

F. L. FRY.
 REVERSING VALVE FOR STEAM ENGINES.
 APPLICATION FILED JUNE 19, 1909.

944,960.

Patented Dec. 28, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

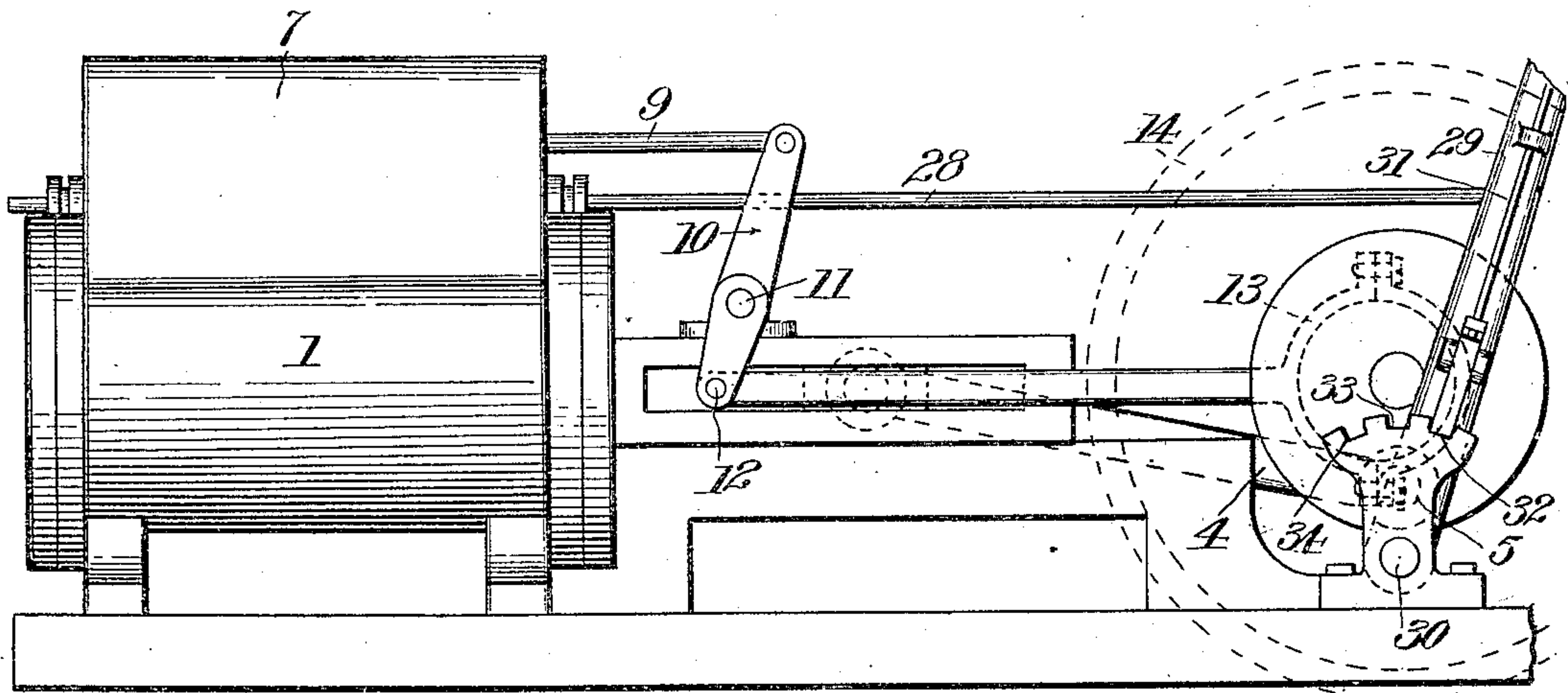


Fig. 2.

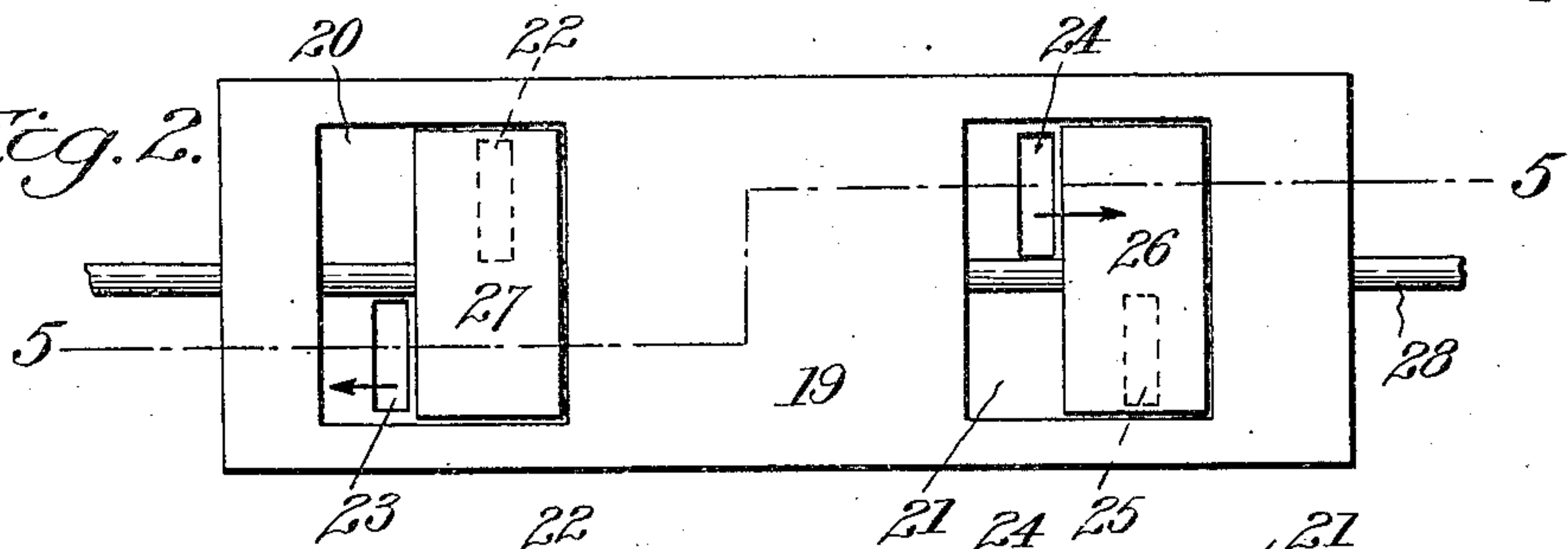


Fig. 3.

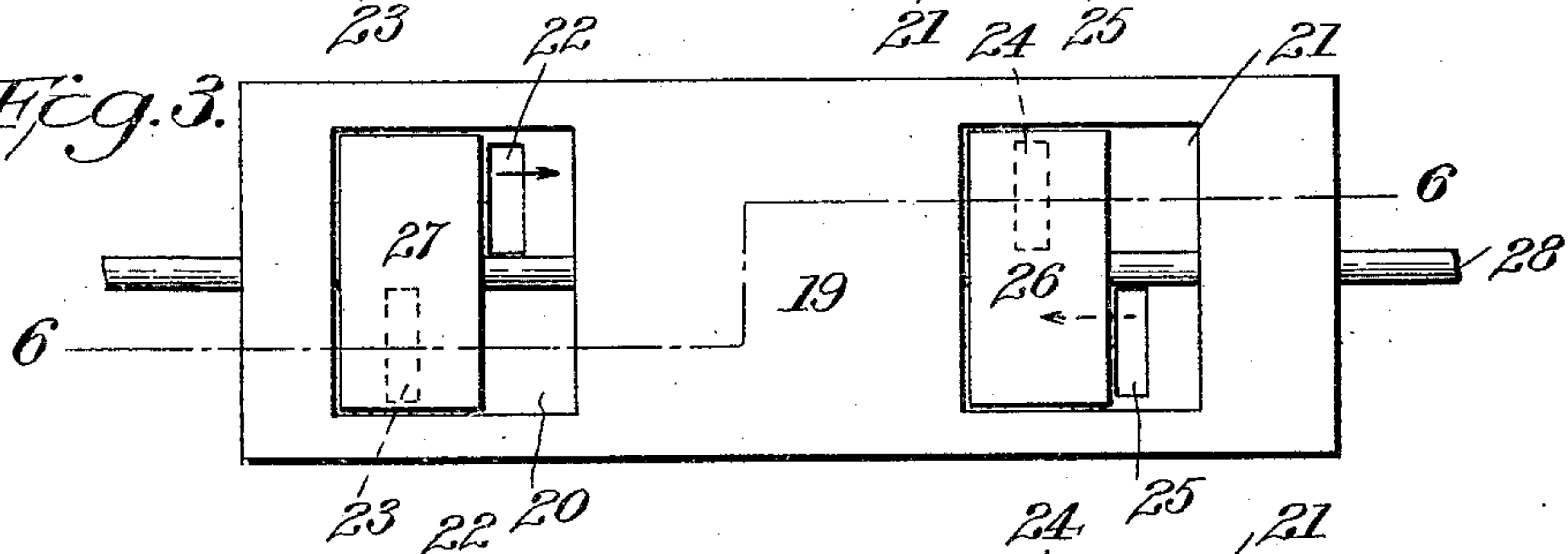
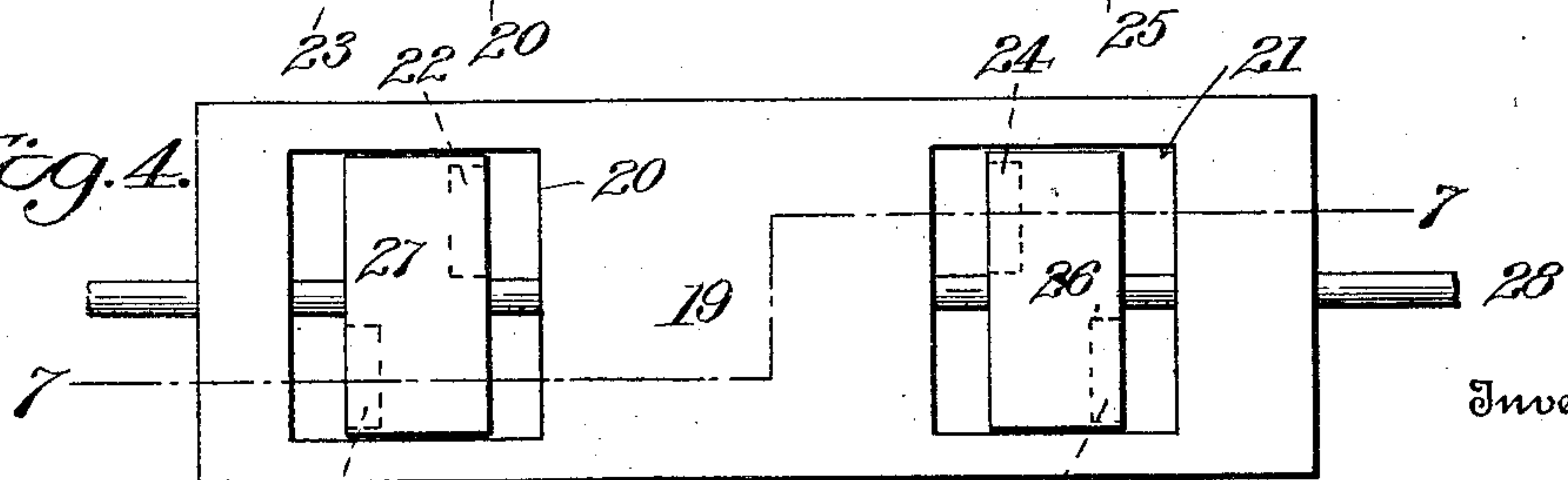


Fig. 4.



Inventor

Witnesses

C. M. Mackus
L. E. Fischer

By

Frank L. Fry.

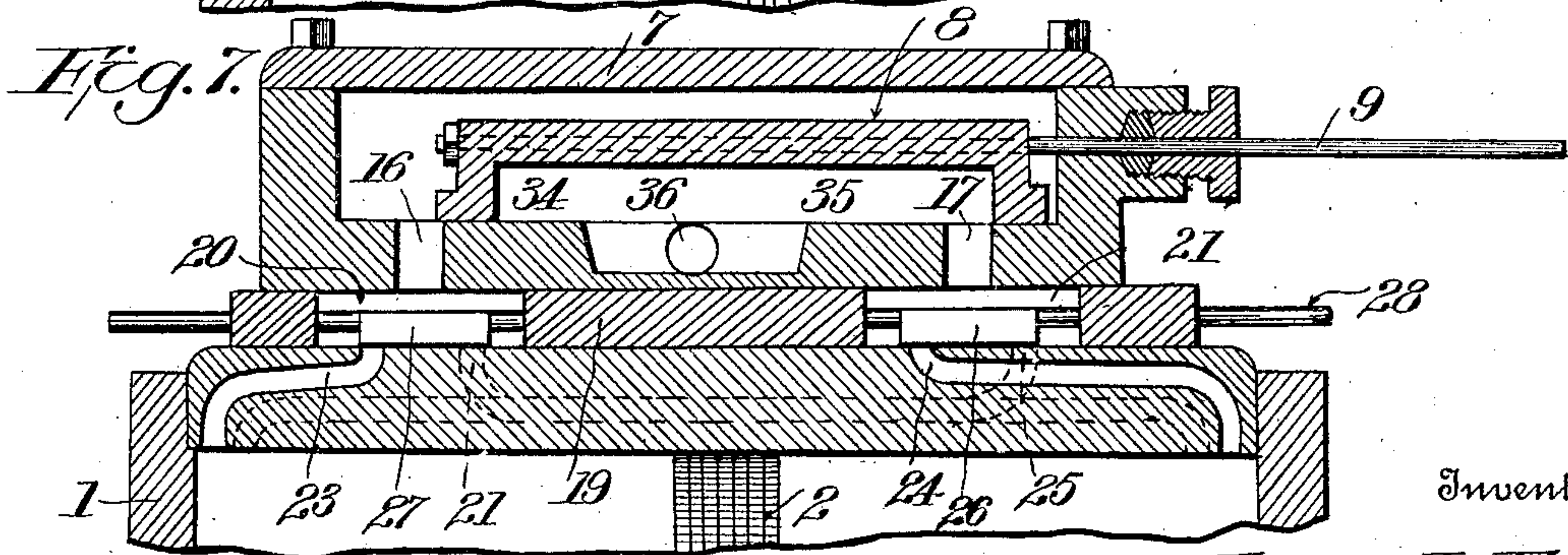
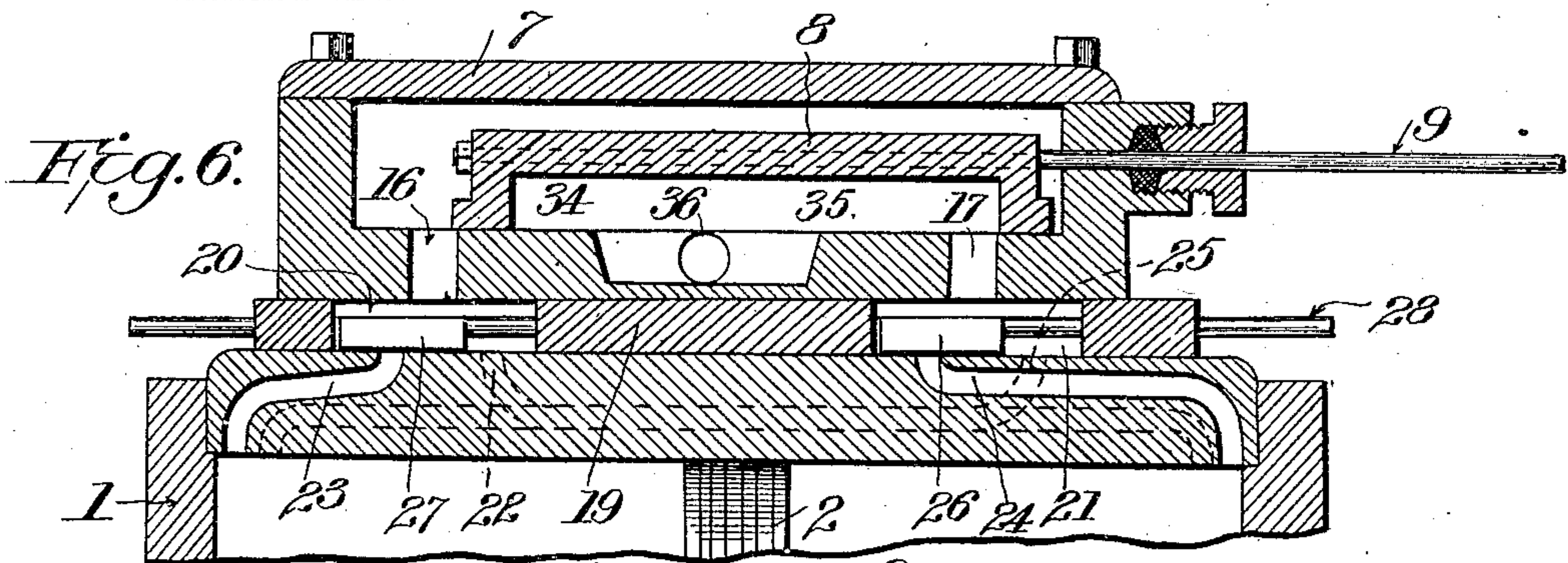
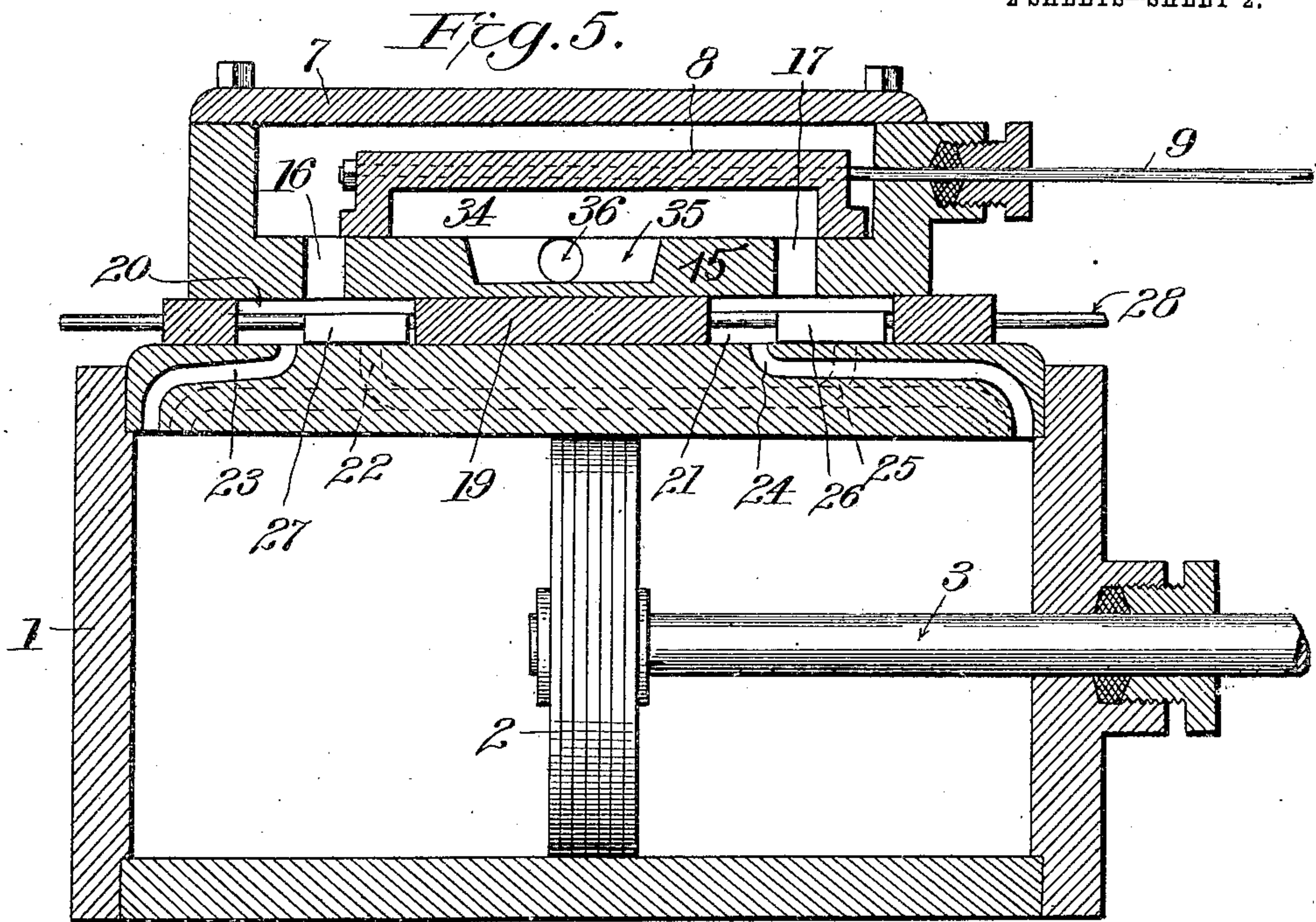
S. Brashear
 Attorney

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2 SHEETS—SHEET 2.



Witnesses
C. Walker,
L. E. Fischer.

Inventor
Frank L. Fry.

By

S. Brashear
Attorney

UNITED STATES PATENT OFFICE.

FRANK L. FRY, OF BALTIMORE, MARYLAND, ASSIGNOR OF ONE-THIRD TO JOHN C. GROSS AND ONE-THIRD TO OLIVER W. KAHLER, OF BALTIMORE, MARYLAND.

REVERSING-VALVE FOR STEAM-ENGINES.

944,960.

Specification of Letters Patent.

Patented Dec. 28, 1909.

Application filed June 19, 1909. Serial No. 503,214.

To all whom it may concern:

Be it known that I, FRANK L. FRY, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Reversing-Valves for Steam-Engines, of which the following is a specification.

My invention relates to improvements in reversing valves for steam engines and has for its object to simplify the mechanism of reversing valves and dispense with many of the parts at present in use for the purpose of reversing.

With this object in view, the invention consists in the improved construction, arrangement and combination of parts of reversing valve mechanism hereinafter fully described and afterward specifically claimed.

In order to enable others skilled in the art to understand my invention, I will now proceed to fully describe its construction and operation having reference to the accompanying drawing, in which:

Figure 1 is a view in side elevation of so much of a steam engine, having my improvements attached thereto, as is necessary to the understanding of my invention. Fig. 2 is a plan view of the mechanism below the steam chest with the reversing valves in their right hand positions, in which the engine will run forward. Fig. 3 is a similar view with the reversing valves in their left hand positions, to run the engine backward. Fig. 4 is a similar view with the reversing valves in their central positions, in which they will operate as throttle valves, and stop the engine. Fig. 5 is a vertical sectional view on a plane passing centrally through the steam chest, and through the reversing valve plate and cylinder on the broken line 5—5 of Fig. 2. Fig. 6 is a similar view, the plane through the lower parts being on the broken line 6—6 of Fig. 3, the lower part of the cylinder being broken away. Fig. 7 is a similar view, the plane through the lower parts being on the broken line 7—7 of Fig. 4.

Like parts in all the figures are indicated by the same reference characters.

Referring specifically to the drawing, 1 indicates the cylinder and 2 the piston therein which is connected in the usual manner by means of a piston rod 3 and pitman 4 with the crank 5 of the main shaft of the engine.

Mounted above the cylinder is the steam chest 7 in which is arranged to reciprocate the usual slide valve 8 connected by a rod 9 with an arm 10 projecting laterally from a shaft 11 having a downwardly projecting arm 12 to which is secured the rod of an eccentric 13 mounted on the main shaft in the usual manner. The main shaft may also carry a fly wheel 14. The bottom 15 of the steam chest is provided with a port 16 near one end and a port 17 near the opposite end. The steam chest is separated from the cylinder by means of a plate 19, in which are formed two spaces 20 and 21, a port 22 leading from the space 20 into the right hand end of the cylinder, as shown in Fig. 2, and a port 23 leading to the left hand end of the cylinder, while from the space 21 a port 24 leads to the right hand end of the cylinder and a port 25 to the left hand end of the cylinder. A reversing valve 26 is seated in the space 20 while a similar valve 27 is seated in the space 21, these valves being mounted upon a rod 28 which is connected at its outer end to a lever 29 pivoted at 30 and adapted to be moved by said lever to three different positions and held in either of said positions by means of a pawl 31 engaging in notches 32, 33, 34, or a curved rack 35 rigidly secured to the frame of the engine. The rod 28 passes entirely through the plate 19 from end to end, and may be provided with similar lever mechanism on its opposite end so as to be operable from both positions.

When the engine is running, its action will not be interrupted by the valves 26 and 27, no matter in which of the outer positions these valves may be located, as illustrated in Figs. 2 and 4, and 3 and 6, but steam will be prevented from passing into the cylinder through any of the ports 22, 23, 24 or 25, when the valves 26 and 27 are in their central positions, as shown in Fig. 7. In this position the reversing valves 26 and 27 become throttle valves by means of which the engine can be quickly stopped in an emergency. When the valves 26 and 27, and the slide valve 8 are in their right hand positions, as shown in Figs. 2 and 5, steam entering from the steam chest 7 will pass through the port 16, space 20 and port 23 to the left hand end of the cylinder, and will be exhausted from the right hand end of the cylinder through port 24, space 21, port 17, exhaust space 35 in the slide valve, and exhaust pipe 36. The

slide valve 8 now moves to its left hand position, which closes port 16 and opens port 17 so that steam from the steam chest will pass through port 17, space 21 and port 24 toward the right hand end of the cylinder, forcing the piston of the left and completing its reciprocation, the steam being exhausted from the left hand end of the cylinder through port 23, space 20, port 16, exhaust space 35 and exhaust pipe 36.

To reverse the engine, the reversing valves 26 and 27 will be moved from the positions of Figs. 2 and 5 to those of Figs. 3 and 6, when, with the slide valve 8 in the position of Fig. 2, steam will pass from the steam chest through port 16, space 20 and port 22 to the right hand end of the cylinder, and be exhausted through port 25, space 21, port 17, exhaust space 35 and exhaust pipe 36, and when the slide valve has passed to its left hand position, it will cover port 16 and uncover port 17, and steam will pass from the steam chest through port 17, space 21 and port 24, into the right hand end of the cylinder, and then complete the reversed reciprocation of the piston.

From the foregoing it will be obvious that the movement of the reversing valves 26 and 27 from the positions shown in Figs. 2 and 5 to those shown in Figs. 3 and 6, or from the positions shown in Figs. 3 and 6 to those shown in Figs. 2 and 5, will reverse the motion of the engine, these valves being held in either of those positions by means of the spring pawl 31 and curved rack, as before described. When, however, occasion may require that the engine be quickly throttled, the lever 29 is quickly thrown from one of these end positions to the central position, in which position it will be held by the spring pawl 31 engaging in the notch 33, and the valves 26 and 27 will then be in position to close the ports 22, 23, 24 and 25 and prevent the entrance of steam from the steam chest into the cylinder.

This construction is extremely simple and the introduction of the plate 19, with its valve spaces, between the cylinder and steam chest and the valves supported therein on

rod 28, renders the assemblage and separation of the parts very easy, the cylinder, steam chest and plate being held in position by ordinary bolts, and readily detachable from each other.

The simplicity and economy of the invention will be obvious and I desire it to be understood that minor variations might be made in the construction of the various parts without departing from the spirit and scope of my invention.

Having described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In an engine, the combination with the cylinder having suitable ports in its upper wall, the steam chest having suitable ports in its lower wall, of a plate between the upper wall of the cylinder and the lower wall of the steam chest and provided with cut away spaces, a rod passing entirely through said plate, and valves on said rod in the cut away spaces of said plate, substantially as described.

2. The combination in an engine, with a cylinder having two sets of ports in its upper wall near each end thereof, one of each set of ports leading to each end of the cylinder, the steam chest above the cylinder having a single port in its bottom wall near each end thereof, a slide valve in the steam chest, a plate mounted on the top of the cylinder, supporting the steam chest, and provided with spaces communicating between the single port in each end of the bottom wall of the steam chest and the double ports in the same end of the top wall of the cylinder, a pair of reversing valves, one located in each of said spaces of the separating plate and connected for simultaneous movement, and means for sliding the reversing valves in said spaces to either end or the middle thereof.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK L. FRY.

Witnesses:

S. BRASHEARS,
A. COOPER.