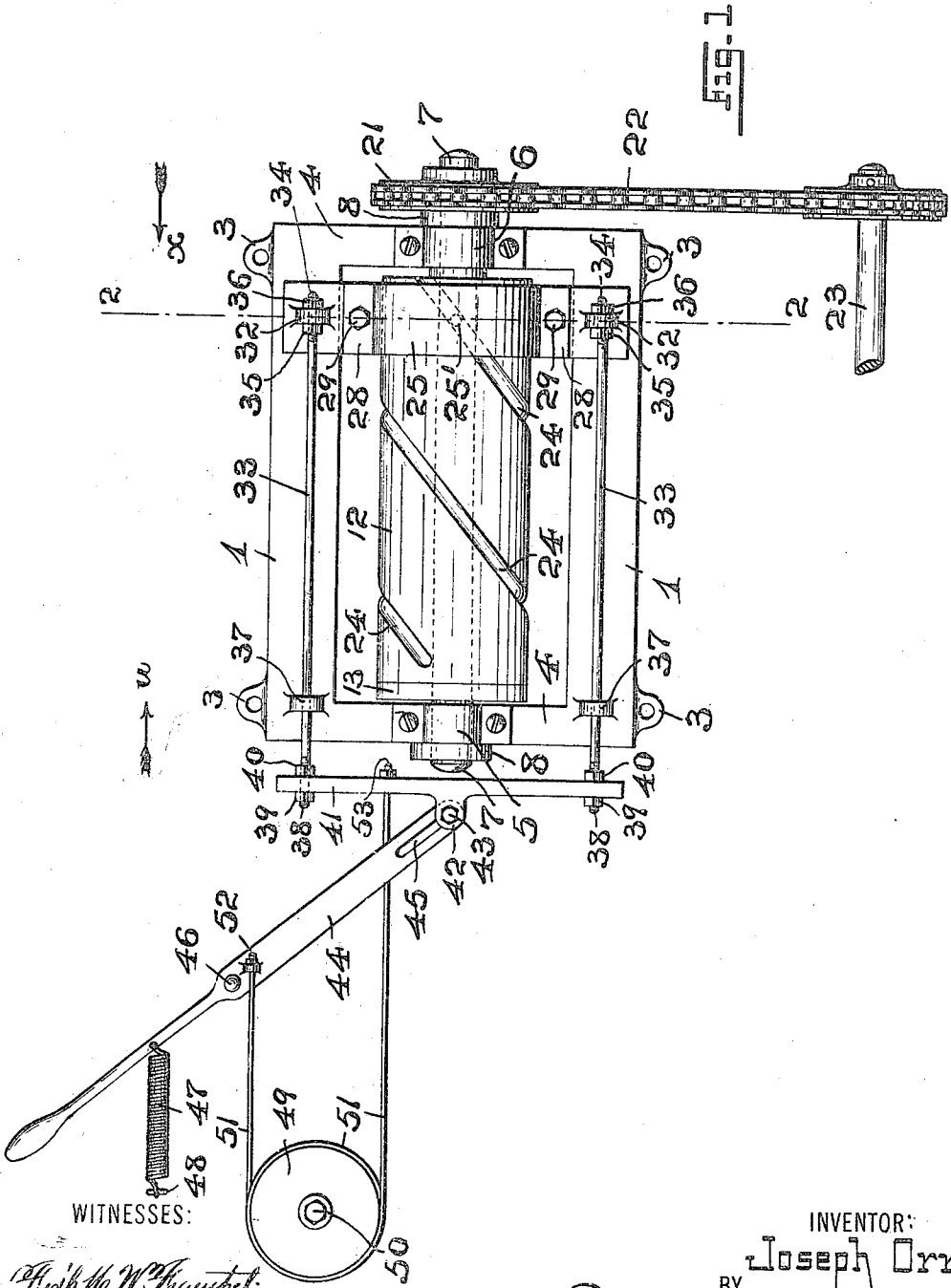


J. ORR.
 STARTING DEVICE.
 APPLICATION FILED MAR. 6, 1917.

1,256,156.

Patented Feb. 12, 1918.
 2 SHEETS—SHEET 1.



WITNESSES:

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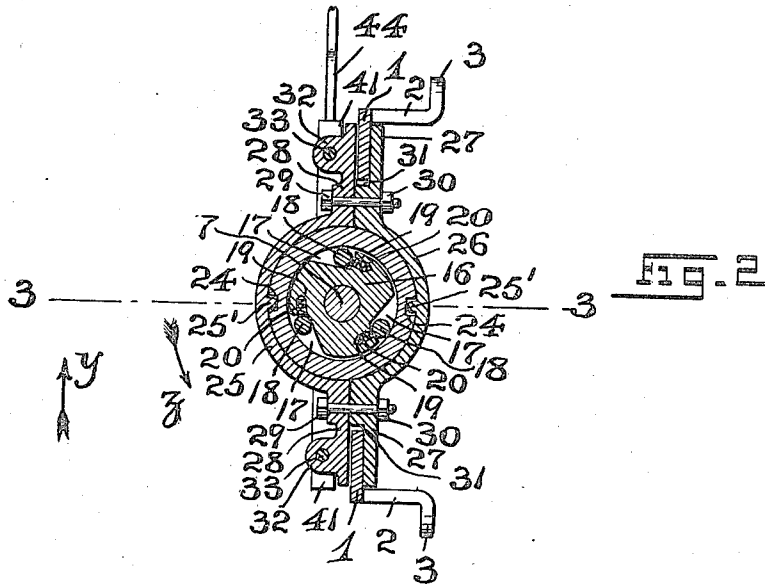
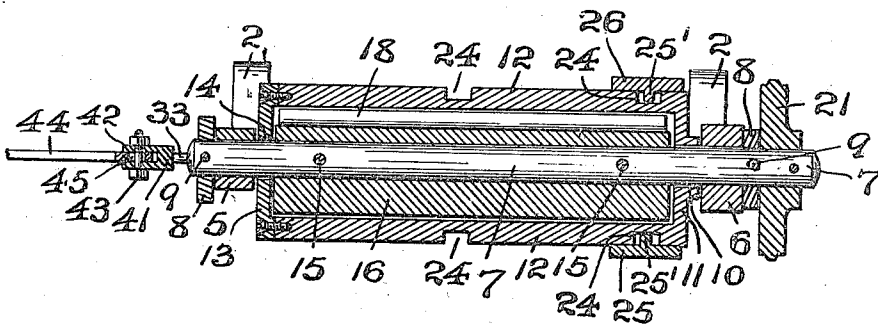


FIG. 3

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UNITED STATES PATENT OFFICE.

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STARTING DEVICE.

1,256,156.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOSEPH ORR, a citizen of the United States, residing at Verona, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Starting Devices; 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 appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

This invention relates, generally, to improvements in starters for internal combustion engines, such as are used for driving automobiles, and the like; and, the invention has reference, more particularly, to a novel and manually operated starting mechanism of such a construction that one stroke of an operating lever will set the starting mechanism in motion, and by its motion will cause more than one complete revolution of the engine-shaft and rapid reciprocatory movements of the piston of the engine.

The present invention, therefore, has for its principal objects a novel, simple and efficiently operating starting mechanism for internal combustion engines, and the like, which can be readily operated by the single stroke of a lever under the control of the chauffeur seated in the vehicle, to rapidly start the motor or engine and at the same time, if desired, the automobile with the driving axle of which the motor or engine is connected in any usual manner.

The invention has for its further object the novel arrangement of a clutch-device operating with relation to a worm-shaft in such a manner, so that a movement of the starting lever in one direction will actuate the worm-shaft so that the motor or engine is started, but which clutch-device works in such a manner so that the operated and moved parts of the starting mechanism will return to their normal initial positions without interfering with the continuing revolutions of the engine-shaft and the continuing driving operations of the engine.

Other objects of the present invention not at this time more particularly enumerated will be clearly understood from the following detailed description of my present invention.

With the various objects of the present in-

vention in view, the said invention consists, primarily, in the novel starting mechanism for internal combustion engines hereinafter set forth; and, the invention consists, furthermore, in the novel arrangements and combinations of the various devices and parts, as well as in the details of the construction of the said parts, all of which will be more fully described in the following specification, and then finally embodied in the clauses of the claim which are appended to and which form an essential part of the said specification.

The invention is clearly illustrated in the accompanying drawings, in which:—

Figure 1 is a front elevation of a starting mechanism embodying the principles of the present invention.

Fig. 2 is a transverse vertical section of the same, said section being taken on line 2—2 in said Fig. 1, looking in the direction of the arrow *x*; and Fig. 3 is a horizontal section of the starting mechanism, said section being taken on line 3—3 in said Fig. 2, looking in the direction of the arrow *y*, the clutch-device, however, being a sectional representation of the same, taken in a plane at right angles to the sectional plane on said line 3—3.

Similar characters of reference are employed in the said above described views to indicate corresponding parts.

Referring now to the said figures of the drawings, the reference-character 1 indicates a suitable frame which is provided with suitably formed members, as 2, having perforated ears or lugs 3 for the reception of bolts by means of which the frame may be secured in a desirable position to the frame-work of an automobile, or the like, and usually in a vertical position. It will be understood, however, that other means may be employed for securing said frame 1 in its operative position. At its opposite ends, the said frame 1 may be made with end-pieces, as 4, which are provided with the bearing-members 5 and 6. The reference-character 7 indicates a shaft which has one of its end-portions rotatably mounted in the bearing-member 6, and has its other end-portion rotatably mounted in the bearing-member 5. Motion of the shaft in said bearing-members 5 and 6 in the direction of its longitudinal axis is prevented by means of devices, as 8, which are pinned to said shaft by means of pins 9, although it will be evi-

dent, that any other suitably constructed means may be provided for overcoming any movement longitudinally of the said shaft in said bearing-members, as will be clearly understood.

Loosely mounted upon said shaft 7, by means of a bearing-portion 10 in the closed end 11 is a hollow cylinder 12, the opposite and open end of said cylinder 12 being suitably closed by means of a mounting disk or plate 13 which is provided with a bearing-portion 14, for loosely supporting said disk or plate upon said shaft 7, and at the same time properly mounting the said hollow cylinder 12 upon the shaft. Upon that portion of the said shaft 7 within the said cylinder 12 is suitably secured by means of pins 15, or otherwise, a clutch-element, as 16, formed in its cylindrical or arc-shaped portions, see Fig. 2 of the drawings, with longitudinally extending recesses or cut-away parts, as 17, preferably of the conformation shown, and in which are disposed so as to roll in said recesses or cut-away parts suitable rollers, as 18. Pockets, as 19, may also be provided, in which are disposed suitable coil-springs 20 which bear against the said rollers. The result is that when the hollow cylinder 12 is rotated in the direction of the arrow z in said figure, in the manner to be hereinafter set forth, the rollers 18 are caused to roll in outward directions toward the peripheral surface-portions of the cylindrical or arc-shaped members of the clutch-element 16 and to sufficiently bind upon the inner surface-portions of the hollow cylinder 12, so that the rotary motion of said cylinder in the direction of the said arrow z will correspondingly rotate the clutch-element 16 and consequently also the shaft 7, the rotary motion of the said shaft being conveyed by means of a sprocket-wheel 21 and a link-chain 22, or other suitable conveying means, to the engine-shaft 23, or other suitable element which is to be started. The rotary motion of the hollow cylinder 12 in a direction reverse from that indicated by the arrow z will release the frictional engagement of the rollers 18, and will not interfere with the continuing rotary motion of the shaft 7 now idly running in the direction of said arrow z simultaneously with the started motor or engine.

As shown, the said hollow cylinder 12 is formed in its outer cylindrical surface with suitably disposed and suitably formed helical grooves or channels 24 into which extend and are adapted to move longitudinally in said grooves or channels 24 actuating pins or lugs 25 of a crosshead or slide. This crosshead or slide consists, essentially, of a pair of semi ring or sleeve-like members 25 and 26, adapted to embrace the hollow cylinder 12, as shown, and respectively provided with the oppositely projecting and

perforated flange-members 27 and 28, secured together by means of bolts 29 and nuts 30, or other suitable securing means. The flange-members 27 are recessed or cut away, as at 31, so that each pair of secured flange-members 27 and 28 will provide a fork or embracing portion slidably mounted upon a longitudinally extending piece of the previously-mentioned frame 1.

Extending from the said flanges 28 are perforated lugs 32 in which are arranged the screw-threaded end-portions 34 of suitable connecting rods or links 33, suitably secured in position by means of nuts 35 and 36 placed on opposite sides of said lugs 32 and screwed upon the screw-threaded portions 34 of the said rods or links 33. The said rods or links are slidably disposed within suitable guiding members 37 connected with and extending from the main frame 1, the said rods or links 33 being also provided upon their opposite end-portions with screw-threads 38 and tightening nuts 39 and 40. Mounted upon the screw-threaded end-portions 39 of the said rods or links 33, and secured in position upon said rods or links between the said tightening nuts 39 and 40, is a connecting plate or bar 41 formed with a perforated ear or lug 42 which carries a pivot-pin or bolt 43. Operatively connected with the said pin or bolt 43 is the slotted end-portion 45 of an operating lever 44, said lever being pivotally mounted, as at 46, upon a suitable location upon the framework of the automobile. If desired, the said lever 44 may have attached thereto one end-portion of a coiled spring 47, the other end-portion of the said spring being suitably attached, as at 48, to the framework of the automobile, as will be evident. The purpose of said spring is, after the upper portion of the lever 44 has been moved in the direction of the arrow u in said Fig. 1, to return the said lever and the parts operated thereby to their normal initial positions, after the lever has been released by the operator.

To prevent rattling of the said lever, due to possible lost motion, there may be provided a compensating device in the form of a roller, as 49, rotatably mounted upon a pin 50, also secured upon the framework of the automobile, a wire or other suitable flexible connection, as 51, being coiled upon said roller 48, and having its respective end-portions 52 and 53 attached to the said lever 44 and the said plate or bar 41 in any suitable manner, as will be clearly understood from an inspection of said Fig. 1 of the drawings. This compensating device may, however, be dispensed with, if desired.

The operation of the starting mechanism, briefly, is as follows:—

When the lever 44 is moved in the direction of the arrow u , the plate or bar 41 and

the connecting rods or links 33 will move the cross-head in the direction of the arrow x in said Fig. 1, thereby properly revolving the hollow cylinder 12, and by means of the clutch-device, herein-above described, correspondingly revolving the shaft 7, which in turn starts the motor or engine. As soon as the lever 44 is returned to its normal position, the clutch-device assumes its released relation, whereby the cross-head and the rods or links 33 and plate or bar 41 move back to their normal initial positions, without interfering with the continuing revolutions of the shaft 7 and the continuing workings of the motor or engine.

I am fully aware, that changes may be made in the general arrangements and combinations of the several devices and parts, as well as in the details of the construction of the said parts, without departing from the scope of the present invention as set forth in the foregoing specification, and as defined in the clauses of the claim which are appended thereto. Hence, I do not limit my invention to the exact arrangements and combinations of the said devices and parts as described in the said specification, nor do I confine myself to the exact details of the construction of the said parts, as illustrated in the accompanying drawings.

I claim:—

1. A starting mechanism of the character set forth, comprising a frame provided with bearing-portions, a shaft mounted in said bearing-portions, means coöperating with said shaft for conveying rotary motion of said shaft to another element as an engine, a helically grooved element mounted upon said shaft, a cross-head slidably mounted upon said frame provided with means for revolving said helically grooved element, and means for actuating said cross-head, consisting of links connected with said cross-head, guiding elements upon said frame in which said links are slidably disposed, a cross-bar connecting said links, and an actuating starting lever connected with said cross-bar.

2. A starting mechanism of the character set forth, comprising a frame provided with bearing-portions, a shaft mounted in said bearing-portions, means coöperating with said shaft for conveying rotary motion of said shaft to another element as an engine, a helically grooved element mounted upon said shaft, a cross-head slidably mounted upon said frame provided with means for revolving said helically grooved element, and means for actuating said cross-head, consisting of links connected with said cross-head, guiding elements upon said frame in which said links are slidably disposed, a cross-bar connecting said links, and an actuating starting lever connected with said cross-bar, combined with a compensating de-

vice operatively connected and coöperating with said lever and said cross-bar.

3. A starting mechanism of the character set forth, comprising a frame provided with bearing-portions, a shaft mounted in said bearing-portions, means coöperating with said shaft for conveying rotary motion of said shaft to another element as an engine, a helically grooved hollow cylinder rotatably mounted upon said shaft, a clutch-device secured upon said shaft within said hollow-cylinder, said clutch-device coöperating with said hollow cylinder to convey the rotary motion of said cylinder to said shaft, a cross-head slidably mounted upon said frame provided with means for revolving said helically grooved hollow cylinder, and means for actuating said cross-head.

4. A starting mechanism of the character set forth, comprising a frame provided with bearing portions, a shaft mounted in said bearing-portions, means coöperating with said shaft for conveying rotary motion of said shaft to another element as an engine, a helically grooved hollow cylinder rotatably mounted upon said shaft, a clutch-device secured upon said shaft within said hollow-cylinder, said clutch-device operating with said hollow cylinder to convey the rotary motion of said cylinder to said shaft, a cross-head slidably mounted upon said frame provided with means for revolving said helically grooved hollow cylinder, and means for actuating said cross-head, consisting of links connected with said cross-head, guiding elements upon said frame in which said links are slidably disposed, a crossbar connecting said links, an actuating starting lever connected with said cross-bar.

5. A starting mechanism of the character set forth, comprising a frame provided with bearing-portions, a shaft mounted in said bearing-portions, means coöperating with said shaft for conveying rotary motion of said shaft to another element as an engine, a helically grooved hollow cylinder rotatably mounted upon said shaft, a clutch-device secured upon said shaft within said hollow cylinder, said clutch-device coöperating with said hollow cylinder to convey the rotary motion of said cylinder to said shaft, a cross-head slidably mounted upon said frame provided with means for revolving said helically grooved hollow cylinder, and means for actuating said cross-head, combined with a compensating device operatively connected and coöperating with said lever and said cross-bar.

6. A starting mechanism of the character set forth, comprising a frame provided with bearing-portions, a shaft mounted in said bearing-portions, means coöperating with said shaft for conveying rotary motion of said shaft to another element as an engine, a helically grooved element mounted upon

said shaft, a cross-head comprising a pair of embracing members adapted to embrace said grooved element, flange-like members extending in opposite directions and in pairs from said embracing members, said pairs of flange-like members embracing portions of said frame and being slidably mounted with relation to said portions of the frame, and means connected with said flange-like members for actuating said cross-head.

7. A starting mechanism of the character set forth, comprising a frame provided with bearing-portions, a shaft mounted in said bearing-portions, means cooperating with said shaft for conveying rotary motion of said shaft to another element as an engine, a helically grooved element mounted upon said shaft, a cross-head comprising a pair of embracing members adapted to embrace said grooved element, flange-like members extending in opposite directions and in pairs from said embracing members, said pairs of flange-like members embracing portions of said frame and being slidably mounted with relation to said portions of the frame, perforated lugs extending from said flange-like members, perforated guiding lugs extending from said frame, links slidably disposed within said guiding lugs, said links being secured with relation to said perforated lugs of the said flange-like members, a connecting bar mounted upon and secured to said links, and a starting lever operatively connected with said connecting bar.

8. A starting mechanism of the character set forth, comprising a frame provided with bearing-portions, a shaft mounted in said bearing-portions, means cooperating with said shaft for conveying rotary motion of said shaft to another element as an engine, a helically grooved hollow cylinder rotatably mounted upon said shaft, a clutch-device secured upon said shaft within said hollow cylinder, said clutch-device cooperating with said hollow cylinder to convey the rotary motion of said cylinder to said shaft, a cross-head comprising a pair of

semi-cylindrical embracing members adapted to embrace said helically grooved hollow cylinder, flange-like members extending in opposite directions and in pairs from said embracing members, said pairs of flange-like members embracing portions of said frame and being slidably mounted with relation to said portions of the frame, and means connected with said flange-like members for actuating said cross-head.

9. A starting mechanism of the character set forth, comprising a frame provided with bearing-portions, a shaft mounted in said bearing-portions, means cooperating with said shaft for conveying rotary motion of said shaft to another element as an engine, a helically grooved hollow cylinder rotatably mounted upon said shaft, a clutch-device secured upon said shaft within said hollow cylinder, said clutch-device cooperating with said hollow cylinder to convey the rotary motion of said cylinder to said shaft, a cross-head comprising a pair of semi-cylindrical embracing members adapted to embrace said helically grooved hollow cylinder, flange-like members extending in opposite directions and in pairs from said embracing members, said pairs of flange-like members embracing portions of said frame and being slidably mounted with relation to said portions of the frame, perforated lugs extending from said flange-like members, perforated guiding lugs extending from said frame, links slidably disposed within said guiding lugs, said links being secured with relation to said perforated lugs of the said flange-like members, a connecting bar mounted upon and secured to said links, and a starting lever operatively connected with said connecting bar.

In testimony that I claim the invention set forth above I have hereunto set my hand this 26th day of February, 1917.

JOSEPH ORR.

Witnesses:

FREDK. C. FRAENTZEL,
FREDK. H. W. FRAENTZEL.

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