

(No Model.)

E. F. ROBERTS.
IGNITING APPARATUS FOR GAS ENGINES.

No. 424,027.

Patented Mar. 25, 1890.

Fig. 1.

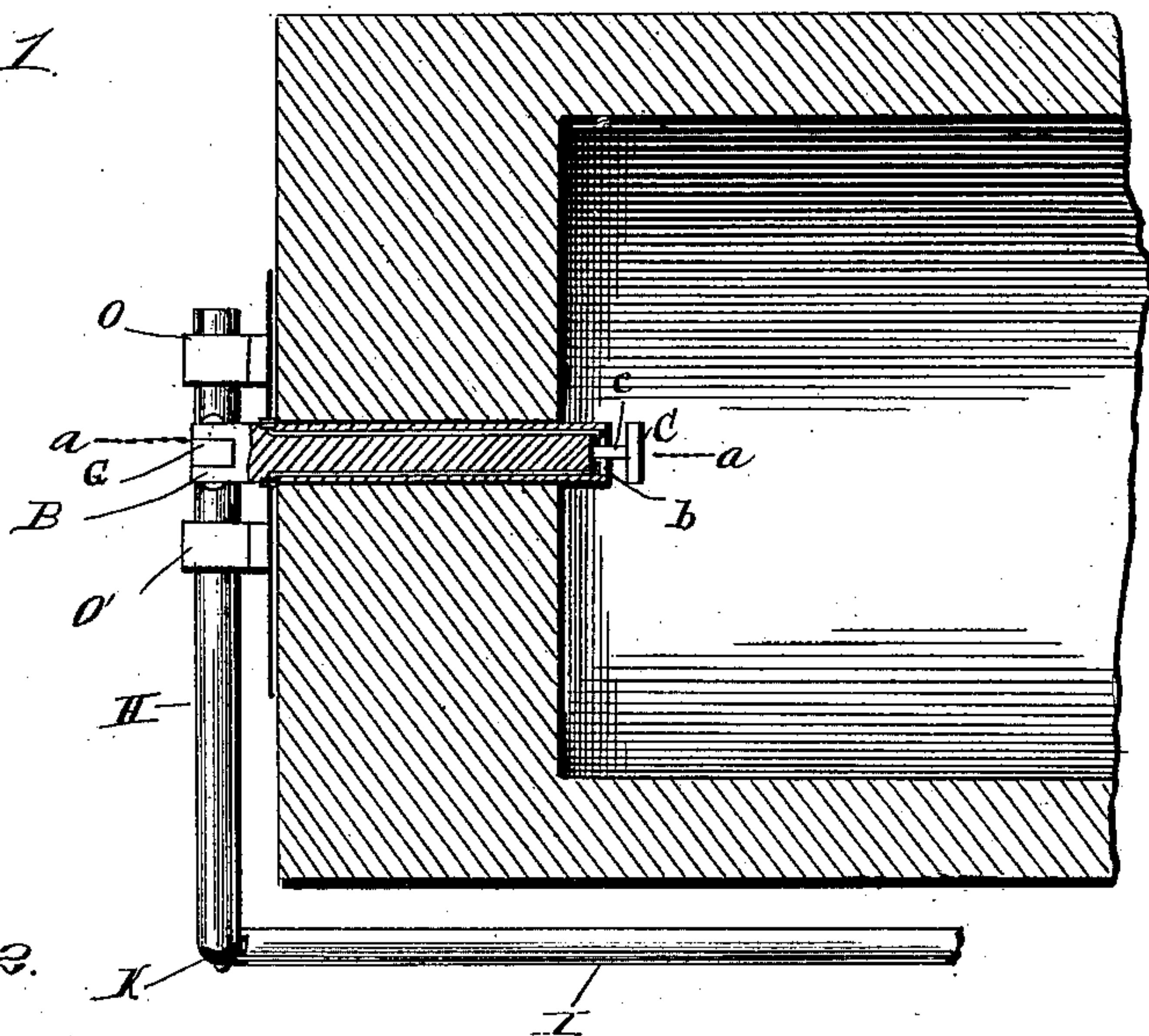


Fig. 2.

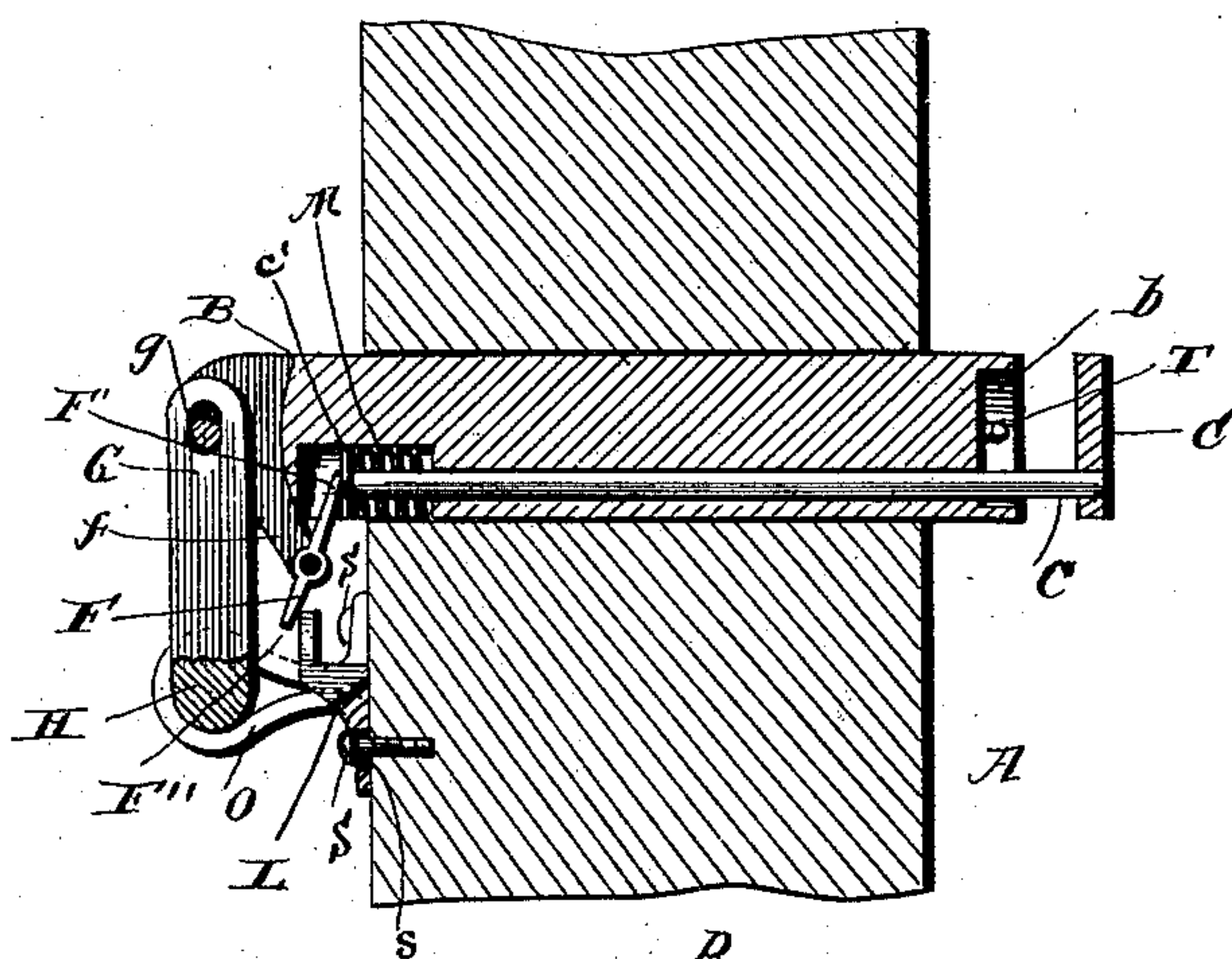


Fig. 3.

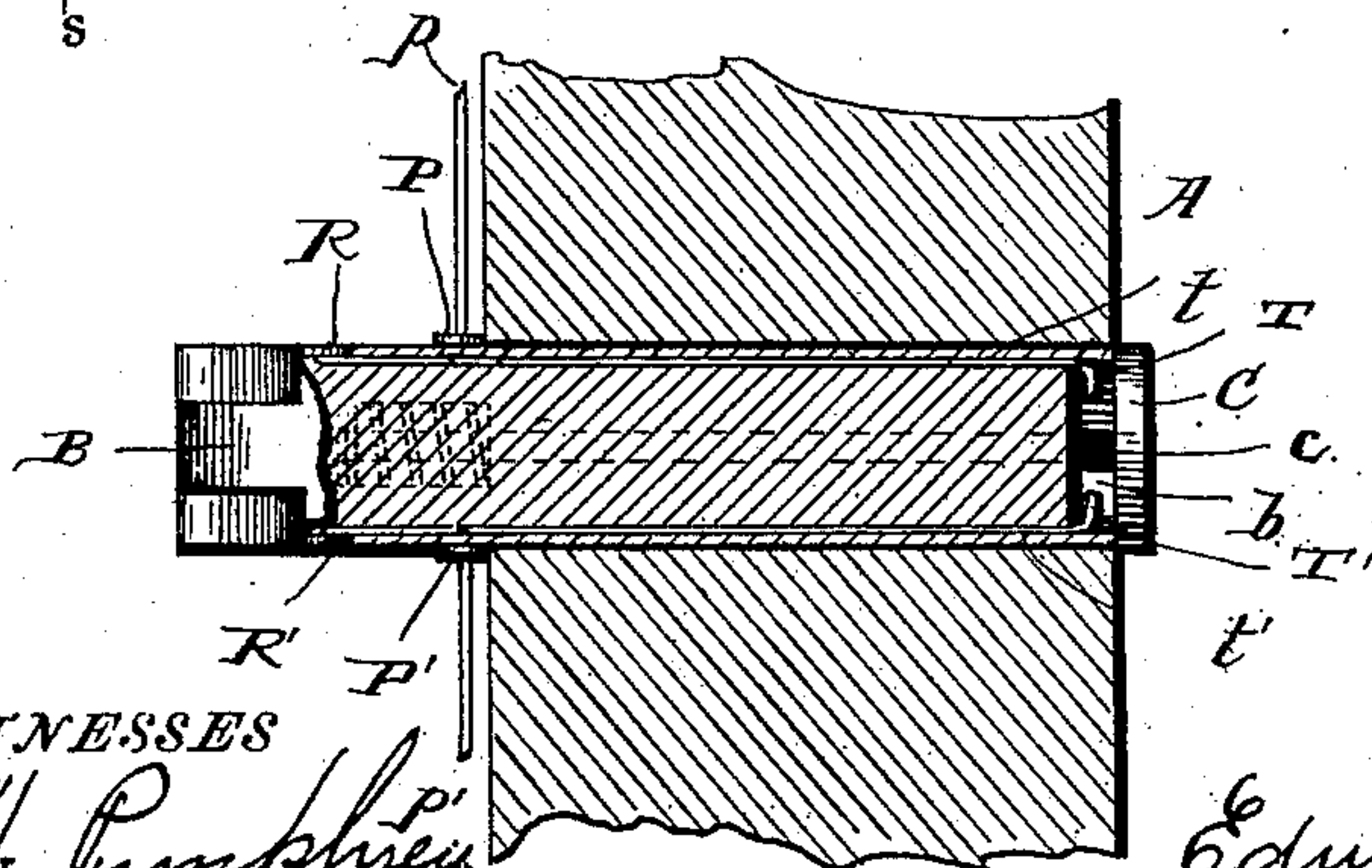
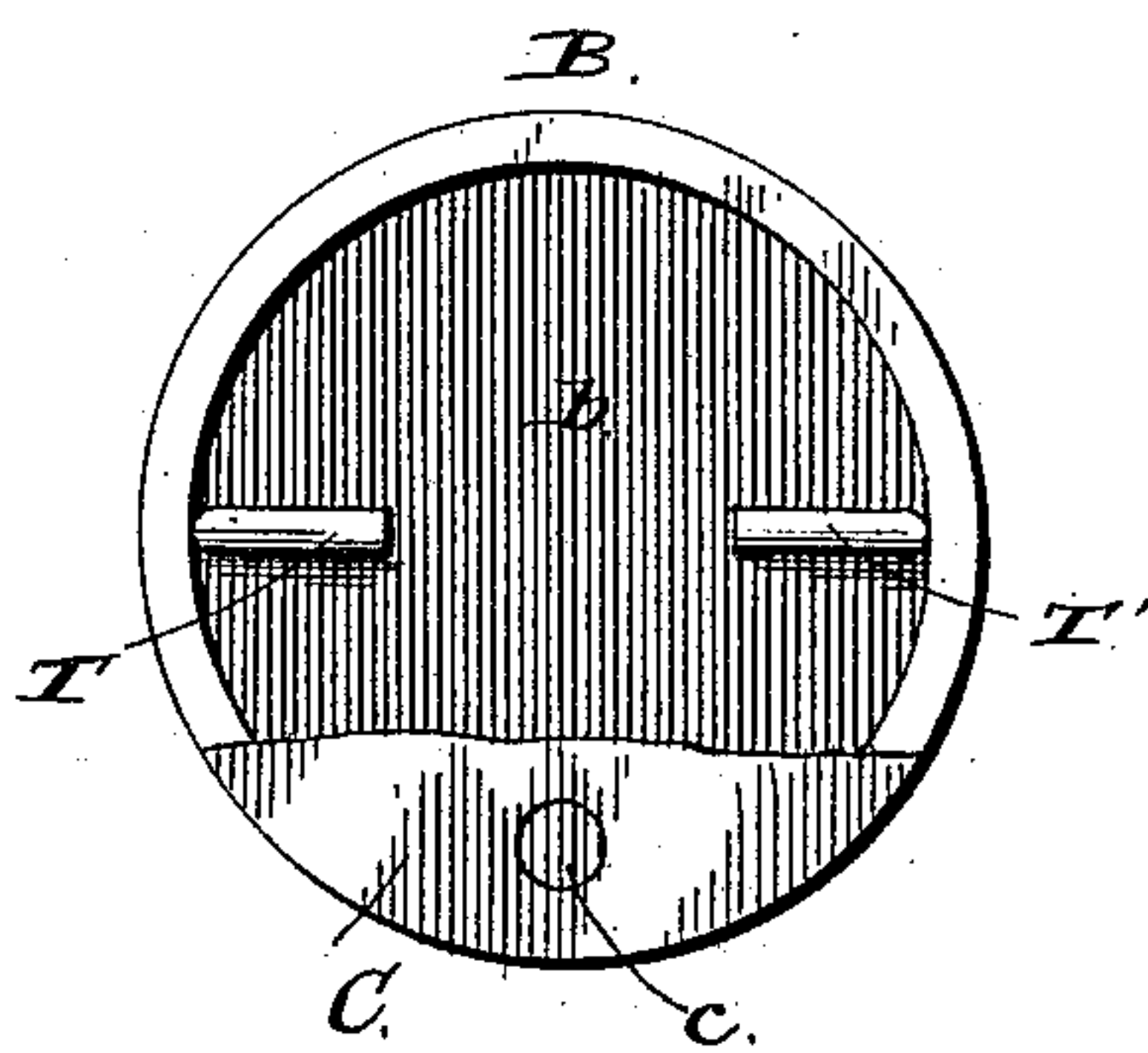


Fig. 4.

WITNESSES

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IGNITING APPARATUS FOR GAS-ENGINES.

SPECIFICATION forming part of Letters Patent No. 424,027, dated March 25, 1890.

Application filed June 15, 1889. Serial No. 314,514. (No model.)

To all whom it may concern:

Be it known that I, EDWARD F. ROBERTS, a citizen of Great Britain, residing at Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Igniting Apparatus for Gas-Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention consists in the improved form of igniting apparatus for gas-engines herein-after to be described and claimed.

In the drawings, Figure 1 shows a longitudinal section of a part of a gas-engine cylinder with my igniting apparatus in place. Fig. 2 is a sectional view on the line *a a* of Fig. 1, enlarged to show the details of the construction. Fig. 3 is an end view of the plunger with a portion of the cap broken away to show the electrical ignitor. Fig. 4 is an enlarged detailed view of a portion of Fig. 1, showing the plunger in a different position.

In the use of electrical ignitors for gas-engines heretofore one difficulty encountered has been the deposition of moisture upon and between the electrodes of the ignitor, whereby the creation of a spark was interfered with.

The object of my igniting apparatus is to permit of the usual form of electrical ignitor without the disadvantage above mentioned.

A is the end of a gas-engine cylinder, through the walls of which protrudes the plunger B. This plunger B has a cavity or recess *b* in its inner end and a cap C, which closes communication between said recess and the interior of the cylinder, which cap C is mounted on a second plunger *c*. In the recess *b* are the electrodes T T' of an ordinary electrical ignitor.

My preferred form of mechanism for operating the plunger and cap consists of the bell-crank G H K, mounted in bearings O O', to which motion is transmitted by the connecting-rod I, and which operates the plunger by means of the connecting-pin *g*. Pivoted on a lug *f* of the main plunger B is a finger F, one end of which F' is connected with the second plunger *c*, while the other end F'' bears against a rigid fulcrum connected with the cylinder or engine frame. This fulcrum

may consist of an adjustable lug L, held by the screws S, which pass through slotted openings *s*. The plunger *c* has a cap *c'* and a spring M, which tends to draw the cap C down upon the end of the main plunger by retracting the second plunger *c*. The electric current for creating the spark between the electrodes T T' is supplied by an external electric circuit connected with the wires *p p'*. These wires terminate in stationary contact-pieces P P' adjacent to the sides of the main plunger B. In the said plunger is an internal electric circuit consisting of the wires *t t'*, including the electrical ignitor, which may consist of the slightly-separated electrodes T T', as illustrated, or of a high resistance which would be rendered incandescent by the passage of the current, and which terminates in contact-pieces R R', which are set in the sides of the main plunger B and in line with the first-mentioned contact-pieces P P'.

The operation of my invention is the following: The plunger B is normally withdrawn to the position shown in Fig. 4 and the cap C closed down, thereby protecting the electrical ignitor in the recess *b* from the action of the moisture within the cylinder or of the hot gases in the same. The electrical circuit is also broken, because the contact-pieces P R and P' R' are out of contact, as shown. When it is desired to ignite the charge, the plunger B may be forced in by hand or by any suitable mechanism, such as that illustrated. The effect of this motion is the still more rapid forward motion of the second plunger *c* by virtue of the action of the pivoted finger F, as clearly shown in Fig. 2. This lifts the cap C and establishes communication between the recess *b* and the interior of the cylinder. When the plunger B has reached its extreme position of projection into the cylinder, the electrical circuit is made between the contact-pieces P R and P' R', as indicated in Fig. 1, the spark passes between the electrodes T T', or the highly-resisting medium between the same is heated into incandescence and the charge ignited. By adjusting the lug L toward or from the plunger B the lever-arm F'' of the pivoted finger F is lengthened or shortened, and the consequent rapidity and extent of the motion of the second plunger *c*

is thereby varied. When the plunger B is withdrawn, the spring M operates to withdraw the second plunger c and closes the cap C down upon the recess b, thereby protecting
5 the electrical ignitor from the disadvantageous action of the engine-gases, as before referred to.

Having therefore described my invention, what I claim as new, and desire to protect by
10 Letters Patent, is—

1. In an igniting apparatus for gas-engines, the combination of the engine-cylinder, a suitable ignitor mounted on a plunger, the
15 ignitor, and suitable connecting mechanism whereby said plunger and ignitor are projected into the cylinder and the cap removed at the moment of ignition, substantially as described.

2. In a gas-engine, the combination of a main plunger which extends into the engine-cylinder and has a recess in its inner end, an electrical ignitor in said recess, a movable
20 cap for the end of said plunger, a second plunger on which the cap is mounted, and a pivoted finger which is mounted on the first or main plunger and has one extremity connected with the second plunger, while its other end rests against a fulcrum rigid with
25 the engine-frame, substantially as described.

3. In a gas-engine, the combination of a main plunger which extends into the engine-cylinder and has a recess in its inner end, an electrical ignitor in said recess, a movable
30 cap for the end of said plunger, a second plunger on which the cap is mounted, and a pivoted finger which is mounted on the first or main plunger and has one extremity connected with the second plunger, together with
35 an adjustable lug on the engine-frame, which furnishes a fulcrum for the other end of said pivoted finger, substantially as described.

4. In a gas-engine, the combination of a main plunger which extends into the engine-

cylinder and has a recess in its inner end, 45 an electrical ignitor in said recess, a movable cap for the end of said plunger, a second plunger on which the cap is mounted, a pivoted finger which is mounted on the first or main plunger and has one extremity connected 50 with the second plunger, while its other end rests against a fulcrum rigid with the engine-frame, together with a bell-crank lever and suitable connections for transmitting motion from the engine to said main plunger, sub- 55 stantially as described.

5. The combination of the main plunger which has a recess in its inner end, the second plunger, and the cap which closes said recess and is operated by said second plunger, 60 a pivoted finger which is mounted on said main plunger and bears against the second plunger, a spring for retracting said second plunger, and an adjustable lug on the engine-frame, against which the other end of the piv- 65 oted finger bears, substantially as described.

6. The combination, in a gas-engine, of the plunger projecting into the cylinder, the electrical ignitor mounted on the inner end of said plunger, an external electric circuit which 70 has its terminals in stationary contact-pieces adjacent to the sides of said plunger, together with an internal electric circuit which includes the ignitor, and which has for its terminals contact-pieces attached to the plunger 75 in line with the first-mentioned stationary contact-pieces, all arranged so that at the moment of extreme projection of the plunger into the cylinder the current is completed through the said contact-pieces, while it is 80 broken at other positions of the plunger, substantially as described.

In testimony whereof I affix my signature in the presence of two witnesses.

EDWARD F. ROBERTS.

Witnesses:

G. W. BALLOCH,
A. P. SMITH.