

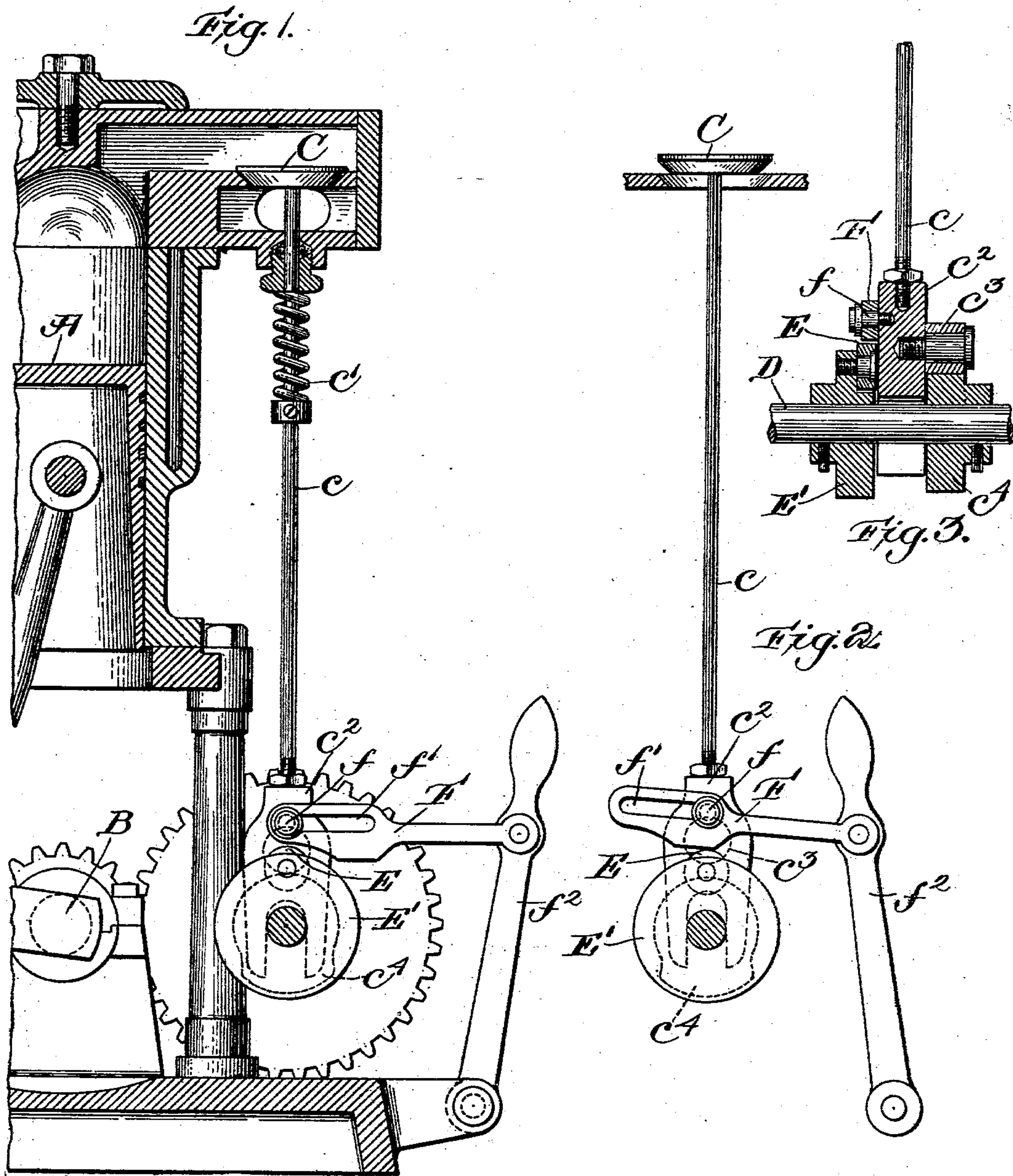
No. 715,208.

Patented Dec. 2, 1902.

J. LIZOTTE.
GAS ENGINE.

(Application filed Dec. 11, 1901.)

(No Model.)



Witnesses:
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UNITED STATES PATENT OFFICE.

JOSEPH LIZOTTE, OF QUINCY, MASSACHUSETTS, ASSIGNOR OF ONE-HALF
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GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 715,208, dated December 2, 1902.

Application filed December 11, 1901. Serial No. 85,441. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH LIZOTTE, of Quincy, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Gas-Engines, of which the following is a specification.

The invention relates to that class of engines in which during the normal running the piston acts on every second rearward stroke to compress an explosive mixture introduced into the cylinder during the preceding forward stroke of the piston. In starting engines of this character it is customary to turn the crank-shaft by hand during the introduction and compression of the initial charge of the explosive mixture. To enable the engine to be thus started without the expenditure of such force during the compressing stroke as would in some instances, at least, render the starting in this manner difficult, if not impractical, means have been provided for relieving the pressure upon the piston during the compressing stroke in starting the engine.

The present invention relates more especially to a means for effecting this result in a simple and efficient manner.

In the construction embodying the features of my invention an exhaust is opened from the cylinder to relieve the pressure during a part of the compressing stroke of the piston by the action of a cam which may be made operative or inoperative at the will of the engineer. To simplify the construction, I prefer to operate the exhaust-valve of the engine to relieve the pressure as well as to permit the escape of the gases from the cylinder during the exhaust-stroke of the piston. A simple and efficient form and arrangement of cam and means for rendering the same operative and inoperative is one in which a slide is connected with the exhaust-valve and is arranged to be moved into or out of the path of a cam secured to the shaft which carries the valve-operating cams of the engine. This construction has been shown in the drawings as one form of mechanism embodying the various features of my invention.

In the drawings, Figure 1 is a sectional view showing so much of a vertical engine as is necessary to illustrate the application of

the invention thereto. Fig. 2 is a detail indicating the adjustment of the pressure-releasing mechanism in starting the engine, and Fig. 3 is a sectional view longitudinally of the cam-shaft.

The engine shown in the drawings is provided with the essential parts of an explosive-engine, including the piston A, connected with a crank on the crank-shaft B, and an exhaust-valve C. The exhaust-valve C is provided with an operating-rod *c*, through which it is lifted, and it is normally held to its seat by a spring *c'*. The rod *c* is provided at its lower end with a saddle *c*², which straddles the cam-shaft D, and carries a roll *c*³, arranged to be engaged by an exhaust-cam *c*⁴, secured to the cam-shaft. The cam-shaft is geared to the crank-shaft, so that it makes one revolution for two revolutions of the crank-shaft, and the cam *c*⁴ is so arranged that it lifts the exhaust-valve during every second upward stroke of the piston. During the normal running of the engine the valve C remains closed during the intervening upward strokes of the piston, so that the explosive mixture introduced into the cylinder is compressed preparatory to the igniting thereof.

To enable the crank-shaft to be turned easily in starting the engine, a cam in the form of a roll E, mounted in a disk E', is secured to the shaft D and is arranged to act upon a slide F, connected with the exhaust-valve. The slide is connected with the valve C through a pin *f*, which passes through a slot *f'* in the slide and is screwed into the saddle *c*². The slide is so shaped that by moving it forward or back it may be brought into or out of the path of the cam E. For convenience in operation the slide is connected to an operating-lever *f*².

When the engine is to be started, the slide F is moved forward into the path of the cam E, as shown in Fig. 2. With the parts in this position the valve C will be lifted to open an exhaust from the cylinder when the compressing stroke of the piston is partially completed, and thus relieve the pressure on the piston, after which the explosive mixture remaining in the cylinder will be again compressed to a limited extent by the continued upward movement of the piston after the

valve C has closed. Thus the pressure in the cylinder will be relieved sufficiently to enable an easy turning of the crank-shaft. After the engine has been started the slide F 5 will be drawn back out of the path of the cam E, and the full compression will take place during the compressing stroke of the piston.

The devices described form an efficient and simple mechanism for relieving the pressure 10 on the piston in starting the engine, and the mechanism may be readily thrown into operative relation without regard to the position of the other parts.

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

1. In combination with the cooperating parts of an explosive-engine, an exhaust-valve, an exhaust-cam for operating said valve, a pressure-relieving cam for operating 20 said valve, a slide connected with said valve to move into and out of the path of said latter cam in a direction at right angles to the axis of the cam and to the valve-rod, an operating device mounted upon a stationary support, and connections between said operating 25 device and slide whereby the slide moves in-

dependently of the operating device when operated upon by the cam, substantially as described.

2. In combination with the cooperating 30 parts of an explosive-engine, an exhaust-valve, an exhaust-cam c^4 , a disk E' secured to the cam-shaft, a roll E in said disk projecting beyond the circumference thereof, a slide F connected with said valve and an operating 35 device for moving the slide back and forth in the plane of movement of the disk to bring it into and out of the path of the roll, substantially as described.

3. In combination with the cooperating 40 parts of an explosive-engine, an exhaust-valve, a yoke c^2 connected with the valve, a cam E secured to the cam-shaft, a slide F connected with the yoke by a pin f and slot f' , and a lever f^2 to which the slide F is con- 45 nected, substantially as described.

In testimony whereof I have affixed my signature in presence of two witnesses.

JOSEPH LIZOTTE.

Witnesses:

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