

April 13, 1926.

1,580,190

H. R. DAVIES

POWER TRANSMISSION GEARING

Filed July 9, 1917

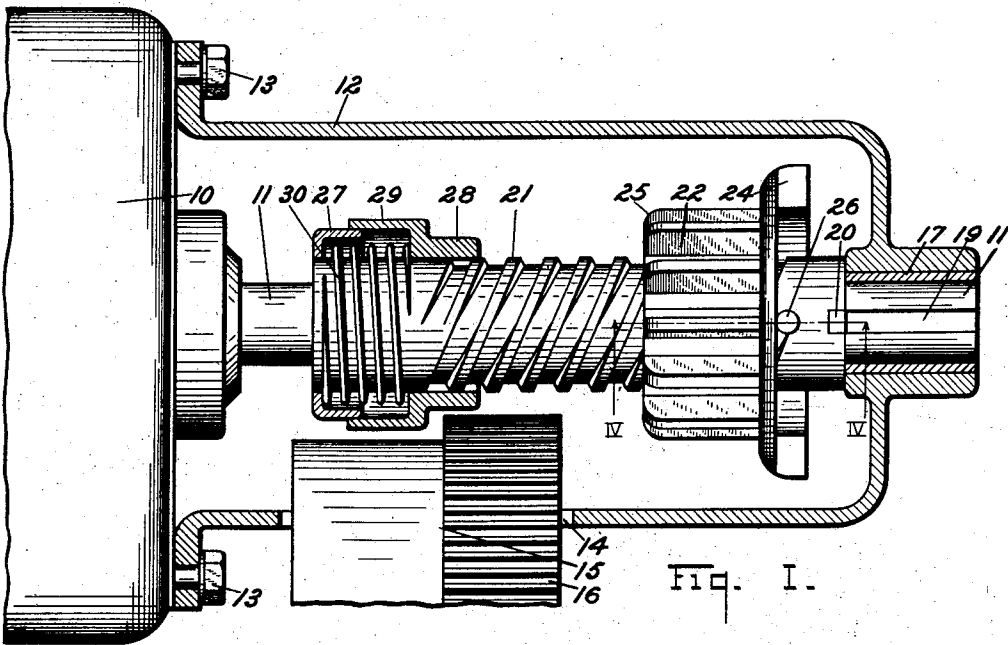


Fig. I.

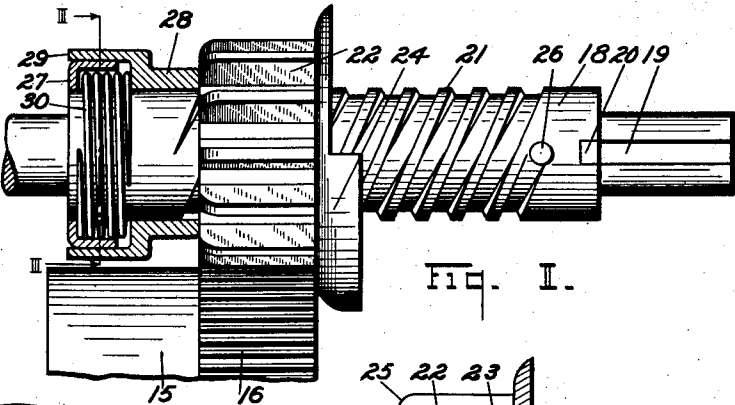


Fig. I.

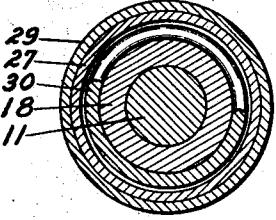


Fig. II.

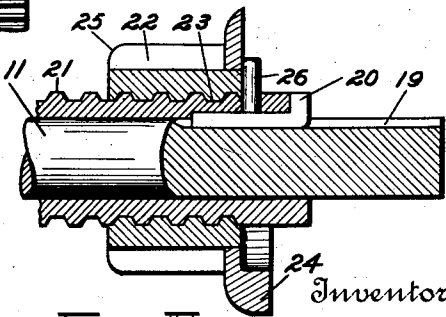


Fig. IV.

Inventor

Henry R. Davies

Chester H. Braselton
Attorney

34

Patented Apr. 13, 1926.

1,580,190

UNITED STATES PATENT OFFICE.

HENRY R. DAVIES, OF TOLEDO, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE ELECTRIC AUTO-LITE COMPANY, OF TOLEDO, OHIO, A CORPORATION OF OHIO.

POWER-TRANSMISSION GEARING.

Application filed July 9, 1917. Serial No. 179,437.

To all whom it may concern:

Be it known that I, HENRY R. DAVIES, a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Power-Transmission Gearing, of which I declare the following to be a full, clear, and exact description.

This invention relates to improvements in power transmission gearing and particularly to improvements in the type of gearing adapted for use in connecting the electric motor of a starting and lighting system for automobiles with the automobile engine, for starting the same.

The principal object of my invention is to provide an improved arrangement of gearing, which automatically moves into driving engagement with the engine when the motor starts, and automatically moves out of driving engagement with the engine when the engine starts. A further object of my invention is to provide an improved arrangement of gearing, which automatically moves into driving engagement with the engine when the motor starts and is held in engagement until the engine speed exceeds the motor speed, when the gearing automatically moves out of engagement with the engine. A further object of my invention is to provide an improved arrangement of gearing in which the gear, which drives the engine, is thrown into driving engagement against spring tension and is yieldingly held in such engagement.

Further objects, and objects relating to economies of manufacture and details of construction, will definitely appear from the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in the following specification. My invention is clearly defined and pointed out in the appended claims.

A structure constituting a preferred embodiment of my invention is illustrated in the accompanying drawing forming a part of this specification, in which:

Fig. I is a view in side elevation of a structure embodying my invention, the casing being shown in section and the gearing being shown out of mesh.

Fig. II is a fragmentary view in side elevation showing the gearing in mesh to drive the engine.

Fig. III is a vertical sectional view, taken substantially on the line III—III of Fig. II, and

Fig. IV is a detail, fragmentary, sectional view, taken on the line IV—IV of Fig. I.

In the drawings, similar reference numerals refer to similar parts throughout the several views, and the sectional views are taken looking in the direction of the little arrows at the ends of the section lines.

Considering the numbered parts of the drawing, the motor 10 has the shaft 11 and the casing 12, which houses the power transmission gearing forming the subject matter of my invention, and is secured to the end wall of the motor 10 by means of the bolts 13. Said casing 12 has a slot 14 in the side thereof, through which the engine fly wheel 15 projects, said fly wheel being provided with a gear 16, through which it is driven by the motor in starting. The bearing 17 for the outer end of the motor shaft 11 is formed in the casing 12. A sleeve 18 is fixed on the shaft 11, said shaft being provided with a key-way 19, in which the key 20 is disposed, to connect the sleeve 18 and the shaft 11. Said sleeve 18 is provided with an external thread 21 and gear 22, which is provided with an internal thread 23 corresponding to the thread 21, said gear being mounted on said sleeve 18, and being provided with a weighted member 24, in order to add to the inertia of the gear, the forward corners of the gear teeth being slightly rounded as at 25 so as to facilitate meshing with the teeth of the gear 16 on the fly wheel 15.

A stop pin 26 is carried by the sleeve 18 to limit the movement in one direction of the gear 22, relative to the sleeve 18. A cup 27 is secured to the end of the sleeve 18, nearest the motor 10, and a sleeve 28 is loosely mounted on the sleeve 18, said sleeve 28 having an annular flange 29 surrounding the cup 27. A compression spring 30 is coiled around the sleeve 18, and compressed between the cup 27 and the sleeve 28, so that said spring tends normally to force the sleeve 28 away from the cup 27.

From the description of the parts given above, the operation of my device should be very readily understood. When the motor 10 starts, the revolution of the shaft 11 carries with it the sleeve 18, which is fixed thereto. The inertia of the gear 22, due in part to the weighted member 24, causes the

gear to tend to drag so that it does not move as rapidly as the sleeve 18, and, due to the co-operating spiral threads 21 and 23 on the sleeve and the gear respectively, the gear 5 moves longitudinally on the sleeve 18, for the reason that said sleeve revolves faster than the gear 22, until the gear is by rotation of the sleeve drawn into mesh with the gear 16 on the fly wheel 15, as shown in 10 Fig. II of the drawing, so that the engine fly wheel is driven by the motor 10.

As soon as the gear 22 is moved on the sleeve 18 sufficiently to permit the edge of the teeth to engage the edge of the teeth 15 of the gear 16, the gear 22 will be held against movement and will immediately, due to the revolution of the sleeve 18, be thrown into meshing engagement with the teeth of the gear 16, and it will be seen that, as 20 it is drawn into such engagement, the sleeve 28 will be forced toward the motor 10 against the pressure of the spring 30, so that the gear 22 is yieldingly drawn into engagement with the gear 16, against the 25 tension of said spring. In this position, the motor 10 drives the engine through the gear 16 on the fly wheel 15 and, as soon as the engine has fired and starts to run under its own power, the fly wheel 15 and the gear 30 16 will begin to travel at a speed of rotation greater than that of the motor 10 and the shaft 11, and, since the gear 16 is traveling faster than the sleeve 18, the gear 22 will, due to the co-operating threads 21 and 23, move 35 out of mesh with the gear 16, to its original position on the sleeve. This movement of the gear is aided by the compression spring 30, which tends to force the gear out of engagement with the gear wheel 16.

40 It will be apparent that, in this manner, I have provided a power transmission gearing which automatically moves into engagement to drive the engine when the motor is started and automatically moves out of driving 45 engagement with the engine as soon as the engine speed becomes greater than the motor speed, and it is furthermore apparent that I have also provided a power transmission gearing connecting the motor and the 50 engine, which moves yieldingly into engagement, to drive the engine, against a spring

pressure, and which is provided with a spring means for forcing the gear out of engagement.

I am aware that this particular embodiment of my invention is susceptible of considerable variation without departing from the spirit of my invention, but I have found that it is desirable from many standpoints and therefore I desire to claim the same 60 specifically as well as broadly as indicated by the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is— 65

1. In an engine starter, combination, a screw-threaded member, a screw-threaded pinion mounted for rotation and longitudinal movement on the screw-threaded member and adapted upon the sudden rotational 70 movement of said screw-threaded member to move into operative engagement with the engine member, a flanged ring secured to said threaded member, a sleeve slidably fitting said threaded member and having a flange 75 to telescope with the flange of said ring, a compression spring between said ring and said sleeve and within said flanges, said sleeve having a comparatively long bearing face with said threaded member to prevent 80 binding thereof and the innermost of said two flanges being of a diameter to receive said spring but to prevent one coil thereof over-riding another when subjected to compression by the movement of the pinion. 85

2. A starter mechanism comprising a rotatable member; a ring secured to the member having a flange turned parallel to the axis of the rotatable member to form a recess; a sleeve slidably mounted on the member and formed with a flange adapted to telescope with said first named flange; a spring encircling said member within the cavity formed by said flanges; said flanges being adapted to prevent the separate turns 90 of the spring from over-riding each other; and a driving gear mounted on said member and adapted to move into contact with the sleeve and compress the spring. 95

In testimony whereof I affix my signature.

HENRY R. DAVIES.