E. SCHIMANEK.

COMBUSTION ENGINE.

APPLICATION FILED OCT. 11, 1910.

1,068,173.

Patented July 22, 1913.

2 SHEETS—SHEET 1.

Fig. 1

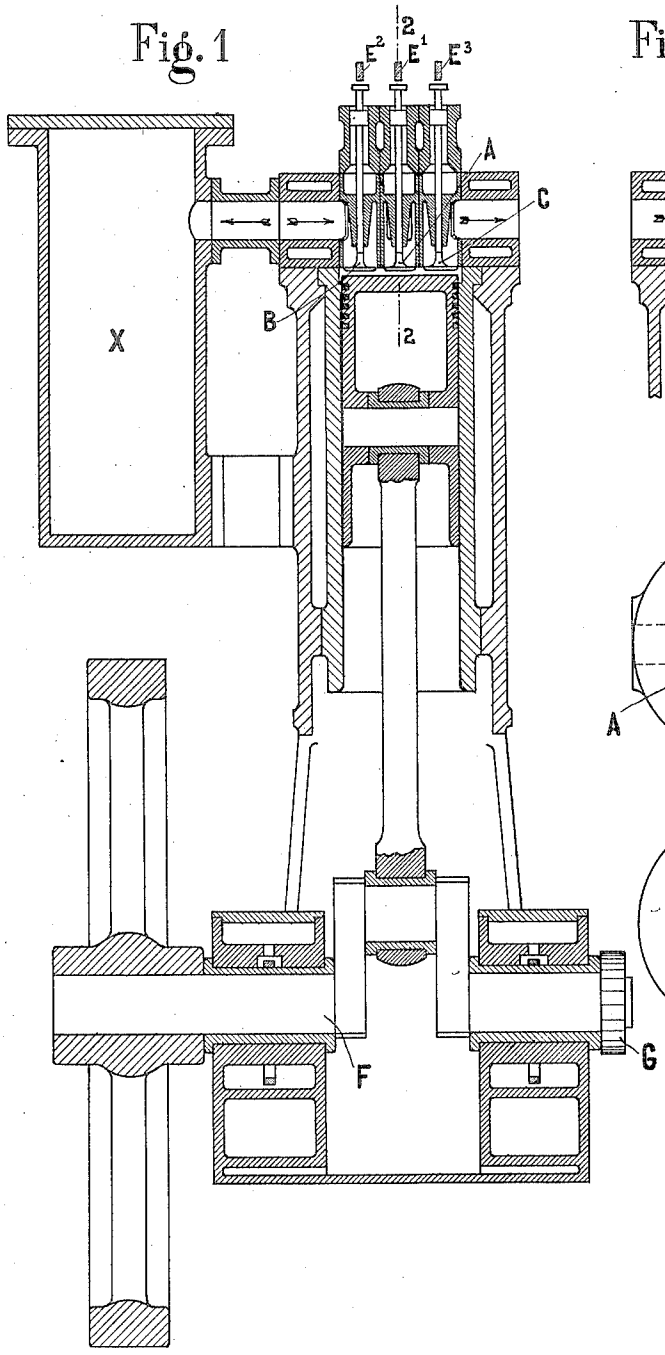


Fig. 2

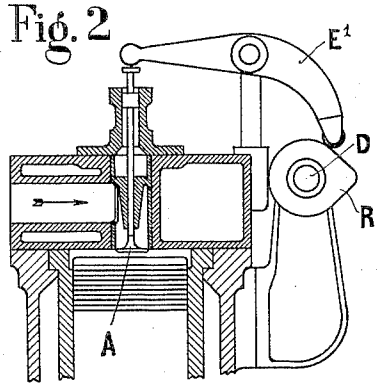
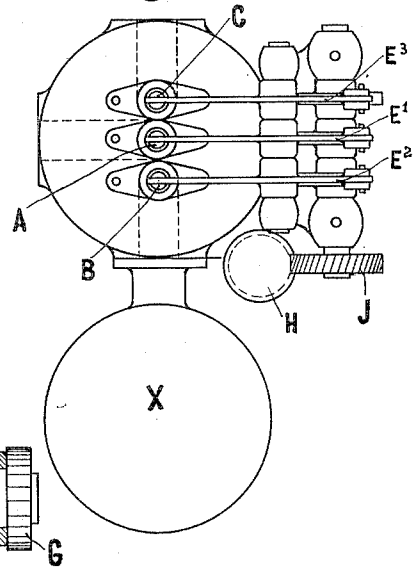


Fig. 3



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2 SHEETS—SHEET 2.

Fig. 4

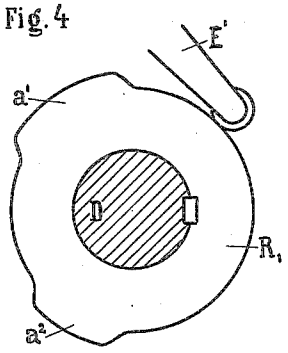


Fig. 5

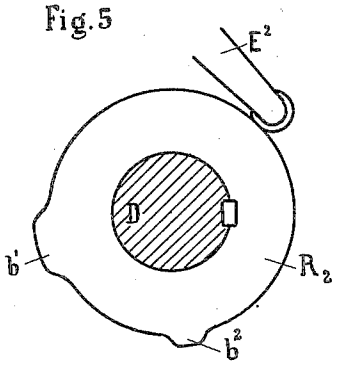


Fig. 6

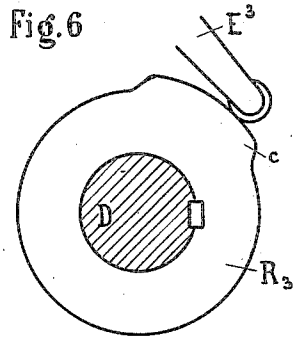


Fig. 7

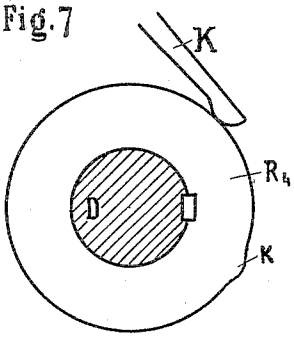
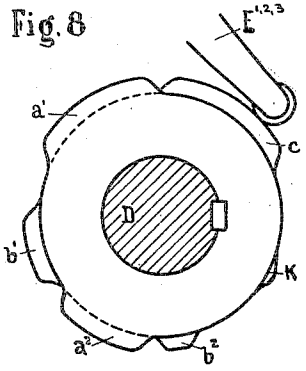


Fig. 8



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COMBUSTION-ENGINE.

1,068,173. Specification of Letters Patent. Patented July 22, 1913.

Application filed October 11, 1910. Serial No. 586,554.

To all whom it may concern:

Be it known that I, EMIL SCHIMANEK, engineer, professor at the Hungarian Royal Polytechnic, subject of the King of Hungary, residing at 1 Fehérvári ut, Budapest, Austria-Hungary, have invented certain new and useful Improvements in Combustion-Engines, of which the following is a specification.

My invention relates to internal combustion engines.

It relates particularly to a new and improved combustion engine in which there is combined with the usual combustion chamber, a storage receptacle for increasing the power of the working stroke of the piston.

Hitherto the quantity of air or mixture required for the individual strokes in combustion engines has been sucked into the cylinder during one single stroke, whereby the quantity of air or mixture to be considered in connection with the work effected per stroke corresponds only to the capacity of the cylinder. Now according to the mode of operation which forms the object of the present invention, a quantity of air or mixture exceeding the cylinder capacity or being twice or several times as large may, during the individual working strokes, be utilized for the work. This is brought about by causing two or several pairs of suction and compression strokes to precede each working stroke in the place of the usual single suction and compression stroke. During the compression strokes preceding the second or the last compression stroke air is stored in a collecting chamber, which is closed by a suitably operated valve. This collecting chamber, at the end of the last suction stroke or at the beginning of the last compression stroke, is connected with the working cylinder, so that the quantity of air contained in the collecting chamber, together with the quantity of air sucked in during the last suction stroke, forms the quantity of air for the combustion during the next following working stroke.

In the accompanying drawings: Figure 1 is a longitudinal section of a constructive example of the new engine; Fig. 2 is a vertical section on the line 2—2 of Fig. 1; Fig. 3 is a plan view; Figs. 4–7 show the cams R^1, R^2, R^3, R^4, operating respectively the valve levers E^1, E^2, E^3, and the igniter K. Fig. 8 shows the relative position of the cams.

Referring to the drawings—A, B, C are three valves controlled by the levers E^1, E^2, E^3. The levers E^1, E^2, E^3 are operated by the cams R_1, R_2, R_3 secured to the shaft D rotated at a speed one third that of the crank-shaft by means of the spiral gears H and I in a well known manner.

A is the suction valve, C the exhaust valve of the motor.

X is the receptacle controlled by the valve B.

The mode of operation is as follows:

1. When the piston starting from the position illustrated in Fig. 1 descends during the first stroke, the suction valve A is opened by the lug a^1, of the cam R_1 (Fig. 4) acting upon the control lever E^1 and air, or a mixture of air and combustible gas, flows into the cylinder until the piston reaches the lower dead point, in which position the lug a^1 disengages the lever E^1 and the suction valve is closed.

2. During the second stroke the piston ascends and the valve B is depressed by the lug b^1 of the cam R_2 (Fig. 5) acting upon the control lever E^2. The air or mixture, in the cylinder is now compressed into the holder X through the valve B. At the upper dead point the lug b^1 disengages the lever E^2 and the valve B is closed.

3. The piston now descends again and executes the third stroke. Hereby the lug a^2 of the cam R_1 (Fig. 4) lifts the lever E^1 and the valve A is again opened and the air, or mixture again flows into the cylinder.

4. Between the third and fourth strokes, or at the beginning of the fourth stroke, theoretically exactly at the dead point, the lug b^2 of the cam R_2 (Fig. 5) acts upon the lever E^2 and the valve B opens, after the valve A has been already closed by the lug a^2 of the cam R_1 (Fig. 4) having disengaged the lever E^1; the earlier compressed air, or mixture rushes back into the cylinder. After flowing of the air or of the mixture into the cylinder the valve B closes, whereupon the ascending piston compresses the air or mixture into the engine cylinder. The receptacle may be connected with the cylinder during the compressing stroke; in this latter case the receptacle may be connected with the cylinder at any desired moment during this compression stroke.

5. During the fifth stroke, the work is done. All the valves remain closed. If up to this time no mixture, but only air has

been sucked in through the suction valve, then during the fifth stroke combustion material is introduced into the cylinder, through a valve not shown, and burned in the strongly compressed hot air. If, however, a mixture has been sucked in, the mixture is ignited at the dead point. In any case the piston executed the working stroke during the fifth stroke. The ignition can be produced by a cam R_4 (Fig. 7) secured to the shaft D, but not shown in Fig. 3, the lug K of said cam R_4 acting upon the igniter K.

6. During the sixth stroke the piston ascends and pushes out the gases of combustion through the exhaust valve G, which is now opened by the lug *c* of the cam R_3 (Fig. 6) acting upon the control lever E^3. The exhaust valve closes at the upper dead point of the piston when the lug *c* of the cam R^3 disengages the lever E^3.

It is clear that as a result of the working process above described, a quantity of air or mixture corresponding to twice the capacity of the cylinder is consumed in each working stroke, that is to say, the engine is capable of performing during the six strokes nearly twice as much work as a two-cycle motor having equal cylinder dimensions.

The valves used with my invention may be of any type, for instance, slide valves or piston valves, or a combination of such valves.

What I claim and desire to secure by Letters Patent is:

1. In an internal combustion engine, the combination of an explosion cylinder, a piston slidable therein, a suction valve, an exhaust valve and a receptacle-valve in the head of said cylinder, a storage receptacle communicating with the explosion cylinder, the communication being controlled by said receptacle valve, a crank-shaft for said engine, and means operated by the crank-shaft for opening and closing said valves, said means being adapted to open and then close the suction valve of the first down stroke to open and then close the receptacle valve on the succeeding up stroke, to open and then close the suction valve on the next down stroke, to open and then close the receptacle valve on the next up stroke, whereby the compressed fluid rushes from the receptacle to the cylinder and is compressed on said last-named up stroke, to retain all the valves closed on the next down stroke the same being the working stroke, and to open the exhaust valve on the next up stroke.

2. In an internal combustion engine, the combination of an explosion cylinder, a receptacle communicating therewith, a valve controlling said communication and establishing said communication during the compression strokes and preventing said communication during the suction strokes whereby fluid is compressed in said receptacle said valve permitting the entrance of the fluid to the cylinder after a plurality of compression strokes, suction and exhaust valves, and means for operating all of said valves.

3. In an internal combustion engine, an explosion cylinder, a receptacle, a receptacle valve therebetween, a suction valve and an exhaust valve, means for closing the receptacle-valve during the suction strokes and opening it during the compression strokes, and means for closing all of the valves, means for opening the receptacle valve to introduce compressed fluid into the cylinder after several compression strokes, means for opening said exhaust valves after the work-stroke of the engine.

4. In an internal combustion engine, a cylinder and a receptacle communicating therewith, a valve for permitting fluid to be forced from the cylinder to the receptacle during the compression strokes, means automatically operating said valve in a manner to prevent the passing of the compressed fluid back to the cylinder during the suction strokes following each of a plurality of successive compression strokes and to allow after the last of this series of suction strokes at the compression stroke preceding the ignition the passing of the compressed fluid back to the cylinder.

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

EMIL SCHIMANEK.

Witnesses:
GEORGE HAMANY,
CHARLES MESSINGER.