S. WILTSE.

CONNECTING ROD FOR ENGINES.

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1,425,567.

Patented Aug. 15, 1922.

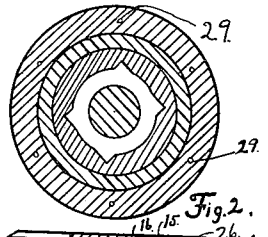


Fig. 2.

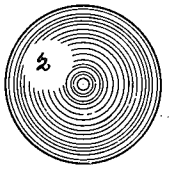


Fig. 4.

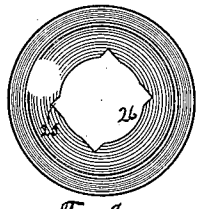


Fig. 8.

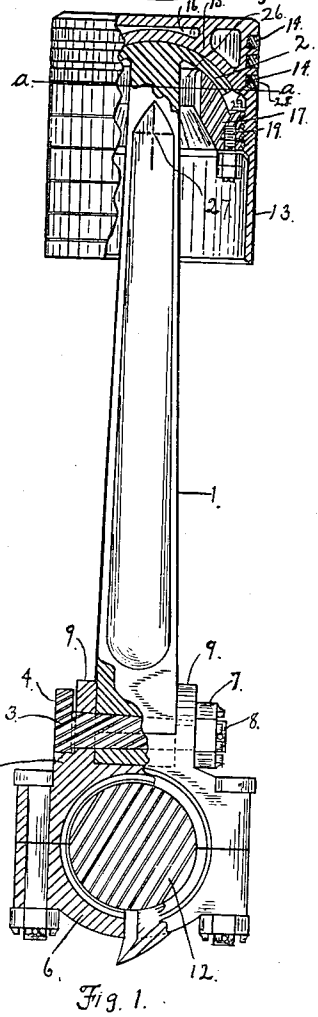


Fig. 1.

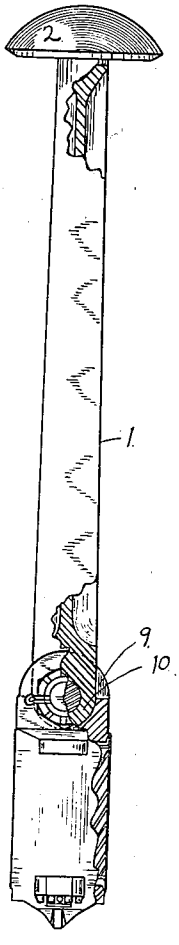


Fig. 3.

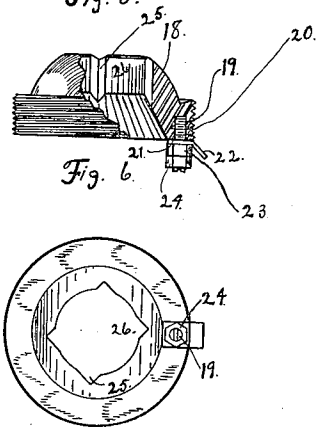


Fig. 6.

Fig. 7.

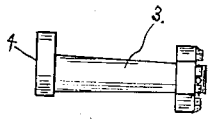


Fig. 5.

WITNESSES:

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CONNECTING ROD FOR ENGINES.

1,425,567. Specification of Letters Patent. Patented Aug. 15, 1922.

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To all whom it may concern:

Be it known that I, SUMNER WILTSE, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Connecting Rods for Engines, of which the following is a specification.

The principal object of my invention is to provide for engines, particularly those of the internal combustion type, a connecting rod which makes possible the perfect alinement of the piston as it functions in the cylinder under all conditions of service. In other words, it insures at all times a common axis for the piston and the inner surface of the cylinder in which it moves. It furthermore insures a common axis for the connecting rod-crank shaft bearing and the crank pin which it receives, irrespective of the relation of the piston, cylinder and crank shaft.

My invention also provides a simple and practical construction that will make every motor which contains it, automatically self-alining during its entire life.

Other important and incidental objects will be brought out in the following specification, and particularly set forth in the subjoined claims.

One form of embodiment of my invention is illustrated in the accompanying drawings, of which Figure 1 is a side elevational view, partly in section, of my improved connecting rod construction. Figure 2 is a section on the line *a*—*a* of Figure 1. Figure 3 is a front view, partly in section, of the connecting rod proper. Figure 4 is a top plan view of the same. Figure 5 is a detail view of the tapered alinement pin. Figure 6 is a perspective view, partly in section, of the means for supporting the shield-shaped head of the connecting rod within the piston. Figure 7 is a bottom plan view of said means. And Figure 8 is a top plan view of the same.

Throughout the specification and drawings, similar reference characters denote corresponding parts.

Referring to the accompanying drawings, the numeral 1 designates a connecting rod that terminates at its upper end in an integral shield-shaped head 2. Provided in its bottom portion is a tapered transverse hole which receives a tapered alinement pin 3. The latter terminates at one end in an annular head 4 whose bottom surface is made flat for engagement with a shoulder 5 on a crank shaft bearing 6, to prevent said alinement pin from turning when a nut 7 is applied to its threaded end 8. (See Figures 1 and 3.)

The bearing 6 is of the common type save that there project upwardly from its top portion a pair of bosses 9, 9 between whose lower ends there is formed an integral socket portion adapted to receive the semi-cylindrical lower end 10 of the connecting rod 1. Within the bosses 9 9 there are formed transverse tapered holes that register with the tapered hole in the lower end of the connecting rod to receive the alinement pin 3. The outer surface of the semi-cylindrical end 10 of the connecting rod and the inner surface of the socket have a common axis which is the axis of the alinement pin 3. This will insure at all times a perfect alinement between the bearing 6 and the crank pin 12 which it receives, by reason of the co-operation between the alinement pin 3 and the construction now to be described.

Referring to Figures 1 and 2, the numeral 13 designates a piston provided with the usual piston rings 14. Cast within the top portion of the piston 13 is a cup shaped bearing portion 15 against which bears the shield shaped head 2 of the connecting rod 1. The bearing surface of the cup-shaped portion 15 is separated from the piston head by a small dead air space 16 to prevent the heat of combustion from destroying the oil film between said bearing surface and the head 2 of the connecting rod.

Referring to Figures 1 and 6, a retaining nut 17 forms the lower bearing for the head 2 of the connecting rod 1. This nut has a truncated spherical top portion 18 whose outer surface engages the under surface of the shield-shaped head 2 of the connecting rod. The nut 17 has an enlarged annular base which is externally threaded in order that it may be screwed into the interiorly threaded middle portion of the piston 13.

For the purpose of locking the nut 17 in its proper position within the piston 13, the following means are provided. Referring to Figures 1, 6 and 7, there is provided in the bottom portion of the nut 17 a vertical hole which is threaded to receive a headless screw 19. To lock said screw in its proper place within said nut, it is provided with a transverse hole through which a small pin 20 projects, or is driven, from one side of said vertical hole into the other side. The screw

19 is thus permanently maintained in position to receive on its lower end, which projects below the bottom of the retaining nut 17, a spring lug or washer 21. The latter has a downwardly inclined lip portion 22 adapted to engage the inner surface of the piston 13. Engaging the spring lug 21 from below, is a nut 23 threaded on the lower end of the screw 19. When this nut is screwed tightly against the spring lug 21, the lip portion 22 of the latter will be forced into tight engagement with the piston wall to lock the retaining nut 17 in its proper position to form a lower bearing for the head 2 of the connecting rod 1. A lock nut 24 is also applied to the lower end of the screw 19, to prevent the screw 23 from turning.

To make a practical construction and facilitate the assembly of the device, the interior surface of the retaining nut 17 is formed to permit the free passage of the lower end of the connecting rod therethrough. In other words, the lower end of the connecting rod being rectangular in cross section, grooves 25 are provided within the inner wall of said nut to allow the edges of the connecting rod to pass through it when the device is being assembled. As shown in Figures 6, 7 and 8, lines connecting the grooves 25 would form a rectangle that is slightly larger than the lower end of the connecting rod. These grooves are necessary to permit the lower end of the connecting rod to pass through the hole 26 in the retaining nut 17, which is round and whose radius is less than one half of the longer diagonal of the rectangle formed by the grooves.

In ordinary constructions where a wrist pin is employed to connect the upper end of the connecting rod within the piston, only a portion of the periphery of the wrist pin is employed in useful work. In my construction I employ a connecting rod having a shield shaped head whose spherical bearing surface need not exceed 120 degrees. Accordingly, my construction in eliminating material, reduces the weight materially, and in lessening the dead surface of the bearing, also reduces friction.

Furthermore, my construction permits the piston to turn radially upon the upper end of the connecting rod, whereby the inner surface of the cylinder and the outer surface of the piston may at all times have a common axis. Therefore, in actual service, the piston and cylinder in which it moves, will always tend to wear round rather than oval as in ordinary constructions, thereby eliminating such evils as piston slap, scored cylinders and the attendant loss of compression.

The construction just described co-operates with the tapered alinement pin construction in insuring a common axis for the connecting rod-crank shaft bearing and the crank pin, irrespective of the relation of the piston, cylinder and crank shaft. The shield shaped head of the connecting rod and its bearings have a common center 27, which permits the head of the connecting rod to have in the piston, an oscillatory movement similar to that of an ordinary wrist pin. This construction, therefore, co-operates with the alinement pin 3 in the lower end of the connecting rod, in insuring a perfect alinement of the piston in the cylinder and the bearing on the crank pin irrespective of the relation of the positions of those parts to each other.

I employ a tapered alinement pin, because it is the only means within my knowledge for obtaining a true bearing that is adjustable between the lower semi-cylindrical end of the connecting rod and the socket into which it fits, since the alinement pin 3 may always be drawn further into the connecting rod to force the lower end of the latter into bearing contact with the socket portion of the bearing 6.

For the purpose of lubricating the bearing surfaces which receive the shield-shaped head 2 of the connecting rod, there projects through the piston wall from the bottom ring groove 28 a number of holes 29. Through these holes on every downward movement of the piston, oil is forced into the space between the bearing surface 15 and the dome-shaped top 18 of the nut 17, thoroughly to lubricate the several parts of the connecting rod head bearing.

Having described my invention, I claim:

1. In a device of the type described, the combination with a piston having a concave bearing surface in its upper portion, of a connecting rod, a shield-shaped head on the latter, a retaining nut threaded into said piston, a dome-shaped top on said retaining nut between which, and the bearing surface above it, the shield-shaped head of the connecting rod has a free oscillatory movement, and a transverse element secured to the bottom portion of said nut, adapted to engage the interior surface of the piston, to lock the retaining nut therein.

2. In a device of the type described, the combination with a piston having a concave bearing surface in its upper portion, of a connecting rod, a shield shaped head on the latter, a retaining nut threaded into said piston, a dome-shaped top on said retaining nut between which, and the bearing surface above it, the shield-shaped head of the connecting rod has a free oscillatory movement, a vertical screw in said nut projecting below the bottom portion of the latter, and a transverse spring element secured to the lower end of said screw, for engaging the interior surface of the piston, to lock the retaining nut therein.

3. In a device of the type described, the combination with a piston having a concave bearing surface in its upper portion, of a connecting rod, a shield-shaped head on the latter, a retaining nut threaded into said piston, a dome-shaped top on said retaining nut between which, and the bearing surface above it, the shield-shaped head of the connecting rod has a free oscillatory movement, a vertical screw in said nut projecting below the bottom portion of the latter, a transverse element having a hole through which the lower end of said screw projects, a nut on the latter adapted to press said transverse element tightly against the bottom portion of the retaining nut, and a spring tongue portion on said transverse element adapted to engage the interior surface of the piston, to lock the retaining nut therein.

4. In a device of the type described, the combination with a piston having a concave bearing surface in its upper portion, of a connecting rod, a shield-shaped head on the latter, a retaining nut threaded into said piston, a dome-shaped top on said retaining nut between which, and the bearing surface above it, the shield-shaped head of the connecting rod has a free oscillatory movement, a vertical screw in said nut projecting below the bottom portion of the latter, means on the lower end of said screw to engage the interior surface of the piston, and a pin projecting through said screw from one side of the locking nut to the other, for the purpose specified.

5. The combination with a connecting rod having a lower semi-cylindrical end, of a crank pin-connecting rod bearing, a pair of bosses on said bearing between whose lower ends there is formed a socket portion to receive the lower semi-cylindrical end of the connecting rod, a tapered alinement pin projecting through said bosses and the lower end of the connecting rod, a head on one end of said alinement pin beyond one of the bosses, and a nut on the other end of said alinement pin beyond the other boss, for the purpose specified.

In testimony whereof I have hereunto set my hand this 22nd day of December, 1919.

SUMNER WILTSE.

Witness:
HOWARD S. SMITH.