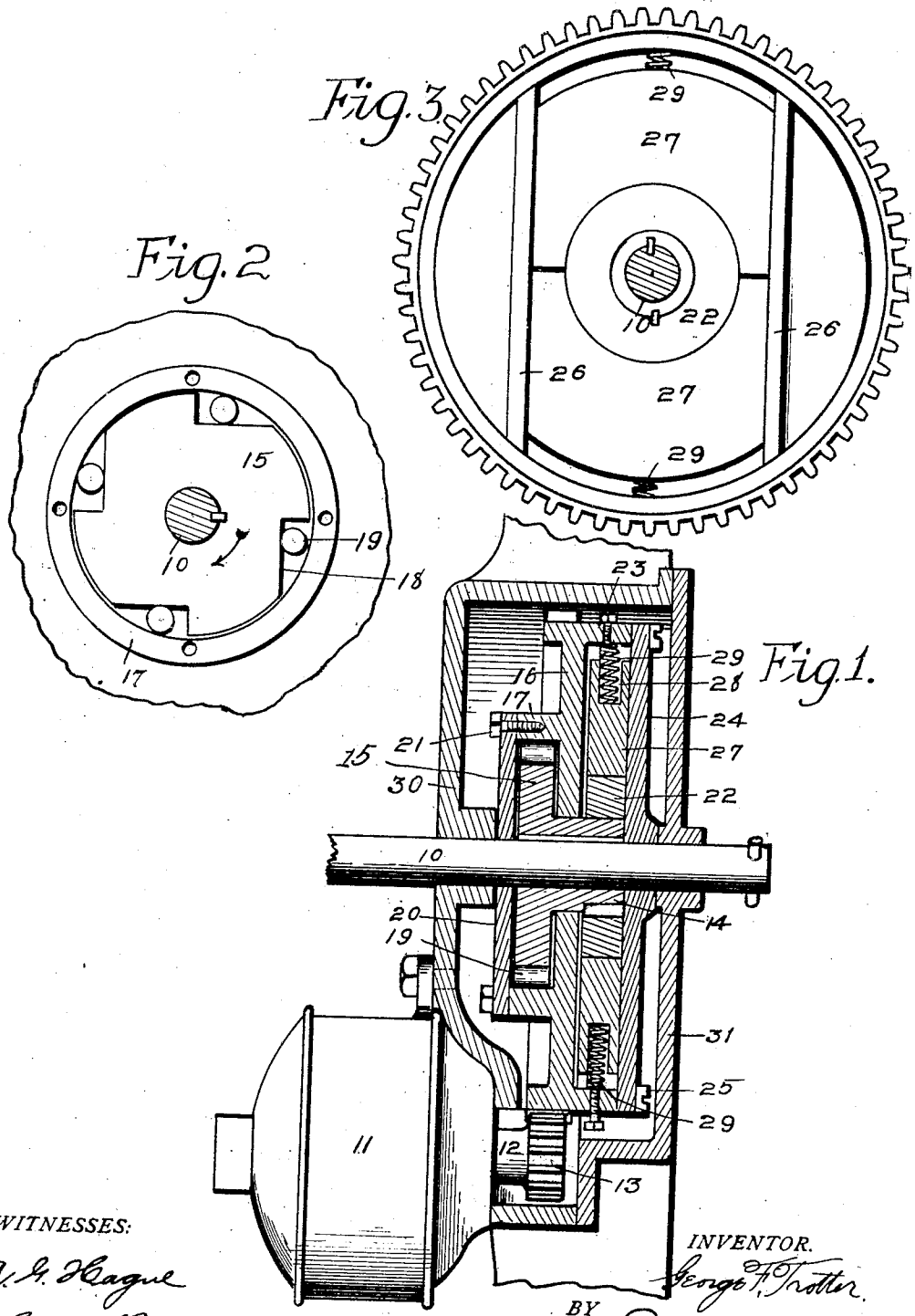


1,114,069.

Patented Oct. 20, 1914.



WITNESSES:
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UNITED STATES PATENT OFFICE.

GEORGE F. TROTTER, OF DES MOINES, IOWA, ASSIGNOR OF ONE-HALF TO A. M. MILLARD,
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SELF-STARTER.

1,114,069.

Specification of Letters Patent.

Patented Oct. 20, 1914.

Application filed April 18, 1913. Serial No. 762,136.

To all whom it may concern:

Be it known that I, GEORGE F. TROTTER, a citizen of the United States, and resident of Des Moines, in the county of Polk and State of Iowa, have invented a certain new and useful Self-Starter, of which the following is a specification.

The object of my invention is to provide a self starting attachment for internal combustion engines and especially those used on motor driven vehicles.

A further object is to provide a device of the class mentioned of extremely simple and inexpensive construction, including an electric motor-dynamo and means whereby power may be transmitted from said motor directly to an engine shaft, the device being so constructed and arranged that the motor may be run from the engine shaft after the engine has been started in such a manner as to operate the motor shaft at a certain predetermined rate of speed, regardless of the fact that the engine shaft may be rotating at a much greater rate.

Still a further object is to provide an electric starting mechanism so arranged that high speed of the engine shaft is not imparted to the transmitting mechanism between said shaft and the motor or dynamo.

Still a further object is to provide such a device in which the power transmitting mechanism is so constructed and arranged that it may be provided with an oil tight gear casing.

My invention consists in certain details, in the construction, combination and arrangement of the various parts of the device whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in the accompanying drawings, in which—

Figure 1 shows a transverse, vertical, sectional view through the gear casing and mechanism of the starting device, embodying my invention. Fig. 2 shows a detail, sectional view of the clutch device, and Fig. 3 shows a detail view, partly in section of part of the mechanism whereby varying speed of the engine shaft is made to impart uniform speed to the motor shaft.

In the accompanying drawings I have used the reference numeral 10 to indicate generally the shaft of an internal combustion

engine. Suitably mounted on the casing, hereinafter described, is an electric motor dynamo 11. The motor shaft is indicated by the numeral 12. On the motor shaft 12 is a gear wheel 13, clearly shown in Fig. 1. Keyed on the shaft 10 is a sleeve 14, having formed on one end a clutch member 15 of a clutch of a ball or roller type. Loosely mounted on the sleeve 14 is a gear wheel 16 which meshes with the gear 13. On one side the gear wheel 16 is provided with a laterally extending annular flange 17 which forms the outer or inclosing member of the clutch. Loosely mounted between the clutch members 15 and 17 in the notches 18 of the member 15 are rollers 19. A plate 20 is detachably secured to the outer edge of the flange 17 by means of bolts 21 and serves to hold the rollers 19 in position and also to reinforce and strengthen the clutch members. Fixed on the sleeve 14, adjacent to the gear 16 is a disk 22. At the outer edge of the gear wheel 16 is a laterally extending circumferential flange 23. Secured to the edge of the flange 23 is a plate 24. It will be understood that the plates 20 and 24 are provided with central openings to receive the shaft 10. The plate 24 is detachably secured to the flange 23 by means of screws or bolts 25. Formed on the gear 16 and the plate 24 are guides 26, shown in Fig. 3. Slidably mounted in the guides 26, on the opposite sides of the disk 22 and between the gear 16 and the plate 24 are weights 27 which at their inner edges are designed to frictionally engage the disk 22. On the outer surfaces of the weights 27 are recesses 28, in which are mounted expansible coil springs 29 which engage the flange 23 and tend to yieldingly hold the weights 27 at the inward limit of their movement. The springs 29 are so arranged and are of such size and strength that they hold the weights 27 at the inward limit of their movement until the shaft 10 and the gear 16 and adjacent members are rotated to a predetermined speed. When such speed is reached, the centrifugal force of the weights 27 contracts the springs 29 and the weights 27 are forced outwardly away from engagement with the disk 22. The tension of the springs 29 may be varied by means of the screws 29^a.

The whole of the mechanism just de-

scribed, excepting the motor 11 and part of the shaft 10 is included within an oil tight casing comprising the members 30 and 31. The casing is suitably mounted on the frame of the vehicle or other means for supporting the engine and the motor 11 is detachably mounted on the casing.

It will be understood that the motor 11 is designed to be suitably connected with batteries, not shown.

In the practical use of my improved starting device, the motor is turned on and the shaft 10 will be operated from the shaft 12 through the gears 13 and 16, the clutch device and the sleeve 14. When the gears are operated from the motor shaft, the sleeve 14 is operated in the direction indicated by the arrow on Fig. 2. When the engine starts, the shaft 10 will rotate more rapidly than it has been rotated from the motor. The shaft 10 and the clutch member 15 will then rotate more rapidly in the direction indicated by the arrow on the clutch member 15 than the flange 17 is rotated by the motor and the clutch will be thrown out of operative engagement. Through the sleeve 14, the disk 22, the flange 23 and the gears 16 and 13, the shaft 12 will be rotated. When the gear 16 reaches a predetermined speed, the centrifugal force will throw the weights 27 outwardly and release them from engagement with the disk 22 to some extent so that the weights will slide on said disk and the shaft 12 will cease to rotate after the predetermined maximum speed has been attained by the gear 16.

With many starting devices a serious defect is found in the fact that the clutch, or transmitting mechanism between the motor shaft, and motor-dynamo shaft is positively operated from the engine shaft. The result is that such mechanism attains very high speed, and the consequent wear on the mechanism is tremendous. In such starters the reducing device, governor or the like is located between the transmitting mechanism just mentioned, and the motor-dynamo mechanism. One great advantage of my device as compared with the ordinary electric starting devices is found in the fact that the high speed of the engine shaft is not imparted to the transmitting mechanism, and that the mechanism in my device is therefore free from the severe wear, and friction mentioned above as objectionable.

My mechanism is of extremely simple and inexpensive construction. The parts of the operative mechanism are few and simple and are wholly contained within an oil tight casing.

It will be understood that variations may be made in the details of the construction of my device and that it is my intention to cover by the present application any such

variations which may be included within the scope of the appended claims.

I claim as my invention:

1. In a device of the class described, a dynamo motor having a shaft, an engine shaft, a gearing mechanism mounted thereon, a gearing device on the dynamo shaft, means for operatively connecting said gearing mechanism and said gearing device, said gearing mechanism including a second gearing device loosely mounted on the engine shaft, a ratchet clutch arranged between the second gearing device and the engine shaft for permitting the engine shaft to be run from the motor shaft and arranged to be inoperative when the engine shaft travels faster than the motor shaft, a disk fixed to the engine shaft, centrifugal friction devices carried by the second gearing device, arranged to frictionally engage said disk, and yielding devices for counteracting the centrifrifugal action of said friction devices.

2. A device of the class described, comprising a motor dynamo having a shaft, an engine shaft, means for gearing the motor dynamo shaft to the engine shaft, comprising a gearing device on one of said shafts, a ratchet device for operatively connecting the gearing device with the shaft on which it is mounted, a gearing device on the other shaft operatively connected with said first gearing device, a disk fixed on the engine shaft, weights slidably mounted on the gearing device on the engine shaft, yielding means for causing said weights to frictionally engage said disk when the engine shaft is rotated below a predetermined speed and arranged to permit the weights to slide away from the disk when a certain predetermined speed has been reached.

3. In a device of the class described a motor having a shaft, a gear on said shaft, a sleeve designed to be fixed on an engine shaft, a gear loosely mounted on said sleeve in mesh with said first gear, coacting ratchet members on said sleeve and said gear, a disk fixed on said sleeve, said gear being formed with a laterally extending annular flange, weights designed to frictionally engage said disk, a yielding device arranged between said weights and said flange for holding said weights in frictional engagement with said disk in such a manner that the rotation of the disk will cause rotation of the weights, until a certain predetermined speed has been attained by the disk.

4. In a device of the class described a motor having a shaft, a gear on said shaft, a sleeve designed to be fixed on an engine shaft, a gear loosely mounted on said sleeve in mesh with said first gear, coacting ratchet members on said sleeve and said gear, a disk fixed on said sleeve, said gear being formed with a laterally extending annular flange,

weights designed to frictionally engage said disk, a yielding device arranged between said weights and said flange for holding said weights in frictional engagement with said disk in such a manner that the rotation of the disk will cause rotation of the weights, until a certain predetermined speed has been attained by the disk and an oil

tight casing inclosing said sleeve, ratchet devices carrying disks, said motor being mounted on said casing. 10

Des Moines, Ia., April 12, 1913.

GEORGE F. TROTTER.

Witnesses:

S. ROBINSON,
H. ANDERSON.

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