

(No Model.)

3 Sheets—Sheet 1.

D. McCOLGAN.

ROTARY ENGINE.

No. 301,618.

Patented July 8, 1884.

Fig. 1.

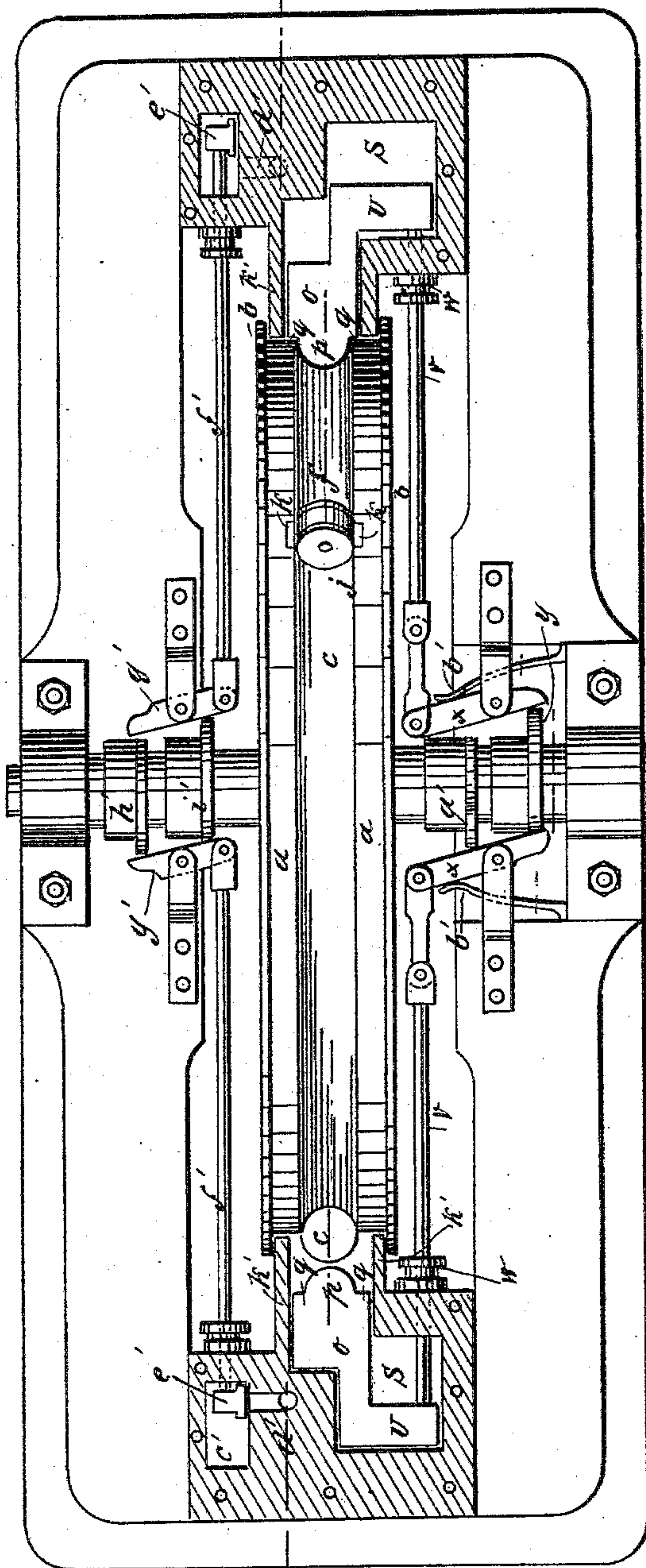


Fig. 2.

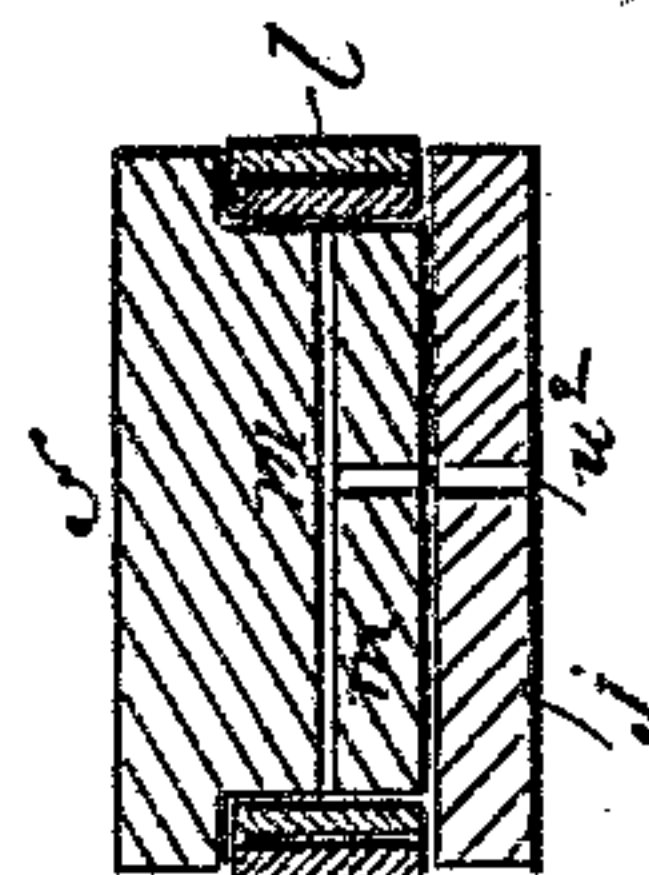
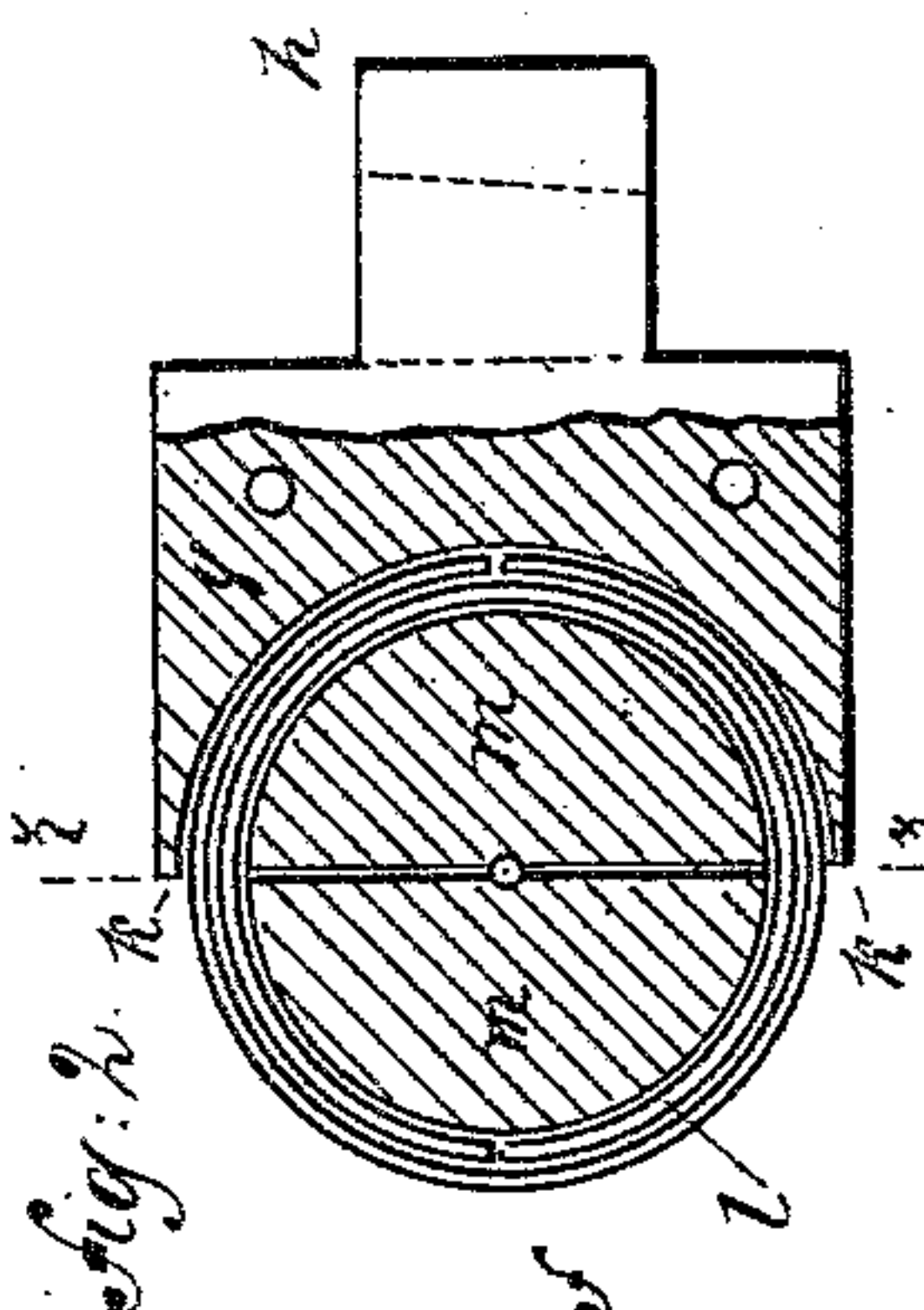


Fig. 3.



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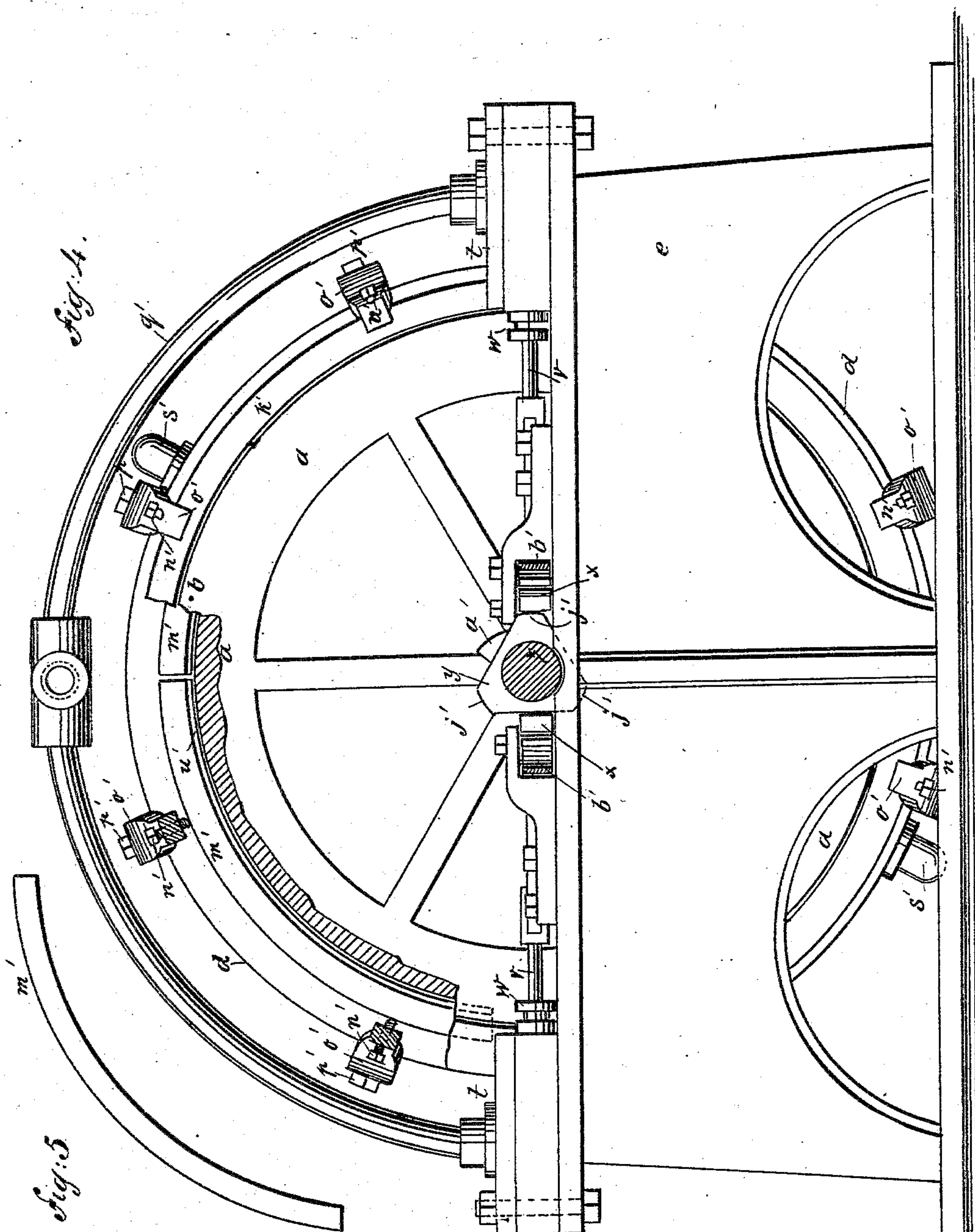
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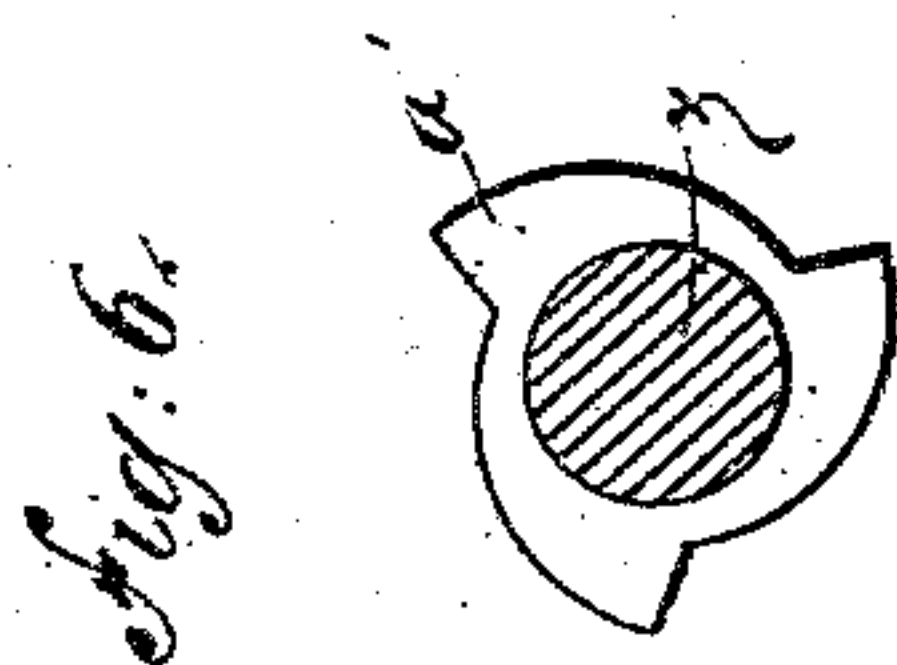
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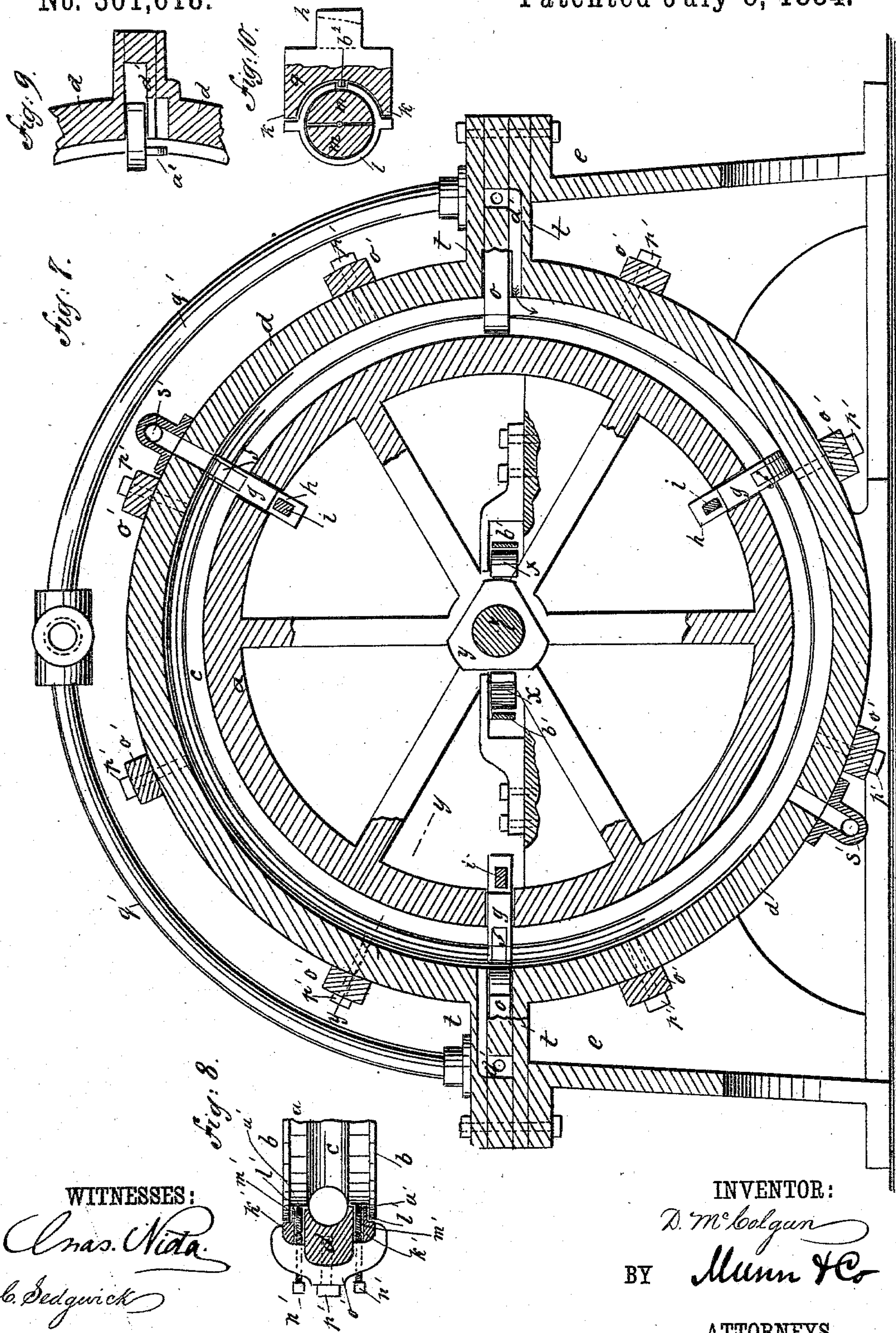
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3 Sheets—Sheet 3.

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UNITED STATES PATENT OFFICE.

DENNIS MCCOLGAN, OF BUTTE CITY, MONTANA TERRITORY.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 301,618, dated July 8, 1884.

Application filed September 21, 1883. (No model.)

To all whom it may concern:

Be it known that I, DENNIS MCCOLGAN, of Butte City, in the county of Silver Bow and Territory of Montana, have invented a new and Improved Rotary Engine, of which the following is a full, clear, and exact description.

My invention consists of a wheel that has a semicircular groove in the face, and running within a stationary ring, also having a semicircular groove, which, together with the groove of the wheel, forms the cylinder or steamway. The wheel carries the pistons, which are fixed in the wheel, and the abutments are arranged in the stationary ring to slide forward and backward, for allowing the pistons to pass, and for closing the cylinder behind them to hold the steam. Slide-valves are employed to shut off the steam while the abutments are shifting, and said valves and the abutments are operated by cams on the shaft of the wheel, the whole being constructed and arranged in a simple manner and adapted to provide an efficient rotary engine of large radius for developing great power with slow motion, all as hereinafter fully described.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a plan view of my improved engine with the upper part of the stationary ring removed, showing the valve and abutment cases open. Fig. 2 is a section of one of the pistons radial to the wheel. Fig. 3 is a transverse section of one of the pistons on line $z z$, Fig. 2. Fig. 4 is partly a side elevation and partly a sectional elevation of the engine. Fig. 5 is a detail of the packing employed between the wheel and the stationary ring. Fig. 6 is a section of the shaft and side view of the cam for working the abutments. Fig. 7 is a sectional elevation of the engine, taken on line $x x$ of Fig. 1, in the plane of the wheel and the stationary ring. Fig. 8 is a section of Fig. 7 on the line $y y$. Fig. 9 is a detail showing a device to push the abutments out by steam-pressure, and Fig. 10 is a detail showing modifications.

I make a strong wheel, a , with flanges b projecting from the sides of the rim, in the face of which I make a semicircular groove, c ,

forming half of the steam-cylinder, the other half of which is formed in the stationary ring d , fitted to the face of the wheel and attached to the bench or base e for support. The face of the wheel is provided with two or more pistons, f , rigidly attached to and located at equal distances apart around the wheel, said pistons being formed on a block, g , that fits steam-tight in a radial slot of the wheel, with a stem, h , projecting through the rim, and being secured by a key, i , inside of the rim. The blocks have a half-round head, j , fitting the groove of the case, and shoulders k , fitting the face of the ring or the packing, and this head is fitted with packing-rings l , which surround a boss, m , of the head; or a removable filling-piece or any approved arrangement of the packing may be employed.

The abutments o consist of a flat plate having a semicircular head, p , fitting the groove c , and shoulders q , fitting the face of the wheel, said plates being arranged in the chambers s and between the flanges t , by which the two sections of the ring d are connected to the base. These abutments have each a laterally-extending arm, u , by which they are connected to a working-rod, v , extending out through a stuffing-box, w , and connected to a lever, x , to be worked by a cam, y , on the shaft z , for shifting them to close behind the pistons, and another cam, a' , on said shaft, and acting on said levers, shifts the abutments back to allow the pistons to pass. In this case I have represented three pistons in the wheel, and therefore employ three throw-cams; but if less or more pistons are employed the cams will be varied accordingly. The springs b' are arranged with the levers x , as shown in Figs. 1 and 4, to throw the abutments forward immediately after the pistons pass, and to press the abutments home in the groove c , and take up any slack that the cams and the levers may have by wear, or may be provided to allow the abutments to be closed in advance of the cams. The valve-chests c' are arranged in the flanges the same as the abutment-chambers are, with steam-ports d' leading therefrom to the steam sides of the abutments, and they are provided with side valves, e' , that are worked by rods f' , levers g' , and cams h' and i' , in the same manner as the abutments are, except that the springs b' are not required with the valves.

These cams are constructed like the others for shifting the valves as many times in the revolution of the wheel as there are pistons.

The cam *y*, which holds the abutments in the cylinder, has concentric faces *j'* for that purpose, which will be varied in number according to the number of pistons employed, and the cams *h'* and *i'* will be suitably shaped for the admission, continuance, cut-off, and release of the steam, according to the manner in which it is preferred to work the steam. For packing the joints between the face of the wheel and the face of the ring *d*, I provide side rings, *k'*, to the main ring, that are connected at the ends to the flanges *t*, by which the half-sections of the ring *d* are attached to the base *e*, said rings having the inner edges, *l'*, fitted between flanges *b* and the sides of ring *d*, and between these rings and ring *d*, I arrange thin sectional packing-rings *m'*, that are pressed on the face of the wheel at their inner edges, with hemp or other suitable packing, *u'*, Fig. 4, between, by set-screws *n'* in clamps *o'*, that are screwed onto the ring *d* at intervals along it by screws *p'*, tapped into said ring. Steam is supplied by the pipe *q'* and exhausts at *s'*.

This improved engine may be used with one piston and abutment, if preferred, when very high speed is required; but for slower speed and greater power I prefer to use two abutments and three pistons, which gives a very steady motion, as in this arrangement the engine takes steam on one side first before it exhausts on the other side. The pistons have a small hole, *u²*, on the steam side, for admitting steam under the packing-rings to expand them, and the heads of the abutments are to be provided with similar rings, which are to be expanded in the same way. The abutments *o* may have a projection, *a²*, which runs in the steam-port *d'* and closes it when the abutment slides back, for enabling the abutment to be shoved forward by the steam when the valve opens, in lieu of the springs *b'*, if preferred. The shoulders *K* of the pistons, that run on the edges of the segments *d*, to prevent the steam from leaking past the pistons, may be formed on the packing-rings *l*, if preferred, and said rings may have a stud at *b²*, projecting from the piston-block into a notch of the rings, to prevent them from turning in their seats in the pistons, as shown in Fig. 10.

By forming the abutment and valve-chests between the flanges *t t* of the stationary ring, great facility is afforded in the casting thereof, and by simply removing the securing-bolts the stationary ring with the supply-pipe may

be simultaneously removed, exposing the several abutments and valve-chests for inspection and repairs. The same flanges also serve as a means of attaching the stationary ring to the bed-plate.

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

1. The combination, in a rotary steam-engine, of the wheel *a*, having a semicircular groove, *c*, in its face, the segmental stationary ring *d*, having a corresponding groove in its inner face, one or more pistons, *f*, attached to the wheel, one or more sliding abutments, *o*, working in bearings formed between flanges *t* in the stationary ring, and one or more valves, *e'*, also working in bearings between the flanges *t* in said stationary ring for admitting the steam, said stationary ring being provided with exhaust-ports, substantially as described.

2. The combination of the cams *y* and *a'* on the shaft *z*, levers *x*, and the springs *b'* with the abutments *o* and their connecting-rods *v*, substantially as described.

3. The segmental ring *d*, constructed in two parts, each having flanges *t*, and being attached to the base *e*, and having the abutment and valve-chests arranged between said flanges, substantially as described.

4. The combination of the side rings, *k'*, packing-rings *m'*, clamps *o'*, and adjusting-screws *n'* with the ring *d*, having a groove forming part of the steamway, and with the wheel *a*, having the groove forming the rest of the steamway, and also having the flanges *b*, substantially as described.

5. The combination, in a rotary engine, of the grooved wheel *a*, grooved stationary ring *d*, fixed pistons *f*, sliding abutments *o*, cams *y a'*, and springs *b'*, sliding valves *e'*, cams *h' i'*, and the levers *x* and *g'*, substantially as described.

6. The pistons *f*, consisting of block *g*, having a semicircular head, *j*, fitted with packing-rings *l*, and provided on its face with an aperture leading to the inner sides of the packing, whereby on the entrance of steam into said aperture said packing is expanded to snugly fit the semicircular groove in the stationary ring, substantially as set forth.

7. The pistons *f*, consisting of block *g*, having a semicircular head fitted with packing-rings *l*, substantially as described.

DENNIS McCOLGAN.

Witnesses:

WILLIAM W. DIXON,
WILLIAM I. LIPPINCOTT.