

J. S. CLARKE.  
 STARTING DEVICE FOR AUTOMOBILE ENGINES.  
 APPLICATION FILED NOV. 14, 1910.

1,006,064.

Patented Oct. 17, 1911.

2 SHEETS-SHEET 1.

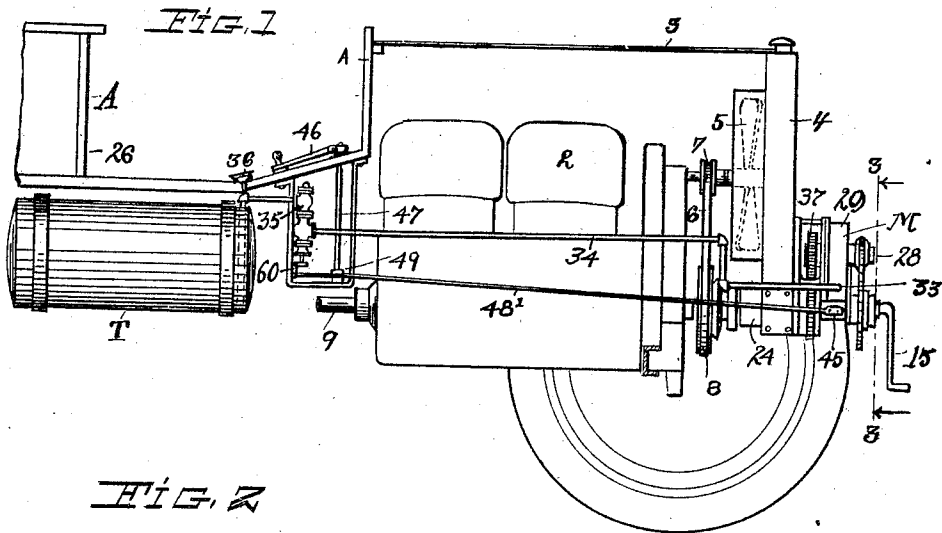


FIG. 1

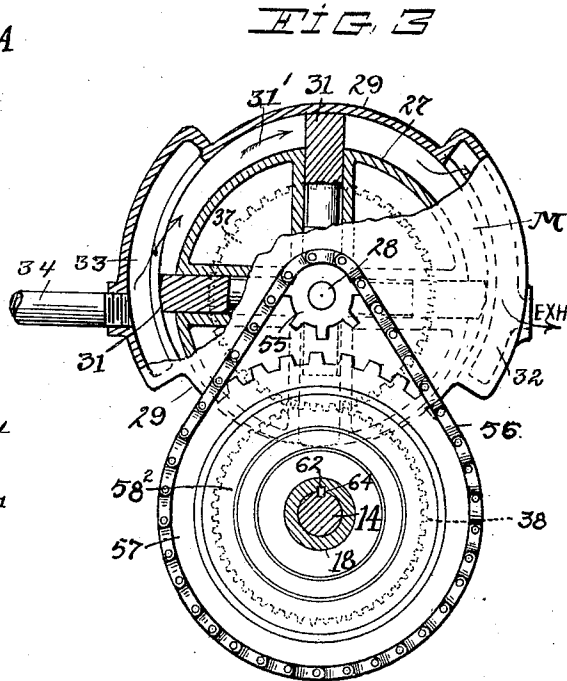
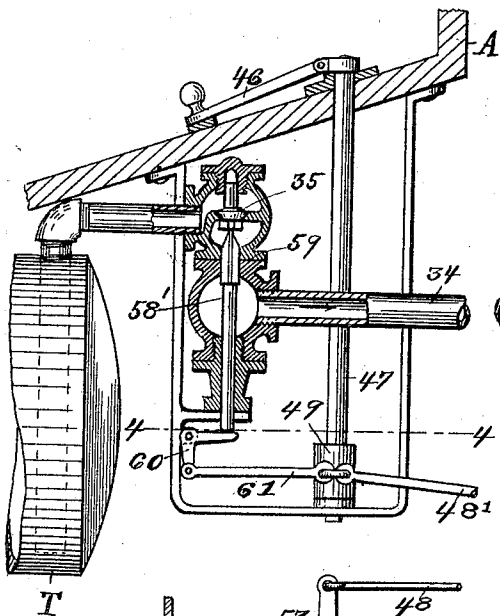


FIG. 3

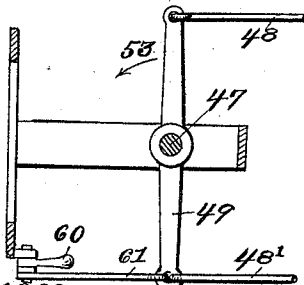


FIG. 4

Witnesses.  
 A. C. Mueser.  
 E. M. Fisher.

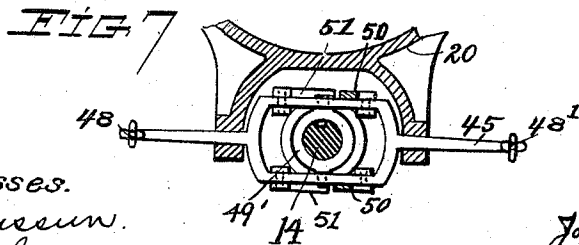
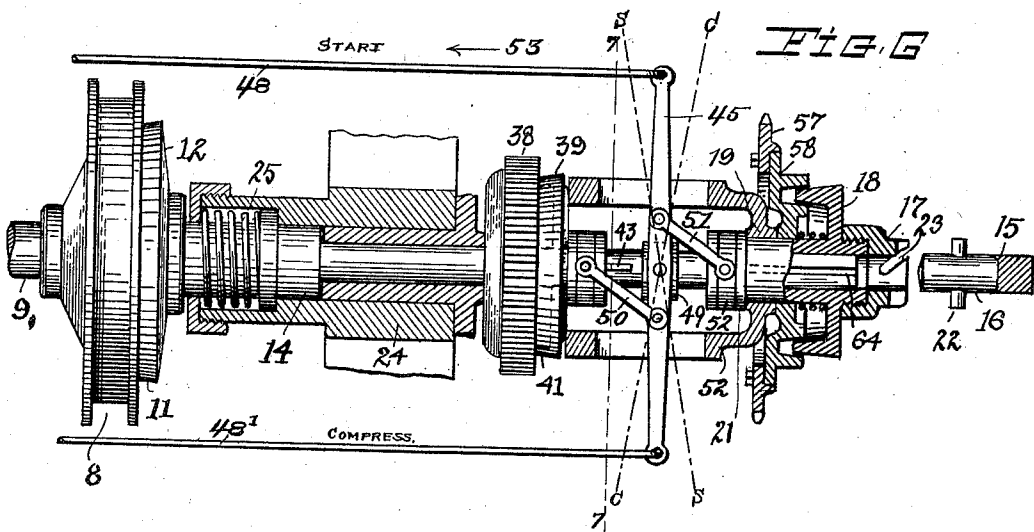
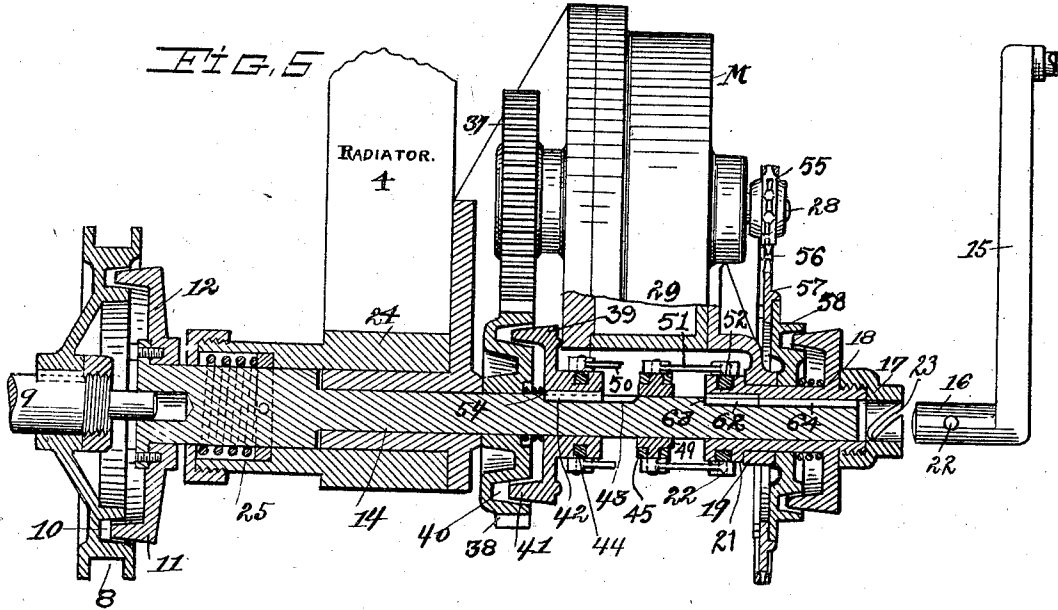
Inventor.  
 John S. Clarke  
 by Fisher & Mueser  
 Attorneys

J. S. CLARKE.  
 STARTING DEVICE FOR AUTOMOBILE ENGINES.  
 APPLICATION FILED NOV. 14, 1910.

1,006,064.

Patented Oct. 17, 1911.

2 SHEETS—SHEET 2.



Witnesses.  
 F. L. Mueser.  
 C. M. Fisher.

Inventor.  
 John S. Clarke,  
 by Fisher & Mueser  
 Attorneys.

# UNITED STATES PATENT OFFICE.

JOHN S. CLARKE, OF EAST CLEVELAND, OHIO, ASSIGNOR OF ONE-HALF TO ALEXANDER H. LANGELL, OF CLEVELAND, OHIO.

STARTING DEVICE FOR AUTOMOBILE-ENGINES.

1,006,064.

Specification of Letters Patent.

Patented Oct. 17, 1911.

Application filed November 14, 1910. Serial No. 592,282.

To all whom it may concern:

Be it known that I, JOHN S. CLARKE, a citizen of the United States, residing at East Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Starting Devices for Automobile-Engines, of which the following is a specification.

My invention relates to improvements in starting devices for automobile engines, and the improvement consists in the means herein described and claimed wherewith cranking of the engine is accomplished, either by hand or motor as the operator may elect or the need requires and wherein a reversal of movement of the cranking motor may be obtained to store fluid under pressure in a suitable receptacle for starting or other purposes.

In the accompanying drawings, Figure 1 is a sectional view and elevation of the front portion of an automobile showing my improvement embodied therein. Fig. 2 is a sectional view enlarged as compared with Fig. 1, of the valve and controller parts located beneath the seating platform of the machine. Fig. 3 is a front view, partly in section, of the cranking motor and drive parts therefor, as seen when looking inward from line 3—3, Fig. 1. Fig. 4 is a plan view on line 4—4, Fig. 2, of the operating connections for the air valve and gear clutches. Fig. 5 is a sectional view and side elevation of the cranking motor and clutch mechanism at the front in line with the engine shaft. Fig. 6 is a plan view partly in section, of the mechanism seen in Fig. 5, and Fig. 7 is a cross section on line 7—7, Fig. 6.

In detail, Fig. 1 represents an automobile A of a common type having engine 2 located at its front and beneath hood 3, and provided with radiator 4 and fan 5 as usual. This fan is driven by belt 6 and pulleys 7 and 8, respectively, from engine shaft 9, pulley 8 on the front end of the shaft being fixed thereon in any suitable way. In my improvement, pulley 8 is also utilized as a clutch member, being provided with an annular groove 10 at one side within which annular rim 11 of a clutch-disk 12 is adapted to enter and make frictional engagement. Cranking of engine shaft 9 is accomplished by means of these clutch parts and short shaft 14 carrying clutch-disk 12, which shaft ex-

tends forwardly and in line with engine shaft 9 to a point in advance of radiator 5. Hand-cranking is obtained by crank handle 15 having an axis portion 16 adapted to enter a socket 17 mounted on a clutch member 18 splined to rotate with shaft 14. Member 18 is free to rotate in a bearing arm 19 fixed to stationary motor casing 29 and an annular flange 21 engages said bearing arm on its inside face to limit outward movement of member 18. Therefore when the transverse pin 22 of crank portion 15 is entered into socket 17 with said pin in seating engagement with the inclined slot or slots 23 therein, a turn of the handle will forcibly move crank portion 16 into contact with the end of shaft 14 and thereby move said shaft axially in its bearings 24 and cause clutching engagement between clutch-disk 12 and pulley 8. Then obviously a continued turn of the crank will rotate engine shaft 9 until starting of engine 2 is accomplished, whereupon disengagement of clutch disk 12 is effected automatically—a coiled spring 25 within the capped end of bearing 24 serving to retire shaft 14 as operations at the crank-handle are discontinued.

When the engine is in operation, air may be stored under compression in a tank T, shown as attached to the car body under seat 26, although it may be elsewhere located. For this purpose I employ a rotary motor M (preferably of a reversible kind and water-jacketed if desired) and support the same at the front of radiator 4 immediately above shaft 14. This motor may be of the type shown in Fig. 3, consisting of a rotor 27 mounted on a shaft 28 set eccentrically within circular casing 29 and having slidable piston blades 31 radially arranged to present opposite working areas for either driving or pump purposes, depending upon the direction of rotation of rotor 27. In the present instance the operating fluid is understood to be air, which may be compressed in tank T by rotation of rotor 27 reversely to the direction indicated by arrow 31' in Fig. 3. Air is then taken in at port 32 and discharged through port 33 at the opposite side of casing 29 and thence transmitted through pipe 34 past check valve 35 into tank T. A pressure gage 36 (Fig. 1) may be used at tank T if desired, and when the requisite amount of

air has been stored under compression, rotor 27 is thrown out of gear and stopped. The drive gearing to operate rotor 27 as a pump consists of a set of meshed gears 37 and 38 mounted on rotor shaft 28 and shaft 14, respectively. However, gear 38 is free to rotate on each shaft 14 and is only rotated by said shaft when clutch ring 39 is frictionally engaged therewith, an annular groove 40 being provided in the face of the gear to receive the annular side flange 41 of ring 39. This ring is free to slide axially on shaft 14 and is also splined thereto by key 42 seated in slot 43, and a loose collar 44 in the grooved extremity of ring 39 is connected by a pair of links 50 with oscillating lever 45. This lever is operated from the seat platform of the vehicle by handle 46 on rotatable stem 47 or its equivalent, and connecting rods 48—48' attached to the ends of said lever and to the ends of a like lever 49 at the bottom end of rotatable stem 47, see Figs. 4 and 6. Lever 45 is of yoke shape (see Fig. 7) and pivotally secured to a slidable sleeve 49' on shaft 14 and has a second pair of links 51 connected therewith at one side of its pivot and with a free collar 52 mounted on front clutch member 18. The single lever 45 operates both clutches 18 and 39, but independently upon reverse movements thereof from its normal position of rest shown in full lines, Fig. 6. Thus when rod 48 is drawn forward by a rotative movement of stem 47 in the direction of arrow 53 (see Figs. 4 and 6), clutch member 18 is thrown into action, and when rod 48' is drawn forward, clutch ring 39 is actuated. Both clutch parts cannot possibly come into clutching relation at the same time as links 50—51 serve as toggles to thrust one of said parts out of clutching relation when the other is thrown into clutching relation. To illustrate, when rod 48' is drawn forward, collar 52 of clutch member 18 is pressed against flange 21 which flange is backed by bearing 19. This is a non-active position of clutch member 18, see Fig. 5, and as a result toggle link 51 thereupon becomes a fulcrum point for lever 45 to move into the inclined position represented by dotted line C—C, Fig. 6. This then obviously moves toggle link 50 in the same direction as rod 48', and therethrough forcibly carries clutch ring 39 into frictional engagement with gear 38 to operate motor M as a pump—assuming that clutch-disk 12 has also been thrown into working relation with its cooperating wheel 8 on engine shaft 9. The latter operation occurs simultaneously with the former, shaft 14 being moved axially by key 42 when ring 39 is carried to the left—the end of said key engaging shoulder 54 of key slot 43, see Fig. 5. These relations being established, pumping and compression of air in tank T proceeds until

the operator throws out clutches 12 and 39 jointly.

My object in compressing the air in tank T is to obtain a supply for repeated starting operations by means of motor M. To this end I provide motor shaft 28 with a sprocket gear 55 to operate a sprocket chain 56 and therethrough a gear 57 secured to clutch wheel 58 which is free to rotate on the reduced portion of its co-acting member 18. This sprocket gearing will rotate shaft 14 in the same direction as rotor 27, which is necessary when engine 2 is to be cranked by motor M. Furthermore, open communication must be established with tank T to operate rotor 27 by air pressure and this is accomplished by forcible uplift of check valve 35 when clutch member 18 is thrown into action by pull upon rod 48 and shift of lever 45 into the inclined position indicated by dotted line S—S, Fig. 6. Thus, in Fig. 2 I show a separate slidable stem 58' supported beneath check valve 35, which stem is engaged at its lower exposed extremity by bell-crank 60 connected to lever 49 by link 61, and whenever the operator rotates controlled shaft 47 in the direction of arrow 53 (see Fig. 4) check valve 35 is opened and clutch member 18 carried into clutching engagement with wheel 51. But this alone would not be effective as clutch-disk 12 must also be moved axially at this time to clutch pulley 8 on engine shaft 9, which operation occurs by reason of end contact of key 62 in the hub of member 18 with shoulder 63 at the inner end of keyway 64 in shaft 14. In other words shaft 14 is moved axially to the left when clutch member 18 is moved to the left, thereby throwing in clutch-disk 12 at the same time. Now it will be noted that sprocket gear 58<sup>2</sup> is larger than gear 56 and therefore power is gained at the expense of speed—assuming that motor M is the driver. Only a few turns are generally needed to start an internal combustion engine, and where a rotary motor M is employed for starting purposes, economy and power is gained by gearing down as shown. But on the other hand if the same motor is to be used as a pump, a high speed of its rotor is desired. This is also obtained in my improvement, as the reversing gears 37 and 38 are particularly proportioned to drive rotor 27 at the same speed as engine shaft 9. A higher rate of speed than this may also be obtained if needed by gearing up—ample power being obtainable from engine 2 to drive small motor M.

In addition to the foregoing my improvement has the advantage of hand-cranking to start the engine initially say before air is compressed into tank T or in the failure of the operator to observe that the supply has fallen below the mark required to oper-

ate motor M. However, by observing reasonable precaution the operator can always maintain a full supply in tank T to start the engine 2 without resorting to handcranking—not for a single day alone, but indefinitely. Handcranking may proceed at any time without effecting other operations and this is also an advantage as the operator is not entirely dependent upon the self-

10 cranking device.

In place of rotatable shaft 47, I may use a pivoted lever and a single rod 48 to operate lever 45 in reverse directions. In fact the means shown for operating the clutches 15 18 and 39, respectively, may be considerably modified and still obtain the same results, and I do not wish to limit myself to the exact construction shown and described. The clutches may also be of a different type 20 than shown, or ratchet mechanism may be substituted.

If a reciprocating motor is used instead of rotary motor M, the gearing connections would necessarily have to be changed and 25 different valve mechanism substituted.

What I claim is:

1. In a starting device for automobile engines, an engine having a crank shaft, in combination with a tank and a fluid motor 30 having valved communication therewith, and means connecting said crank shaft and said motor comprising separate gearing adapting reversal movements of said motor and separate means to control independent 35 operations thereof for the purposes described.

2. In a starting device for automobile engines, an engine having a crank shaft and a starting shaft and a clutch on said shafts, 40 in combination with a tank and a fluid motor having valved communications therebetween, separate direct and indirect gear connections between said motor and said starting shaft, and separate clutching de- 45 vices for said separate gear connections

adapting said motor to operate either as a cranking device or as a compressor.

3. In a starting device for automobile engines, an engine crank shaft having an axially movable shaft extension, and clutching 50 devices on said shafts, in combination with a fluid motor having separate sets of gear connections with said shaft extension to produce rotatable movements of the motor shaft either in the same direction or in a 55 reverse direction in respect to the crank shaft, separate clutching devices for said gear connections adapted to move said shaft extension axially when either is operated, and means to operate said clutching devices 60 independently.

4. In a starting device for automobile engines, an engine having a crank shaft and a shaft extension having a clutch to connect the same rotatably with said crank shaft, in combination with a reversible fluid motor 65 having a set of reversing gears and direct driving gear connections with said shaft extension, a separate clutch for said gears and gear connections and means to operate said 70 clutches independently and co-jointly with said shaft extension.

5. In a starting device for automobile engines, an engine having a crank shaft provided with a separate shaft extension mounted to move axially, and clutching members 75 between said parts, in combination with a fluid motor having gear and clutching connections with said shaft extension, and a separate crank handle and means carried by 80 one of said clutches to move said shaft extension axially during handcranking operations.

In testimony whereof I affix my signature in the presence of two witnesses.

JOHN S. CLARKE.

Witnesses:

R. B. MOSER,  
E. M. FISHER.