No. 754,466. PATENTED MAR. 15, 1904.

S. S. & A. LEWIS.

EXPLOSIVE ENGINE.

APPLICATION FILED JAN. 2, 1902.

NO MODEL.

Fig. 2.

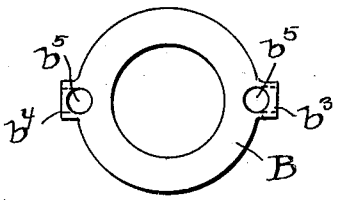


Fig. 3.

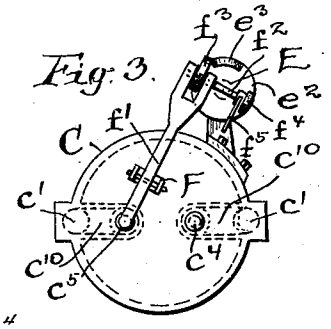


Fig. 1.

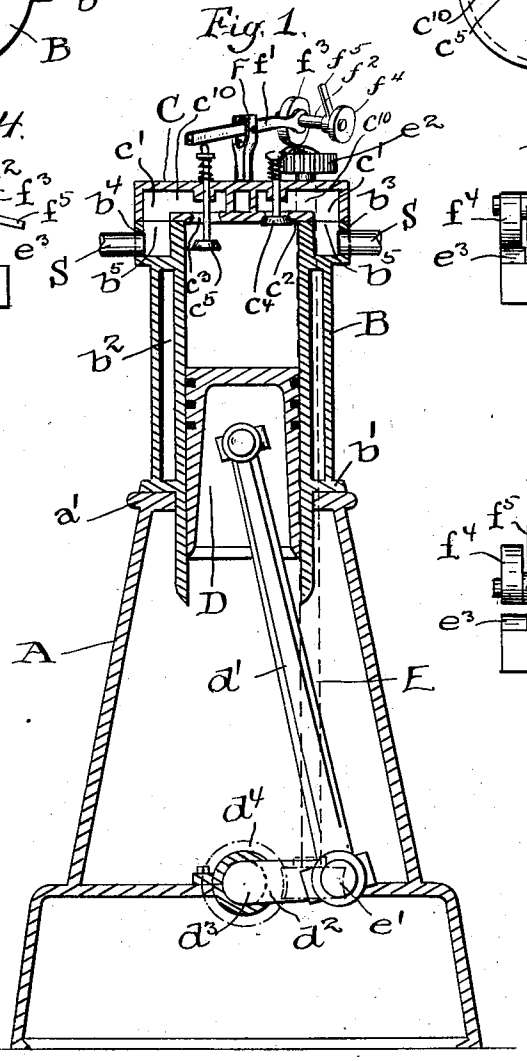


Fig. 4.

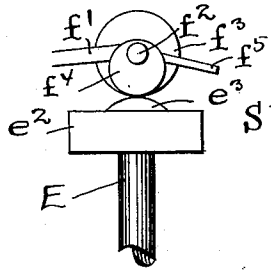


Fig. 5.

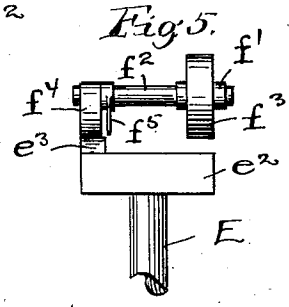
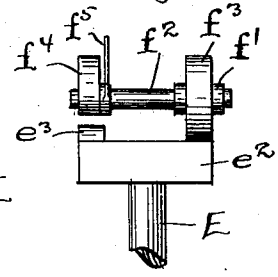


Fig. 6.



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No. 754,466. Patented March 15, 1904.

UNITED STATES PATENT OFFICE.

SHIRLEY S. LEWIS AND ALBERT LEWIS, OF SYRACUSE, NEW YORK, ASSIGNORS TO LEWIS GAS ENGINE AND MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

EXPLOSIVE-ENGINE.

SPECIFICATION forming part of Letters Patent No. 754,466, dated March 15, 1904.

Application filed January 2, 1902. Serial No. 88,090. (No model.)

To all whom it may concern:

Be it known that we, SHIRLEY S. LEWIS and ALBERT LEWIS, citizens of the United States, and residents of Syracuse, in the county of Onondaga and State of New York, have invented certain new and useful Improvements in Explosive-Engines, of which the following is a specification.

Our invention relates generally to explosive-engines, and more particularly to the cylinder and valve-operating means.

One of the objects of our invention is to provide means whereby the compression may be relieved when the engine is starting up or at any other time.

Other objects will appear as the specification proceeds.

We shall describe an explosive-engine embodying our invention and afterward point out the novel features in the claims.

In our drawings we have shown our invention in connection with a four-cycle engine; but changes may of course be made within the scope of the claims.

Figure 1 is a sectional view of an engine embodying our invention. Fig. 2 is a top view of the cylinder. Fig. 3 is a top view of the cylinder-head and the valve-operating means. Figs. 4, 5, and 6 are detail views of the means for operating the valve-gear.

Similar letters of reference indicate corresponding parts in the different views.

A represents a base portion provided with an annular ledge a', adapted to form a support for the cylinder B, the flange b' of which rests upon the said ledge. The cylinder is open at both ends, extends a distance into the base portion, and is surrounded by a water-jacket b^2. At its upper end it is provided with an inlet and an outlet, respectively, denoted by b^3 and b^4, which do not, however, communicate directly with the inside of the cylinder, a passage b^5 extending upward from each of the same, thereby communicating with the passage c' of the head C, which opens into the interior passages c^{10} of the latter. This head C is adapted to fit upon the upper end of the cylinder and is provided with two valve-ports c^3 and c^3, in which the puppet-valves c^4 and c^5 operate.

D is the piston, connected by means of the pitman d' with the crank d^2 on the main shaft d^3, which carries a worm-gear d^4, adapted to mesh with the corresponding gear e' on the upright shaft E. The upright shaft extends up above the cylinder-head, where it is provided with the gear e^2, adapted to operate a suitable governor. (Not shown.)

Mounted upon the upper side of the head C is a bifurcated standard F, in which is mounted a rod f'. One end of the said rod extends over the exhaust-valve c^5, the stem of which it is adapted to contact with periodically at intervals, while the other end supports a shaft f^2, provided with a large roller f^3, adapted to coöperate with the cam e^3 of the gear e^2 as the the latter rotates. This shaft f^2 also supports the eccentrically-mounted roller f^4, adapted to be adjusted by means of the handle f^5, so that it can be moved to any position in or out of contact with the cam e^3 as the latter rotates.

From the above it will now be understood that the cam e^3 rotates with the gear e^2 on the shaft E, and in so doing encounters the roller f^3, thereby tipping the rod f', thus opening the exhaust-valve c^5 periodically. The elements are so proportioned in this instance, it being a four-cycle engine, that this exhaust action takes place once to every four strokes of the piston. In starting up the engine or when part of the load is taken off the engine it is frequently desirable to relieve the compression somewhat. This is accomplished by throwing the eccentrically-mounted roller f^4 into its lower position, so that it will contact with the cam e^3, thereby operating the exhaust-valve twice in every four strokes or semiperiodically. By moving this valve all or part of the way the amount of the gas exhausted may be delicately adjusted, thus making the exhaust automatic and uniform instead of regulating it by means of a hand-operated valve. The speed of the cam depending upon the speed of the main shaft makes the oper-

ation accurate no matter what the speed of the engine may be. It will be understood, however, that the cam e^3 need not be mounted upon the gear e^2. That is merely a coincident construction for the sake of convenience, but could of course be mounted upon a shaft or other element separate from the same. There is also an advantage in the construction of inlet and exhaust through the side of the cylinder and through the head of same, inasmuch as the gas in so doing is heated, thus making ignition easier, besides cooling the cylinder and head at the point where the explosion of the charge takes place. Another and very important advantage in this construction of inlet and outlet through the side of the cylinder without perforating the same and up through the head into the inside of the cylinder lies in the fact that the head can be removed when so desired without disconnecting the connecting-pipes S from the cylinder.

Having thus described our invention, what we claim is—

In an explosion-motor, the combination with the exhaust-valve and a cam whose speed is proportional to the speed of the motor, a lever, adapted to actuate the valve when tipped, a disk carried by same adapted to contact with the cam to tip the lever periodically, and a smaller disk carried eccentric of the first-mentioned disk and adjustable with relation to the cam to contact with the cam when moved into a contacting position to tip the lever semiperiodically.

Signed at Syracuse, in the county of Onondaga and State of New York, this 12th day of December, A. D. 1901.

SHIRLEY S. LEWIS.
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