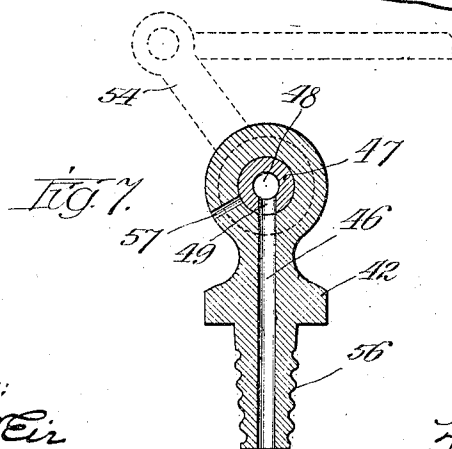
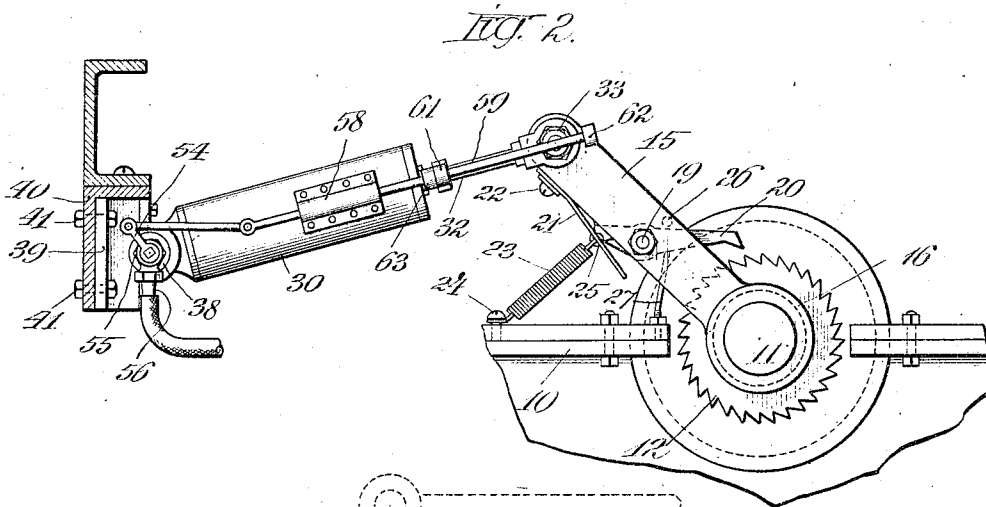
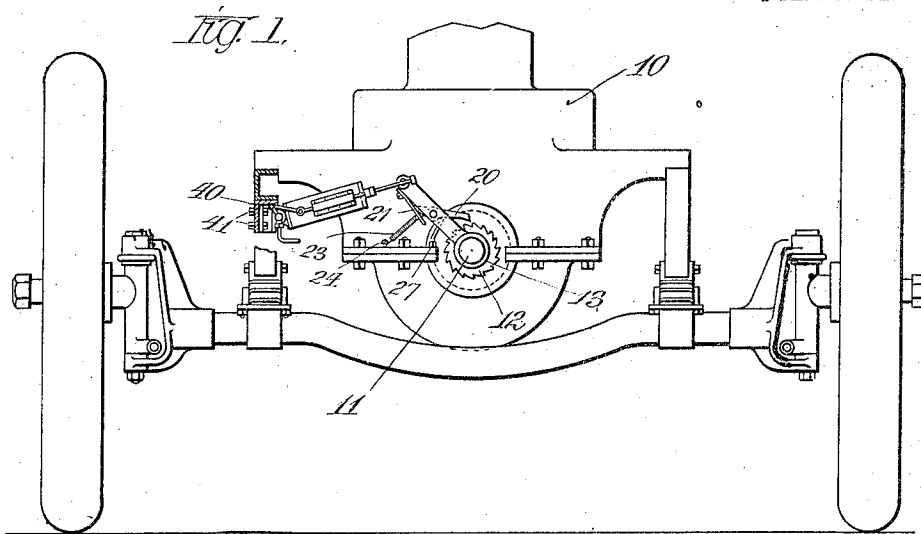


J. DESMOND.
 AUTOMATIC STARTING DEVICE FOR INTERNAL COMBUSTION ENGINES.
 APPLICATION FILED JUNE 15, 1911.

1,033,882.

Patented July 30, 1912.

2 SHEETS-SHEET 1.



Witnesses:
 Robert V. McEir
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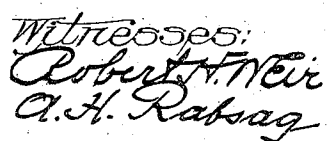
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC STARTING DEVICE FOR INTERNAL-COMBUSTION ENGINES.

1,033,882.

Specification of Letters Patent.

Patented July 30, 1912.

Application filed June 15, 1911. Serial No. 633,272.

To all whom it may concern:

Be it known that I, JOHN DESMOND, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Starting Devices for Internal-Combustion Engines, of which the following is a specification.

My invention relates to improvement in automatic starting devices for internal combustion engines.

It has special reference to devices of this character wherein a fluid under pressure, such as air, or the like, is admitted into a cylinder, of the starting device, to give motion to a responsive piston therein, whereby the main shaft of the engine is rotated by a succession of strokes of definite length.

One of the objects, of my invention, is to generally improve structures of this character and to render them entirely automatic in operation.

Other and further objects of my invention will be readily understood, from a consideration of the description, hereinafter contained, taken in conjunction with the drawings wherein:

Figure 1 is an end view of an automobile, showing a side elevation of my engine starting device, as applied to the engine thereof. Fig. 2 is an enlarged elevation of the starting device, looking from the front of the automobile. Fig. 3 is a similar view, looking from the rear, and showing parts thereof in dotted line positions. Fig. 4 is a section, taken on line 4—4 of Fig. 3. Fig. 5 is an enlarged, sectional, view taken on lines 5—5 of Fig. 4. Fig. 6 is a cross sectional view, taken on line 6—6 of Fig. 5, showing the motive-fluid controlling-valve in position of exhaust. Fig. 7 is a similar view showing the valve port registering with the conduit, from the source of supply.

In all of the views the same reference characters are used to indicate similar parts.

My device is employed for starting internal combustion engines in the same manner that engines, of this character, are started by hand, that is to say by the direct rotation of the main shaft of the engine.

In Fig. 1, 10 is an engine of the class, to which my device is especially adapted, showing parts thereof broken away. The main shaft 11 of the engine extends to the front of the vehicle, just as it does when the

engine is designed to be started by a crank lever to be operated by hand. To the end of the shaft 11 is secured a ratchet wheel 12 and a collar 13, as by means of a key 14.

Loosely mounted on the ends of the shaft, 11, is an arm, 15, held against displacement by a collar 16, which latter is secured to the shaft by a series of screws 17, or otherwise, so as to retain the arm 15 in associated, movable, relation with the ratchet wheel 12 and to prevent its displacement over the end of the shaft. The arm, 15, is provided with a boss, 18, which is perforated for a bolt, 19, upon which a pawl, 20, is pivoted. The pawl 20, moves freely on its pivoted stud, or bolt, 19, and is held with its front end yieldingly depressed by means of the spring 21, which is secured to the arm, 15, by a screw 22. The arm, 15, normally occupies a retracted position, shown in full lines in Fig. 3, and is, after operation, returned to this position and held by means of a spring 23, secured to a stationary part of the engine frame, 10, by suitable means such as screw 24 and its other end is secured to the arm 15, as at 25. The stop, 26, secured to the arm 15, limits the upper movement of the pawl 20 and a stop 27, secured to a fixed part of the engine frame 10, lifts the front end of the pawl when the arm 15 is in its retracted position, as shown in Fig. 3. A motor means for moving the arm 15 is the cylinder 30, in connection with its reciprocating piston 31. The piston stem 32 is pivotally connected with the arm, 15, as at 33, so that when the piston, 31, is reciprocated, within the cylinder, the arm is moved from the full line position to the dotted line position, shown in Fig. 3, at the same time the pawl 20 will engage the teeth of the ratchet wheel 12, and rotate the main shaft 11 of the engine.

Air, or like fluid, under pressure, is taken from a source of air supply and is used in the cylinder, 30, for the purpose of moving the piston, and thereby to accomplish the results described. After the parts have moved into the position shown in dotted lines, Fig. 3, and the engine shaft has been rotated correspondingly, it becomes necessary to return the parts to the position shown in full lines and to repeat this cycle of movement. I therefore provide a valve controlling mechanism, operated automatically by the piston, by means of which the air,

contained in the cylinder, may be exhausted, after the power stroke has been completed. The parts may be then returned to normal position, by means of spring 23, after which
 5 another charge of air under pressure is admitted into the cylinder by the automatic manipulation of the valve.

The cylinder 30 is secured to a T shaped trunnion 35, upon which is provided a screw threaded cylinder head 36. The trunnion
 10 bearings 37 and 38 are supported in the bearing box 39 which is secured to the frame 40 by means of screws 41. A fitting, 42, has screw threaded engagement in the end of the bearing block of the trunnion 35, as
 15 at 43. The fitting, 42, is axially perforated, as at 44, the said perforation being in axial alinement with the perforation 45, the latter communicating with the interior of the
 20 cylinder 31. The fitting, 42, is also perforated at right angles to its axis, as at, 46.

A tapered rotary plug, valve, 47, is contained in an interfitting opening in the end of the fitting, 42. The valve, 47, is provided with ports, 48 and 49, which communicate with the perforations 44 and 46, respectively, when the plug valve has been rotated in the proper position, for this purpose. The plug valve, 47, is provided, at its
 25 outer end, with a projection 50, that is square at 51 and screw threaded as at 52 for the reception of a nut 53. The latter holds the arm 54 in immovable position upon valve 47, the end of the arm 54 being square to correspond with the square 51 of the valve.
 30 A gland, 55, has a screw threaded engagement with the end of the fitting, 42, and thereby holds the plug valve 47 in place and incloses packing to provide an air proof joint between the valve, 47, and the fitting 42, as will be readily understood.

The fitting 42 is provided on its extreme end with a serrated projection, 56, whereby to attach a hose or pipe that communicates
 45 with a source of air supply. It is also perforated, as at 57, and thus provides an exhaust port so that after the piston has made its power stroke the contents thereof may be exhausted. In Fig. 6 the plug valve 47 is
 50 shown in position whereby the contents of the cylinder will be exhausted through port 57 and the air under pressure from the source of supply will be cut off.

To the side of the cylinder 30, is secured
 55 a rod guide 58 for supporting the cut-off rod 59. The rod 59 is adapted to be reciprocated, for the purpose of moving the valve 47. A bracket fixture 60 is secured to the piston stem 32. It is perforated near its
 60 outer end for reception of the rod 59, as at 61.

Stops 62 and 63 are adjustable, along the rod 59, and provide abutments against which
 65 when it is moved by the piston stem 32, for

the purpose of controlling the valve. The reciprocating rod 59 is connected with the arm 54 that moves the valve 47 by link 65.

In the use and operation of my automatic engine starter, a receptacle for air, under pressure, is employed as a source of air supply. The receptacle is connected to the fitting 42 by hose or other suitable conduit, attached to the part 56. Between the source of air supply, and the starting device, conveniently located in the conduit that conducts the fluid, under pressure, is a valve adapted to be hand operated, by means of which air is permitted to flow from the source of supply to the starting device.
 70 When the air is turned on, the piston 31 is reciprocated in the cylinder 30, and the pawl 20, on the ratchet wheel 12 serves to rotate the main shaft 11, of the engine, to the extent of the movement of the arm 15. When
 75 the piston has reached the outer end of the cylinder at the end of the power stroke bracket 60 will contact with the stop 62 and move the valve into the position shown in Fig. 6, whereby the contents of the cylinder
 80 will be exhausted and the parts will then be returned to the original position, by means of the spring 23. Before the parts reach the position, last referred to, the bracket 60 will engage the stop 63 and move the rod 59 in
 85 the opposite direction whereby the valve 47 is rotated into the position shown in Fig. 5, wherein the exhaust port is closed and the source of air supply is again connected to the interior of the cylinder. When the engine
 90 has been started by this means, and becomes self operating, the power from the source of air supply may be shut off from the starting device, after which the spring 23, will return the parts to the position
 95 shown in Fig. 3 wherein the pawl 20 is lifted from the ratchet teeth of the wheel 12, by the stop 27, thereby permitting the wheel 12 to turn freely and without contact with the pawl 20.
 100

Any convenient means may be employed in connection with the engine for compressing the air in a reservoir.

While I have herein disclosed a single embodiment of my invention, it is evident to a
 115 person skilled in the art that many changes may be made from the specific exemplification without departure from the spirit of the invention and within the scope of the appended claims.

What I claim is:

1. In a starting device for an internal combustion engine having a shaft, a ratchet wheel fixed to the shaft, an arm loosely mounted on said shaft, a pawl on said arm
 125 adapted to engage said ratchet wheel to rotate the shaft upon movement of said arm in one direction, a spring tending to maintain said arm in retracted position, and means to cause automatic intermittent for-
 130

ward movements of said arm comprising a rod pivoted to the end of said arm, means actuated by a suitable medium to move said rod, a bracket extension upon said rod, stops engaged by said bracket at the two extremes of its movement, and means operable upon such engagement of said bracket and stops respectively to permit introduction of the actuating medium to and shut off said medium from said rod-moving means.

2. In a starting device for an internal combustion engine having a shaft, the combination, with a source of compressed air supply, of a cylinder, piston, and piston rod, a head for said cylinder having trunnion bearings for supporting said cylinder for pivotal movement, one of said trunnion bearings provided with a bore communicating with the interior of the cylinder for air

supply thereto, a valve structure secured to said bored trunnion bearing, an arm at one end loose upon said engine shaft and at the other end pivoted to the end of said piston rod, means for transmitting movement in one direction from said arm to said engine shaft, a spring to return the arm, and means associated with said piston rod respectively to open and close said valve at the two extremes of the movement of said rod for automatic intermittent movements of said arm and shaft.

In testimony whereof I hereunto set my hand in the presence of two witnesses.

JOHN DESMOND.

In the presence of—
MARY F. ALLEN,
W. LINN ALLEN

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