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STARTING MECHANISM FOR AUTOMOBILE-ENGINES.

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To all whom it may concern:

Be it known that we, EDGAR LA MOTTE WEAVER and EDWARD CREVELING KIMMEL, citizens of the United States, residing at Saltillo, in the county of Huntingdon and State of Pennsylvania, have invented certain new and useful Improvements in Starting Mechanism for Automobile-Engines, of which the following is a specification, reference being had to the accompanying drawings.

This invention is an improved mechanism for starting internal combustion engines, such as are used in automobiles, the object of the invention being to provide an improved starting mechanism of this type by means of which the engine may be readily started in operation without injury to the attendant or to any of the machinery in the event of back firing in the engine cylinders, the invention consisting in the construction, combination and arrangement of devices, hereinafter described and claimed.

In the accompanying drawings—Figure 1 is a plan of a starting mechanism constructed in accordance with our invention. Fig. 2 is a sectional view of the same on the plane indicated by the line *a— a* of Fig. 1, and showing the sliding starting gear in initial position in full lines, and at the other end of its stroke in dotted lines. Fig. 3 is a transverse sectional view of the same on the plane indicated by the line *b— b* of Fig. 1, and showing the starting pinion in its initial lowered position in full lines, and in elevated position in dotted lines.

For the purposes of this specification, a portion of the frame of an automobile is indicated diagrammatically at A. The crank shaft of the engine is indicated at 1, bearings therefor being indicated at 2. On the crank shaft is a beveled gear 3. Parallel with the crank shaft and near the same is a bracket arm 4 which is secured to a transverse member of the frame and is provided at its front end with a vertical longitudinal slot 5, which slot is open at the front end of the said bracket arm. On opposite sides of the said slot are bearings 6 in which a shaft 7 is mounted, the said shaft being provided with a gear 8 which engages the gear 3, and is disposed in the said slot. A longitudinally disposed brace 9 is provided on its upper side with a vertical bearing and guide arm 10, which has a vertical slot 11,

at the upper and lower ends of which are babbitted bearings 12, 13. This slot is abreast of and in line with the shaft 7. A tumbling shaft 14 extends through the slot 11, has its inner end connected to the shaft 7 by a universal joint 15, and is provided at its outer end with a pinion 16. The gear teeth 17 of the said pinion are relatively long and are curved or inclined in one direction toward their outer ends. At one side of the frame is a horizontal longitudinally disposed guide bar 18, which has a dove-tailed guide groove 19 in its upper side, and is also provided at one side with an upwardly opening bearing 20 for the reception of the projecting free end of the tumbling shaft.

A sliding gear 21 is provided on its under side with a dove-tailed flange 22 which operates in the guide groove 19, and in connection therewith, slidably mounts the said slide gear on the guide 18 for reciprocation thereon. The said slide gear is provided on its inner side with laterally projecting gear teeth 23 which are disposed in an arc, the chord of which is longitudinal of the slide gear. The pinion 16 is in the path of the said gear teeth. At the rear end of the slide gear, on the inner side thereof, is a curved way 24, which affords clearance for the projecting outer end of the tumbling shaft, when the latter, together with the pinion 16 moves upwardly, as hereinafter described. A hand lever 25 which is fulcrumed as at 26 to a suitable support 27, has its lower end connected by a rod 28, to the said slide gear so that the latter may be moved longitudinally by means of the said lever.

The operation of our invention is as follows: In the initial position of our improved starting mechanism, the lever is lowered and the slide gear is slightly in rear of and disconnected from the pinion 16. The tumbling shaft is initially in lowered position in line with the shaft 7 and engaged with the bearings 13 and 20.

In order to start the engine the lever is turned so as to run the slide gear forwardly, and thus engage its teeth with the upper side of the pinion and hence rotate the pinion and cause it to turn the tumbling shaft and the shaft 7, and thereby cause the gears 8 and 3 to turn the crank shaft. The gears are so timed that the forward stroke of the slide gear starts the engine at compression

and hence the engine moves by its own power as soon as the slide gear completes its forward stroke. The rotation of the pinion 16 by the engine, as soon as the slide gear completes its forward stroke, causes said pinion which is at the rear end of the slide gear and engaged with the rearmost tooth thereof, to move upwardly, thereby carrying the tumbling shaft upwardly in the slot 11, and causing the pinion to get above the teeth of the slide gear so that the rotation of the pinion causes the slide gear to move rearwardly to its initial position, and as the rearward movement of the slide gear is completed, the tumbling shaft drops and its outer end reengages the bearing 20.

In the event that one forward movement of the slide gear is not sufficient to start the engine in operation it will, however, impart sufficient impulse to the engine shaft to cause the pinion 16 to rotate so that when the slide gear reaches the forward end of its stroke the pinion 16 by the inertia of the engine shaft and its connections will be caused to move upwardly on the slide gear and get above the teeth thereof and the slide gear can then be drawn back by appropriately operating the lever 25 and, hence, in this manner the slide gear can be alternately pushed or pulled, by merely operating the lever 25 as many times as may be necessary to set the engine in operation. Hence our improved starting mechanism may be employed to "spin" the engine as it is called to start the engine in operation when it is provided with a magneto.

It will be understood that our improved starting mechanism enables the operator to start the engine without leaving his seat and merely by operating the lever 25.

It will be understood that our improved starting mechanism is very simple, is strong and durable, is positive and direct in its operation and may be manufactured and installed at very slight cost.

While we have herein shown and described what we now consider a preferred

embodiment of our invention, we would have it understood that changes may be made in the form, construction and proportion of the several parts without departing from the spirit of our invention, and within the scope of the appended claims.

We claim:—

1. In a starting mechanism of the class described, the combination of an engine shaft, a starting shaft geared thereto, a tumbling shaft connected to the starting shaft and provided with a pinion, and a slide gear mounted for longitudinal movement, and having gear teeth on one side to pass over the pinion, and turn the same when the slide gear moves in one direction, and the tumbling shaft is in lowered position, the said pinion when actuated by the power of the engine, moving up on the slide gear above the teeth of the slide gear, and returning the slide gear to its initial position and means to operate the slide gear.

2. In a starting mechanism of the class described, the combination of an engine shaft, a starting shaft geared thereto, a tumbling shaft connected to the starting shaft and provided with a pinion, and a slide gear mounted for longitudinal movement, and having gear teeth on one side to pass over the pinion, and turn the same when the slide gear moves in one direction, and the tumbling shaft is in lowered position, the said pinion when actuated by the power of the engine moving up on the slide gear above the teeth of the slide gear, and returning the slide gear to its initial position, and a lever connected to the slide gear to actuate the latter.

In testimony whereof we hereunto affix our signatures in the presence of two witnesses.

EDGAR LA MOTTE WEAVER,
EDWARD CREVELING KIMMEL,

Witnesses:

H. T. WEAVER,
S. W. KIMMEL.