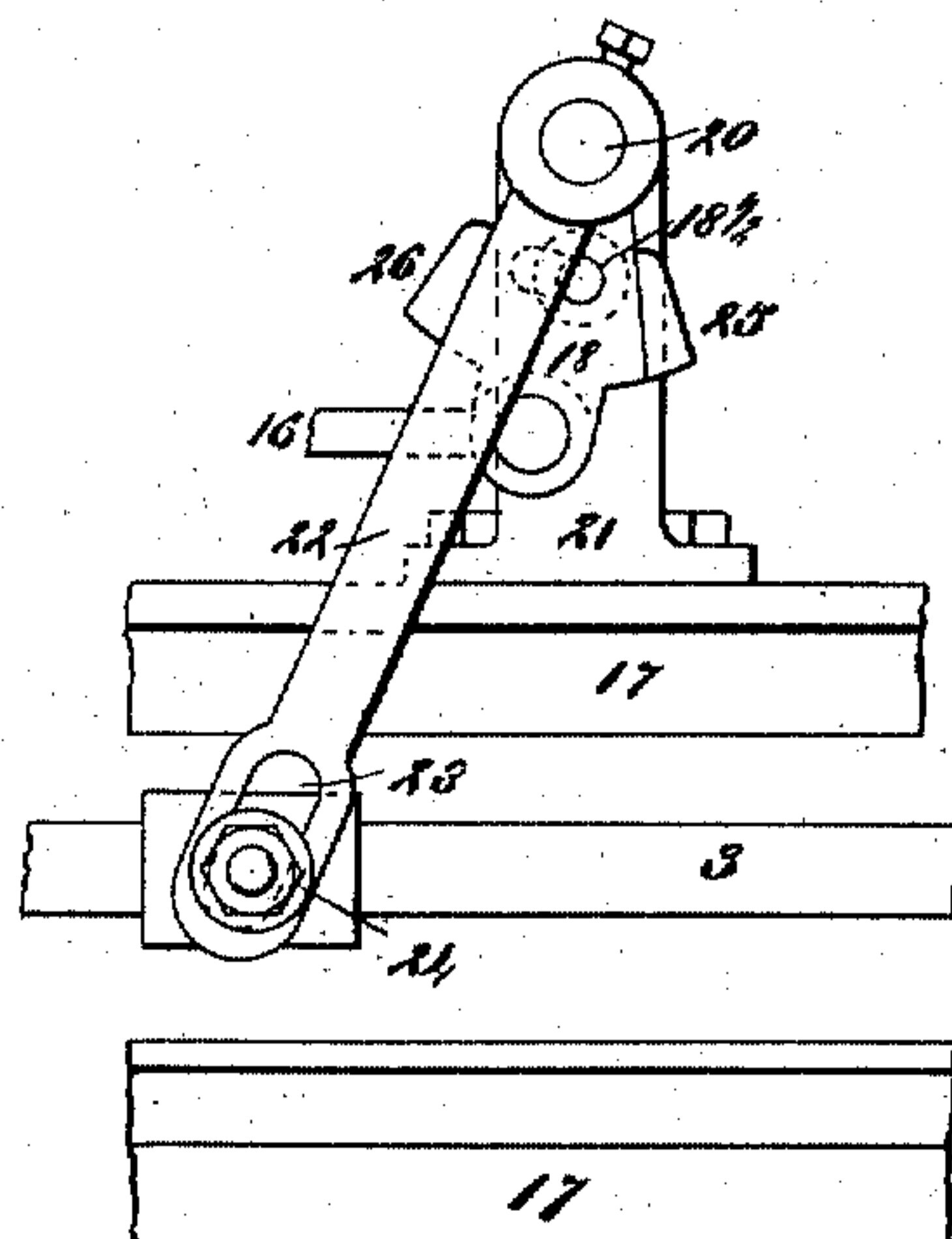


Fig. XV,



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UNITED STATES PATENT OFFICE.

FRANK STEINMANN, OF ST. LOUIS, MISSOURI.

STEAM PUMPING-ENGINE.

SPECIFICATION forming part of Letters Patent No. 400,877, dated April 2, 1889.

Application filed August 20, 1888. Serial No. 283,206. (No model.)

To all whom it may concern:

Be it known that I, FRANK STEINMANN, of the city of St. Louis, in the State of Missouri, have invented a certain new and useful Improvement in Steam Pumping-Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, and in which—

Figure I is a side elevation of my improved engine, shown in connection with a pump. Fig. II is a vertical longitudinal section of the engine, taken on line II II, Fig. VI. Fig. III is a similar view taken on line III III, Fig. VI. Fig. IV is a top view with the valve-chest removed. Fig. V is a similar view with the valve also removed. Fig. VI is a vertical transverse section taken on line VI VI, Fig. II. Fig. VII is an enlarged perspective view of the D-valve. Fig. VIII is an enlarged perspective view of the auxiliary valve. Fig. IX is a vertical longitudinal section taken on line IX IX, Fig. X. Fig. X is a vertical transverse section taken on line X X, Fig. XI. Fig. XI is a vertical longitudinal section taken on line XI XI, Fig. X. Fig. XII is a vertical transverse section taken on line XII XII, Fig. XI. Fig. XIII is a vertical transverse section taken on line XIII XIII, Fig. I. Fig. XIV is a vertical transverse section taken on line XIV XIV, Fig. I. Fig. XV is an enlarged detail elevation illustrating the mechanism for moving the auxiliary valve.

My invention relates to certain improvements in steam pumping-engines; and my invention consists in features of novelty hereinafter fully described, and pointed out in the claims.

Referring to the drawings, 1 represents the main cylinder of the engine, within which is located a piston, 2, having a rod, 3. In the cylinder 1 are formed the supply-ports 4 5 and the exhaust-port 6. The ports 4 and 5 are controlled by a D-valve, 7, located in a chamber, 8. Above the chamber 8 and D-valve 7 is an auxiliary piston, 9, located in a cylinder or chamber, 10. Between the cylinders or chambers 1 and 10 the chamber 8 is located, and in this chamber 8 is an auxiliary valve, 11. The valve 7 is connected to the piston 9, as shown in Fig. III, the piston having a central opening, 12, to receive up-

wardly-extending wings 13, formed upon the valve 7. (See Figs. III and VII.) The wings fit snugly in the opening 12, so that the valve 7 will be moved back and forth with the piston 9; but at the same time it is allowed to move downwardly on its seat, so that it always fits snugly, regardless of the amount of wear it may receive. The chamber 8 communicates at its opposite ends with the cylinder 10 through ports 14 15, which are controlled by the auxiliary valve 11. The valve 11 has a stem, 16, which extends to near the center of the connecting-frame 17 between the engine and pump, (see Fig. I,) where it is connected to an arm, 18, as shown at 19. The arm 18 is pivoted on a shaft or spindle, 20, secured to the upper end of a standard, 21, mounted on the frame 17. (See Figs. I, XIV, and XV.) On the shaft or spindle 20 is also a lever or arm, 22, the lower end of which is provided with a slot, 23, to receive a pin, 24, that connects the lever at its lower end to the piston-rod 3. The arm 18 is provided with lugs or projections 25 26, against which the lever 22 impinges to move the valve 11 as the piston 2 reaches the respective ends of its stroke.

The operation of the engine is as follows: The steam enters the chamber 8 through a pipe, 27, and a port, 28. (See Figs. I and VI.) On entering the chamber 8 it passes into one end of the cylinder 10 through the port 14 and forces the piston 9 and valve 7 over into the position shown in Fig. II. This exposes the port 4, and the steam passes through the port 4 into the cylinder 1, behind the piston 2, and forces the piston in the direction shown by the arrows, Figs. II and III. As the piston 2 reaches the limit of its movement in this direction, the lever 22 comes against the lug 25 on the arm 18 and swings the arm in the direction indicated by the arrows, Fig. I. This moves the auxiliary valve 11 in the direction indicated by the arrows, Figs. II and III, which closes the port 14 and opens the port 15, thus allowing the steam to pass through the port 15 into the cylinder 10 and force the auxiliary piston 9 in the opposite direction to that in which it was moved by the steam passing through the port 14. This shifts the D-valve 7, closing the port 4 and opening the port 5 to live steam, which then,

entering through the port 5, forces the piston 2 in the opposite direction to that indicated by the arrows in Figs. II and III, the exhaust-steam escaping through the ports 4 and 6 in the usual manner. When the piston 2 has about completed its movement in this direction, the lever 22 comes against the projection 26 of the arm 18 and forces the valve 11 back again, opening the port 14 and closing the port 15, so that the piston 9, carrying the valve 7, is shifted again, and thus the operation goes on continuously. The valve 11 is provided with ports 14½, (see Figs. II and VIII,) which form communications between the ports 14 and 15 above and below the valve. As the piston 9 is moving in the direction indicated by the arrows, Fig. II, the steam escapes through the port 15 into the port 6, as indicated by the arrows on the right-hand side of Fig. III. The arm 18 has a slot, 18½, which receives a pin, 21½, on the standard 21. The object of this slot and pin is to prevent the valve being carried too far in either direction by its momentum. The pin allows the valve to be moved in either direction as far as the piston 2 carries it, but still prevents the momentum of the valve carrying it beyond its place.

The construction of the pump is shown in Figs. IX to XII, inclusive.

30 represents a piston secured to the rod 3. It works in a cylinder, 31, located within a housing, 32, and communicating at its respective ends with water-chambers 33 34.

35 35½ represent water-chambers between the cylinder and housing, with which communicates an inlet-port, 36, and an outlet-port, 37. (See Fig. IX.) The heads 38 of the cylinder are provided with valves 39 and 40, which control the passage of the water, the valves 39 permitting the passage of the water from the lower chamber, 35, into the chambers 33 34, and the valves 40 permitting the passage of the water from the chambers 33 34 into the chamber 35½. Each of the valves 39 (see Fig. XI) seats against a ring, 41, connected by arms 42 (see Figs. XI and XII) to a central stem, 43, which is provided with a head, 44, that fits in an opening, 45, in the head of the cylinder 31.

The head 44 is provided with a socket to receive a wrench, and by turning it the ring 41 is unscrewed and the valve can be thus easily removed for repairs. Each valve is held upon its seat (except when forced open) by means of a spring, 46, surrounding the stem 43 outside of the valve and located between the valve and a disk, 47, on the stem. The valves 40 are held against their seats 48 by means of springs 49, surrounding a short stem or projection, 50, on caps 51, which screw into openings 52, made in the heads of the cylinder 31.

The operation of the pump is as follows: When the piston 30 moves in the direction indicated by the arrows in Fig. IX, the water

passes from the chamber 35 into the chamber 33 and cylinder 31 behind the piston, and the water that is in advance of the piston at the same time passes from the chamber 34 through the valve 40 into the chamber 35½ and escapes through the port 37. Then, as the piston moves back in the other direction, the water from the chamber 35 passes through the other valve, 39, into the chamber 34 and into the cylinder behind the piston, and the water in front of the piston passes from the chamber 33 through the valve 40 into the chamber 35½. The upper ends of the ports 37 are provided with openings 60 and an air-chamber, 61. There may be more than one of the openings 60, and, if so, all but one will be closed by plugs 62. The discharge-pipe is connected to any one of these openings 60, as desired, and if it is desired to use the machine in a vertical position the air-chamber may be screwed into one of the openings 60 and the water discharged through the opening which the air-chamber occupies in Fig. IX. (See dotted lines, Fig. I.)

In this application I have shown and described in connection with my engine an improved pump; but I have not claimed the same herein, as such forms the subject-matter of my application, Serial No. 293,698, filed December 15, 1888.

I claim as my invention—

1. The combination of the main cylinder provided with a piston and receiving-ports, 4 and 5, and exhaust-ports 6, an auxiliary cylinder located over the main cylinder and having ports 14 15 communicating therewith, an auxiliary piston connected to the valve of the main cylinder, an auxiliary valve for controlling the ports of said auxiliary cylinder, having the exhaust-ports 14½ extending there-through, adapted to place the exhaust 6 and the ports 14 15 in communication, and mechanism connecting the rod of the main piston to the stem of the auxiliary valve, substantially as and for the purpose set forth.

2. The combination of the main cylinder provided with a piston and receiving and exhaust ports, an auxiliary cylinder located over the main cylinder, an auxiliary piston, a valve for controlling the ports of the main cylinder connected to said auxiliary piston, an auxiliary valve for controlling the ports of the auxiliary cylinder, and a connection between the valve-stem and piston-rod of the main cylinder, consisting of a pivoted arm to which said stem is connected and which is provided with lugs and a slot, a lever connected to said piston-rod, a standard to which said arm and lever are connected, and a pin on the standard fitting in a slot in said arm, substantially as and for the purpose set forth.

FRANK STEINMANN.

In presence of—

JOS. WAHLE,

EDW. S. KNIGHT.