

H. WILLIAMS.
GAS OR SIMILAR MOTOR ENGINE.

No. 490,006.

Patented Jan. 17, 1893.

Fig. 1.

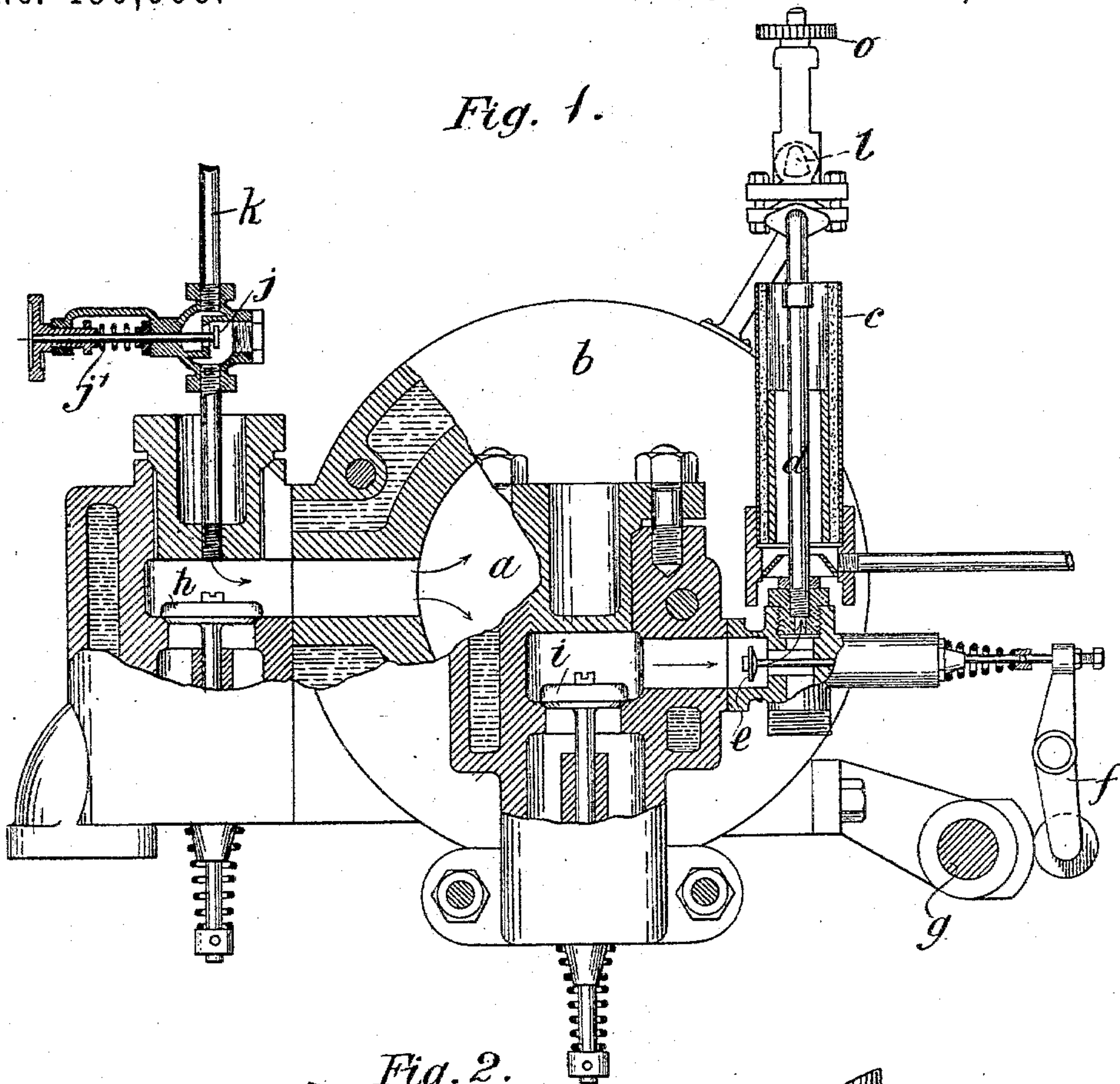
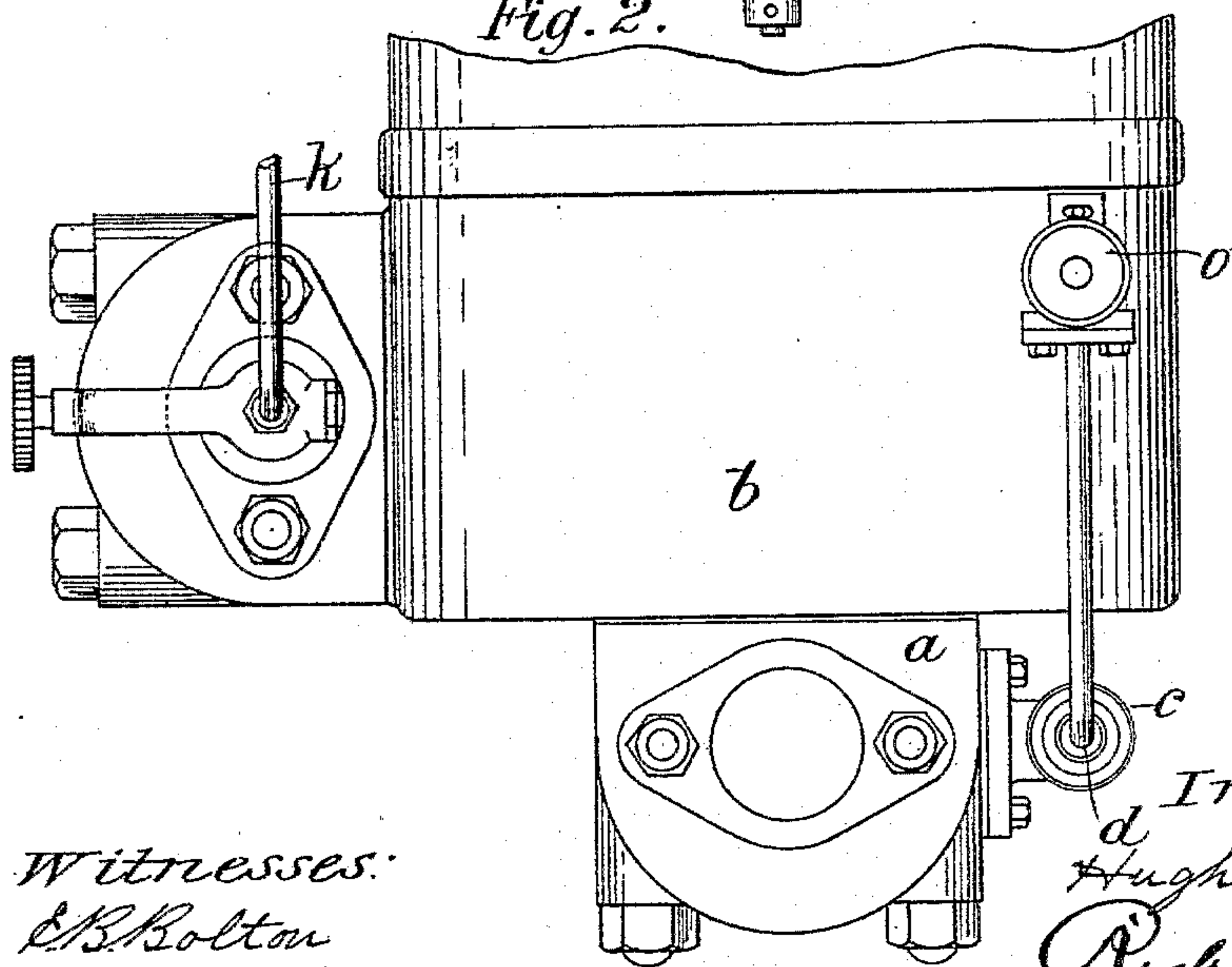


Fig. 2.



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Fig. 4.

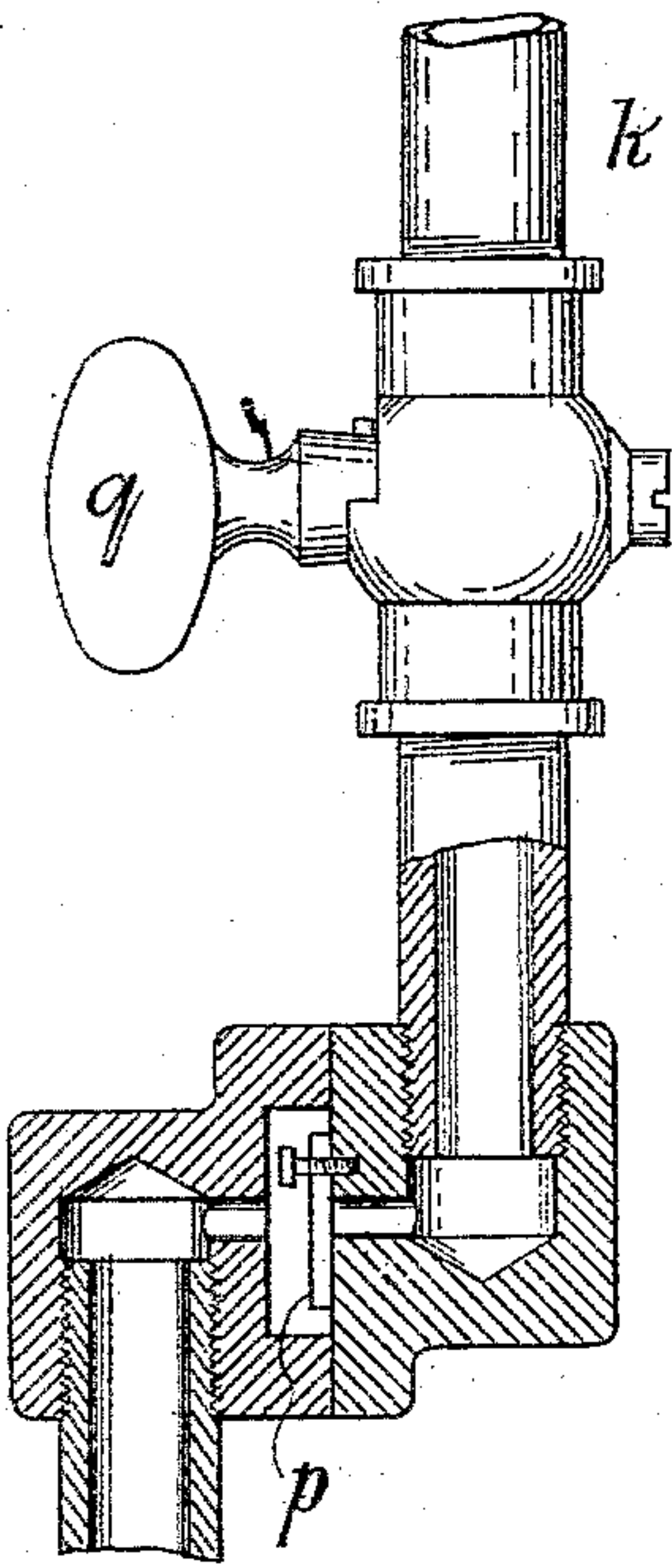


Fig. 3.

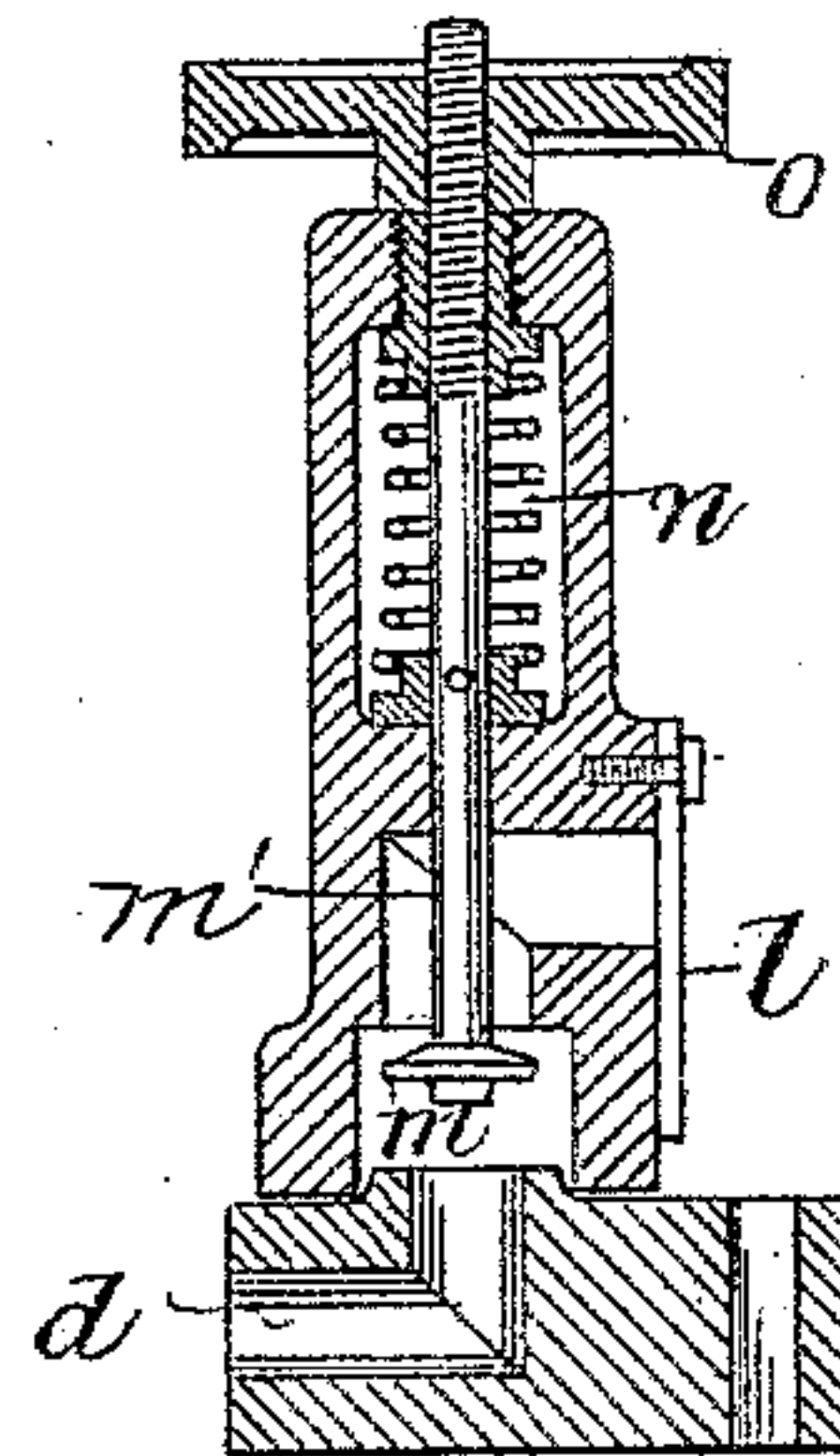


Fig. 6.

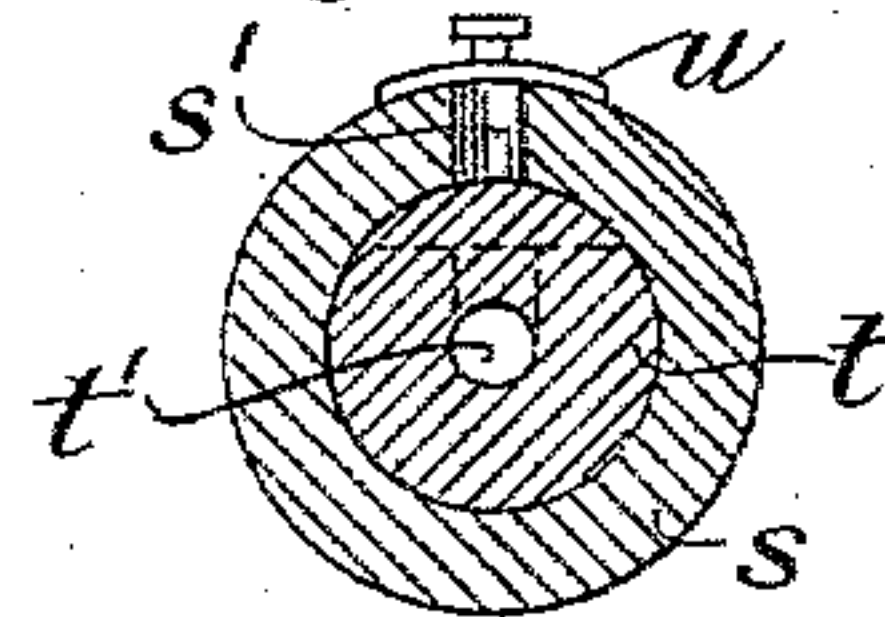
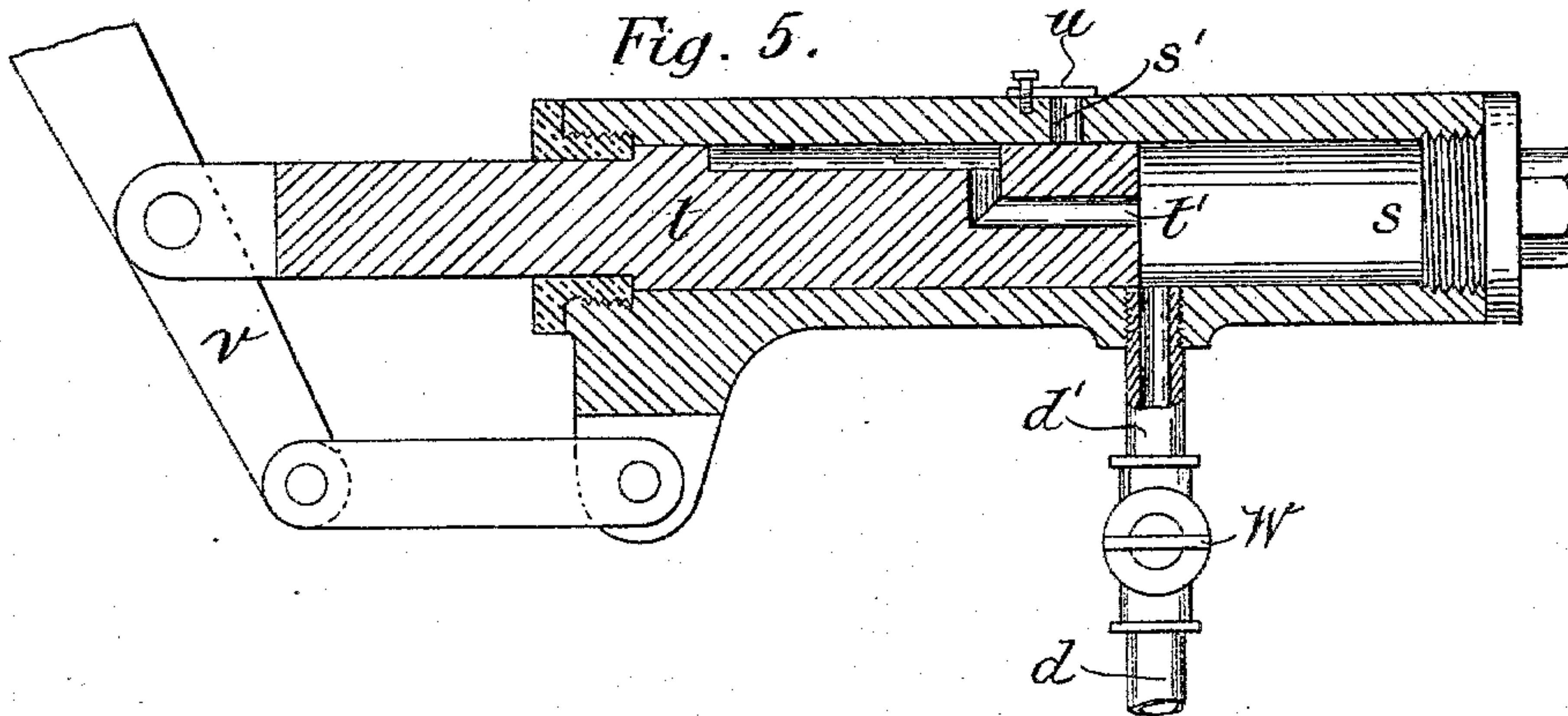


Fig. 5.



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UNITED STATES PATENT OFFICE.

HUGH WILLIAMS, OF STOCKPORT, ENGLAND.

GAS OR SIMILAR MOTOR ENGINE.

SPECIFICATION forming part of Letters Patent No. 490,006, dated January 17, 1893.

Application filed June 29, 1892. Serial No. 438,357. (No model.) Patented in England September 7, 1891, No. 15,078.

To all whom it may concern:

Be it known that I, HUGH WILLIAMS, a subject of the Queen of Great Britain, residing at Edgeley, Stockport, in the county of Chester, England, have invented certain new and useful Improvements in Gas or Similar Motor Engines, (for which I have obtained Letters Patent in Great Britain, No. 15,078, bearing date September 7, 1891,) of which the following is a specification.

My invention relates to improvements in the mechanism for starting gas and similar motive power engines more particularly those engines wherein the combustible charges are ignited by means of heated tubes, and whereby such engines can be started readily and with certainty. I effect this in several ways for example—First,—the igniting tube being at one end in communication with the combustion chamber of the power cylinder, I attach to the other end of this tube an arrangement of pressure and back pressure valves which when starting the engine are kept open so that the interior of the heated tube is in communication with the atmosphere. And in order that my invention may be fully understood and readily carried into effect I will describe the accompanying two sheets of drawings reference being had to the figures and letters marked thereon.

Figure 1 is an end view partly in section of a gas or similar motor engine to which my improvements are applied. Fig. 2 is a plan of the same. Fig. 3 is an enlarged sectional view of the arrangement of starting valves applied to the ignition tube and Fig. 4 is a view partly in section of an alternative form of the gas admission valve shown in Fig. 1. Figs. 5 and 6 are two views illustrating the second method wherein I attach a small pump to the end of the igniting tube.

In the first arrangement, Figs. 1 and 2,—*a* designates the combustion chamber of the power cylinder *b*, *c* the chimney in which is placed the igniting tube *d*, *e* is the ordinary ignition valve which is operated by the lever *f* from the cam shaft *g*, *h* is the exhaust valve, *i* the air inlet valve, *j* the gas admission valve, and *k* the gas supply pipe.

In Fig. 3 is shown on an enlarged scale the arrangement of valves which I apply accord-

ing to my invention to the igniting tube *d*. In this case *l* is the back pressure valve which is a simple flap valve, and *m* is the pressure valve which is kept normally open by the spring *n*, but can be closed when required by turning the milled head *O* fitted on the valve spindle and so screwing down the valve *m* upon its seating. The object of the pressure valve *m* attached to the igniting tube is, that the instant ignition takes place, the force of the explosion automatically closes it against the escape of the ignited fluid into the atmosphere and the valve *m* can be then screwed up tight upon its seating; and the object of the back pressure valve *l* is that when the engine from starting is gaining its normal speed the pressure valve *m* being open when the engine is drawing its charge the back pressure valve *l* closes against the atmosphere and prevents cold air entering the heated tube *d*.

I will assume that the engine in stopping is permitted to run on by its own momentum without gas entering the cylinder, the valve *j* being screwed down upon its seating against the resistance of the spring *j'*; thus air only is admitted to the cylinder *b* until the products of previous combustion shall have been expelled from the cylinder and combustion chamber and air only remains. When on re-starting the engine the crank is brought over the dead center the spindle of the valve *j* is unscrewed and gas is induced to enter the cylinder through the non-return valve *j* and diffuse with the air already contained therein until an explosive mixture is formed. This induction of gas causes a circulation within the cylinder to take place, and an escape of the combustible mixture is permitted through the heated igniting tube *d* and the pressure and back pressure valves *m* and *l* aforesaid, until an explosive mixture reaches the heated part of the igniting tube *d* when an ignition takes place an impulse being thereby given to the piston and the engine is started. When the engine has got on the way and is running in its normal condition, communication between the heated part of the igniting tube and the pressure and back pressure valves is cut off by screwing down the valve *m*.

In the alternative form of gas admission

valve illustrated by Fig. 4, *p* is the non-return valve through which the gas flows from the supply pipe *k* to the combustion chamber and *q* a tap by which the gas can be cut off when required.

Second.—Another method whereby I attain the object of this invention is illustrated by Figs. 5 and 6 and described below, the igniting tube *d* as before mentioned being in communication with the cylinder at one end, I attach to the other end of this tube a small pump to be worked by hand or by the engine. The pump consists of a barrel *s* which is in communication with the igniting tube by means of a pipe *d'*. In the barrel *s* is fitted the piston or plunger *t* in which is formed a passage *t'*, and in the side of the barrel *s* is a port *s'* closed by a flap or non-return valve *u*. The plunger *t* is worked by a lever *v* operated either by hand or power.

On re-starting the engine the combustible charge within the cylinder may be formed in the manner described in the first method, or a charge may be formed by turning the fly wheel round and so drawing a charge of combustible mixture into the cylinder. The igniting tube being in a properly heated condition for igniting the charge, and the crank set over the inward center the pump is then worked until a portion of the combustible charge is drawn from the cylinder into the heated tube and there ignited, thereby communicating the ignition to the main charge within the cylinder. When the engine shall have got on its way and is running at its normal speed communication between the heated part of the

tube and the pump is cut off by a suitable valve or tap *w*.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed I declare that what I claim and desire to secure by Letters Patent of the United States is:—

1. In combination, in a gas engine, the igniting tube, a tubular extension connected therewith and opening to the outside air, a valve arranged to control the egress of the mixture from the igniting tube to the outside and the back pressure valve controlling the port leading from the extension to the outside and arranged to prevent the inlet of cold air to the said extension and igniting tube, substantially as described.

2. In combination, in a gas engine, the igniting tube, the extension connected therewith and having a port to the outside air a valve at said port to prevent the inlet of air, the said extension comprising a pump cylinder and the means therein acting as a valve to open and close communication between the inlet port from the igniting tube and the valved outlet port from the cylindrical extension said means consisting of the piston having the passage *t'*, therein, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

H. WILLIAMS.

Witnesses:

TINSLEY WATERHOUSE,
EDWARD PRICE.