(No Model.) 5 Sheets—Sheet 1.

J. F. McGLENN.

ROTARY ENGINE.

No. 600,951. Patented Mar. 22, 1898.

Fig. 1.

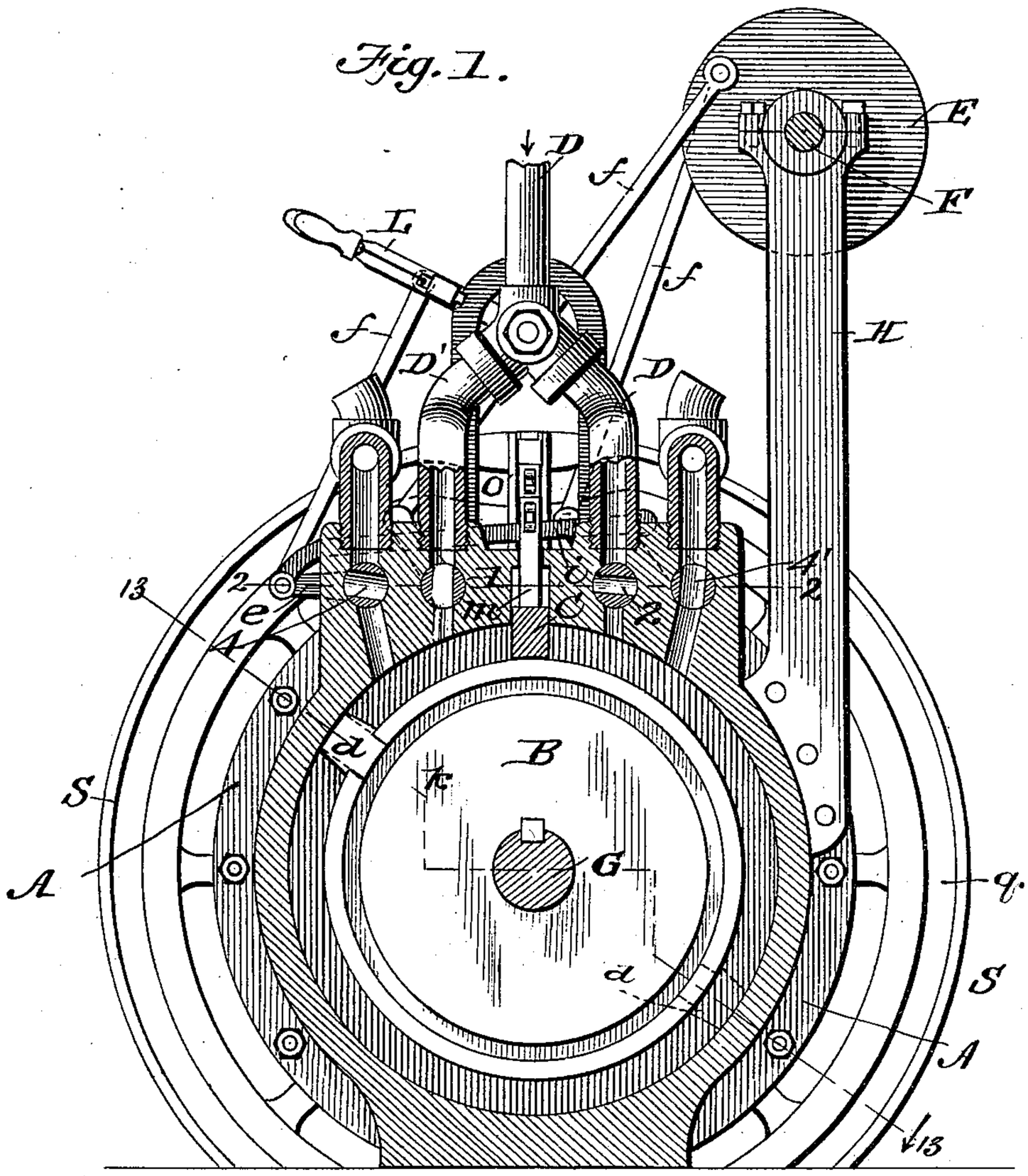
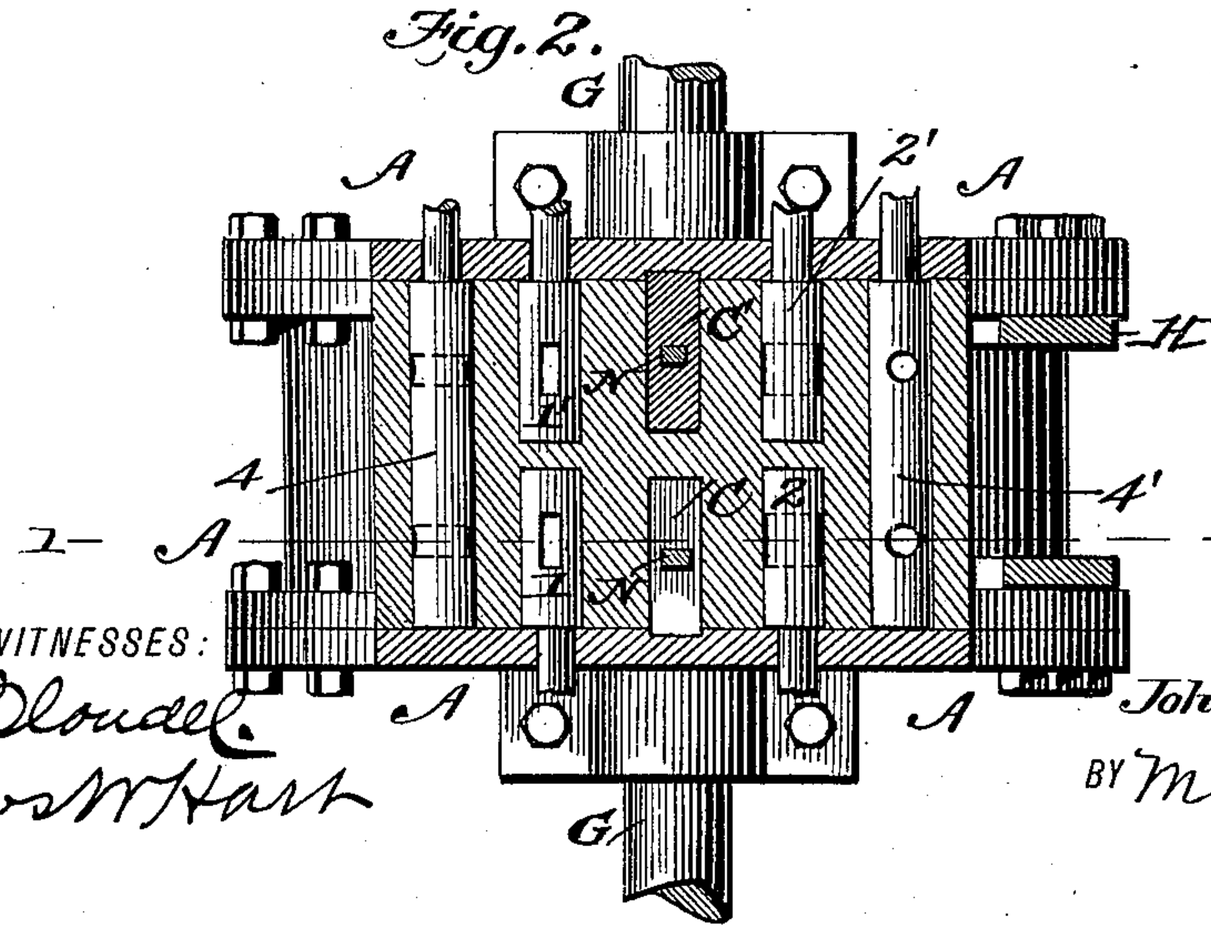


Fig. 2.



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(No Model.)

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Fig. 3.

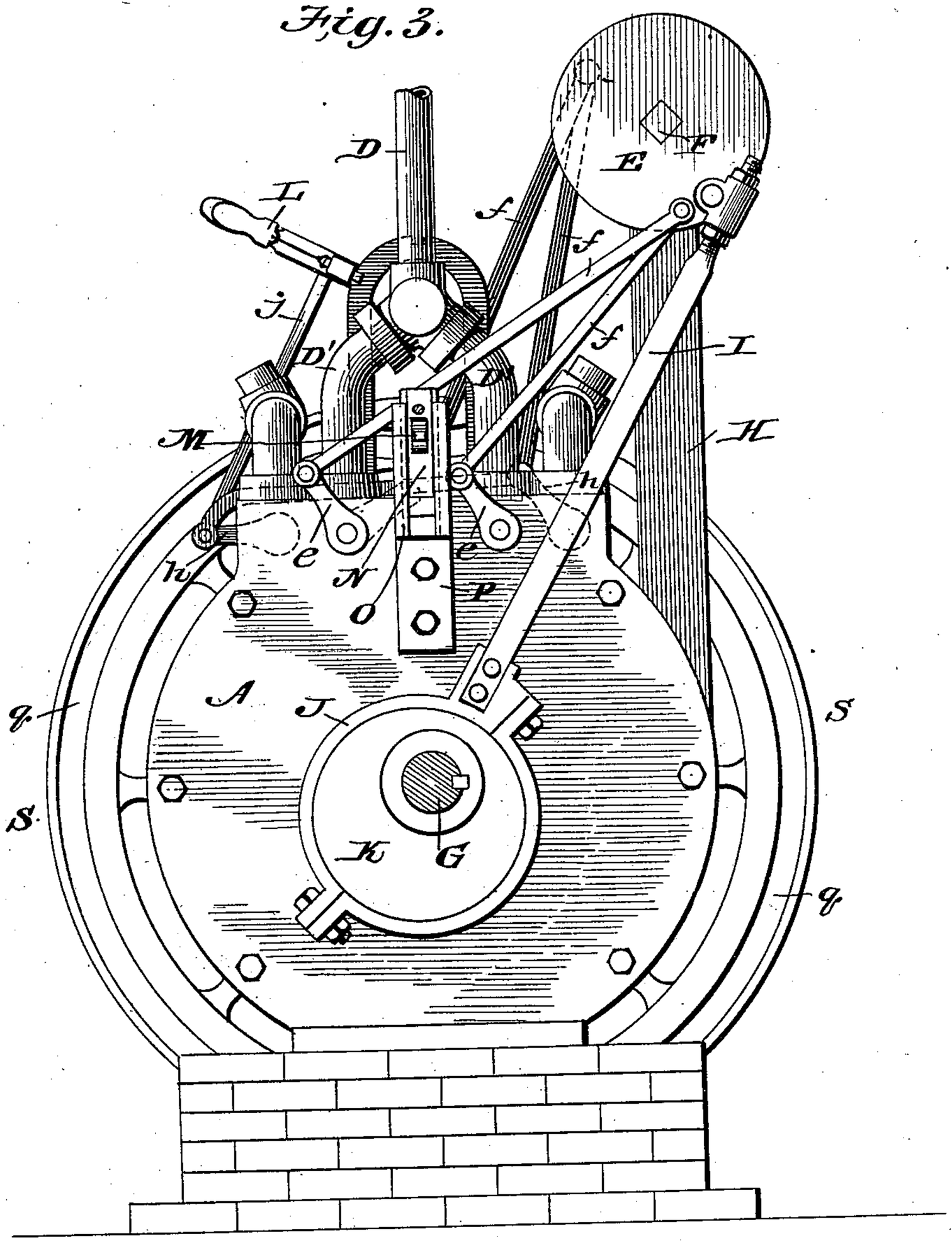

Fig. 4

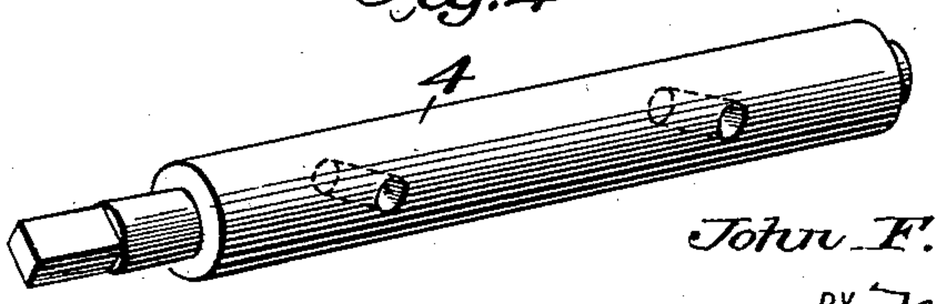

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Fig. 5.

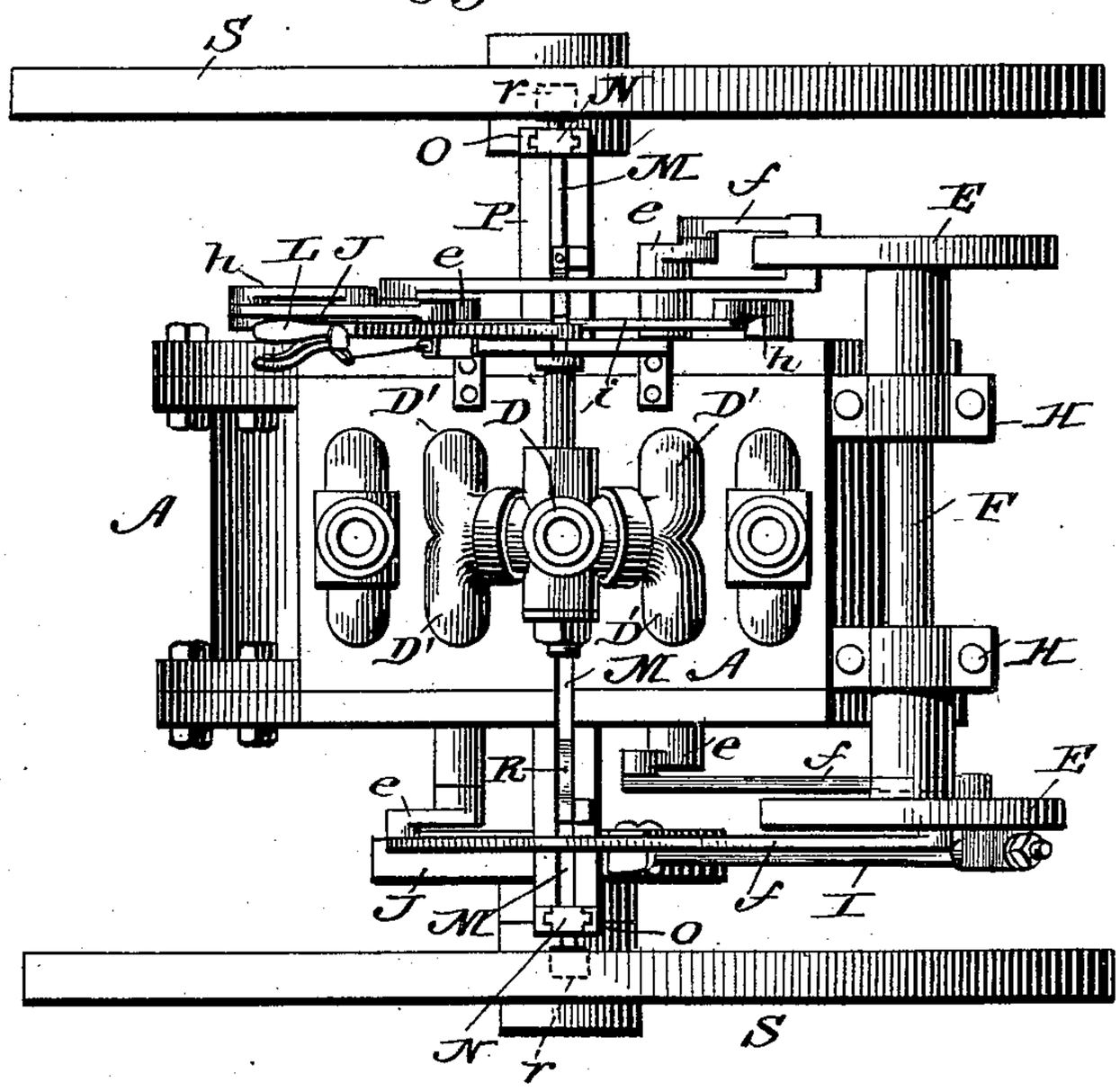


Fig. 6.

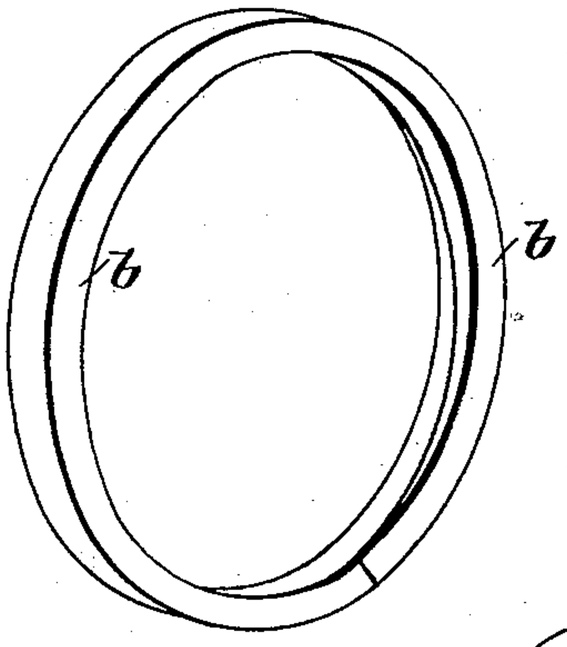


Fig. 7.

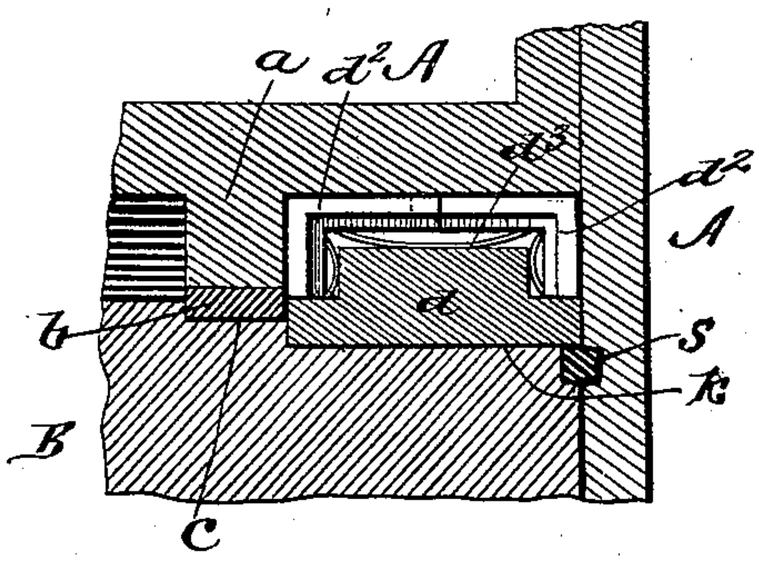
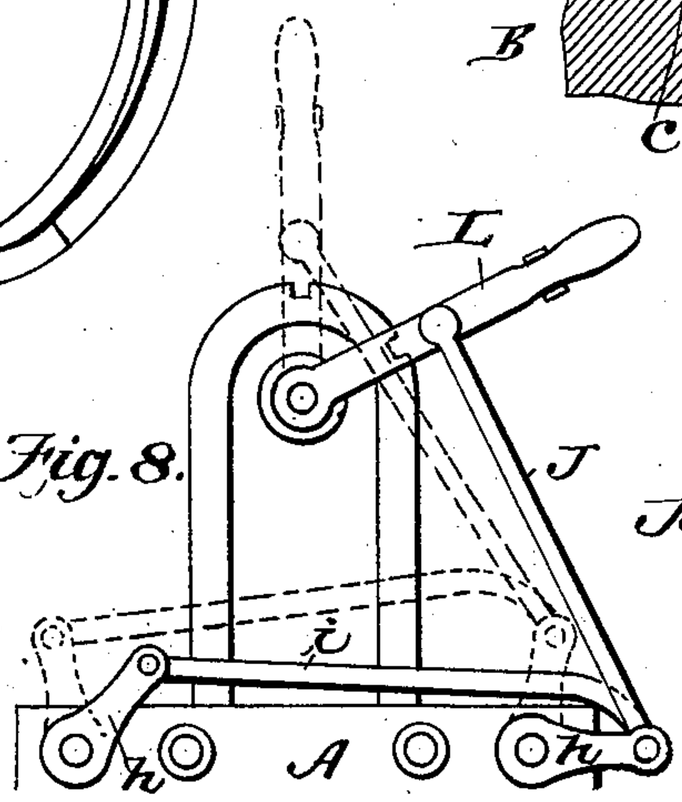


Fig. 8.



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5 Sheets—Sheet 4.

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Fig. 9.

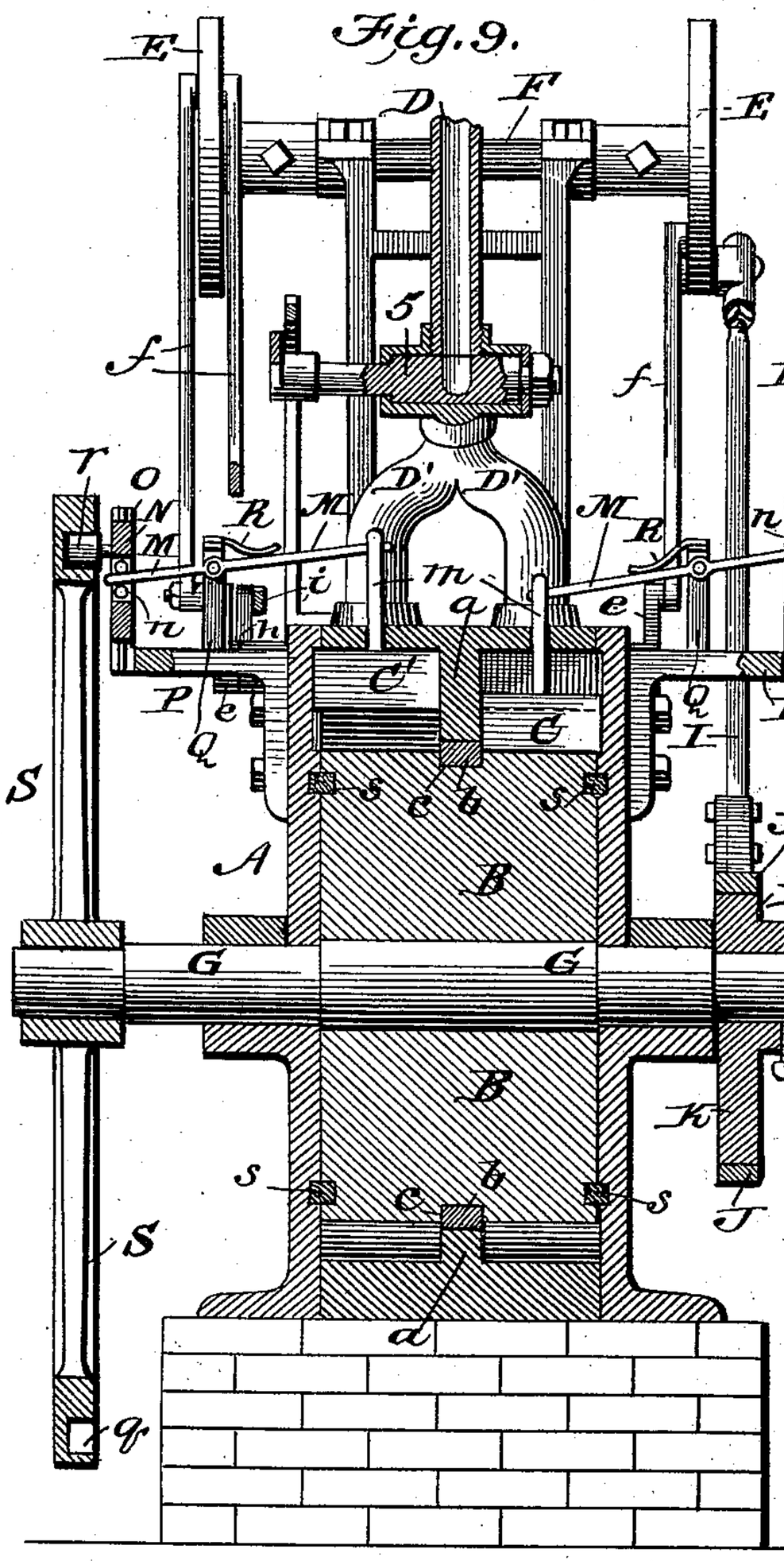


Fig. 10.

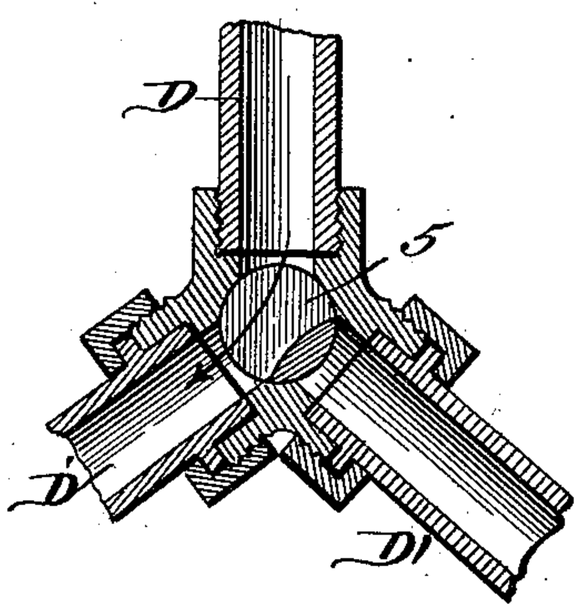


Fig. 11.

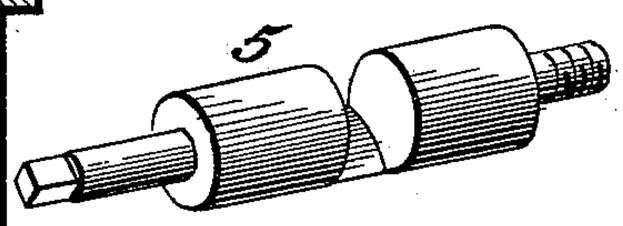
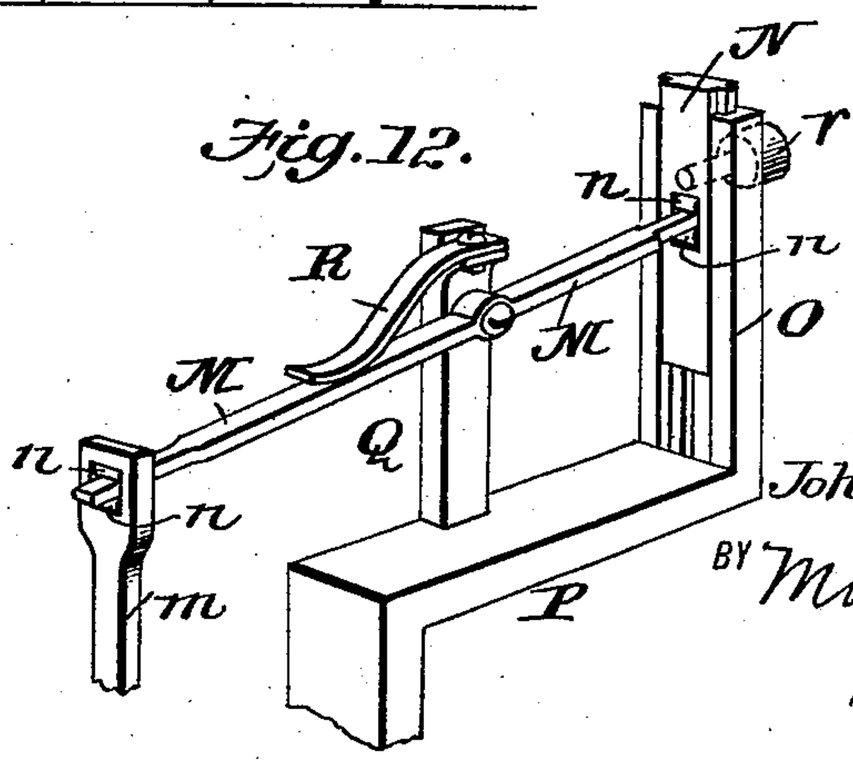


Fig. 12.



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ROTARY ENGINE.

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Fig. 13.

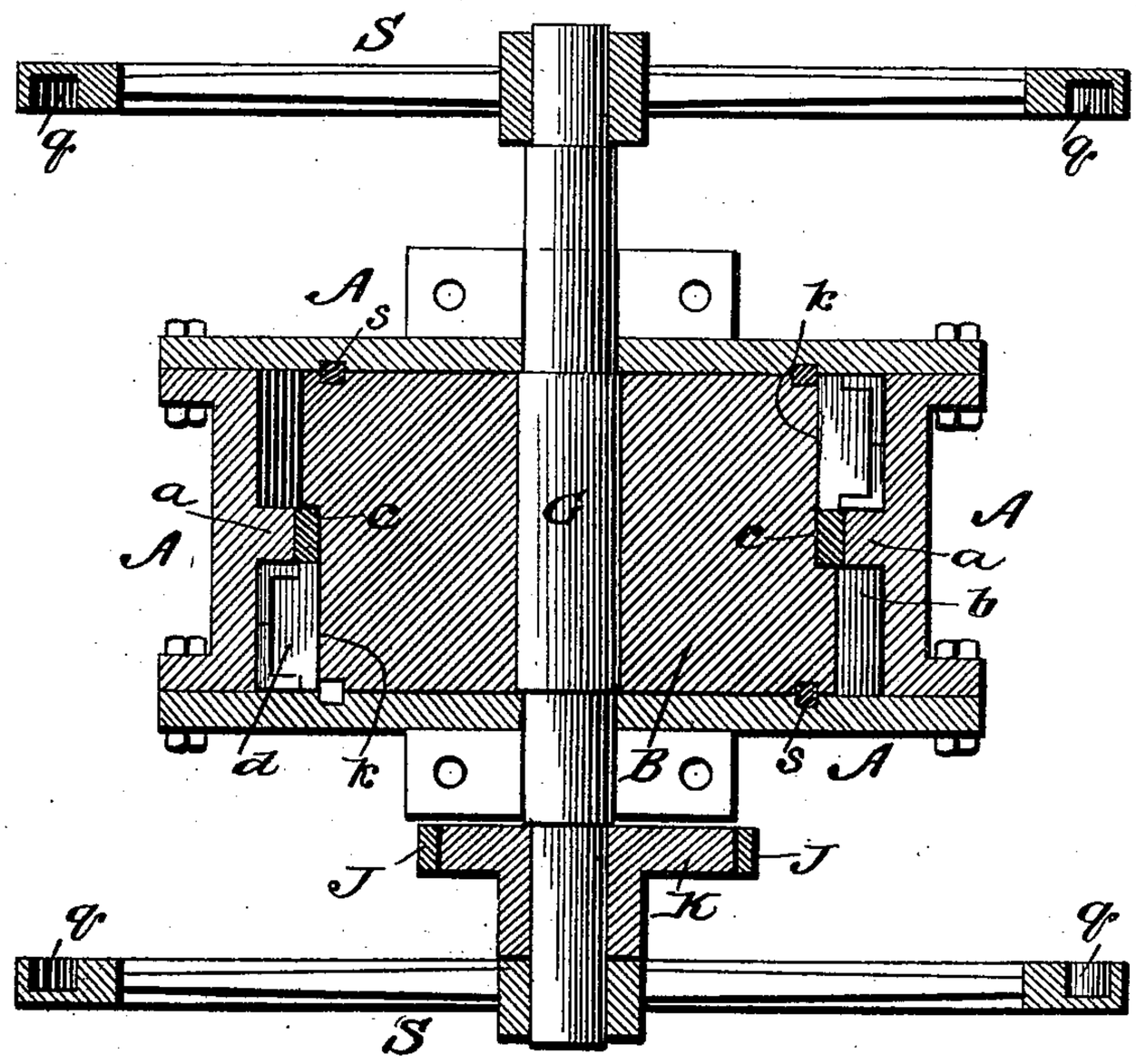
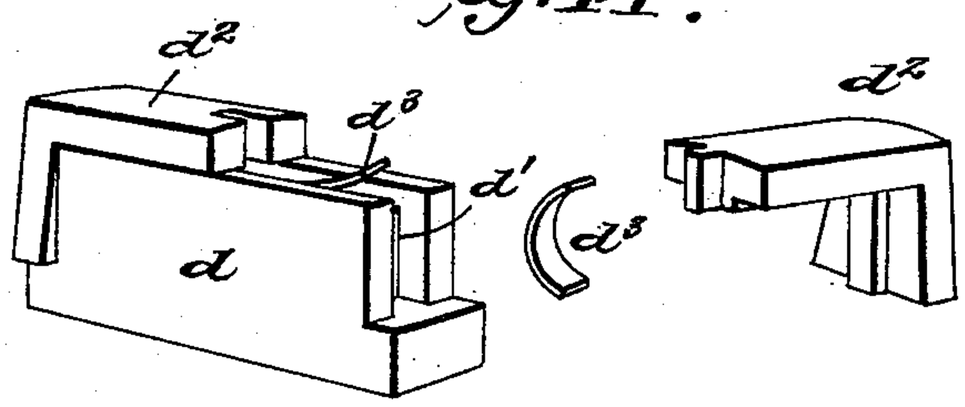


Fig. 14.



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UNITED STATES PATENT OFFICE.

JOHN F. McGLENN, OF BOWDLE, SOUTH DAKOTA.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 600,951, dated March 22, 1898.

Application filed April 24, 1897. Serial No. 633,648. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. MCGLENN, of Bowdle, in the county of Edmunds and State of South Dakota, have invented a new and useful Improvement in Rotary Engines, of which the following is a specification.

My invention is an improvement in that class of rotary engines in which the cylindrical casing or drum is so divided as to form practically two chambers or compartments in which separate pistons rotate together, there being two inlet and two exhaust ports for each compartment and other duplicate attachments, which form practically two engines having a common shaft for the application of power.

I have devised certain improvements in the construction and arrangement and combination of parts, as hereinafter specified.

In the accompanying drawings, five sheets, Figure 1 is a vertical section of my engine on line 1 1 of Fig. 2. Fig. 2 is a horizontal section on line 2 2 of Fig. 1. Fig. 3, Sheet 2, is a side view of the engine. Fig. 4 is a perspective view of one of the exhaust-valves. Fig. 5, Sheet 4, is a plan view. Fig. 6 is a perspective view of the piston packing-ring. Fig. 7 is an enlarged detail section of an upper portion of the casing or drum, showing the arrangement of a piston-wing. Fig. 8 is a side view of the mechanism for shifting the throttle and exhaust valves. Fig. 9, Sheet 4, is a central vertical cross-section of the engine. Fig. 10 is an enlarged detail section of the inlet-pipes and throttle-valve. Fig. 11 is a perspective view of the throttle-valve. Fig. 12 is a perspective view of part of the mechanism for operating the sliding abutments. Fig. 13, Sheet 5, is a transverse section on line 13 13 of Fig. 1. Fig. 14 is a perspective view of one of the wings of the rotary dasher, showing a portion of the packing for the same detached.

The cylindrical casing or drum A of the engine (see Fig. 9) is provided interiorly with a radial, central, and annular rib or partition *a*. The cylindrical rotary piston B extends through the casing interiorly, but is of considerably less diameter, so that annular spaces are left between them on each side of the rib *a*. Said piston B is provided with a packing *b*, that is inserted and held in a peripheral groove *c* and projects to meet the inner edge of the aforesaid casing-rib *a*. The packing *b* is shown detached in Fig. 6 and consists of a divided ring whose ends are scarfed and lapped. The rib *a* of the casing A and the annular packing *b* of the piston B work in frictional contact as the piston rotates, and thus divide the annular space, so that practically two annular steam-chambers are formed. At diagonally opposite points the piston is provided with the wings *d* and *d'*, that work in the two annular spaces or steam-chambers. There are two radially-sliding abutments C C', Figs. 1 and 2, arranged in the annular steam-chambers directly opposite each other and on the upper side of the piston. These abutments slide in slots or guideways in the casing, as shown, and are operated—*i. e.*, raised alternately—by means that will be presently described.

Live steam is admitted to the steam-chambers by the pipe D and its four branches or branch passages, and such admission is controlled by two pairs of duplicate cylindrical oscillating valves 1 1' and 2 2', which are arranged as shown in Fig. 2. Thus the alined valves 1 1' control admission to the opposite steam-chambers on one side of the respective abutments C and C', while the other valves, 2 2', perform a similar function on the other side of said abutments, and thus provide for reversal of the engine. There are likewise duplicate cylindrical exhaust-valves 4 and 4', (one is shown detached in Fig. 4,) which extend through the steam-chest and allow exhaust on both sides of the abutments C C'.

The throttle-valve 5, Figs. 10 and 11, is arranged at the bifurcation of the steam-pipe D and is cut out centrally, so that it may close or open the branch passages D' on either side. In Fig. 10 it is shown in position to allow admission of steam to the left-hand side of the abutments C and C', Figs. 1 and 2.

It will be understood that from the throttle-valve 5 four steam-passages lead downward, two on the left and two on the right, as required to conduct steam to both sides of said abutments. Thus there are two steam-passages in each of the pipe branches D D'.

In Figs. 1 and 2 the valves 1 and 1' are shown open and the corresponding valves 2 2' closed, while exhaust-valve 4 is closed and 4'

open. Thus steam fills the spaces between the sliding abutments C C′ and wings *d* of piston B, while exhaust has taken place from both chambers through valve 2′. At the next shifting of the four inlet-valves the valves 1 and 1′ will close and the others, 2′, open; but practically the latter do not effect anything in so doing, since the throttle-valve 5 is so adjusted as to cut off steam from the right-hand branches D′ and the right side of the steam-chest. The valves 1 and 1′ will close before the piston-wings *d* pass the exhaust-ports, whereby steam is worked expansively. The valves 1 and 1′ of course remain closed until the piston-wings *d* again pass to the left of the abutments and inlet-ports, when they again open and the operation is repeated. It is obvious that by reversing the throttle-valve 5 and exhaust-valves 4 4′ the rotation of the piston and the engine as a whole will be reversed, since steam will then be cut off from the left side and admitted on the right-hand side of abutments C C′, while the exhaust will be through valve 2. In such case the valves 2 and 2′ obviously control the inlet and valves 1 and 1′ have no function, although continuing to oscillate simultaneously with said valves 2 and 2′.

The mechanism for operating the inlet-valves is shown in Figs. 1, 3, 5, and 9. Each valve has a crank-arm *e* affixed to its projecting shank or stem, and such arms are pivotally connected by rods *f* with wrist-pins on two parallel disks E, which are keyed on a shaft F, that is parallel to the main shaft G and journaled in two vertical standards H, bolted to opposite sides of the casing A. Such counter-shaft F is rocked or oscillated by a rod I, that connects with the strap J of an eccentric K (see Fig. 9) on the main shaft G. Thus as the latter rotates the counter-shaft F rocks and the valves 1 1′ and 2 2′ receive a like motion simultaneously. This operation is obviously automatic.

The mechanism for operating the throttle-valve 5 and exhaust-valves 4 4′ (shown plainly in Fig. 8) is operated manually. It consists of a hand-lever L, attached to the stem of the throttle-valve, and shorter arms *h*, applied on the exhaust-valves, and rods *i* and *j*, which connect the three valves, so that by shifting the lever L the valves are all shifted simultaneously.

As shown in Figs. 1 and 7, the wings *d* of the piston B are set and fixed in radial slots *k* in the periphery of the latter. Said slots have straight parallel sides. As shown in Fig. 14, the wings *d* have a groove *d′* in the outer edge and ends to receive a rib of the right-angular packing-pieces d^2, whose inner meeting ends have a tongue-and-groove connection. Springs d^3 hold the packings d^2 pressed outward, so that they work steam-tight with the inner periphery of casing A and constantly take up the wear incident to such friction. The lower ends of the side portions of packing d^2 are broadened to carry them by the grooves in which the abutments work. The steel ring *b*, Figs. 6 and 7, is compressed slightly and also works steam-tight with the casing-rib *a*.

The means for shifting the abutments C C′ to allow the piston-wings *d* to pass are shown best in Figs. 5, 9, and 12. Each abutment has a radial stem *m*, that projects through the periphery of the casing, and levers *m* are loosely connected with the respective stems and with bars N, that slide vertically in slotted guides formed integrally with or else rigidly attached to brackets P, bolted to the sides of the casing. Said levers *m* are pivoted in standards Q and springs R depress their inner ends, so that the abutments C C′ are held pressed normally inward in close contact with the piston B. The reduced ends of the levers M work in slots in the abutment-stems *m* and slide-bars N, friction at such points being mainly relieved by parallel cylindrical rollers *n*, arranged on both upper and under sides of the slots. The slide-bars N are connected with cam-wheels S on the main shaft G, so as to reciprocate when the latter rotates. Said wheels S have a cam-groove *q* on the inner side, which groove receives a wrist-pin *r*, projecting from the slide-bars N. Such wheels S not only serve as cams to shift the abutments, but as balance-wheels for reducing the operation of the engine to uniformity.

It will be seen that as the piston-shaft rotates the cam-wheels S go with it, and thus tilt the levers M alternately, one at each half-rotation of the piston, thus alternately raising the abutments C and C′, so that they allow the piston-wings *d* to pass. When one of the wings is passing an abutment, the other will be at the lowest point on the under side of the piston and steam will be acting on it, so that there is no "dead-point." In other words, steam-pressure is always on one and during a good part of the time it is on both wings.

As shown in Fig. 9, the parallel sides of the casing A and piston B have opposite grooves in which steam-packing *s* is held. In Fig. 1 the groove in one end of the piston is shown without such packing.

What I claim is—

1. The improved rotary engine, comprising a casing having a steam-chamber, a rotary cylindrical piston arranged within and extending through the latter, an annular partition which divides the annular portion of such chamber that lies between the casing and piston into two like annular parts, and with which the cylindrical piston works in frictional contact, radial projections on the piston which are arranged on opposite sides of the central partition, radially-sliding abutments arranged in the respective annular steam-chambers, levers for working such abutments, slides and guides therefor, and eccentric grooved wheels that reciprocate the slides, inlet-ports and rotary valves for the

latter, oscillating disks, an eccentric and connecting rods for oscillating said valves simultaneously, two exhaust-port valves and a throttle-valve, for the two sides of the engine, and a lever and links for connecting the three valves, as shown and described.

2. In a rotary engine, the combination with the cylindrical casing having an annular partition projecting inward from its inner periphery, the cylindrical rotary piston arranged in said casing and having a circumferential groove, and a circular expansible steel packing laid in the said groove and divided and overlapped, as shown and described.

3. In a rotary engine, the combination, with the casing, having a central interior rib, a rotary piston having wings working on the respective sides of said rib, and radially-sliding abutments coacting with the said wings, of pivoted, horizontal levers that loosely engage the stems of the respective abutments, bars sliding vertically in slotted guides at opposite sides of the casing and loosely connected with the outer ends of said levers, wrist-pins attached to said bars, cam-wheels on the piston-shaft, having grooves in their inner opposite sides to receive said wrist-pins, and springs for holding the inner ends of the levers depressed, as shown and described.

JOHN F. McGLENN.

Witnesses:
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E. J. EDWARDS.