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STARTING MECHANISM FOR MOTOR VEHICLES

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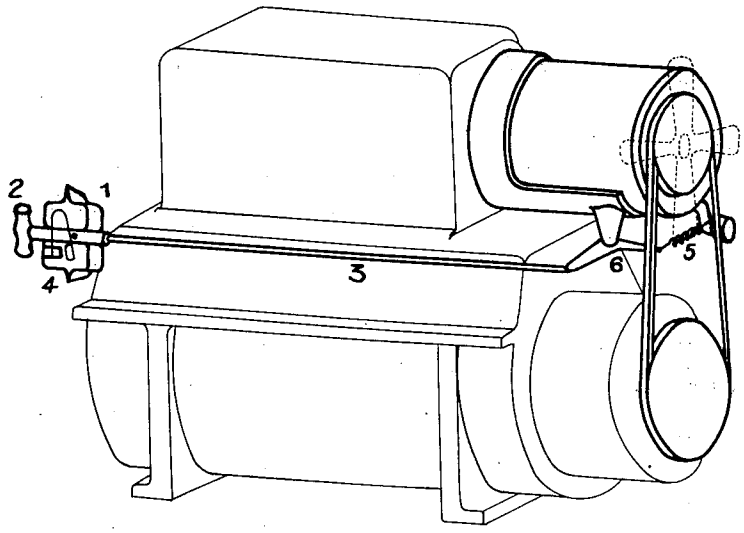

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STARTING MECHANISM FOR MOTOR VEHICLES

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This invention relates to self-starter apparatus for starting an internal combustion engine, of the type comprising an electrical starter motor-generator operatively connected to the internal combustion engine by means of a transmission belt.

A principal object of the invention is to provide an improvement in self-starter apparatus of this type which will make for higher efficiency of operation.

I have already claimed in my copending application bearing the Serial Number 457,687, a method of operating a self-starter apparatus of the type referred to, consists in temporarily increasing the tension of the transmission belt when torque is to be transmitted from the motor-generator, that is to say, temporarily increasing the tension of the belt above the normal tension which obtains when torque is being transmitted from the engine to the motor-generator, such increase of tension in the belt being applied prior to the commencement of operation of the motor-generator.

The present specification describes one manner of carrying out the above method.

As will be appreciated, the means provided in the present invention makes for enhanced efficiency of operation of a self-starter apparatus of the type to which the invention relates, for the starter motor obtains its driving engagement with the transmission belt immediately upon commencing to operate without the initial slip common in known starter apparatus of the type in question. Moreover, this result is achieved in an extremely simple and convenient manner.

The invention will now be further described with reference to the accompanying drawing, which illustrates one embodiment by way of example.

In this drawing, which is mostly diagrammatic, 1 is the starter switch which controls the motor-circuit of the motor-generator and 2 is a handle for actuating the said switch. The switch handle 2 is operatively connected to a tensioning pulley 7 for temporarily applying an increase of tension in the transmission belt 8 of the starter apparatus. The operative connection between said switch handle 2 and the tensioning pulley 7 includes a connecting rod 3, a bell crank lever 6 and a spring link 5.

The arrangement of parts is such that the increase of tension in the transmission belt 8 is applied prior to the closure of the starter motor circuit. To this end, the initial movement of the switch handle 2 presses the pulley 7 against the belt 8 and the continued movement of the handle brings the movable contact 4 of the switch to its closed position.

The spring link 5, which, as will be appreciated, can be inserted at any point in the operative connection between the switch handle 2 and the pulley 7, provides, in a simple and convenient manner for the automatic re-opening of the starter switch and the return to its inoperative position of the tensioning pulley. It also provides for the two-stage movement, just referred to, of the handle 2. Further, it serves to absorb vibrations and reaction thrusts from the belt and prevent their transmision to the switch 1 and manipulating handle 2.

The bell crank lever 6 may be of proportions such that the pulley 7 has imparted to it a small extent of movement only, relatively to the movement of the manipulating handle 2, so that a relatively small amount of effort is required in the manipulation of said handle, or, conversely, if the required temporary increase of tension in the transmission belt should demand a relatively large extent of movement of the pulley 7, the proportions of the lever 6 may be such that the operative travel of the pulley 7 is magnified, relatively to the throw of the switch handle 2.

Conveniently, the improved motor starter system provided in accordance with the invention may embody means whereby the tensioning roller for the belt may, if necessary, be employed for adjusting the normal belt tension, that is to say, the tension obtaining in the belt when it is transmitting torque from the engine to the generator; and such means may be adapted either rigidly to hold the roller against release from its adjusted position, or only yieldingly to hold it against such release.

It is obvious that the invention is suscepti-

ble to many and various modifications with regard to structural details. For example, instead of employing a system of connecting rods and links in the operative connection between the manipulating handle 2 and pulley 7, Bowden wires or cables may be employed having a spring connection with the tensioning roller. Also, the control of the switch and the tensioning pulley may be effected, if desired, by a manipulating handle of the push type, or by a pivoted lever operatively connected to the switch and the pulley. Further, if desired, the arrangement may be one embodying separate controls for the switch and the pulley, the said controls being actuated together.

I claim:

1. Self-starter apparatus for an internal combustion engine including the combination, with a crank shaft, of a combined electric motor-generator having a common shaft, a transmission belt which is normally under predetermined tension, connecting said shaft with the engine crank shaft in order to transmit the rotation thereof to the latter, a tensioning device applied against said belt to maintain the tension thereof, means operable at will for increasing the pressure of said device against said belt, whereby to increase the tension of the latter above the predetermined value, means for closing the circuit of the motor after increasing the pressure of the tensioning device, and means for releasing the tension of said belt to the predetermined value.

2. Self-starter apparatus for an internal combustion engine including the combination, with a crank shaft, of a combined electric motor-generator having a common shaft and having a circuit breaker in its circuit, a transmission belt which is normally under predetermined tension connecting said shaft with the engine crank shaft in order to transmit the rotation thereof to the latter, a tensioning device applied against said belt to maintain the tension thereof, means operable at will for simultaneously moving and increasing the pressure of said device against said belt and moving and effecting closure of the circuit breaker subsequently to the increase of the pressure of said device on the belt, and resilient means for opening the circuit breaker and its associated circuit and releasing said tensioning device.

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