E. P. TITUS.

ROTARY EXPLOSIVE ENGINE.

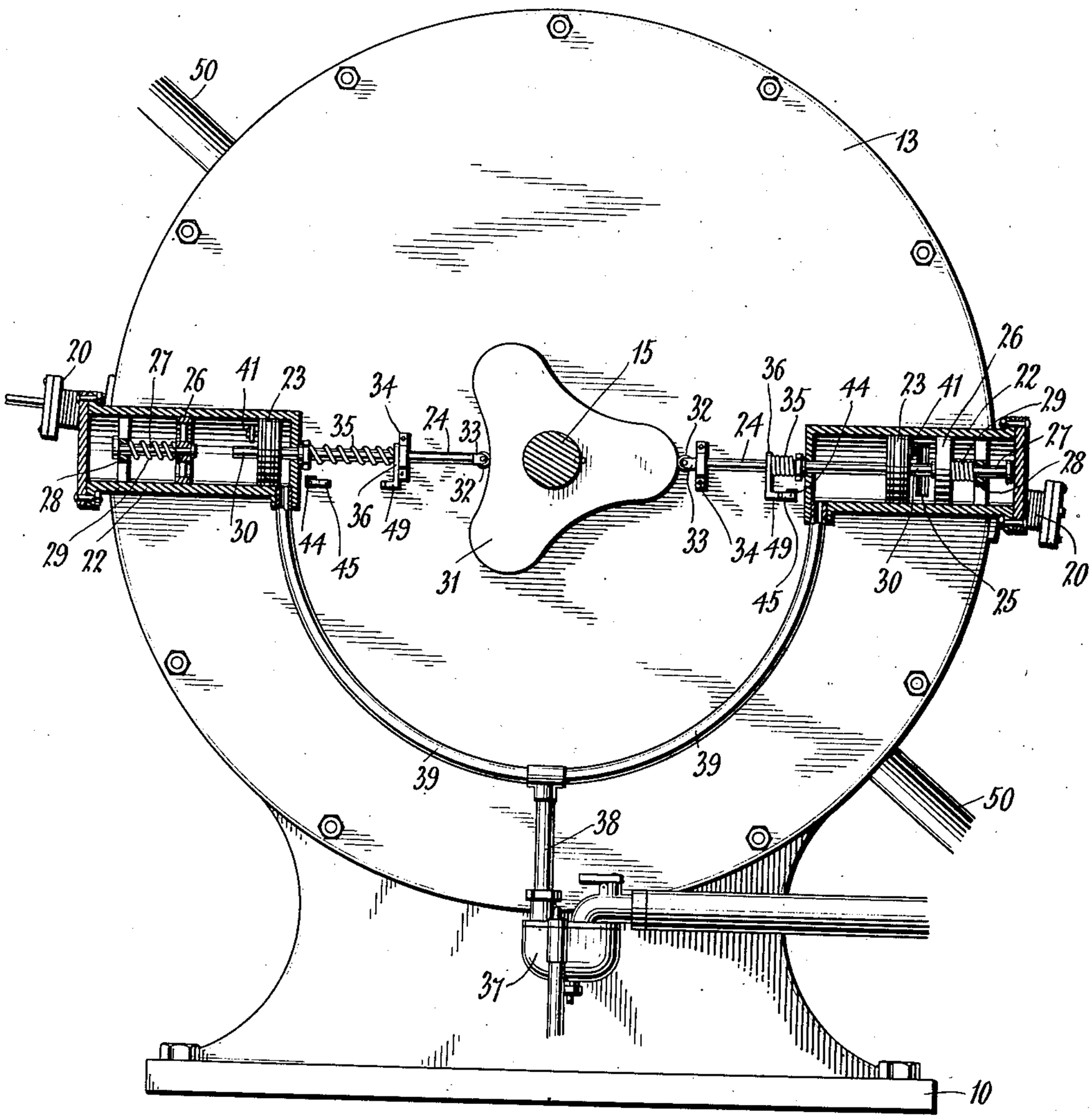
APPLICATION FILED MAY 31, 1910.

969,675.

Patented Sept. 6, 1910.

3 SHEETS—SHEET 1.

FIG. 1



Witnesses

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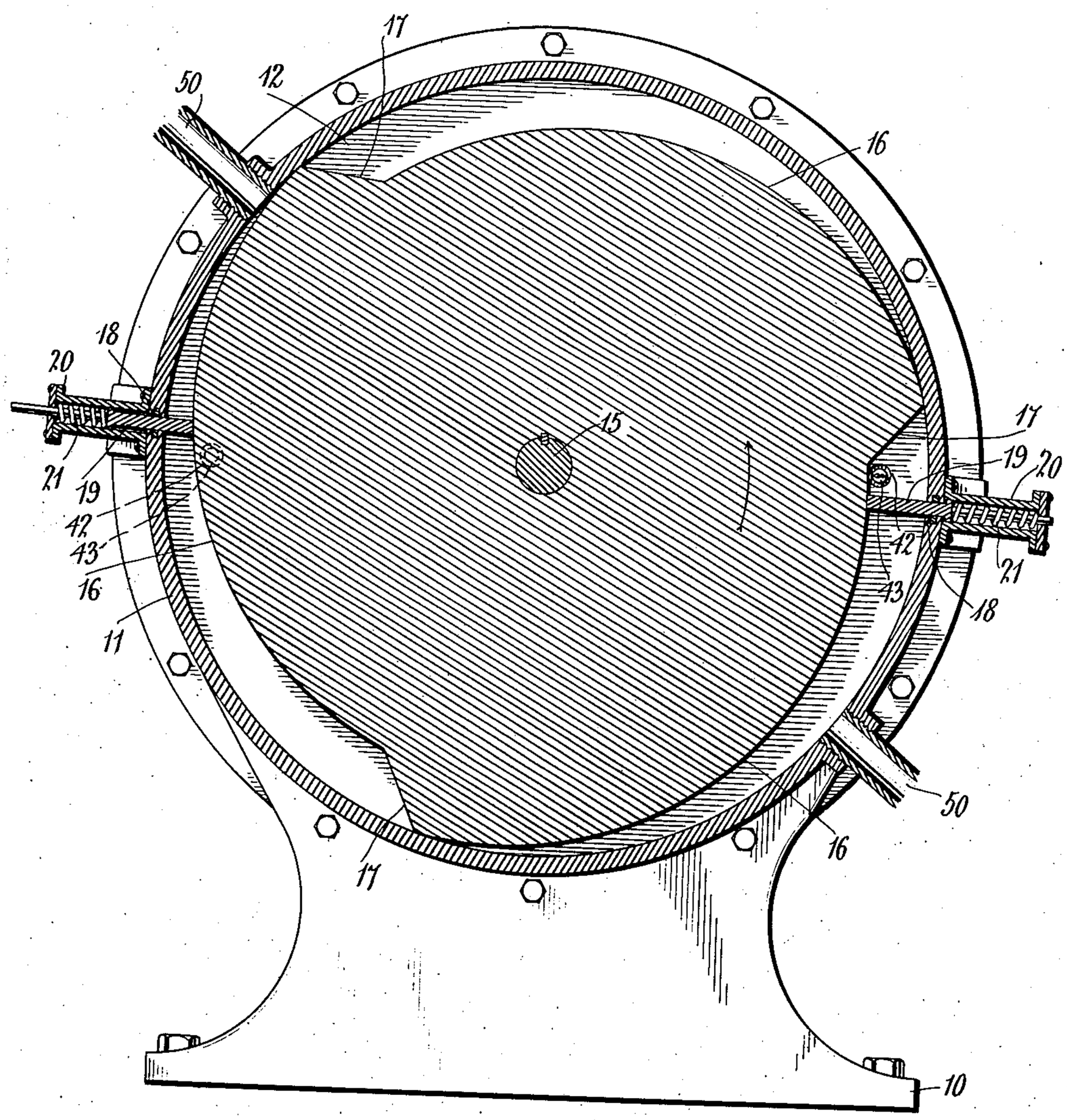
3 SHEETS—SHEET 2.

FIG. 2



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3 SHEETS—SHEET 3.

FIG. 3

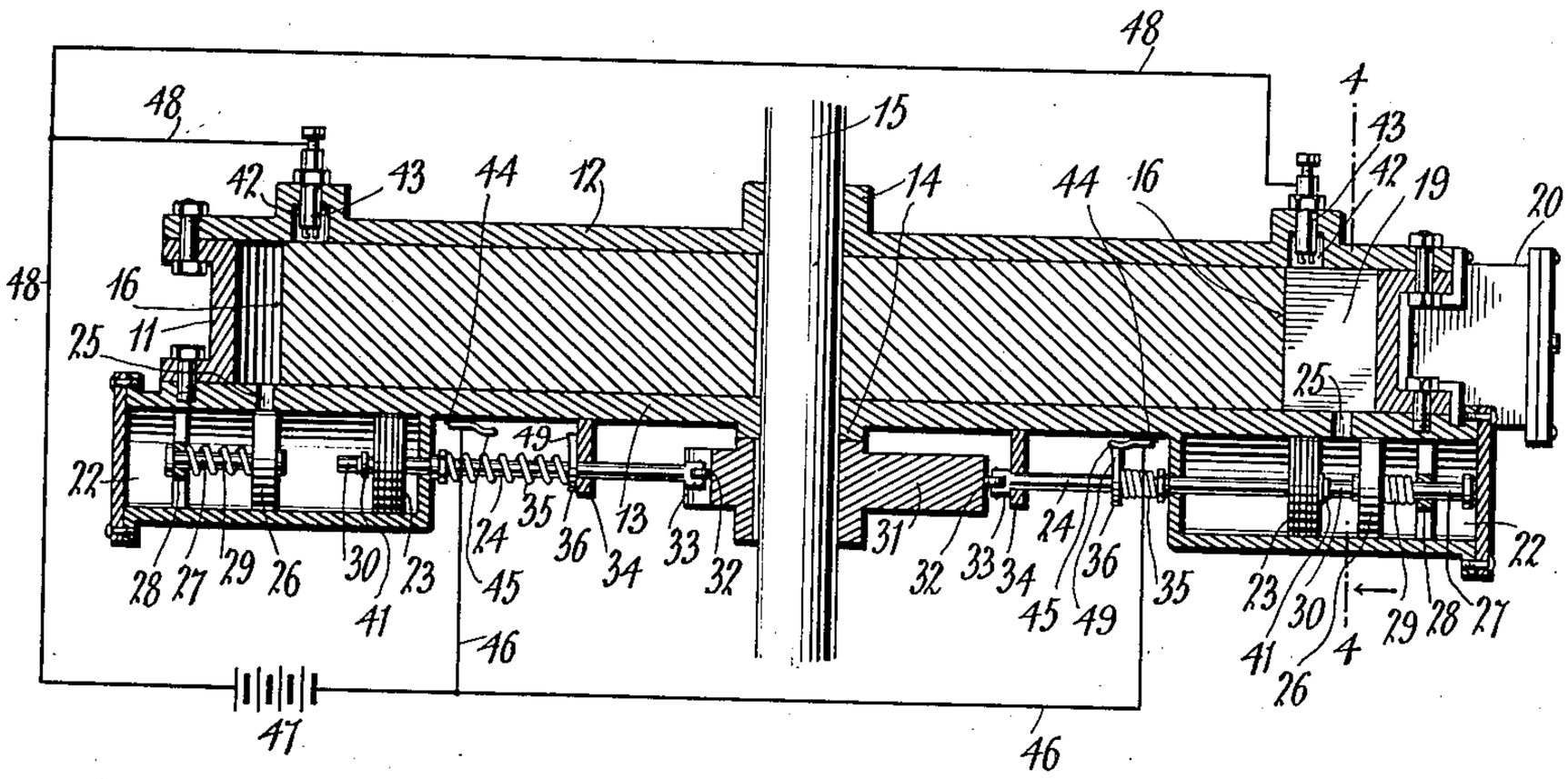


FIG. 4

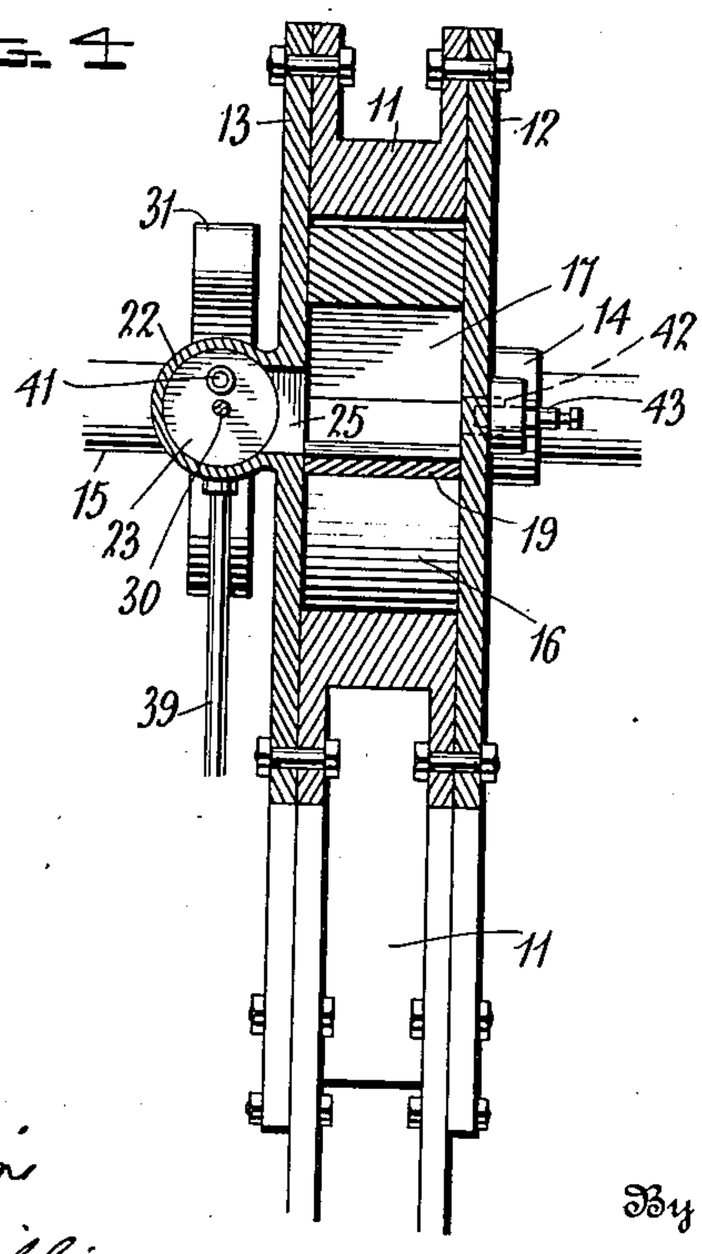
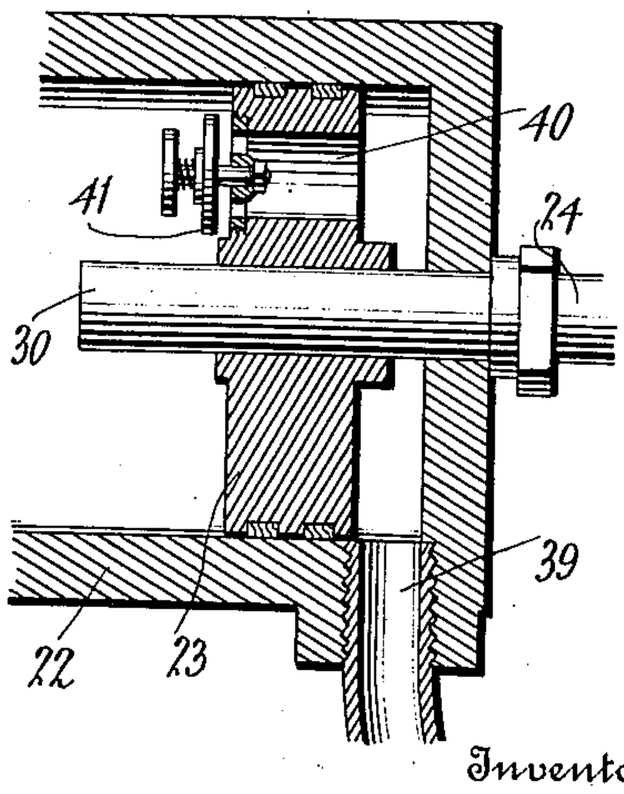


FIG. 5



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UNITED STATES PATENT OFFICE.

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ROTARY EXPLOSIVE-ENGINE.

969,675. Specification of Letters Patent. **Patented Sept. 6, 1910.**

Application filed May 31, 1910. Serial No. 564,276.

To all whom it may concern:

Be it known that I, EDWIN P. TITUS, a citizen of the United States, residing at Mena, in the county of Polk, State of Arkansas, have invented certain new and useful Improvements in Rotary Explosive-Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to explosive engines and has special reference to an explosive engine of the rotary type.

The principal object of the invention is to improve and simplify the general construction of engines of this character.

Another object of the invention is to provide an improved compression mechanism for such engines.

A further object of the invention is to provide an improved ignition mechanism for use with such engines.

With the above and other objects in view, the invention consists in general of a rotary engine provided with novel compression mechanism and improved ignition means.

The invention further consists in certain novel details of construction and combinations of parts hereinafter fully described, illustrated in the accompanying drawings, and specifically set forth in the claims.

In the accompanying drawings, like characters of reference indicate like parts in the several views, and:—Figure 1 is a side elevation of an engine constructed in accordance with this invention, the compression cylinders being shown in section. Fig. 2 is a vertical section through the casing of an engine constructed in accordance with this invention. Fig. 3 is a horizontal section through such an engine, the section showing the compression mechanism. Fig. 4 is a section on the line 4—4 of Fig. 3. Fig. 5 is an enlarged detail view of one of the pistons employed in the compression cylinders, a portion of the cylinder also being shown.

This engine is provided with the usual base 10 whereon is mounted a ring 11 to which are secured heads 12 and 13 each of which has a centrally disposed boss 14 through which passes a shaft 15. The parts just described, with the exception of the shaft, form the stator of the engine. The rotor is held within the ring 11 and between the heads and consists of a disk, the outer periphery of which includes cam portions 16, the surfaces of these cam portions being connected by surfaces 17 which form angularly disposed shoulders. The cam surfaces 16 are preferably arcuate with the centers of the arcs eccentric to the center of the stator and the outer ends of these cam surfaces 16 engage closely against the inner surface of the ring 11, the shape and construction being clearly shown in Fig. 2. This rotor is securely keyed to the shaft 15.

Suitably disposed through the ring 11 are slots 18 through which slide abutments 19. Secured to the ring 11 opposite the slots 18 are casings 20 which receive the abutments 19 when the latter are forced outward through the ring 11 by the action of the cams 16. These casings serve to hold springs 21 which constantly urge the abutments 19 inward.

Formed upon the head 13 are cylinders 22 in each of which slides a piston 23 having a piston rod 24 extending inward toward the shaft 15. Extending from each of the cylinders 22 through the head 13 is a port 25 forming a conduit for the compressed gas as will be hereinafter described. In each of the cylinders 22 is a sliding valve 26 provided with a stem 27, the outer end whereof extends through a guide 28. Surrounding the stem 27 between the valve and the guide is a spring 29 which normally holds the valve 26 inward so that the conduit 25 is closed. Each piston is provided with an outwardly extending stem 30 so arranged that when the piston is moved outward this stem will contact with the respective valve 26 and push the same outward against the action of the spring 29. These cylinders are positioned adjacent the abutments but slightly behind the same in the direction of rotation of the rotor so that the compressed gas entering the stator will fill the space between the shoulder 17 and an abutment 19.

In the present instance a form of the engine has been shown wherein two cylinders 22 are employed and the rotor is provided with three shoulders. The cylinders being diametrically opposite, the arrangement is such that the explosion takes place every sixth of a revolution of the rotor. To this end the shaft 15 has keyed thereon a three-lobed cam 31 against which bear rollers 32 carried in forked ends 33 formed on the respective piston rods 24, said rods being furthermore guided by suitable guide lugs 34

formed on the head 13. These rollers 32 are constantly held in contact with the cam by means of springs 35 which surround the respective piston rods, one end of each spring engaging against the inner end of the cylinder 22 while the other end engages a collar 36 fixed on the respective rod 24. Now, it will be seen that as the engine rotates the cam will also be rotated and this will cause the pistons to move outward alternately, said pistons being moved inward in reverse order by the springs 35.

At 37 is indicated a carbureter from which extends a pipe 38 having branches 39 which communicate with the respective cylinders 22. Each of the pistons 23 is provided with a port 40 which is controlled by means of a valve 41, the valve opening as the piston moves inward and being closed as the piston moves outward. The form of valve here shown is that commonly used in air compressors but it is obvious that any other form found desirable may be substituted without affecting the operation of the device.

Now, when the device is in motion, as the respective pistons 23 move inward they permit the outer ends of the cylinders 22 to be filled with the explosive mixture from the carbureter by reason of the opening of the valves 41. When these pistons move outward they compress the explosive mixture in their cylinders until the stems 30 contact with the respective valves 26. These valves 26 are annular valves, the centers being formed by spiders so that the compression of the gas in the cylinders does not tend to move the valves. When the valves are struck by the stems 30 they will then be moved outward and the compressed gases allowed to escape through the respective ports 25. At the time when one of these ports is thus opened one of the shoulders 17 will be slightly in advance of an abutment 19 which will be in the position indicated to the right of Fig. 2, the parts being adjusted to this end. The compressed gases will thus be received in a chamber between said abutment and shoulder.

In order to produce an explosion at this time the head 12 has formed thereon small chambers 42 and spark plugs 43 are screwed into the position on said head wherein said chambers are formed. Secured to the head 13 are insulating blocks 44 on each of which is a contact finger 45 and from these contact fingers wires 46 lead to a battery 47. From the spark plugs 43 wires 48 also lead to this battery. On the collars 36 are contact fingers 49. When the pistons 23 are moved outward by the action of the cam 31 the contact fingers 49 and 45 will contact and a circuit will be established from the battery 47 through the wire 48, spark plug 43, across the sparking terminals of said plug, through the metal of the machine to the contact finger 49, through the contact finger 45 and wire 46 back to the battery 47. An explosion will thus take place which will cause the rotor to move in the direction of the arrow on Fig. 2. The movement of the rotor will force the abutment 19 outward and bring the shoulder 17 now shown on the upper left hand side of Fig. 2 in advance of the abutment on that side of the engine when the operation will be repeated with the left hand spark plug giving the explosion.

In order to permit the escape of the exhaust gases suitable exhaust pipes 50 lead outward from the ring 11 as clearly shown in Fig. 2.

There has thus been provided a simple and efficient device of the kind described and for the purpose specified.

It is obvious that minor changes may be made in the form and construction of this invention without departing from the material principles thereof. It is not therefore desired to confine the invention to the exact form herein shown and described, but it is wished to include all such as properly come within the scope of the appended claims.

Having thus described the invention, what is claimed as new, is:—

1. In a rotary explosive engine, a casing, a shaft extending through said casing, a rotor fixed upon said shaft within said casing, shoulders formed on the periphery of said rotor, cam surfaces connecting said shoulders, an abutment extending through said casing and engaged by said cam surfaces, means constantly urging said abutment inward, a spark plug extending within said casing in advance of said abutment, a compression cylinder adjacent said abutment, a piston in said cylinder, means on said shaft to actuate said piston, a conduit leading from said cylinder into said casing in advance of said abutment, a valve normally closing said conduit, means on said piston to open said valve, and a sparker mechanism operable by the movement of said piston.

2. In a rotary explosive engine, a casing, a shaft extending through said casing, a rotor fixed upon said shaft, an abutment extending through said casing and engaging said rotor, said abutment being movable outwardly by said rotor, means to move said abutment inward, a spark plug extending within said casing in advance of said abutment, a compression cylinder, a valved piston in said compression cylinder, a carbureter, a pipe leading from said carbureter to said cylinder, a conduit leading from said cylinder into said casing in advance of said abutment, means on said shaft to actuate said piston, a valve normally closing said

conduit, and means carried by the piston to open said valve.

3. In a rotary explosive engine, a casing, a shaft extending through said casing, a rotor fixed upon said shaft, an abutment extending through said casing and engaging said rotor, said abutment being movable outwardly by said rotor, means to move said abutment inward, a spark plug extending within said casing in advance of said abutment, a compression cylinder, a valved piston in said compression cylinder, a carbureter, a pipe leading from said carbureter to said cylinder, a conduit leading from said cylinder into said casing in advance of said abutment, means on said shaft to actuate said piston, a valve normally closing said conduit, means carried by the piston to open said valve, and a sparker mechanism operable by the movement of said piston.

4. In a rotary explosive engine, a casing, a shaft extending through said casing, a rotor fixed upon said shaft, an abutment extending through said casing and engaging said rotor, said abutment being movable outwardly by said rotor, means to move said abutment inward, a spark plug extending within said casing in advance of said abutment, a compression cylinder, a valved piston in said compression cylinder, a piston rod extending inwardly from said piston and passing through the inner end of said cylinder, a carbureter, a pipe leading from said carbureter to the inner end of said cylinder, a conduit leading from the outer end of said cylinder into said casing in advance of said abutment, a cam on said shaft engaging the inner end of the piston rod, means to hold said rod in engagement with said cam, a valve in said cylinder normally closing said conduit, and means carried by the piston to engage and open the last mentioned valve.

5. In a rotary explosive engine, a casing, a shaft extending through said casing, a rotor fixed upon said shaft, an abutment extending through said casing and engaging said rotor, said abutment being movable outwardly by said rotor, means to move said abutment inward, a spark plug extending within said casing in advance of said abutment, a compression cylinder, a valved pis ton in said compression cylinder, a piston rod extending inwardly from said piston and passing through the inner end of said cylinder, a carbureter, a pipe leading from said carbureter to the inner end of said cylinder, a conduit leading from the outer end of said cylinder into said casing in advance of said abutment, a cam on said shaft engaging the inner end of the piston rod, means to hold said rod in engagement with said cam, a valve in said cylinder normally closing said conduit, means carried by the piston to engage and open the last mentioned valve, a contact arm carried by said piston rod, and a second contact mounted on said casing in the path of the contact arm, said second contact being insulated from said casing.

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

EDWIN P. TITUS.

Witnesses:

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H. A. GARDNER.