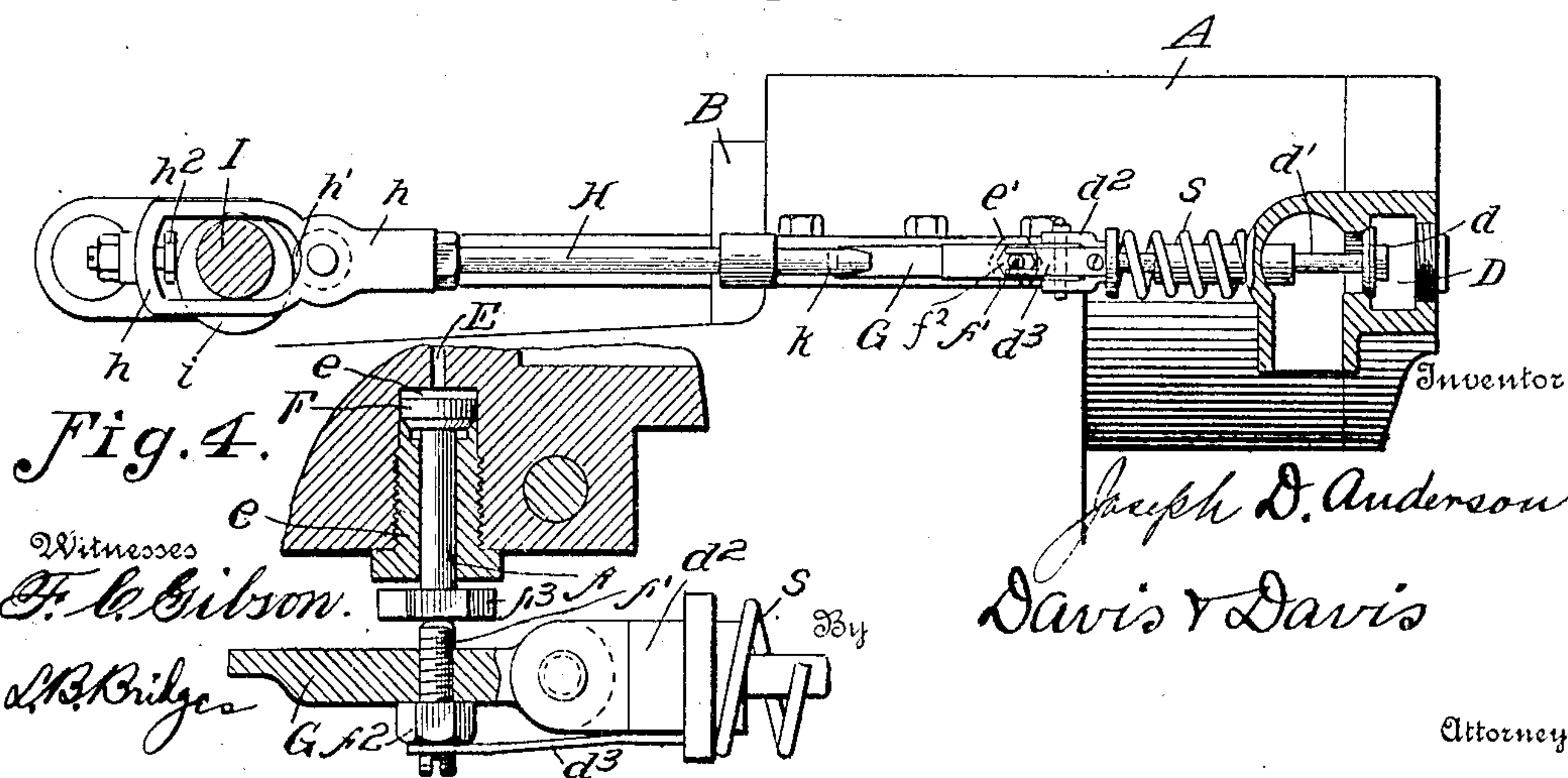
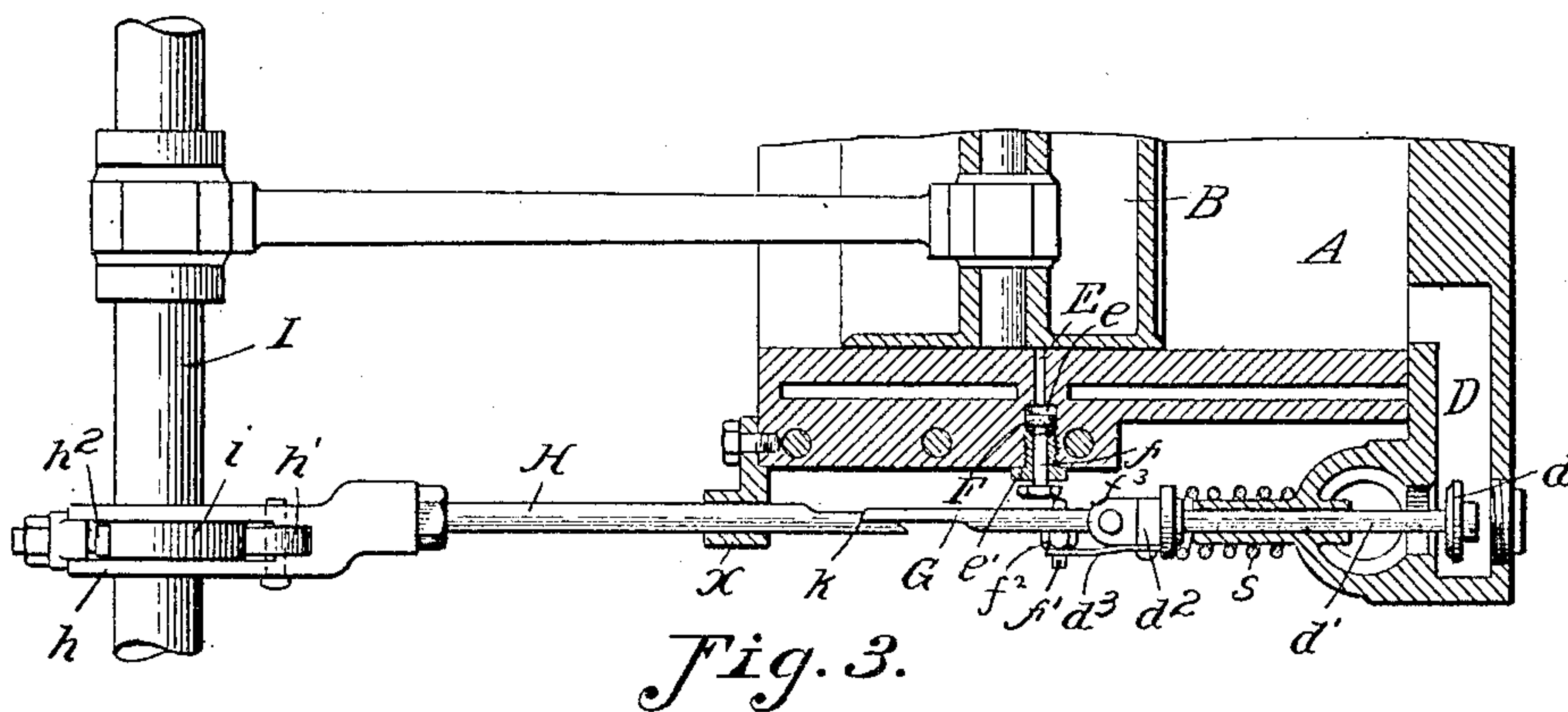
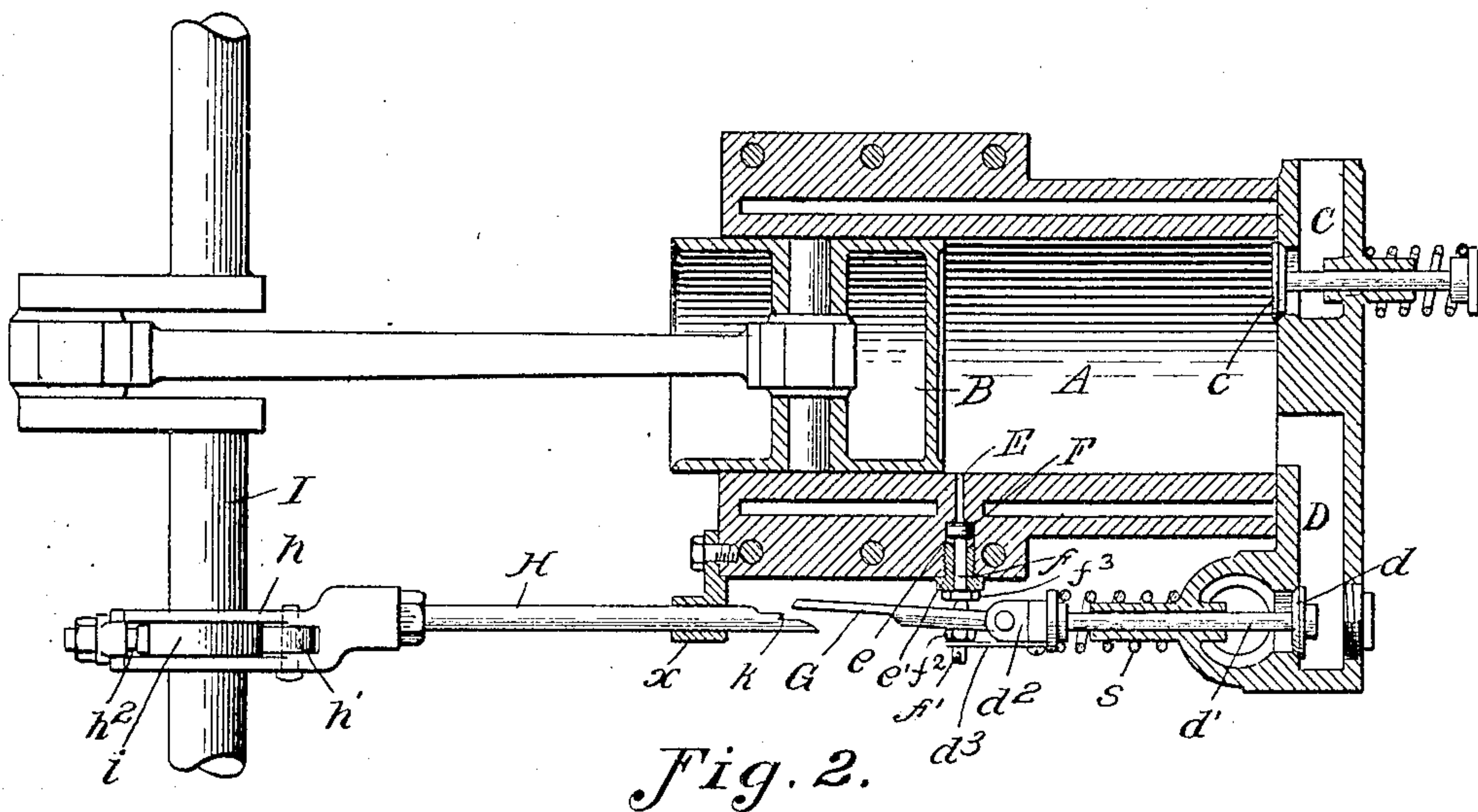


No. 869,611.

PATENTED OCT. 29, 1907.

J. D. ANDERSON.
EXPLOSIVE ENGINE.
APPLICATION FILED JAN. 9, 1907.

Fig. 1.



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JOSEPH D. ANDERSON, OF ST. MARYS, OHIO.

EXPLOSIVE-ENGINE.

No. 869,611.

Specification of Letters Patent.

Patented Oct. 29, 1907.

Application filed January 9, 1907. Serial No. 351,551.

To all whom it may concern:

Be it known that I, JOSEPH D. ANDERSON, a citizen of the United States of America, and a resident of St. Marys, in the county of Auglaize and State of Ohio, have invented certain new and useful Improvements in Explosive-Engines, of which the following is a full and clear specification, reference being had to the accompanying drawings, in which—

Figure 1 is a horizontal longitudinal section of an explosive engine provided with my invention, the piston being shown at the rear end of its stroke; Fig. 2 a similar view showing the engine on its expelling stroke; Fig. 3 a side elevation of Fig. 2, partly in section; and Fig. 4 a detail section of the auxiliary piston and coacting parts.

The object of this invention is to adapt a hit-and-miss device for operating the exhaust valve, means being provided whereby the exhaust valve will be opened only when an explosion takes place, thereby avoiding the waste and nuisance resulting from discharging unexploded charges, as more fully hereinafter set forth.

In the drawing A designates the cylinder of an ordinary four cycle explosive engine; B the piston thereof; C the charging inlet provided with the automatic valve c ; and D the exhaust passage closed by an inwardly opening exhaust valve d of the usual type and provided with a stem d' whose outer end is rigidly attached to a head d^2 , between which head and the casing is a coil spring s for normally holding the valve closed.

The letter I designates the crank shaft to which is affixed the exhaust valve operating cam i adapted to operate the valve rod H through the medium of a yoke h which embraces the shaft and the cam so that the valve rod shall be guided accurately, the bracket x on the engine cylinder assisting in the guiding action. The cam works against a small antifriction roller h' and a suitable set bolt h^2 is mounted in the rear of the yoke in an adjustable manner, this bolt being adapted to be adjusted up to the rear face of the cam so that the valve rod will be restricted. The valve rod H at a short distance back from its free forward end is provided with a V-shaped notch k which faces toward the cylinder.

The finger G is pivoted to the head d^2 of the exhaust valve stem and extends rearwardly and has its forward end beveled so as to adapt it to engage into the V-shaped notch k . This finger is normally pressed toward the cylinder, so that its free end shall be out of alignment with the notch k , by means of a flat spring d^3 secured on the outer face of the head d^2 and extending rearwardly, this rear free end of the spring being bifurcated to engage over a set-screw f' and bear upon the outer face of a lock nut f^2 carried by the set-screw and bearing against the outer face of the finger G. The set-screw is tapped through the finger G and its projecting end projects far enough to normally bear upon a head

f^3 when the exhaust valve is closed and the finger G is out of line with the valve operating rod.

The head f^3 is rigidly attached to the outer end of a piston rod f working through a bushing c' screwed or otherwise fastened into a cylindrical chamber c in the cylinder. The inner end of the rod f is provided with a piston F which fits and works in the cylindrical passage c beyond the inner end of the bushing, the outer face of this piston is beveled and is adapted when at the outer limit of its stroke to seat against a similarly beveled seat formed on the inner end of the plug e' and perform the function of a valve. A port E extends from the inner end of the chamber c into the explosion chamber of the cylinder, its inner end communicating with the cylinder at a point sufficiently far from the forward limit of the stroke of the piston to insure the piston passing beyond the port in its forward stroke, thereby putting said port E in direct communication with the atmosphere at the end of each forward stroke.

It will be observed that when the piston is driven backwardly by the explosion far enough to uncover port E the pressure of the explosion will force the piston F outward and thus swing finger G into line with notch k just as the valve rod H is being moved forwardly on its actuating stroke, thus opening and holding open the exhaust valve during the expelling stroke of the piston.

It will be observed that the auxiliary piston F will seat itself against the seat in the plug and thus effectively prevent the escape of gases and lubricating oil. When the rear end of the piston passes the port E on its forward stroke, which it will do immediately before the piston reaches the forward extremity of the stroke, the gases which have been confined in the port E and chamber c are allowed to escape into the atmosphere, thus permitting spring d^3 to swing the hit-and-miss finger G out of engagement with the valve-rod, so that the parts will be in position for operation upon the next explosion stroke of the piston. If an explosion is missed, there will be no outward pressure on the piston F and consequently no operation of the exhaust valve, thereby retaining the charge in the cylinder until an explosion does occur.

It will be observed that a special advantage of my construction lies in the fact that but a very slight movement of the auxiliary piston is required to operate the hit-and-miss finger and also in the further fact, as stated, that the auxiliary piston is caused to act as a pressure operated valve to prevent leakage of gases and oil out through the bushing or plug.

Having thus fully described my invention, what I claim and desire to secure by Letters Patent, is:—

1. In combination with an explosive engine having an exhaust valve and a valve rod and means for reciprocating it, of a hit-and-miss finger pivotally connected to the

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end of the exhaust valve stem, means on the stem for normally swinging this finger toward the engine cylinder and out of alinement with the valve rod and an adjustable contact screw on this finger, an auxiliary cylinder formed in the main cylinder adjacent to the pivotal point of the said finger, a bushing or plug closing this cylinder, the inner end of this plug being provided with a valve seat, a piston working in said auxiliary cylinder and having its outer face formed into a valve and its stem or rod extending through the bushing and provided with a head against which said contact screw normally abuts.

2. In combination with an explosive engine having an exhaust valve and means for actuating said valve consisting of a valve rod and a hit-and-miss finger provided with a contact part and pivotally connected to the valve stem, of automatic means for actuating this finger consisting of an inwardly extending auxiliary cylinder formed in the side wall of the main cylinder adjacent to the pivotal point of the finger and having a port directly connecting its inner end with the interior of the main cylinder at a point where it will be uncovered at the end of the working stroke of the piston, a piston in said auxiliary cylinder provided with a rod or stem extending outward to near the pivotal point of the hit-and-miss finger where it is provided with a head, and means for normally pressing said hit-and-miss finger inwardly toward the cylinder with its contact part into contact with the head on the outer end of said rod.

3. In combination with an explosive engine having an exhaust valve and means for actuating said valve consisting of a valve rod and a hit-and-miss finger provided with an adjustable contact part and pivotally connected to the valve stem, of automatic means for actuating this finger consisting of an auxiliary horizontal cylinder formed in the body of the main cylinder adjacent to the pivotal

point of the finger and having a port directly connecting its inner end with the interior of the main cylinder at a point where it will be uncovered at the end of the working stroke of the piston, a plug closing said auxiliary cylinder and provided with a valve seat, a piston in said auxiliary cylinder provided with a rod or stem extending outward through said plug and having its outer face formed into a valve, said stem being provided with a head, and means for normally forcing said hit-and-miss finger toward the cylinder and its contact part into contact with the head on the outer end of said rod.

4. In combination with an explosive engine having an exhaust valve and means for actuating said valve consisting of a valve rod and a hit-and-miss finger having a contact part and pivotally connected with the valve stem, of automatic means for actuating this finger, said means consisting of an inwardly extending auxiliary cylinder formed in the side wall of the main cylinder adjacent to the hit-and-miss finger and having a port directly connecting its inner end with the interior of the main cylinder at a point where it will be uncovered at the end of the working stroke of the piston, a piston in said auxiliary cylinder provided with a rod or stem extending outwardly to near the hit-and-miss finger where it is provided with a head, and means for pressing said hit-and-miss finger inwardly toward the cylinder with its contact part in contact with the head of the outer end of the stem of the auxiliary piston, substantially as set forth.

In testimony whereof I hereunto affix my signature in the presence of two witnesses this 5th day of January, 1907.

J. D. ANDERSON.

Witnesses:

C. REISELT,

B. W. BRINKLEY.