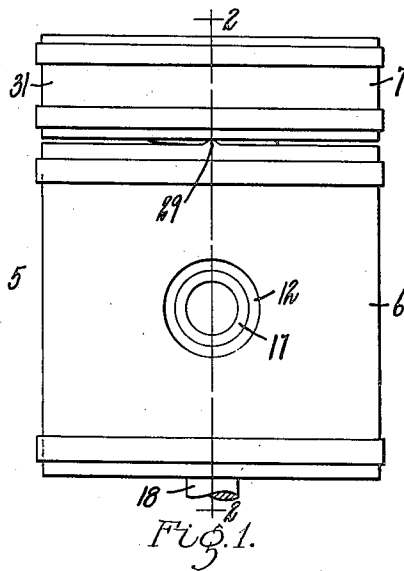
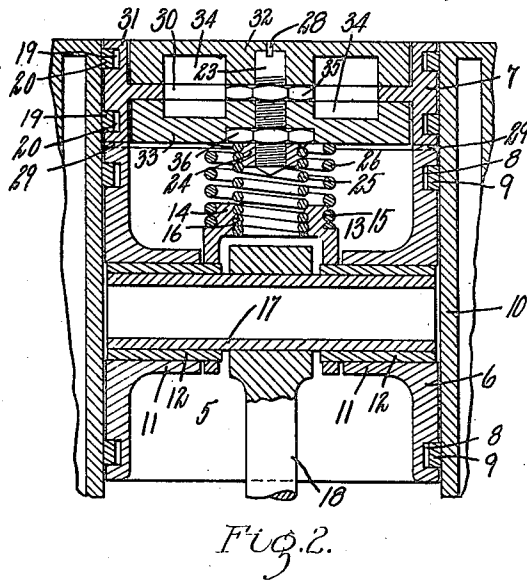
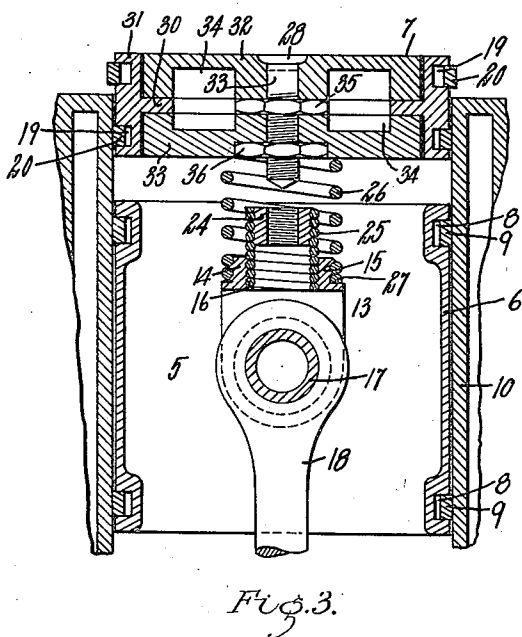
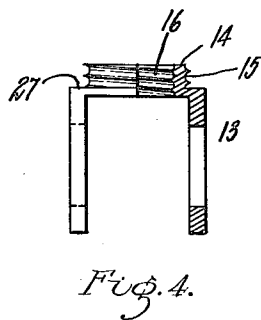


J. BOLAN.
PISTON FOR INTERNAL COMBUSTION ENGINES.
APPLICATION FILED DEC. 30, 1920.

1,402,393.

Patented Jan. 3, 1922.



Inventor:
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By his attorney,
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UNITED STATES PATENT OFFICE.

JAMES BOLAN, OF BOSTON, MASSACHUSETTS.

PISTON FOR INTERNAL-COMBUSTION ENGINES.

1,402,393.

Specification of Letters Patent.

Patented Jan. 3, 1922.

Application filed December 30, 1920. Serial No. 434,024.

To all whom it may concern:

Be it known that I, JAMES BOLAN, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Pistons for Internal-Combustion Engines, of which the following is a specification.

This invention relates to an improved piston for internal combustion engines.

In an internal combustion engine carbon is liable to form in the compression chamber and gather on the compression rings and the underside of the piston head and it is very desirable that the engine should be free of carbon in order to secure the greatest efficiency. In internal combustion engines having a piston in one piece connected to the connecting rod, in order to perfectly remove the carbon it is necessary to drain the oil from the oil pan, take off the oil pan, disconnect the connecting rod from the crank and push the connecting rod and piston up through the top of the cylinder. This is a very difficult operation and involves a large amount of labor and loss of time.

The object of this invention is to provide a piston which will overcome these difficulties and this result is attained by making the piston in two parts, a body portion and a head portion, so connected together that the head portion with the compression rings can be removed from the cylinder and replaced therein in a few minutes.

It is further the object of this invention to provide a piston in which the upper portion moves up and down and does not have any side thrust from the connecting rod thereon.

Another object of the invention is to so construct the upper part, or head portion of the piston, as to prevent over-heating of the oil in the crank case and bearings.

To these ends the invention consists in a piston for internal combustion engines having, in combination, a body portion and a head portion connected together and constructed as hereinafter set forth in the specification and particularly pointed out in the claims.

Referring to the drawings:

Figure 1 is a side elevation of a two-part piston embodying my invention, a portion of a connecting rod being shown in connection therewith and broken away.

Fig. 2 is a sectional elevation taken on

the line 2-2, Figure 1, showing a portion of a cylinder in connection with the piston.

Fig. 3 is a sectional elevation similar to Fig. 2 but with the head of the piston disconnected from the body portion thereof.

Fig. 4 is a side elevation partly in section of the bridge, the section being taken on the line 2-2, Figure 1.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, 5 is the piston consisting of a body portion 6 and a head portion 7. The body portion is preferably provided with annular grooves 8 and compression rings 9. The body portion forms a loose fit in a cylinder 10 in the usual manner, while the rings 9 form a close fit therein. The body portion is provided with a pair of oppositely disposed inwardly extending hubs 11 and located in each of these hubs is a bushing 12. The inner ends of the bushings 12 project inwardly beyond the inner ends of the hubs 11 and upon the inner ends of the bushings a bridge 13 is pivotally mounted, said bridge has a hollow boss 14 thereon extending upwardly and having a screw thread 15 on the outside and a screw thread 16 on the inside. 17 is a piston pin to which the usual connecting rod 18 is connected.

The head portion 7 of the piston is provided with annular grooves 19 on its periphery and with compression rings 20 located in said grooves. The piston head 7 forms a loose fit in the cylinder 10 and the rings form a tight fit therein in the usual manner. The piston head 7 preferably consists of a central web 30 with an annular flange 31 thereon in the periphery of which are provided the annular grooves 19, said web and flange being preferably formed of cast iron. In the cylindrical space on opposite sides of the web 30 two discs 32 and 33 are provided and these are preferably formed of aluminum. These circular discs are each provided with an annular space 34 and these spaces may be either left empty for air space for the sake of lightness or they may be filled with packing as may be desired. A screw 23 is fastened to the head 7 by nuts 35 and 36 and projects downwardly and beyond said head to engage a nut 24 which is screw threaded upon the outside to receive a spring 25, the lower end of which extends into and is in screw-threaded engagement with the screw thread 16 on the boss 14 on

the bridge 13 to which it is fastened. Another spring 26 is interposed between the head portion 7 and the bridge 13, the lower end of the spring resting upon a shoulder 5 27 on said bridge.

The head portion 7 is provided with a slot 28 through which the end of a screw driver may be inserted to engage the screw 23 and by means of which the head portion can be 10 rotated in the cylinder 10 to cause the screw 23 to engage the nut 24 and lock the parts together as illustrated in Fig. 2. The spring 25 is wound in such a manner that when the head 7 is locked by the screw 23 to the body 15 portion 6, as illustrated in Fig. 2, by screwing the screw 23 into the nut 24, said spring 25 will be expanded or under tension. The spring 26, on the contrary, when the head 7 is locked to the body portion 6, as illustrated in Fig. 2, is under compression, so that when the piston head 7 is rotated to detach the screw 23 from the nut 24 the head 20 portion 7 will be forced partly out of the cylinder by the spring 26, as illustrated in Fig. 3 and the spring 25 being released by the screw 23 will assume the position illustrated in Fig. 3 where the coils of the spring are drawn together and contact with each other.

The main body portion 6 is provided on 30 its upper edge with two projections 29 which are diametrically opposed to each other, each preferably V-shaped, see Figs. 1 and 2. The lower edge of the head portion 7 rests upon 35 these V-shaped projections when the parts are assembled as illustrated in Fig. 2 and thus the force of the explosion will be transmitted from the head 7 through the V-shaped projections to the body portion 6 of 40 the piston.

The general operation of the piston hereinbefore specifically described is as follows:—Assuming the parts to be in the relative positions illustrated in Fig. 3, the piston 45 head is pushed downwardly into the cylinder until the lower end of the screw 23 engages the nut 24. The piston head is then rotated by means of a screw driver, or other desirable tool, until the screw has entered 50 the nut and the parts of the piston assume the relative positions illustrated in Figure 1 with the screw inserted in the nut and with the spring 26 compressed. This operation causes the nut 24 to be pulled upwardly, 55 placing the spring 25 under tension. To remove the piston head portion 7 from the cylinder, the reverse of the operation just described is performed.

In operation, the body portion 6 of the 60 piston is moved upwardly and downwardly with the connecting rod 18 and wrist pin 17 in the usual manner. It will be evident that all lateral thrust upon the piston, as a whole, will be taken by the body portion 6 and that 65 no lateral thrust will be imparted to the

head portion 7. When the piston head and body are driven downwardly by the explosion of the compressed gas in the cylinder 10, the head portion 6 is forced downwardly and through the V-shaped projections 29 70 forces the body portion of the piston downwardly and thus through the piston pin 17 a downward motion is imparted to the connecting rod 18 and the crank shaft is rotated in the usual manner. During the intake stroke, however, the head portion 7 is 75 drawn upwardly and carries the body portion with it by means of the screw 23, nut 24, spring 25, bridge 13 and piston pin 17. Thus, during the upward movement of the 80 piston, as a whole, the two parts are held together against the suction of the intake by the spring 25.

In the operation of the piston, any slight lateral variation or movement of the body 85 portion 6, due to the thrust thereon of the connecting rod 18, will not be transmitted to the piston head 7 for the reason that said piston head is connected to the connecting rod 18 by the spring 25 and said piston head 90 is pivotally and slidably mounted on the body portion 6 through the V-shaped projections 29, which constitute fulcrums by reason of which the body portion 6 can rock 95 relatively to the piston head 7.

It will be evident that from the two-part construction of the piston hereinbefore described and the particular manner in which 100 the piston head is connected to the piston body by a spring, and by the V-shaped projections on the body bearing against the underside of the head that any wear on the walls of the cylinder, due to lateral thrust, will take place only throughout the extent 105 of that portion of the cylinder with which the body portion of the piston comes in contact, but that portion of the cylinder with which the head comes in contact will not be worn by the head as there is no lateral thrust on it. Therefore, the compression 110 will at all times be practically perfect.

I claim:

1. A piston for internal combustion engines having, in combination, a body portion and a head portion, pivotal means whereby 115 said head portion is pivotally mounted on said body portion and means other than said pivotal means connecting said head portion to said body portion.

2. A piston for internal combustion engines having, in combination, a body portion and a head portion, pivotal means whereby 120 said head portion is pivotally mounted on said body portion and means other than said pivotal means detachably connecting said 125 head portion to said body portion.

3. A piston for internal combustion engines having, in combination, a body portion and a head portion, said head portion being 130 pivotally mounted on said body portion and

means yieldingly connecting said head portion to said body portion.

4. A piston for internal combustion engines having, in combination, a body portion and a head portion, a pair of diametrically opposed projections constituting fulcrums, located on one end of one of said parts and adapted to bear against the adjacent end of the other of said parts and means connecting said head portion to said body portion.

5. A piston for internal combustion engines having, in combination, a body portion and a head portion, pivots extending transversely of said body portion, means connecting said head portion to said body portion, a bridge mounted on said pivots and extending upwardly therefrom within said body portion and a spring interposed between said head and bridges and adapted to move said head portion away from said body portion.

6. A piston for internal combustion engines having, in combination, a body portion and a head portion, pivots extending transversely of said body portion, a bridge mounted on said pivots and extending upwardly therefrom within said body portion, a spring connected at one end thereof to said bridge and projecting toward said head portion, a nut fast to the other end of said spring and a screw on said head portion adapted to engage said nut, whereby upon the rotation of said head portion it will be drawn toward said body portion.

7. A piston for internal combustion engines having, in combination, a body portion and a head portion, said head portion being pivotally mounted on said body portion, pivots extending transversely of said body portion, a bridge mounted on said pivots and extending upwardly therefrom within said

body portion and a spring interposed between said head and bridge and adapted to move said head portion away from said body portion.

8. A piston for internal combustion engines having, in combination, a body portion and a head portion, said head portion being pivotally mounted on said body portion, pivots extending transversely of said body portion, a bridge mounted on said pivots and extending upwardly therefrom within said body portion, a spring fast at one end thereof to said bridge and projecting toward said head portion, a nut fast to the other end of said spring and a screw on said head portion adapted to engage said nut, whereby upon the rotation of said head portion it will be drawn toward said body portion.

9. A piston for internal combustion engines having, in combination, a body portion and a head portion, said head portion being pivotally and slidably mounted on said body portion, a pivot extending transversely of said body portion, means connecting said head portion to said body portion, a bridge mounted on said pivot and extending upwardly therefrom within said body portion, a spring interposed between said head and bridge and adapted to move said head portion away from said body portion, a piston pin extending transversely across said body portion, and a connecting rod connected to said piston pin.

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

JAMES BOLAN.

Witnesses:

CHARLES S. GOODING,
FRANKLIN E. LOW.