

(No Model.)

2 Sheets—Sheet 1.

E. Y. MOORE.  
DIFFERENTIAL PULLEY BLOCK.

No. 492,609.

Patented Feb. 28, 1893.

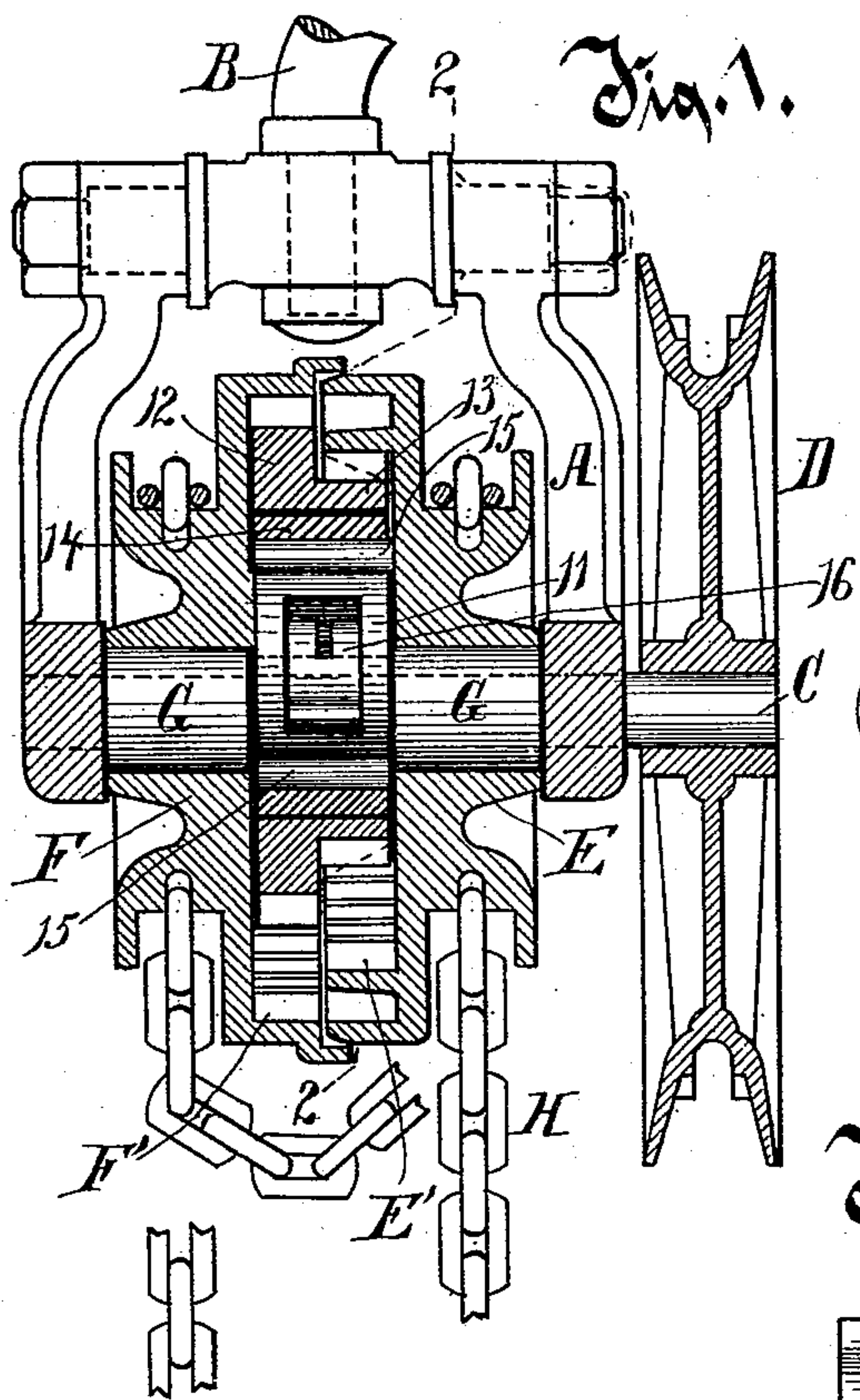


Fig. 1.

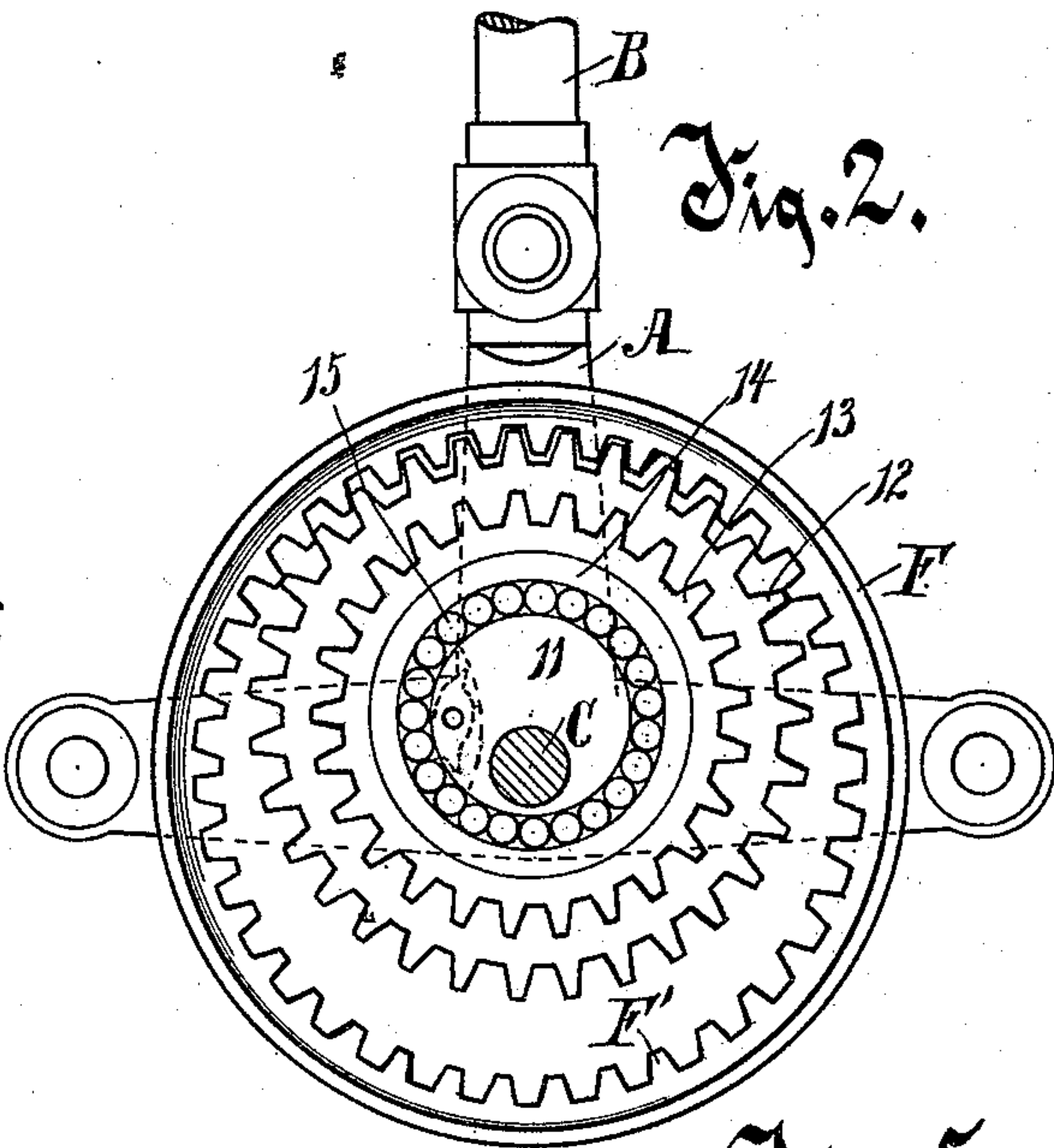


Fig. 2.

Fig. 6.

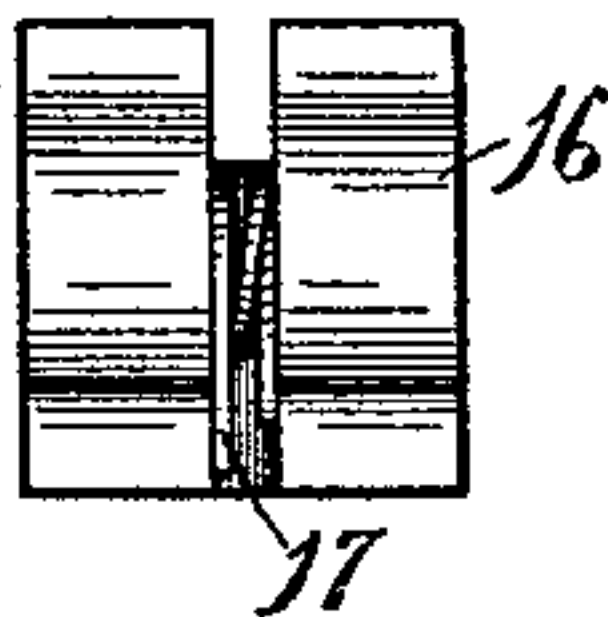


Fig. 3.

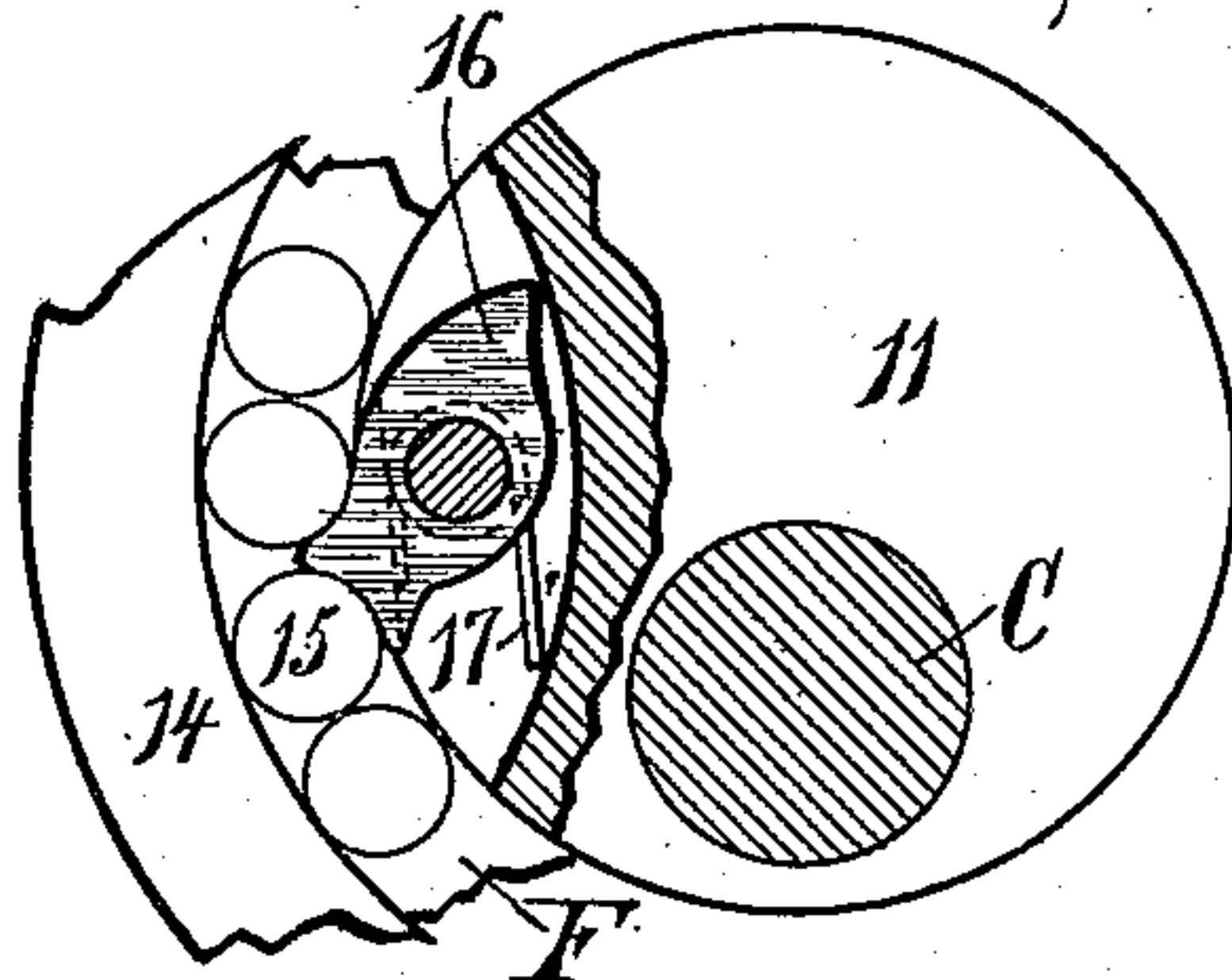
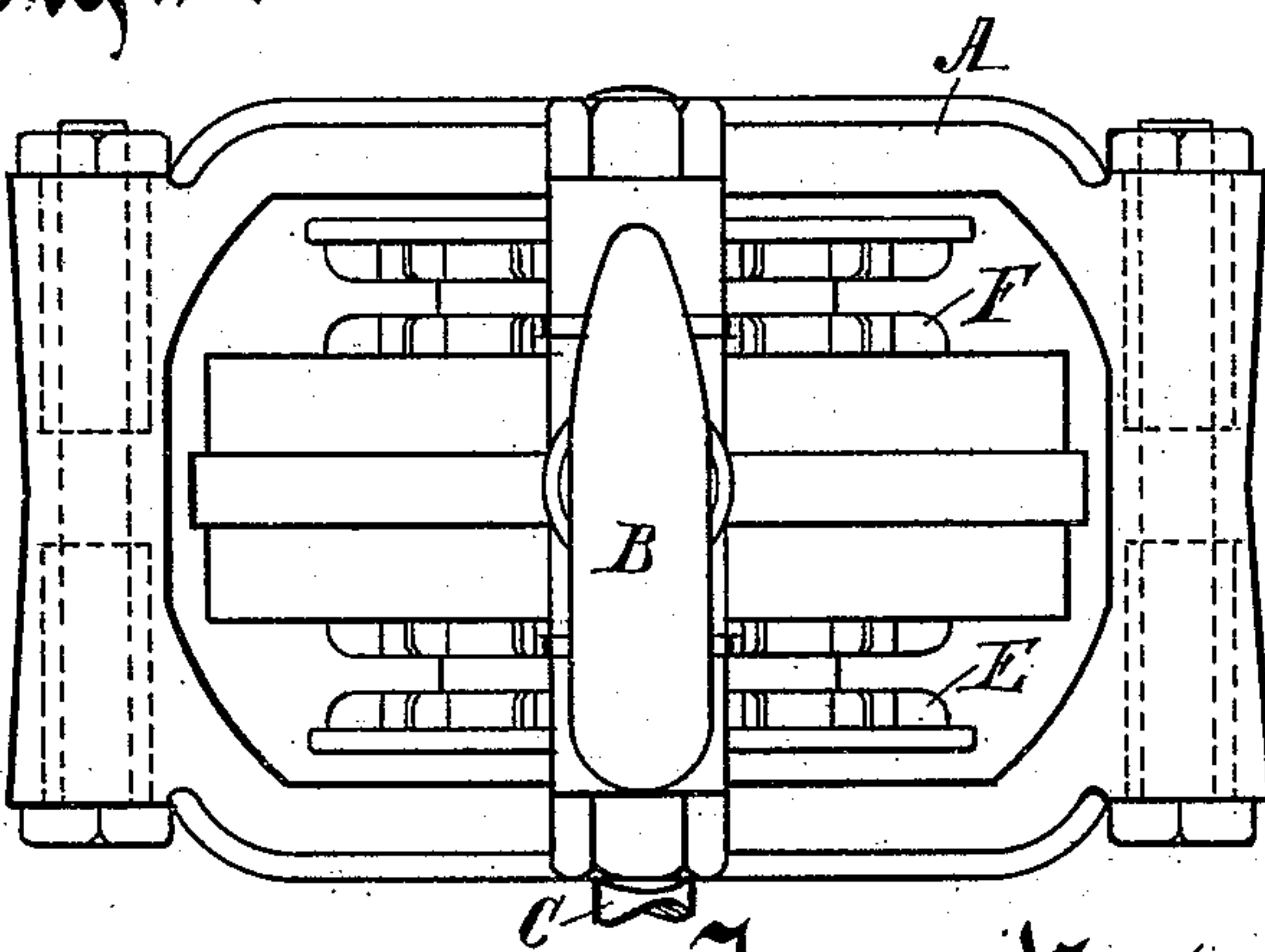
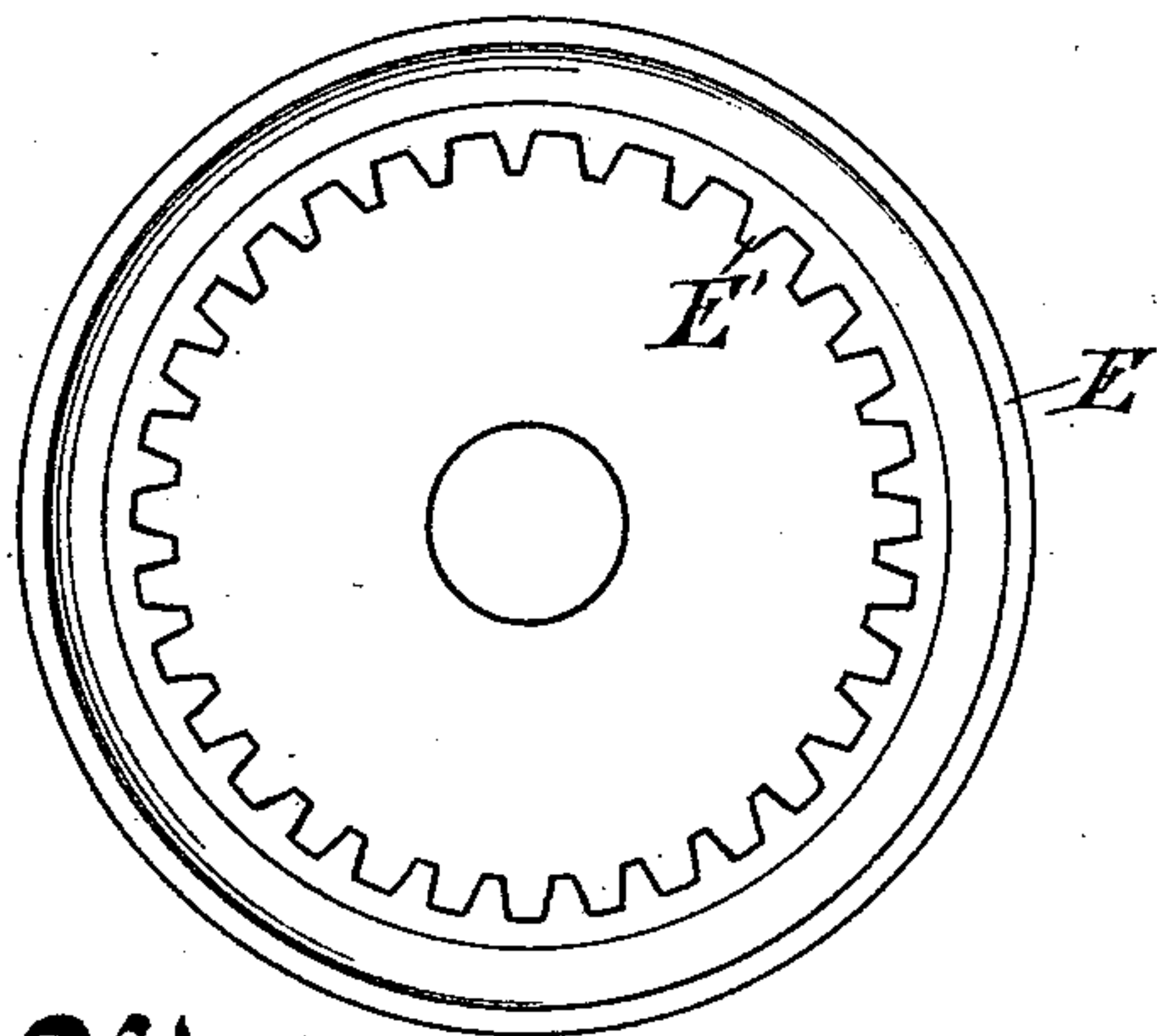


Fig. 5.

Fig. 4.



Witnesses.  
Anna C. Faust.  
C. H. Kuehn.

Inventor  
Edward G. Moore  
By Benedict Monell  
Attorneys.

(No Model.)

2 Sheets—Sheet 2.

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Fig. 7.

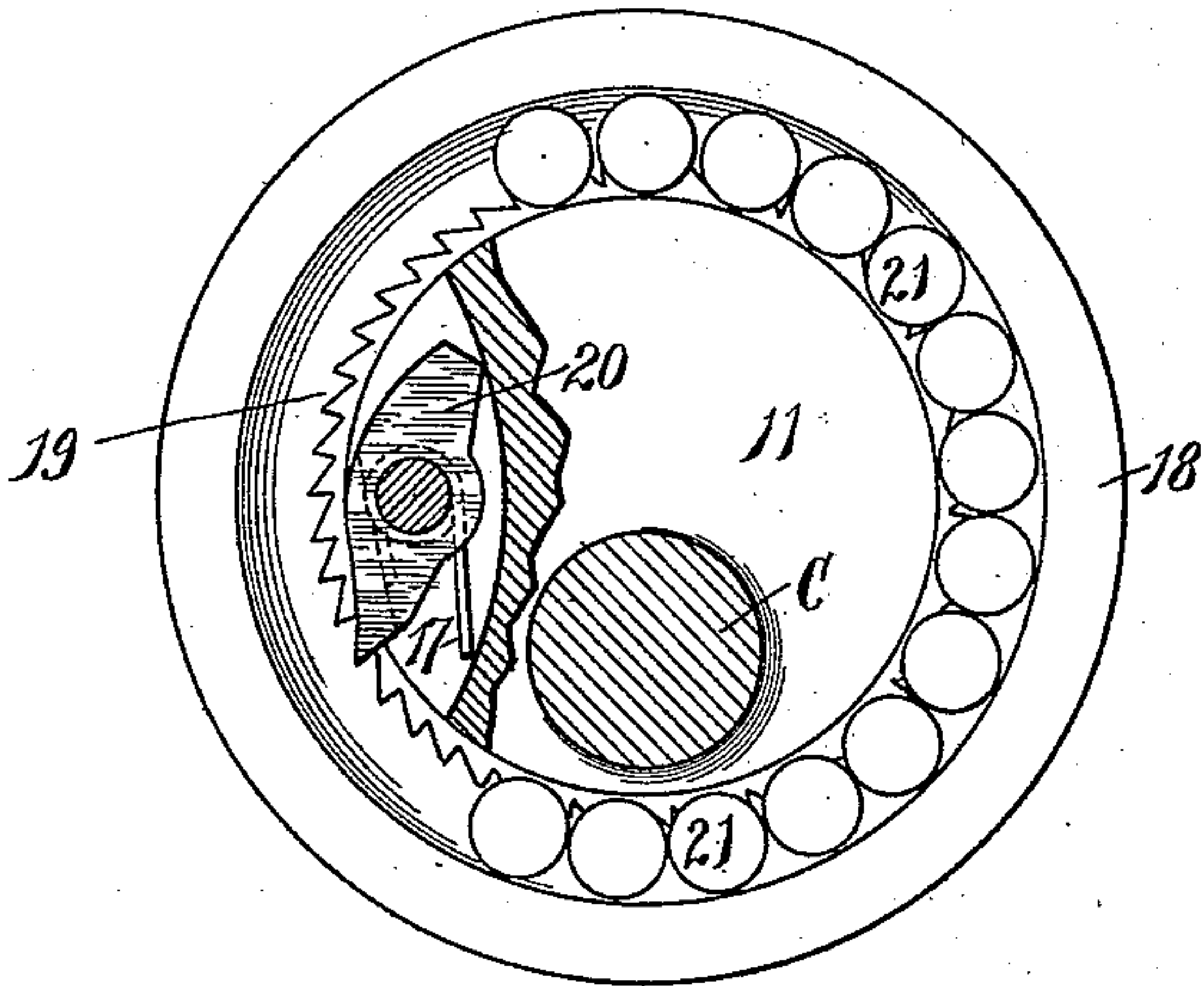


Fig. 8.

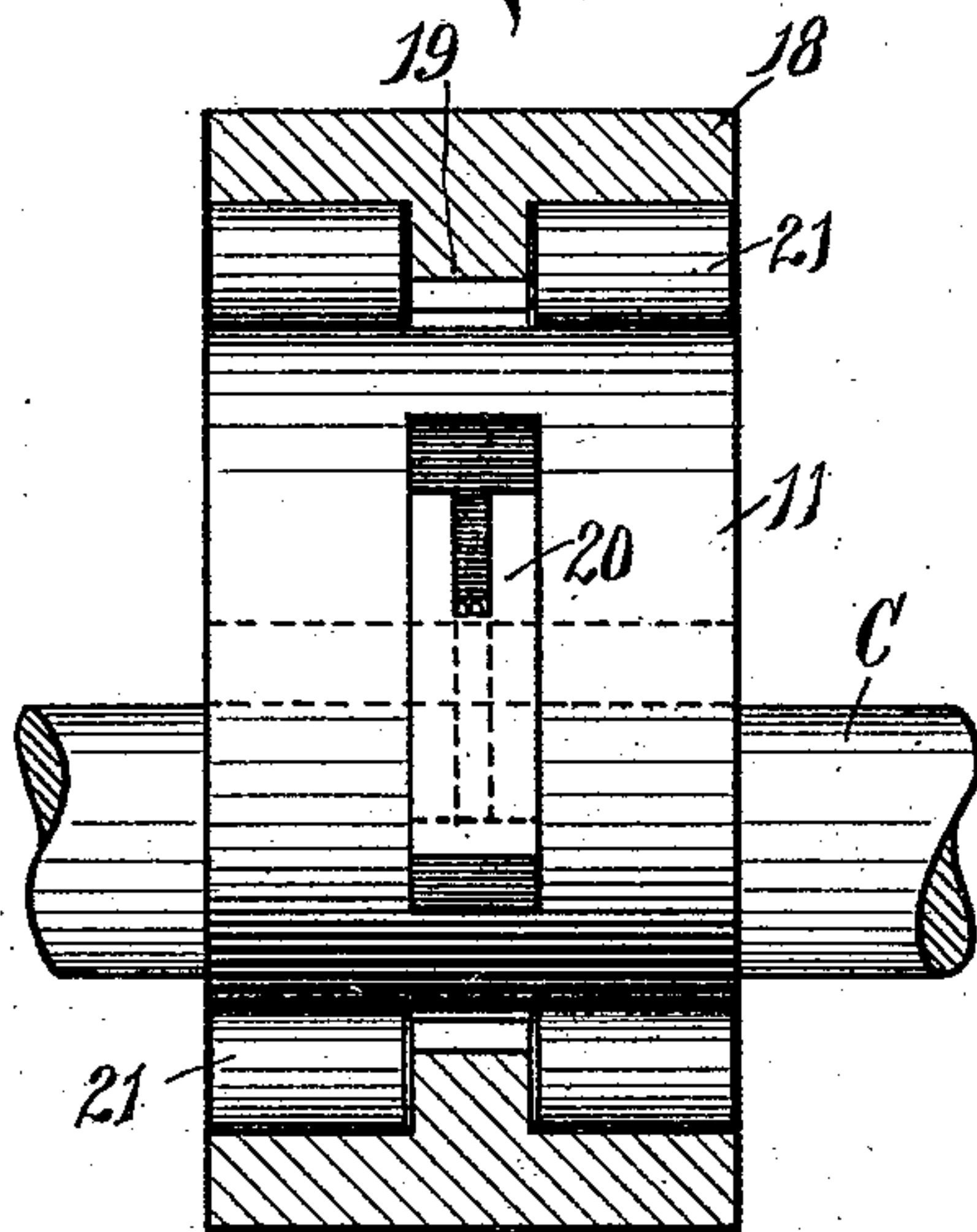


Fig. 9.

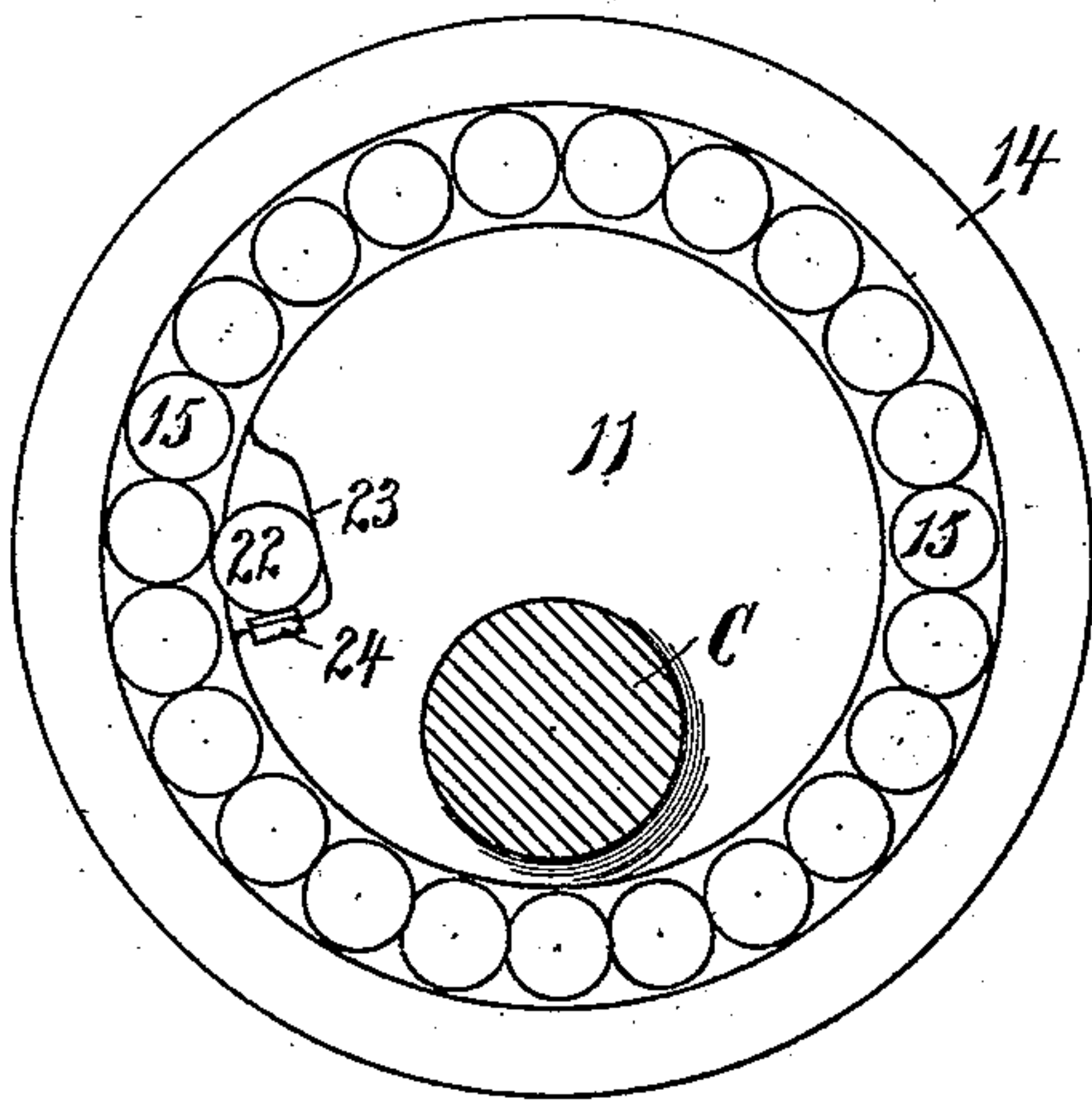
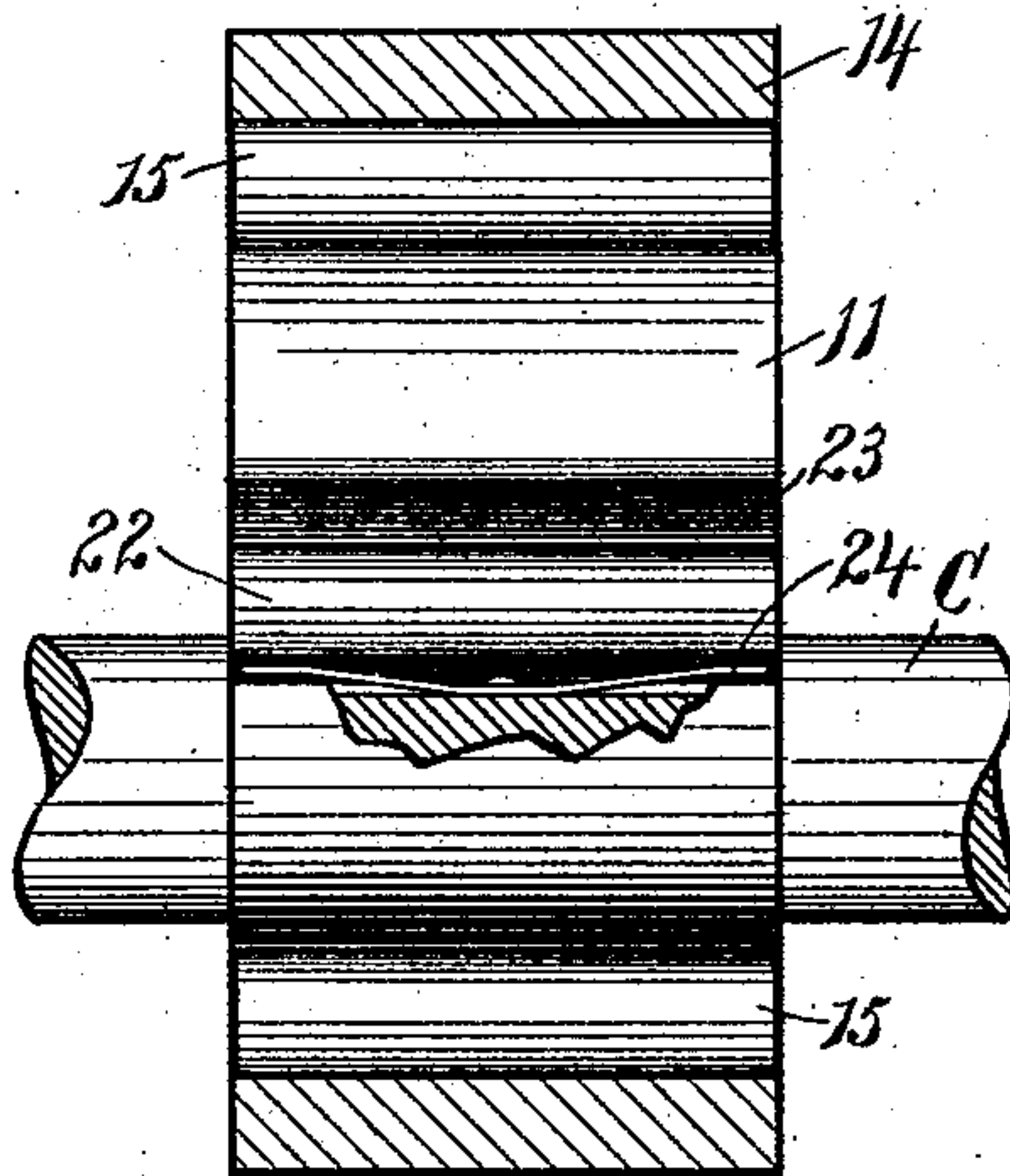


Fig. 10.



Witnesses.

Anna C. Faust.  
O. H. Keeney,

Inventor.

Edward Y. Moore  
By Rudolph Morell  
Attorneys.



# UNITED STATES PATENT OFFICE.

EDWARD Y. MOORE, OF MILWAUKEE, WISCONSIN.

## DIFFERENTIAL PULLEY-BLOCK.

SPECIFICATION forming part of Letters Patent No. 492,609, dated February 28, 1893.

Application filed October 27, 1892. Serial No. 450,150. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD Y. MOORE, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a new and useful Improvement in Differential Pulley-Blocks, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

This invention relates to new features in a pulley-block like or similar to the block for which Letters Patent No. 467,513 were issued to me on January 26, 1892.

The pulley-block which is improved by the invention, is an apparatus for raising and lowering great loads at a slow speed, by means of a comparatively small amount of power, moving through a much greater space and at much greater speed.

The chief object of this invention is to provide means for locking the active mechanism in the pulley-block against reversing its load-elevating movements, or in other words, means for obviating its running down under the weight of a load.

The invention consists in the mechanism hereinafter described and claimed, in and by which said chief object is accomplished and other minor results are secured.

In the drawings, Figure 1, is an elevation of the pulley-block partly in section, thus disclosing features of my invention which are located interiorly about the axle. Fig. 2, is a section of the device on line 2—2 of Fig. 1 looking toward the left. Fig. 3, is a top plan view of the pulley block. Fig. 4, is an elevation of the chain wheel at the right of the line 2—2 in Fig. 1. Fig. 5, is an end view of the eccentric on the axle, which eccentric is partly broken away showing a pawl pivoted therein, in connection with a fragment of the encompassing ring and interposed rollers thereby exhibiting the locking mechanism and illustrating its method of operation. Fig. 6, is a detail of the pawl. Figs. 7 and 8 show a modified form of the locking mechanism, and Figs. 9 and 10 show still another modified form of the locking mechanism.

A is the frame of the pulley-block, which is of suitable size and form to carry the operative mechanism mounted therein. The hook B is swiveled in the top of the frame centrally,

and is adapted for suspending the pulley-block. An axle C journaled in the frame is provided with a fixed chain wheel D. An endless chain (not shown in the drawings) runs on this wheel, and is adapted for rotating the wheel by hand, to operate the mechanism. Two other chain wheels E and F, of equal diameter, are mounted revolubly on the cylindrical studs or bosses G, integral with the frame, which are pierced centrally by the axle C. The wheels E and F are concentric with the axle C. A chain H runs on the two wheels E and F, the chain being so arranged that it runs over one wheel, as E, from front to rear or from rear to front, one line of the chain being carried diagonally beneath the wheels and up over the other wheel F in the same direction as over the wheel E, that is, from front to rear or from rear to front. The load is supported on the free ends of the chain, conveniently by a yoke (not shown in the drawings) to which the extremities of the chain are attached. This yoke when carrying a load rises and falls evenly with the extremities of the chains pendent from the wheels on opposite sides of the axle C.

The chain H as described is integral, and is conveniently but not necessarily so in practice as there may instead be two chains one running on each wheel, E and F, it being only necessary that the load is supported on two extremities of the chains, one extremity of each chain, and that the two extremities depend on opposite sides of the axle.

Interposed between and partially within the wheels E and F a cylindrical eccentric 11 is fixed on and rotates with the shaft C. Two spur wheels (or double wheel) a greater wheel 12 and a lesser wheel 13 constructed integrally and arranged concentric with the eccentric 11, are carried thereby around the axle C, being mounted free on a ring 14 which is rotatable about and concentric with the eccentric 11 on antifriction rollers 15 interposed between them. The chain wheel E is provided with internal teeth or gear E' which meshes with the teeth of the smaller wheel 13, the internal gear E' being considerably larger and containing more teeth than the spur wheel 13 does, which may differ in ratio but which in the drawings are thirty-one in the gear E' and twenty-five in the wheel 13. The chain



wheel F is provided with an internal gear F' which meshes with the spur wheel 12, but which is larger and contains more teeth than the spur wheel 12 does. The difference in the number of teeth in the gear F' and the wheel 12 may vary as desired but in the drawings are shown as being thirty-eight and thirty-two respectively, the difference (six, in the device shown) in the number of the teeth on the wheels 12 and 13 being the same as the difference in the number of cogs on the wheels E and F. The teeth on the wheels E and 13 and the teeth on the wheels F and 12 that respectively mesh with each other, are constructed with the same pitch, and are so proportioned as not to wedge upon, strain or unduly grind each other. These several wheels and their supporting devices are so constructed and arranged that the wheels 12 and 13 as they roll around the axle C with the eccentric 11, are constantly in mesh with the wheels E and F on that side of the axle at which the eccentric has the greatest radius, and are otherwise out of gear therewith.

The double wheel 12, 13, is fitted rotatably on the ring 14 so that ordinarily and especially when the tackle block is supporting a load the ring held to the wheel by friction rotates therewith. The bearing surface of the periphery of this ring is of such extent and contacts with the double wheel 12, 13 with so much resistance as to obviate the reversing of the motion of the wheel 12 and 13 on the ring 14 under the strain on the wheels of the weight of the load even when the load is not counterbalanced by force applied through the chain on the wheel D and axle C. It only remains therefore to lock the ring 14 against reversing its motion on the eccentric 11 to perfectly lock the operative mechanism against running down when supporting a weight not counterbalanced by force applied through the hand chain running on wheel D. For this purpose a pawl 16 pivoted in a recess therefor in the periphery of the eccentric 11 is arranged to engage the rollers 15 in one direction and force the roller engaged against the inner wall of the ring 14 and directly and indirectly against the rollers following in the line of motion thereby preventing rotation of the ring 14 about the eccentric against the resistance of the pawl. A spring 17 bearing against the pawl holds it up to its work yieldingly permitting the rollers to pass the pawl in one direction and to be engaged by it in the other direction. This construction effectually prevents the running down of the load when unbalanced otherwise than by the friction and differentiated or cross strain of the mechanism.

In the modified form of device shown in Figs. 7 and 8 the ring 18 corresponding generally with the ring 14 in the first form of device is provided midway between its ends with an annular inwardly projecting flange 19 having teeth on its inner edge adapted to be engaged directly by the pawl 20 pivoted

in the peripheral recess in the eccentric 11. This construction directly and positively locks the ring 18 to the eccentric 11 against rotation thereon in a direction opposite to the resistance of the pawl. In this form of device there are two sets of rollers 21, 21, one set on each side of the flange 19, interposed between the eccentric 11 and the ring 18 to receive the bearing of these parts respectively.

In the modified form shown in Figs. 9 and 10 a loose cylindrical block 22 located in a recess therefor in the periphery of the eccentric 11 is made to serve as a pawl engaging the rollers 15 in one direction, thereby locking the ring to the eccentric against rotation thereon in one direction. The cylindrical block 22 is advisably of substantially the same size as one of the rollers 15 and is located in a recess in the periphery of the eccentric 11 being arranged longitudinally parallel with the rollers 15. The recess in the eccentric 11 is elongated peripherally being of sufficient depth radially at one end to receive the block 22 so entirely therein as to permit the rollers 15 to pass the block freely when in that location. The rear wall 23 of the recess is, however, arranged obliquely to a radius of the eccentric narrowing the depth of the recess toward its other extremity so that the block being forced away from this widened part toward the other end of the recess is wedged between the rear wall of the recess and a roller 15 thereby forcing the rollers 15 against the ring 14 and preventing its rotation about the eccentric in opposition to the resistance of the block. The block is held yieldingly up to its work by a spring 24, secured to the eccentric and bearing against the block.

In use the double wheel 12, 13, in raising a load engages the ring 14 by friction sufficiently that the ring rotates with the wheel traveling on the rollers 15, and the load is automatically sustained by the locking of the eccentric to the ring and the friction of the double wheel on the ring, but when the load has been removed or is to be run down, the movement of the elevating chain H is reversed or run down, by reversing the motion of the wheel D, the double wheel 12, 13, during such reversed motion or running down, rotating on the ring 14. It will be understood concerning this device for locking the ring to the eccentric against rotation thereon in one direction, that a pawl located in the ring and adapted to engage the interposed rollers or rack teeth on the eccentric would be merely reversing the position of the pawl and would be an equivalent for the special forms shown in the drawings.

The invention claimed is—

1. In a differential pulley-block, the combination with an axle, of an encircling loose pulley provided with gear, a toothed wheel mounted on the axle meshing with the pulley-gear for transmitting motion to and from the pulley, an interposed free friction bearing



ring and means for locking the ring against independent rotation in one direction, substantially as described.

2. In a differential pulley-block, the combination with an axle, an eccentric rigid on the axle, and a double gear wheel mounted and revoluble thereon adapted for transmitting motion to a loose pulley, of a free friction bearing ring within the double wheel, and rollers interposed between the ring, and eccentric, as set forth.

3. In a differential pulley-block, the combination with an axle, an eccentric rigid on the axle, and a double gear-wheel mounted and revoluble thereon, of a free bearing ring within the double wheel, rollers interposed between the ring and eccentric, and means for locking the ring to the eccentric against rotation thereon in one direction.

4. In a differential pulley-block, the combination with an axle, an eccentric rigid on the axle and a double gear-wheel mounted and

revoluble thereon, of a free bearing ring within the double wheel, rollers interposed between the ring and eccentric, and a pawl provided with a spring arranged to engage a roller, and block the rotation in one direction of the ring on the eccentric.

5. In a differential pulley-block, the combination with an axle, of an encircling loose pulley, a gear wheel for transmitting motion between the axle and the pulley, a free friction bearing ring interposed between the gear wheel and the axle, rollers on which the ring revolves about the axle, and means for locking the ring to the axle against rotation thereon in one direction, as described.

In testimony whereof I affix my signature in presence of two witnesses.

EDWARD Y. MOORE.

Witnesses:

C. T. BENEDICT,  
A. L. MORSELL.