No. 681,111. Patented Aug. 20, 1901.

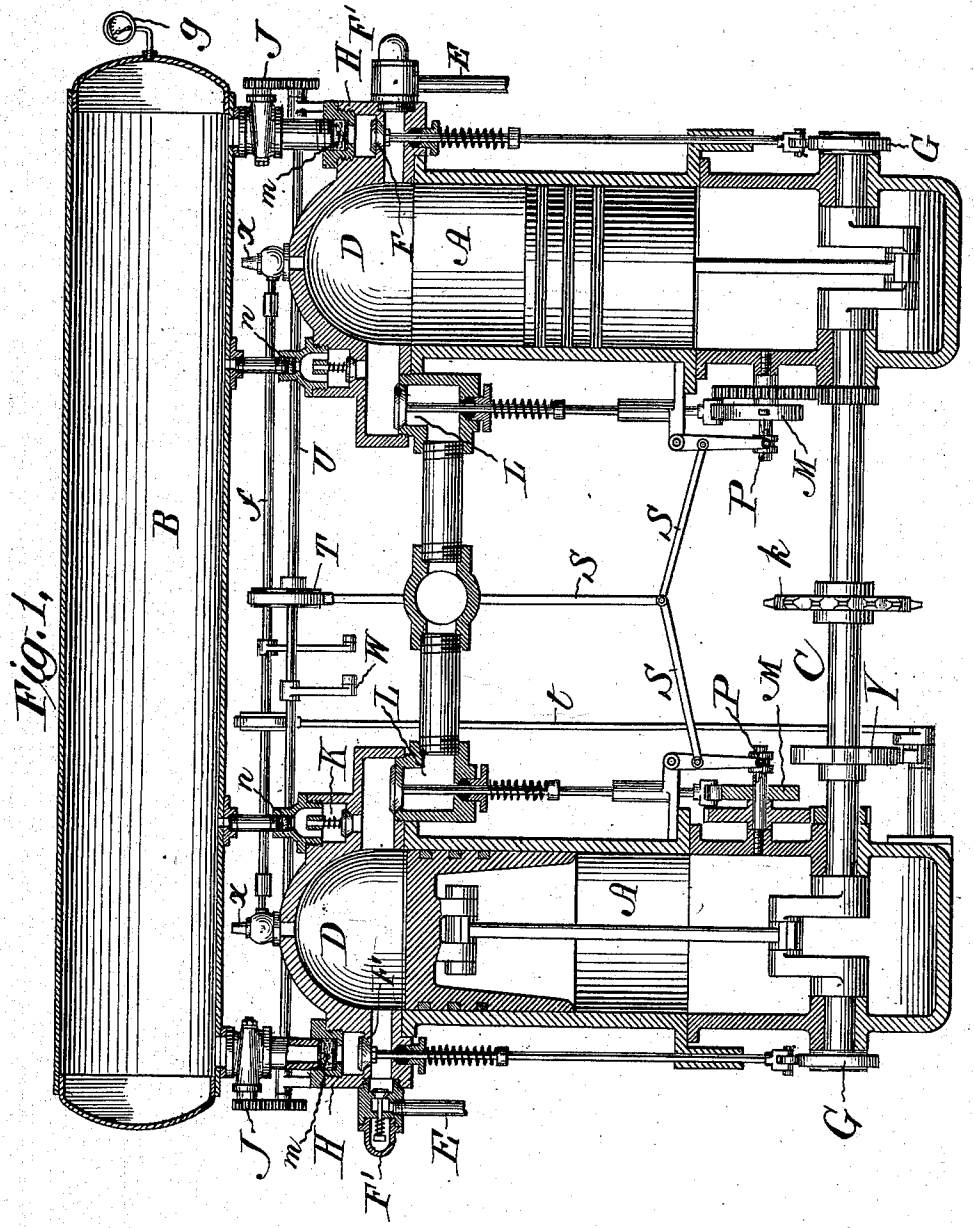
E. N. DICKERSON.

SELF STARTING EXPLOSIVE ENGINE.

(Application filed Nov. 5, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.



WITNESSES:

D. F. Raymond

Charles S. Jones.

INVENTOR

Edward N. Dickerson

BY Harry Cantwell

his ATTORNEY

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Fig. 2,

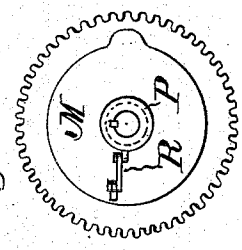


Fig. 5,

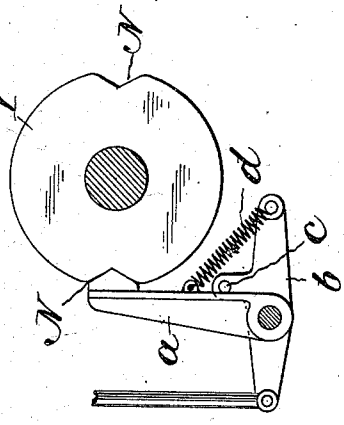


Fig. 3,

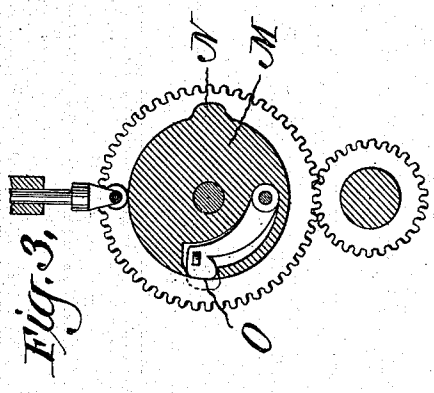
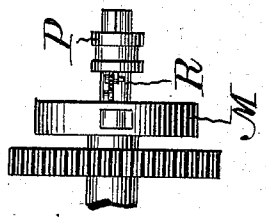


Fig. 4,



WITNESSES:

D. H. Haywood.

Charles S. Jones.

INVENTOR

Edward N. Dickerson

BY Harry Courtant

his ATTORNEY

UNITED STATES PATENT OFFICE.

EDWARD N. DICKERSON, OF STOVALL, NORTH CAROLINA.

SELF-STARTING EXPLOSIVE-ENGINE.

SPECIFICATION forming part of Letters Patent No. 681,111, dated August 20, 1901.

Application filed November 5, 1900. Serial No. 35,457. (No model.)

To all whom it may concern:

Be it known that I, EDWARD N. DICKERSON, of Stovall, Granville county, State of North Carolina, have invented a new and useful Improvement in Self-Starting Explosive-Engines, of which the following is a full, true, and exact description, reference being had to the accompanying drawings.

This invention relates to an improvement in mechanism for automatically setting in motion an engine, and is shown as applied to the ordinary type of gasolene explosion-engines operating upon the four-cycle system. These engines, which are of the type generally used upon automobiles, have to be kept in constant operation. In case it is desired to start and stop the vehicles at intervals the driving mechanism is disconnected from the engine. It is obviously important to be able to stop and start the engine at will rather than to keep it in constant operation. Ordinarily these engines of the smaller type are put in motion by a crank or lever or similar mechanism, and sometimes a compressed-air system is employed and sometimes secondary batteries and an electric motor are used to start the engine.

By my invention I dispense with all secondary power and start the engine by the pressure generated within itself. I remove and store some of the compressed gases produced in the operation of the engine and subsequently utilize them for putting the motor in operation.

My invention will be readily understood from the accompanying drawings, in which—

Figure I represents a vertical elevation, generally in cross-section, of my apparatus; Figs. II, III, and IV, details of the exhaust-valve cam mechanism, and Fig. V a transverse view of mechanism for arresting the crank at a point off its dead-center.

The system is shown as applied to a two-cylinder four-cycle gasolene-motor of the usual type, the firing mechanism being omitted for simplicity. The cylinder mechanism is shown as identical for both cylinders.

A represents a cylinder, and B a storage-tank which connects with both cylinders.

C is the usual crank-shaft, the centers being opposite, as shown.

D is the explosion-chamber.

E is the inlet for the explosive mixture, provided with a check-valve F′ in the usual way. In the passage connecting the inlet E with the explosion-chamber is the valve F, which is raised by the cam G. This closes the passage H, leading to the chamber B, which is itself controlled by the valve or cock J. Connecting with the explosion-chamber is a tube K, also provided with a check-valve opening toward the compression-chamber B.

L represents the ordinary exhaust-valve operated from the cam M on the secondary shaft, the motion of which is reduced as two to one in the ordinary way. The cam M, however, is a peculiar cam, having not only the fixed lifting-lug N, but also a secondary movable lug or cam-shaped surface O, practically at one-hundred-and-eighty-degrees revolution from the fixed lug N. This lug is pivoted in the cam and can be raised by means of the longitudinally-sliding sleeve P, which, affecting the small levers R when it is moved toward the cam, causes the movable lug O to project into the position shown in dotted lines in Fig. III, being then a duplicate of the lug N. The sliding sleeve P is controlled by a system of levers S, forming practically a toggle-joint, and operated from the cam T on the control-shaft U, the rotation of which shaft also opens and closes the valves J by suitable connection, the arrangement being such that the valves J are opened when the supplemental lugs O project from the cam. A control-lever W brings the mechanism to the hand of the operator. Exhaust-valves or petcocks X are controlled by a similar shaft to be opened in the usual way when the motion of the engine is caused to cease. The main shaft C may also be provided with a pulley Y, having in it two depressions Z, with which a projection on the lever *a* can engage. The lever *a* is removed out of contact with the pulley Y by the rocker-arm *b* through pin *c* and is held in contact with the pulley by the strong spring *d*. The rocker-arm is operated by the rod *l*, which is thrown by means of the cam on the shaft *f*, which operates the petcocks *x*. Ordinarily the petcocks are closed and the lever *a* is held out of contact with the pulley Y. The compression-chamber B may be provided with a gage *g* and should be suitably insulated against

the escape of heat from the compressed gases. It is advisable to provide the tubes H and K with explosion-preventing diaphragms to prevent the possibility of any explosion in the chamber B in case mixed air and gasolene should enter therein. Such diaphragms are shown at *m* and *n*.

The operation of my mechanism can now be readily understood. When the engine is in operation, the arm connecting with levers S is raised by the cam T or rod U, which simultaneously closes the valves J. The operation is now identical with that of an ordinary explosion-engine, excepting that a portion of the compressed gases escapes by the check-valve K into the chamber B, which soon contains a pressure approximately that of the explosion-chamber at the time of the explosion. Of course this pressure will gradually reduce as the heat escapes; but it will be constantly kept up by additional amounts of hot gases, and as the pressure is in any event largely in excess of that required to start the engine the loss of heat and pressure is not material to be considered. When it is desired to stop the operation of the engine, the shaft *f* is turned in such a manner as to open the petcocks *x* and allow the lever A to engage with the pulley or wheel Y, it of course being understood that the naphtha is shut off and the explosion prevented. The notches on the surface of the wheel Y are so arranged that when the lever *a* engages the crank will be a little past the center. As the engine slows down and its momentum becomes less it will soon come to rest, its motion being arrested by the lever *a* at a position off the center. Of course this arrangement is not necessary in three or four cylinder engines. When it is desired to start, the lever W is turned, throwing the shaft U, which opens the valve J and also throws out the supplemental lug on the cam M. These cams are so arranged as to open the exhaust-valve as the piston approaches the lower termination of its stroke, whereas the valve F is raised as soon as the crank passes its upper center. Under these circumstances it is plain that the machine is a single-acting two-cylinder trunk-engine, using the compression-chamber B as a boiler. A single revolution is usually enough to start the mechanism when the valves J are closed and the naphtha and explosion mechanism turned on. The reason of the supplemental lug in the cam M is to enable the exhaust-valve to be opened at each stroke, whereas ordinarily it is only opened at each second stroke of the piston. The engine may perform its work through the sprocket-wheel *k* or in other suitable ways.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. An explosion-motor comprising a storage-chamber, a cylinder having an explosion-chamber, a plurality of connections uniting said parts, each including a valve and one of the valves being manually operable, a cock controlling the explosion-chamber, hand-operable means for actuating said cock, a piston in said cylinder, a shaft driven by said piston, and mechanism governed by said hand-operable means for stopping said shaft.

2. An explosion-motor comprising a storage-chamber, a cylinder having an explosion-chamber, a connection uniting said parts, having a valve, an exhaust-valve for the said explosion-chamber, mechanism for causing the exhaust-valve to operate at each second revolution of the engine or at each revolution of said engine at the will of the operator, a cock controlling the explosion-chamber, hand-operable means for actuating said cock, a piston in said cylinder, a shaft driven by said piston, and mechanism governed by said hand-operable means for stopping said shaft.

3. An explosion-motor including an exhaust-valve and a cam for operating the same, said cam having diametrically opposite lugs one of which is fixed and the other of which is movable.

4. An explosion-motor including a cylinder provided with supply and exhaust valves, a cam for actuating the exhaust-valve, said cam having fixed and movable lugs, and mechanism for simultaneously operating the movable lug and the supply-valve.

5. An explosion-motor including a cylinder having a valve, a piston in said cylinder, a shaft driven by said piston, a wheel connected with said shaft, having a notch, and manually-controlled means for operating said lever and valve in unison, said lever being arranged to enter said notch.

6. The combination in an explosion-engine of a wheel Y provided with notches N, a lever *a* engaging with said notches at the will of the operator, and mechanism for simultaneously operating the petcocks of the engine when the lever *a* is thrown into operation on the surface of the wheel Y, substantially as described.

7. An explosion-motor including a cylinder having an exhaust-valve, means including a rotary cam for opening said valve, said cam having diametrically opposite valve-opening members one of which is normally ineffective and is movably mounted, and manually-operable means for putting said movable valve-opening member into its effective position.

8. An explosion-motor including a cylinder having a piston, a shaft operable by said piston, a wheel connected with the shaft, having a notch, a lever having a portion to enter said notch, a rock-arm movable independently of the lever and having a pin to engage said lever, and a yielding connection uniting the rock-arm and lever.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

E. N. DICKERSON.

Witnesses:
JULIUS J. SUCKERT,
CHARLES S. JONES.