Dec. 9, 1930. A. D. MacFARLANE 1,784,192

ENGINE CONSTRUCTION

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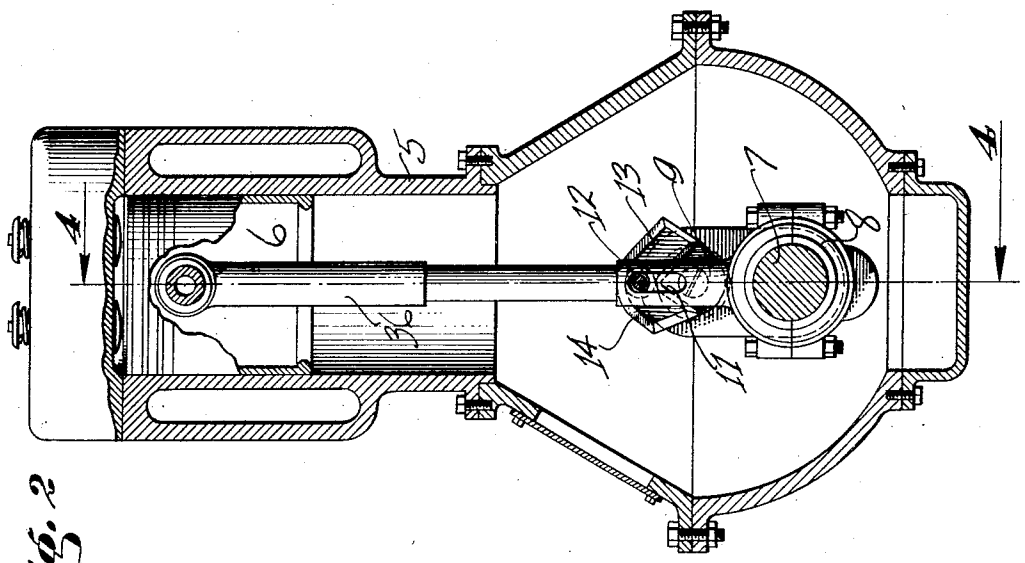


Fig. 2

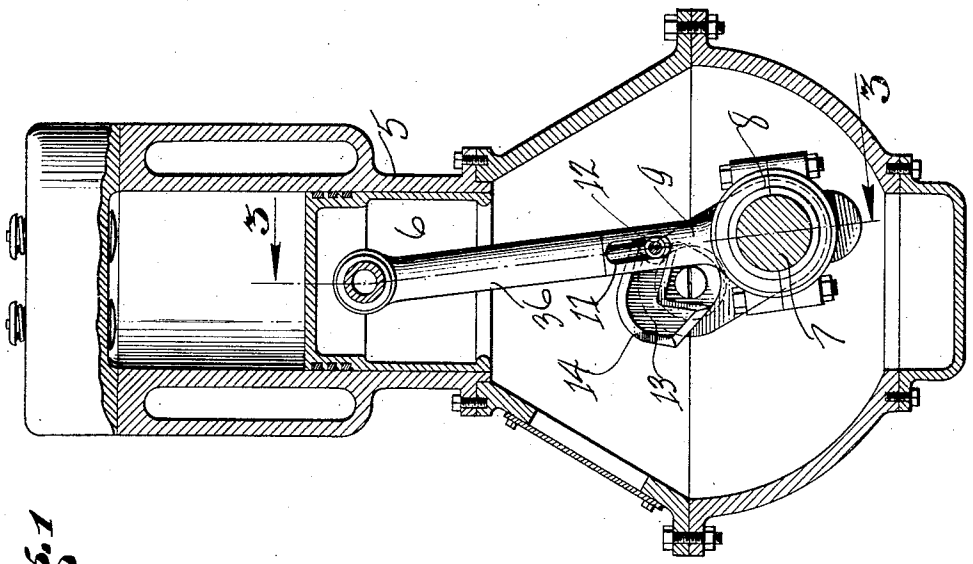


Fig. 1

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Fig. 5

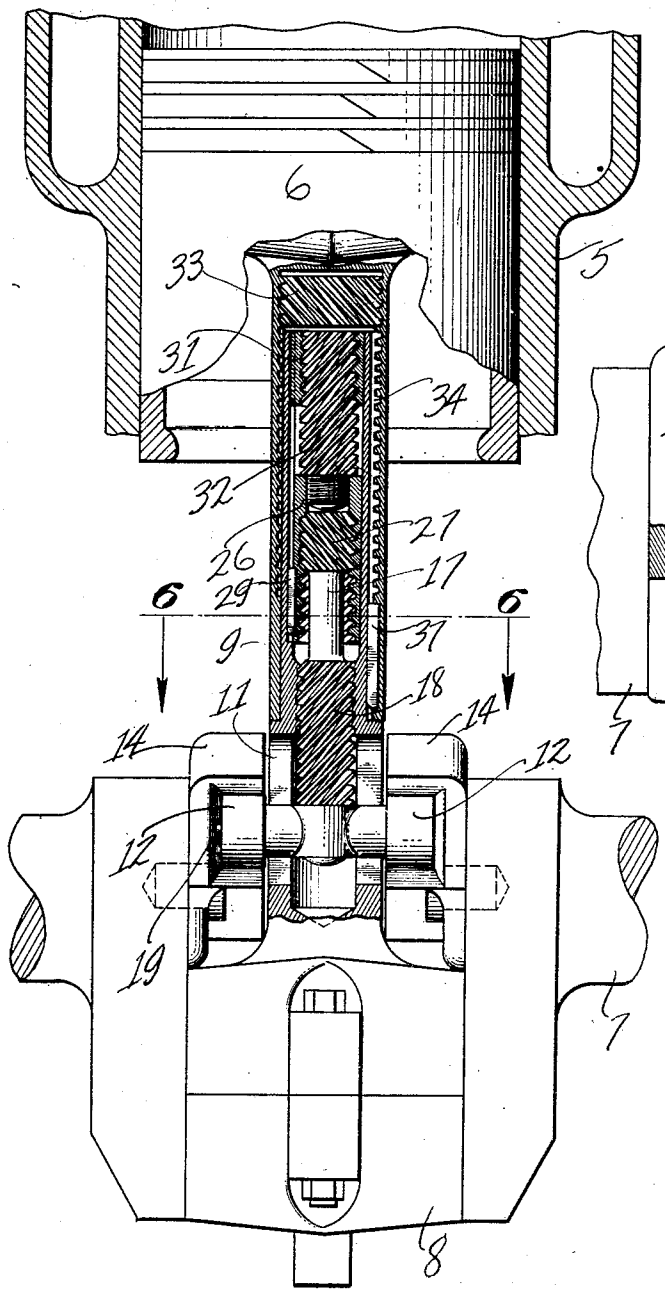
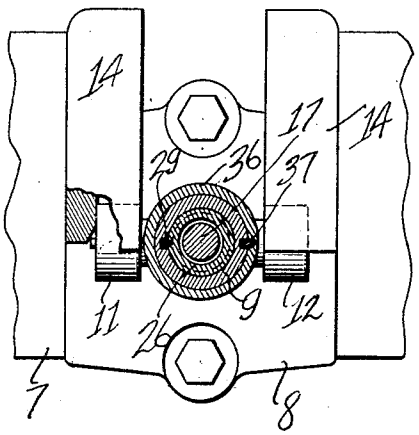


Fig. 6



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Fig. 4

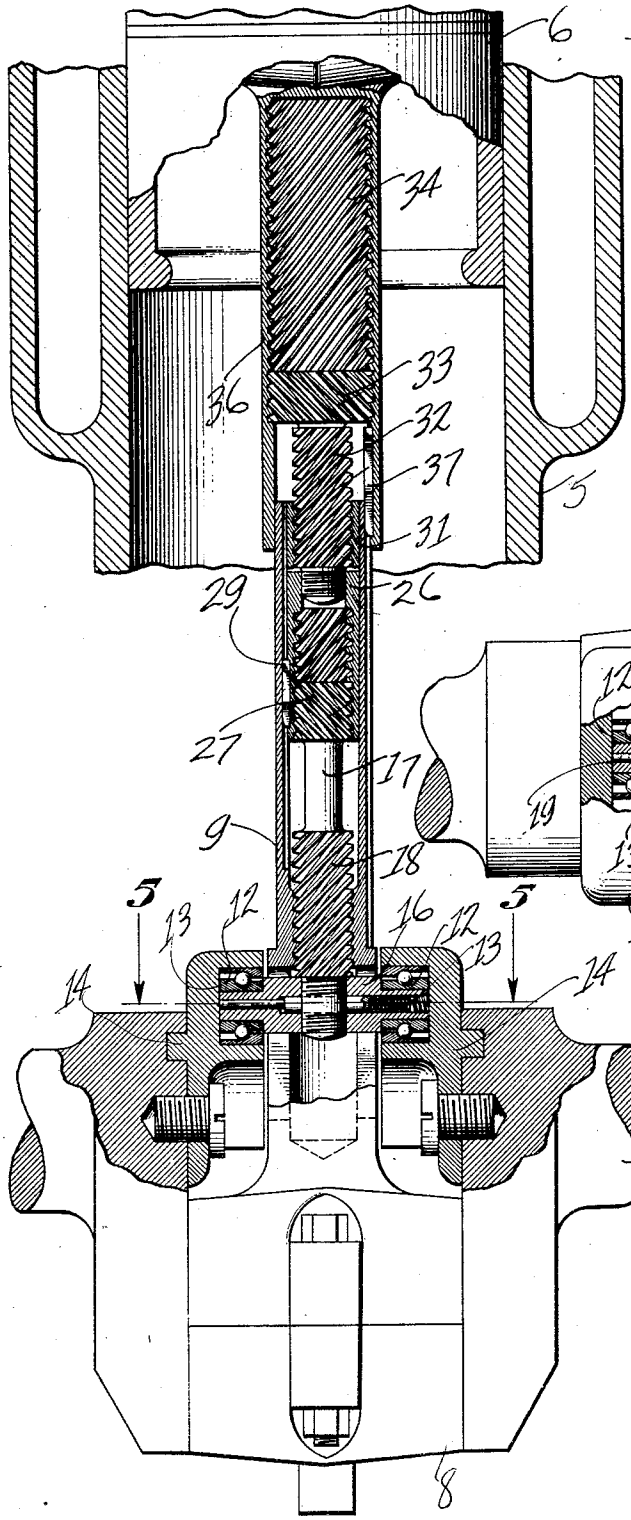
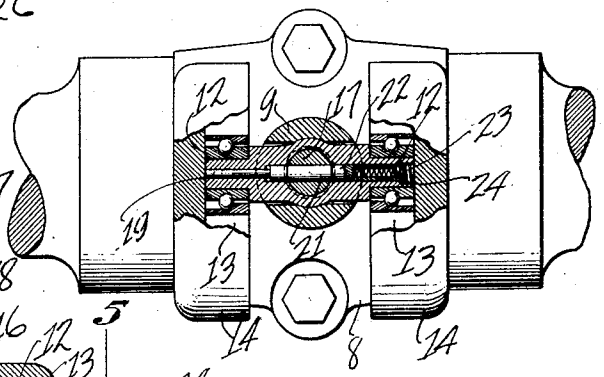


Fig. 5



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UNITED STATES PATENT OFFICE

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ENGINE CONSTRUCTION

Application filed August 9, 1929. Serial No. 384,731.

This invention relates to improvements in engine constructions.

The principal object of the present invention is to produce a device wherein the power of the engine is increased by causing an additional number of explosions without increasing the speed of the engine.

Another object is to produce an engine of this character without materially altering the details of construction of an ordinary internal combustion engine.

Another object is to produce an engine wherein the basic principles remain the same and a device wherein the cost of manufacture is nominal.

A further object is to provide means whereby the operating mechanism is locked when thrown out of operative position.

Other objects and advantages will be apparent during the course of the following description.

In the accompanying drawing forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a side elevation partly broken away of an engine having my invention thereon and showing the piston near the bottom of its stroke,

Figure 2 is a view similar to Figure 1 showing the crank shaft at the bottom of its stroke and the piston at the top of its stroke,

Figure 3 is an enlarged fragmentary detail view showing certain parts in cross section and in retracted position in order to better illustrate my construction,

Figure 4 is a view similar to Figure 3 with the exception that the parts are in extended position,

Figure 5 is a cross-sectional view taken on the line 5—5 of Figure 4 and showing the locking mechanism, and

Figure 6 is a cross-sectional view taken on the line 6—6 of Figure 3.

The ordinary four cycle internal combustion engine requires two complete revolutions of the crank shaft for each explosive stroke, while the two cycle engine employs an explosive force for each revolution of the crank shaft. Each of these engines have good points, and it is to utilize the good points that I have devised means whereby the four cycle engine may become a two cycle engine in that an explosion occurs at each revolution of the crank shaft thereby increasing the amount of power for each revolution derived from the same engine.

In accomplishing this object I employ a connecting rod extending between the crank shaft and the piston which connecting rod is of such construction that at a given point on the downward explosive stroke, rollers carried upon the connecting rod engage a cam and through the actuation of these rollers upon the cam the connecting rod is caused to become elongated which forces the piston upwardly while the crank is completing its downward movement. As the crank starts to move upwardly the rollers still traveling in the cam will cause the connecting rod to be shortened thus drawing in a new charge to be compressed upon the completion of the upward crank shaft throw. The cycle being that for each explosion there is first a downward movement of the piston, then an upward movement of the piston to exhaust the burned gases, then a downward movement of the piston to draw in a fresh charge, and an upward movement of the piston to compress the fresh charge. This will all occur during the complete revolution of the crank shaft.

In the accompanying drawing wherein for the purpose of illustration is shown a preferred embodiment of my invention, particularly referring to Figures 3 and 4, it will be noted that the numeral 5 designates the customary cylinder within which a piston 6 moves. The crank shaft is designated at 7 and has the usual offset to which the yoke 8 of the crank is connected. The construction thus far described is identical with that found in the ordinary engine.

The connecting rod extending between the piston 6 and the crank 7 is constructed of a plurality of sections, the lowermost section being designated by the numeral 9 and has extending therefrom and slidable in slots 11, rollers 12. These rollers are adapted to rotate in cam slots 13 formed upon cam members 14 secured to the sides of the crank 7.

The rollers 12 are mounted upon a spindle 16 which is rotatably held on the bottom of a rod 17. This rod is provided with a thread 18 which engages a thread formed upon the lower section 9 of the connecting rod. In order to prevent this rod 17 from turning, I employ a locking pin comprising three sections 19, 21 and 22. The section 22 has a spring 23 mounted therein which engages a plug 24. The operation of this locking pin will be later seen.

Within the lower section 9 of the connecting rod is a sliding bushing 26 which is interiorly threaded so as to be engaged by a threaded head 27 of the rod 17. It will be noted that the threads on the members 27 and 18 are right and left, the result being that the bushing 26 keyed as at 28 to the section 9 of the connecting rod will cause the bushing 26 to move to or away from the crank 7 depending upon the direction of rotation of the rod 17.

A fixed bushing 31 is carried in the upper end of the rod 9 and has rotatably positioned therein a threaded rod 32 having a head 33 which is also threaded but in an opposite direction to the thread 32. This head 33 engages a thread 34 formed in the upper portion 36 of the connecting rod which upper portion is keyed to the piston 6 and is slidably keyed as at 37 to the lower section 9. The operation of my device is as follows:—

Assuming that the parts are in the position shown in Figure 1, the rollers 12 will just be entering the cam slots 13, at this time the end of the section 19 of the locking pin will engage a cam surface on the cam 14 (see Figure 5) and will force the end of the locking pin inwardly thus pushing the sections 21 and 22 against the spring 23. This will result in the unlocking of the rod 17 which will now be free to rotate. As the rollers 12 travel upwardly in their cam slot, that is, away from the crank, rotation will be imparted to the rod 17 through the thread 18 engaging its thread in the lower section 9 and as this rotation takes place the bushing 26 will be forced upwardly, which will cause rotation of the threaded rod 32 and its head 33 which will in turn cause the upper section 36 of the connecting rod to move away from the crank. By the time the crank has reached the lowermost position of Figure 2, the rollers 12 have reached the upper movement in the cam slot and at this time the piston has moved from a point near its lowest position of travel, to its uppermost position and will have exhausted the burned gases. As the crank shaft rotates the rollers 12 will now be forced downwardly retracting the parts which the crank shaft has had a chance to start upon its upward movement. Consequently, this gas which is sucked in on the downward movement of the piston will be compressed ready for firing as soon as the crank has reached its proper position upon the upward stroke.

As soon as the rollers pass from their cam slots, the locking pin will again be actuated so as to prevent any movement of the parts until they are again in a position to be actuated.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same and that various changes relative to the shape, size, material and arrangement of parts may be resorted to without departing from the spirit of the invention, or the scope of the subjoined claims.

Having thus described my invention, I claim:—

1. In a device of the character described the combination of a piston, a crank shaft having an offset formed therein, a connecting rod extending between said piston and said crank shaft, said connecting rod comprising sections, threads formed in said sections, and means carried within said sections and engaging said threads whereby said connecting rod may be lengthened or shortened during the rotation of said crank shaft, said means including a rotating rod having threaded extremities, means for moving said rod lengthwise of said connecting rod, said means comprising a pair of rollers actuated by a cam in the manner described.

2. In a device of the character described the combination of a piston, a crank shaft having an offset formed therein, a connecting rod extending between said piston and said crank shaft, said connecting rod comprising sections, threads formed in said sections, means carried within said sections and engaging said threads whereby said connecting rod may be lengthened or shortened during the rotation of said crank shaft, said means including a rotating rod having threaded extremities, means for moving said rod lengthwise of said connecting rod, said means comprising a pair of rollers actuated by a cam, and locking means for preventing rotation of said rod when said rollers are out of engagement with said cam.

In testimony whereof I affix my signature.

ARTHUR D. MacFARLANE.