V. M. FULCHER.

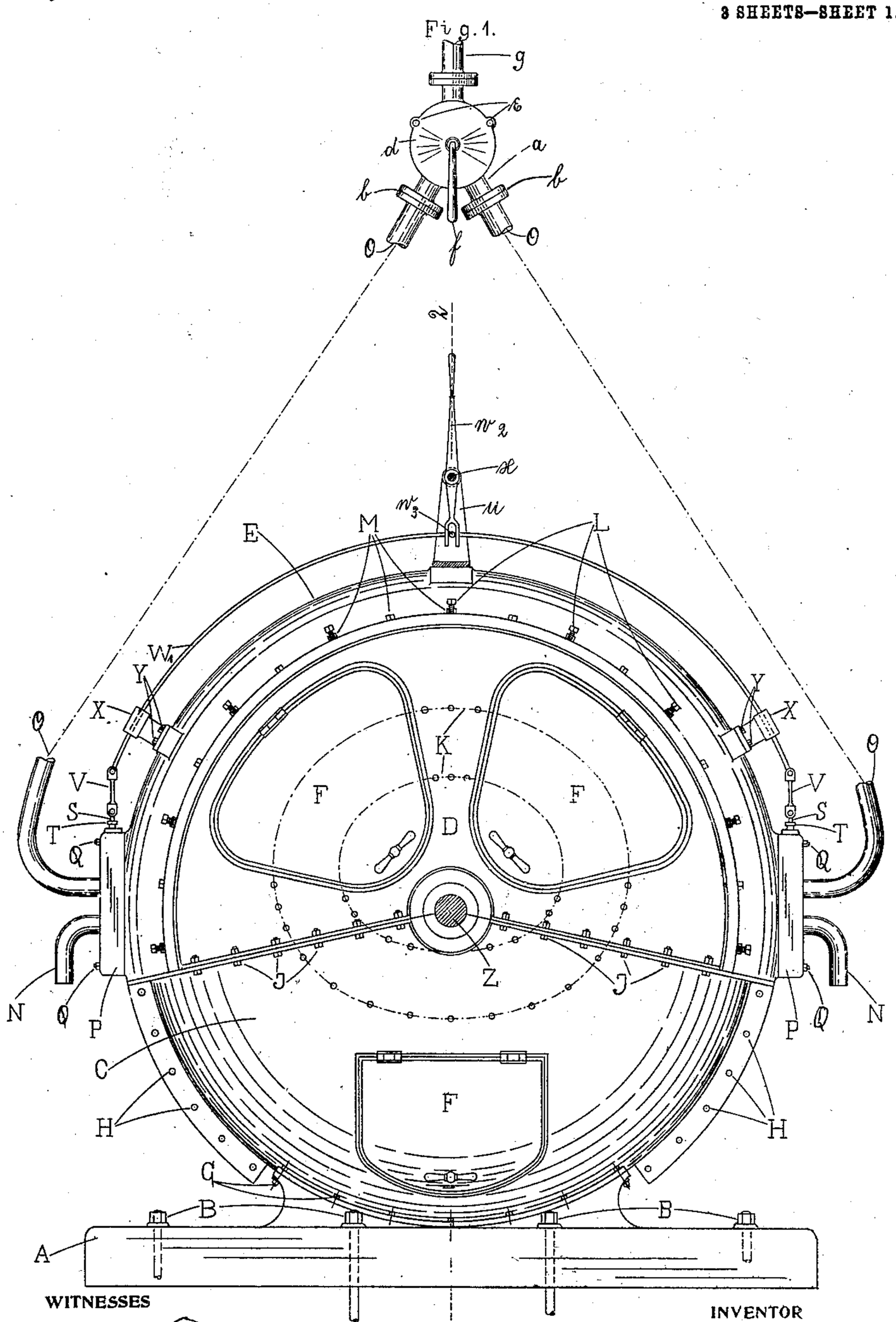
ROTARY ENGINE.

APPLICATION FILED SEPT. 10, 1907. RENEWED MAY 5, 1909.

924,899. **Patented June 15, 1909.**

3 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

J. H. Masters

R. Haselbauer.

INVENTOR

V. M. FULCHER.

BY J. Clyde Hizar.

ATTORNEY

V. M. FULCHER.

ROTARY ENGINE.

APPLICATION FILED SEPT. 10, 1907. RENEWED MAY 5, 1909.

924,899. **Patented June 15, 1909.**

3 SHEETS—SHEET 2.

Fig. 7.

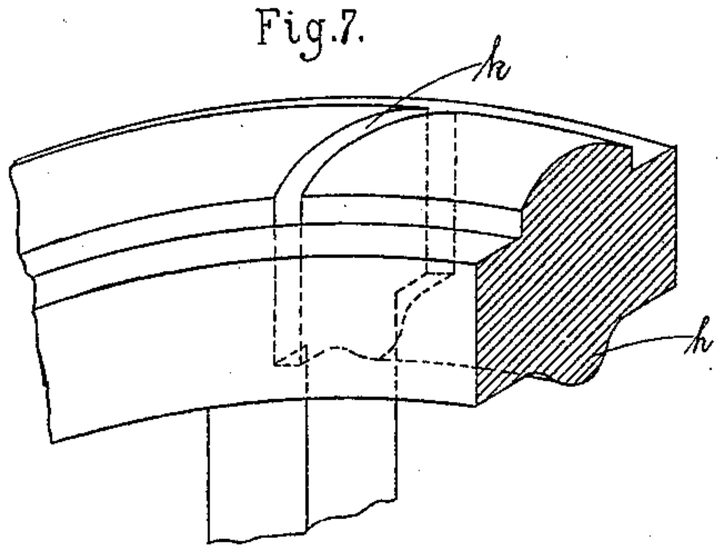
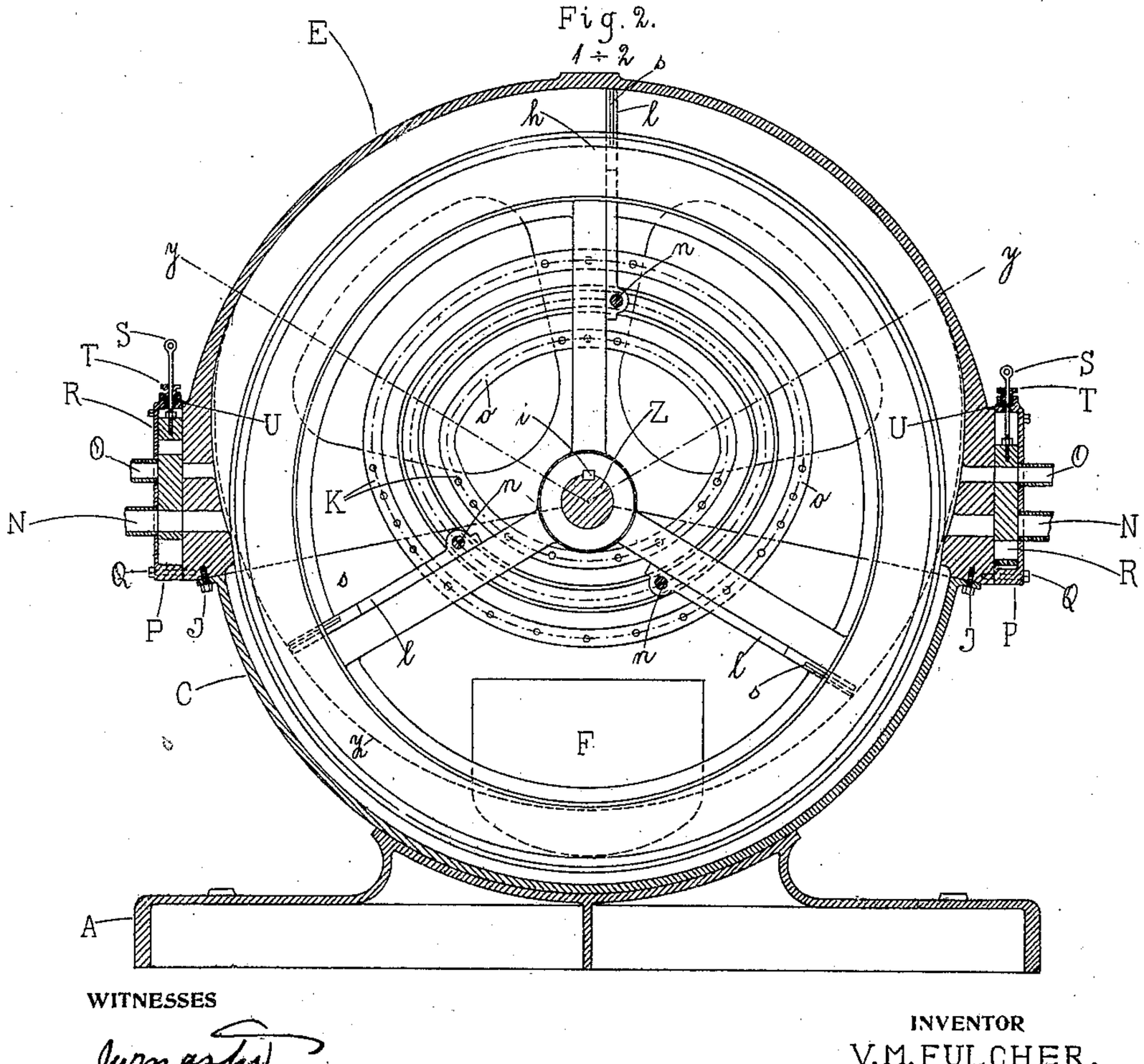


Fig. 2.



WITNESSES

J. Mastin

R. Haselhauer.

INVENTOR

V. M. FULCHER.

BY J. Clyde Hizar

ATTORNEY

V. M. FULCHER.

ROTARY ENGINE.

APPLICATION FILED SEPT. 10, 1907. RENEWED MAY 5, 1909.

924,899.

Patented June 15, 1909.

3 SHEETS—SHEET 3.

Fig. 6.

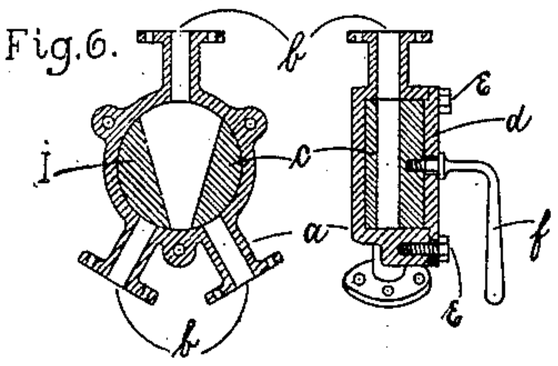


Fig. 5.

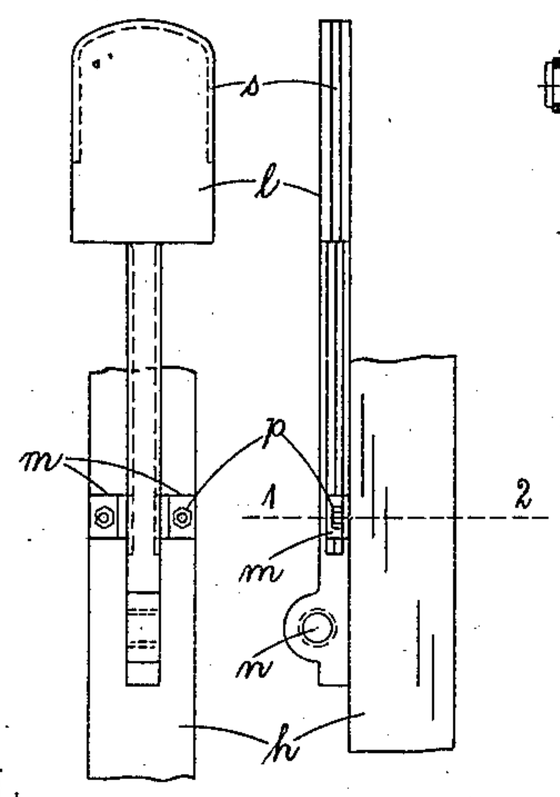


Fig. 8.

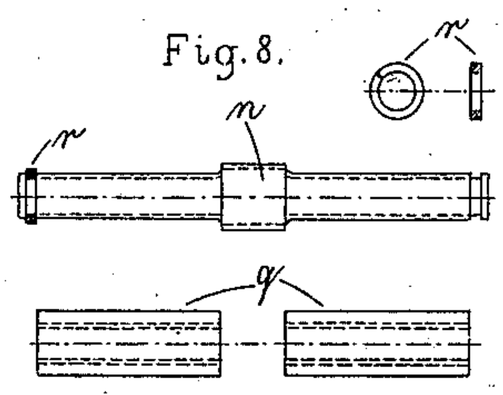
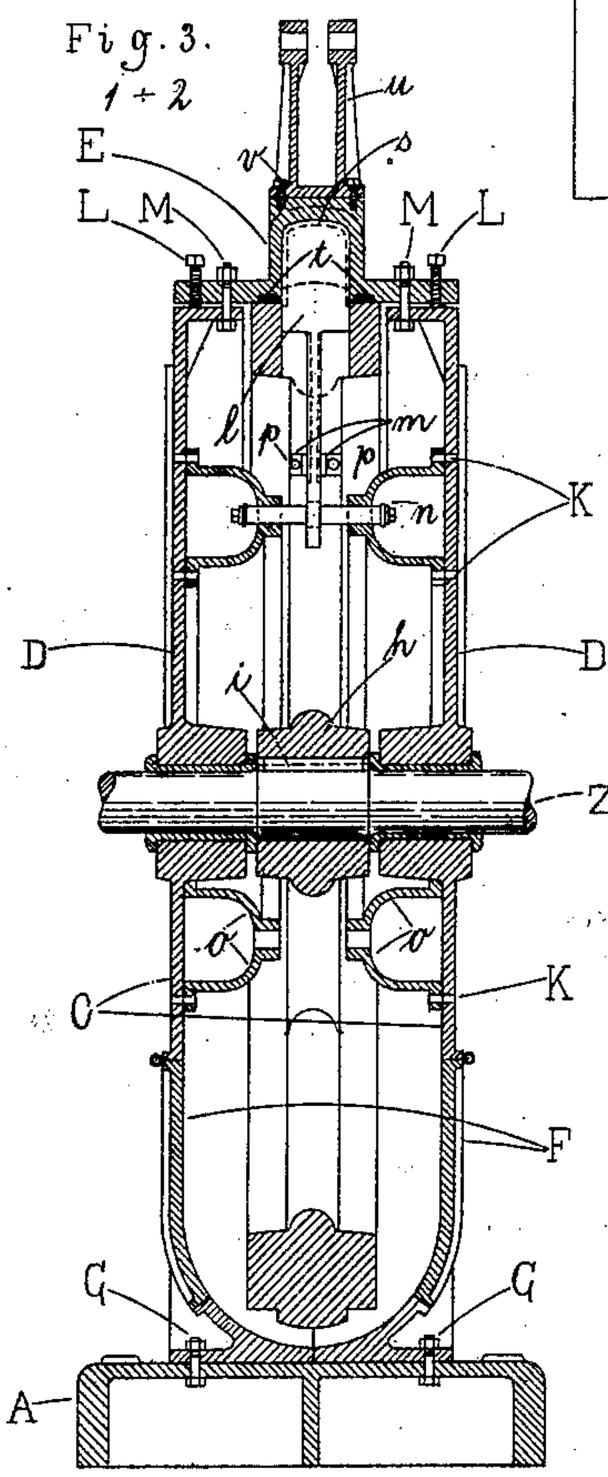


Fig. 3.

1 ÷ 2



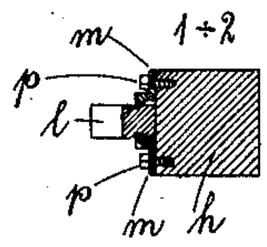
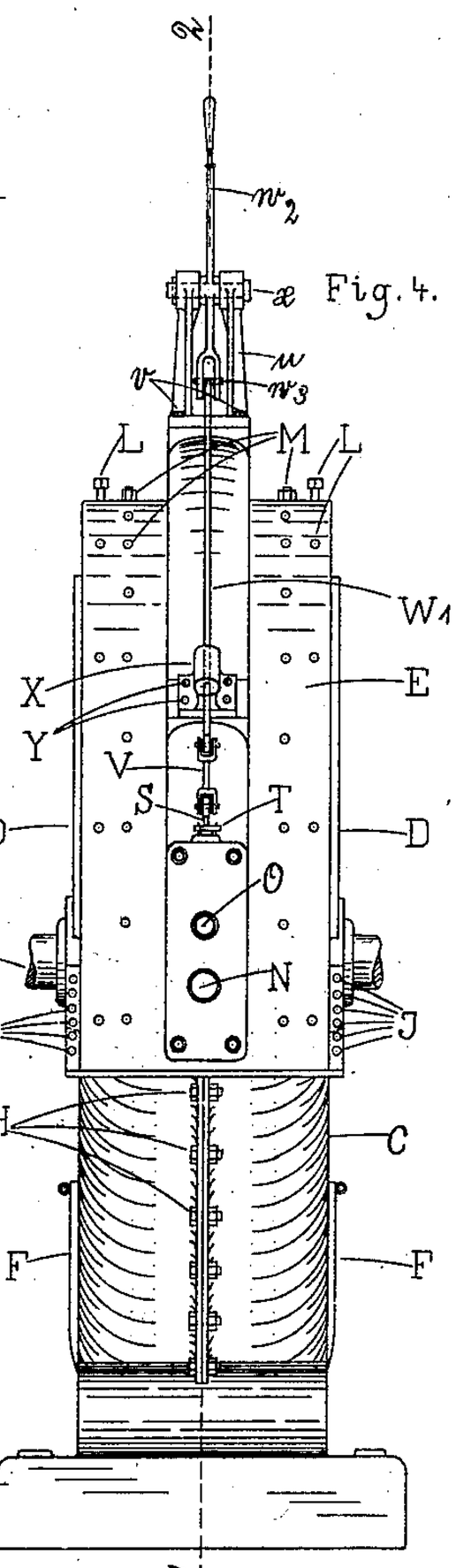


Fig. 4.



WITNESSES

J. W. Mastin

R. Haselbauer.

INVENTOR

V. M. FULCHER.

BY J. Clyde Hizar.

ATTORNEY

UNITED STATES PATENT OFFICE.

VALENTINE MOTT FULCHER, OF SAN DIEGO, CALIFORNIA.

ROTARY ENGINE.

No. 924,899. Specification of Letters Patent. Patented June 15, 1909.

Application filed September 10, 1907, Serial No. 392,136. Renewed May 5, 1909. Serial No. 494,135.

To all whom it may concern:

Be it known that I, VALENTINE MOTT FULCHER, a citizen of the United States of America, residing in San Diego, in the county of San Diego and State of California, have invented a new and useful Rotary Engine, of which the following is a specification.

My invention relates to improvements in rotary engines in which a rotating wheel, attached to a shaft having its bearings in a casing which serves to support it and inside of which the wheel revolves, imparts to the shaft a rotary motion, enabling the shaft by proper attachments to impart a suitable motion to connecting machinery and perform its functions in an economical manner. I attain this object by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of the entire machine, Fig. 2 is a front sectional elevation of the machine cut in two, on lines 1—2 shown in Figs. 2 and 4, and shows the inner workings of the machine. Fig. 3 is a side elevation of the machine, cut in two along lines 1 and 2. Fig. 4 is a side elevation of entire machine with steam-pipes detached. Fig. 5 is different views of part designated as 1 in other views. Fig. 6 is sectional elevations of valve *d* in Fig. 1. Fig. 7 is sectional view showing shape of rim of wheel *h* and how slot is made in same. Fig. 8 shows cross arm *n*, which is fitted in lower end of eccentric rod *l*.

Similar characters refer to similar parts throughout the different views.

A is the foundation plate and is bolted to foundation by bolts B.

C and D are the lower and upper sections respectively of the casing which covers nearly all the working parts of the machine, and are attached one to the other rigidly by bolts J and H. Section C is in turn bolted to the foundation A by bolts G. Section D is provided around its outer circumference with a flange or lip which projects at right angle inwardly as shown in Fig. 3, perforated with holes to receive bolts M which bind it to chamber E.

F F F are doors in casing to give access to working parts.

In the center and at junction of the sections C and D of the casing, are bearings in which the shaft Z works. Bolted to the casing C and D on both the back and front of inner side, are the elliptical eccentric guides K, placed immediately opposite to and each like parts parallel to one another. This eccentric guide is formed as shown in Fig. 3, the inner lips of the two pieces on each side are placed parallel to each other, forming an annular opening or slot of elliptical shape as shown by the middle dotted line of K in Fig. 2, and placed off the center of the machine so as to give an eccentric motion to the rod *l* as the cross arms *n* in lower end of *l* traverse the path of the annular ring as the wheel *h* rotates, carrying the arm *l* with it.

h is a rotating wheel, keyed rigidly to shaft *z* and provided with three arms or spokes placed equal distances one from the other. The rim of wheel *h* is shaped essentially as shown in Fig. 7, and provided with three slots *k*, through a portion of its rim, at equal distance from each other, one of which is shown in Fig. 7, for the reception of a movable blade *l*, shown in Figs. 3 and 5. The slot *k* is intended to have a suitable packing around its lower rim to prevent steam from escaping from chamber E while it is in contact with chamber E. This packing is not shown in drawings.

l is one of three eccentric rods having at its lower end a cross arm, fitted through it, provided with thimbles *q*, that may fit on smoothly or be threaded to screw on each end of cross arm *n;* there is an annular groove cut around end of *n* to receive a split steel ring *r*, which serves to prevent thimbles *q* from working off, these thimbles are designed to be replaced by other similar thimbles when they wear sufficiently to become useless. The upper or outer extremity of the rod *l* is provided with a blade designed to at all times be partly housed in the slot *k* in rim of wheel *h*, fitting the slot steam tight, but admitting of a piston action which is imparted to it by the cross arm on lower end of rod *l*, as it travels along the elliptical annular ring of eccentric guide K. The rod *l* has a V shaped groove on each of its sides in which an angular pointed guide *m*, which is bolted to the arm of the wheel *h* by bolt *p*, has a bearing as shown in Fig. 5. This guide serves to keep the rod in parallel position to the face of the arm and while it allows the rod *l* a lateral motion, it prevents it from having any side motion. The blade *l* is intended to have a ring packing applied to its edges as indicated by dotted line *s*, Fig. 5, so

that it will effectually close chamber E where so intended and prevent escape of steam ahead of it.

E is steam chamber, shaped essentially as shown in drawings and having a lip extending out on each side, at right angle, which is provided with holes which coincide with holes in lip of casing C and D, previously described, in which bolts *m* are fastened and which hold it in a rigid position, at intervals along the lip threaded holes are provided into which set screws L are inserted for the purpose of regulating the pressure of chamber E upon the shoulders of rim of wheel *h* where it has a contact and also where the end walls of chamber E have a contact across the oval face of wheel *h*—where this contact occurs there is a packing chamber provided in the walls of chamber E, as shown by *t* in Fig. 3. (If a perpendicular line is drawn through the middle of chamber E, its two sides would be duplicates.) Near its lower extremities it is provided with two annular ports for the ingress and exhaust of steam. The upper port O is for inflow of steam, and the lower port N for the outflow or exhaust. These ports extend through the outer shell of chamber E to inner side of valves P, and are immediately opposite the ports in pipes O and N which extend through the outer casing R, of valves P. The chamber E is of uniform size between the points *y* and *y* and is graduated to a point below *y* and *y*. The space between *y* and *y* is the point of contact of inner surface of chamber E with outer edge of blade *l*. This contact is kept uniform between these points *y* and *y*, because the outer edge of the chamber space E is parallel to the annular groove of eccentric guide K, between the lines *y* and *y*. The contour of the chamber E at right angles to its length is shown in Fig. 3. It is rounded so that the ring packing can be applied to the edge of blade *l*. The valves P work in a casing which covers the valve except the bottom, where it rests on a smooth bed, prepared on outer side of wall to chamber E, the casing is bolted to wall of chamber E by bolts Q. The valves are perforated by holes that correspond in area to ports leading into chamber E, and so arranged that when steam port O is open, exhaust port N is closed, and vice versa.

s is valve stem, F is packing box to valve stem *s*.

Valves P are connected by the circular rod W^1 which is provided with a link V, attached to valve stem *s*. At the top center of rod W^1, it is provided with a cross pin W^3 which works in a forked connection on lower end of lever w^2, which is in turn supported by uprights *u*, having a pivot *x* with bearings in uprights *u*, which forms an axle which admits of shifting the extremities of w^2 off the perpendicular and at same time extending the rod W^1 either to right or left, thus reversing the position of the valves P.

X are pillows, perforated to receive W^1, and keep it from springing or buckling as it is shifted from side to side.

O are steam feed pipes and are connected to the 2 way valve, I as shown in upper part of Fig. 1.

Fig. 6 is a metal disk valve with a hole perforating it, as shown in drawing, so as to leave walls *c* on all sides, but entirely opened at top and bottom of disk, and shaped as shown in Fig. 6. It is fitted into a circular steam tight recess, having one port at top and two ports at bottom, the bottom ports being connected to pipes O and the top port to main feed pipe, the disk I is rigidly connected to the lever *f*, which extends through the outer casing *d*. The lever *f* is designed to shift the lower port in disk I to the desired position by turning the disk to right or left, bringing the port to either the right or left pipe O, or leaving it in position as in drawing when desiring to cut the steam from both pipes. The amount of flow may be regulated by amount of opening exposed at bottom. The orifice through which the steam flows is shaped as shown in drawing in order that when the outlet point is shifted to either side the steam entering at top will not be throttled.

Z is shaft to which wheel *h* is keyed.

i is key.

All circular parts between *y* and *y* are parallel to each other.

The method of operating is as follows—Say position of working parts are as shown in Fig. 2 and machine to work from right to left—the valves P are in proper position as shown in Fig. 2. The blade *l* has chamber closed near center. Valve I is shifted to the right, bringing its lower port in juxtaposition to pipe O. The steam flows through pipe O, the opening in valve P and on into chamber filling the chamber back of blade *l* and forcing the blade *l* to the left and as part of blade *l* is incased in rim of wheel *h*, and the lower end of *l* is working in slot *k* of eccentric guide and the bearings which fasten rod *l* to arm of wheel *h* prevent it from getting out of its alinement, the blade virtually becomes rigid and revolves wheel *h* with it, as the blade *l* reaches *y* on the left, the following blade whose outer path is indicated by dotted line has reached *y* on the right and closes the chamber at the instant that the preceding blade begins to recede from its outer contact allowing the steam to commence to escape over the top of blade and make its exit by exhaust port N on left. Owing to the curvation of the annular slot or ring of K the blade as it passes the point *y* on left its extremity travels the path indicated by dotted line, thus allowing it to be

drawn back flush with outer surface of wheel *h* to pass out of chamber E. As is indicated the blade continues to be drawn back by the action of slot in K in conjunction with cross arm *n* on inner end of *l*, until it reaches the lowest point of its circuit, after which it is gradually extended until just as it passes clear of the end, wall of chamber E, it begins to protrude beyond the outer circumference of wheel *h*, until it reaches *y* on right. The same motions occur when machine is reversed. As the working part of chamber E between *y* and *y* covers only one third of the outer circumference, it is manifest that there must be three eccentric rods *l* placed at equal distances from each other, and three slots *k* in rim of wheel *h* at equal distances from each other, and in line with blade on outer end of rod *l*, so in these specifications a description relative to one rod *l* applies to the other two rods *l*, and of one slot *k* applies equally to the other two slots *k*.

What I claim is:—

A rotary engine comprising a base, a pair of separated side plates and a peripheral closure plate having an eccentric channel formed therein, separated guide plates secured to the side plates to form eccentric guide channels, a wheel having its bearings in the side plates and having a peripheral rib adapted to enter the channel of the peripheral plate and having outstanding rim portions which lie adjacent said peripheral plate, packing members *t* between said rib members and the peripheral plate, said wheel comprising a hub and a plurality of spokes, blades adapted to fill and travel in the channel of the peripheral plate, said blades having inwardly extending portions, means for slidably engaging said inwardly extending portions with the wheel spokes, and transversely extending members mounted upon the lower ends of said inwardly extending portions and entering between said guide plates, substantially as shown and described.

VALENTINE MOTT FULCHER.

Witnesses:

JNO. MASHE,

JAMES MASON.