J. W. Barriger's Rotary Engine.

No. 120,231. Patented Oct. 24, 1871.

Fig: 1

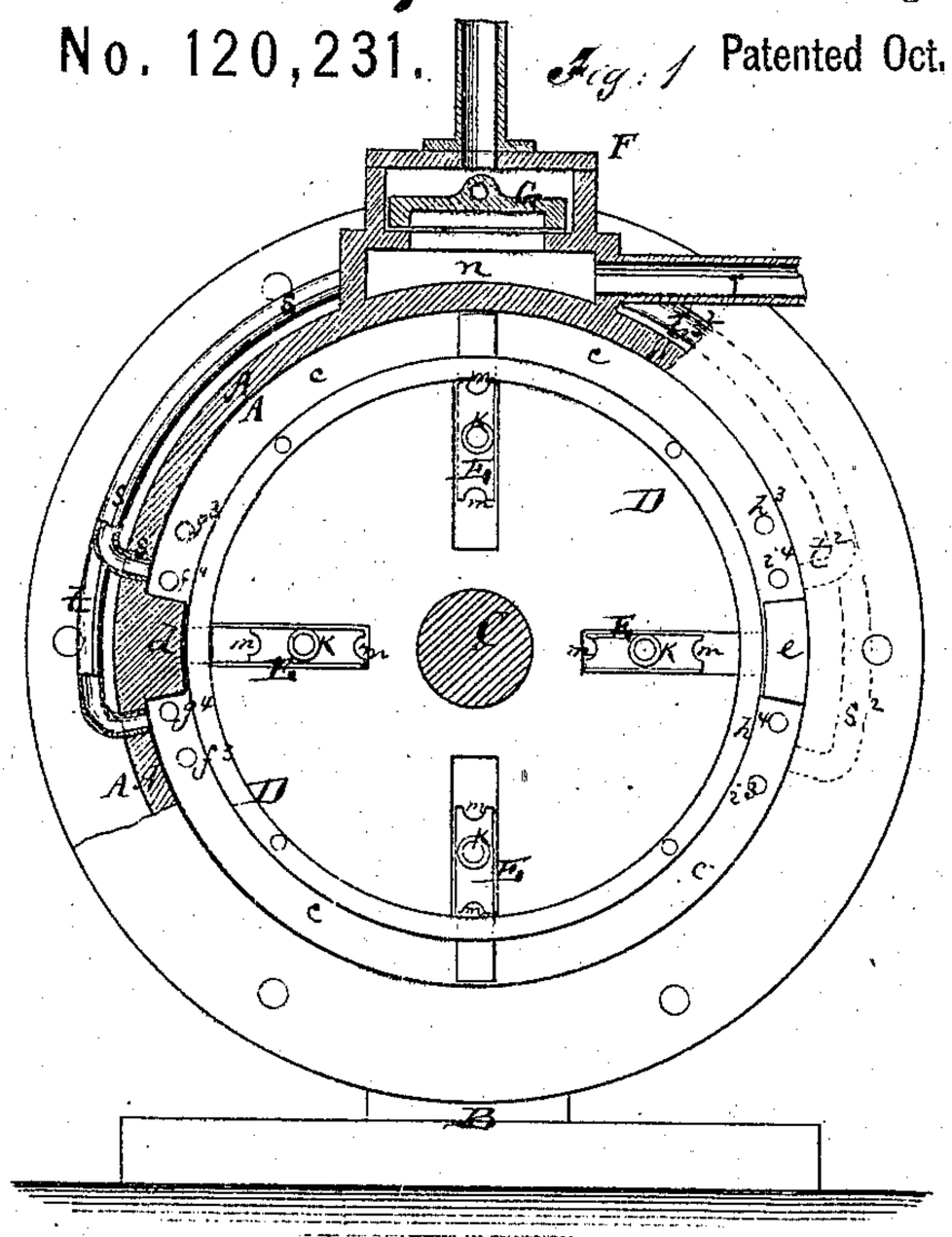

Fig: 2

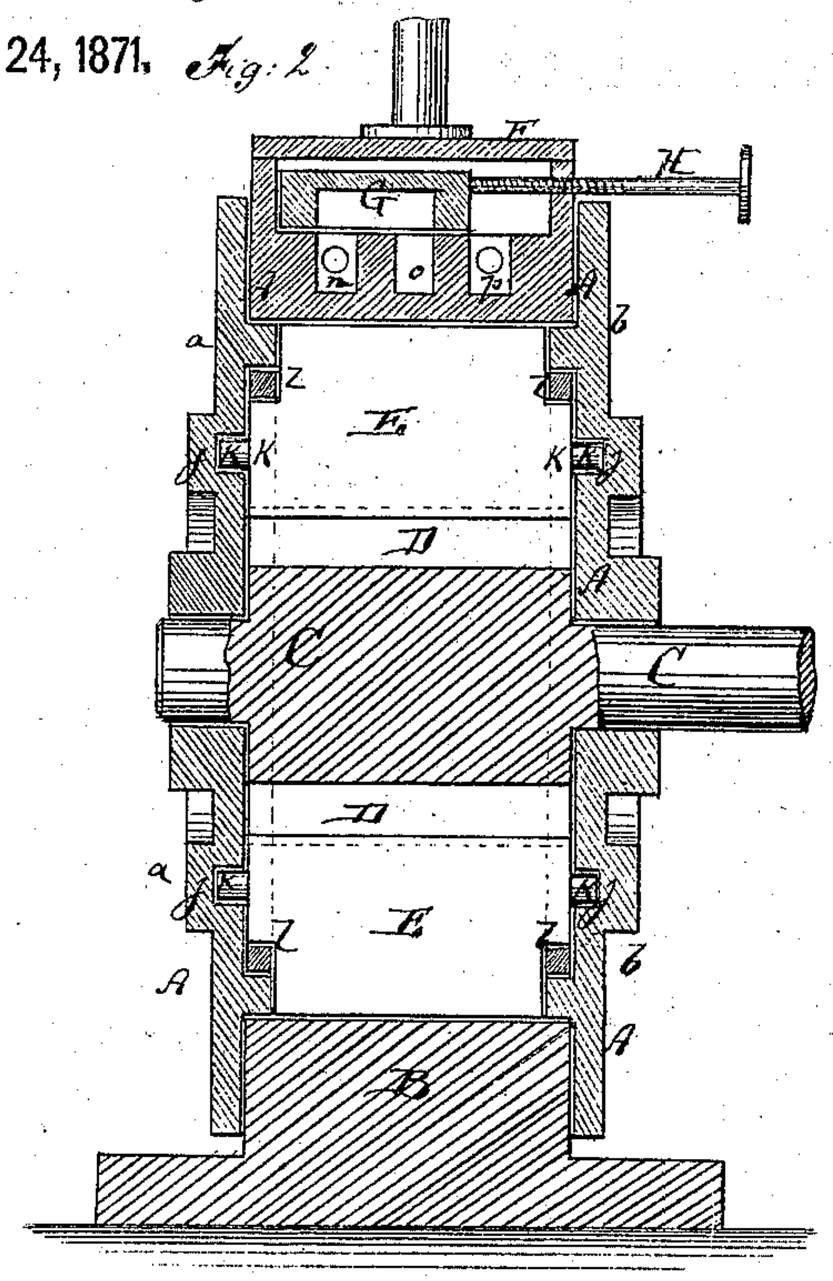

Fig: 3

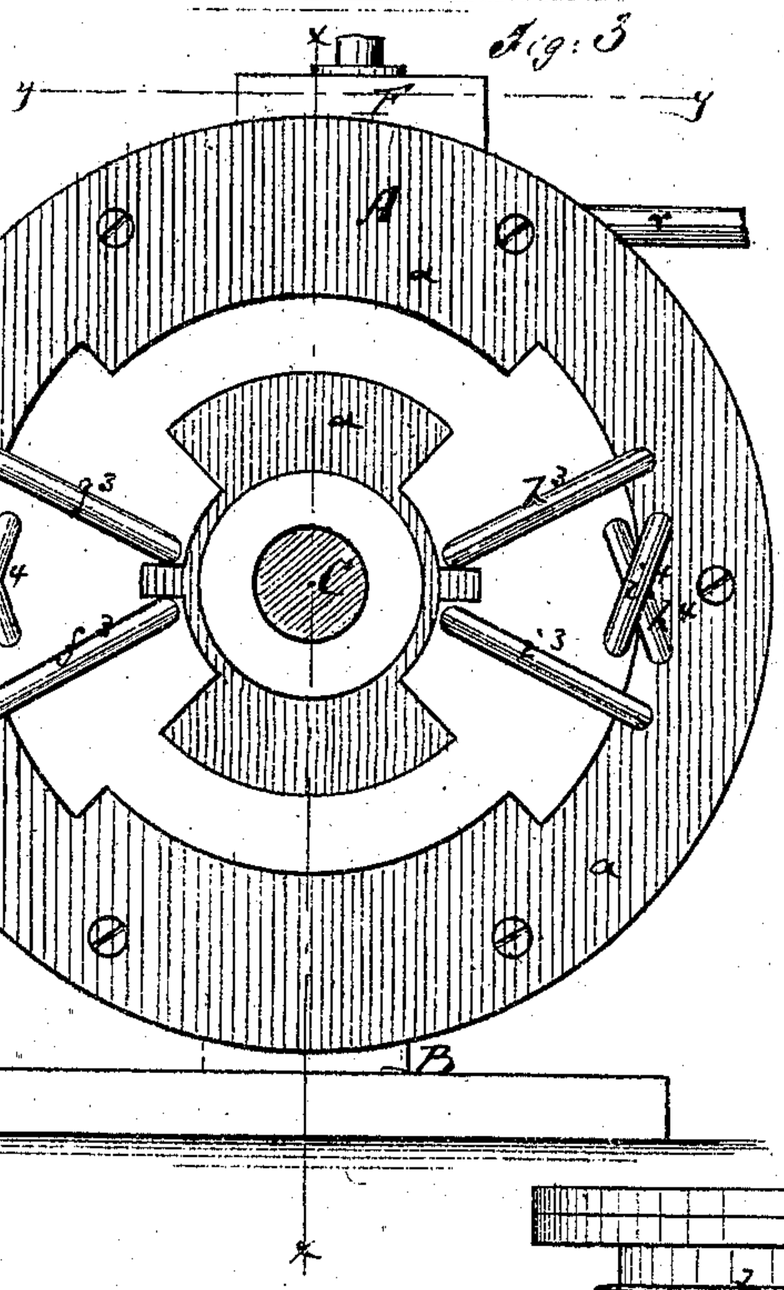

Fig: 4.

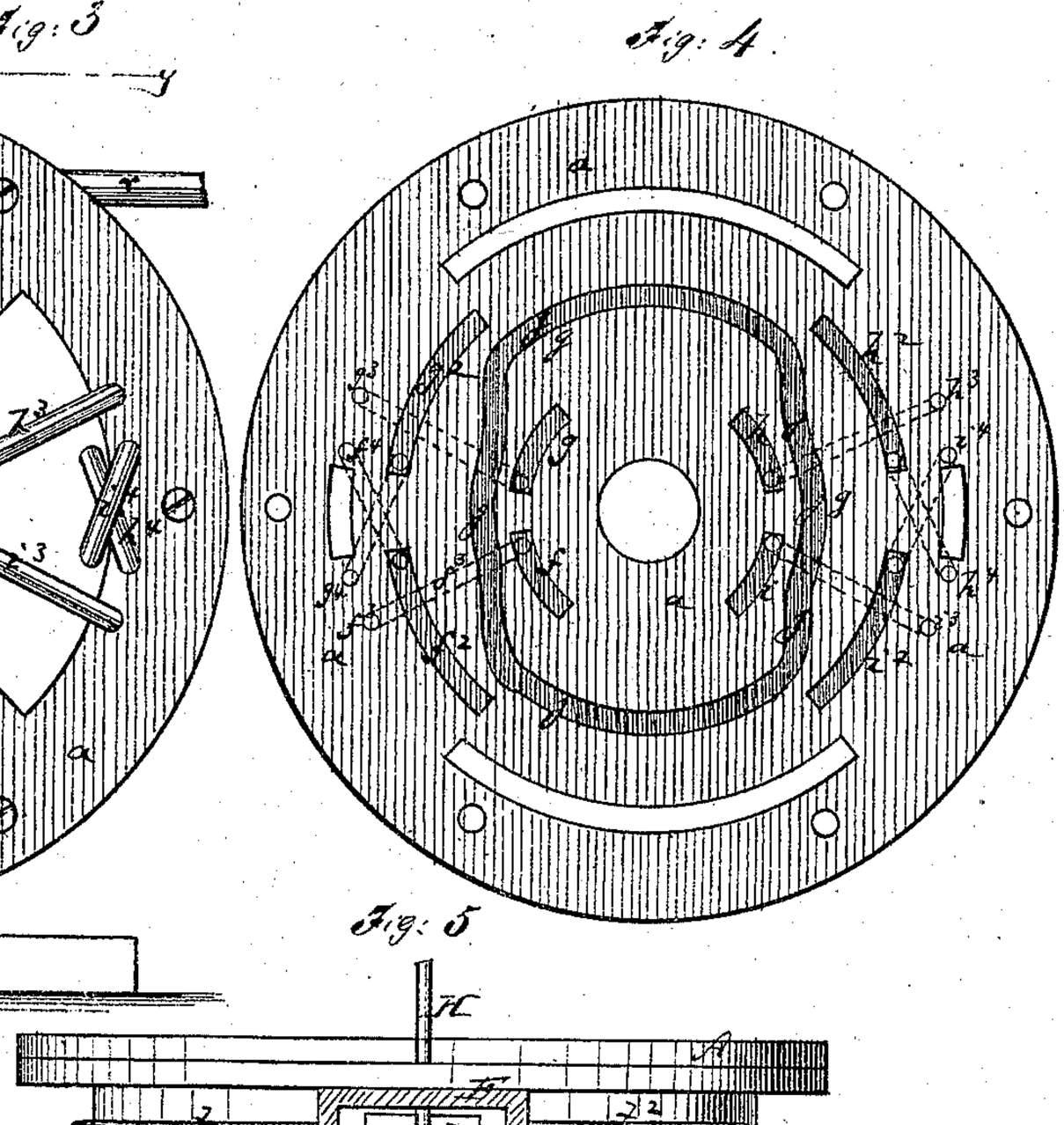

Fig: 5

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UNITED STATES PATENT OFFICE.

JOHN W. BARRIGER, OF OMAHA, NEBRASKA.

IMPROVEMENT IN ROTARY ENGINES.

Specification forming part of Letters Patent No. 120,231, dated October 24, 1871.

To all whom it may concern:

Be it known that I, JOHN W. BARRIGER, of Omaha, in the county of Douglas and State of Nebraska, have invented a new and Improved Rotary Steam-Engine; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawing forming part of this specification, in which—

Figure 1 represents a face view, partly in section, of my improved rotary engine with the head removed. Fig. 2 is a vertical longitudinal section of the same taken on the plane of the line *x x*, Fig. 3. Fig. 3 is an outer-face view of the head of the engine. Fig. 4 is an inner-face view of the same. Fig. 5 is a horizontal section of the engine taken on the plane of the line *y y*, Fig. 3.

Similar letters of reference indicate corresponding parts.

This invention relates to an improved rotary engine of that class in which a rotary cylinder, provided with adjustable sliding pistons, is arranged within a cylindrical case; and the invention consists in the construction and arrangement of parts hereinafter described, in connection with others forming the complete or operative engine and specifically stated in the claims.

A in the drawing represents the cylindrical case of my improved engine, made of suitable size, and supported by a substantial frame or standard, B, whereby it is held stationary. C is the central shaft or axle of the engine. It hangs on the heads *a* and *b* of the case A, and supports within the case the rotary cylinder D. This cylinder is concentric with and smaller than the inner diameter of the case, leaving an annular space, *c*, around it. The cylinder D is firmly mounted upon the shaft, to rotate with the same. The annular space *c* is divided into two equal steam-tight compartments by two abutments, *d* and *e*, which project toward the cylinder from the inner circumference of the case, being diametrically opposite each other, as in Fig. 1. Each head *a b* of the case A contains on its inner side four pairs of ports, which are, on the outside of the head, provided and connected with steam-pipes. One pair of such ports is arranged above and below each of the abutments *d e*, and consists of a longer outer and shorter inner port. The four pairs of ports are fully shown in Fig. 4, and respectively marked $f\ f^2$, $g\ g^2$, $h\ h^2$, and $i\ i^2$. The pipes from the short ports *f*, *g*, *h*, and *i* are respectively marked f^3, g^3, h^3, and i^3, in Fig. 3, and indicated by dotted lines in Fig. 4, while the pipes from the long ports are marked f^4, g^4, h^4, and i^4, respectively. It will be noticed that the pipes from the short ports re-enter the case on the same side of the abutment on which they start, while those from the long ports cross over to the opposite side of such abutments. All these said pipes from the ports communicate with the annular space *c*. *j* is a cam-groove cut into the inner face of each head, so that it passes between the inner and outer ports *f* and f^2, *g* and g^2, &c. This groove is contracted, *i. e.*, brought toward the center of the case, in line with the diameter in which are the abutments, and thrown out at right angles thereto. The two heads *a b* are made exactly alike as regards the position and arrangement of the said ports and cam-grooves. The cylinder D contains four sliding pistons, E E, which are set in slots of the cylinder, so that they can be moved in and out in the same. They have tenons *k k* at their ends, said tenons entering the cam-grooves *j*. The pistons will thus, by mechanical means, be radially thrown out to reach the inner circumference of the case, and divide the space *c*, when they stand at right angles to the abutments, and drawn in when in line with and opposite to the latter, as is clearly shown in Fig. 1. The object of the steam-ports in the heads of the case is, however, to adjust the said pistons by the live steam, so that the friction of mechanical adjustment will be avoided. The cam-grooves serve, therefore, as a reliable guide to insure the proper position of the pistons. The cam-grooves serve also to moderate the motion of the pistons and prevent impact upon their inner and outer seats, which would occur if they were entirely abandoned to the pressure of steam. The outer stops of the several pistons on the cylinder D are formed by rings *l l* on the latter, against which shoulders on the pistons strike, as indicated in Fig. 2. Shallow grooves *m m* are formed in the shoulders and inner edge of each piston, to facilitate the admission of steam from the aforesaid ports to move the piston from its seat. The outer edges of each piston has the same curvature as the inner periphery of the case. F is a steam-chest,

secured upon the case A, and provided with three ports, *n*, *o*, and *p*, and with a slide, G, for connecting two of said ports. Steam is admitted to the central port *o* by a pipe, *r*, and conveyed thence to the port *n* or *p*, with whichever the same is connected by the slide or valve G, the latter being adjusted by a screw, H, or other mechanism. Two pipes, *s* and s^2, lead from the port *n* to opposite sides of the case, one over the abutment *d* and the other under the abutment *e*. Two pipes, *t* and t^2, lead from the port *p* to opposite sides of the case, one under the abutment *d*, the other over the abutment *c*. If the port *n* is in connection with *o* the pipes *s* s^2 are for steam supply, while the pipes *t* t^2 are for the exhaust. The reverse will be the case if *p* is connected with *o* and *n* left open to the exhaust.

The operation is as follows: Steam is admitted simultaneously, through the branch-pipes *s* s^2 or *t* t^2, to opposite sides of the case, both said pipes piercing the case. Steam fills thus the annular spaces between the abutments and that pair of pistons already out in contact with the inner periphery of the case, and enters also the ports of the heads *a b*, which are open to it. The steam pressure causes a rotation of the pistons and cylinder. This rotation produces the sliding motion of the pistons in the cylinder, another pair being exposed to the action of the steam whenever one pair is drawn in. Continuous rotation is thereby obtained. The action of the ports in the heads *a b* is as follows: If steam, for example, enters through the pipe *s*, it also enters the pipes f^4 and g^3, besides acting on the upper piston. The pipes g^3 lead steam to the small port *g* above the abutment *d*, and the pipe f^4 leads steam to the large port f^2 under said abutment. As the space under the abutment connects with the exhaust-pipe *t* the steam in f^4 will escape without action, while that from g^3 will enter the inner shallow grooves *m* of the piston then in line with *d* and tend to force it outwardly, to come into action when above the shaft. The steam which at the same time enters by the pipe s^2 passes into the pipes i^3 and h^4, and serves by the former to push out the piston then in contact with *e*. As the piston from above, however, approaches *e*, so as to cover part of the port h^2, the pipe h^4 brings live steam to act upon its shoulder for forcing it inwardly. The pipe f^4 acts in the same manner upon the other piston. When the engine is reversed by shifting the slide G the other pipes, f^3 g^4 and h^3 i^4, will come into the stated action. By thus providing an automatic adjustment of parts, without the use of valves or special mechanism, the friction of operation is reduced to its minimum, being occasioned only by the rotating cylinder and the sliding pistons. Friction-rollers may, if desired, be fitted upon the projecting tenons of the sliding pistons.

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

1. The case A provided with the abutments *d e*, and combined with the rotating cylinder D, sliding pistons E, and with the heads *a b*, which have the cam-grooves and four pairs of ports, as specified.

2. The sliding pistons E provided with the projecting tenons *k k*, and with the shallow steam-grooves *m m*, as set forth.

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