

C. G. HESS.
PNEUMATICALLY OPERATED IGNITION DEVICE FOR GAS ENGINES.
APPLICATION FILED APR. 22, 1908.

929,429.

Patented July 27, 1909.

3 SHEETS—SHEET 1.

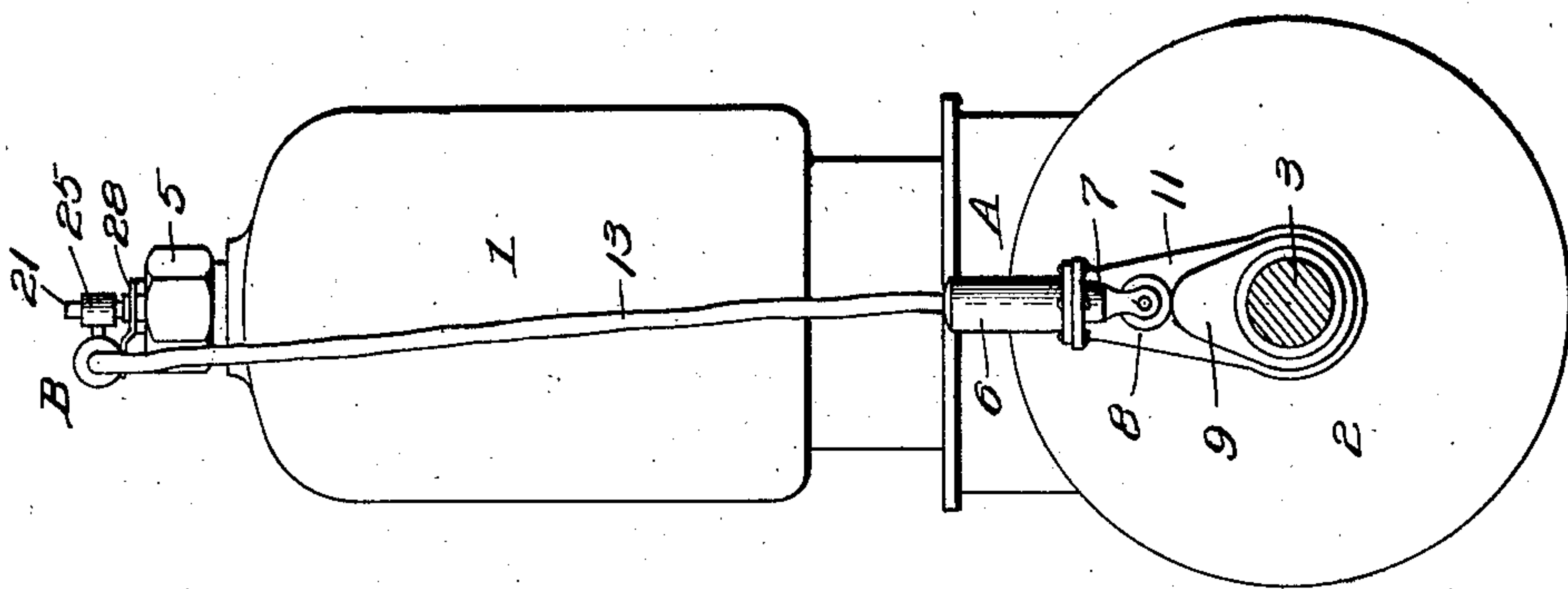


Fig. 2.

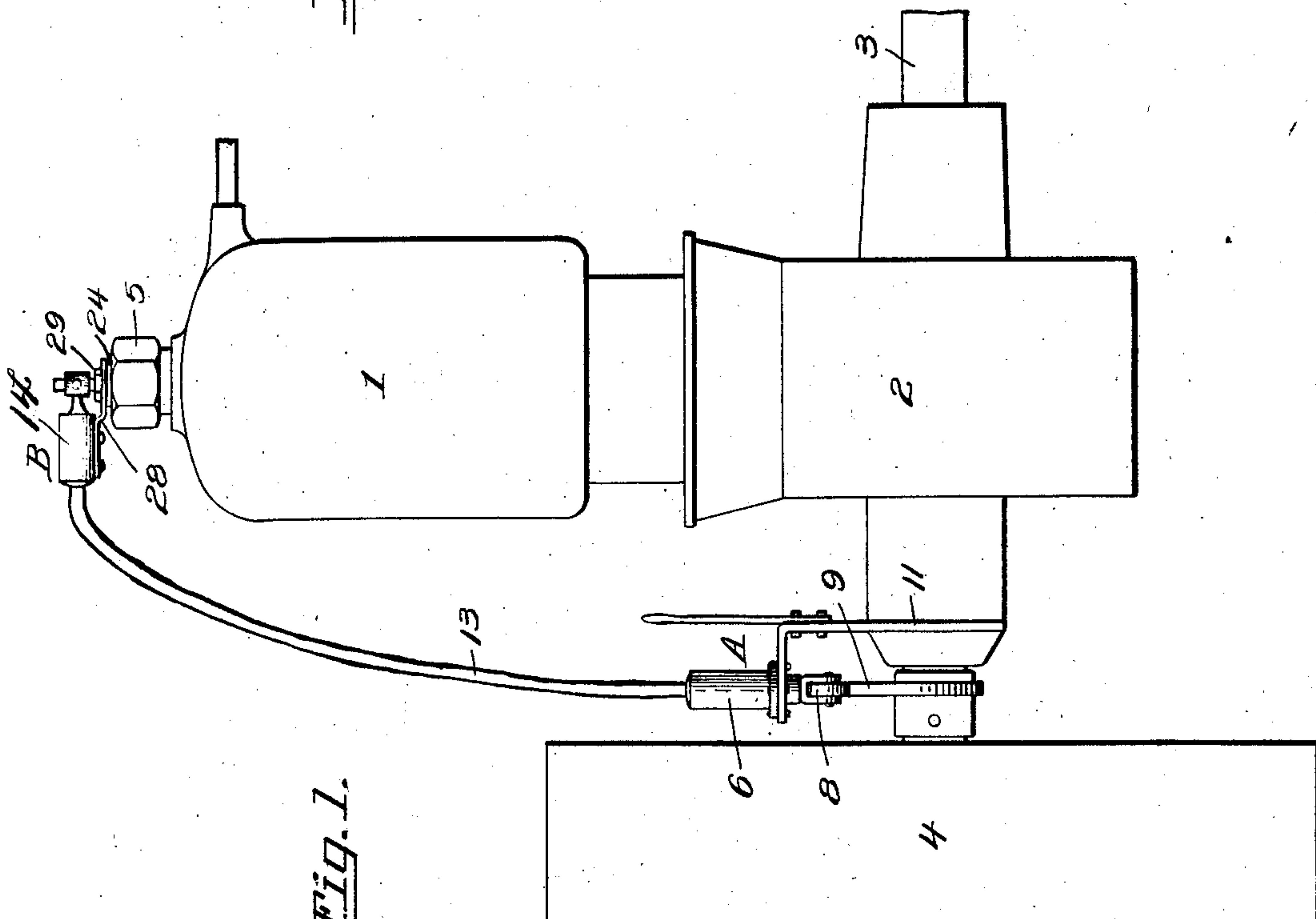


Fig. 1.

Inventor
Charles G. Hess.

Witnesses
F. C. Gibson.
C. Bradway.

By Victor J. Evans
Attorney

C. G. HESS.
PNEUMATICALLY OPERATED IGNITION DEVICE FOR GAS ENGINES.
APPLICATION FILED APR. 22, 1908.

929,429.

Patented July 27, 1909.

3 SHEETS—SHEET 2.

Fig. 3.

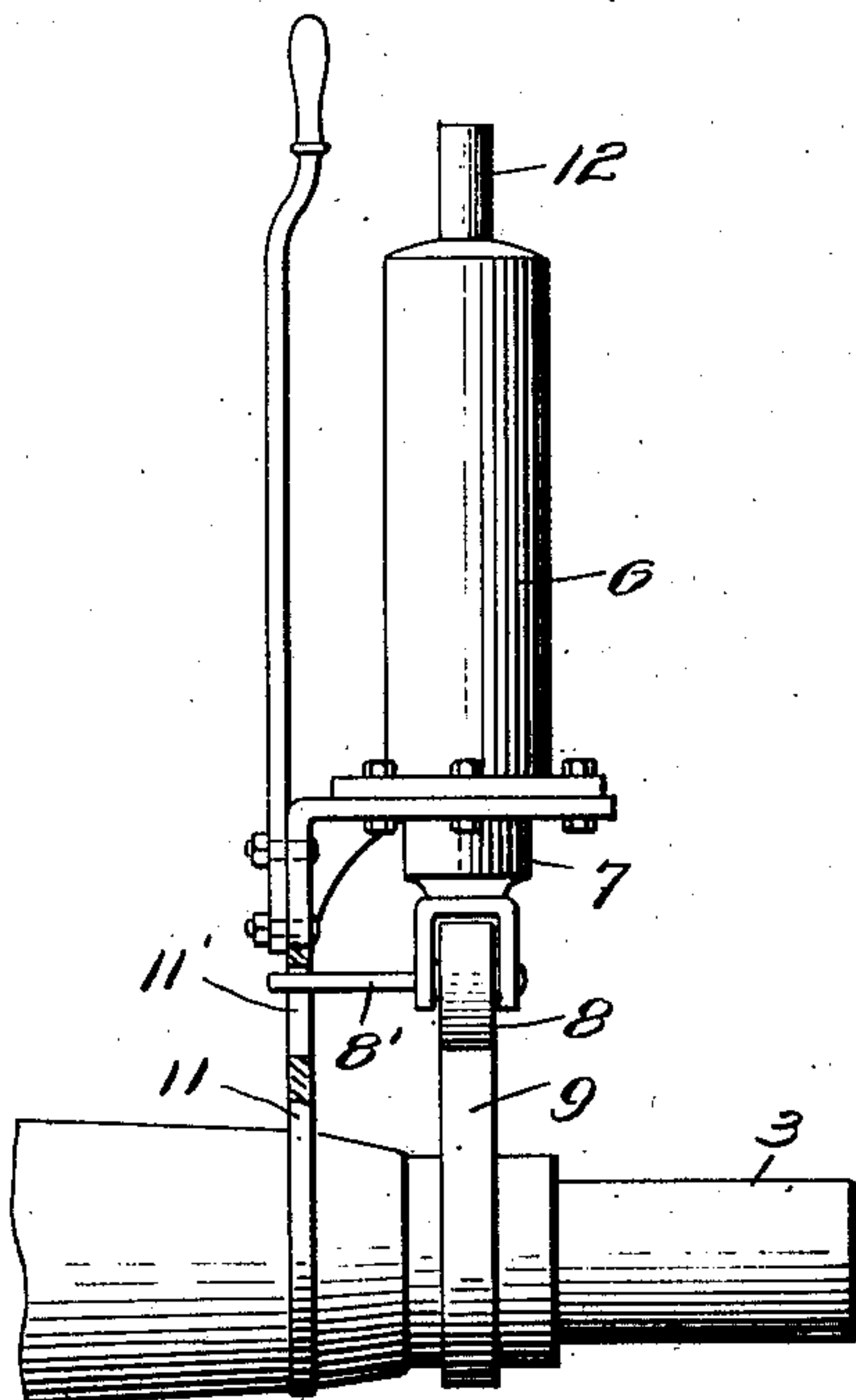


Fig. 4.

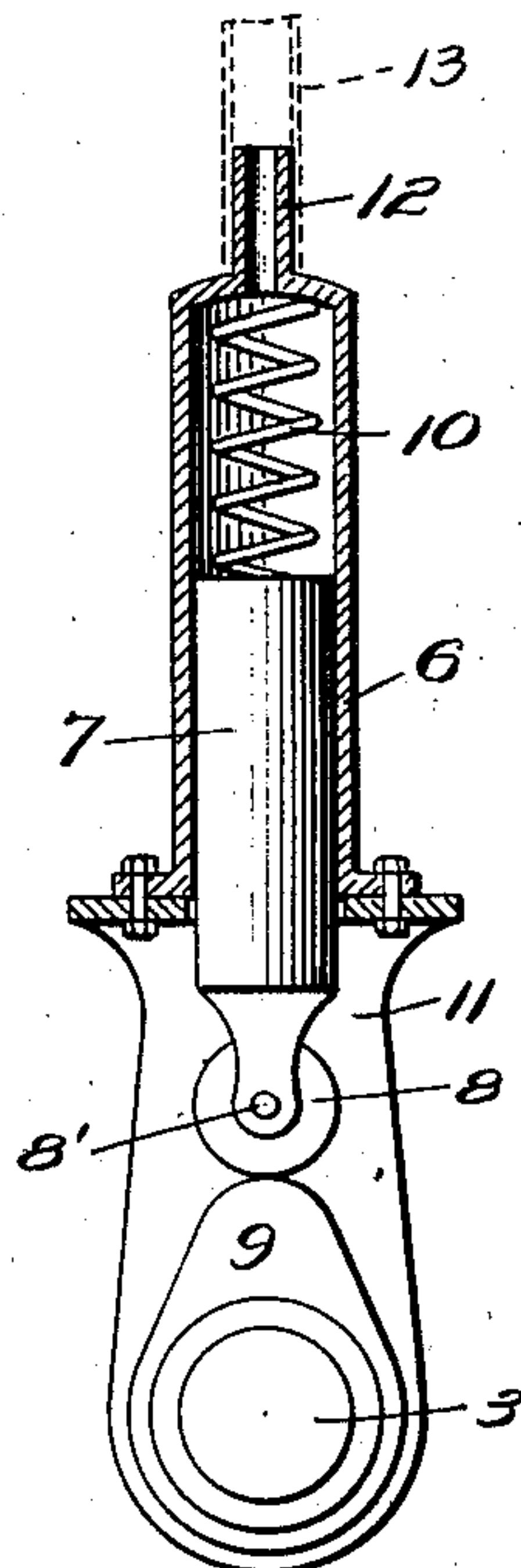


Fig. 5.

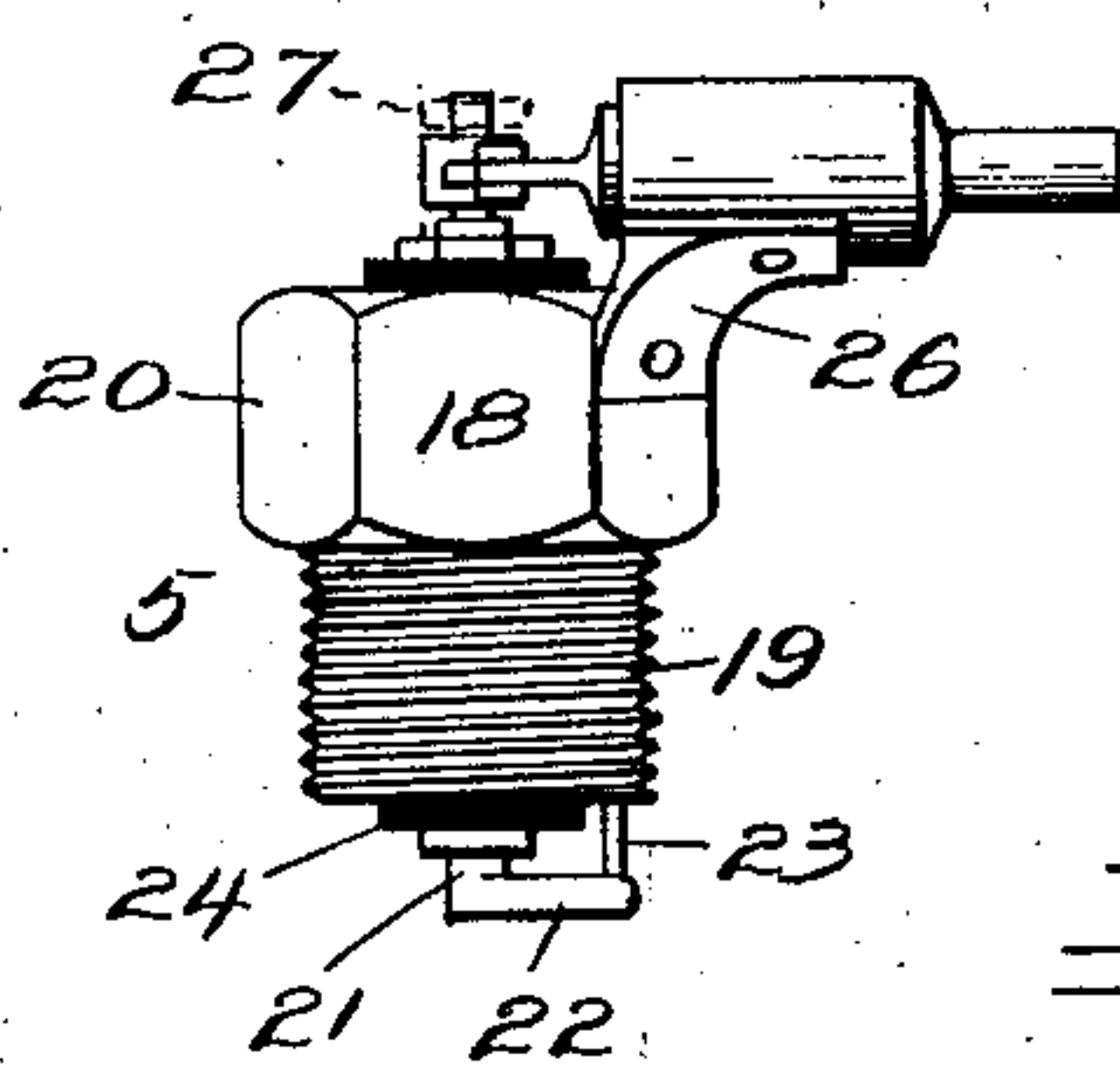


Fig. 6.

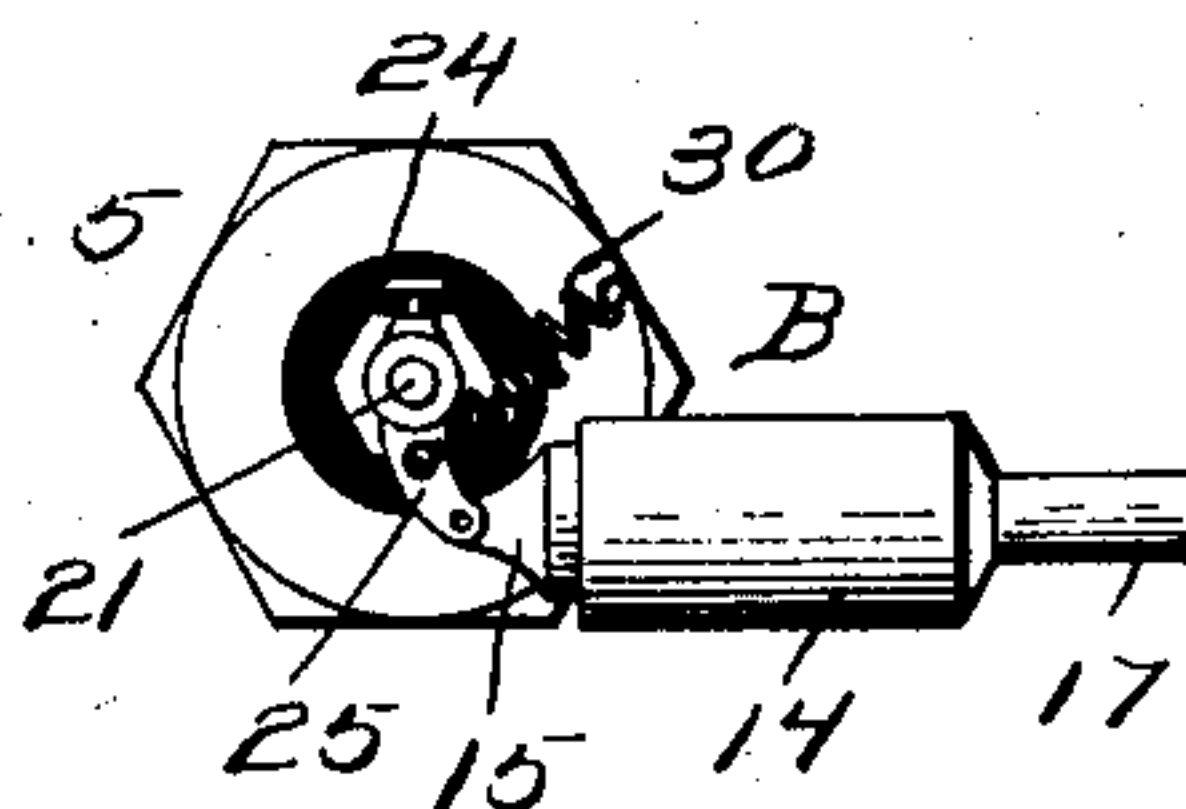
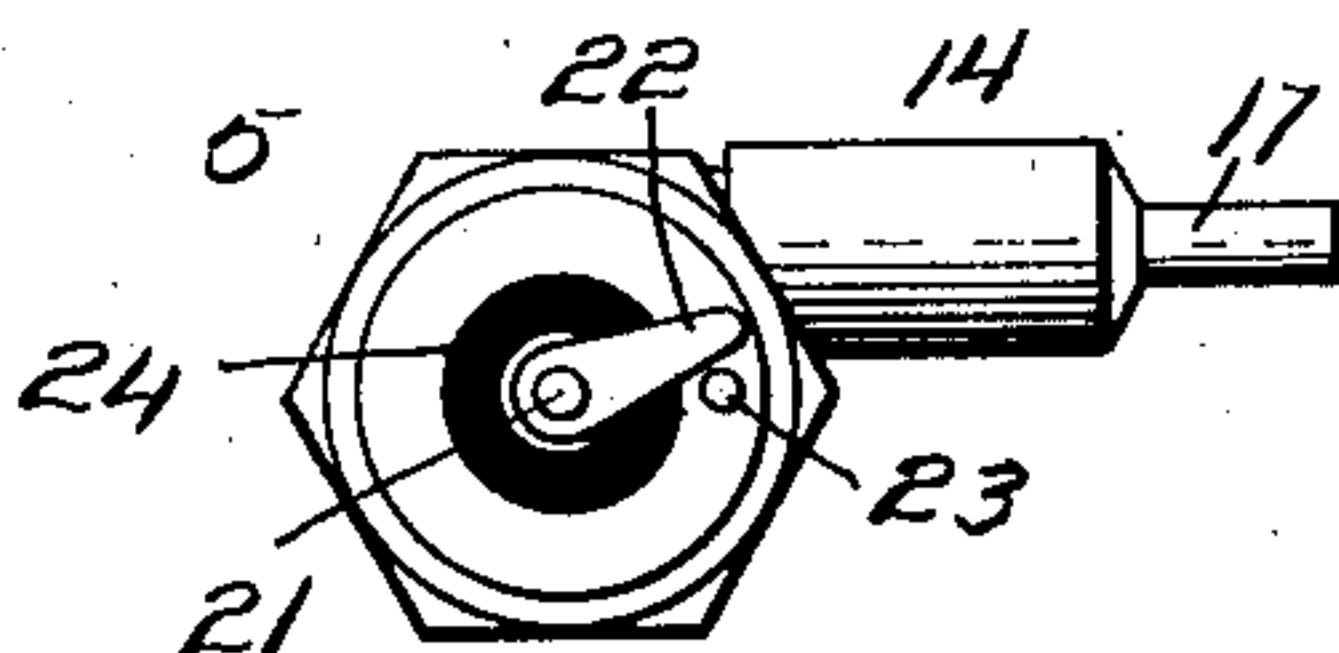


Fig. 7.



Inventor
Charles G. Hess.

Witnesses
F. L. Gibson.
C. Bradway.

By Victor J. Evans
Attorney

C. G. HESS.
PNEUMATICALLY OPERATED IGNITION DEVICE FOR GAS ENGINES.
 APPLICATION FILED APR. 22, 1908.

929,429.

Patented July 27, 1909.
 3 SHEETS—SHEET 3.

Fig. 8.

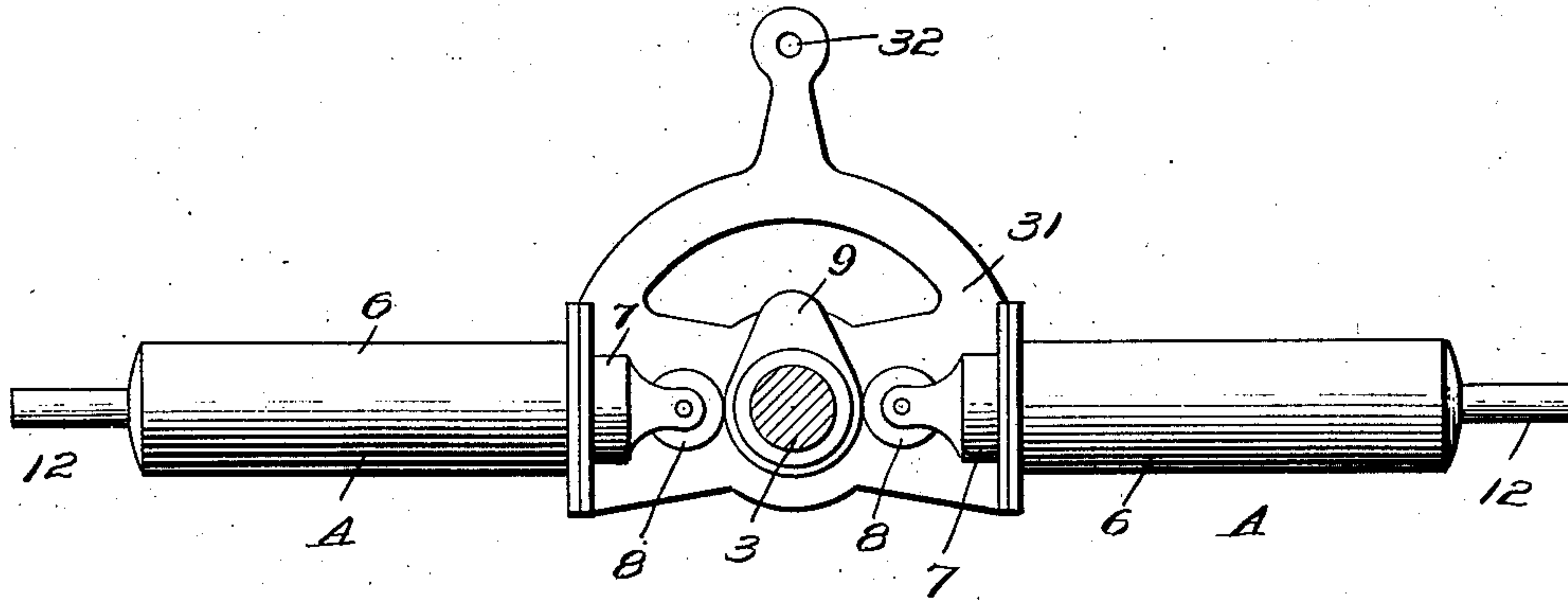


Fig. 9.

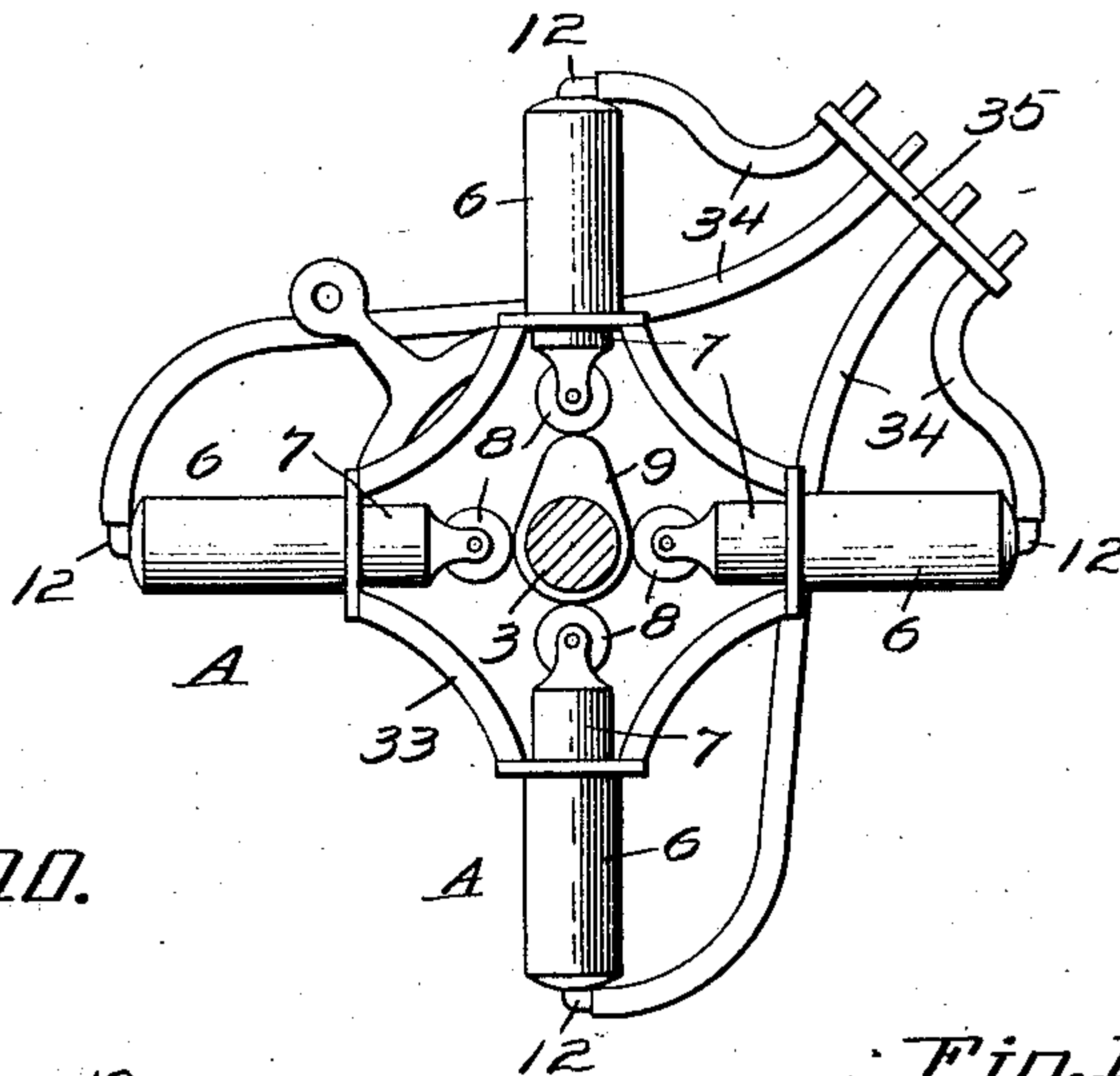


Fig. 10.

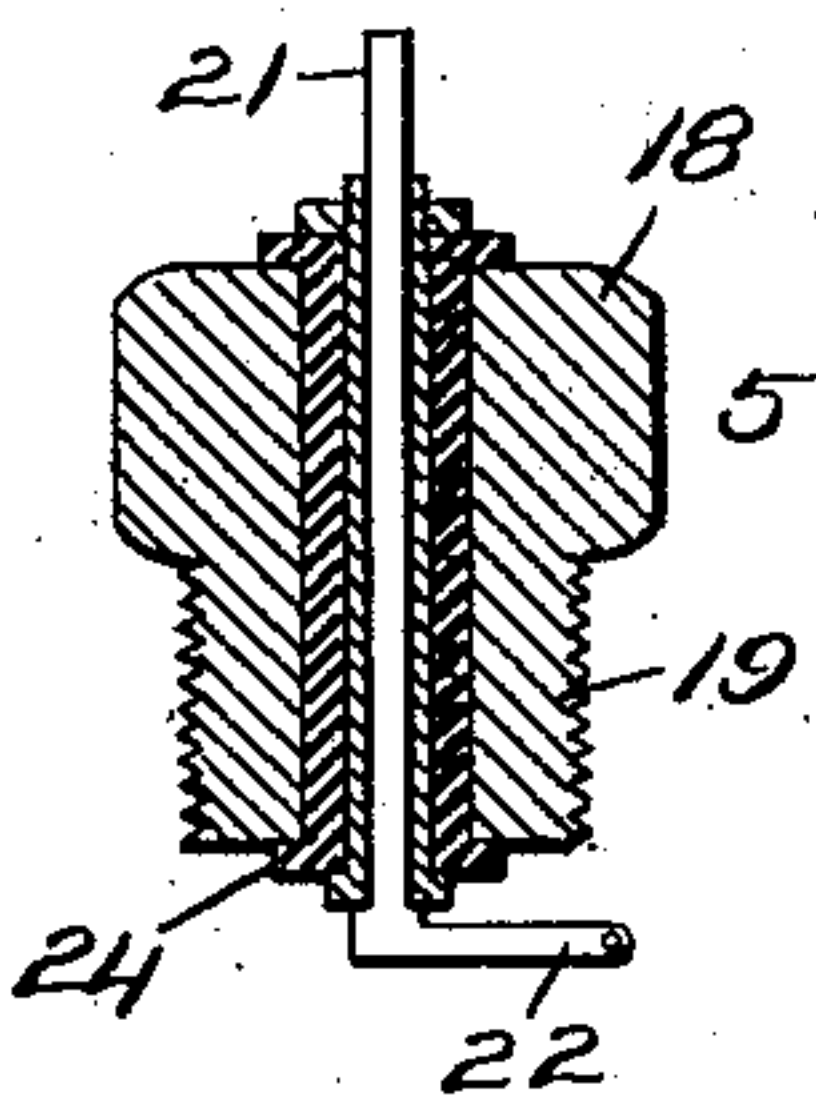
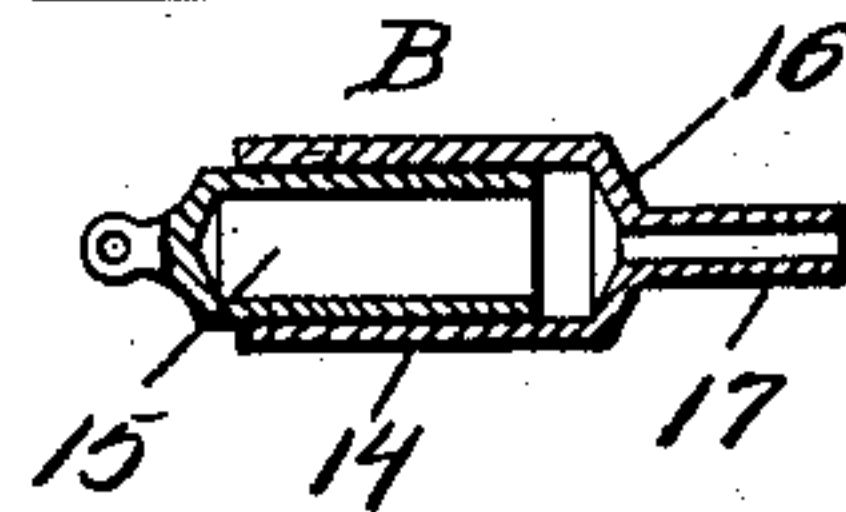


Fig. 11.



Witnesses
F. C. Gibson.
C. Bradway.

Inventor
Charles G. Hess.

By *Victor J. Evans*
 Attorney

UNITED STATES PATENT OFFICE.

CHARLES G. HESS, OF CENTER, COLORADO.

PNEUMATICALLY-OPERATED IGNITION DEVICE FOR GAS-ENGINES.

No. 929,429.

Specification of Letters Patent.

Patented July 27, 1909.

Application filed April 22, 1908. Serial No. 428,532.

To all whom it may concern:

Be it known that I, CHARLES G. HESS, a citizen of the United States, residing at Center, in the county of Saguache and State of Colorado, have invented new and useful Improvements in Pneumatically-Operated Ignition Devices for Gas-Engines, of which the following is a specification.

This invention relates to an ignition system for explosive engines, and relates more particularly to pneumatically-actuated sparking devices of the contact or make and break type.

The invention has for one of its objects to improve and simplify the construction and operation of apparatus of this character so as to be comparatively easy and inexpensive to manufacture, readily installed either on new engines or engines already in use without changing the design, and which is thoroughly reliable and efficient in use.

A further object of the invention is the provision of a make and break sparking device composed of comparatively few parts, so that liability to derangement and disorder is reduced to a minimum, the device being so designed that the time of ignition can be efficiently advanced or retarded with as much ease as the most approved jump spark ignition system without, however, being subject to the many objections common in such systems.

With these objects in view and others, as will appear as the description proceeds, the invention comprises the various novel features of construction and arrangement of parts which will be more fully described hereinafter and set forth with particularity in the claims appended hereto.

In the accompanying drawings, which illustrate certain of the embodiments of the invention, Figure 1 is a front view of a single cylinder engine equipped with the improved ignition system. Fig. 2 is a side view thereof with the crank shaft in section. Fig. 3 is a front view of the pump or compressor and the timing device for varying the time of ignition. Fig. 4 is a sectional view taken longitudinally of the pump. Fig. 5 is a side view of a modified form of spark plug. Fig. 6 is a top plan view thereof. Fig. 7 is a bottom plan view of the plug. Figs. 8 and 9 are side elevations of modified forms of pumps or compressors adapted, respectively, for two and four cylinder engines. Fig. 10 is a central longitudinal section of the spark

plug. Fig. 11 is a detail sectional view of the fluid-actuated motor for operating the movable electrode of a spark plug.

Similar reference characters are employed to designate corresponding parts throughout the several views.

Referring to the drawing, and more particularly to Figs. 1 and 2, 1 designates the cylinder of an ordinary explosive engine; 2, the crank casing; 3, the crank shaft; 4, the fly wheel; and 5, the spark plug. In the present instance, the engine is of the two stroke cycle type, and on the crank shaft is a cam 9 for operating the pump or compressor A that subjects the motor B to the action of air under pressure so as to operate the movable electrode.

The pump or compressor comprises, in the present instance, a cylinder 6, as clearly shown in Figs. 3 and 4, in which is slidably fitted a plunger 7 that has at its outer end a roller 8 running over a cam 9 on the crank shaft 3, the piston being constantly urged outwardly by a spring 10 preferably disposed within the piston and serving to hold the roller 8 in constant contact with the cam. The cylinder 6 is mounted on a bracket 11 secured to a suitable part of the engine. On the head of the cylinder is a nipple 12 to which is connected a flexible tube 13 of some appropriate material to be unaffected by oil which might be thrown off from the engine, the said tube being connected at its outer end with the motor B. The motor, in the present instance, consists of a cylinder 14, Figs. 1 and 11, in which is slidably mounted a plunger 15 that moves in and out of the cylinder 6 open at one end. The opposite end has a head 16 provided with a nipple 17 to which the hose or flexible tube 13 is attached. The plunger 15 of the motor is connected with the movable element of the spark plug.

The spark plug 5 may be of any suitable construction consisting preferably of a metallic shell 18, Figs. 5 to 7, that has a threaded portion 19 for screwing into the usual tapped opening of the engine cylinder intended to receive the spark plug, the plug having a non-circular portion 20 to receive a wrench for facilitating the placing or removal of the plug. Passing through the shell 18 is a movable electrode 21 that has its lower end formed into an arm 22 that is adapted to contact with the fixed electrode 23 arranged on the shell 18, and grounded

through the latter on the engine cylinder. The movable electrode is insulated from the shell of the spark plug by a bushing 24 of mica or other suitable material, the electrode being of such length as to project out of the bushing at the top of the plug. On the outer end of the movable electrode is attached an adjustable arm 25 to which the plunger of the motor B is connected, so that the movement of the plunger will bring the electrodes into contact. The spark plug serves as a support for the motor B and the latter is attached to the shell by means of a bracket piece 26, as shown in Fig. 5, the motor being, of course, insulated from the shell of the spark plug. One side of the primary circuit is connected with the movable electrode in any suitable manner, as for instance, by a nut 27, Fig. 5, and the other side of the circuit will be grounded on the engine, as will be understood. In Figs. 1 and 2, the motor is secured by a bracket piece 28 to the movable electrode of the spark plug, the bracket piece being clamped against the upper end of the bushing 24 by a nut 29.

In operation, the rotation of the crank shaft causes the cam 9 to reciprocate the plunger of the air compressor, and when the plunger moves inwardly, the air contained in the cylinders 6 and 14 in the connecting tube 13 is compressed and thus forces the plunger 15 of the motor B outwardly, thus dropping the movable electrode so as to make contact with the fixed electrode. As soon as the cam passes its central point, the plunger 7 is moved outwardly by the spring 10, thereby relieving pressure of air acting on the motor so that the electrodes can separate, this separation being effected by a spring 30. This separation of electrodes produces a large spark of great intensity, so that the ignition of the compressed charge within the engine cylinder will be exploded.

In order to vary the time of ignition, it is merely necessary to adjust the position of the pump or compressor A with respect to the cam 9, so that the air will be compressed at a point suitably in advance or behind the time that the engine piston reaches its inner dead center. For this purpose, the bracket 11, Figs. 1 to 4 inclusive, is mounted on the crank shaft so as to be adjusted around the latter as a center, and this bracket is connected with any suitable regulating mechanism for throwing it in one direction or the other. In the bracket A is a slot 11¹ into which engages the extension 8¹ of the axle for the roller 8, Fig. 3. Since the tubes 13 are flexible, the angular adjustment of the bracket 15 can be effected without the tubes interfering.

In Fig. 8 is shown an arrangement of pumps adapted for a two cycle engine, the

bracket 31 being adjustably mounted on the crank shaft 3 and supporting oppositely-disposed pumps or compressors A, the plungers of which are operated by a single cam 9. It is obvious, however, that the ignition device is adapted equally well to a four cycle engine, it being necessary to mount the pump so as to be operated by a cam on the secondary shaft. On the bracket 31 is an arm 32 to which may be connected a controlling mechanism operated from the driver's seat, as when the engine is used in automobiles or other service. In Fig. 9, the bracket 33 is designed for holding four pump cylinders A, and the flexible tubes 34 connected with the motors of the spark plugs are attached to a yoke 35 so as to keep them in proper relative position. It is obvious that any desired number of pumps may be used, according to the number of cylinders of the engine, and a bracket for supporting the pump or pumps can be readily designed so as to apply to the crank or secondary shaft of any engine, while the spark plugs can be substituted for the ordinary spark plugs now in use, thus rendering the ignition apparatus a ready substitute for other ignition systems without requiring any alterations in the engine.

From the foregoing description, taken in connection with the accompanying drawings, the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention appertains, and while I have described the principle of operation of the invention, together with the apparatus which I now consider to be the best embodiment thereof, I desire to have it understood that the apparatus shown is merely illustrative, and that such changes may be made when desired as are within the scope of the claims.

Having thus described the invention, what I claim is:—

1. In an ignition apparatus, the combination of a make and break plug, a pneumatically actuated motor for operating the movable electrode of the plug, a pump including a piston, a shaft, a bracket mounted in co-operative relation with the shaft to be adjusted around the axis of the same, a connection between the motor and pump, a cam on the shaft, a device connected with the piston and arranged to ride on the cam, and means guided by the bracket for holding said device in coöperative relation with the cam.

2. The combination of an engine including a shaft, a cam on the shaft, a bracket on the shaft adjustable around the axle thereof, a pump mounted on the bracket and including a plunger, a roller on the plunger riding on the cam, a member on the plunger engaging the bracket for maintaining the roller in the same plane as the cam, a spark plug

for the engine, and connecting means between the plunger of the pump and the movable member of the spark plug for operating the latter by the pump.

5 3. In an engine, the combination of a fluid compressing device, with a spark plug operated thereby, said plug including a movable electrode, an arm secured to the electrode, a cylinder mounted on the spark plug,
10 a plunger mounted therein for movement in a plane at right angles to the electrode, a

connection between the plunger and said arm, and a spring operating on the electrode to hold the same in open circuit position and for maintaining the plunger within the cyl- 15
inder.

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

CHARLES G. HESS.

Witnesses:

CASE L. EWBANK,

THOMAS ROSEBROUGH.