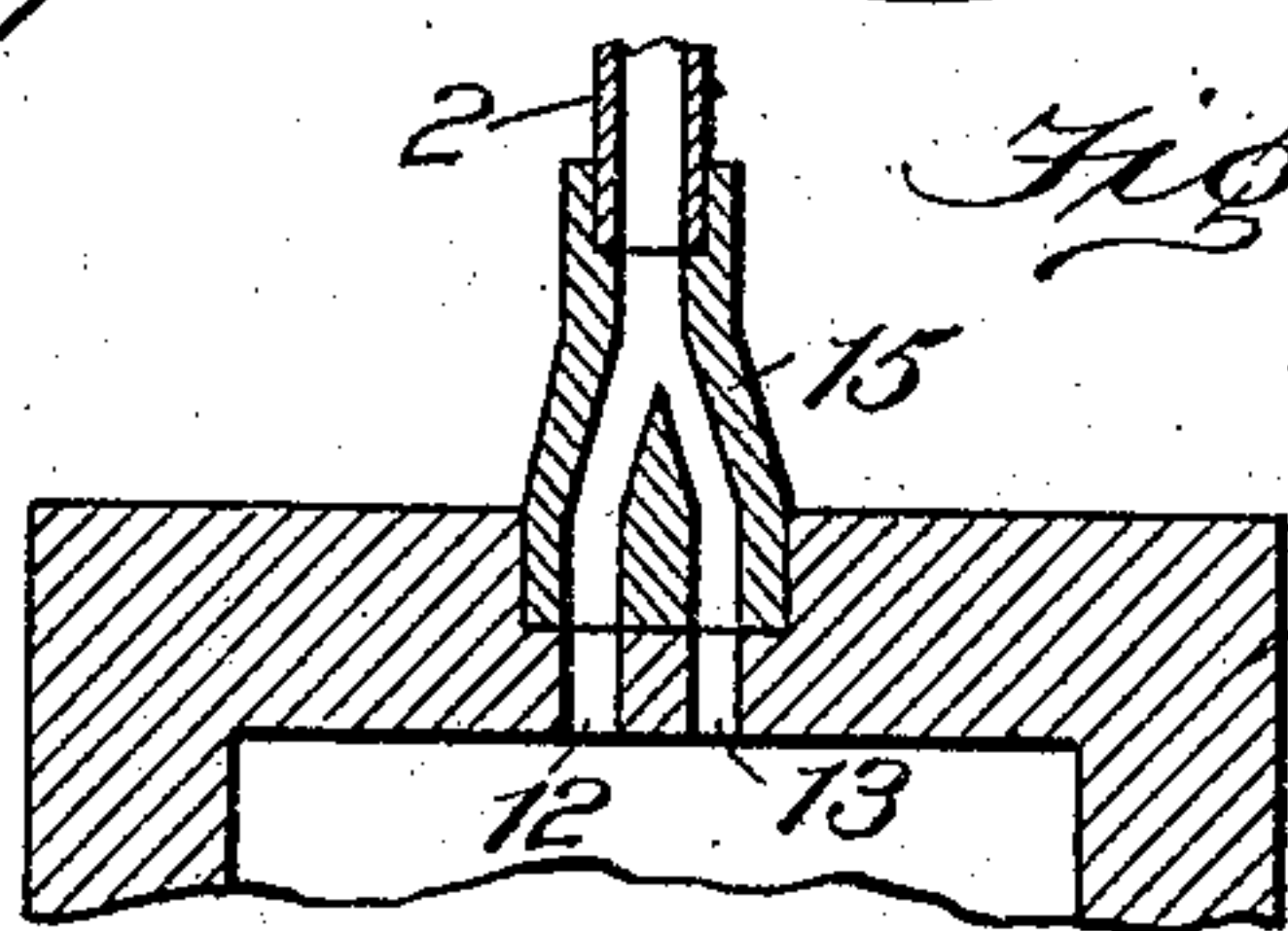
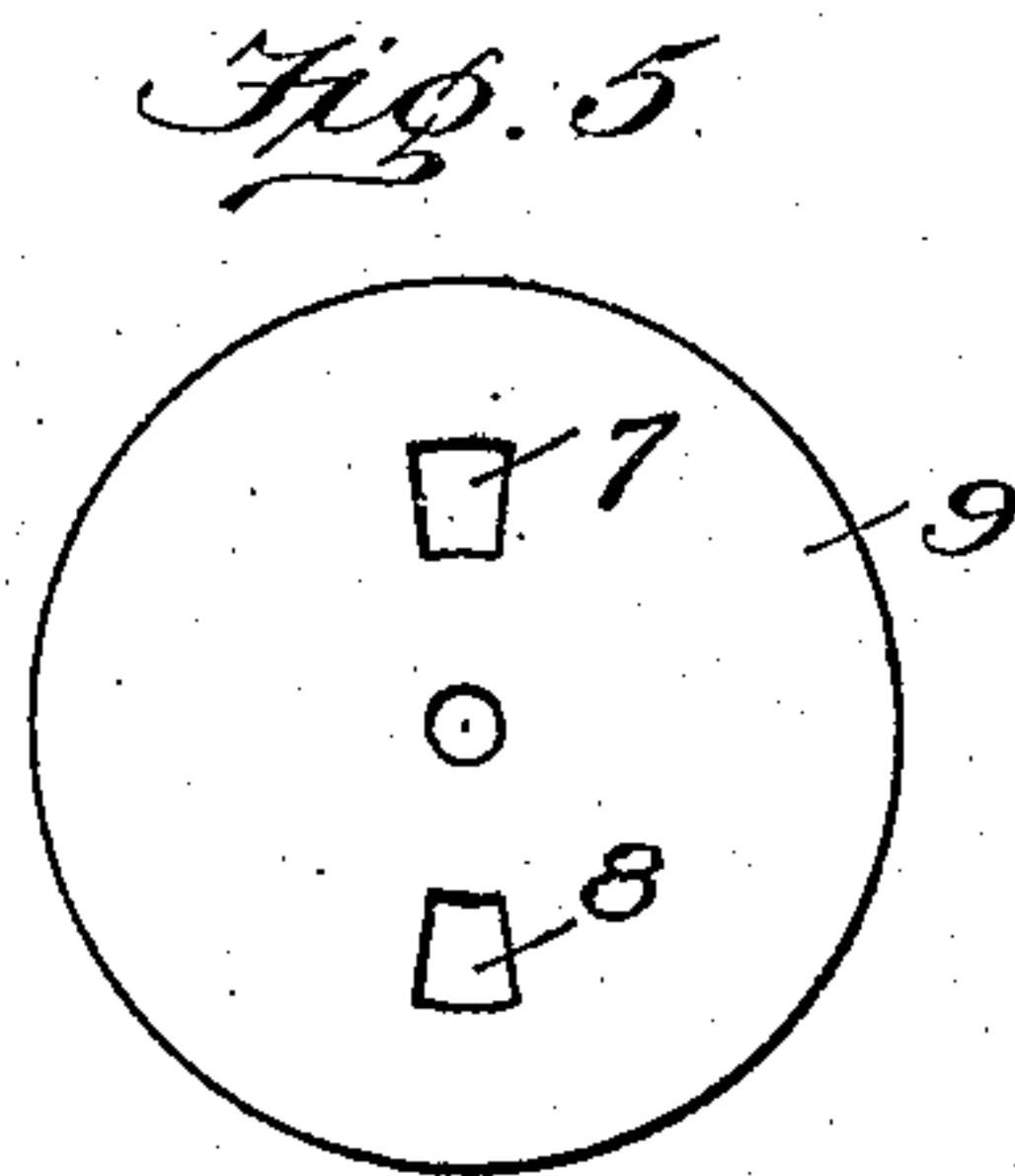
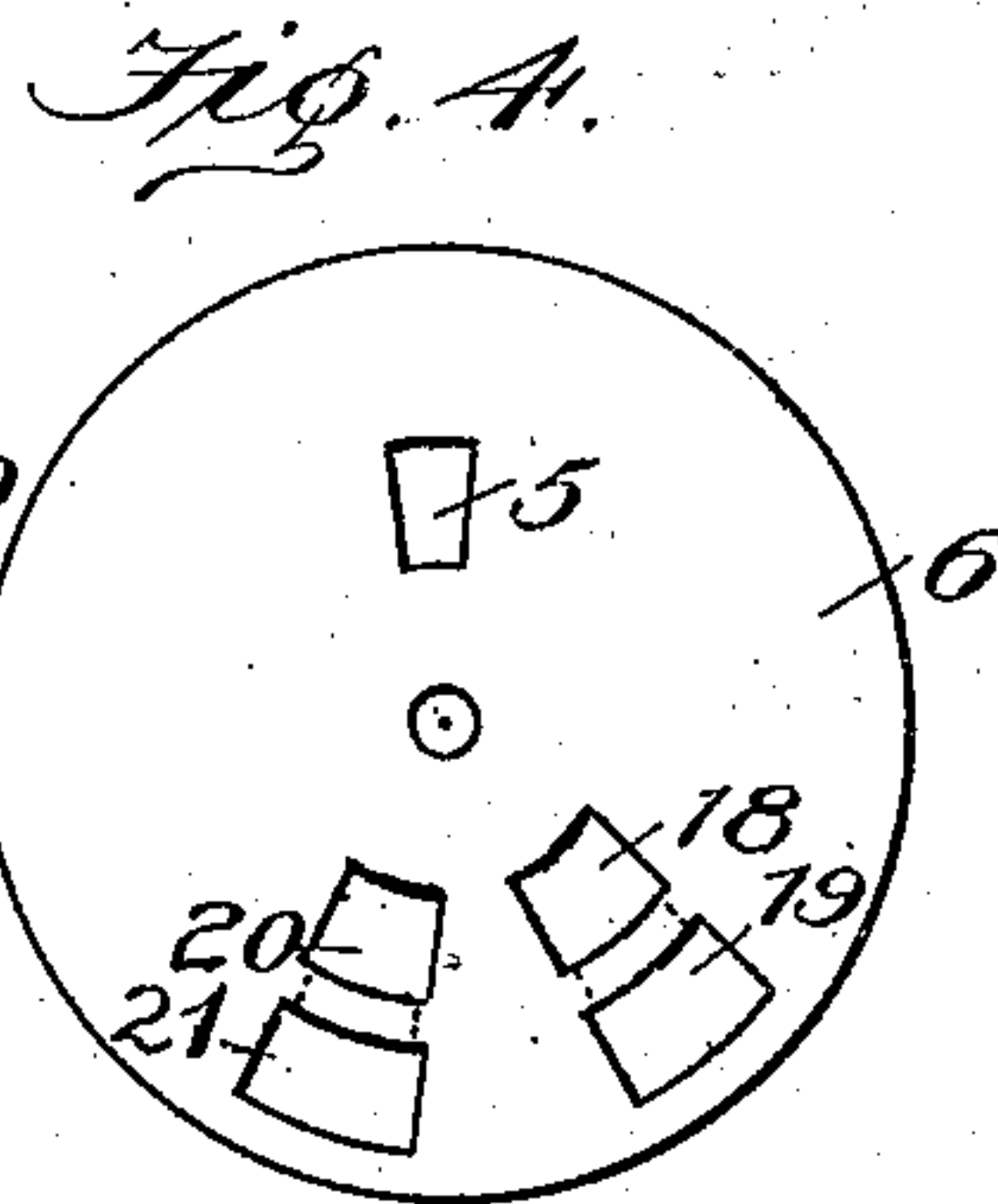
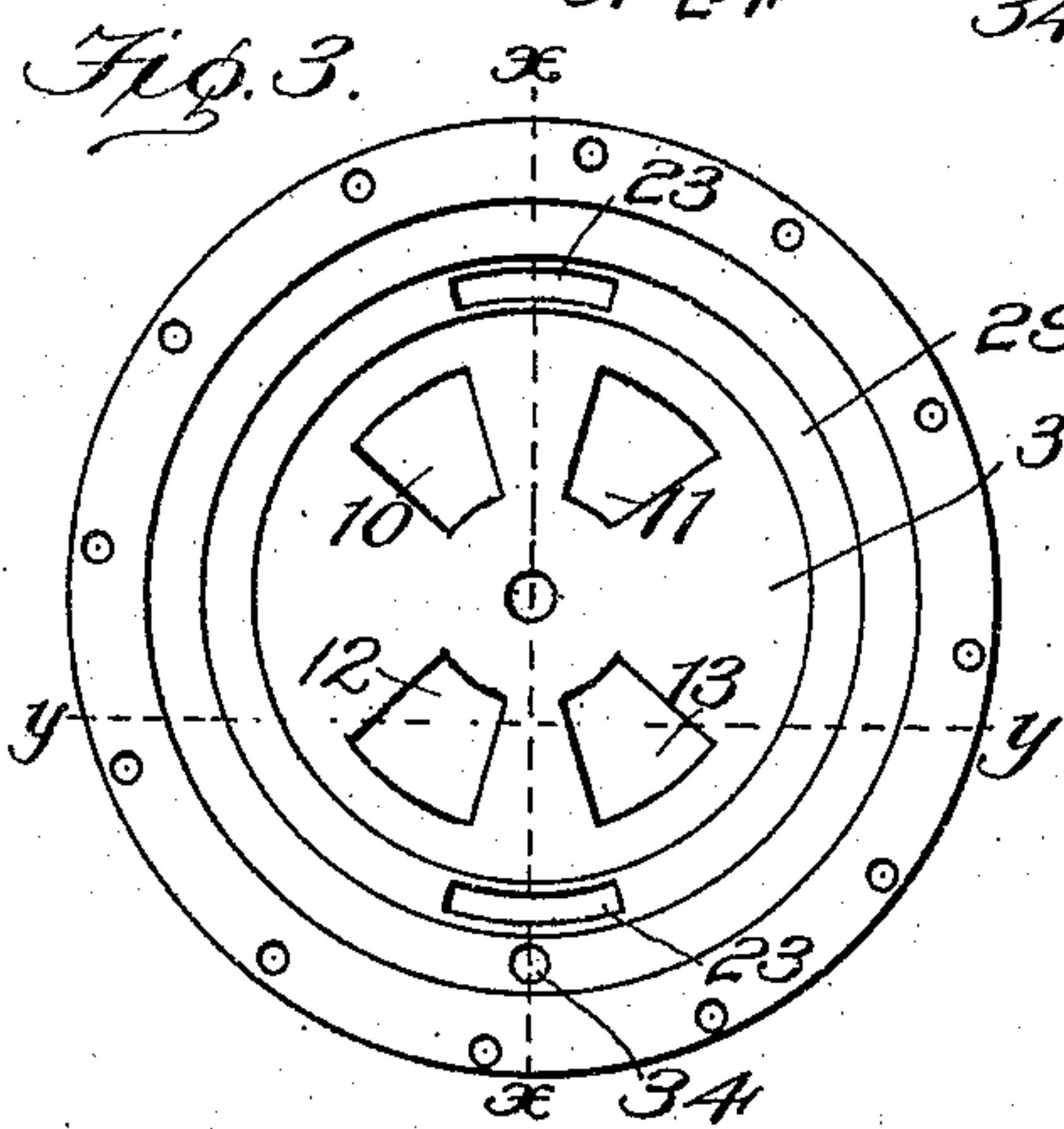
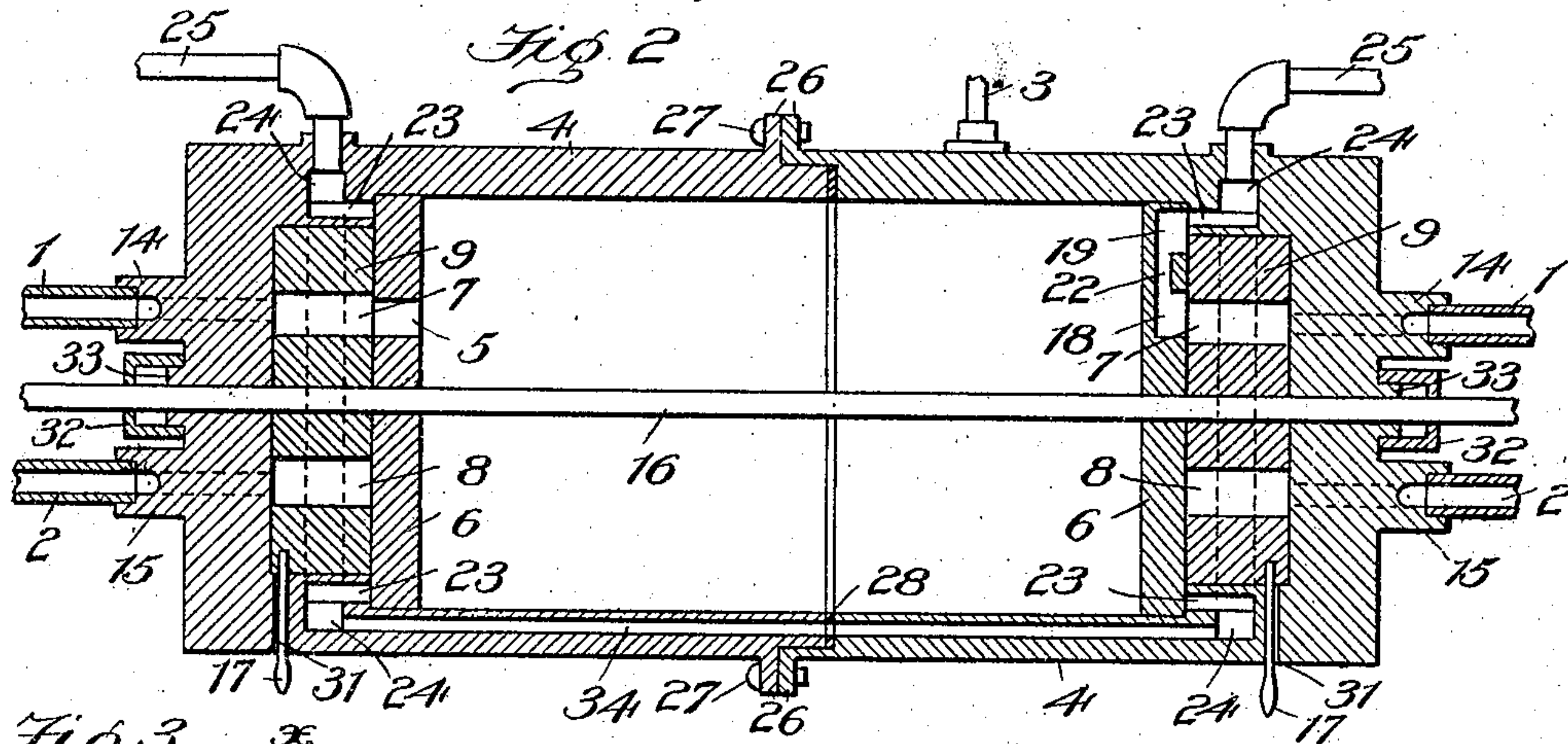
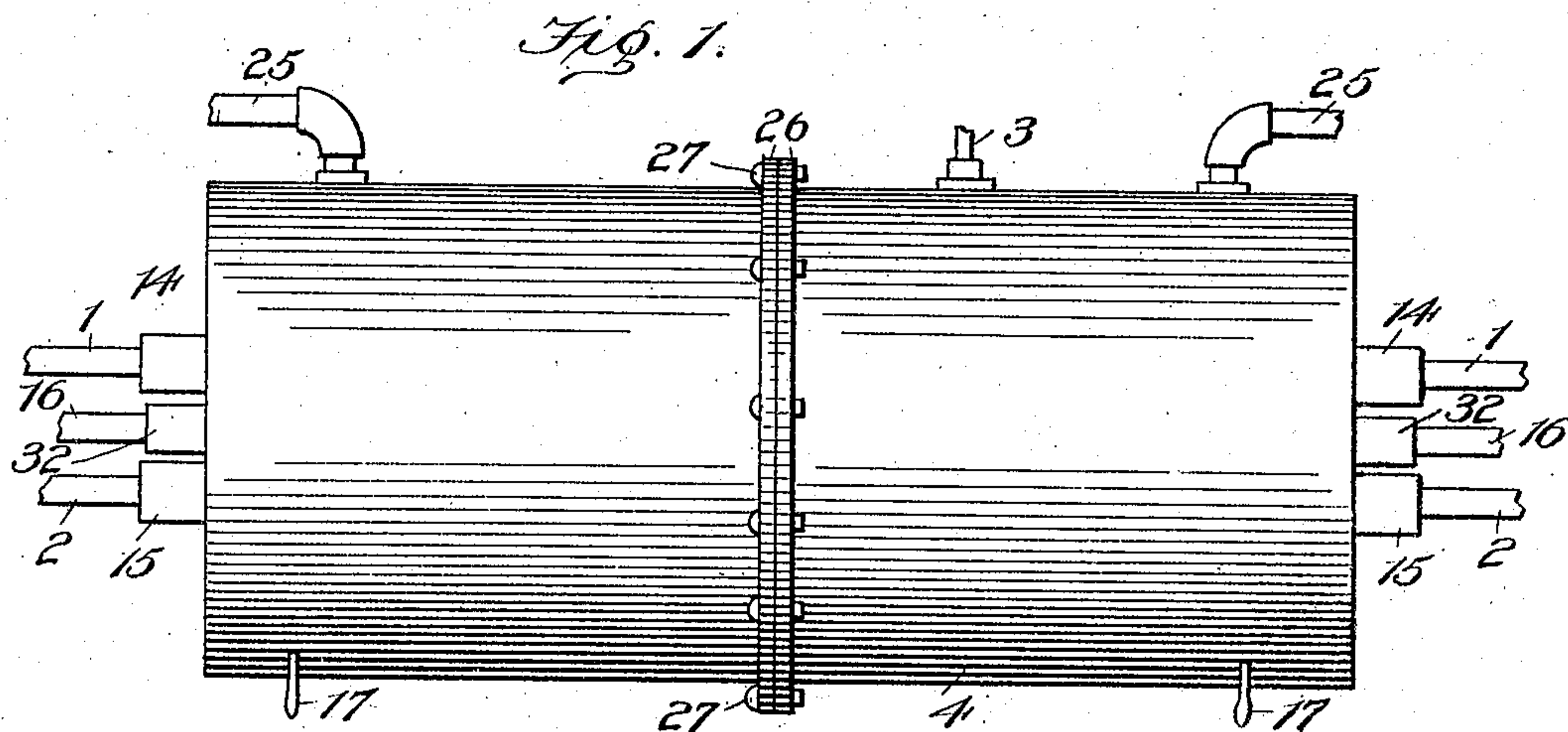


No. 816,098.

PATENTED MAR. 27, 1906.

W. J. INMAN.  
EXHAUST CONTROLLING VALVE.  
APPLICATION FILED JAN. 4, 1905.



Witnesses:-

*J. W. Smith.*  
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# UNITED STATES PATENT OFFICE.

WESLEY J. INMAN, OF FORT WORTH, TEXAS, ASSIGNOR OF ONE-FOURTH  
TO J. H. WARREN AND THREE-EIGHTHS TO C. H. McCORMICK, OF FORT  
WORTH, TEXAS.

## EXHAUST-CONTROLLING VALVE.

No. 816,098.

Specification of Letters Patent.

Patented March 27, 1906.

Application filed January 4, 1905. Serial No. 239,649.

*To all whom it may concern:*

Be it known that I, WESLEY J. INMAN, a citizen of the United States, residing at Fort Worth, in the county of Tarrant, State of Texas, have invented certain new and useful Improvements in Exhaust-Controlling Valves, of which the following is a specification.

This invention relates to improvements in valve-motions for steam or air engines; and the objects are to control the exhaust by rotary motion instead of reciprocating motion, to prevent lost motion of valve mechanism, to simplify the valve mechanism by reducing the number of parts, and to reduce the cost of operation.

One difficulty in the valve-motion of valves now in use is that there is no direct communication between the inlet and the exhaust. The communication in the old valves is accomplished indirectly, and there is considerable lost motion by reason of the fact that the numerous parts of the valve mechanism are exposed to dirt and dust. In my invention these defects are remedied by a reduction of the number of parts of the valve-movement and by inclosing the valves in a steam-chest or inclosure and by directing the steam or other power-producing element through appropriate ports in the valves and the valve-seats and by direct communication with the engine-cylinders. The link, the eccentrics, the valve-rods, the rocker-arms, and the slide-valves in common use are dispensed with. In my invention the steam oils the complete valve-movement with the same oil that oils the cylinders.

Other objects and advantages will be fully explained in the following description, and the invention will be more particularly pointed out in the claims.

Reference is had to the accompanying drawings, which form a part of this application and specification.

Figure 1 is a side elevation of a steam-chest equipped with my improved valve-movement. Fig. 2 is a longitudinal section of the same, taken along the line *xx* of Fig. 3. Fig. 3 is an interior view of one section of the steam-chest. Fig. 4 is a bottom plan view of a rotary feed and exhaust valve. Fig. 5 illustrates the ports in the oscillating feed and exhaust valve. Fig. 6 is a broken longitudinal section along the line *yy* of Fig. 3.

Similar characters of reference are used to

indicate the same parts throughout the several views.

The improved valve-movement is mounted in the steam-chest 4. This chest is composed of two parts coupled together, one part being seated in the other and each part having a flange 26 and the two flanges being secured together by suitable bolts 27. The joint may be made steam-tight by suitable packing 28. The steam-chest is mounted on the shaft 16 of the engine. A suitable pipe 3 leads from the boiler to the steam-chest. There are two valves in each end of the steam-chest. The description of the valves in one end will be sufficient, because the valves in the other end are the same in construction.

The valve 6 is a rotary feed and exhaust valve and is rigid with shaft 16. This valve is provided with an intake-port 5. On the bottom of this valve or on the face next to the oscillating valve are two exhaust-ports, one of which consists of a cavity 18 and a cavity 19, formed in the valve, and each of these ports is considerably larger than the feed-port 5, and these cavities are connected by an under surface duct 22, and the other exhaust-port consists of two cavities 20 and 21, formed in the valve and united by a duct similar to duct 22. The ports 20 and 21 are also considerably larger than port 5. The valve 6 has a seat 29 in the steam-chest.

The valve 9 is an oscillating feed and exhaust valve and may also be called a "divider," because the steam may be divided on the centers or when the port 5 is on the line *xx* either between ports 10 and 11 or between ports 12 and 13. When standing in either one of these positions, the engine may be started in either direction. This valve is loosely mounted on shaft 16 and is provided with two ports 7 and 8. This valve has a seat 30 in the steam-chest. The valve 9 is oscillated by a lever 17, attached thereto and operating in a slot 31 in the chest 4. In the end of the chest 4 there are two ports 10 and 11 for the port 7 of valve 9 and two ports 12 and 13 for port 8 of valve 9. The object in having two ports in the end of the steam-chest for each valve-port is to provide spaces along the line *xx* on the bottom of the steam-chest for cut-off purposes. With such spaces for cut-offs any length of the stroke of the piston desired may be had. The ports in the end of the steam-chest are united by Y connections. The ports 10 and 11 are united by



the Y connection 14, and the ports 12 and 13 are united by the Y connection 15. A pipe 1 forms a passage from connection 14 to one end of the steam-cylinder, and a pipe 2 forms a passage from the connection 15 to the other end of the steam-cylinder. A packing-box 32 is provided for each end of the steam-chest and may be attached to the steam-chest by screwing the same on a boss 33, formed on the steam-chest. The ports 18 and 19 are adapted to form an exhaust-passage from the port 7 to an exhaust seat-port 23. The ports 23, formed in the seat 29, form exhaust-passages to a circular duct 24, formed in the steam-chest. This duct 24 is continuous around and within the wall of the chest 4. A suitable exhaust-pipe 25 connects with the exhaust-duct 24 and leads to a place to dispose of the exhaust. There is a similar exhaust-duct in each end of the steam-chest, and the two are connected by means of a duct 34, formed in the wall of the two chest-sections.

The pipes 1 and 2 at one end of the steam-chest are intended to be connected to one engine-cylinder, and the pipes 1 and 2 at the other end of the steam-chest are intended to be connected to another engine-cylinder. One pipe 25 may serve as an exhaust for both engine-cylinders, because the two circular ducts 24 are connected by the longitudinal duct 34. The amount of steam can never be greater than that which comes through port 5. The ports 10 and 11 and the ports 12 and 13 are feed as well as exhaust ports and are larger than port 5; but these ports being larger than port 5 cannot increase the feed beyond the capacity of port 5, but they do increase the exhaust, because the exhaust-ports 18 and 20, which cooperate with ports 10 and 11 and 13, are equal in exhausting capacity to these ports and equal to the seat exhaust-ports 23. Thus the exhaust will continue longer than the feed, or, in other words, the exhaust is greater than the feed.

In operation steam comes from the boiler through pipe 3 to the steam-chest, which stands in communication with the boiler. Steam passes from the steam-chest 4 by means of the port 5 in the rotary feed-valve 6, thence through the port 7 or port 8 of the oscillating feed-valve 9, thence through the ports 10 and 11 or through the ports 12 and 13 to the pipe 1 or 2, respectively, and thence to one end of the steam-cylinder. As the valve 6 is rotated the port 5 passes over the ports 7 and 8 in succession and allows steam to pass through. Consequently steam is fed through pipe 1 for a short time and then through pipe 2 for a like space of time as the piston is reciprocated in the engine-cylinder. Steam is exhausted back from the engine-cylinder through the pipes 1 and 2 in the following manner: When pipe 1 is feeding, the pipe 2 is exhausting, and vice versa. The

exhaust comes back through the pipe 2, through the connection 15, through ports 12 or 13. When port 18 passes over the port 8, the exhaust passes from port 8 to port 18, thence through duct 22 to port 19, thence through one of the valve seat-ports 23 onto exhaust-duct 24. A like operation takes place when port 20 passes over port 8, the exhaust passing from port 8 to port 20 and from port 20 to port 21 and thence through one of the ports 23 to exhaust-duct 24. A like series of operations takes place when one of the valve face-ports 18 or 20 passes over the port 7. The exhaust passes from the ports 23 to the exhaust-ducts 24 and thence through exhaust-pipe 25 to some place for discharging the exhaust.

The valve 9 may be called a "divider." It may be turned in either direction to regulate the cut-off, and the engine may be reversed by turning the valve 9 so that the port 7 may communicate with port 10 instead of with port 11, and the port 8 may be turned to communicate with port 13 instead of with port 12, and vice versa. The steam may be entirely cut off by moving the ports 7 and 8 to a plane midway between the ports 10 and 11 and between the ports 12 and 13—that is, turning the valve so that the ports 7 and 8 will rest against the seat 30 along the line *xx* of Fig. 3. The valve 9 may be turned to regulate the amount of steam to be admitted by turning the valve so that the port 7 will be partly over the port 10 or 11 and the port 8 will be partly over port 13 or port 12. The engine may be reversed simply by moving the reverse-lever 17 from left to right or right to left, as the lever may have been set.

The steam-chest 4 may be located at any suitable place.

If this valve mechanism is for use on a stationary engine, the shaft 16 may be the main driving shaft of the engine. If the valve mechanism is for use on a locomotive-engine, the shaft 16 may be driven by suitable gearing from an axle. The drawings show valve mechanism for two engines. It is apparent that one of the valves can be disconnected and the device used for a single engine.

Various other changes may be made in the construction of the valve mechanism without departing from my invention.

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

1. Valve-gear comprising a suitable steam-chest, a shaft rotated in said chest, a rotary valve carried by said shaft and having a port therethrough and face-ports toward the end of said chest for exhausting, a seat for said valve formed in said chest and provided with exhaust-ports therethrough, an oscillating valve loosely mounted on said shaft and cooperating with said rotary valve, said oscillating valve having combined inlet and ex-



haust ports, and said chest having suitable inlet and exhaust ports and pipes to be connected with an engine-cylinder.

2. Valve-gear comprising a suitable steam-chest, a rotary valve having an inlet-port therethrough operating in said chest, a seat formed in said chest for said valve having exhaust-ports therethrough, an oscillating valve having combined inlet and exhaust ports therethrough cooperating with said rotary valve, and suitable combined inlet and exhaust pipes communicating with said oscillating valve and to be connected to an engine-cylinder, said rotary valve having face exhaust-ports communicating with said seat-ports and said oscillating valve.

3. Valve-gear comprising a steam-chest, combined inlet and exhaust pipes communicating with said steam-chest and to be connected to an engine-cylinder, an oscillating valve mounted in said chest and provided with combined exhaust and inlet ports to cooperate with said pipes, a rotary valve having an inlet-port therethrough and face exhaust-ports adjacent to said oscillating valve, and a seat having exhaust-ports cooperating with ports in said rotary valve.

4. Valve-gear comprising a steam-chest, means for supplying said chest with steam, an oscillating valve mounted in said chest and provided with ports for alternately feeding and exhausting, combined feeding and exhausting pipes communicating with said ports, a rotary valve having an inlet-port therethrough cooperating with said oscillating valve and face exhaust-ports cooperating with said oscillating valve, and a seat formed in said chest for said rotary valve having exhaust-ports therethrough.

5. Valve-gear comprising a steam-chest, a rotary feed-valve mounted in said chest having a port therethrough, combined exhaust and feed pipes communicating with said chest, and an oscillating feed and exhaust valve co-

operating with said pipes and said rotary valve for starting, stopping or reversing an engine, said rotary valve being provided with face exhaust-ports adjacent to said oscillating valve.

6. Valve-gear comprising a steam-chest, a rotary feed-valve mounted in said chest having an inlet-port therethrough, two combined feeding and exhaust pipes communicating with said chest, each pipe having a double connection with said chest, a seat for said rotary valve having exhaust-ports therethrough, and an oscillating valve having ports therethrough for feeding and exhaust purposes for starting, stopping, or reversing purposes, said oscillating valve forming the connection between said pipes and said rotary valve and said rotary valve having exhaust-ports cooperating with said oscillating valve-ports.

7. Valve-gear comprising a steam-chest, combined feeding and exhausting pipes connected with each end of said chest, an oscillating valve having combined feed and exhaust ports therethrough mounted in each end of said chest and cooperating with said pipes, a rotary valve having a feed-port therethrough mounted in each end of said chest adjacent to said oscillating valves and provided with face exhaust-ports, a seat for each valve having a plurality of exhaust-ports therethrough, the casing of said chest having a circular duct communicating with each seat-port at each end and a longitudinal duct connecting the two circular ducts, and an exhaust-pipe connected to one of said ducts.

In testimony whereof I set my hand, in the presence of two witnesses, this 10th day of December, 1904.

WESLEY J. INMAN.

Witnesses:

A. L. JACKSON,  
J. W. STITT.