No. 640,269. Patented Jan. 2, 1900.

A. H. CANNING.

ROTARY ENGINE.

(Application filed Mar. 14, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

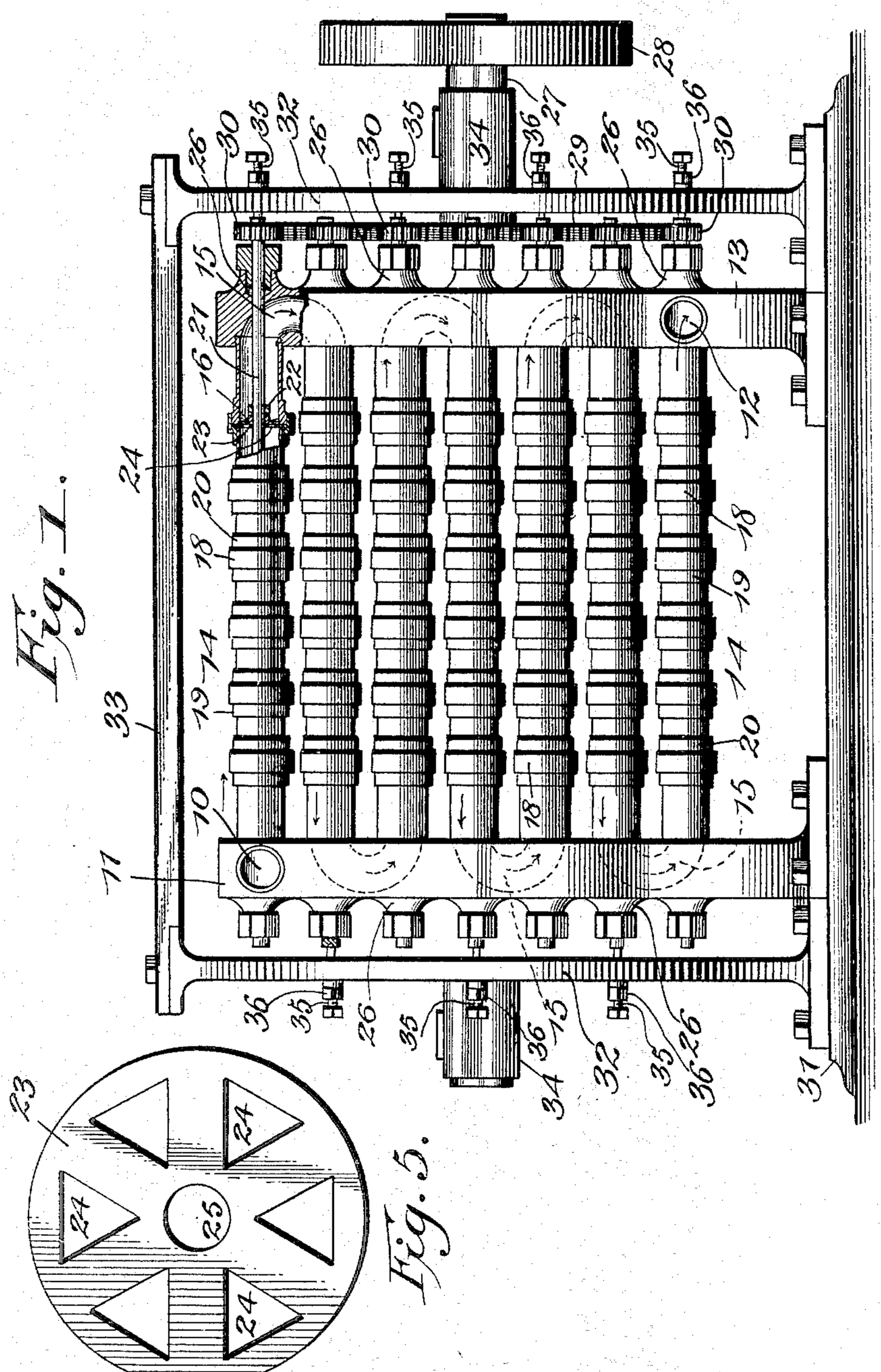

Fig. 5.

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Fig. 4.

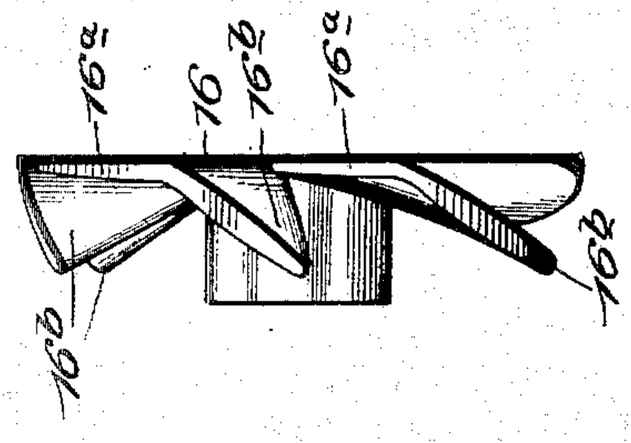


Fig. 3.

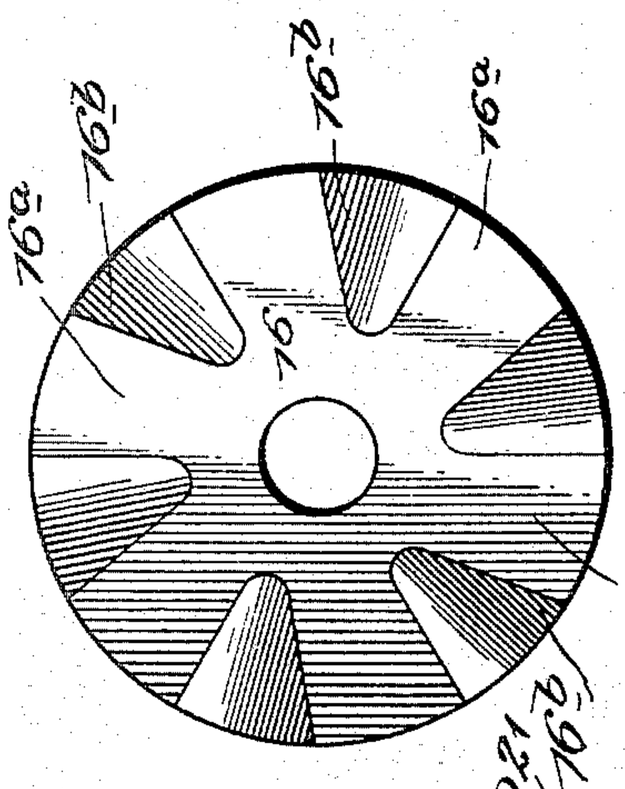


Fig. 5.

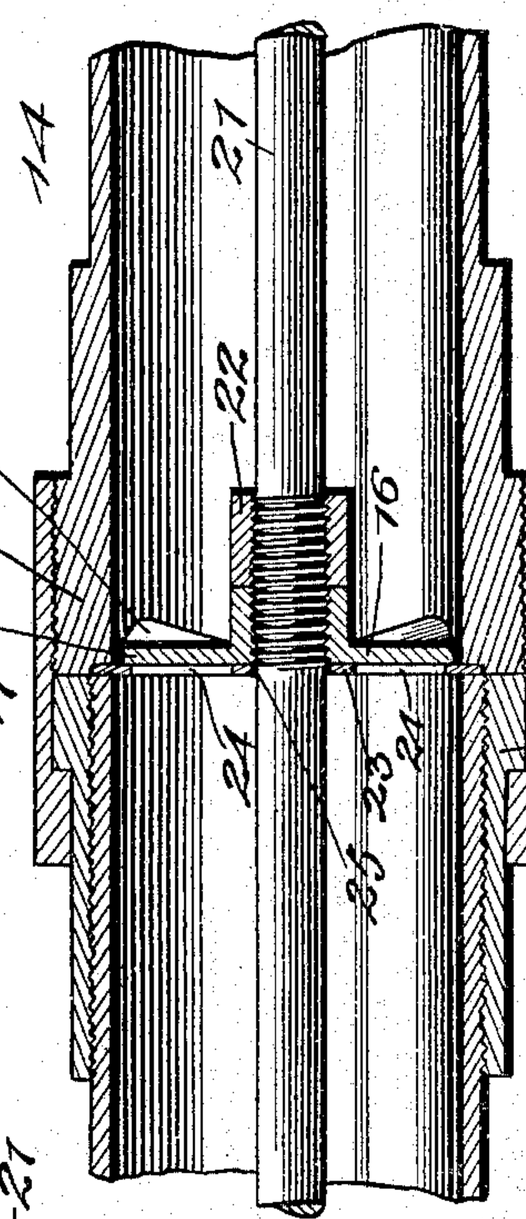
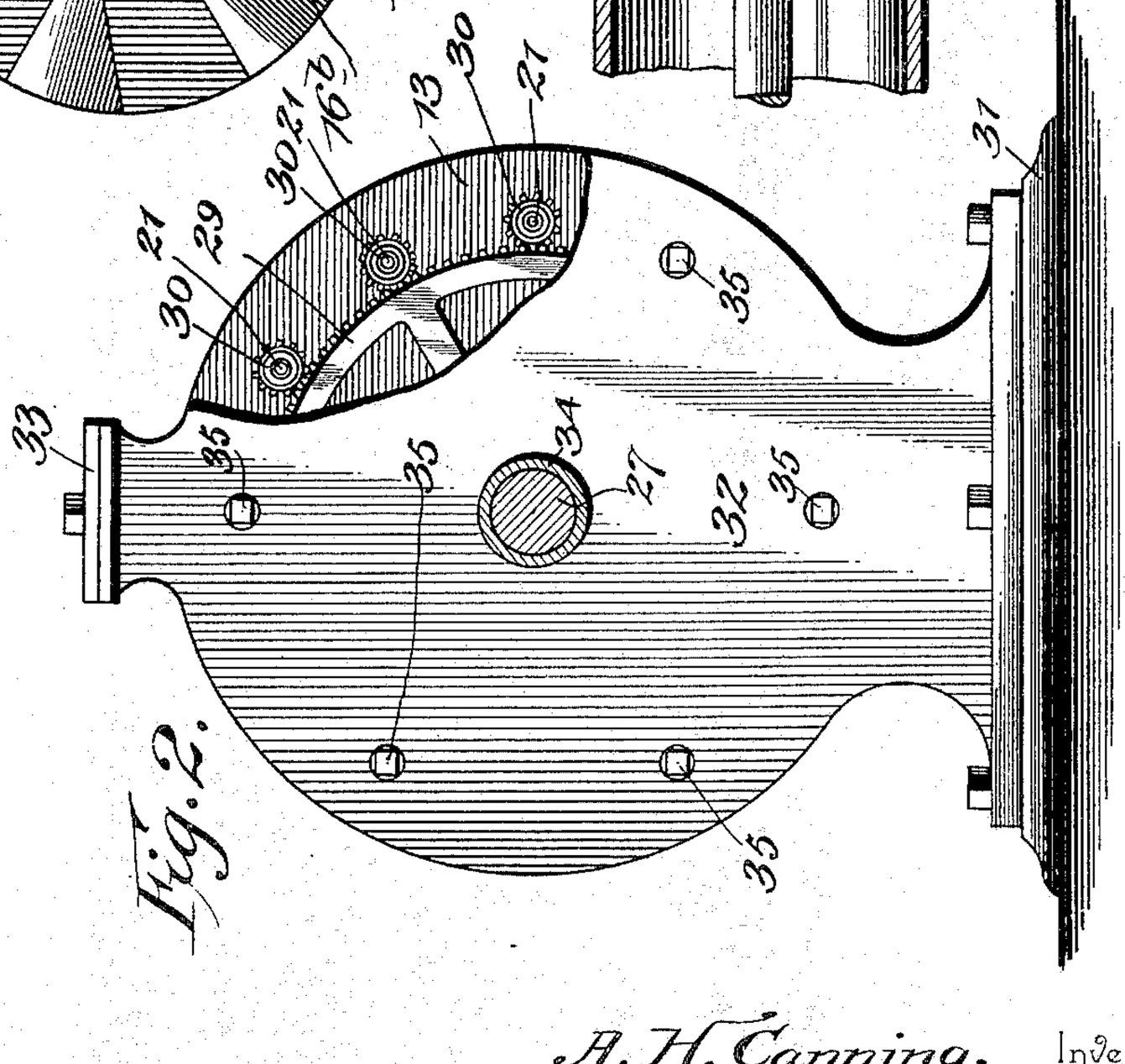


Fig. 6.

Fig. 2.



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D. E. Boyle

By his Attorneys.
A. H. Canning, Inventor.
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UNITED STATES PATENT OFFICE.

ALEXANDER HASTINGS CANNING, OF TORONTO, CANADA.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 640,269, dated January 2, 1900.

Application filed March 14, 1899. Serial No. 709,084. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER HASTINGS CANNING, a subject of the Queen of Great Britain, residing at Toronto, in the Province of Ontario and Dominion of Canada, have invented a new and useful Rotary Engine, of which the following is a specification.

My invention relates to rotary engines, and has for its object to provide a compact structure whereby the maximum efficiency of the motive agent, such as steam, may be obtained.

Further objects and advantages of this invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings, Figure 1 is a side view, partly in section, of an engine constructed in accordance with my invention. Fig. 2 is an end view, partly broken away to show the means whereby motion is communicated from the piston-shafts to the engine-shaft. Fig. 3 is a detail plan view of one of the pistons. Fig. 4 is an edge view of the same. Fig. 5 is a detail view of one of the port-walls. Fig. 6 is a detail sectional view of a portion of the cylinder.

Similar reference characters indicate corresponding parts in all the figures of the drawings.

The cylinder of the engine embodying my invention consists of a manifolded pipe forming a continuous conveyer into which steam or other motive agent is introduced at one end through a feed-port 10, formed in the cylinder-head 11, and from which it is exhausted at the other end through an exhaust-port 12, formed in another head 13, and in the preferred construction the cylinder consists of a plurality of parallel members 14, terminally stepped in the inner or facing sides of the heads 11 and 13 and connected in series by cored passages 15, whereby the steam or other motive agent passes continuously through the series from the inlet end to the outlet end to successively actuate a plurality of rotary pistons 16, arranged in the cylinder. Preferably each member or fold of the cylinder comprises a plurality of sections having abutting extremities secured by couplings 17, and in the construction illustrated each coupling comprises an interiorly-shouldered sleeve 18, fitted upon the shouldered thimble 19 upon the adjacent extremity of one conveyer-section, and threaded upon an enlargement 20 of the adjacent extremity of the adjoining conveyer-section and adjacent to the plane of each piston 16, of which the hub is threaded upon a piston shaft or spindle 21 and is held in place by a lock-nut 22, is a port wall or partition 23, having an annular series of ports 24, through which the motive agent passes preparatory to contact with the wings of the adjacent piston. The partition is provided with a central opening 25, through which the shaft or spindle 21 extends, and the edge of the partition is secured between the adjacent extremities of the abutting pipe-sections.

The piston is provided with a flat surface adjacent to and approximately in contact with the partition, each wing 16^a being of a width approximately equal to that of one of the ports 24 in the partition. Also, each wing is provided with a rearwardly-deflected portion forming a blade 16^b, of which the surface is beveled or obliquely disposed, the free edge of each blade extending beyond or overlapping the adjacent edge of the next wing. This overlapping of the blades and wings prevents the straight passage through the piston of steam or other motive agent traversing the conveyer, and hence causes an efficient pressure of such motive agent upon the deflected or oblique-faced blades, which produces the desired rotary motion of the pistons, and hence of the shafts or spindles to which they are fixed. The flat-surfaced portions of the wings serve as valves whereby the ports 24 are closed alternately, and as the piston advances to bring the bevel-faced portions of the wings opposite the ports the pressure of the steam or other motive agent is applied efficiently thereto, the exposure or opening of the ports increasing as the piston advances.

Each shaft or spindle carries a plurality of pistons, of which the peripheries are arranged outside of or beyond the outer portions of the ports in the partitions or walls to prevent the steam or other motive agent from traversing the peripheries of the pistons, and said shafts or spindles, which extend axially through the several folds or members of the cylinder, are mounted in bearings in the heads 11 and 13,

said bearings being fitted with stuffing-boxes 26. In the construction illustrated the members of the manifolded cylinder are arranged in an annular series, thus correspondingly disposing the shafts or spindles around a center which is occupied by the main or drive shaft 27 of the engine, said drive-shaft being provided with any suitable means, such as a pulley 28, whereby motion may be communicated to machinery to be driven. Said drive-shaft carries a gear 29, and each of the piston shafts or spindles is provided with a pinion 30, meshing with said gear, whereby as the pistons rotate their motion is communicated through the intermeshing pinion and gear to the drive-shaft 27.

I have illustrated the engine embodying my invention arranged in a frame having a base 31, uprights 32, and a connecting-bar 33, it being understood that any other construction of frame may be employed, and the drive-shaft is mounted in bearings 34 in the uprights of the frame. Also, adjustably mounted in the uprights in axial alinement, respectively, with the piston shafts or spindles are thrust-pins 35, consisting of bolts threaded in the uprights and secured at the desired adjustment by lock-nuts 36. Obviously as the pressure against each piston is uniformly in one direction, thus applying axial pressure to each piston shaft or spindle in one direction, it is necessary to arrange a thrust-pin at only one end of each shaft or spindle, or, in other words, at that end toward which the steam or other motive agent is advancing in its passage through the manifolded cylinder.

From the above description it will be seen that steam or other motive agent entering the cylinder at one end passes continuously therethrough, and thus is brought successively into operative contact with a plurality of pistons, and that the series may be extended, as may be desired, or that the conveyer may be made in sections to cause the transmission of all of the power of the motive agent to the mechanism. It will be understood, furthermore, that, if preferred, the exhaust-port of the cylinder may be arranged in communication with a condenser; but as this feature is old and well known I have deemed it unnecessary to illustrate the same in the drawings. It will be understood, furthermore, that various means other than those illustrated may be employed for communicating motion from the piston shafts or spindles to a common drive-shaft or other element to be driven and that various other changes in the form, proportion, size, and minor details of construction within the scope of the appended claims may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention. For instance, while I have found it preferable to construct the pistons with wings having overlapping edges and also of an area slightly exceeding that of the ports in the partition-wall it is also possible to operate the mechanism without having said blades constructed to overlap and also without having the blades respectively equal in area with the ports, and therefore I desire to have it understood that I do not wish to be limited to the construction in these respects as specifically described and shown.

Having described my invention, what I claim is—

1. In a rotary engine, the combination of a manifolded cylinder having a series of partitions arranged in each of the folds or members and provided with ports, a series of independent pistons mounted adjacent the said partitions, a common driven rotary device, and means for communicating motion from the pistons to the said rotary device.

2. In a rotary engine, the combination of a manifolded cylinder having a series of partitions therein, provided with ports, a plurality of independent pistons located in each fold or member adjacent the partitions and having a common shaft or spindle, a common driven rotary device, and means for communicating motion from the shafts or spindles to the said rotary device.

3. In a rotary engine, the combination of a manifolded cylinder having a series of partitions arranged therein at predetermined intervals and provided with ports, a shaft or spindle extending longitudinally through each fold or member of the cylinder, a plurality of pistons mounted on the said shaft or spindle and located adjacent the partitions, a single drive-shaft, a gear carried by said shaft, and pinions carried respectively by the piston shafts or spindles and peripherally surrounding and meshing with the said gear on the drive-shaft.

4. In a rotary engine, the combination of opposite heads, one of which has an inlet-port and the other an outlet-port, a manifolded cylinder having its folds or members connected up with passages in the said heads and arranged in series to form a continuous conveyer, a plurality of partitions mounted in fixed position in each member or fold of the cylinder and provided with ports, a shaft or spindle extending longitudinally through each fold or member of the cylinder, a series of pistons made fast to the said shafts or spindles adjacent the partitions and projecting through the heads, a single drive-shaft having a gear fixed thereto, and pinions on the projected ends of the shafts or spindles extending outwardly from the folds or members of the cylinder and peripherally surrounding and meshing with said gear of the drive-shaft.

5. In a rotary engine, the combination of a manifolded cylinder having a plurality of tubular members and heads connecting said members at their extremities, provided with passages in communication therewith, to connect them circumferentially in series, said heads having shaft-bearings and stuffing-boxes in alinement respectively with the folds

or members, a plurality of partitions arranged in each member or fold and having ports therein, shafts extending longitudinally through and out from each of the folds or members, independent pistons fixed on said shafts adjacent the partitions, a drive-shaft, and means for communicating combined motion from the shafts or spindles of the folds or members to the said drive-shaft.

6. In a rotary engine, the combination of a manifolded cylinder consisting of a series of folds or members arranged to provide a continuous conveyer, a series of partitions in each of the folds or members provided with ports, a shaft or spindle extending through each fold or member and the centers of the several partitions therein, a series of independent pistons fixed on each shaft in the folds or members adjacent to the partitions, said pistons being positioned axially parallel with and in advance of the motive agent and having radial oblique-faced blades, thrust-pins for receiving the thrust of the shafts or spindles, a drive-shaft having a gear thereon, and pinions on the projected ends of the several shafts or spindles from the folds or members which peripherally surround and mesh with the gear on the drive-shaft.

7. In a rotary engine, the combination with a cylinder, of a piston arranged axially parallel with the direction of movement of the motive agent through the cylinder and having radial flat-faced wings and oblique-faced blades, the free edges of the blades overlapping the adjacent edges of the wings, a partition arranged adjacent to the plane of the flat faces of the wings and provided with ports for allowing application of pressure to the oblique-faced blades, a shaft rotatably mounted in the partition and having a piston affixed thereto, a driven device, and means for communicating motion from the end of the shaft of the cylinder to the driven device.

8. In a rotary engine, a cylinder and a piston arranged axially parallel with the direction of movement of the motive agent through the cylinder, and provided with flat-faced wings and oblique-faced blades, in combination with a port wall or partition arranged adjacent to the plane of the flat faces of the wings and provided with ports for allowing application of pressure to the oblique-faced blades, the area of each flat-faced portion of a wing exceeding that of a port in the wall or partition, substantially as specified.

9. In a rotary engine, the combination of a cylinder comprising axially-alined sections, couplings for connecting the sections in series, port walls or partitions arranged between the abutting extremities of cylinder-sections, pistons arranged respectively adjacent to said walls or partitions and having oblique-faced blades for exposure to fluid-pressure in the cylinder applied through the ports in said walls or partitions, and a shaft or spindle common to a plurality of pistons in the alined cylinder-sections, substantially as specified.

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

ALEXANDER HASTINGS CANNING.

Witnesses:

THOMAS M. HIGGINS,

CHRISTINA MCARTHUR.