PATENT SPECIFICATION

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No. 20301/39.

COMPLETE SPECIFICATION

Improvements in or relating to Connecting Rods for Internal Combustion Engines

We, LANCIA & C. FABBRICA AUTOMOBILI-TORINO—S.A., an Italian Company, of Via Monginevro 99, Turin, Italy, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to connecting rods used in internal combustion engines and in particular in two-cycle engines, in which the diameter of the aperture in the big end is large with respect to the diameter of the cylinder which is of extensive length relatively to its diameter.

It is known that in engines of this type difficulties are met with in removing, through the cylinder, the piston with its connecting rod, especially if the gudgeon pin of the piston has a roller bearing, and various means have already been proposed for reducing to a minimum the width of the big end of the connecting rod and to render easy a coupling of the cap with the said big end.

According to the invention, this result is attained by the fact that each bolt for connecting the cap of the big end of the connecting rod comprises a head extending over only a portion of the circumference of the bolt in such manner that this head owing to the rotation of the bolt takes up its position either against a supporting surface made in the big end of the connecting rod for the union of the cap, or outside such a surface to allow the cap to disengage from the big end.

In the annexed drawings there is shown by way of example one construction of the invention.

Figure 1 showing diagrammatically a cylinder of an internal combustion engine with the piston on the point of being removed with its connecting rod;

Figure 2 is a view in perspective on a larger scale, of the big end of the connecting rod with the cap removed;

Figure 3 is a side view partly in section of the big end of the connecting rod with the cap mounted in position;

Figure 4 is a section of the connecting rod seen from the side of the rod and which shows the interior portion of the big end with the bolts for the union of the cap in two different positions, and

Figure 5 is a view on the right-hand side of the front of the connecting rod seen from its outer extremity, and on the left-hand half, the section in the plane of separation of the big end.

In Figure 1, 1 indicates the cylinder and 2 the piston mounted in the cylinder and which carries the hinged connecting rod 3, the big end of which is indicated by 4, this big end, in spite of the large diameter of its bearing, being of less width than the inner diameter of the cylinder 1 in order that it can be removed with the piston 2, through the cylinder.

As will be seen more particularly from Figure 2, the flanks of the connecting rod big end 4 are machined (preferably turned) so that curves are produced which bisect the axes of the bolt-holes serving to unite the cap with the big end of the connecting rod. The curves form parts of a circle of a diameter slightly less than the internal diameter of the cylinder. The seats of the bolts in the big end 4 are thus reduced to channels 5 which run in a longitudinal direction along the two flanks of the big end 4.

The portion removed from the flanks of the big end 4 is replaced by extensions 6 which extend in the longitudinal direction at the two sides of the cap 7, there being provided in these extensions the other portion of the channel which completes the seat for the bolts in the extension of the holes 8 which pass through the cap 7.

Each of the bolts 9 for connecting the cap to the connecting rod big end 4, comprises at its extremity at the side of the cap a threaded portion on which the nut 10 is screwed and which is terminated by a portion 11 with flat lateral faces which permits of gripping the bolt by means of a spanner.

At the opposite extremity, that is to say, at the extremity which is at the side of the big end 4 of the connecting rod, each bolt comprises a projecting head 12 which extends over less than half the circumference. To take the heads 12 of

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the bolts, the connecting rod big end 4 comprises lateral recesses 13 the supporting surface of which for the head 12 of the bolts is, with respect to the plane of separation of the big end, at a distance less than the length of the lateral extensions 6 of the cap. In this way, when the cap is mounted on the big end of the connecting rod, as shown by Figure 3, the extremity of each extension 6 of the cap projects by a certain amount beyond the bottom of the recess 13.

When the cap 7 is mounted on the connecting rod big end 4 and is connected to the said big end in the manner shown in Figure 3, the cap is engaged with the connecting rod by the heads 12 of the bolts 9, each of which bears against the bottom of the recess 13 and is clamped in this position by the nut 10. Under these conditions, any rotation of the bolts is prevented by the lateral faces of the heads 12 which abut against the lateral extremities of the extensions 6. The union of the cap 7 with the connecting rod big end 4 is thus absolutely assured and possible tendencies to flexion of the bolts are supported by the lateral extensions 6 of the cap 7.

To separate the cap 7 from the connecting rod big end 4, the nuts 10 are loosened by an amount sufficient to permit an axial displacement of the bolts 9 at least equal to the projection of the extremities of the extensions 6 with respect to the abutment bases of the lateral recesses 13 of the big end 4. It is then possible by acting on the flat lateral faces of the end portion 11, to make the bolts 9 carry out an angular displacement which is no longer prevented by the end flanks of the extensions 6, and by the effect of which the head 12 of each bolt leaves the recess 13 and takes its position up on the extremity of the extension 6, as shown by Figure 2 and in the right-hand portion of Figure 4.

It is clear that, under these conditions, the cap 7 may be removed from the big end 4 with the bolts 9 which remain in the cap 7 (Figure 2). The connecting rod can remain attached to the piston 2, the big end of the connecting rod being of a width reduced to such an extent that it can pass freely through the body of the cylinder (Figure 1).

By arranging at the outer extremities of the bolts 9, for example on the front face of their end portions 11, a mark constituted for example by an arrow 14 (Figure 5) or by a suitable projection, it is possible to ascertain from the outside by sight or by touch, the angular position occupied each time by the bolts 9, which permit of effecting without any uncertainty the manipulation necessary for disengaging the bolts from the big end 4 or bringing them into their position of engagement.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A connecting rod removable through the cylinder in internal combustion engines, with big end cut along the seat of the bolts which serve to connect the cap, characterised by the heads of the bolts extending only over a portion of the circumference of the bolt and, during operation, resting on corresponding surfaces of the big end of the connecting rod, and, in order to permit the cap to be removed, the heads of the bolts, after loosening the nuts, being adapted to be brought, by rotation, out of engagement with the surfaces of the big end of the connecting rod which support them.

2. A connecting rod according to claim 1, characterised by the arrangement at the flanks or sides of the cap, of lateral extensions the upper edges of which project, when the big end is assembled, over surfaces made for the support of the bolt heads, in such manner as to create lateral rests for the said bolt heads.

3. A connecting rod according to claim 1, characterised by its big end being machined along its flanks so that curves are produced thereon bisecting the axes of the bolt holes serving to unite the cap with the big end of the connecting rod, these curves forming parts of a circle of a diameter slightly less than the internal diameter of the body of the cylinder.

4. A connecting rod according to claim 1, characterised by each bolt comprising at its outer threaded extremity, flat lateral faces by means of which it is possible to act on the bolt to effect its angular displacement.

5. A connecting rod according to claim 1, characterised by the external extremity of each bolt being provided with means for indicating visually or by touch the angular position of the bolt.

6. The connecting rod for internal combustion engines substantially as described with reference to the accompanying drawings.

Dated this 12th day of July, 1939.
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Fig. 1

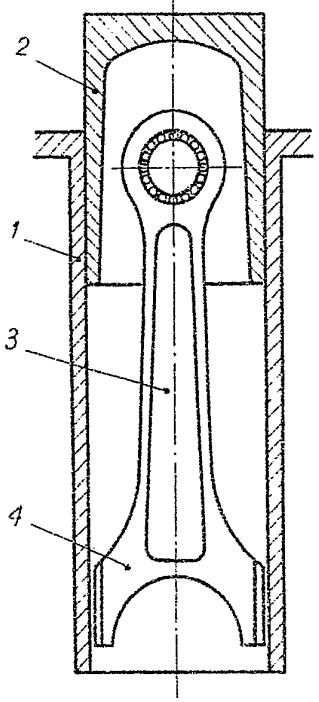


Fig. 3

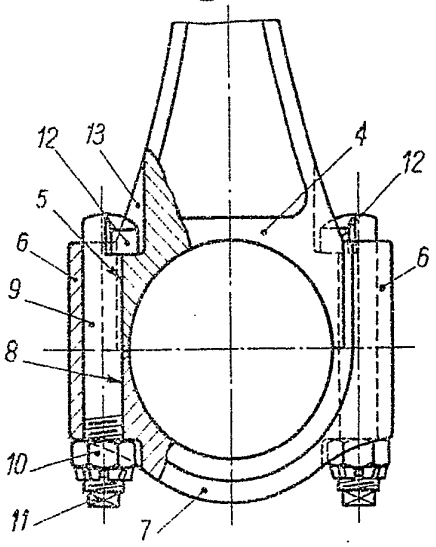


Fig. 4

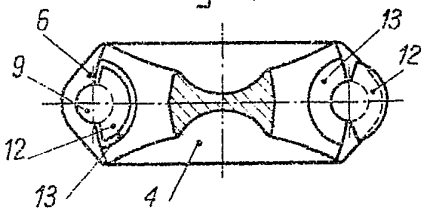


Fig. 2

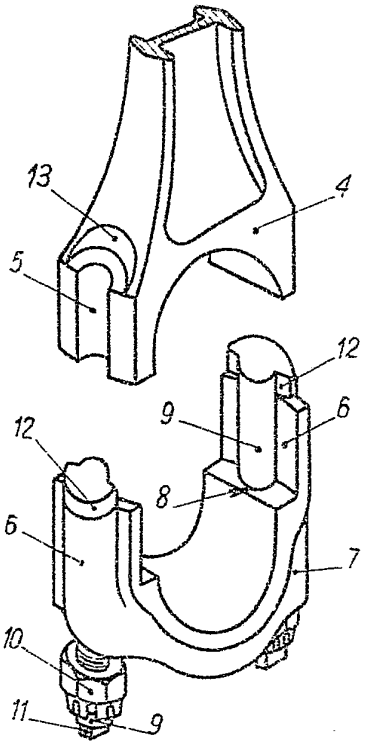
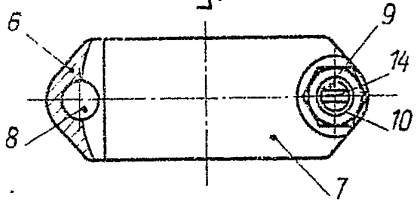


Fig. 5



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