(No Model.) 2 Sheets—Sheet 1.

# B. M. WILKINSON.

## ROTARY ENGINE.

No. 518,436. Patented Apr. 17, 1894.

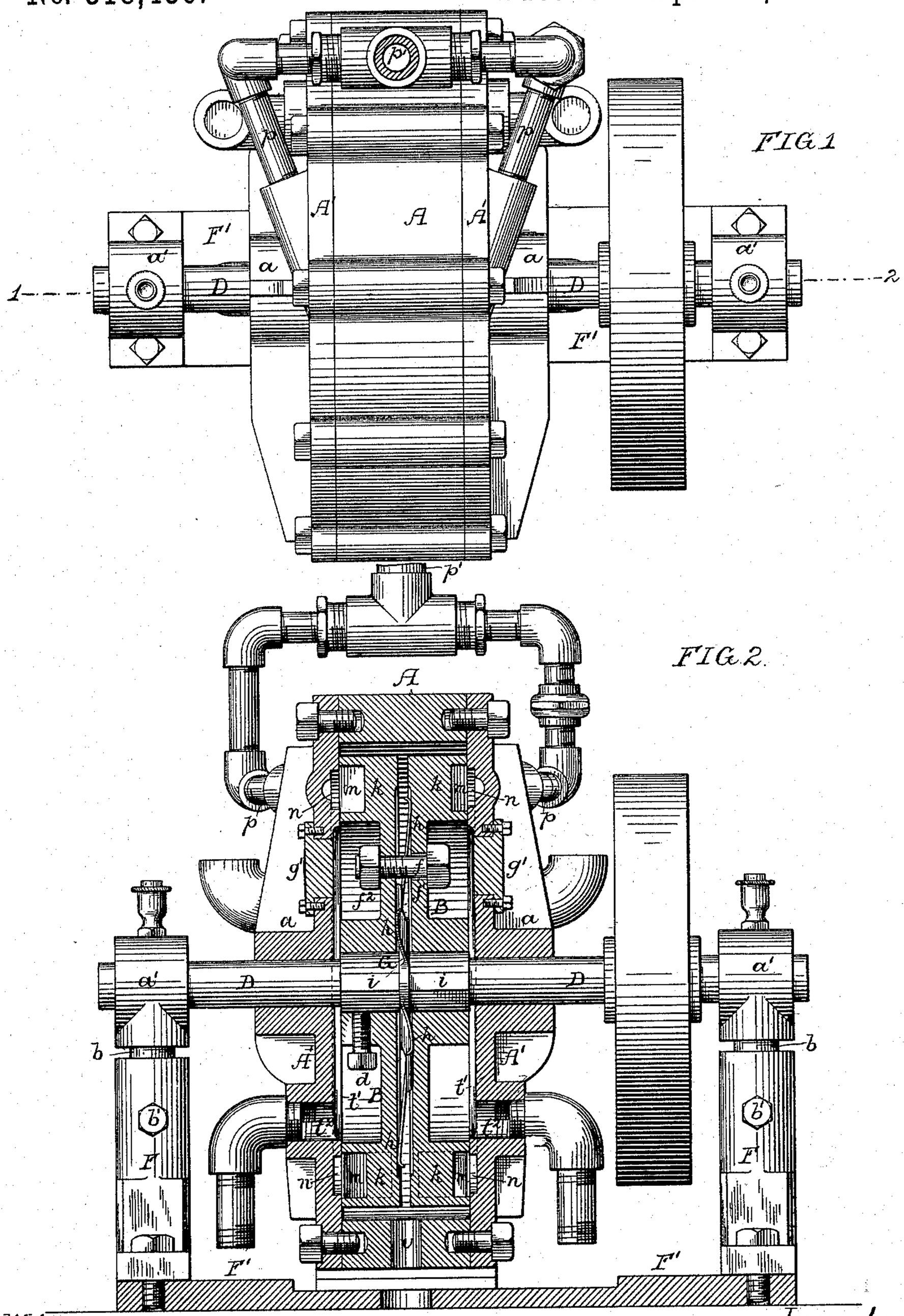



FIG 1

FIG 2.

Witnesses:
A. D. Gropper.
William D. Bowers

Inventor:
Burwood M. Wilkinson
By his Attorneys
Hodson & Howson

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

# B. M. WILKINSON.

## ROTARY ENGINE.

No. 518,436. Patented Apr. 17, 1894.

FIG. 3.

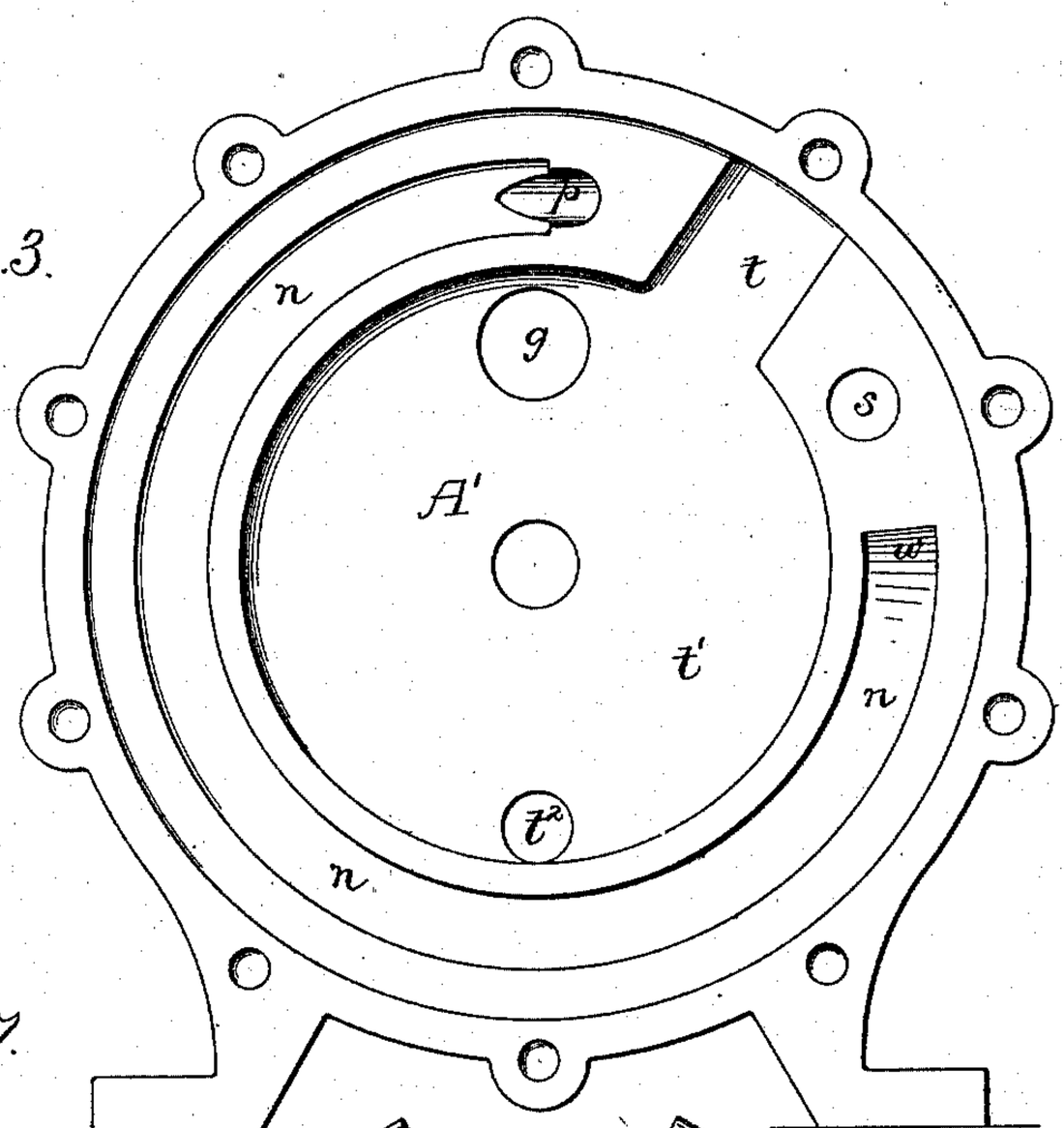



FIG. 7.

FIG. 6.

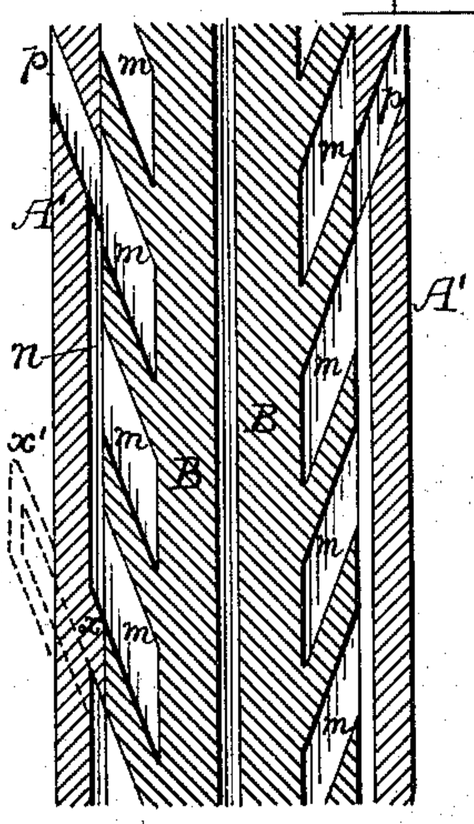
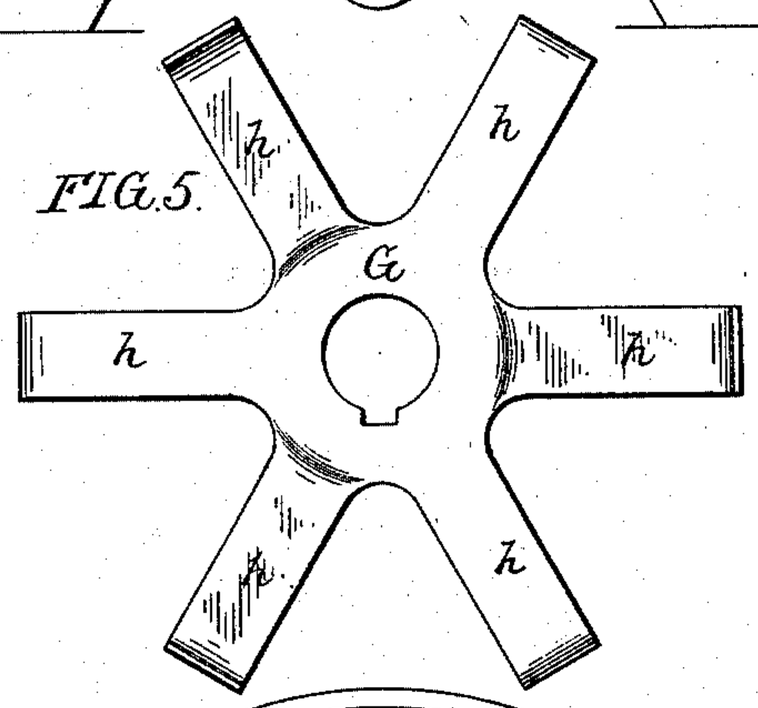



FIG. 5.



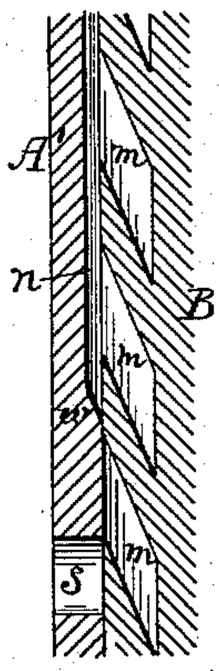
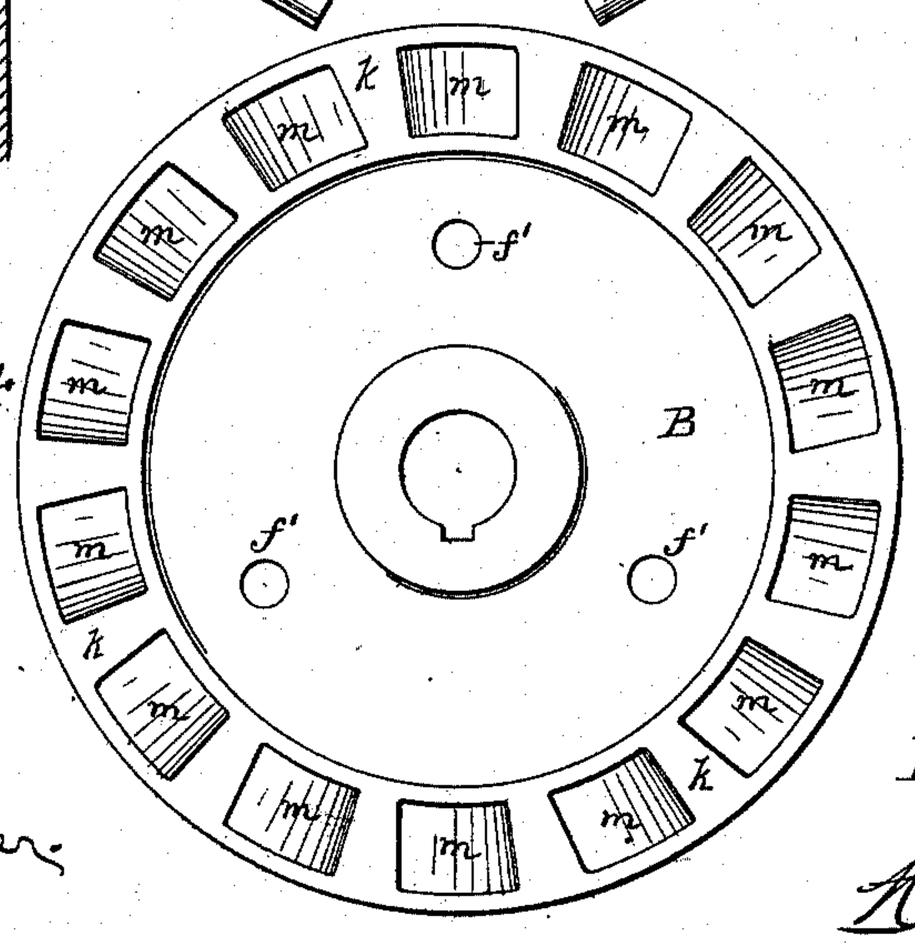




FIG. 4.




Witnesses:
A. V. Brooke.
William D. Bowers.

Inventor,
Burwood M. Wilkinson
By his Attorneys
Howson & Howson

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

# UNITED STATES PATENT OFFICE.

BURWOOD M. WILKINSON, OF CAMDEN, NEW JERSEY.

## ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 518,436, dated April 17, 1894.

Application filed July 20, 1891. Serial No. 400,091. (No model.)

*To all whom it may concern:*

Be it known that I, BURWOOD M. WILKINSON, a citizen of the United States, and a resident of Camden, Camden county, New Jersey, have invented certain Improvements in Rotary Engines, of which the following is a specification.

My invention consists of certain improvements in that class of rotary engines in which the steam or other motive fluid acts by impact upon a rotating disk having buckets or pockets, the object of my invention being to so construct an engine of this class that it will be perfectly balanced and so that provision is afforded for the most effective action of the motive fluid upon the rotating part and for the complete and convenient drainage of the water of condensation from the casing, the setting up of parts to compensate for wear being also readily accomplished.

In the accompanying drawings:—Figure 1, is a plan view of a rotary engine constructed in accordance with my invention. Fig. 2, is a view, partly in elevation, and partly in section, on the line 1—2, Fig. 1. Fig. 3, is an inner face view of one of the heads of the fixed drum or casing of the engine. Fig. 4, is an outer face view of one of the rotating disks of the same. Fig. 5, is a side view of an adjusting spring forming one of the elements of the engine; and Figs. 6 and 7, are diagrams illustrating special features of construction.

The fixed casing of the engine consists of a cylindrical shell A having opposite heads A′ suitably bolted thereto so as to form a hollow drum for containing the rotating element of the engine which consists of a pair of disks B, B, carried by the shaft D of the engine which is adapted to suitable bearings *a* on the opposite heads A′ of the fixed drum or casing, and also, by preference, to other bearings *a′* carried by stems *b* which are secured to and are vertically adjustable in standards F on the base F′ of the engine, said stems *b* being secured in position after adjustment by means of set screws *b′*, so that the proper horizontal alignment of the shaft D can always be effected even though the foundation upon which the base F′ rests is out of line. The hubs of both of the disks B are recessed to receive the spline *i* upon the shaft D so that the latter is compelled to turn with said disks, and one of the latter is also by preference, secured to the shaft by means of a set screw *d* or its equivalent so that it is incapable of longitudinal movement on said shaft, the other disk, however, being free to move longitudinally to an extent limited by set screws *f* which pass through openings *f′* in one disk and are screwed into like openings *f′* in the other disk and have jam nuts $f^2$ beyond said disk, the heads of the set screws and the jam nuts, as the disks are turned, being accessible through openings, *g*, in the heads A′ of the drum or casing, which openings are normally closed by detachable cover plates *g′* as shown in Fig. 2. If the jam nuts $f^2$ are not used, the opening in one of the heads A′ may be dispensed with.

The separation of the disks B is effected by means of a spring G interposed between the two disks and recessed for the reception of the spline *i* of the shaft D so that it turns with said shaft and disks, this spring having a series of projecting arms or fingers *h* some of which project to the right and bear upon one disk, while the others project to the left and bear upon the other disk, thus tending to separate the two disks to the extent permitted by the set screws *f* and thereby insure the desired close fit of the outer faces of the disks against the inner faces of the heads A′ of the outer fixed casing or drum of the engine. Each disk B has, around its outer portion, a rim *k*, in which is formed a series of pockets *m*, preferably projecting forward in the direction of rotation of the disks and preferably, also, overlapping each other as shown in Figs. 6 and 7, and in each of the heads A′ of the outer casing of the engine is formed a segmental channel or passage *n* in line with the annular series of pockets in the disk, said passage receiving the motive fluid at one end through an inlet pipe *p* inclined at an acute angle in respect to the plane of the motion of the disks, as shown in Fig. 1, and these inlet pipes being connected to the supply pipe *p′* by means of suitable branch pipes and couplings, as fully shown in Figs. 1 and 2.

In each head A′ of the fixed casing or drum of the engine, in advance of the end of the segmental passage *n* in the direction of move-

ment of the disks, is an exhaust port *s*, and between the latter and the inlet end of the channel or passage *n* is formed in each head A′ a recess *t*, which communicates with a central recess *t′* in the head, this latter recess having at its lowest point a drainage opening $t^2$. A drainage opening *v* is also formed in the bottom of the cylindrical shell A′ of the fixed drum as shown in Fig. 2. The steam or other motive fluid entering the inlet ends of the channels *n* of each head, acts simultaneously upon both of the disks B, B, so that the engine is perfectly balanced laterally, and in order that there may be no perceptible brake in the continuity of the forward thrust of the motive fluid upon the disks, the pockets *m* of the opposite disks are preferably staggered or offset in respect to each other, as shown in Fig. 7, so that when the partition between two pockets of one disk is passing the inlet of its corresponding head, a pocket of the other disk will be receiving the full force of the incoming flow at the inlet of the opposite head. There is a constant forward flow of the motive fluid through the segmental channels *n* in the opposite heads of the engine. Hence a forward impulse is imparted to each disk throughout the entire extent of each channel and the forward end of each channel is preferably inclined, as shown at *w* in Fig. 6, so as to direct the steam into the pockets of the disk in a direction calculated to exert the best propulsive action. As soon as a pocket *m* of a disk is cut off from communication with the channel *n* as shown in Fig. 6, it begins to communicate with the exhaust port *s* and the motive fluid escapes from the pocket through said exhaust port. If the motive fluid employed is steam, any water of condensation which may have collected in the pocket and which remains in the same after it has passed the exhaust port, will be discharged into the recess of the head A′ and will flow thence through the central recess *t′* to the drainage opening $t^2$, through which it will be discharged, and any motive fluid which may, by leakage, find its way inwardly between the contact faces of the disks B and heads A′ will be likewise discharged, while any motive fluid finding its way outwardly between said contact faces will be discharged through the drainage opening *v* in the bottom of the shell A. If desired the drainage passages *t t′* and $t^2$ may also serve as exhaust passages, but the construction shown is preferred. The channels *n* may be provided with abutments *x* at intervals, as shown in Fig. 7, or may have, at suitable intervals, expansion pockets *x′* as shown by dotted lines in said figure.

Although I prefer in all cases for balancing purposes to construct the engine in the duplex form illustrated, that is to say, with oppositely facing pocketed disks and with a steam channel and exhaust port in each head of the casing, it will be evident that the main features of my invention may be embodied in an engine having but one disk and a steam channel and exhaust port in but one head of the casing, the spring G in this case having a bearing under the opposite head of the casing, or if desired upon a collar on the shaft, in which case, said head of the casing may be dispensed with.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. The combination of the engine shaft, with the disk carried thereby and having an annular series of pockets in its outer face, and a head having in its inner face a segmental channel for the motive fluid, in line with the pockets of the disk and having between the termination of said channel and the inlet end of the same, a drainage recess communicating with a drainage outlet, and serving to receive the contents of the pockets of the disk as they successively pass the same, substantially as specified.

2. The combination of the engine shaft, with a pair of disks mounted thereon and each having an annular series of pockets in its outer face, a drum or casing inclosing said disks and having in each of its heads an internal channel for the motive fluid, and an exhaust port, and a spring interposed between the disks and serving to maintain the outer faces of the same in contact with the inner faces of the heads of the fixed casing, substantially as specified.

3. The combination of the engine shaft, two disks mounted thereon, and each having an annular series of pockets in its outer face, the outer drum or casing having in each head an inlet and exhaust port, and a spring interposed between the two disks and having a series of projecting arms or fingers, some of which act upon one disk and the others upon the opposite disk, substantially as specified.

4. The combination of the engine shaft, the two disks mounted thereon, and each having an annular series of pockets in its outer face, a drum or casing inclosing said disks, and having in each of its heads an inlet for the motive fluid, and an exhaust port, a spring for forcing the disks apart and into contact with the heads of the outer casing, and set screws for limiting said separation of the disks, substantially as specified.

5. The combination of the engine shaft, the two disks mounted thereon, and each having, in its outer face, an annular series of pockets, an outer casing or drum inclosing said disks and having in each of its heads an inlet for the motive fluid, an exhaust port, a spring for forcing the disks apart and into contact with the heads of the casing, set screws for limiting the separation of the disks, and a detachable cap closing an opening in one of the heads through which access can be had to said set screws, substantially as specified.

6. The combination of the engine shaft, the disks each having an annular series of pockets in its outer face, the outer casing

having, in each head, inlet and exhaust ports, a spring for separating the disks, set screws and lock nuts for limiting said separation, and detachable caps closing openings in both heads of the casing, in line with said set screws and nuts, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

BURWOOD M. WILKINSON.

Witnesses:
WILLIAM D. CONNER,
HARRY SMITH.