No. 861,344. PATENTED JULY 30, 1907.

W. L. A. WRIGHT.

ROTARY ENGINE.

APPLICATION FILED OCT. 24, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

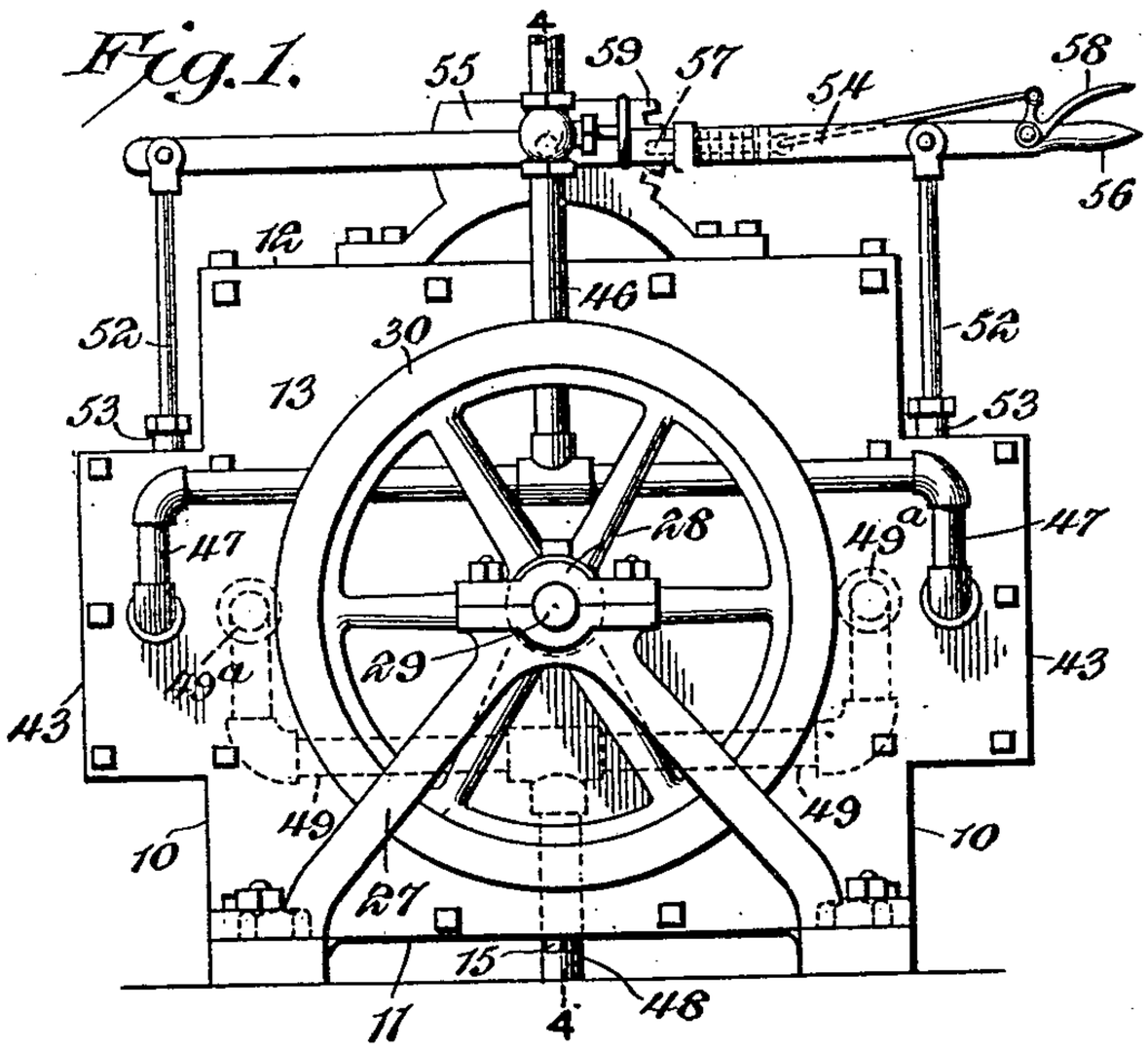


Fig. 6.

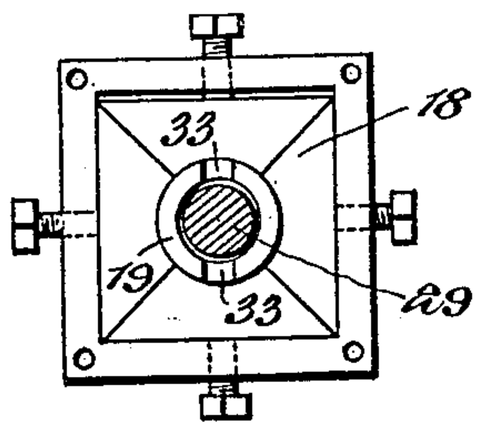


Fig. 7.

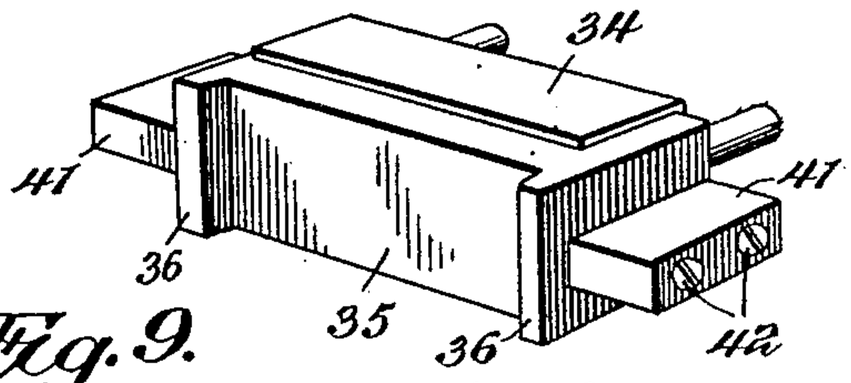


Fig. 2.

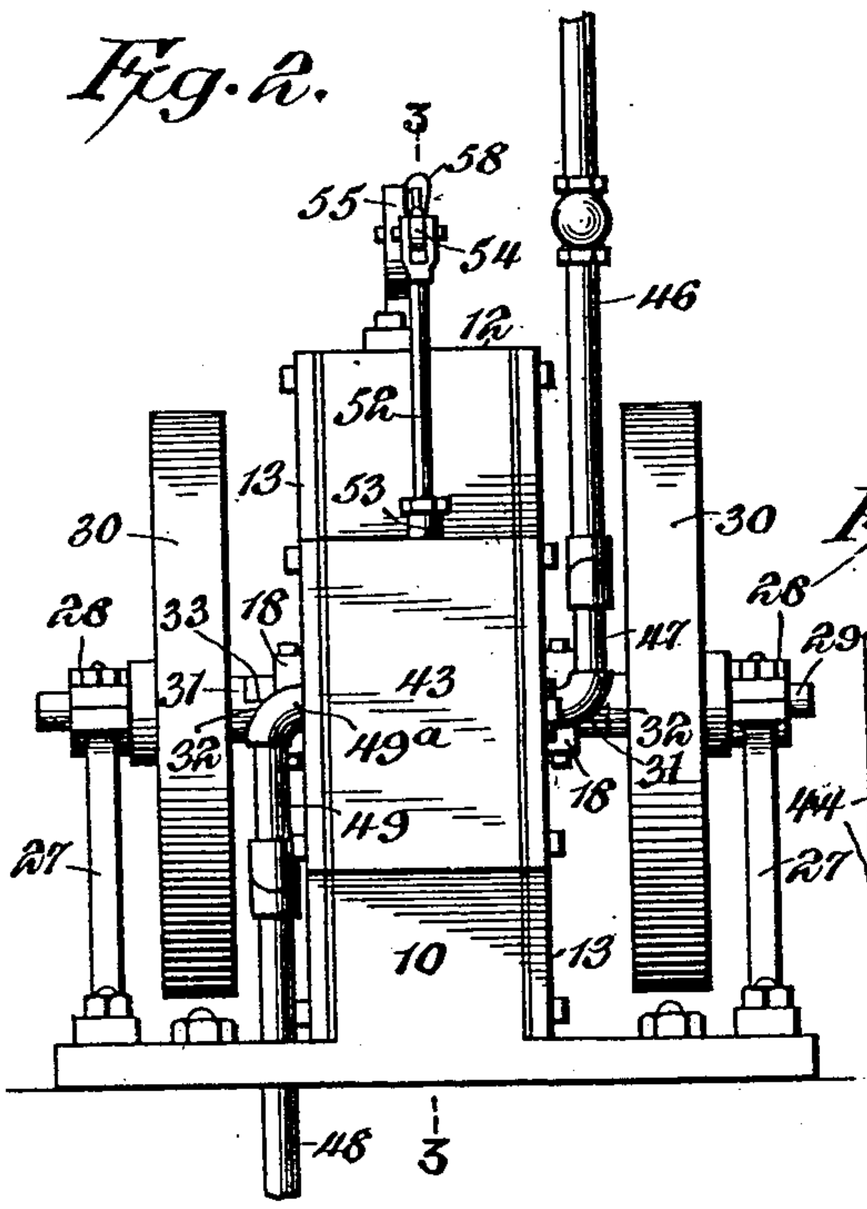


Fig. 9.

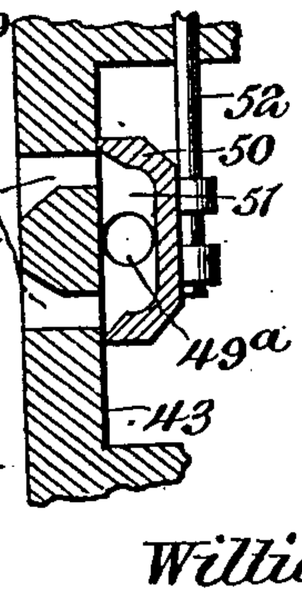
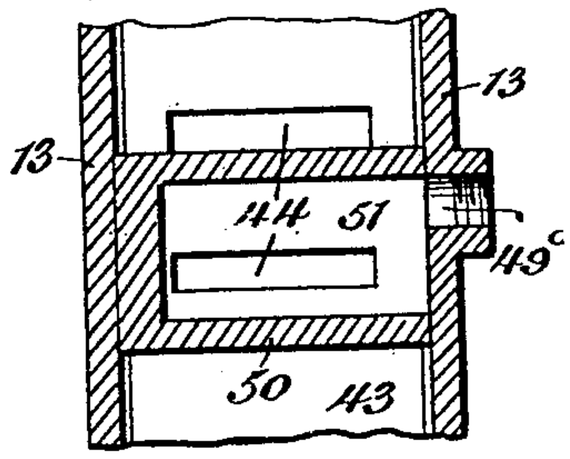


Fig. 8.



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2 SHEETS—SHEET 2.

Fig. 3.

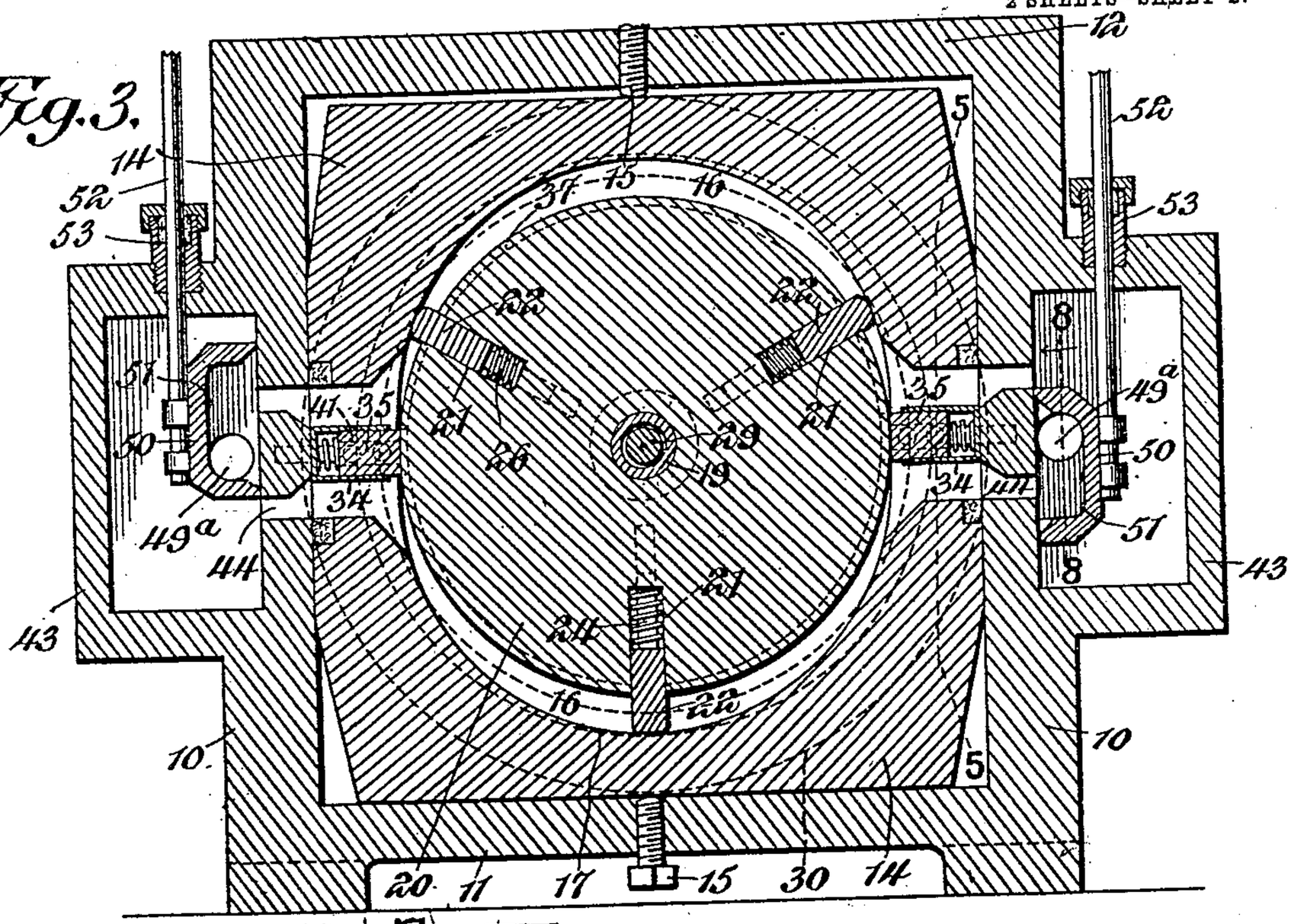


Fig. 4.

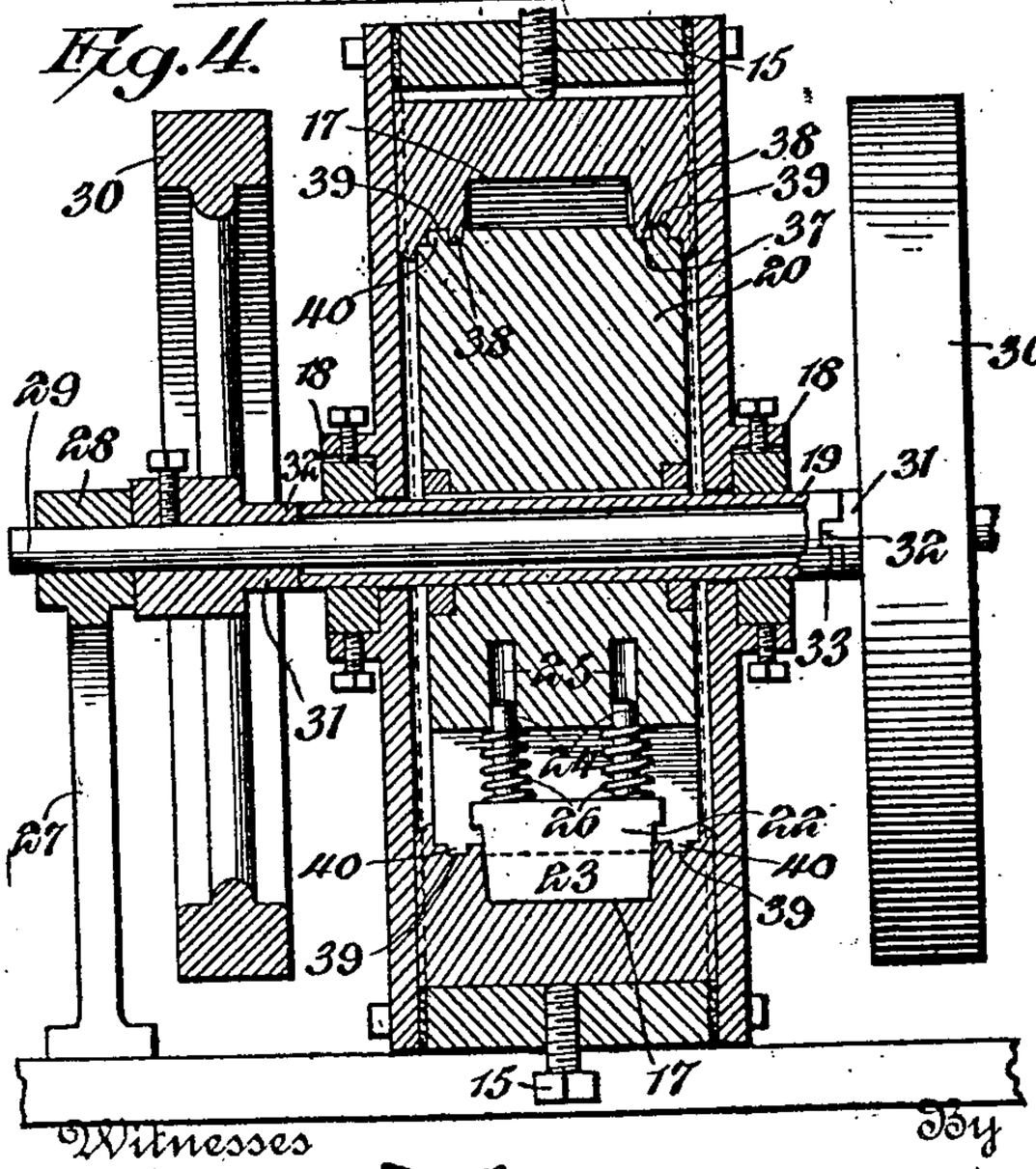
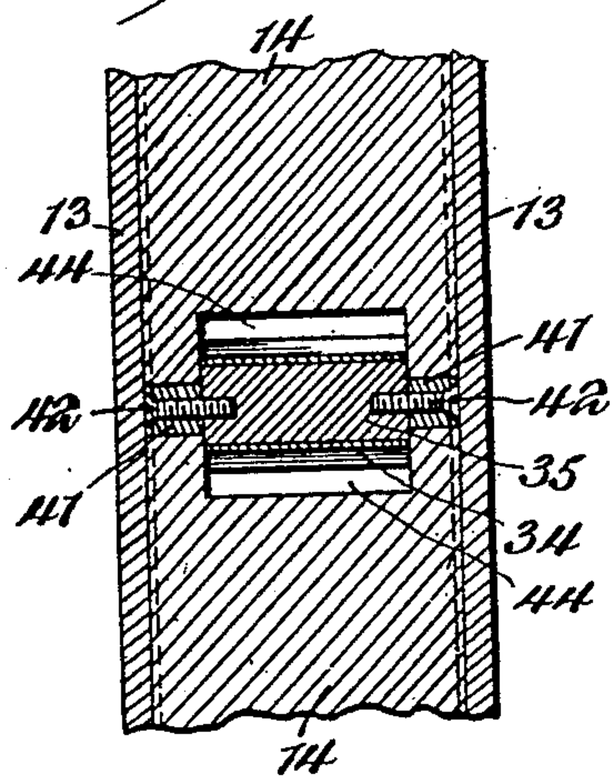


Fig. 5.



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UNITED STATES PATENT OFFICE.

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ROTARY ENGINE.

No. 861,344. Specification of Letters Patent. Patented July 30, 1907.

Application filed October 24, 1906. Serial No. 340,391.

To all whom it may concern:

Be it known that I, WILLIAM LEE ANDREW WRIGHT, a citizen of the United States, residing at Diana, in the county of Upshur and State of Texas, have invented a new and useful Rotary Engine, of which the following is a specification.

One of the important objects of this invention is to provide a novel and simple structure that will secure a high degree of power from the steam or motive fluid, will automatically take up wear, and is so constructed that the parts can be readily adjusted to prevent the escape of steam and the consequent loss of power.

A further object is to provide an engine which can be readily reversed, and when the motive fluid is cut off, will produce no vacuum in the cylinder or piston chamber to resist the movement of the piston under its own momentum.

A still further object is to provide, in an engine of this type, driving mechanism so constructed that the piston will be relieved of the "spring" of the driving shaft, and consequently of the wear and strain upon the parts, due thereto.

The preferred form of construction is illustrated in the accompanying drawings, wherein:—

Figure 1 is a side elevation of the engine. Fig. 2 is an end view of the same. Fig. 3 is a sectional view on the line 3—3 of Fig. 2. Fig. 4 is a sectional view on the line 4—4 of Fig. 1. Fig. 5 is a detail sectional view on the line 5—5 of Fig. 3. Fig. 6 is a detail view on an enlarged scale of one of the boxings for the piston shaft. Fig. 7 is a detail perspective view of one of the packing devices. Fig. 8 is a sectional view on the line 8—8 of Fig. 3. Fig. 9 is a detail sectional view through one of the steam chests, illustrating the relation of the controlling valve when the motive fluid is entirely cut off from the piston chamber.

Similar reference numerals designate corresponding parts in all the figures of the drawings.

In the embodiment illustrated, an outer casing is employed, comprising upright end walls 10, a bottom 11, a top 12, and detachable side walls 13. Within this casing is located a cylinder member consisting of sections 14 that are urged toward each other by set screws 15 threaded through the bottom and top 11 and 12 of the casing and having their inner ends bearing against the central portions of said sections. The cylinder member is provided with a piston chamber 16, that is substantially elliptical, as shown in Fig. 3, its minor axis being disposed in the plane of the joint between the sections 14. The elliptical shape of the chamber is due to the formation of an outer channel 17 of less width than the cylinder member, which channel gradually increases in depth from the joint between the sections 14 to the central portions of said sections, the channel being outwardly tapered in cross section, as illustrated in Fig. 4.

Secured to the side walls 13 of the outer casing are suitable boxings 18, in which is journaled a tubular shaft 19 that extends centrally across the piston chamber, and carries a circular rotary piston body 20 that is arranged within the chamber. This body is provided with radially disposed slots 21 in which wings or blades 22 are slidably mounted. The outer ends of the wings or blades are tapered as shown at 23 in Fig. 4, said outer ends corresponding to the shape of and operating in the channel 16. The inner ends of the blades have inwardly projecting pins 24 that operate in sockets 25, formed at the inner ends of the slots 21, and surrounding these pins are springs 26 that urge the blades outwardly. Standards 27 are located on opposite sides of the casing, and have boxings 28 at their upper ends, in which is journaled a driving shaft 29, the said driving shaft loosely passing through the tubular shaft 19, and thus being supported independently thereof. Drive wheels 30 have hubs 31, fixed to the shaft 29 between the boxings 28 and boxings 18. The hubs of these wheels have loose clutch connections with the ends of the tubular shaft. Thus in the present embodiment, said hubs have inwardly projecting lugs 32, which engage in sockets 33 formed in the ends of the shaft 19.

Interposed between the sections 14 of the cylinder member are packing devices. Each of these packing devices consists of a substantially U-shaped metallic casing 34, in which is slidably mounted a packing block 35. The casing 34 has its rear end bearing against the adjacent portion of the end wall 10 of the outer casing, while the inner end of the packing block bears against the periphery of the piston body, being preferably provided with projections 36 that engage in grooves 37 formed in said body. The casing sections 14 also have ribs 38 that engage in said grooves, as shown in Fig. 4, and furthermore have grooves 39 to receive the ribs 40 formed upon the periphery of the piston body. Plates 41, detachably secured to the opposite ends of the block 35 by screws, 42, are borne against by the sections 14, as shown in Fig. 5.

Steam chests 43 are located on the ends of the outer casing, and have inlet ports 44 that extend through the ends of the sections 14, and communicate with the piston chamber on opposite sides of the packing devices. The steam chests are supplied with motive fluid from a suitable pipe 46, having branches 47 that communicate with the chests on one side of the engine, and an exhaust conduit 48 has branches 49 connected to the steam chests on the opposite side of the engine. The ends of the branches 49 communicate with the chests through ports 49ª between the ports 44, as shown in

Fig. 3. Controlling slide valves 50 are located in the chests, and are movable to positions so as to uncover either of the inlet ports 44, or to cover both simultaneously. These valves furthermore have interior chambers 51 provided with open ends that are at all times in communication with the exhaust ports 49ª. They are also movable into communication with either of the inlet ports 46 or both simultaneously, as shown in Figs. 3 and 9. The valves are connected to links 52 that pass through suitable stuffing boxes 53 in the upper ends of the chests, and have their upper ends suitably connected to an actuating lever 54, that is fulcrumed between its ends on a bracket 55 fastened to the top of the outer casing. One end of the lever has a handle 56, and a dog 57 mounted on said lever, has an actuating device 58 associated with the handle. The dog cooperates with a suitable rack 59 formed upon the bracket 55.

The operation of the engine may be briefly described as follows. If motive fluid is supplied to the steam chests, and the lever is moved in one direction, the upper inlet port 44 of one chest will be uncovered, while the lower port of the opposite chest will be exposed. The motive fluid will thus have access to the piston chamber on opposite sides of the packing devices, and will move in opposite directions, thereby acting against the blades 23 and causing the rotation of the piston, the exhaust taking place through covered ports 44 and exhaust ports 49ª. To reverse the engine, it is only necessary to swing the lever in the opposite direction, thereby covering the opposite ports and connecting them to the exhaust, while opening the ports which were before in communication with said exhaust. To stop the engine, the lever is moved to and locked in an intermediate position, whereupon both sets of inlet ports 44 will be covered, but when so arranged, it will be noted by reference to Fig. 9 that all the ports will be in communication with the exhaust, and consequently there will be no vacuum in the piston chamber, caused by the revolving blades, and no resistance offered thereby to the rotation of the piston.

In operating the structure, the wear will, of course, be between the blades 23 and the walls of the channel 17 in which they operate, but inasmuch as the channel and the blades are tapered, the wear will be automatically taken up, and a proper fit at all times secured. In case it is desired to move the cylinder sections closer together, it is only necessary to turn the set screws 15, but if the wings or plates 41 of the packing devices will not permit the desired movement, said wings or plates are removed and planed down the desired distance. The particular connection of the driving means to the piston is important. It will be observed that the driving shaft is supported independently of the piston, and yet is directly connected thereto. As a result, the "spring" of the driving shaft due to the resistance of the parts being driven, is not transmitted to the piston, which has its own mounting; said piston is therefore not liable to be thrown out of alinement, and is relieved of the strains incident to said "spring", thereby obviating excessive wear upon the parts.

From the foregoing, it is thought that the construction, operation, and many advantages of the herein described invention will be apparent to those skilled in the art, without further description, and it will be understood that various changes in the size, shape, proportion, and minor details of construction, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

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

1. In a rotary engine, the combination with an outer casing, of a cylinder member located therein and comprising sections, said sections having ports therethrough at the joint between them, a device located between the sections and separating the ports, and a rotary piston located in the cylinder member.

2. In a rotary engine, the combination with a cylinder member comprising sections, said sections having ports therethrough at the joint between them, a rotary piston located in the cylinder member, and packing elements mounted between the sections and coöperating with the piston, said elements separating the said ports.

3. In a rotary engine, the combination with a cylinder member having a piston chamber and comprising sections, of means for urging the sections toward each other, a rotary piston operating in the chamber, and packing elements mounted between the sections and coöperating with the piston.

4. In a rotary engine, the combination with a cylinder member having a substantially elliptical piston chamber and comprising sections, said chamber being disposed partially in each section and having its minor axis substantially in the plane of the joint between the sections, means for urging the sections towards each other, a rotary piston packing in the chamber, and packing elements mounted between the sections and coöperating with the piston.

5. In a rotary engine, the combination with a cylinder member comprising sections and having a piston chamber, of a rotary piston operating in the chamber, and packing means interposed between the sections of the cylinder member and comprising a casing, a packing block located in the casing, and a spring interposed between the end of the block and the casing, said spring being housed within said casing.

6. In a rotary engine, the combination with an outer casing, of a cylinder member located within the casing and having a substantially elliptical piston chamber therein, said cylinder member comprising sections and having the chamber located partially in each section, set screws threaded through the opposite sides of the casing and having their inner ends bearing against the sections for urging them toward each other, a rotary piston operating in the chamber and having blades coöperating with the outer walls of said chamber, and packing devices interposed between the cylinder member sections and arranged on opposite sides of the piston, said packing members each comprising a substantially U-shaped casing, a packing block located in the casing and coöperating with the piston, and springs interposed between the block and rear end of the casing.

7. In a rotary engine, the combination with an outer casing, of a cylinder member comprising sections arranged within the casing, said cylinder member having a piston chamber, means engaged with the casing for moving the sections toward each other, a rotary piston operating in the piston chamber, packing devices interposed between the sections of the cylinder member, steam chests arranged on opposite sides of the casing and having ports communicating with the piston chamber on opposite sides of the packing devices, and means for controlling the passage of motive fluid through the ports.

8. In a rotary engine, the combination with a cylinder member comprising sections and having a piston chamber that is provided with an outwardly tapered outer channel, of a rotary piston body located in the chamber, an outwardly movable outwardly tapered blade carried by the piston body and operating in the channel, and packing elements located between the sections of the cylinder member and coöperating with the piston.

9. In a rotary engine, the combination with a cylinder member comprising sections and having a substantially

elliptical piston chamber, the chamber having an outer channel that gradually increases in depth from the joint between the sections to the center of said sections, said channel being tapered in cross section, of packing devices interposed between the sections of the cylinder member, a rotary piston body operating in the piston chamber, and outwardly movable blades carried by the body and having their outer ends tapered and operating in the channel.

10. In a rotary engine, the combination with a cylinder member having a piston chamber, of a rotary piston operating therein, a steam chest having spaced inlet ports in one wall communicating with the chamber and also having an exhaust port in another wall, and a controlling slide valve located in the steam chest and movable to positions over either or both of the inlet ports, said valve having an interior chamber that is movable into communication with either of the supply ports and also having an open end that is at all times in communication with the exhaust.

11. In a rotary engine, the combination with a cylinder, of a rotary piston operating therein, a tubular shaft for the piston, and a driving shaft loosely passing through the tubular shaft and having a clutch connection therewith.

12. In a rotary engine, the combination with a cylinder member, of a rotary piston operating therein, a tubular shaft carrying the piston, a driving shaft loosely passing through the tubular shaft, and a drive wheel mounted on the driving shaft and having a clutch connection with the tubular shaft.

13. In a rotary engine, the combination with a cylinder member, of a rotary piston operating therein, a tubular shaft carrying the piston, journal boxes for the tubular shaft, a driving shaft loosely passing through the tubular shaft and having a connection therewith, and other journal boxes for the driving shaft.

14. In a rotary engine, the combination with a cylinder member having a piston chamber, of a tubular shaft passing through the piston chamber, a rotary piston mounted on the tubular shaft and operating in the piston chamber, a driving shaft loosely passing through the tubular shaft, said driving and tubular shafts having separate journal boxes, and driving wheels having hubs secured to the driving shaft, said hubs having interlocking engagements with the tubular shaft.

15. In a rotary engine, the combination with a cylinder member, of a rotary piston operating therein, a tubular shaft carrying the piston and projecting beyond the opposite sides of the cylinder member, boxings on the cylinder member for said tubular shaft, a driving shaft extending through the fubular shaft, boxings for the driving shaft, and wheels secured to the driving shaft between the boxings of said shaft and the boxings for the tubular shaft, said wheels having connections with the tubular shaft.

16. In a rotary engine, the combination with an outer casing, of a cylinder member arranged within the same and comprising sections, said cylinder member having a piston chamber, means for urging the sections towards each other, packing devices interposed between the cylinder member sections, steam chests carried by the outer casing and having ports communicating with the piston chamber on opposite sides of the packing devices, valves for controlling the ports, a tubular shaft extending across the piston chamber and journaled upon the outer casing, a piston carried by the shaft and having blades provided with tapered outer ends, said piston chamber having a channel that is tapered in cross section and receives said outer ends, standards located on opposite sides of the outer casing, a shaft journaled in the standards and extending through the tubular shaft, and connections between said shafts.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

WILLIAM LEE ANDREW WRIGHT.

Witnesses:
G. W. KNIGHT,
J. A. STARR.