F. S. & A. F. WRIGHT.

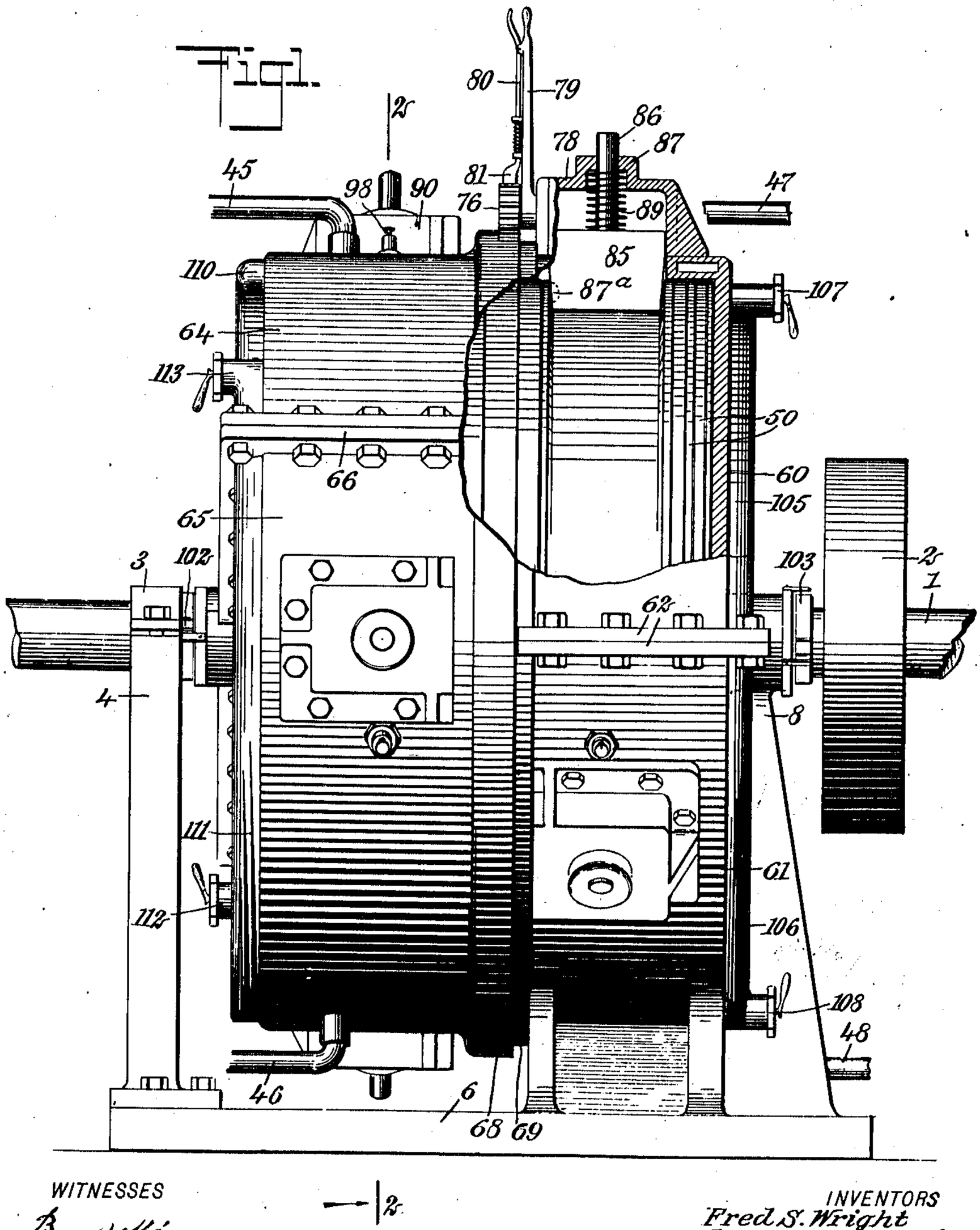
INTERNAL COMBUSTION ROTARY ENGINE.

APPLICATION FILED NOV. 27, 1908. RENEWED APR. 11, 1911.

992,096.

Patented May 9, 1911.

4 SHEETS—SHEET 1.



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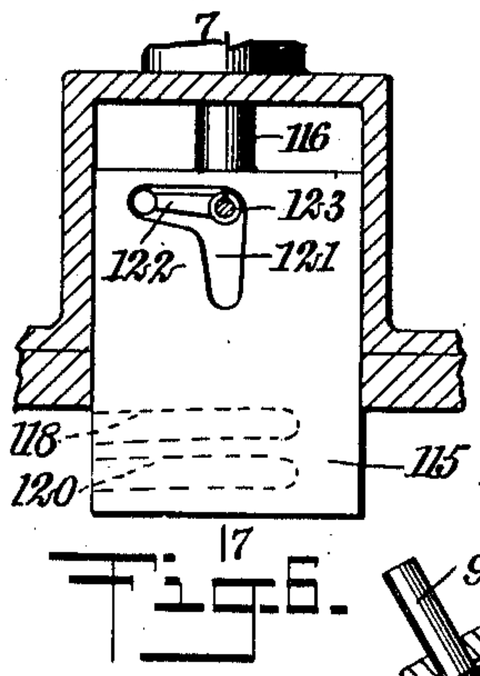


Fig. 6.

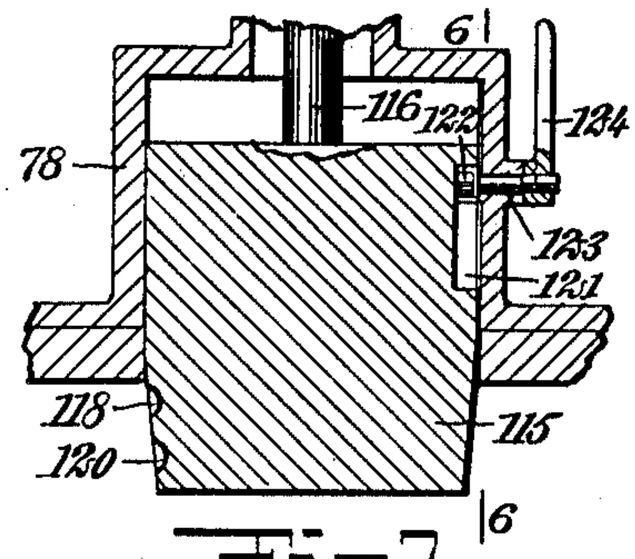
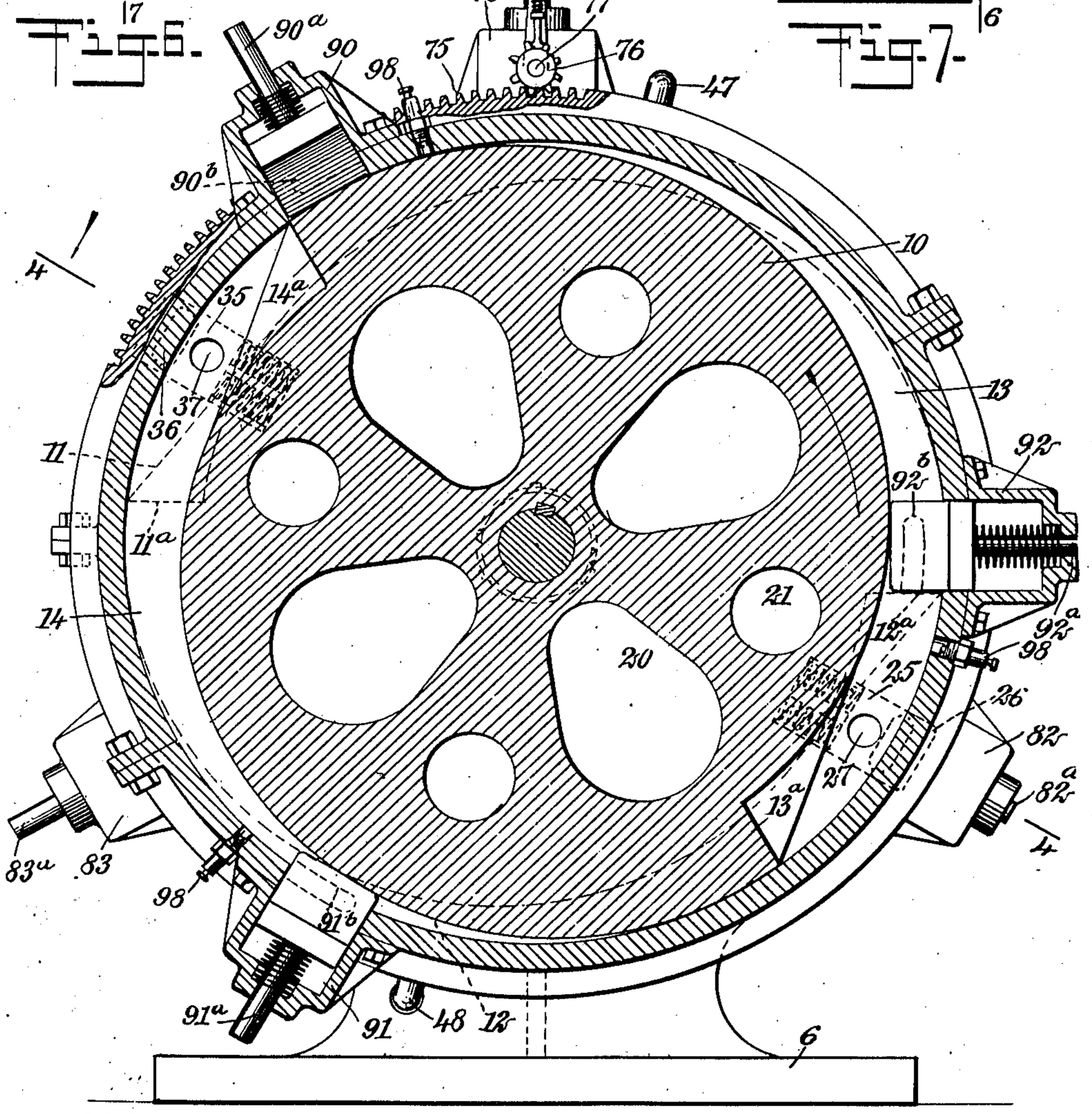


Fig. 7.

Fig. 2.



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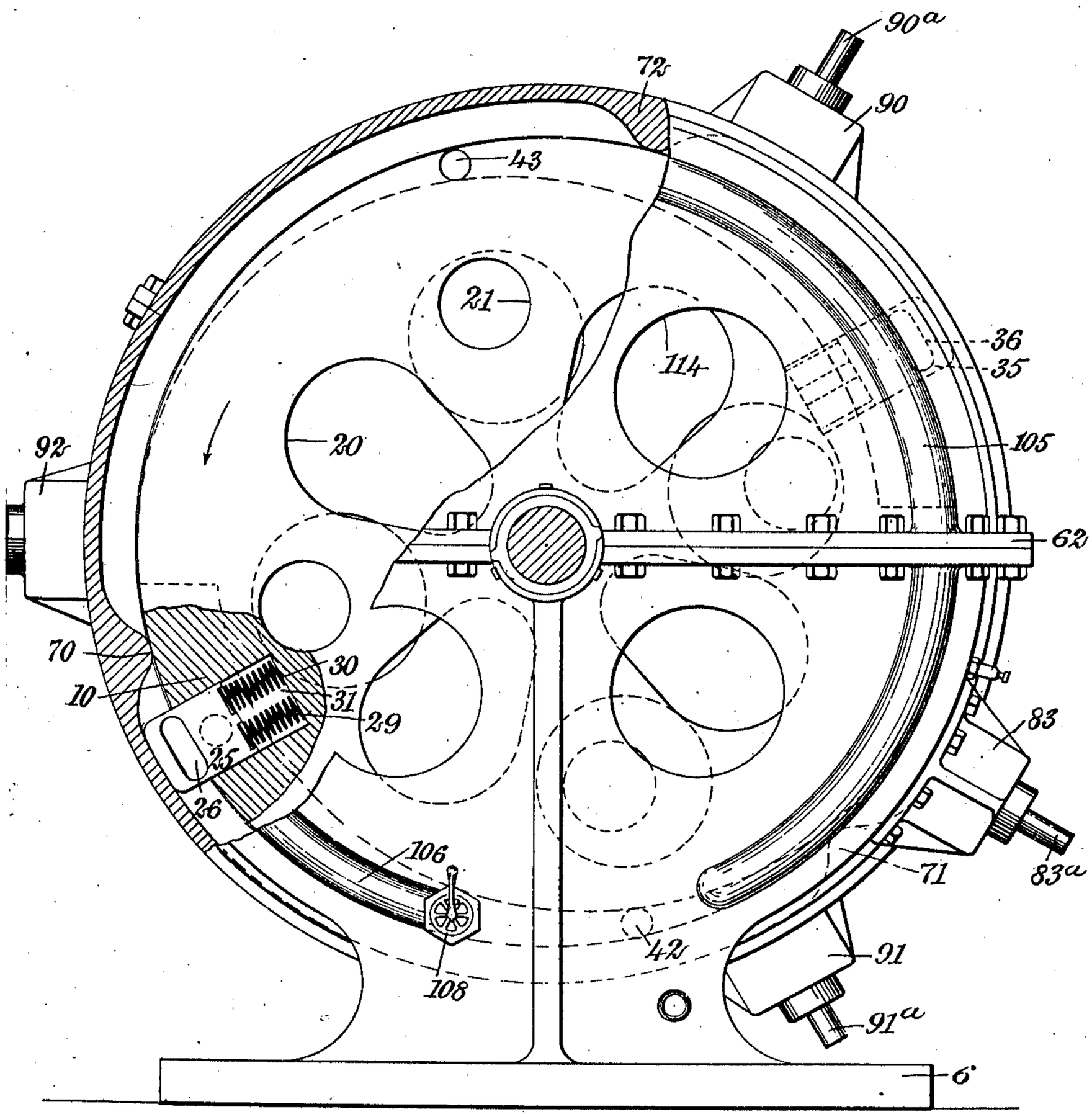
4 SHEETS—SHEET 3.

Fig. 3.



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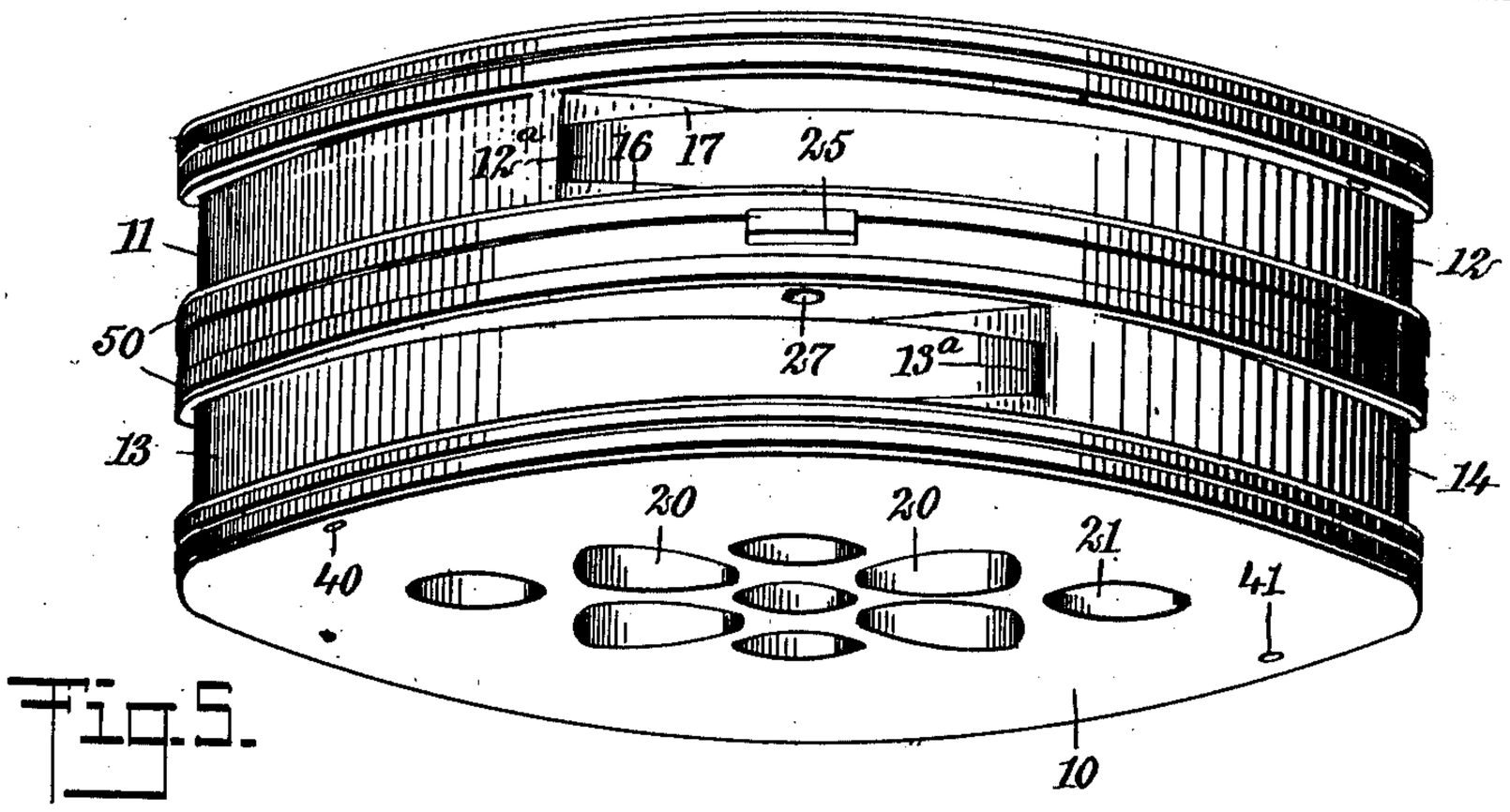
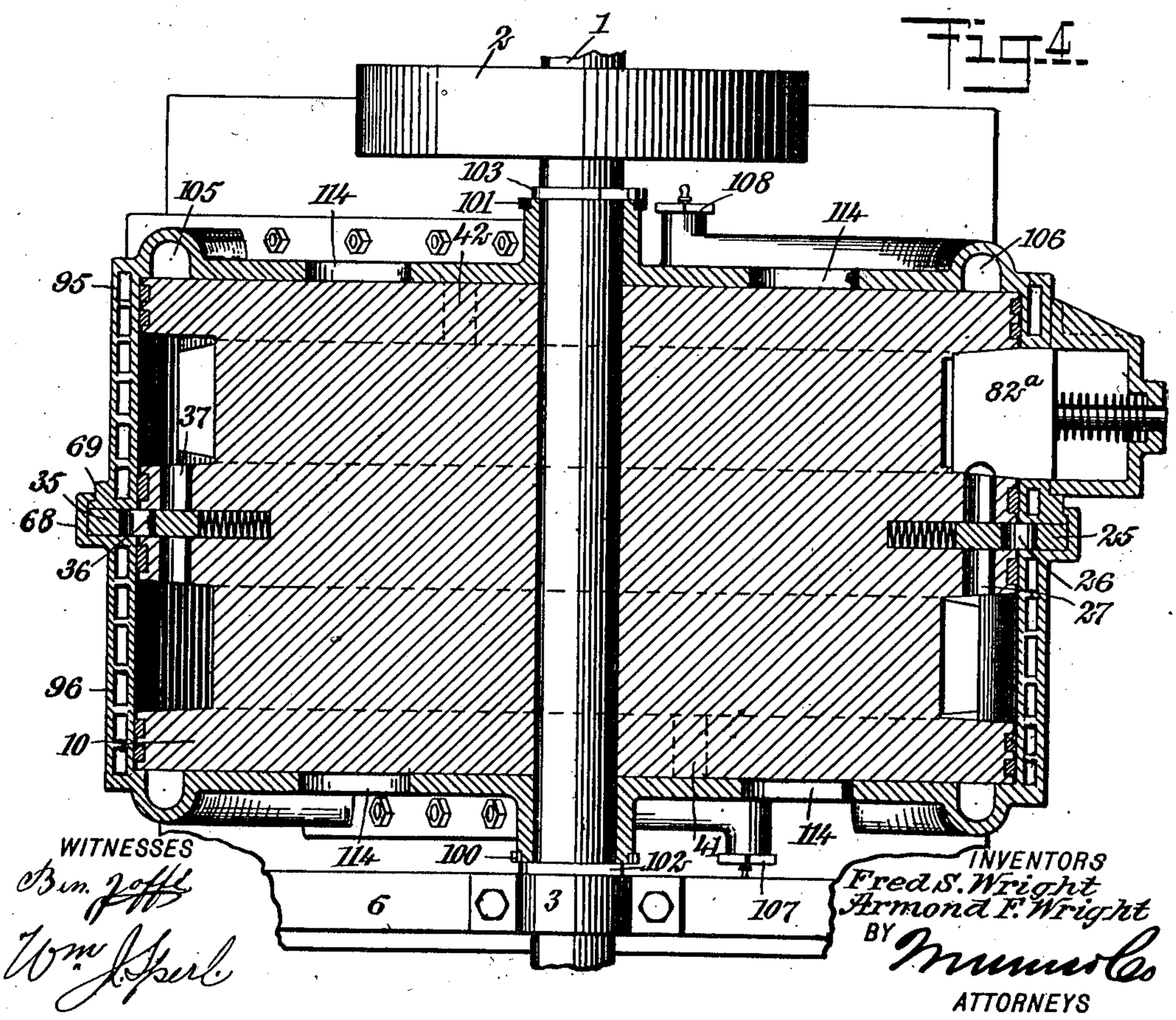


Fig. 5.

Fig. 4.



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UNITED STATES PATENT OFFICE.

FRED SMITH WRIGHT AND ARMOND FREDERICK WRIGHT, OF TACOMA, WASHINGTON.

INTERNAL-COMBUSTION ROTARY ENGINE.

992,096. Specification of Letters Patent. Patented May 9, 1911.

Application filed November 27, 1908, Serial No. 464,698. Renewed April 11, 1911. Serial No. 620,459.

To all whom it may concern:

Be it known that we, FRED S. WRIGHT and ARMOND F. WRIGHT, both citizens of the United States, and residents of Tacoma, in the county of Pierce and State of Washington, have invented a new and Improved Internal-Combustion Rotary Engine, of which the following is a full, clear, and exact description.

This invention relates to internal combustion rotary engines.

One object is to provide a rotary engine which is readily reversible.

A further object is to provide an engine in which the compression and explosion chambers may be varied in size to vary the power of the engine.

A still further object is to provide an engine in which the compression chambers may be made explosion chambers and the explosion chambers may be made compression chambers when the direction of rotation of the engine is reversed.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation, partly in section, of the rotary engine; Fig. 2 is a vertical section taken on the line 2—2 in Fig. 1; Fig. 3 is an end elevation, partly in section, of the right-hand end of the engine, as shown in Fig. 1; Fig. 4 is a section on the line 4—4 in Fig. 2; Fig. 5 is a perspective view of the rotary member; Fig. 6 is a sectional view taken on the line 6—6 in Fig. 7, showing the means for holding one of the plungers in an inoperative position; and Fig. 7 is a section taken on the line 7—7 in Fig. 6.

In said drawings the main shaft 1 is provided with a driving wheel 2, and is journaled at one end in a bearing 3 supported by a bracket 4, bolted to a base 6. The other end of the shaft is journaled in a bearing 8 formed in the right-hand side of the casing of the engine.

Keyed to the main shaft 1 is a rotary member 10 having channels, 11, 12, 13 and 14. Each channel is of increasing depth and extends around a portion of the periphery of the rotary member. The bottom of each channel is substantially spiral. The channel 12 at its deepest end is provided with guideways 16 and 17 which are to coöperate with the plungers which move within the channels, as will be hereinafter explained. The channels are formed with tapering side walls in order that the plungers may fit tightly therein to prevent the escape of gas between the side walls and plungers, and are also provided with shoulders, as shown at 11^a, 12^a, 13^a and 14^a, as shown in Figs. 2 and 5. Said rotary member may also be provided with cored holes 20 and 21 in order to allow a circulation of air through the same for cooling purposes.

A cut-off valve 25 is slidably mounted within the rotary member to move radially, and is provided with a port 26 adapted to register with a port 27 which affords communication between the channels 12 and 13. Said cut-off valve is spring-pressed outwardly by means of coiled springs 29 and 30 bearing against the inner face of the cut-off valve, and held within a socket 31 formed in the rotary member 10. Diametrically opposite the cut-off valve 25 is a similar cut-off valve 35, having a port 36 adapted to form means of communication with the port 37 which communicates between the channels 11 and 14. The rotary member 10 is also provided with exhaust ports 40, 41, 42 and 43. It will be understood that two of these exhaust ports only are open at a time, that is, two on one side of the casing. The gas or other explosive mixture is supplied by pipes 45, 46, 47 and 48. It will be understood that these pipes are provided with valves so that the two on opposite sides of the engine from the exhaust ports may be utilized for supplying gas, while the other two are shut off. Said rotary member is also provided with compression rings 50, which are mounted in suitable grooves and adapted to form a tight joint between the rotary member and the inner periphery of the casing.

The casing of the engine comprises a stationary member composed of two halves 60 and 61, each provided with flanges 62 by which the half members may be bolted together. The member 61 is formed integrally with the base 6 of the engine.

The movable member of the casing comprises two halves 64 and 65, each provided

with flanges 66 whereby the two members may be bolted together. The movable member is provided with an annular flange 68 which fits an annular rib 69, which encircles the stationary member. Within the movable member are three cam surfaces 70, 71 and 72 which are adapted to operate to trip the valves 25 and 35.

A rack 75 is formed on the outer periphery of the movable casing and is adapted to co-act with a pinion 76, which is rotatably mounted about a stud 77 supported in the valve casing 78. A lever 79 is also pivoted about the stud 77 and is provided with a pivoted handle 80, which is spring-pressed and provided with a tooth 81 adapted to enter between the teeth on the pinion 76. By manipulating the lever 79 and the handle 80, the pinion 76 may be rotated to cause a relative rotation between the stationary casing and the movable casing of the engine.

The stationary casing is provided with three valve chambers 78, 82 and 83. Each valve chamber is provided with a plunger slidably mounted therein. In the valve chamber 78 is a plunger 85 mounted upon a stem 86 adapted to slide within a boss 87 formed on the outside of the casing 78. A spring 89 surrounds the stem 86 and acts to normally press the plunger 85 against the periphery of the rotary member 10. The plunger 85 is provided with a port 87 in one side thereof, which is open at one end and closed at the other. The valve chambers 82 and 83 are provided with plungers 82^a and 83^a.

The movable member of the casing of the engine is provided with valve chambers 90, 91 and 92 bolted thereto. The valve chambers are provided with plungers 90^a, 91^a and 92^a similar to the plunger 85 described above, and are also provided with ducts 90^b, 91^b and 92^b.

The stationary and movable casings are provided with cored chambers 95 and 96, for the reception of cooling water. A spark plug 98 is mounted to coöperate with each plunger, and is connected by means of suitable electrical connections to the contact points 100 and 101 mounted upon the casing of the engine and suitably insulated therefrom.

Timers 102 and 103 are mounted upon the shaft 1 and adapted to co-act with the contact points 100 and 101 respectively. Said contact points may be connected to any suitable battery, and by means of a switch either set may be thrown into circuit, as will be readily understood.

The stationary casing is provided with two exhaust chambers 105 and 106, and provided with an exhaust valve 107 and 108 respectively. The movable casing is provided with exhaust chambers 110 and 111, having exhaust valves 112 and 113 communicating therewith. The outer end of each casing is provided with air holes 114.

In Figs. 6 and 7 is shown a modification of the plunger which travels in the channels of the rotary member. Said plunger comprises a body 115 having a stem 116 passing through the upper member of the valve casing and having two lateral ports 118 and 120. It will be understood that the lateral ports 118 and 120 may be substituted for the port 87^a, shown in the plunger 85.

In order to maintain any of the plungers in inactive position and thus reduce the number of cycles of operation during each revolution of the engine, an L-shaped slot 121 is formed in the side of the plunger body and adapted to receive a lever 122, which is mounted upon a shaft 123, having an operating handle 124 detachably secured thereto.

If it be desired to raise the plunger body to an inactive position, the handle 124 is moved so that the outer end of the lever 122 is raised and thereby raises the plunger body. Said lever is raised until it assumes a vertical position, above that shown in Fig. 6. The handle 124 may be removed when the plunger is in action. The lever 122 travels within the slot 121 when the plunger moves up and down.

It will be understood that the channels in the rotary member extend around a portion of the periphery, and the number may be varied to suit the requirements of the particular engine. One channel will suffice, or more than one may be provided at each side of the rotary member. The plungers used in the channels are made interchangeable, and the description of one will suffice for all.

The operation of the engine is as follows: The engine may be considered as rotating in the direction indicated by the arrow in Fig. 2. Gas is being supplied by the pipes 47 and 48, the pipes 45 and 46 being shut off and the exhaust valves 107 and 108 closed. The gas from the pipe 47 has entered the channel 12 in advance of the shoulder 12^a, and behind the plunger 82^a becomes compressed and passes through the ports 25 and 26 into the channel 13 between the shoulder 13^a and the plunger 92^a, and explodes in the chamber thus formed in the channel 13. The plunger 83^a is just beginning to move inwardly and the gas fed from the pipe 48 is being compressed between said plunger and the shoulder 12^a formed at the end of the channel 12. The gas from the previous explosion has been exhausted through the duct 91^b in the plunger 91^a and exhaust port 41 into the exhaust chamber 111 and out of the exhaust valve 113 into the atmosphere. The gas from the pipe 48 is being compressed in the channel 11 between the shoulder 11^a and the plunger 85, and when the valve 35 is pushed inwardly by the cam 72, the ports 36 and 37 will be brought into registry and the com-

pressed gas forced through said ports into the explosion chamber formed between the shoulder 14ª and the plunger 90ª, which will by that time have passed down the inclined ways in the channel 14. There are two explosions for each plunger during each revolution, or six explosions per revolution of the engine in the present embodiment of the invention. By rotating the pinion 76, the movable casing may be given a partial rotation with respect to the stationary casing, and the relative positions of the plungers thereby varied, thus increasing or decreasing the size of the chambers in which the explosions and compressions take place. By means of the lever 79 the movable casing may be rotated in one direction to draw in the charge of gas, and then rotated in the opposite direction to compress and explode the gas at starting. By these means the engine may be reversed by rotating the movable casing in the direction in which the engine is rotating, throwing the switch from those spark plugs entering the chambers which have been acting as explosion chambers, to the other series of plugs opening the other fuel supply and exhaust valves, and closing the ones previously in use.

Having thus described our invention, we claim as new and desire to secure by Letters Patent:

1. In an internal combustion rotary engine, the combination of a casing comprising a stationary and a movable portion, a rotary member within said casing and having channels formed therein, means mounted to slide in and coöperating with said channels to form chambers, means for supplying an explosive mixture to said chambers, means for compressing said mixture, means for exploding said mixture, and means for exhausting the products of combustion from said engine.

2. An internal combustion rotary engine, having a casing comprising a stationary and a movable portion, a rotary member within said casing and having peripheral channels, plungers coöperating with said channels, and means for rotating the members of said casing relatively to one another.

3. An internal combustion rotary engine, having a casing comprising a stationary and a movable portion, a rotary member within said casing having peripheral channels, said channels increasing in depth and provided with guides at their deepest portion, plungers coöperating with said channels and guides, and means for rotating one member of said casing relatively to the other member.

4. In an internal combustion rotary engine, the combination of a casing comprising a stationary and a movable portion, means within said casing adapted to act as explosion and compression chambers, and means for rotating said casing members relatively to one another to reverse the direction of rotation of the engine.

5. In an internal combustion rotary engine, the combination of a casing, a rotary member within said casing having channels, plungers coöperating with said channels, and means for maintaining some of said plungers in inactive position.

6. In an internal combustion rotary engine, the combination of a casing, a rotary member provided with channels, spring-pressed plungers moving radially within said channels, and means for holding some of said plungers in inactive position.

7. In an internal combustion rotary engine, the combination of a casing, a rotary member within said casing provided with a plurality of peripheral channels, plungers mounted to coöperate with the channels in said rotary member, means for affording communication laterally between said channels, means for supplying gas to the engine, means for exploding the gas, and means for exhausting the products of combustion.

8. In an internal combustion rotary engine, the combination of a casing, a rotary member within said casing provided with a plurality of peripheral channels the depth of which increases in opposite directions, and means for affording communication between opposing portions of said channels.

9. In an internal combustion rotary engine, the combination of a casing, a rotary member within said casing provided with two series of channels, means for affording communication between said channels, comprising a valve located between the opposing portions of each pair of channels, and a cam on the inside of said casing for controlling the operation of said valve.

10. In an internal combustion rotary engine, the combination of a casing comprising a stationary and a movable portion, a rotary member within said casing, a plurality of channels on said rotary member, means for affording communication between said channels, and means for rotating said casing members relatively to one another to reverse the direction of rotation of the engine.

11. In an internal combustion rotary engine, the combination of a casing, comprising a stationary and a movable portion, a rotary member within said casing, a plurality of channels on said rotary member, plungers coöperating with said channels to form compression and explosion chambers, means for affording communication between said chambers, and means for rotating said casing members relatively to one another, to reverse the direction of rotation of the engine.

12. In an internal combustion rotary engine, the combination of a casing, a rotary member within said casing having channels, plungers mounted to slide within said channels and adapted to co-act therewith to form

chambers, irrespective of the direction of rotation of said member, a plurality of means for supplying fuel, a plurality of means for exhausting the products of combustion, and means whereby the direction of rotation of said rotary member may be reversed.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

FRED SMITH WRIGHT.
ARMOND FREDERICK WRIGHT.

Witnesses:
A. P. THOMPSON,
GEO. FECHTER.