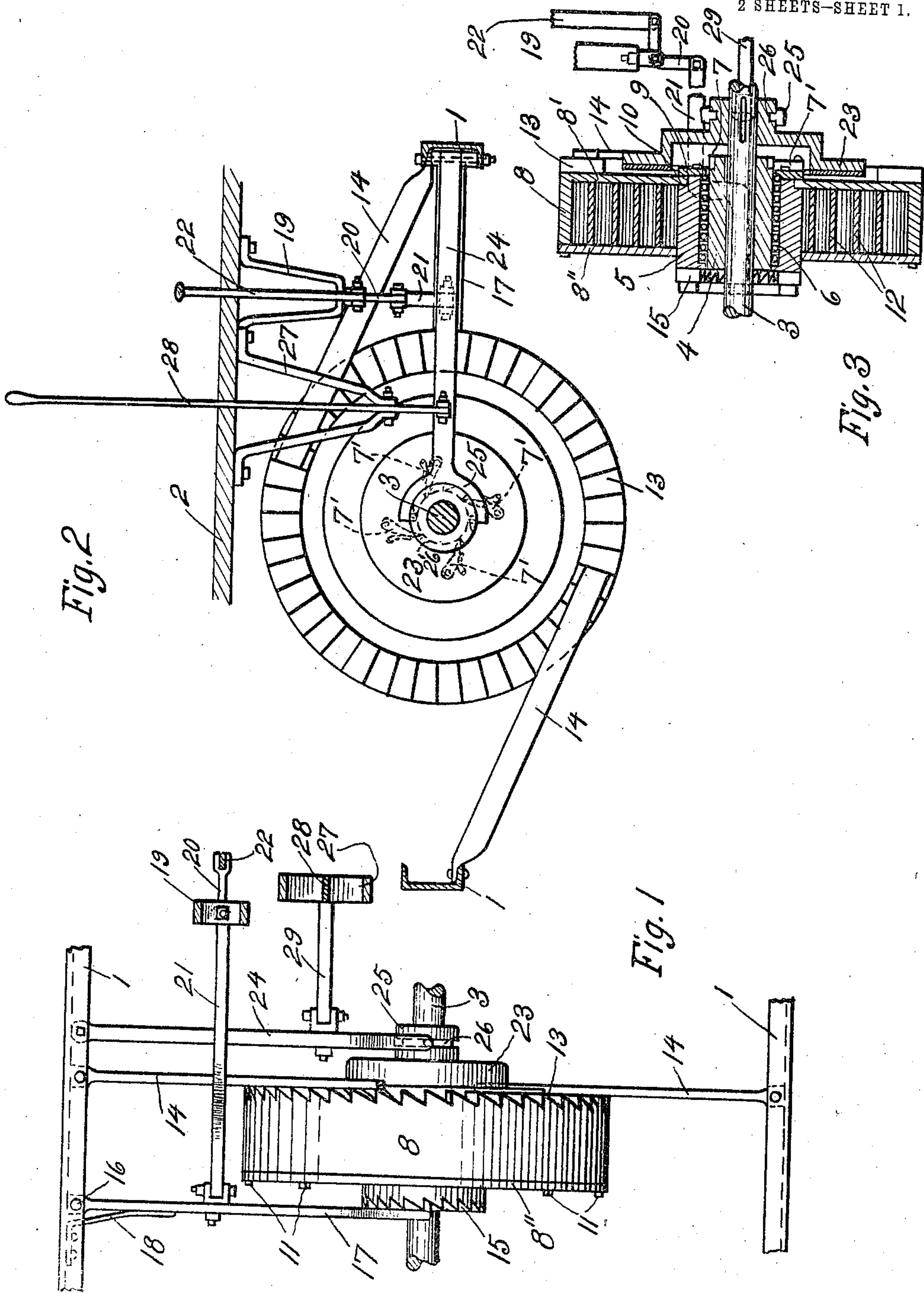


H. B. STRUNK.  
STARTING DEVICE FOR EXPLOSION ENGINES.  
APPLICATION FILED AUG. 1, 1910.

995,925.

Patented June 20, 1911.

2 SHEETS—SHEET 1.



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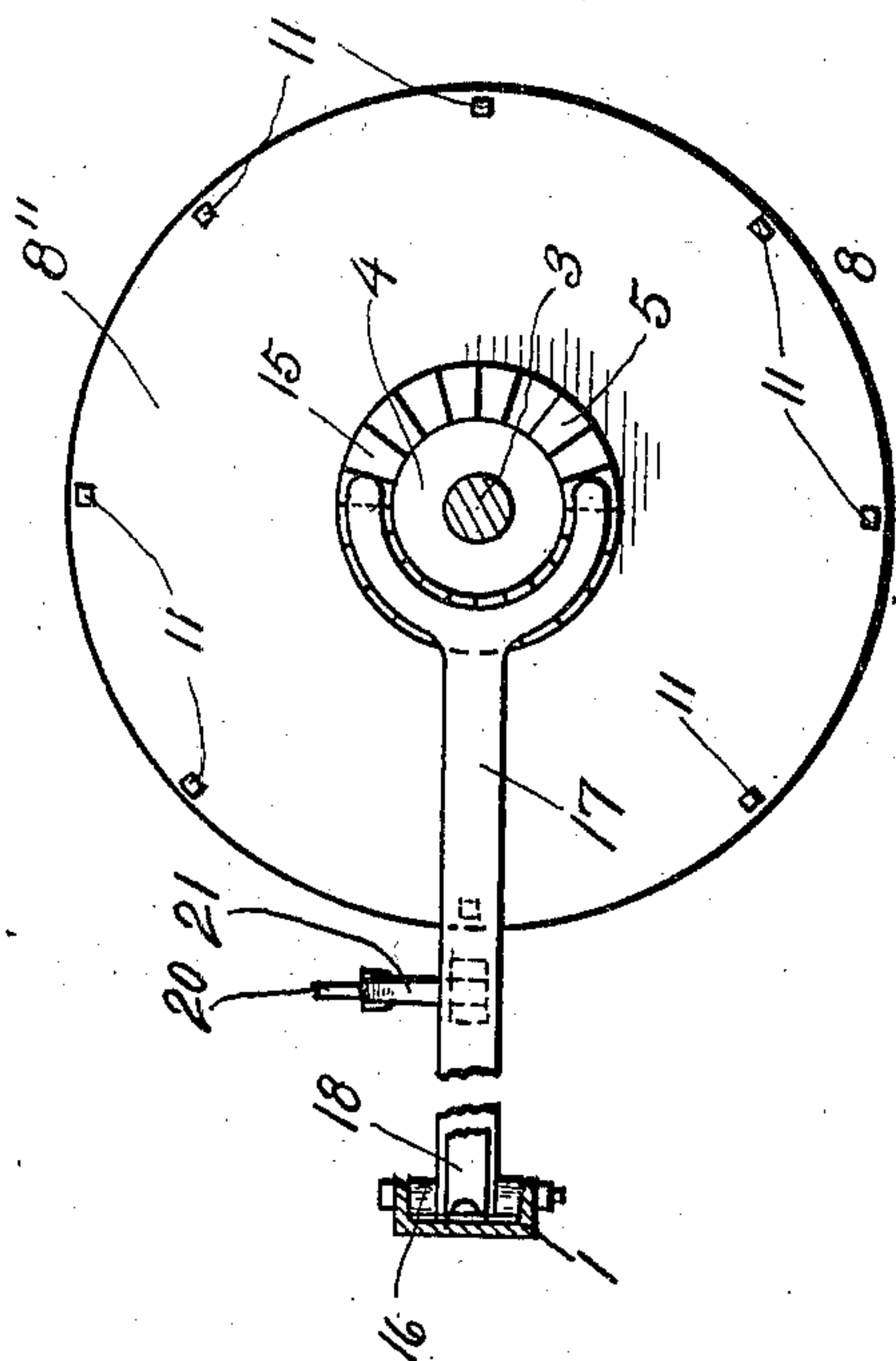


Fig. 5

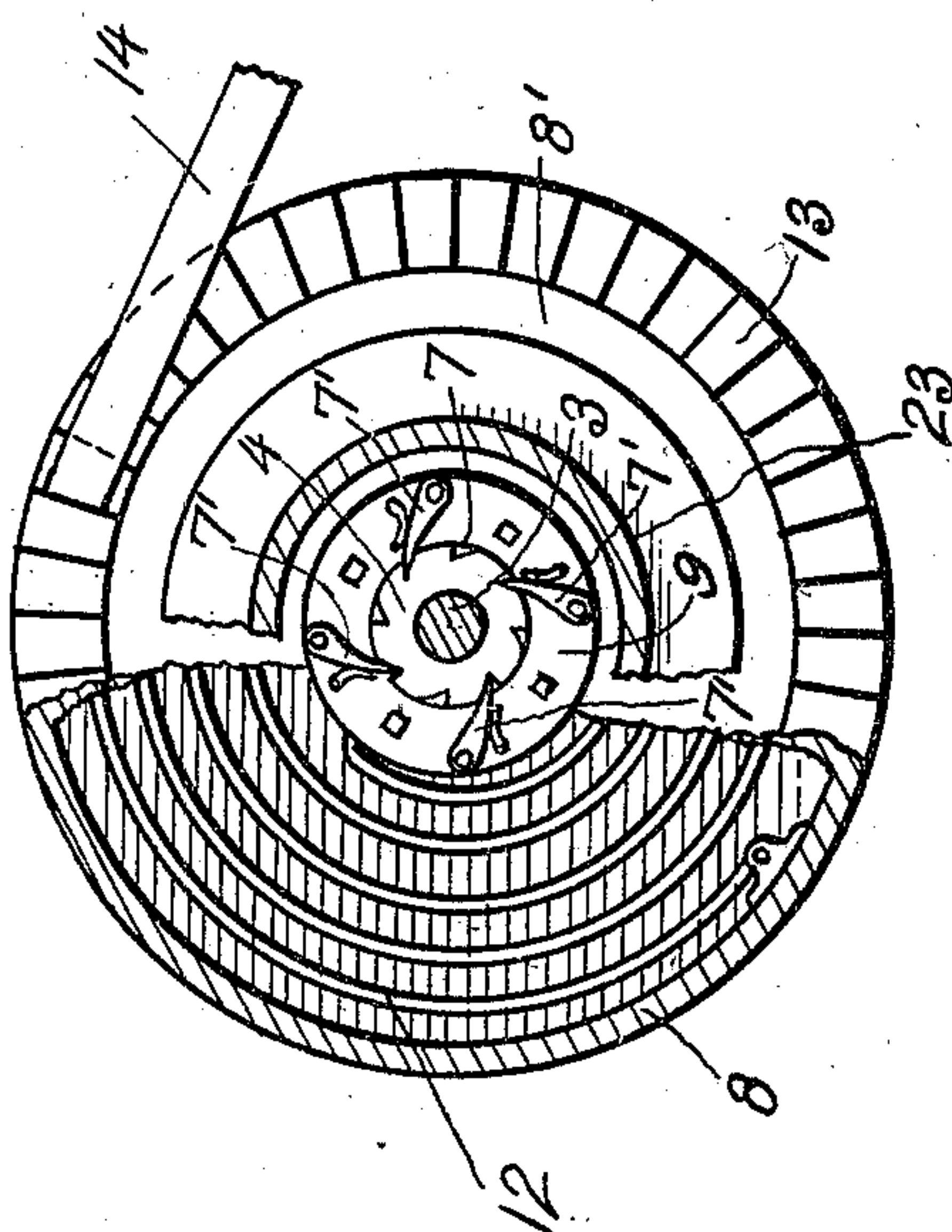


Fig. 4

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# UNITED STATES PATENT OFFICE.

HERSCHEL B. STRUNK, OF DETROIT, MICHIGAN, ASSIGNOR OF ONE-THIRD TO EDWARD P. LANG, OF CHICAGO, ILLINOIS:

## STARTING DEVICE FOR EXPLOSION-ENGINES.

995,925.

Specification of Letters Patent. Patented June 20, 1911.

Application filed August 1, 1910. Serial No. 574,974.

*To all whom it may concern:*

Be it known that I, HERSCHEL B. STRUNK, a citizen of the United States, residing at Detroit, county of Wayne, and State of Michigan, have invented certain new and useful Improvements in Starting Devices for Explosion-Engines, of which the following is a specification:

My invention relates to certain new and useful improvements in starting devices for explosion engines in self-propelled vehicles.

The object of my invention is the means of a starting device of the character mentioned by means of which the engine may be started through the medium of stored mechanical energy and, further, by means of which the starting of the engine may be effected by the driver of the vehicle from his position in the latter.

A further object is the provision of a starting device as mentioned which will be of durable and economical construction and efficient in operation.

Other objects will appear hereinafter.

With these objects in view my invention consists in a starting device characterized as above mentioned and in certain details of construction and arrangement of parts all as will be hereinafter fully described and more particularly pointed out in the appended claims.

My invention will be more readily understood by reference to the accompanying drawings forming a part of this specification, and in which,

Figure 1 is a side elevation of a starting device embodying the preferred form of my invention, Fig. 2 is a rear elevation thereof, Fig. 3 is a transverse section taken through the spring drum of the device, Fig. 4 is a fragmentary rear elevation, portions being broken away in order to expose underlying parts, and Fig. 5 is a fragmentary front elevation.

Referring now to the drawings 1 indicates the longitudinal bars of the chassis of the vehicle in conjunction with which the device is employed, 2 indicating the floor or bottom of the vehicle body, and 3 the main shaft of the propelling engine, the latter not being shown. Keyed or otherwise rigidly fixed to the shaft 3 is a sleeve 4. Loosely mounted upon the sleeve 4 is a second sleeve 5, ball bearings 6 being preferably inter-

posed between the adjacent surfaces of said sleeves to alleviate friction. Formed at one extremity of the sleeve 4 is a ratchet 7, spring pressed pawls 7' pivotally secured to the adjacent extremity of the sleeve 5 being adapted to coact with said ratchet to serve to normally establish an operative connection between said sleeves and hence between the sleeve 5 and the shaft 3; said pawls being so arranged as to be adapted, upon rotation of the sleeve 6, to drive said shaft only in a positive direction or in a direction to start the engine. Loosely mounted upon the sleeve 5 is a circular spring drum 8, the latter being held against longitudinal movement upon said sleeve by means of a ring 9 secured to one extremity of said sleeve and between which and a circumferential shoulder 10 formed upon the latter, the stationary head 8' of said drum is held. The head 8' of said drum which is removable is secured in position by screw bolts 11. Arranged within the drum 6 is a spiral spring 12, the respective extremities of which are secured to the peripheral wall of said drum and to the periphery of the sleeve 5, as clearly shown in Fig. 4; said drum being so arranged that, in wound condition and with the drum 6 held stationary, the same will be adapted, when released, to effect the positive rotation of the shaft 3.

Formed upon the outer surface of the head 8' at the periphery thereof is an annular ratchet 13, the teeth of the latter being radially disposed. Having their outer extremities secured to the base bars 1 are inwardly projecting spring pawls 14, said pawls being so arranged as to normally coact with the ratchet 13 to prevent retrograde rotation of the spring drum or rotation in a direction opposite to that of the shaft 3 when in operation.

Formed upon one extremity of the sleeve 5 is an annular ratchet 15. Pivotally secured as at 16 at its outer extremity to one of the base bars 1 is an inwardly projecting arm 17 carrying pawls at its bifurcated inner extremity adapted to coact with the ratchet 15 to prevent positive rotation of the sleeve 5 or rotation in a direction the same as that of the shaft 3 when in operation. A leaf spring 18 having its free end engaging said arm is adapted to normally hold the latter in engagement with the



ratchet 15. Secured to and depending from the bottom 2 of the vehicle body is a bracket 19 in which is pivotally mounted a bell-crank 20. To the vertically extending arm 5 of said bell-crank is connected a link 21 which extends to and is connected with the arm 17. To the outer extremity of the horizontally extending arm of said bell-crank is connected the lower extremity of a presser rod 22, the latter projecting up through the bottom 2 for engagement by the foot of the vehicle driver. The arrangement is such as will be observed that rocking of the arm 17 to effect disengagement thereof from the ratchet 15 may be effected by simply depressing the rod 22, the latter being so located that such depression thereof may be effected by the vehicle driver without necessitating his leaving his position in the driver's seat in the vehicle.

Splined to the shaft 3 adjacent the head 8' of the drum 6 is a disk 23, the peripheral portion of the inner side thereof being provided with a coating of frictional material adapted, when said disk is properly moved, to engage against the outer surface of the head 8' to establish an operative connection between the shaft 3 and said drum. Pivotally secured at its outer end to one of the base bars 1 is a switching fork 24, the bifurcated inner end 25 thereof engaging a circumferential groove 26 in the reduced outer end portion of the disk 23, establishing an operative connection between said form and disk. Secured to and depending from the bottom 2 of the vehicle body is a bracket 27. Fulcrumed intermediate its extremities to the lower end of said bracket is a lever 28. The lower extremity of said lever is connected by means of a link 29 with the free end of the switch fork 24 so that oscillation of the latter to effect the forcing of the friction disk into engagement with the spring barrel may be effected by operating the upper extremity of the lever 28. Said lever is so positioned that the upper end thereof is located in operative proximity with the driver's seat and so that operation thereof by the vehicle driver may be effected without necessitating his leaving his position in the vehicle.

The operation of the device is as follows: Assuming the spring 12 to be in wound condition and the vehicle engine to be inert, now, in order to start the engine from a position within the vehicle, it is only required to depress the rod 22. Upon such depression of the latter, pawl arm 17 will be rocked to disengage the sleeve 5. Said sleeve being disengaged, the same will, by reason of its connection with the inner end of the spring 12, be immediately positively rotated, the outer end of said spring being held by the spring drum which is held against rotation by the pawls 14. Said

sleeve, through the pawls 8 which engage the sleeve 4, the latter being fixed to the shaft 3, effects the positive rotation of said shaft, thus the engine may be started. The sleeve 5 will be rotated only so long as the spring 12 is exerting its force thereon. When said spring is run down said sleeve will cease to rotate. The engine being in operation, in order to effect the winding of the spring again for a subsequent starting of the engine, it is only required to operate the lever 28 to force the friction disk 23 into engagement with the spring drum, as before described, since by so doing said drum will be rotated in a direction such as to cause the winding of the spring. The connection of the friction disk with the drum is such that when the spring is fully wound the resistance offered thereto to further the rotation of the drum will cause the slipping of said drum upon said disk, this slipping also serving to notify the operator of the complete winding of the spring.

The device set forth is durable, the same is of simple construction, hence may be manufactured at a low cost and, further, because of its simplicity, the same is not susceptible to readily becoming inoperative, and the device is of great efficiency in operation.

While I have shown what I deem to be the preferable form of my device, I do not wish to be limited thereto as there might be various changes made in the details of construction and arrangement of parts described without departing from the spirit of the invention comprehended within the scope of the appended claims.

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

1. The combination with a drive shaft having an internal combustion engine connected thereto, of a spring drum loosely mounted upon said shaft; an annular ratchet secured to a face of said drum; spring pawls engaging said ratchet for preventing rotation of the latter in one direction; a spiral spring within said drum and having its outer end connected therewith; a sleeve loosely mounted upon said shaft and connected with the inner end of said spring; ratchet teeth upon the end of said sleeve; pawls cooperating with the ratchet upon said sleeve for normally preventing rotation of said sleeve in one direction; manually operable means for releasing said last mentioned pawls; a pawl and ratchet connection between said sleeve and said shaft whereby upon release of said spring when in wound condition, said shaft will be rotated to start the engine; a friction disk splined to said shaft and adapted to engage a side of said drum to effect the winding of said spring when said shaft is



in operation; and means for manually operating said friction disk, substantially as described.

2. The combination with a drive shaft  
5 having an internal combustion engine connected thereto, of a spring drum loosely mounted upon said shaft; an annular ratchet secured to a face of said drum; spring pawls engaging said ratchet for preventing rotation of the latter in one direction; a spiral  
10 spring within said drum and having its outer end connected therewith; a sleeve loosely mounted upon said shaft and connected with the inner end of said spring;  
15 ratchet teeth upon the end of said sleeve; pawls cooperating with the ratchet upon said sleeve for normally preventing rotation of the sleeve in one direction; a foot

lever arranged for releasing said last mentioned pawls; a pawl and ratchet connection between said sleeve and said shaft  
20 whereby upon release of said spring when in wound condition, said shaft will be rotated to start the engine; a friction disk splined to said shaft and adapted to engage a side of  
25 said drum to effect the winding of said spring when said shaft is in operation; and a hand lever for operating said friction disk, substantially as described.

In testimony whereof I have signed my  
30 name to this specification in the presence of two subscribing witnesses.

HERSCHEL B. STRUNK.

Witnesses:

PAUL B. STRUNK,

SUSAN M. BUTTERFIELD.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."

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