

L. BURNHAM.
ENGINE STARTER.
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Patented Oct. 12, 1909.

936,700.

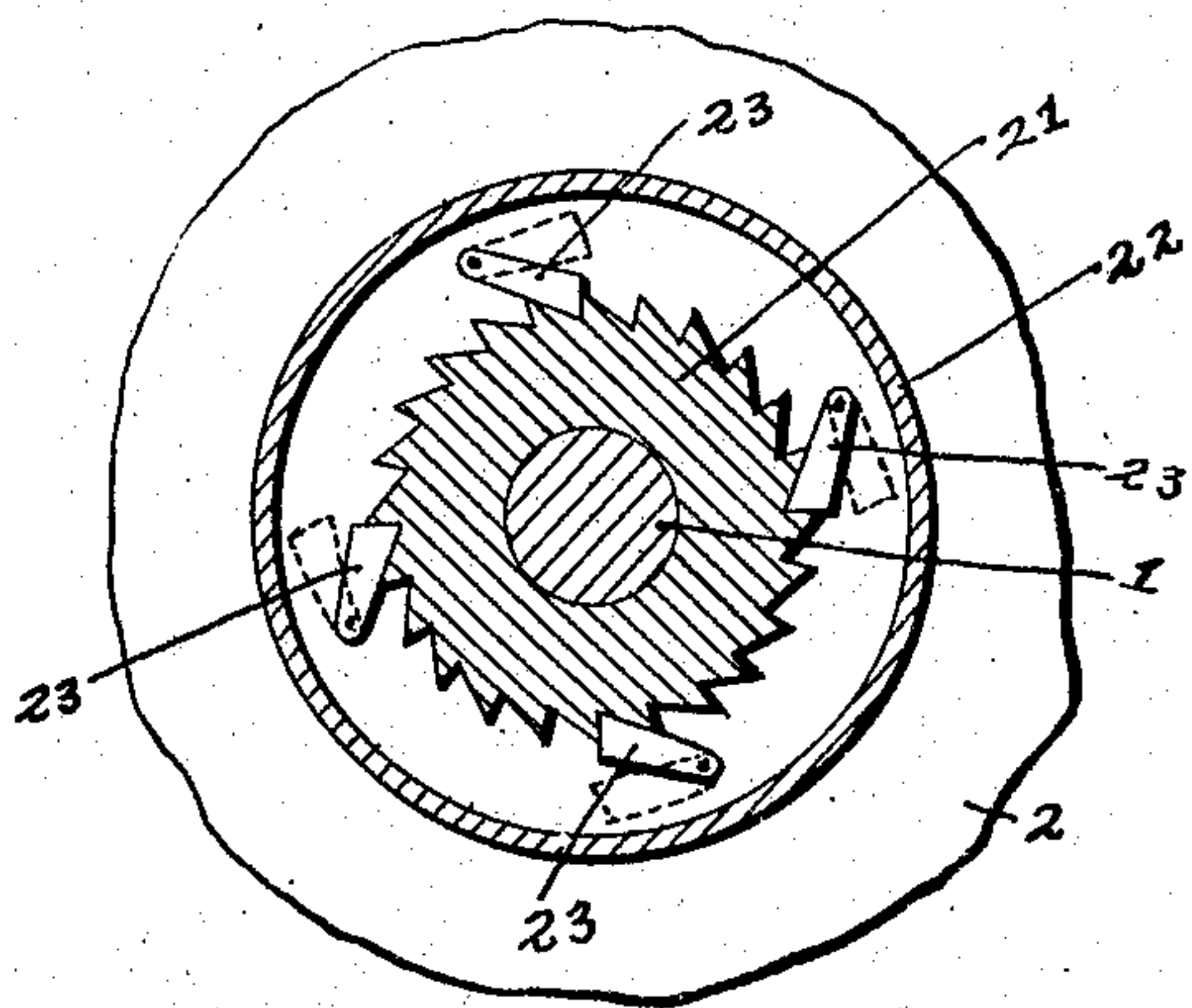


Fig. 3.

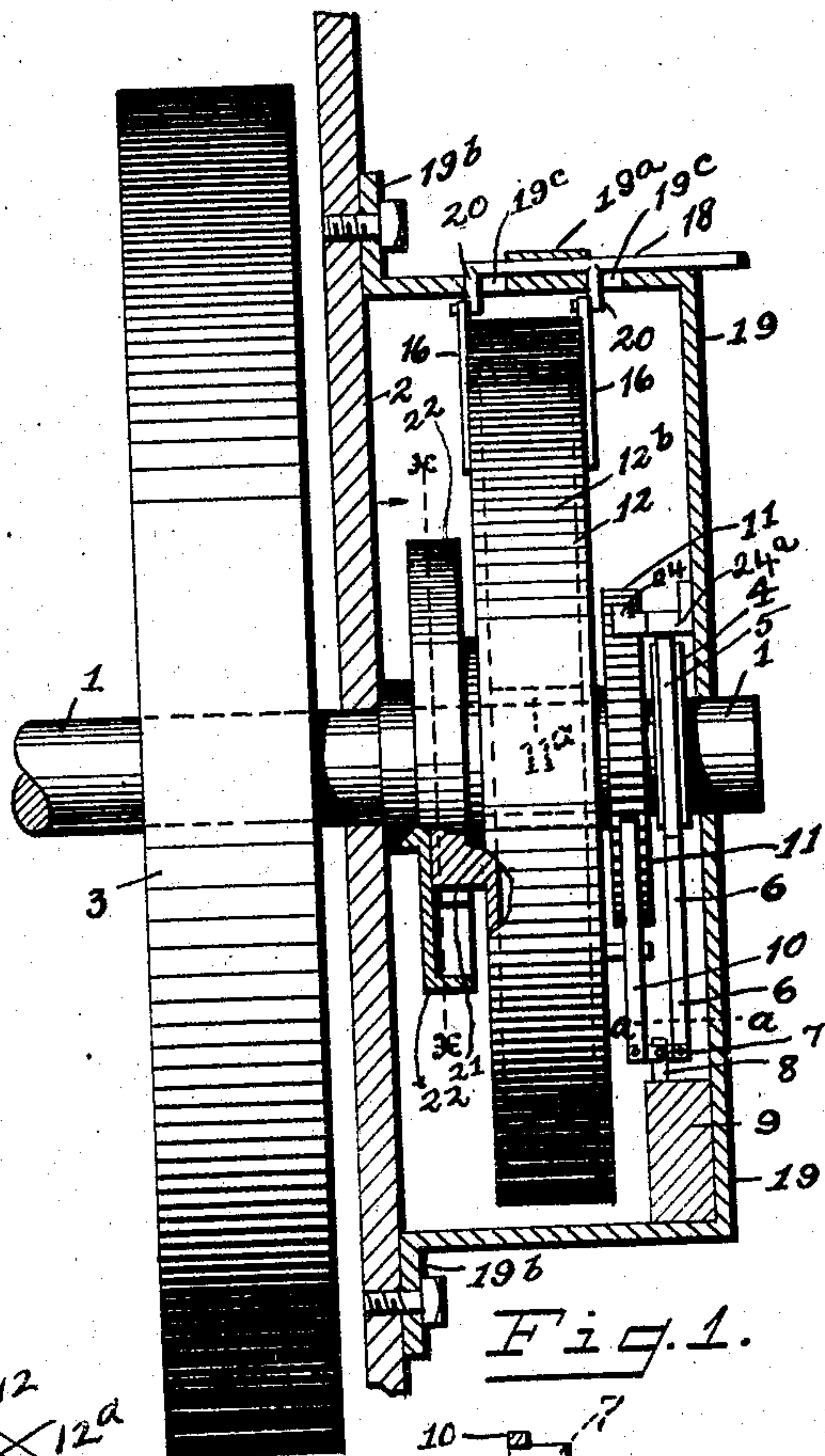


Fig. 1.

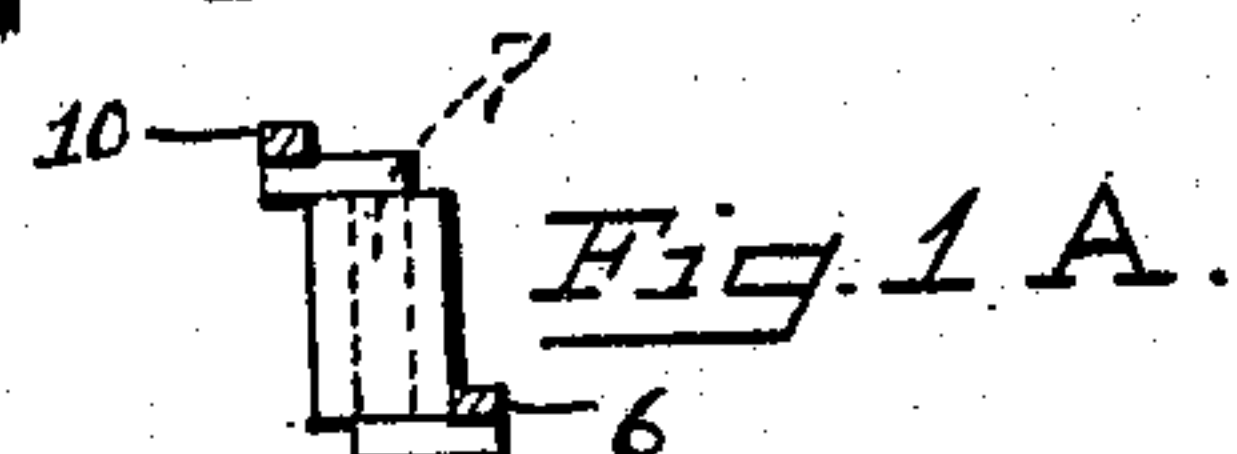


Fig. 1 A.

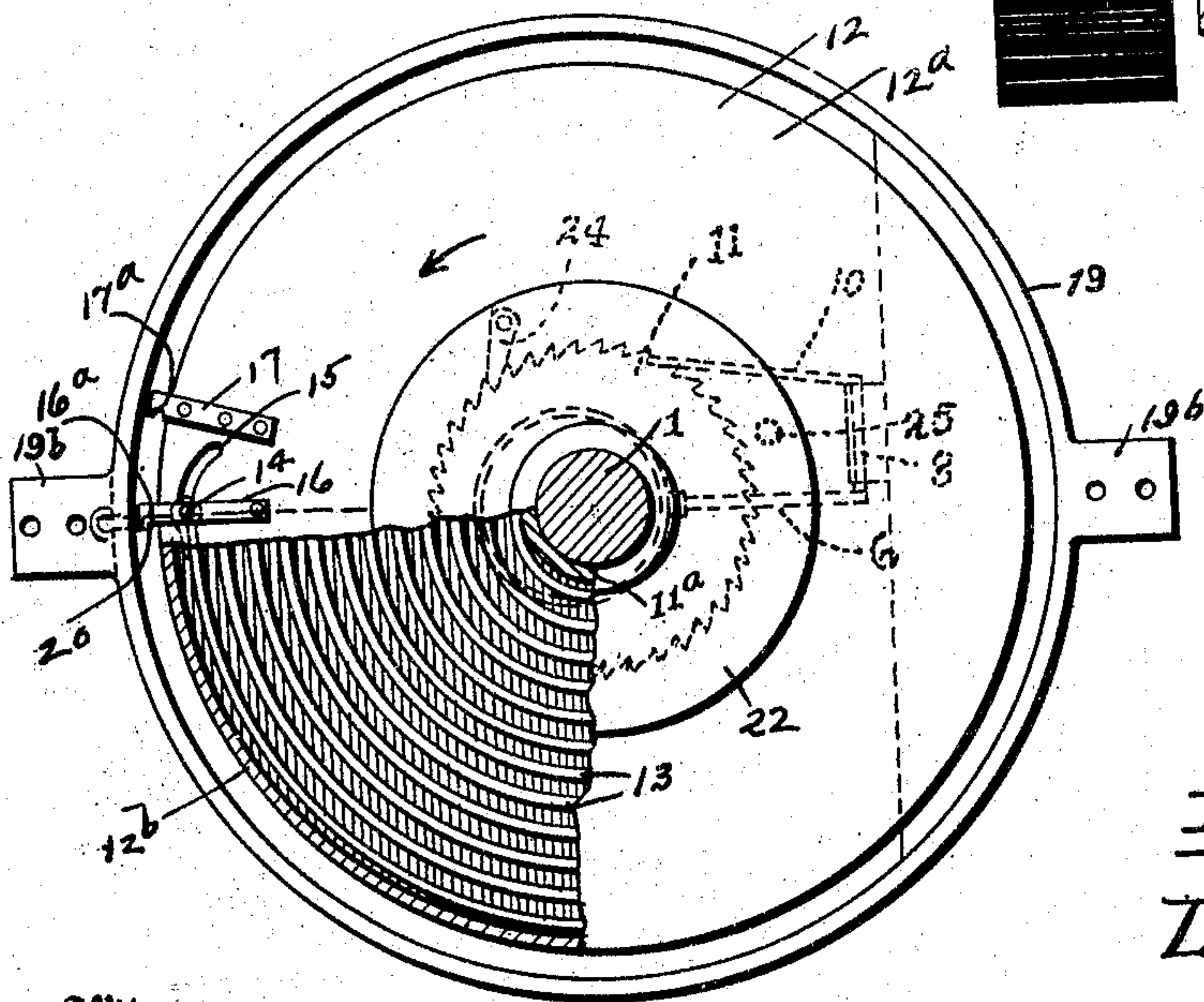


Fig. 2.

Fig. 4.

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UNITED STATES PATENT OFFICE.

LINCOLN BURNHAM, OF URBANA, OHIO.

ENGINE-STARTER.

936,700.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, LINCOLN BURNHAM, a citizen of the United States, residing at Urbana, in the county of Champaign and State of Ohio, have invented certain new and useful Improvements in Engine-Starters, of which the following is a specification.

My invention relates to the improvement of engine starters of that class which are adapted for use in connection with gas or gasoline engines, and the objects of my invention are to provide a simple compactly arranged mechanism whereby an initial impetus may be readily imparted to the crank shaft of an engine; to so construct my improved starting mechanism as to obviate the necessity of employing additional shafts having gear connections with the crank shaft and to otherwise produce an effective engine starting device, which by the running of the engine, will automatically collect or store the energy necessary to impart the initial starting movement to the engine after the same has been stopped. These objects I accomplish in the manner illustrated in the accompanying drawing, in which:

Figure 1 is a plan view of a portion of an engine main or crank shaft, showing my improved starting mechanism connected therewith. Fig. 1^a is a transverse section on line *a-a* of Fig. 1. Fig. 2 is a transverse section through the crank shaft showing my improved mechanism in side elevation thereon. Fig. 3 is a sectional view on line *x-x* of Fig. 1, and, Fig. 4 is a vertical section through the upper portion of the spring case.

Similar numerals refer to similar parts throughout the several views.

1 represents the main or crank shaft of a gasoline engine and 2 a frame member in which said shaft is mounted, it being understood that said frame member may be a part of an automobile frame or other engine supporting frame.

3 represents the usual fly wheel carried by the shaft 1 and at a point on said shaft, preferably near one end thereof, I mount an eccentric wheel 4 about which passes the usual eccentric strap 5, from which extends horizontally the eccentric rod 6. The outer end of this rod is pivotally connected with one of the crank terminations of a rocking member 7 which has a central bearing in a projection 8 from a convenient frame member 9. With the remaining crank termination of said member 7 is connected pivotally one end of

a pawl arm 10, the free end of which bears upon and lies in position to engage the teeth of a ratchet wheel 11, the latter being loosely mounted upon the shaft 1 and having a central hub extension also loose on said shaft, which hub extension is indicated at 11^a. Upon the sleeve hub extension 11^a of the ratchet wheel 11, is loosely mounted a comparatively large casing 12 which comprises opposing disks or plates 12^a and a circular cover plate 12^b.

Coiled within the casing 12 is a spring 13, the inner end of said spring being connected with the sleeve 11^a and the outer end thereof being connected with a transverse pin or short rod 14 which extends transversely through the casing adjacent to the marginal portion thereof, the end portions of said pin projecting through oppositely located and inwardly inclined slots 15 in the side plates 12^a of the casing 12. Each end of the pin 14 is pivotally connected with a catch bar 16, the inner end of which is pivoted to the adjacent side plate 12^a at a point on the inner side of the lower end portion of the slot 15, while the outer termination of said catch bar which is on the outer side of the casing rim, is provided with an underside notch 16^a. At points above and at a desirable distance from the members 16, I secure radially to the faces 12^a of the casing 12 outwardly projecting rigid catch members 17 which as prescribed for the members 16 have their projecting portions formed with underside notches 17^a.

18 represents an operating rod or lever which is slidably mounted in the direction of the length of the shaft 1, this slidable support being preferably effected by providing a horizontal keeper 19^a in connection with a casing 19 which casing is of cup form and which has its open end portion provided with attaching flanges 19^b which are designed to be secured to the frame member 2, the casing thus being made to embrace or inclose my improved starting mechanism.

With the operating rod or lever 18, I provide two separated angular projections 20 which extend through slotted openings 19^c in the casing 19 and which have their inner correspondingly bent ends adapted to be projected into positions to engage the notches 16^a of the members 16, or the notches 17^a of the members 17. With one of the casing plates 12^a, I form a central laterally projecting ratchet wheel 21, this ratchet

wheel projection extending within a cup-like casing 22 connected with and carried by the shaft 1. To the inner wall of the casing 22 are pivoted the smaller ends of a plurality of pawls 23, the larger free ends of which are adapted to engage the teeth of said ratchet wheel projection.

In order to prevent a reversed rotation of the ratchet wheel 11, I provide a pawl 24 which is pivotally connected with a bracket 24^a on the inner side of the casing 19, the free end of said pawl engaging the teeth of the ratchet wheel 11. On the outer face of the spring casing 12 at a point below the pawl arm 10, I provide an outwardly projecting pin 25.

The operation of my invention is substantially as follows: Assuming that the pawl arm 10 is in engagement with the teeth of the wheel 11 and that the pin 14 is in the lower ends of the slots 15 of the casing, the catch bar 16 being in engagement with the pin 20, it will be understood that the rotation of the crank shaft 1 during the running operation of the engine, will result in a reciprocating movement of the eccentric rod 6 and a corresponding backward and forward movement of the pawl arm 10, whereby the ratchet wheel 11 will have a succession of rotary movements imparted thereto, said ratchet wheel being prevented from reversed rotation by engagement of the pawl 24 therewith. In this rotary movement of the ratchet wheel 11 and its sleeve-like hub 11^a, it is obvious that the spring 13 which is connected with said sleeve hub, will be tightened about said hub and in this tightening or coiling action of the spring, it is evident that the position of the pin 14 will shift toward the upper and inner ends of the slots 15 owing to the downward pull on the casing 12 of the outer end of the spring. By thus changing the position of the pin 14 with relation to the slots 15, it is obvious that the outer ends of the catch bars 16 will finally be disengaged from the laterally projecting upper terminations of the angular rod members 20 and that said casing will be turned in the direction of the arrow in Fig. 2 of the drawing until the notched outer ends of the bars 17 engage said pin terminations 20, by which time the spring 13 will have been placed under desirable tension.

In the rotary movement of the casing 12, it will be seen that as the operation of winding the spring is completed, the pin 25 will come into contact with the underside of the pawl arm 10 operating to raise the latter out of engagement with the teeth of the ratchet wheel 11, thereby preventing a further wind-

ing action. During the rapid rotation of the shaft 1 and the cup-like casing 22 which is connected therewith, it is obvious that the centrifugal force created, will operate to swing the heavier inner ends of the pawls 23 outward toward the flange or rim of the casing 22, thereby preventing engagement with the teeth of the ratchet 21. On the stopping of the engine, however, it is obvious that the pawls 23 will drop into engagement with said ratchet teeth, thereby operating to connect the shaft with the casing 12. Assuming that the engine is stopped and that the spring has been placed under tension, in the manner described, it will be readily understood that by pulling outward the rod 18 until the pin terminations of its arms 20 are out of engagement with the notches of the bars 17, the spring will be free to move the spring casing and its ratchet extension 21 which is now in engagement with the pawls 23, thereby imparting the desired preliminary or initial rotation to the shaft 1, which will insure the starting of the engine.

What I claim, is:

1. In a gas engine starting mechanism, the combination with a crank shaft, a sleeve on the crank shaft, and means for imparting successive intermittent movements to said sleeve, of a casing loose on said crank shaft, a spring in said casing having one end connected therewith and the remaining end connected with said sleeve, means by which the latter is connected with the shaft during the initial operation of said shaft and by which the connection of the shaft and spring casing is broken during the winding operation of the spring, and means for automatically discontinuing said winding operation.

2. In a gas engine starting mechanism, the combination with an engine crank shaft, a sleeve loose on said shaft, a casing loose on said sleeve, and a spring within said casing having one end connected therewith and the other end connected with said sleeve, a ratchet wheel carried by the spring casing and loose on the shaft, a pawl carrying member carried by the shaft, pivoted pawls connected to said member and adapted to engage the teeth of said ratchet wheel projection of the casing or to swing out of engagement with said teeth, means for imparting successive intermittent movements to said sleeve to wind said spring, and means for limiting the winding action of said spring.

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

LINCOLN BURNHAM.

Witnesses:

FLORENCE SEIBERT,
MARCELLA M. MAXWELL.