A. I. EAGLE.

INTERNAL COMBUSTION ENGINE.

APPLICATION FILED AUG. 25, 1913.

1,111,252.

Patented Sept. 22, 1914

2 SHEETS—SHEET 1.

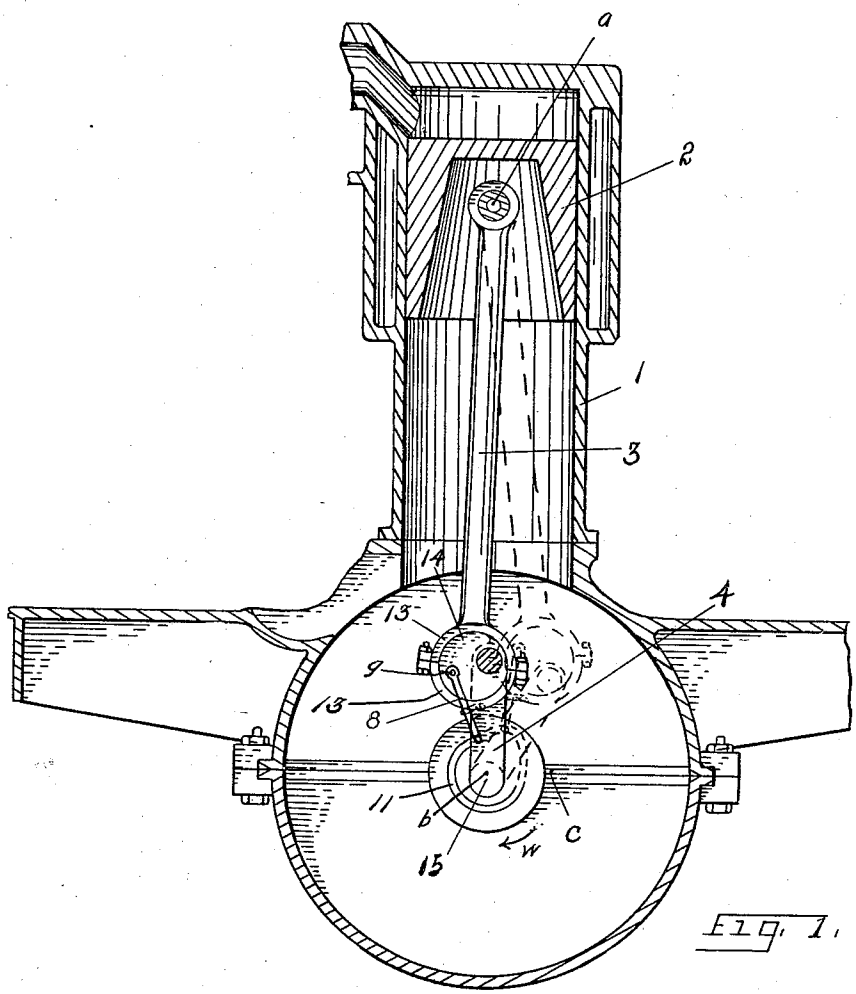


Fig. 1.

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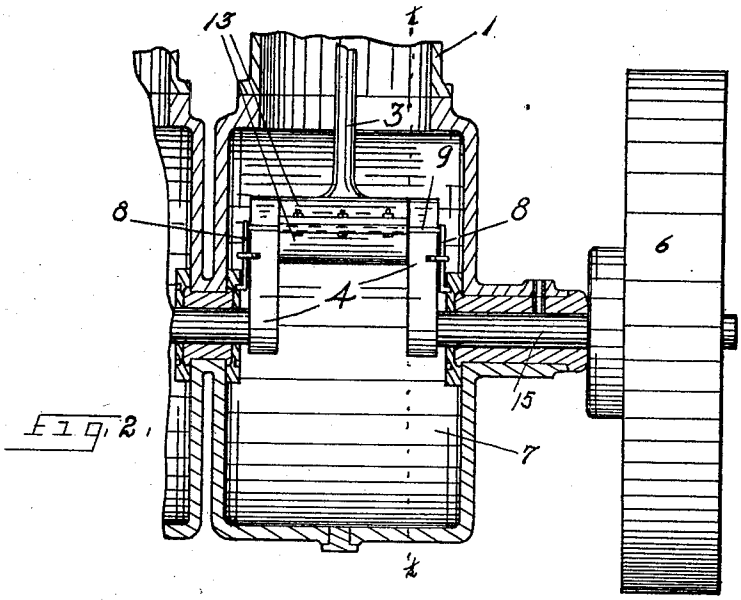


Fig. 2.

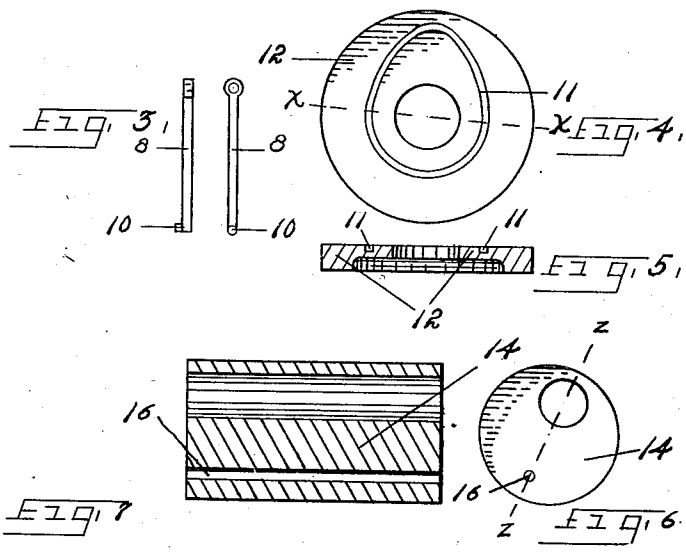


Fig. 3. Fig. 4. Fig. 5. Fig. 7. Fig. 6.

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INTERNAL-COMBUSTION ENGINE.

1,111,252. Specification of Letters Patent. Patented Sept. 22, 1914.

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To all whom it may concern:

Be it known that I, AUBREY I. EAGLE, a citizen of the United States, residing at Stockton, in the county of Toelle and State of Utah, have invented certain new and useful Improvements in Internal-Combustion Engines, of which the following is a specification.

My invention relates to internal combustion engines, and has for its object to provide a connection between the piston and crank shaft which is automatically adjustable in length and by the use of which the greatest possible amount of compression may be had on the explosive gases in the engine cylinder, and said compression maintained until the crank shaft has passed several degrees beyond the vertical center before the explosion occurs, whereby greater power may be developed or generated through said engine with a given amount of fuel than has previously been possible. These objects I accomplish with the device illustrated in the accompanying drawings in which similar letters of reference indicate like parts throughout the several figures, and as described in the specification forming a part of this application and pointed out in the appended claims.

Figure 1 is a vertical section through the engine on line *t t* Fig. 2, and with the cam lever in elevation. Fig. 2 is a fragmentary view of a longitudinal section of the crank case and shaft, with portions of the piston rod and connections in elevation. Fig. 3 is a side and front elevation of the cam lever. Fig. 4 is a plan view of one of the cam disks. Fig. 5 is a section through one of said cam disks on line *x x* of Fig. 4. Fig. 6 is an end elevation of the eccentric cam. Fig. 7 is a longitudinal section through the eccentric cam on line *z z* of Fig. 6.

As is well known the power generated by firing compressed gases is the strongest the instant after ignition and when the compression is the greatest. One of the problems to be solved by inventors and users of internal combustion engines is to devise mechanism that will utilize to its fullest extent the initial expansion of highly compressed explosive gases. Heretofore and with the connections now in use between the crank shaft and the piston head, the ignition of the compressed gas takes place slightly before the crank arm and piston rod have been in longitudinal alinement or have passed dead center. The force of the explosion is applied almost as a blow on the end of the crank arm with very little of the force applied on the crank shaft, and the object of my invention is to apply the force of the explosion to the crank arm later in that revolution of the crank shaft in order that the force of the explosion will be applied to the crank shaft through the crank arm acting as a lever on the shaft.

The preferred form of constructing my device is shown in the drawings wherein the engine cylinder 1 has the usual piston 2 operated therein. A piston rod 3 connects the crank arms 4 with the piston. The ordinary crank shaft 15, carrying a pulley 6, is rotated by said arms 4 and is mounted in the case 7. Pivotally and slidably mounted on each of said crank arms 4 is a cam lever 8. Said levers 8 are connected by an eccentric rod 9, that is mounted in bearings in the outer ends of said cam levers. The other end of each of said cam levers has a cam roller 10 mounted thereon, which is made to operate within a cam tract or channel 11 cut in the face of a cam disk 12. The lower or shaft end of said piston rod 3 is provided with the usual strap arms 13, which inclose the eccentric cam 14. Said cam has a longitudinal opening 16 therethrough within which is operated the said eccentric rod 9 which rod acts as the pivots for one end of the cam levers 8. The cam on the shaft 15 rotates said eccentric cam 14. Said strap arms 13—having suitable fastenings—and cam 14 form the eccentric by which said rod 3 and the said shaft 15 are connected. As will be apparent when the said shaft 15 is rotated by the crank arms 4, a partial rotation will drive the piston 2 to the upper or outer end of said cylinder as shown in Fig. 1. With the other members in position as shown in said Fig. 1, the continuance of the forward movement or rotation of said shaft in the direction of the arrow *w* will drive the eccentric cam 14 around on said shaft 15 as the axis and allow the crank arms 4 to assume a position similar to that shown in dotted lines in Fig. 1, before said piston rod 3 will act on the piston 2 or move it in the cylinder and lower the compression of the gases. By retarding the ignition spark so that the explosion will occur at this period in the rotation of the shaft 15 much greater power will be generated as the leverage of the crank arms 4 is much greater when in

that position than would have been should the explosion have occurred when the arms 4 were practically in alinement with said rod 3. I thus provide an automatic means for lengthening and shortening the connection between the shaft 15 and the piston rod, and one that is sufficiently strong to stand the blow of the explosion and in which the change in length may be so timed with the other parts of an internal combustion engine, that the greater portion of the force of an explosion will be applied to rotate the shaft as a lever. In the drawings the length of the lever is equal to the base of a right angled triangle with the sides shown as lines drawn from the point of connection of the piston 2 and rod 3 to the axis of the shaft 15 and centrally through said rod 3 and projected to cut said base line, as shown at *a*—*b*—*c*.

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

1. An internal combustion engine consisting of an explosion cylinder; a piston operated therein; a crank shaft; a piston rod pivoted to said piston; strap arms on one end of said rod; an eccentric cam carried in said arms and rotatable on said crank shaft; and means to automatically move said cam on said shaft which means consists of levers pivoted to said cam, and disks mounted on said crank shaft to move said levers.

2. An internal combustion engine consisting of an explosion cylinder; a piston operative therein; a crank shaft; arms on said shaft; disks secured on said shaft and rotatable therewith having a cam track in the face of each; cam levers pivoted on said arms and movable by said disks; a piston rod pivoted to said piston; strap arms on one end of said rod; an eccentric cam carried in said strap arms, rotatable on said crank shaft and having an opening longitudinally therethrough; and a rod in said longitudinal opening connecting said cam levers.

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

AUBREY I. EAGLE.

Witnesses:
F. W. THOMAS,
SAM RANEY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."