No. 726,226. PATENTED APR. 21, 1903.

A. KRASTIN.

EXPLOSIVE ENGINE.

APPLICATION FILED AUG. 5, 1901.

NO MODEL.

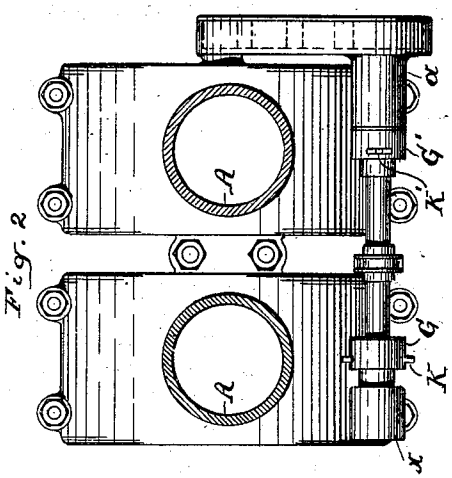


Fig. 2.

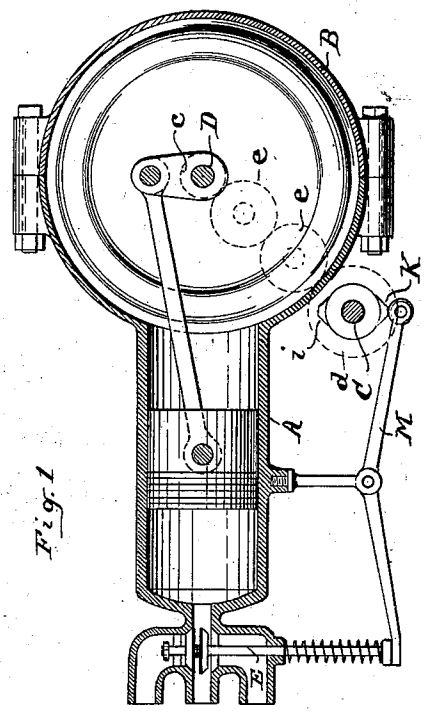


Fig. 1.

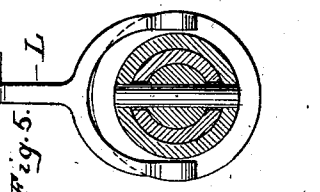


Fig. 5.

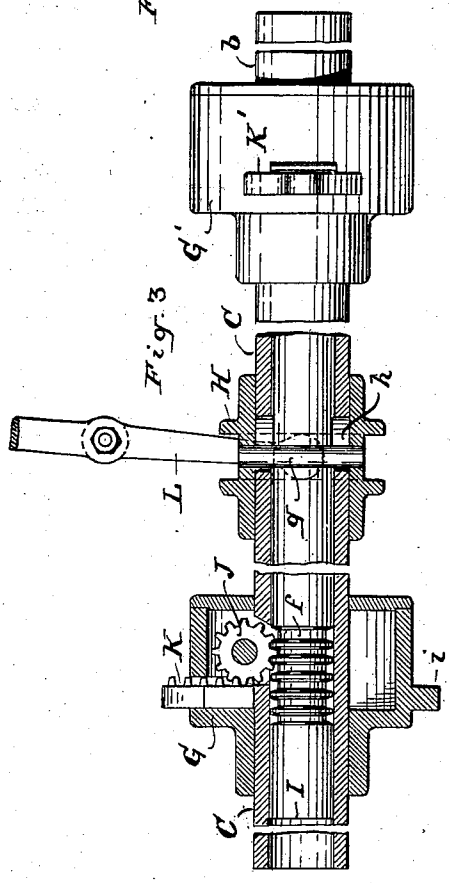


Fig. 3.

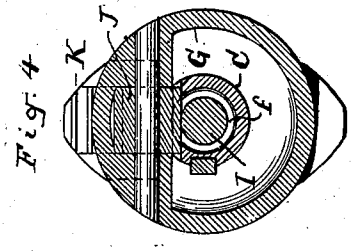


Fig. 4.

Witnesses.

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UNITED STATES PATENT OFFICE.

AUGUST KRASTIN, OF CLEVELAND, OHIO, ASSIGNOR TO THE KRASTIN AUTOMOBILE COMPANY, OF CLEVELAND, OHIO.

EXPLOSIVE-ENGINE.

SPECIFICATION forming part of Letters Patent No. 726,226, dated April 21, 1903.

Application filed August 5, 1901. Serial No. 70,942. (No model.)

To all whom it may concern:

Be it known that I, AUGUST KRASTIN, a citizen of the United States of America, and a resident of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Explosive-Engines, of which the following is a specification.

My invention relates to improvements in explosive-engines; and the object of my improvement is to provide suitable means which facilitate the starting of such engines. I prefer to attain this object in and with a compression-releasing device which is constructed and arranged substantially as shown in the accompanying drawings, in which—

Figure 1 is a central sectional view of an explosive-engine equipped with the improvements as above referred to. Fig. 2 is an end view of a pair of explosive-engines and a compression-releasing device for both of said engines. Fig. 3 is an enlarged central sectional view of said releasing device; and Figs. 4 and 5 are detail views of said device, reference to which will be made hereinafter.

Like letters of reference denote like parts in the drawings and specification.

In the illustration Fig. 1 there is shown a cylinder A, with crank-casing B at the inner terminal and an inlet and outlet valve arranged at the outer terminal, this being a type which is usually adapted for vehicle-motors and which is generally applied in pairs, as shown in Fig. 2. It is presupposed that these motors operate under what is known as the "four-cycle" style and that in consequence thereof the cam-shaft C is geared down to half the speed of the crank-shaft D. (See Figs. 1 and 2.) The cam-shaft C is provided for the purpose of opening the exhaust-valve E of such engines, and in this present instance it is also equipped to open such valves during the compression-strokes for the purpose of facilitating the starting of such engines, the construction and arrangement of such equipment being the essential feature of my invention.

In Fig. 3 there is shown a tubular shaft C, which is journaled in suitable bearings *a a*, (see Fig. 2,) the terminal *b* of which being in geared connection with the crank-shaft D through the intervention of the gears *c d* and *e e*, the former having a ratio of one to two and the latter being simply idler-wheels. (See Fig. 1.) Securely connected with said shaft C are a pair of hubs G G′, and slidingly mounted thereon is the grooved collar H. (See Figs. 2 and 3.) Inside the shaft C is a spindle I, which is grooved, as at *f f*. Pinions J J engage said grooves and the slides K K′. It is thus that said slides can be moved in radial direction from out and into the hubs G G′ by means of the shifter L. (See Figs. 3 and 5.) A pin *g* extends through said collar, shaft, and spindle. The slot *h* admits of moving the spindle within said shaft, while the latter remains stationary as far as transverse movement is concerned.

By means of the fixed cams *i i* upon the hubs G G′ exhausting is effected of the waste gases, while by means of the slides, which also serve in the capacity of cams, compression can be released for the purpose of facilitating the starting of such engines. The lever or levers M establish operative connection of the cams *i i* and slides K K′ with valve E.

When the cylinders are connected with one crank-shaft, of which the cranks are set at right angles, then the actual exhaust-cams are likewise set at right angles, while the auxiliary cams or slides are posited in opposite directions to each of the fixed cams. (See Figs. 2 and 3.)

The shifter may be pivoted in any suitable position convenient for reach of the operator, and the auxiliary cams can be moved more or less from out of the face of the hubs simply by tilting the lever from right to left, as the case may be. Furthermore, since the slides move in radial direction there is at no time any resistance encountered in raising said slides from out of the hubs, for the reason that the exhaust-valve terminal or roller remains constantly in alinement with said cams. According to the amount of projection the discharge-valve may be kept open, so that there may be no compression or only a partial compression. Such conditions are necessary in order to facilitate the starting of these engines, especially motors applied to vehicles.

From the foregoing it can readily be under-

stood that this compression-releasing device affords equal advantage in connection with single-cylinder motors as well as with double-cylinder-motors.

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

1. In explosive-engines the compression-releasing device comprising the combination with a positive exhaust-cam of an auxiliary movable cam, the said auxiliary cam being located diametrically opposite the positive cam and operated by rack, pinion and lever mediums arranged in operative connection as shown and set forth.

2. The exhaust-valve-operating device of explosive-engines comprising a tubular shaft, a cam-hub mounted upon said shaft, an auxiliary cam slidingly connected with said hub, a pinion mounted within said hub, a rack-spindle within said shaft, a grooved collar upon the outside of said shaft and a shifter engaging said collar, all constructed and arranged substantially as and for the purpose set forth.

3. In a pair of explosive-engines, the combination therewith of a tubular shaft, cam-hubs mounted thereon, a cam-faced rack-slide extending through the periphery of said hubs, a pinion mounted in each of said hubs, which engage said slides, a double rack-spindle in gear with said pinions, a grooved collar secured to said spindle and a shifter for said collar, all constructed and arranged substantially as and for the purpose set forth.

Signed at Cleveland, Ohio, this 31st day of July, 1901.

AUGUST KRASTIN.

Witnesses:

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