G. A. PARKER.

EXPLOSIVE ENGINE.

APPLICATION FILED SEPT. 7, 1909.

967,046.

Patented Aug. 9, 1910.

3 SHEETS—SHEET 1.

Fig. 1.

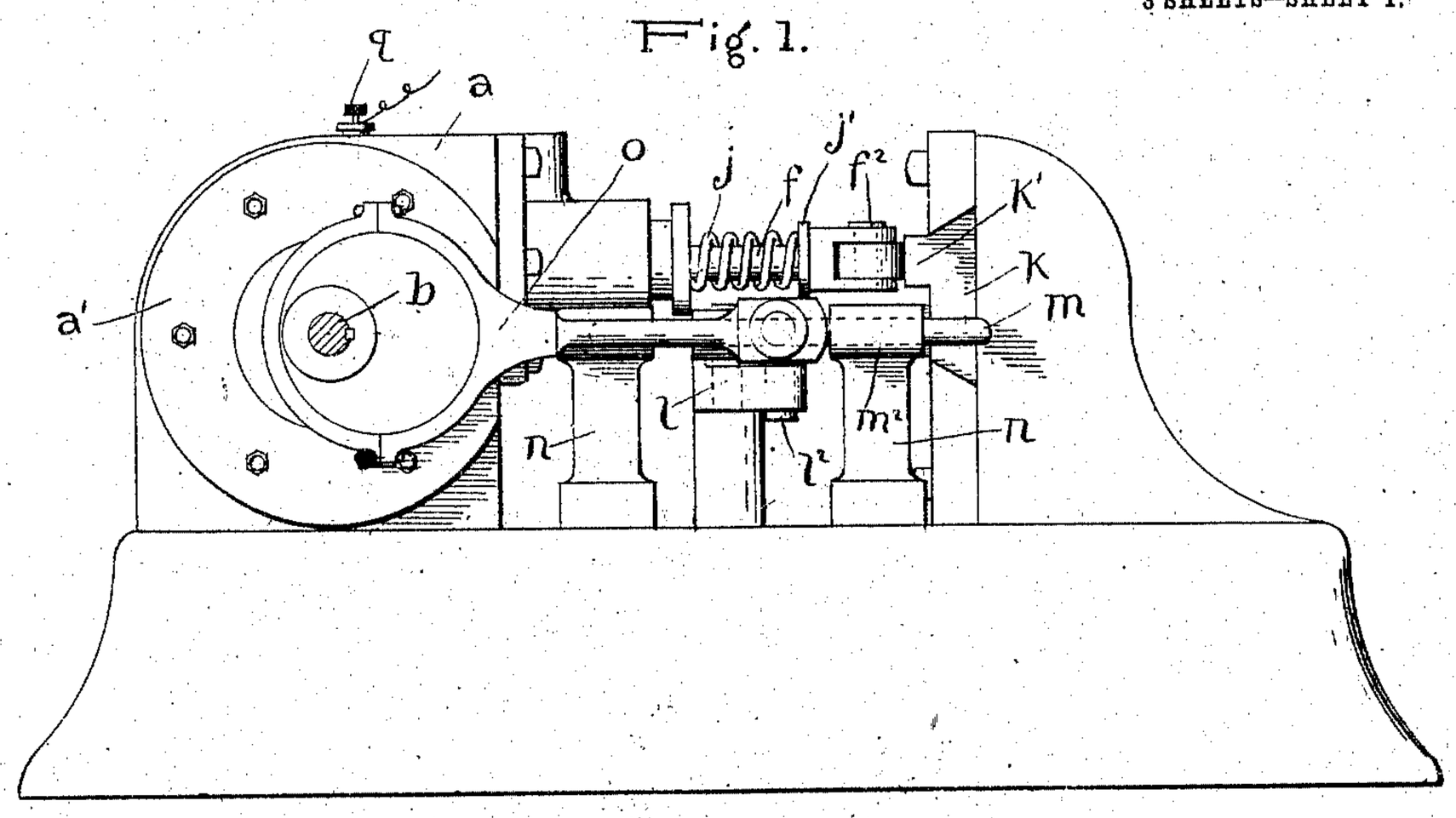
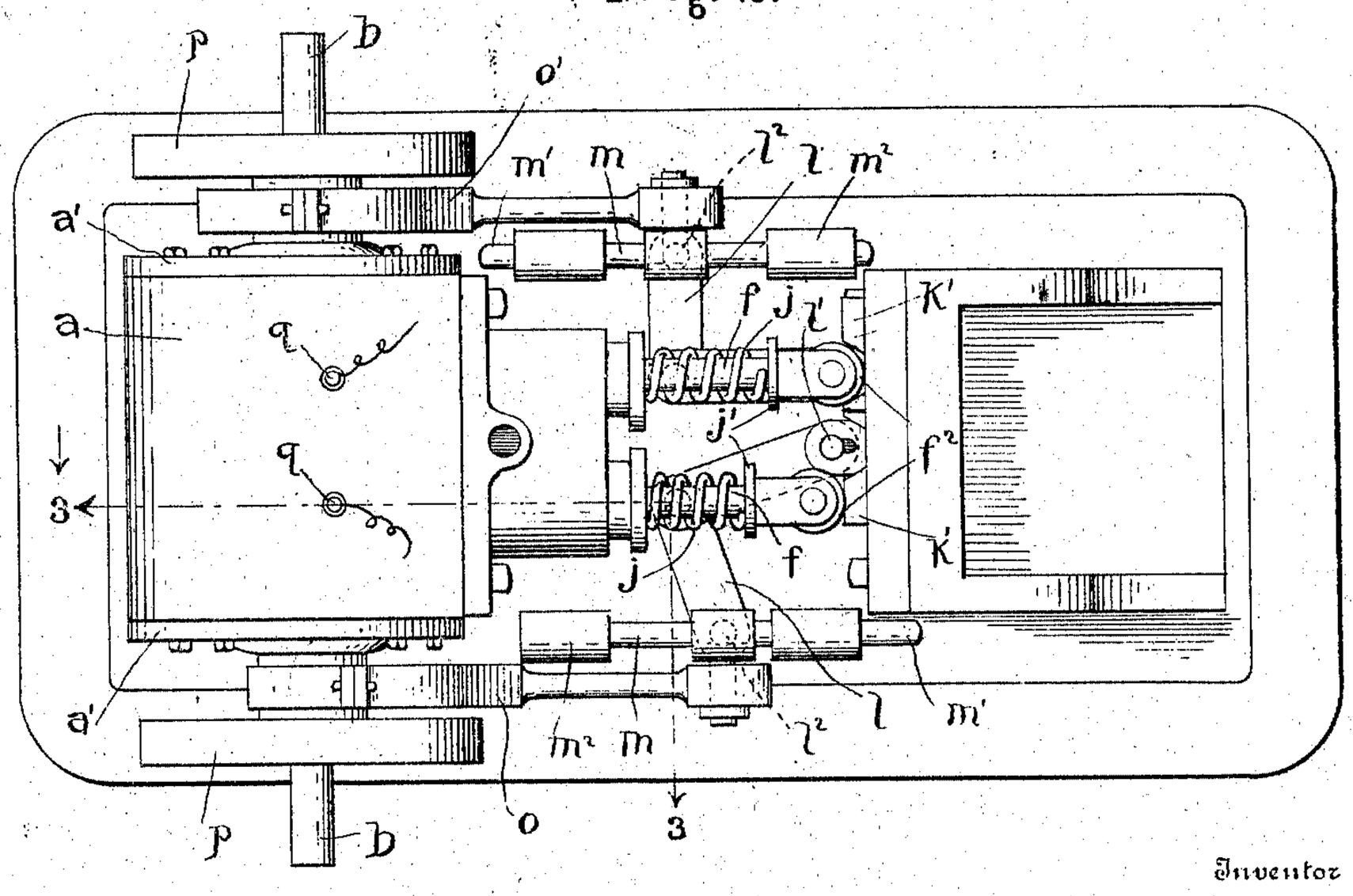


Fig. 2.



Witnesses

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3 SHEETS—SHEET 2.

Fig. 3.

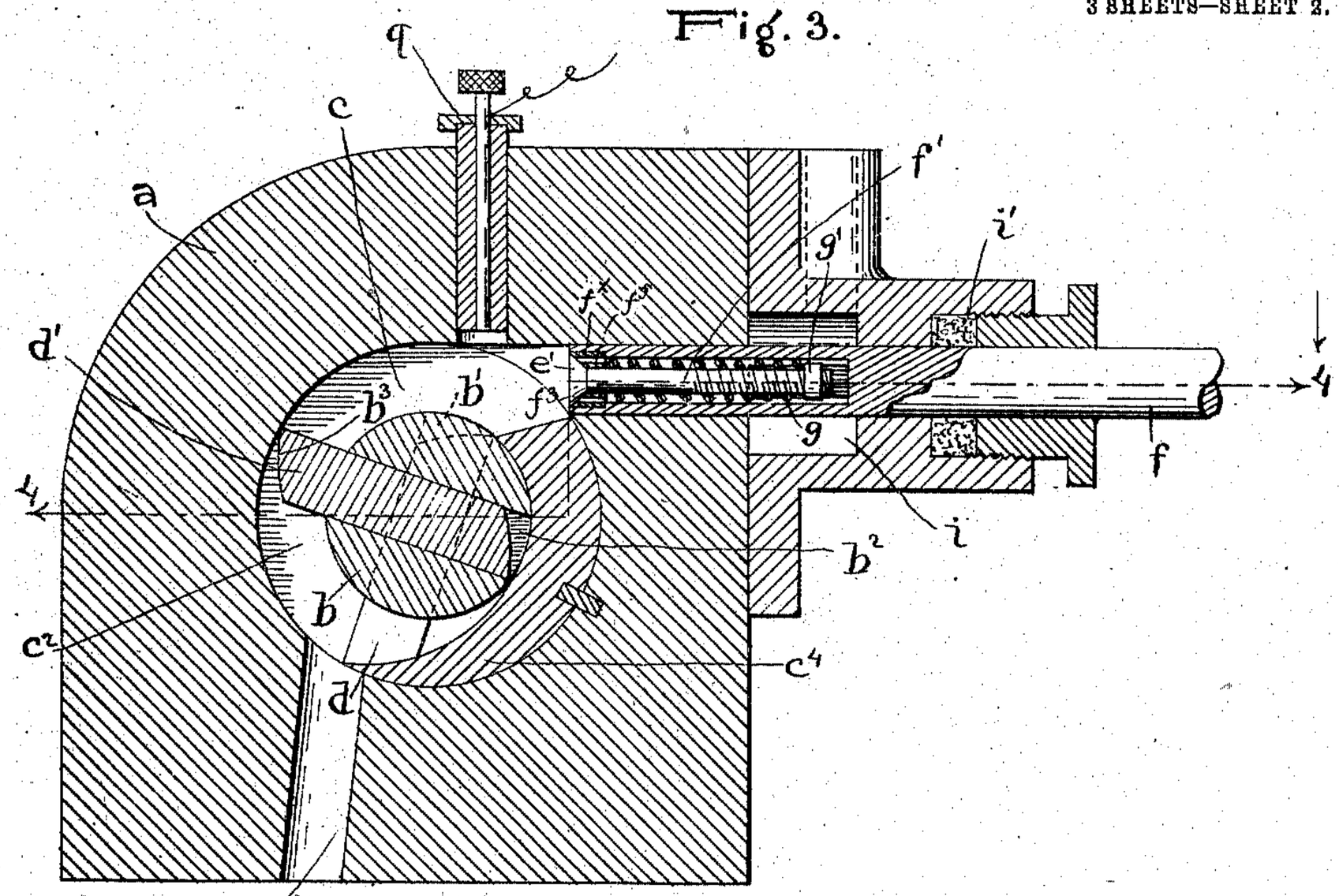
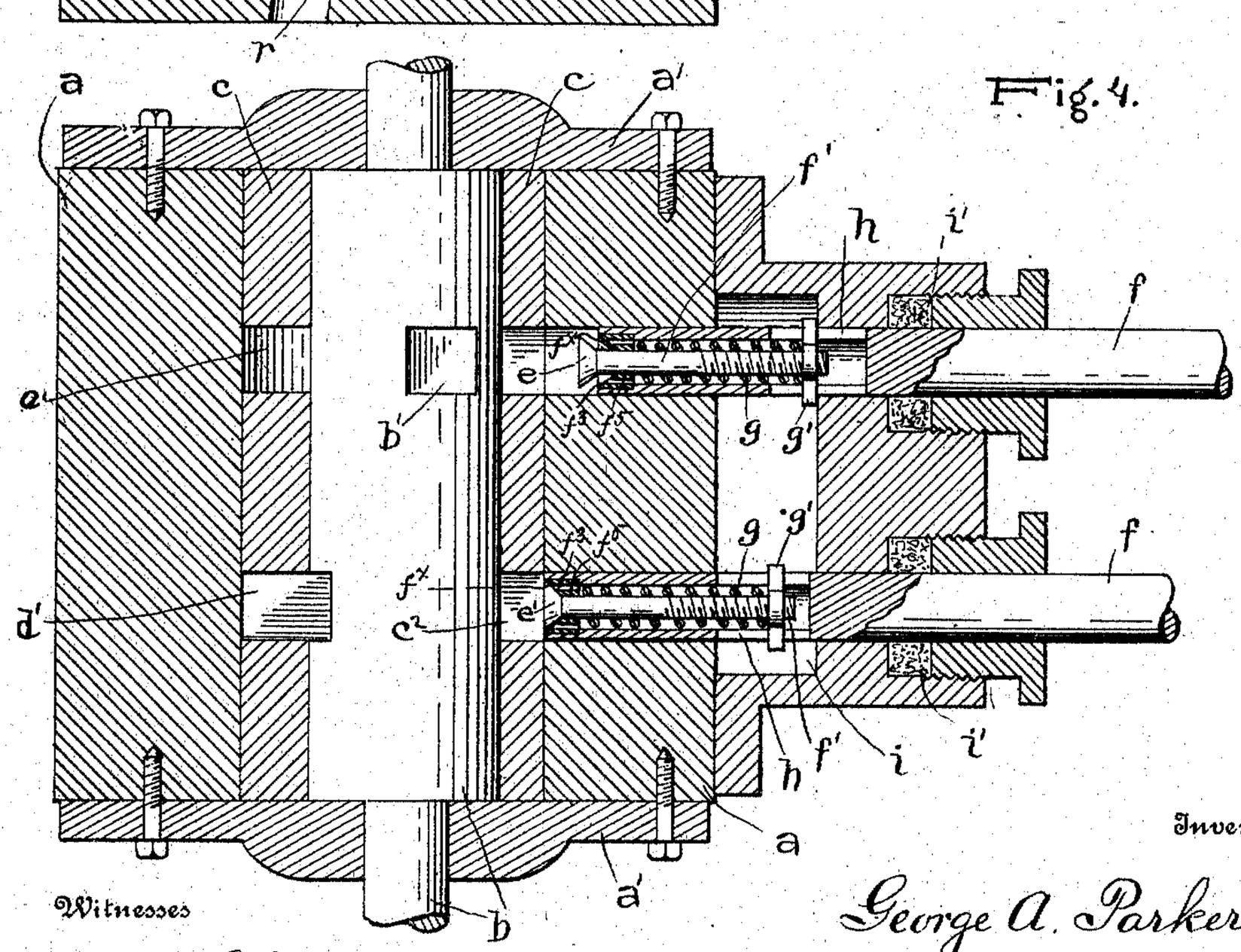


Fig. 4.



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3 SHEETS—SHEET 3.

Fig. 5.

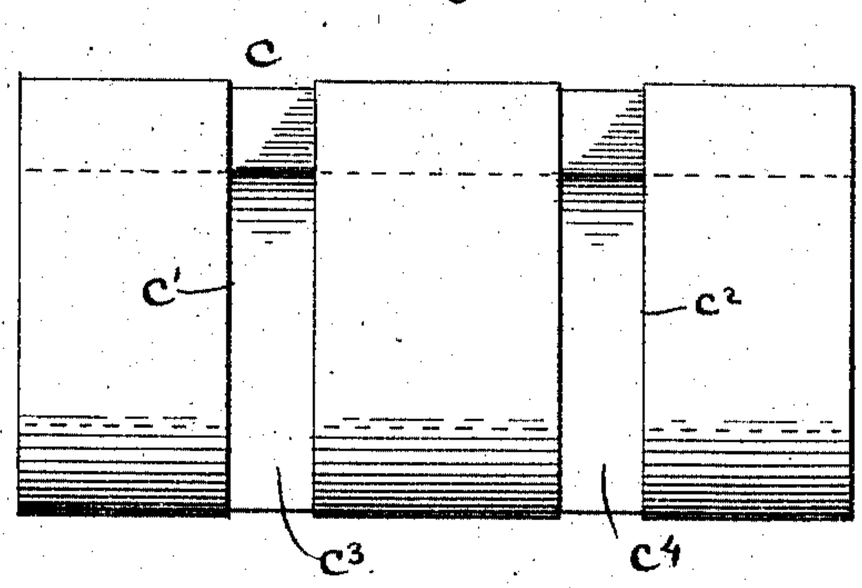


Fig. 6.

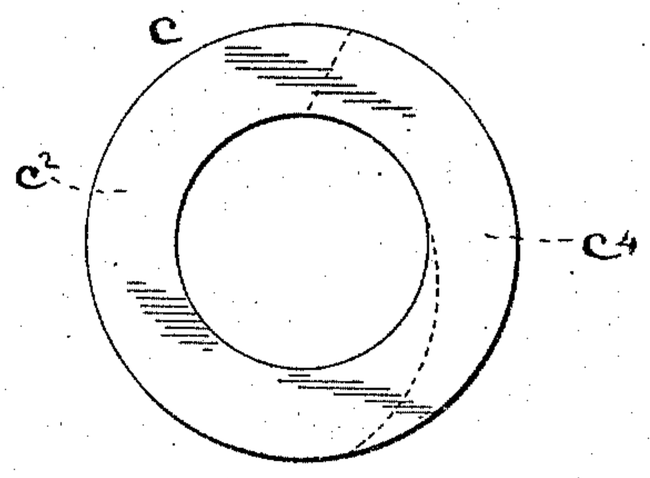


Fig. 7ª

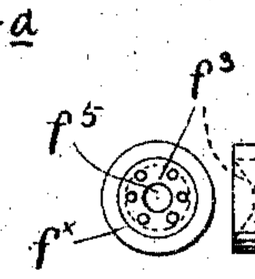


Fig. 7.

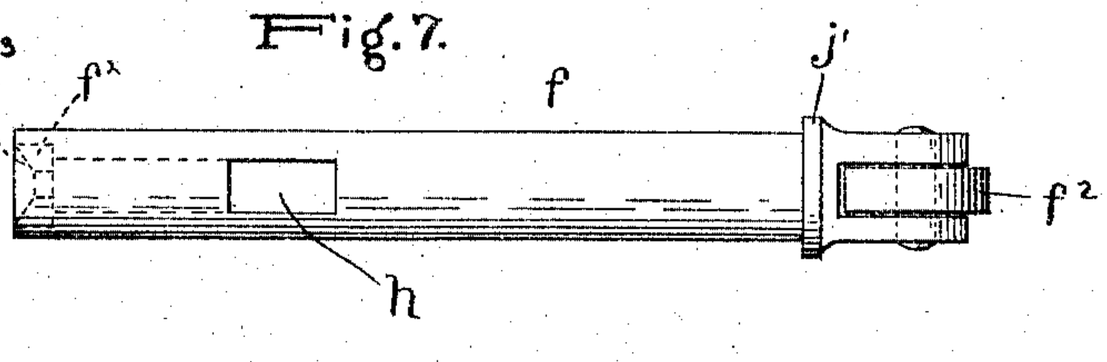


Fig. 8.

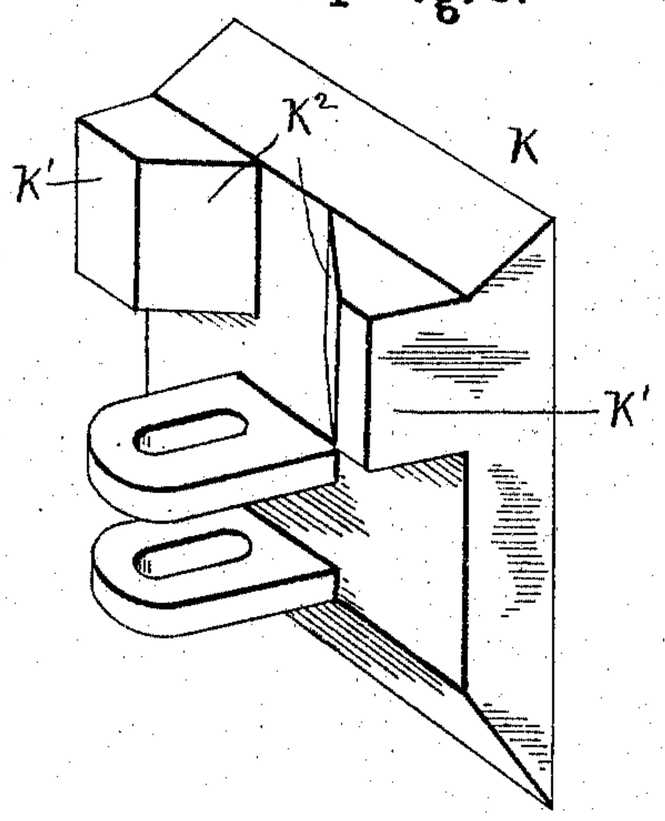
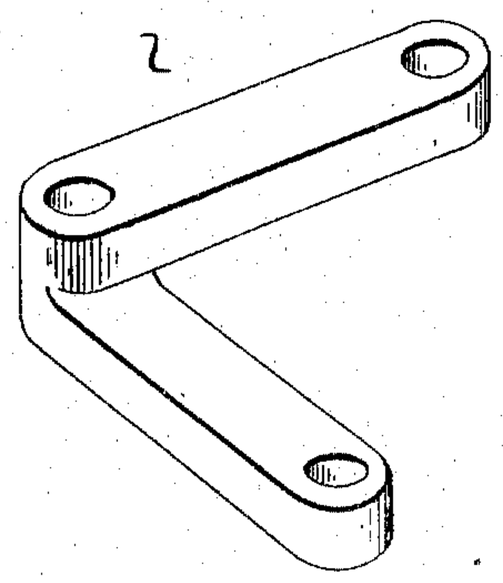


Fig. 9.



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UNITED STATES PATENT OFFICE.

GEORGE A. PARKER, OF HOPE VALLEY, RHODE ISLAND, ASSIGNOR OF ONE-HALF TO HELLEN GERTRUDE SIMMONS, OF HOPE VALLEY, RHODE ISLAND.

EXPLOSIVE-ENGINE.

967,046. Specification of Letters Patent. Patented Aug. 9, 1910.

Application filed September 7, 1909. Serial No. 516,487.

To all whom it may concern:

Be it known that I, GEORGE A. PARKER, a citizen of the United States, resident of Hope Valley, in the county of Washington and State of Rhode Island, have made a certain new and useful Invention in Explosive-Engines; and I declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it appertains to make and use the invention, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

Figure 1 is a side view of my engine. Fig. 2 is a plan view of the same. Fig. 3 is a section on the line 3—3, Fig. 2. Fig. 4 is a section on the line 4—4, Fig. 3. Fig. 5 is a detail front view of the bushing. Fig. 6 is an end view of the same. Fig. 7 is a detail side view of a valve carrier. Fig. 7ª is a detail end view of the same. Fig. 8 is a detail perspective view of the slide plate. Fig. 9 is a similar view of the bell crank lever.

The invention relates to explosive engines and it consists in the novel construction and combinations of parts as hereinafter set forth.

In the accompanying drawings, illustrating the invention, the letter a, designates the casing, provided with a cylindrical bore a^x, closed at the ends by the heads a', in which are provided journal bearings for the central rotary shaft b, extending longitudinally of said bore. c, is a hollow cylindrical stationary bushing of the same length as said bore in which it closely fits, the shaft b, which is of the same diameter as the internal diameter of the bushing fitting closely and having rotary movement therein. The bushing is provided with two grooves each groove being of the shape of the major portion of an annulus, in connection with the cylinder walls of the bore a^x, opposite the same, as shown, such grooves forming the expansion chambers for the explosive mixture and in which work the pistons, to be described. The grooves c', c^2, are cut entirely through the walls of the bushing, integral cam portions c^3, c^4, in alinement with said grooves connecting the ungrooved portions of the bushing. The shaft b, has transverse slots b', b^2, at right angles to each other, bar or plate pistons d, d', fitting and having sliding movement in said slots, said pistons being located in alinement with the grooves c', c^2, and having contact at one end thereof with the cylinder wall of the expansion chamber opposite such grooves and at their opposite ends lying just within the slots. As the shaft b, and its sliding pistons rotate, such pistons at the ends thereof which are in contact with said cylinder wall are adapted to have contact with the cams c^3, c^4, whereby they are forced through the slots of the shaft to protrude upon the opposite side thereof into contact with the cylinder wall. The ends of the pistons are rounded as shown at b^3, for more ready engagement with the cams referred to.

At the inner terminations of the cam portions c^3, c^4, are located valves e, e', designed to admit the gaseous explosive mixture to the expansion chambers, said valves being opened and closed periodically as hereinafter described. Each valve, which is of tapered form, has an elongated stem f', fitting in one end portion of a carrier f, said carrier having at the opposite end thereof a roller f^2. The tapered valve normally lies against the tapered valve seat f^3, of a perforated plug f^x, partially closing the valved end portion of the carrier f, and having a central aperture f^5, to receive the valve stem. A coiled spring g, surrounds each valve stem, bearing at one end against the plug f^4, and at its opposite end against a cross bar g', threaded upon the outer end portion of the valve stem, said cross bar extending at each side and having movement within slots h, h, of the carrier f. Each valve casing or carrier f, projects through the gas chamber i, and into the expansion chambers formed by the grooves of the bushing aforesaid, suitable stuffing boxes being provided at i', where it enters the gas chamber, and coiled springs j, surrounding said carriers and having bearings at one end against such stuffing boxes and at their opposite ends against shoulders j', of the carriers and acting to keep the carriers and valves withdrawn. In order to thrust the valve carriers forward within the expansion chambers or grooves c', c^2, a transversely sliding plate k, is provided for each such carrier, said plate having at each side a lug k', provided with an inclined inner surface k^2. Upon inward movement of the plate k, the inclined or cam surface k^2, of the outer lug k', thereof

will act upon the roller f^2, to thrust the valve carrier forward as aforesaid. This movement of each plate is accomplished by means of a bell crank lever l, one arm of which is pivoted to the plate at l', and the other arm of which is pivoted to a slide m, at l^2, said slide having opposite extensions m', having slide bearings at m^2, upon supports n, extending upward from the base of the machine. Each slide m, has an eccentric and pitman connection o, o', with the driving shaft b, for actuation of the bell crank lever and slide plate k. A balance wheel p, is also provided at each end of said shaft. When the slide plate k, is moved outward through the action of its bell crank lever, the valve carrier is retracted through the action of its spring j, when the roller thereof will lie between the lugs k'. The valve e, or e', is at the same time opened through pressure of the cross bar g', against the outer wall of the gas chamber, admitting gas to the expansion chamber c', or c^2, when upon the thrusting forward of the valve carrier, which follows rapidly, the valve will be closed under the influence of its spring g, and the gas compressed in the expansion chamber, inasmuch as the movement of the valve carrier is quicker than that of the sliding piston. At this point the gas is exploded through an igniter q, which drives the sliding piston forward, at the same time exerting power upon the shaft b, to turn the same. When each sliding piston reaches the point in its movement when its retraction or reversal is begun through the action of the cam c^3, or c^4, the products of the combustion or explosion of the gas are exhausted through port r. Inasmuch as the sliding pistons are reversed or thrust outward alternately into contact at one end thereof with the wall of the cylinder, at each quarter turn of the shaft b, the same result is obtained from one sliding piston as from two direct acting pistons, the two pistons being thus equal to four direct acting pistons. As many of these sliding pistons may be employed as required for the purpose in view, by locating them at different points along the shaft b, grooves in the bushing being provided to correspond, and the other necessary parts being duplicated.

The eccentrics o, o', upon the shaft b, are set to throw the pitman connections at each quarter turn of said shaft whereby the valve carriers and valves are actuated at the same time, thus doing away with unnecessary duplication of parts.

Having described the invention, what I claim and desire to secure by Letters Patent is:

1. In a rotary explosive engine, a casing having a cylinderical opening provided with grooves therein separated from each other and forming expansion chambers, a central rotary shaft having diametric slots of the same dimensions throughout extending entirely through the same in register with said chambers and having an angular relation to each other, and sliding diametric bar pistons of the same dimensions throughout working in and extending entirely through said slots, each bar piston having endwise movement from opposite ends of its slot at different times against the peripheral wall of its expansion chamber, and cam means operating against the ends of the pistons for causing the same to be successively withdrawn within their slots and projected therefrom.

2. In a rotary explosive engine, a casing having a cylindrical opening provided with grooves therein separated from each other and forming expansion chambers, a central rotary shaft having diametric slots extending entirely through the same in register with said chambers and having an angular relation to each other, sliding diametric pistons working in said slots, each piston having endwise movement from opposite ends of its slot at different times against the peripheral wall of its expansion chamber, a gas chamber at one side of and separated from said expansion chambers, a passage connecting each expansion chamber with said gas chamber, a hollow valve carrier having movement in said passage and communication at opposite ends thereof with the gas and expansion chambers, and a valve normally closing the communication of said carrier with the expansion chamber and provided with a retracting spring, means for retracting the valve carrier and for thrusting the same forward at predetermined times, and means for opening the valve upon retraction of the valve carrier.

3. In a rotary explosive engine, a casing having a cylindrical opening provided with a bushing having separated grooves therein forming expansion chambers, ungrooved portions and cam portions connecting the ungrooved portions of the bushing, a central rotary shaft having diametric slots extending entirely through the same in register with said chambers and having an angular relation to each other, and sliding pistons working in said slots, each piston having endwise movement from opposite ends of its slot at different times against the peripheral wall of its expansion chamber, and having operative engagement at either end thereof with said cam portions.

4. In a rotary explosive engine, a casing having a cylindrical opening provided with grooves therein separated from each other and forming expansion chambers, a central rotary shaft having diametric slots extending entirely through the same in register with said chambers and having an angular relation to each other, sliding pistons working in said slots, each piston having endwise

movement from opposite ends of its slot at different times against the peripheral wall of its expansion chamber, a gas chamber at one side of and separated from said expansion chambers, a passage connecting each expansion chamber with said gas chamber, a hollow valve carrier having movement in said passage and communication at its ends with the gas and expansion chambers, a valve normally closing the communication of said carrier with the expansion chamber and provided with a retracting spring, transverse reciprocating means for thrusting the valve carriers forward at predetermined times, a retracting spring for the valve carrier, and means for opening the valve upon retraction of the valve carrier.

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

GEORGE A. PARKER.

Witnesses:
ARCHD. MACKENZIE,
HELLEN G. SIMMONS.