

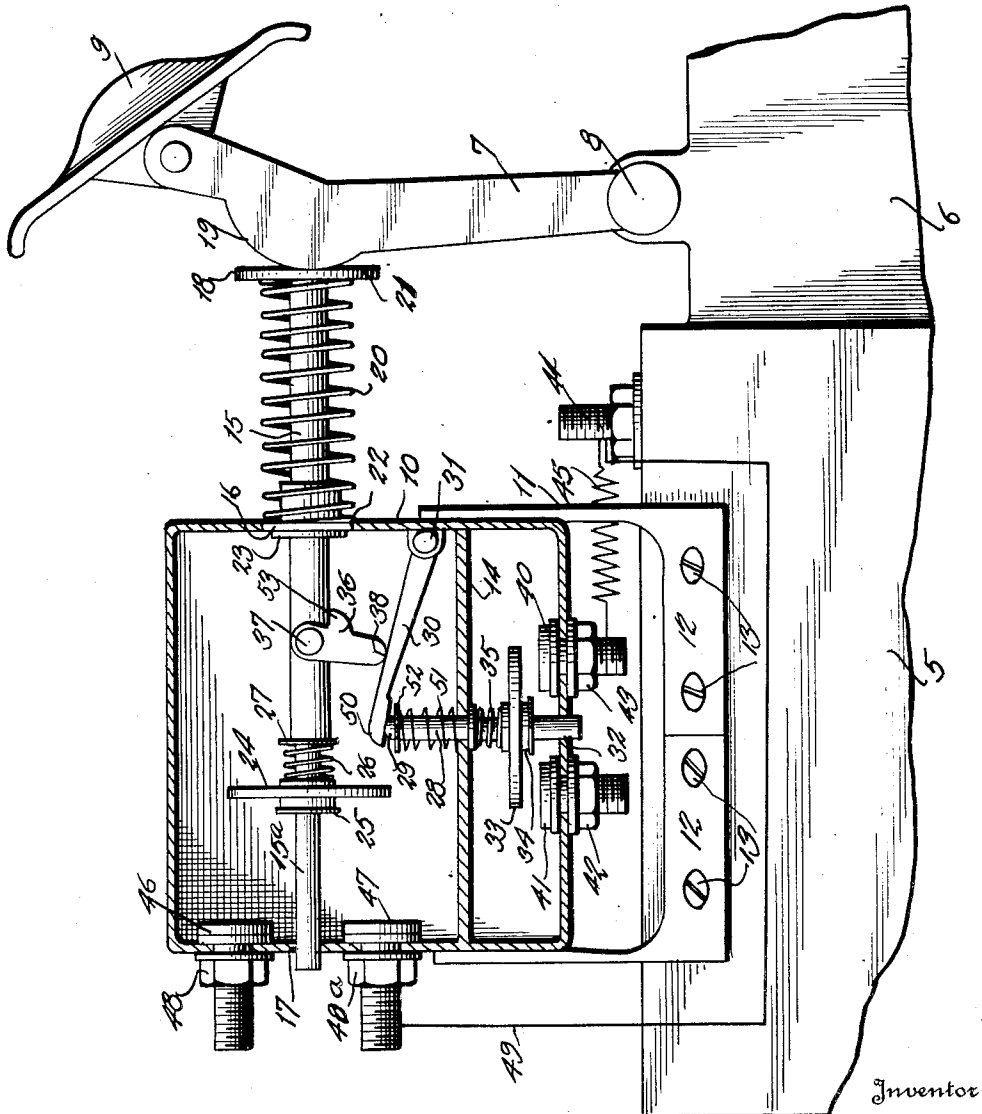
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MANUALLY OPERATED PINION ENGAGING STARTER FOR MOTOR VEHICLES

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MANUALLY OPERATED PINION ENGAGING
STARTER FOR MOTOR VEHICLESKenneth R. Blake, Anderson, Ind., assignor of
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4 Claims. (Cl. 290—38)

This invention relates to certain new and useful improvements in manually operated pinion engaging starters for motor vehicles, and has reference more particularly to a starter system including a starter motor having a pinion gear mounted on the armature shaft thereof adapted to engage a driven member such as the ring gear carried by the fly wheel of the internal combustion engine.

The primary object of this invention is to provide manually controlled starter pinion engaging means in combination with starter motor switches which are operated simultaneously with the shifting of the pinion gear to effect the closing of successive circuits, one of which may be provided with a suitable resistance element whereby different speeds will be produced by the electric motor such as a slow speed while the pinion is being engaged caused by the initial movement of the starter pinion shifter, after which the full voltage of the motor vehicle storage battery is applied to the starter motor to cause the starting of the internal combustion engine.

A further object of this invention is to provide manually operated starting motor switches for an internal combustion engine adapted to be closed successively in response to the movement of the pinion shift lever whereby the closing of the first switch will supply the electric motor with a minimum amount of current in order that the starter pinion may engage the teeth of the fly wheel in a slow and even fashion before the full supply of current becomes effective upon the starter motor after the second switch has closed.

A still further object of this invention is to provide a starter of the manually shiftable type for motor vehicles which will eliminate the use of large electro magnets and solenoids now employed on present day vehicles.

A still further object of this invention is to provide a manually engageable starter pinion for starter systems of motor vehicles adapted to be operated more easily by the driver of the motor vehicle and which will not require a large amount of pressure applied to the foot pedal or starter button.

Other objects and advantages of the invention will become apparent during the course of the following description, taken with the drawing wherein is shown a preferred embodiment of the invention.

In the drawing, wherein for the purpose of illustrating the invention and wherein like ref-

erence characters will be employed to designate like parts throughout the same, the reference character 5 will generally be employed to designate a starter motor of a motor vehicle which in present day motor vehicles is usually connected to a starter pinion casing 6 by means of nuts or bolts (not shown).

The starter motor pinion casing 6 is provided with a shift lever 7 pivoted to the casing as at 8 provided on the upper end with a foot pedal or button 9 which normally extends through the floor board of the motor vehicle in close proximity to the driver's seat.

Mounted upon the starter motor 5 is a casing 10 as by means of suitable brackets 11 secured thereto and fastened to the motor by means of offset arms 12 as at 13, which extend into the motor body 5 and are anchored in threaded openings formed therein.

The casing 10 is provided with a partition 14 and is also provided with a slide rod 15 which operates in a slide bushing 16 formed in one wall of the casing 10 and said slide rod 15 is provided with a reduced portion 15a which slides in an opening 17 formed in the opposite wall of the casing 10. One end of the slide rod 15 is provided with a button 18 adapted to engage a cam face 19 formed on the starter pinion shift lever 7 so that a movement of the shift lever 7 will effect the movement of the slide rod 15, in a forward direction. A coil spring 20 encircles the slide rod 15 and has one of its ends as at 21 engaging the button 18 while the opposite end 22 engages a flange formed on the bushing 16 and a stop washer 23 is provided on the inside of the bushing 16 for limiting the outward movement of the slide rod 15. Slidably mounted upon the reduced portion 15a of the slide rod 15 within the casing 10 and above the partition 14 is a contact plate 24 mounted on a slide bushing 25 adapted to impinge one end of a coil spring 26 while the opposite end of the coil spring is retained by means of a washer 27 which may be secured on the reduced portion 15a by suitable fastening means.

Slidably mounted in the partition 14 is a slide shaft 28 having a head 29 adapted to be engaged by an arm 30 pivoted to the casing 10 as at 31. The slide shaft 28 also extends through the bottom wall of the casing 10 as at 32 and between the bottom wall of the casing 10 and the partition 14 there is slidably secured a contact plate 33 capable of moving upwardly on the shaft 28 but limited downwardly by means of a washer 55

34. A coil spring 35 encircles the slide shaft 28 below the partition 14 and has one end engaging the underside of the partition 14 while the opposite end engages the contact disk 33 to hold 5 the same against the washer 34.

Mounted on the slide shaft 15 is a dog 36 pivoted thereto as at 37 and having its free end presented to the pivoted arm 30 as at 38 whereby the initial movement of the slide rod 15 will 10 move the pivoted arm 30 downwardly which carries with it the slide shaft 28 and causes the disk 33 to engage a set of contacts 40 and 41 which extend through the bottom wall of the casing 10 and are retained in place by means of suitable 15 nuts 42 and 43. The contacts 40 and 41 are suitably insulated from the casing 10 by means of rubber washers and the like.

Connected between the contact 40 and a terminal 44 of the starter motor 5 is a resistance 45 20 while the opposite contact button 41 may be connected to the storage battery of the motor vehicle so that as the pedal 9 is depressed, the rod 15 will slide forwardly and cause the dog 36 to engage the pivoted arm 30 thereby depressing 25 the slide rod 28 and moving the contact disk 33 into engagement with and bridging the contacts 40 and 41 which completes a circuit through the starter motor and resistance 45 thereby applying a minimum amount of current to the starter 30 motor 5 at the same time that the starter pinion is moving into mesh with the teeth on the fly wheel of the internal combustion engine.

Upon continued travel of the slide rod 15 the disk or contact plate 24 will engage stationary con- 35 tacts 46 and 47 carried by the side wall of the casing 10 and held in place by means of nuts 48 and 48a respectively and also insulated from the casing by means of suitable rubber washers.

It is proposed to connect a cable from the stor- 40 age battery of the motor vehicle (not shown) to the contact 46 and to connect a line wire 49 to the stationary contact 47 so that as the contact disk 24 bridges and engages the contacts 46 and 47 a circuit will be completed through the stor- 45 age battery and starter motor after the starter pinion teeth have fully engaged the teeth of the fly wheel and will thereby apply a maximum amount of power to the pinion gear for the purpose of starting the internal combustion engine.

Just before the contact plate 24 has bridged 50 the stationary contacts 46 and 47, further movement of the slide rod 15 will cause the pivoted dog 36 to move over the free ends 50 of the pivoted arm 30 so that the coil spring 51 encircling 55 the upper portion of the shaft 28 will urge the shaft upwardly carrying with it the contact plate 33 thereby breaking the circuit between the stationary contacts 40 and 41. The coil spring 51 may be held in place by means of a suitable 60 washer 52 secured upon the slide shaft 28 and may have its opposite end engaging the partition 14.

After the internal combustion engine has started the pedal 9 may be released thereby allowing 65 the coil spring 20 to retract the slide rod 15 and allow the pivoted dog 36 to move over the free end 50 of the pivoted lever 30 without depressing the same. It will be noted that the pivoted dog 36 is capable of moving in one direction only as a 70 result of the projection 53 formed thereon which engages the slide rod 15 during the forward travel thereof but may be allowed to pivot in the opposite direction such as when the slide rod 15 is being released when pressure is relieved upon 75 the foot pedal 9.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred embodiment of the same and that various changes in the shape, size and arrangement of parts may be resorted to without 5 departing from the spirit of the invention or the scope of the sub-joined claims.

I claim:—

1. In a starter for internal combustion engines of automobiles wherein a lever is employed for 10 shifting a pinion on a starter motor armature shaft into engagement with a ring gear, and wherein sets of contacts are successively bridged for respectively rotating the pinion at minimum and maximum speeds, said starter comprising a 15 casing, a tensioned shaft slidable therein, a second tensioned shaft slidable in the casing at right angles to the first shaft, contacts adapted to be bridged by sliding movements of the two shafts, and means carried by the first shaft to effect slid- 20 ing movement of the second shaft.

2. In a starter for internal combustion engines of automobiles wherein a lever is employed for 25 shifting a pinion on a starter motor armature shaft into engagement with a ring gear, and wherein sets of contacts are successively bridged for respectively rotating the pinion at minimum and maximum speeds, said starter comprising a casing, a tensioned shaft slidable therein, a second tensioned shaft slidable in the casing at right 30 angles to the first shaft, contacts adapted to be bridged by sliding movements of the two shafts, and means carried by the first shaft to effect bridging of the contacts associated with the second shaft in advance of the bridging of the con- 35 tacts associated with the first shaft.

3. In a starter for internal combustion engines of automobiles wherein a lever is employed for 40 shifting a pinion on a starter motor armature shaft into engagement with a ring gear, and wherein sets of contacts are successively bridged for respectively rotating the pinion at minimum and maximum speeds, said starter comprising a casing, a tensioned shaft slidable therein, a second tensioned shaft slidable in the casing at right 45 angles to the first shaft, contacts adapted to be bridged by sliding movements of the two shafts, and means carried by the first shaft to effect sliding movement of the second shaft, said means including a pivoted dog on the first shaft and a piv- 50 oted arm in the casing engaged with the second shaft and adapted to be moved by the dog for the operation of the second shaft.

4. In a starter for internal combustion engines of automobiles wherein a lever is employed for 55 shifting a pinion on a starter motor armature shaft into engagement with a ring gear, and wherein sets of contacts are successively bridged for respectively rotating the pinion at minimum and maximum speeds, said starter comprising a 60 casing, a tensioned shaft slidable therein, a second tensioned shaft slidable in the casing at right angles to the first shaft, contacts adapted to be bridged by sliding movements of the two shafts, and means carried by the first shaft to effect 65 bridging of the contacts associated with the second shaft in advance of the bridging of the contacts associated with the first shaft, said means including a pivoted dog on the first shaft and a pivoted arm in the casing engaged with the sec- 70 ond shaft and adapted to be moved by the dog for the operation of the second shaft.

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