

UNITED STATES PATENT OFFICE.

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ENGINE-STARTER.

1,056,799.

Specification of Letters Patent.

Patented Mar. 25, 1913.

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To all whom it may concern:

Be it known that I, JOHN D. KNEEDLER, a citizen of the United States, residing at Sioux City, in the county of Woodbury and State of Iowa, have invented certain new and useful Improvements in Engine-Starters; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

This invention relates to automobiles and more particularly to engine starters for automobile engines.

15 An object of the invention is to provide an engine starter comprising an air pump to be operated by the engine while the latter is in operation to store air in the storage tank and a motor to be operated by the 20 stored air to start the engine.

Another object is to provide a starter of this character having a drive shaft which may be locked in various positions for operating the pump or for starting the engine 25 or in inoperative positions, as desired.

Other objects and advantages will be hereinafter set forth and pointed out in the specification and claims.

The drawing which forms a part of this 30 application is a diagrammatic view showing some of the parts in section.

Referring more particularly to the drawing 1 represents the cylinders of an engine such as employed upon automobiles and 2 35 the shaft with the wide gear wheel 3 mounted thereon.

Parallel with the engine shaft 2 is the drive shaft 4 of the engine starter, one end of the shaft 4 being mounted in the bracket 40 bearing 5 while the opposite end is received within one end of the adjusting pin 6 which extends through a bushing 7 within an opening through the stationary member 8 which may, if desired, form a part of 45 the engine casing.

The drive shaft 4 carries the rigid narrow gears 9 and 10 near its opposite ends, the gear 10 being adapted for engagement at times with the wide gear 3, as will be later 50 more clearly stated. The shaft 4 also carries the bevel gear 11 which is secured thereto by the collar 12 and set screw 13, a short distance from the gear 10 and is adapted to mesh at times with the bevel gear 14 upon 55 a suitable stub shaft carried by the post 15. The narrow gear 9 is adapted for engage-

ment at times with the gear 16 upon the shaft 17 of the air motor 18 to rotate the shaft 4 by means of said motor. A coil spring 19 is positioned between the gear 10 and the bracket bearing 5 and engaged 60 around the shaft 4 to resiliently retain the latter in its outermost position.

Carried upon a pin 20 projecting from the outer flat face of the bevel gear 14 is one 65 end of the pitman rod 21; the opposite end of which is bifurcated, as shown at 22 and has therebetween the outer end of the piston rod 23. The piston rod 23 works through the removable head 24 of the pump cylinder 70 25 which has its opposite end closed by a similar head 26 with a central valve opening 27 which is normally held closed by the spring controlled valve 28 held against the inner face of said head to close the opening 75 27, by means of the leaf spring 29. The piston rod 23 carries upon its end within the cylinder 25 a piston 30 which draws air into the cylinder and forces the same, by means of the pipe 31 into the storage tank 80 32. It will be understood that valves 33 and 34 are secured respectively, by means of springs 35 and 36 to the piston 30 and head 37 of the storage tank 32. It will further be understood that the piston 30 has provided therethrough a passage, against which 85 the valve 33 is normally held while the valve 34 is held against the end of the pipe 31 secured to the head 37 of the storage tank 32. The opposite end of the storage tank 32 90 is closed by a similar head 38 having a blow-off or safety valve 39 held against the openings 40 through the head 38 and controlled by the curved spring 41, as will be clearly understood. Leading from the storage tank 95 32 is an air conducting pipe 42 which is connected with the air motor 18 to supply air to said motor from the tank 32 to operate said motor. Within said air conducting pipe 42, and preferably a short distance 100 from the air motor 18 is a suitable controlling valve, the stem 43 of which projects through the stationary member 8 and has a wheel 44 or the like secured upon its end by means of which the valve may be turned 105 to control the supply of air to the motor or cut off the supply, as desired.

The adjusting pin 6 is provided upon its outer end with a suitable button 45 by means of which the same may be readily forced inwardly to its various positions as will be 110 presently clearly understood, and inwardly

of the button 45 said pin 6 is provided with circular adjusting channels 46, 47 and 48 within which the curved end of the pivoted locking lever 49 is adapted to engage to hold the drive shaft 4 in the proper position. The locking lever 49 is pivoted to the block 50 carried by the stationary member 8 and has its free end 51 bent and formed into a handle.

10 When the curved end of the lever 49 is engaged within the circular adjusting channel 46 the drive shaft 4 is locked in its outermost or first position, at which time the gear 10 is engaged with the gear 3 of the engine shaft and the bevel gear 11 is engaged with the bevel gear 14 to drive the pitman rod 21 and thus operate the pump piston 30 from the engine shaft 2 to cause the same to compress air and store the latter in the storage tank 32. In this instance the gear 9 is disengaged from the bevel gear 16 and the motor 18 is inoperative. By locking the drive shaft 4 of the engine starter in this position air may be compressed and stored within the tank 32 while the engine is operating. When the engine is stationary, however, and it is desired to start the same, the locking lever 49 is swung upon its pivot block 50 and the button 45 pressed inwardly until the circular adjusting channel 47 is opposite the curved end of the locking lever 49 when the latter is allowed to engage within the channel 47 to lock the shaft 4 in its second or intermediate position. When the shaft is in this position, the gear 9 is in mesh with the gear 16 of the air motor 18 and the gear 10 is in mesh with the gear 3 of the engine shaft 2 while the bevel gear 11 is thrown away from the bevel gear 14 connected with the pump piston rod 23. Thus it will be seen that by turning the wheel 44 to the proper position to open the valve within the air conducting pipe 42, the air from the storage tank 32 will be admitted to the air motor 18 to operate the latter and thus start the rotation of the engine shaft 2 by means of the gears 16 and 9, the drive shaft 4 and the gears 10 and 3, while the air pump remains inoperative.

When the engine is in motion and the storage tank is full or when it is desired for any reason to render the entire starting mechanism inoperative, the button 45 is pushed inwardly to its fullest extent and the curved end of the locking lever 49 engaged within the circular adjusting channel 48 locking the drive shaft 4 in its innermost position with the gear 9 disengaged from the gear 16, the gear 10 disengaged from the wide gear 3 and the bevel gear 11 thrown away from the bevel gear 14, thus preventing rotation of the shaft 4.

It will be understood that at any time the pressure of compressed air within the storage tank becomes too great, the blow-off or

safety valve 39 will be automatically operated to allow the proper quantity of air to escape from said tank.

It will thus be seen that I have provided an engine starter of improved and novel construction and operation and one which will be highly efficient and effective in the performance of its duties.

It will also be evident that a hose may be connected directly to the pump or to the storage tank and properly connected with a tire for the purpose of inflating the latter.

What I claim is:—

1. An engine starter comprising a drive shaft having gears near its opposite ends, one of said gears being adapted to be engaged by a gear operated by a motor, a motor having a gear for engagement with said gear carried by the drive shaft, an engine shaft having a gear to be engaged by the gear near the opposite end of the drive shaft, an air pump, and connections between the drive shaft and pump.

2. The combination with an engine shaft, of a drive shaft, connections between the engine shaft and the drive shaft, an air pump and a storage tank, connections between the drive shaft and the pump for operating the latter, connections between the pump and the storage tank, an air motor, connections between the storage tank and the air motor, and means for shifting said drive shaft and connections for disconnecting the drive shaft and pump and connecting the drive shaft with the air motor to start the engine.

3. The combination with an engine shaft, of a drive shaft, a pump, connections between the drive shaft and the pump, a storage tank connected with the pump, bearings for said drive shaft, said drive shaft being slidable longitudinally within the bearings to various positions, means for locking the drive shaft in position within the bearings to connect the driven shaft with the engine shaft and with the pump to compress and pump air into the storage tank to be used for starting the engine.

4. An engine starter comprising combination with an engine shaft, of a drive shaft, a storage tank, an air motor, connections between the storage tank and the air motor, means for controlling the supply of air from the storage tank to the air motor, said drive shaft being movable longitudinally, gears carried by the drive shaft, a gear upon the motor shaft, a gear upon the engine shaft, and means for locking the drive shaft in position with one of its gears engaged with the gear carried by the motor shaft or with the other of its gears in position with the gear of the engine shaft to start rotation of the latter.

5. A device of the class described comprising the combination of a motor shaft hav-

ing a gear wheel, a drive shaft having a gear
wheel adapted for engagement at times
with the gear wheel carried by the engine
shaft, said drive shaft having a second gear
5 wheel spaced from the first gear wheel, a
bevel gear upon the drive shaft, a pump
having a piston, a bevel gear connected with
the piston, the bevel gear carried by the
drive shaft being adapted for engagement
10 at times with the bevel gear connected with
the piston of the pump, a storage tank con-
nected with the pump, an air motor con-
nected with the storage tank, the shaft of
the air motor having a gear wheel, the sec-
15 ond gear wheel carried by the drive shaft
being adapted for engagement at times with
the gear wheel carried by the motor shaft,
said drive shaft being movable longitudi-
nally and means for locking the drive shaft
20 in operative or inoperative positions.

6. A device of the class described compris-
ing the combination of a motor shaft hav-
ing a gear wheel, a drive shaft having a
gear wheel adapted for engagement at times
25 with the gear wheel carried by the engine

shaft, said drive shaft having a second gear
wheel spaced from the first gear wheel, a
bevel gear upon the drive shaft, a pump
having a piston, a bevel gear connected with
the piston, the bevel gear carried by the 30
drive shaft being adapted for engagement at
times with the bevel gear connected with
the piston of the pump, a storage tank con-
nected with the pump, an air motor con-
nected with the storage tank, the shaft of the 35
air motor having a gear wheel, the second
gear wheel carried by the drive shaft being
adapted for engagement at times with the
gear wheel carried by the motor shaft, said
drive shaft being movable longitudinally, 40
and means for locking the drive shaft in op-
erative or inoperative positions.

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

JOHN D. KNEEDLER.

Witnesses:

C. A. KNEEDLER,
BLANCHE I. STEWART.