F. KASPAREK.

ROTARY INTERNAL COMBUSTION MOTOR.

APPLICATION FILED OCT. 7, 1908.

930,601.

Patented Aug. 10, 1909.

2 SHEETS—SHEET 1.

Fig. 2.

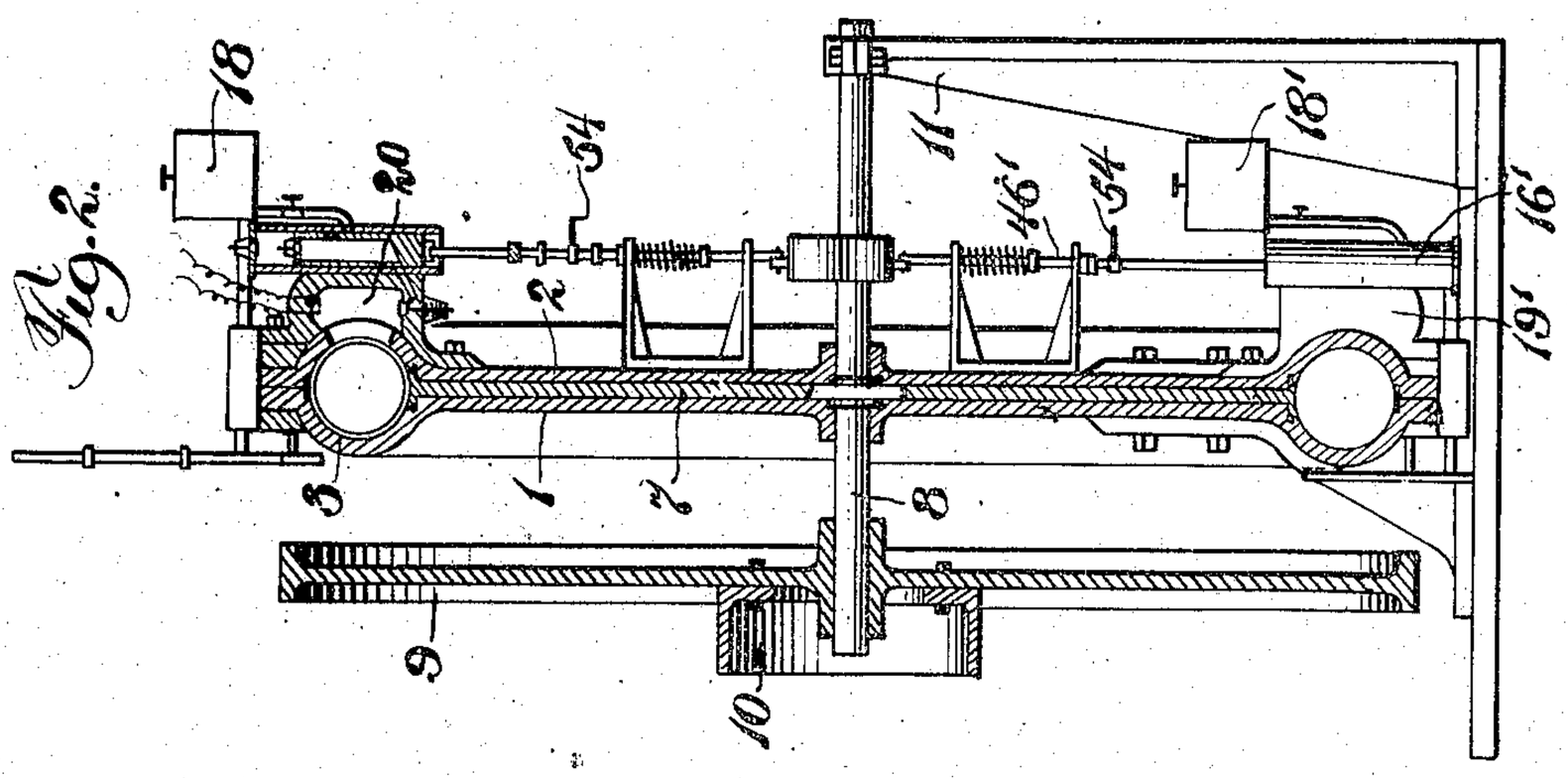
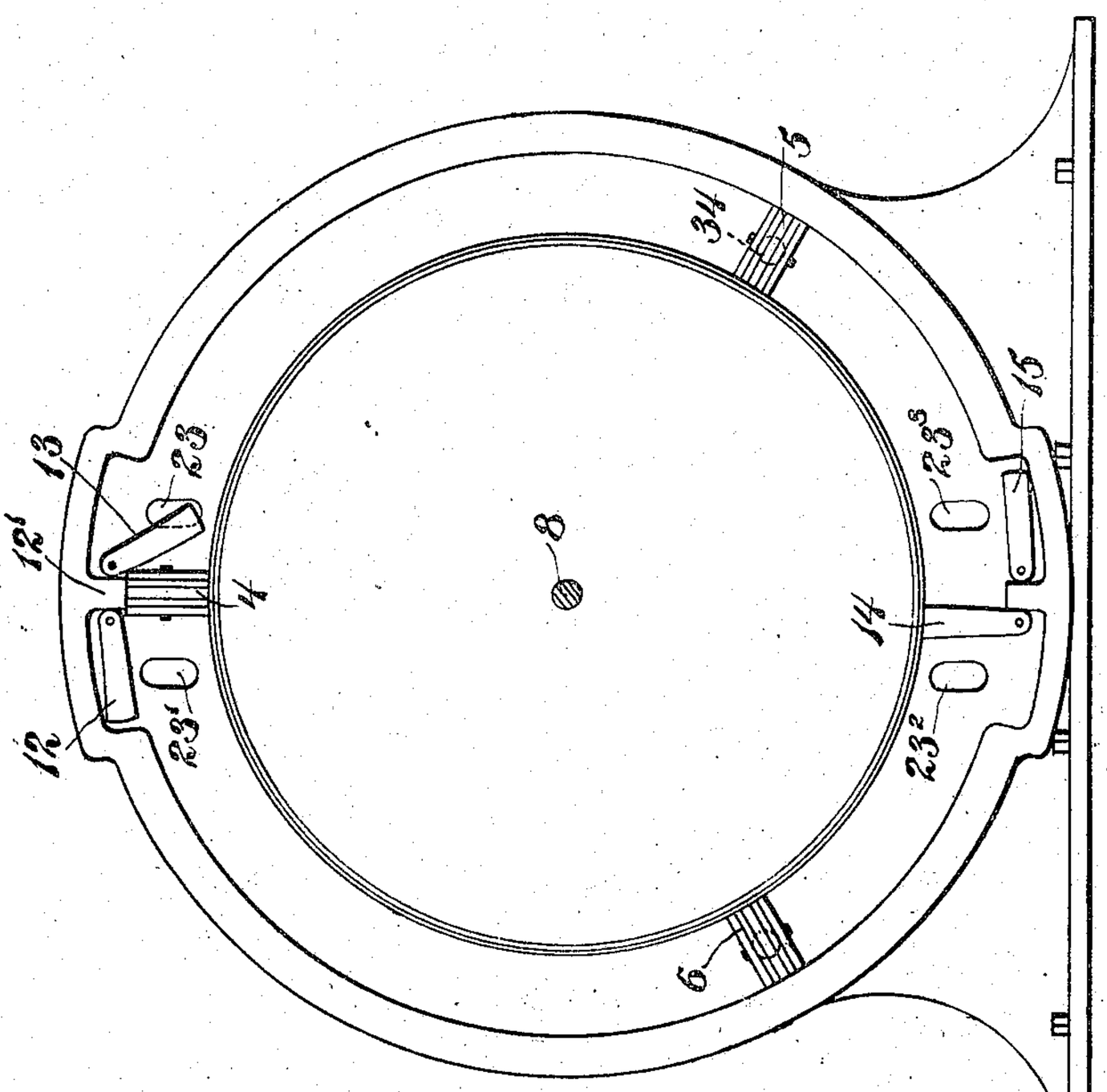


Fig. 1.



WITNESSES

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2 SHEETS—SHEET 2.

Fig. 3.

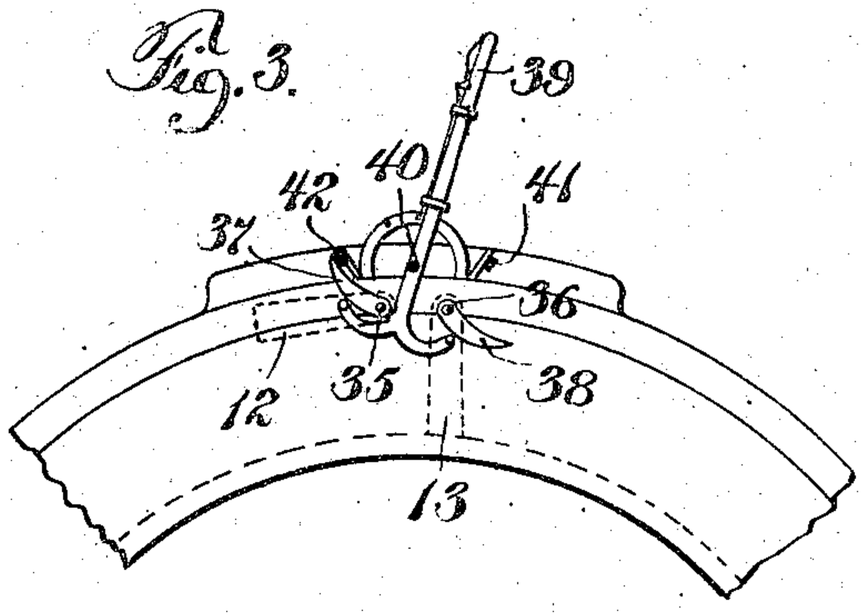


Fig. 4.

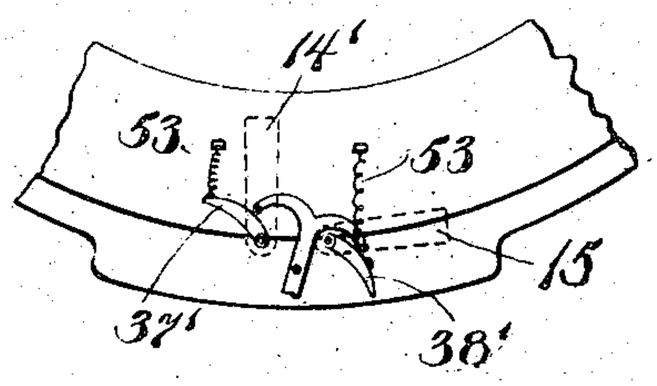


Fig. 5.

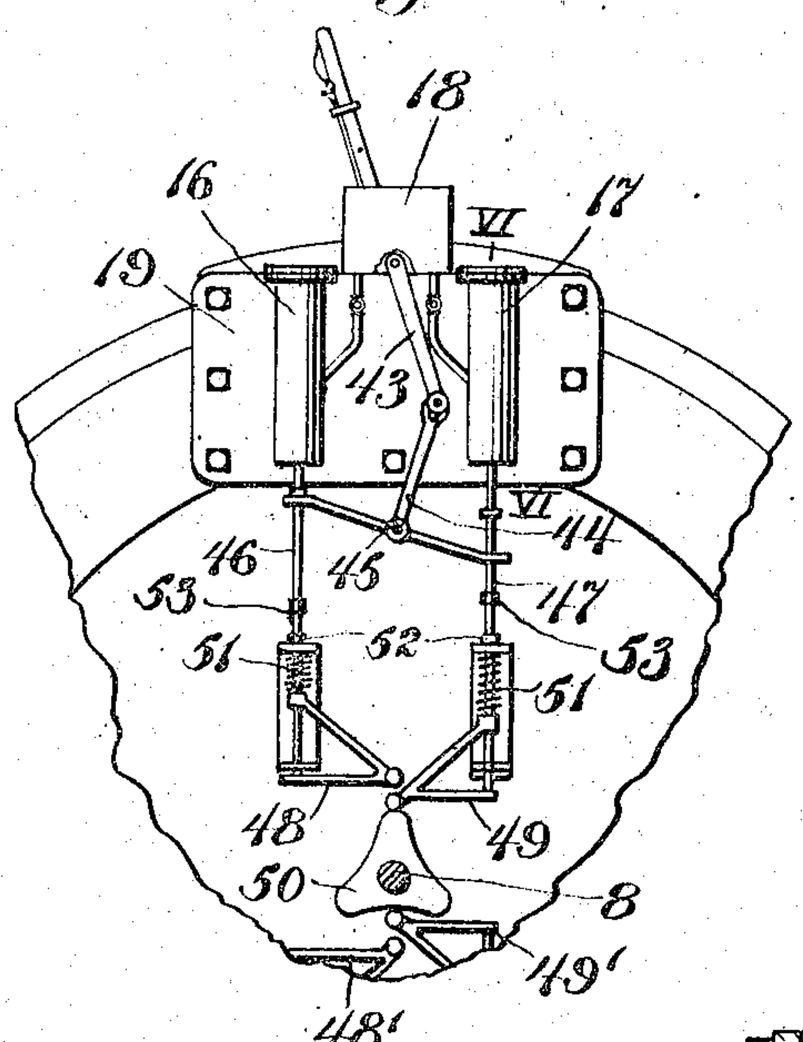


Fig. 6.

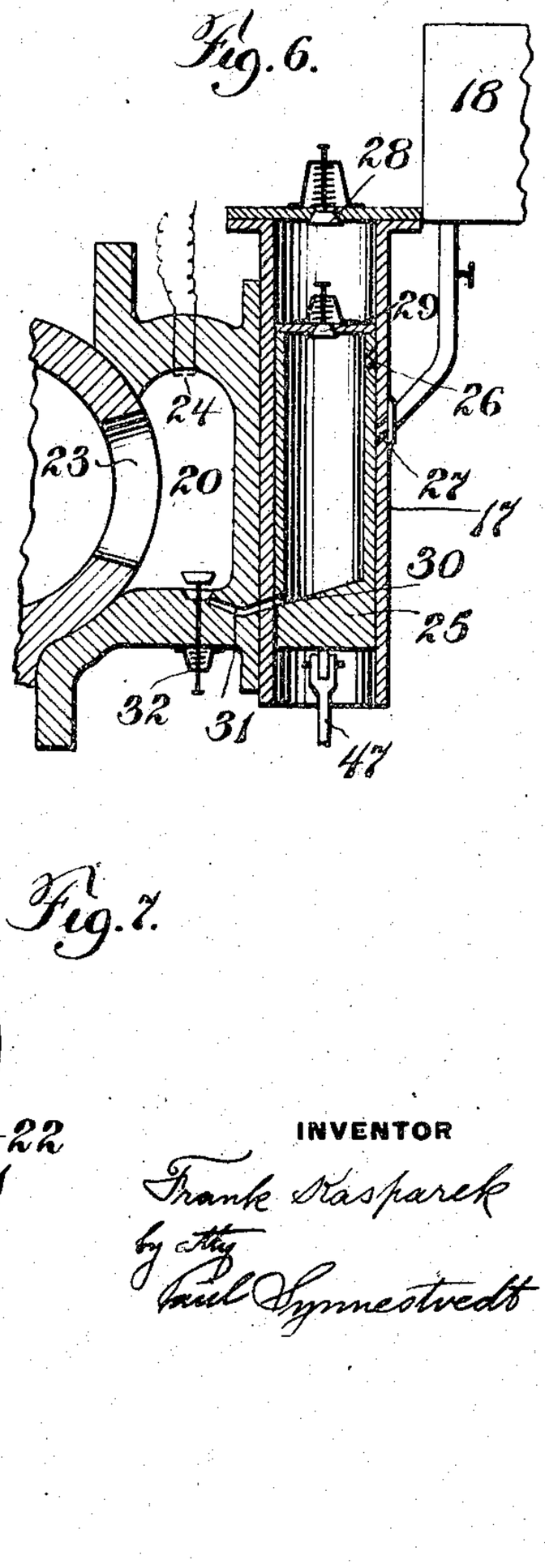
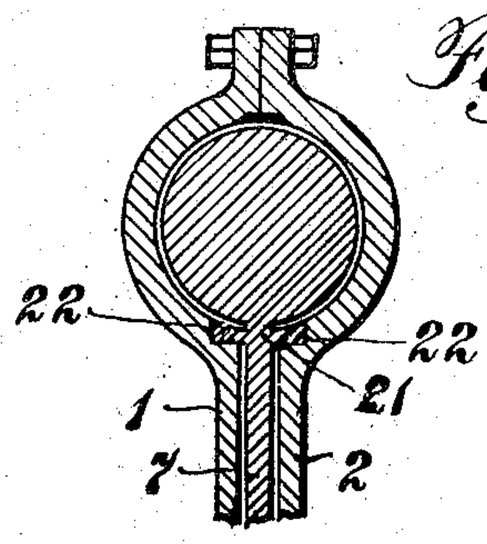


Fig. 7.



WITNESSES

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UNITED STATES PATENT OFFICE.

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ROTARY INTERNAL-COMBUSTION MOTOR.

No. 930,601. Specification of Letters Patent. Patented Aug. 10, 1909.

Application filed October 7, 1908. Serial No. 456,528.

To all whom it may concern:

Be it known that I, FRANK KASPAREK, a citizen of the United States, residing at Jeannette, in the county of Westmoreland and State of Pennsylvania, have invented certain new and useful Improvements in Rotary Internal-Combustion Motors, of which the following is a specification.

The invention relates to internal combustion or explosion motors of the rotary type and has for its primary objects; the provision of an improved motor of this character of greater efficiency and simplicity than motors as heretofore constructed; the provision of an improved arrangement of movable cylinder heads for permitting the passage of the pistons; the provision of an improved arrangement whereby the motor may be reversed; the provision of improved means for insuring tight joints between the relatively movable parts; and the provision of improved means for supplying the explosive mixture employed. One embodiment of the invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a side elevation of the motor with one of the side plates removed to show the interior of the cylinder,

Figure 2 is a transverse section through the motor,

Figure 3 is a detail side elevation of the upper portion of the motor, showing the reversing mechanism,

Figure 4 is a detail side elevation of the lower edge of the cylinder, and shows the reversing mechanism for the lower pair of cylinder heads,

Figure 5 is a detail side elevation of the mechanism for supplying explosive fluid to the motor,

Figure 6 is a detail enlarged section through the explosion chamber, and fluid supply cylinder on the line VI—VI of Figure 5, and

Figure 7 is a section through the cylinder and one of the pistons.

Referring first to the general arrangement of parts as shown in Figures 1, 2 and 5, such parts may be enumerated as follows; 1 and 2 are circular side plates bolted together and out-curved near their outer edges to form the continuous annular cylinder 3; 4, 5, 6 are pistons mounted in the cylinder, and integral with the supporting plate 7, 8 is the drive shaft to which the plate 7 is keyed, and which carries at its end the fly wheel 9 and drive pulley 10, 11 is a strut for supporting the right hand end of the shaft 8, 12 and 13 are movable cylinder heads mounted in the upper portion of the cylinder casing and taking against the wall 12′, 14 and 15 are similar heads mounted in the lower part of the cylinder casing, 16 and 17 are pump cylinders from which the explosion chambers are supplied, 18 is the tank containing the explosive fluid, and 19 is the casing carrying the two explosion chambers, one of which 20, is shown in Figures 2 and 6.

By reference to Figure 7 it will be noted that the plate 7 fits loosely between the side plates 1 and 2, and that such plate 7 is provided with a T head 21 fitting in recesses in the side plates 1 and 2 at the periphery of the cylinder. In order to provide a tight joint the rings 22 are provided. By this arrangement a tight joint is secured with a minimum amount of friction. The combustion or explosion chamber (Figures 2 and 6) is located at the side of the cylinder and communicates therewith by means of the elongated port 23. The explosion is provided for by means of the igniter 24. Fluid is supplied periodically to the chamber 20 from the tank 18 through the casing 17 by means of a piston 25 which is worked up and down in a manner to be hereinafter described. Referring to Figure 6 it will be noted that the piston 25 is hollow and is provided with a port 26 which registers with an inlet port 27 when the piston is in its lowermost position. When the piston moves up to the position shown in Figure 6, air is compressed above the upper end of the piston by reason of the spring held check valves 28 and 29. This pressure causes the valve 29 to open admitting the compressed air to the interior of the piston 25. At this time a second port 30 has been brought into registry with a port 31 leading to the combustion chamber 20, and a quantity of fluid together with a certain amount of air is forced through these ports into the chamber, the spring held check valve 32 rising to permit the flow. This charging of the combustion chamber occurs just as the piston 4 passes the port 23, and at this time the igniter 24 operates to fire the charge. The pressure thus generated in the combustion chamber is transferred to the cylinder through the port 23 thus forcing the piston ahead. Ex-

haust occurs through the exhaust port 34 after the piston passes the position of the piston 5 as illustrated in Figure 1. The device is started by means of handles 54 (Figure 2) carried by the rods on which the pump pistons are carried. The cylinder heads are not designed to be operated by the direct contact of the piston therewith, but by the air which is compressed in front of the piston heads just prior to the time they would otherwise impinge upon the head.

When it is desired to run the motor in the reverse direction, the cylinder head 12 (Figure 1) is lowered and the head 13 raised, and admission occurs through the port 23′ instead of through the port 23. This port 23′ connects with a combustion chamber corresponding to the combustion chamber 20, which chamber is supplied from the cylinder 16 (Figure 5), the arrangement being in all respects similar to the arrangement heretofore described and illustrated in Figure 6. The reversal of the parts is made by means of the construction illustrated in Figures 3 and 5. As here illustrated the two cylinder heads 12 and 13 are mounted respectively upon rods 35 and 36 carrying at their outer ends the levers 37 and 38. The levers are actuated by means of the lever 39 pivoted on the rod 40 and having its ends in engagement with the two levers as shown in Figure 3. By moving the handle 39 to the left the head 12 may be lowered and the head 13 raised to inoperative position. Rubber blocks 41 and 42 are provided for cushioning the upward movement of the levers 37 and 38. The rod 40 upon which the handle 39 is carried is extended through the casing and has keyed to its other end the link 43, which link 43 actuates the lever 44 pivoted at 45. The purpose of the lever 44 is to place out of operative connection one of the rods 46 and 47, which rods operate the pistons 25 in the cylinders 16 and 17. These rods 46 and 47 carry at their lower ends projecting arms 48 and 49 provided with rollers for engaging a cam 50 mounted upon the operating shaft 8. As indicated in Figure 5, the rod 46 is held up by the lever 44, so that the cam 50 is out of operative engagement with the arm 48. At this time the piston carried by the rod 46 is in its uppermost position with its upper port out of registration with the port leading to the tank 18. The rod 47 on the other hand is free to be moved up and down periodically by the cam 50, three reciprocations of the rod being afforded by the cam 50 for each revolution of the plate 7, to correspond with the three pistons carried by such plate. Springs 51 are provided for positively moving the rods 46 and 47 downwardly, and resilient blocks 52 are inserted below the stop blocks 53 on the rods 46 and 47 in order to reduce the noise and jar.

By reference to Figure 1 it will be noted that a pair of cylinder heads 14 and 15 are employed at the lower portion of the cylinder, to which admission occurs through the ports 23^2 and 23^3. This portion of the cylinder is provided with a combustion chamber casing 19′ (Figure 2) carrying a pair of combustion chambers corresponding in all respects to the combustion chamber 20 shown in Figure 6. These combustion chambers are supplied by means of a pair of cylinders 16′ fed from a tank 18′, the construction corresponding in all respects to that heretofore described at the upper portion of the cylinder. The pistons in the cylinders 16′ are operated by rods 46′ carrying at their upper ends arms 48′ and 49′ (Figure 5), which arms engage the cam 50 in the same manner as the arms 48 and 49.

Figure 4 illustrates the manner in which the cylinder heads 14 and 15 at the bottom of the cylinder are operated. These heads are normally held in vertical position by means of springs 53, which engage the ends of the levers 37′ and 38′ carried by the rods upon which the heads 14 and 15 are pivoted. The position of the heads 14 and 15 is controlled by means of the lever 39′ corresponding in all respects to the lever 39 shown in Figure 3.

It will be apparent that the invention is not limited to the use of three pistons or two sets of combustion chambers with the operating mechanism therefor, but that the number of these parts may be varied to suit conditions. It will also be apparent that the cylinder heads might be operated positively from some moving part connected with the shaft 8, or with some other moving part instead of being moved directly by the pistons themselves or by the compressed gas in front of the pistons. It will also be apparent that various other types of movable cylinder heads might be employed in lieu of the ones illustrated.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is the following:—

1. In a rotary explosive motor, an annular cylinder, a piston rotatively mounted and fitting therein, a pair of cylinder heads mounted to swing independent of each other in opposite directions into and out of the cylinder, admission means at the front of each head, independent controlling valves therefor, means operated from the piston for operating the valves, shifting means whereby either of the valves may be disconnected from the operating means, and a handle connected to the shifting means and provided with means for operating the cylinder heads and adapted to simultaneously swing either

of the cylinder heads out of the cylinder and disconnect the corresponding valve.

2. In a rotary explosive motor, an annular cylinder, a piston rotatively mounted and fitting therein, a pair of movable cylinder heads, explosion chambers having admission openings to the cylinder in front of each head, shifting means whereby either head may be moved to inoperative position, a pair of pistons for injecting an explosive mixture to the chambers, mechanism for operating the pistons and means operated by the shifting means for moving one of the pistons to inoperative position when the corresponding head is moved to inoperative position.

3. In a rotary explosive motor, an annular cylinder, a piston rotatively mounted and fitting therein, an explosion chamber at the side of the cylinder and communicating therewith, a cylinder having a port communicating with the chamber, an opening for supplying an explosive mixture to the cylinder, a hollow piston working in the cylinder and provided with openings adapted to communicate with the said port and opening at different portions of its stroke, inwardly opening check valves in the ends of the cylinder and piston, and means for reciprocating the pistons.

4. In a rotary explosive motor having an explosion chamber, a cylinder having a port communicating with the chamber, an opening for supplying an explosive mixture to the cylinder, a hollow piston working in the cylinder and provided with openings adapted to communicate with the said port and openings at different portions of its stroke, inwardly opening check valves in the ends of the cylinder and piston, and means for reciprocating the pistons.

In testimony whereof I have hereunto signed my name in the presence of the two subscribed witnesses.

FRANK KASPAREK.

Witnesses:
AMAND DESUTTER,
ARCHWORTH MARTIN.