

[54] **ROLLER TAPPET GUARD**

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[58] Field of Search74/569; 123/90.5; 417/539

[56]

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UNITED STATES PATENTS

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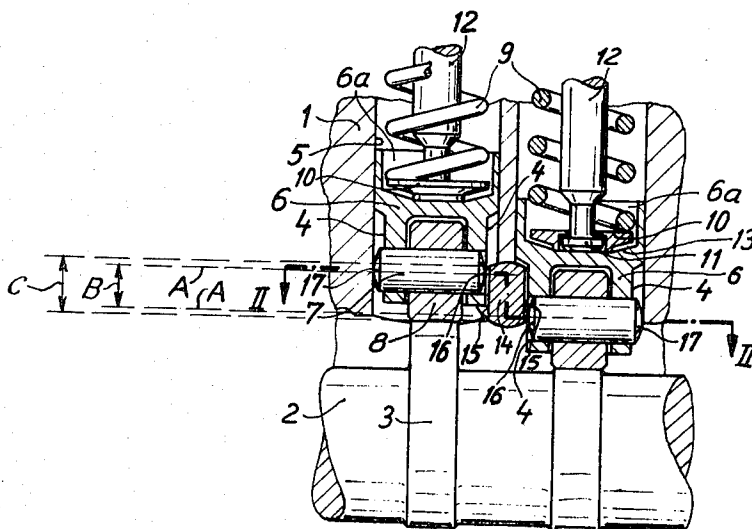
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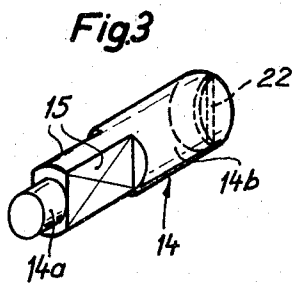
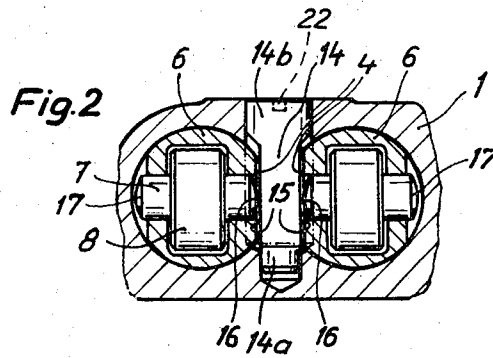
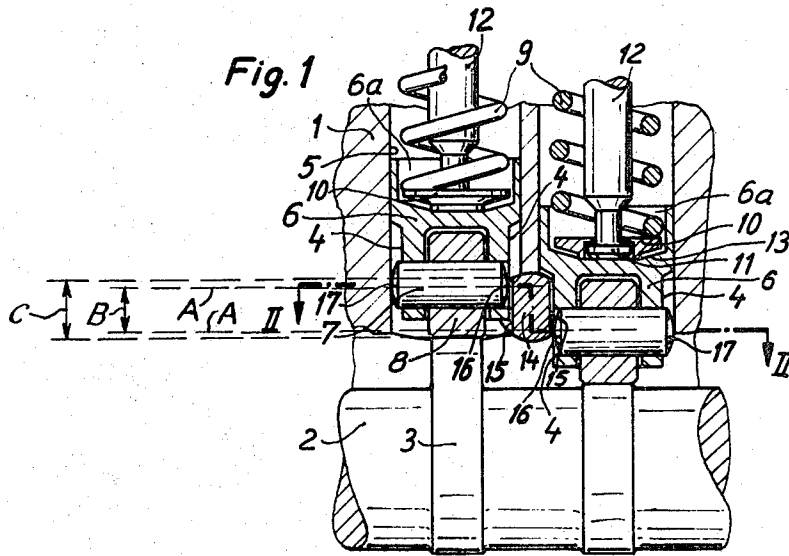
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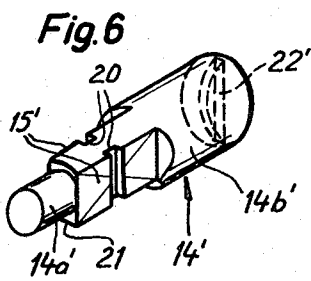
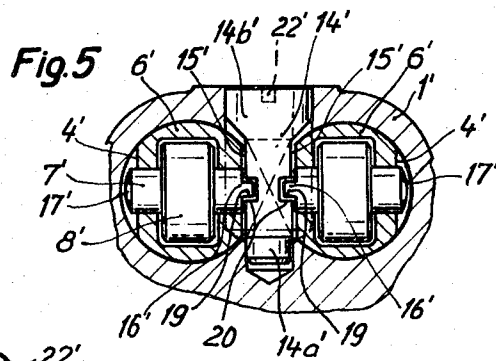
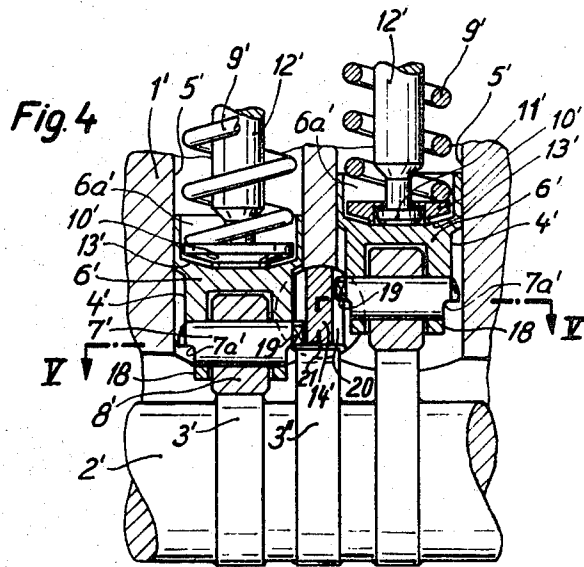
ABSTRACT

In a multicylinder device, such as a fuel injection pump, between two adjacent roller tappets there is fixedly held in the pump housing a securing pin which, by virtue of parts thereof cooperating with parts of said roller tappets, prevents the latter from turning and the roller pins from axially sliding.

2 Claims, 6 Drawing Figures







ROLLER TAPPET GUARD

BACKGROUND OF THE INVENTION

This invention relates to guard means which, in multicylinder pump structures, particular multicylinder fuel injection pumps, prevents the roller tappets from turning about their axes during operation. Conventionally, two immediately adjacent tappets are flattened on facing sides and are secured against rotation by means of a pin inserted into the pump housing and extending in a direction perpendicular to the tappet axis.

In known structures of the aforementioned type (such as disclosed in German Pat. No. 1,016,497 and U.S. Pat. No. 2,410,947), the rotatably or fixedly inserted pin serves merely to prevent the roller tappet from rotation. In such structures the roller pin of the tappet has to be secured against axial displacement by additional means such as forced fitting, rivetting, the provision of cotter pins, or the like.

In other known fuel injection pumps, two adjacent tappets and roller pins are secured against undesired displacement by means of T-shaped plates inserted perpendicularly to the tappet axis and longitudinally with respect to the pump. It is a disadvantage of such structures that said plates are difficult to install and further, grooves have to be provided in the housing walls. Such grooves weaken the housing and require an involved machining operation.

OBJECT AND SUMMARY OF THE INVENTION

It is an object of the invention to provide an improved guard or securing means of the aforementioned type which, in addition to securing the roller tappets against rotation, secures the roller pins against axial displacement or rotation without appreciably weakening the pump housing.

Briefly stated, according to the invention there is provided a pin inserted in the pump housing between two adjacent roller tappets; said pin is provided with two diametrically opposed parallel flattened portions associated with the flattened portions of the tappet, said flattened portions on the securing pin also serve for preventing an axial displacement of the roller pin carrier by each tappet.

The invention will be better understood, as well as further objects and advantages become more apparent, from the ensuing detailed specification of two exemplary embodiments taken in conjunction with the drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a fragmentary axial sectional view of a multicylinder serial fuel injection pump incorporating a first embodiment of the invention;

FIG. 2 is a sectional view along line II—II of FIG. 1;

FIG. 3 is a perspective view of a securing pin incorporated in the structure shown in FIGS. 1 and 2;

FIG. 4 is a fragmentary axial sectional view of a multicylinder serial fuel injection pump incorporating a second embodiment of the invention;

FIG. 5 is a section view along line V—V of FIG. 4; and

FIG. 6 is a perspective view of a securing pin incorporated in the structure shown in FIGS. 4 and 5.

DESCRIPTION OF THE EMBODIMENTS

In the description that follows, similar or identical components in the two embodiments are designated by the same reference numeral, differentiated by a prime sign.

In both embodiments, in an only partially shown housing 1, 1' of the fuel injection pump, there is rotatably held a cam shaft 2, 2', the cams 3, 3' of which are engaged by at least two adjacent roller tappets 6, 6' provided with flattened portions 4, 4' and guided in housing bores 5, 5'. To each tappet 6, 6' there is secured a roller 8, 8' by means of a roller pin 7, 7'. The rollers 8, 8' are urged into contact with the work face of cam 3, 3' by means of a tappet spring 9, 9' supported in the housing 1, 1'. The tappet spring 9, 9' exerts its force on the tappet 6, 6'

through a spring seat disc 10, 10' disposed in a cavity 6a, 6a' of tappet 6, 6'. The spring seat disc 10, 10' is provided with a central opening through which extends a terminal portion of piston 12, 12'. Said terminal portion carries an integral collar 11, 11' which is held captive with a small clearance between spring seat disc 10, 10' and the base 13, 13' of the respective cavity 6a, 6a'.

Into the housing 1, 1' there is force-fitted, between two tappets 6, 6' a securing pin 14, 14' disposed perpendicularly to both the axes of the two adjacent tappets 6, 6' and those of roller pins 7, 7'. Each securing pin 14, 14' has two cylindrical terminal portions 14a, 14a', and 14b, 14b' and a mid-portion which has two diametrically opposed flattened parts 15, 15', extending normal to the axis of each roller pin. The faces 15, 15', cooperating with the flattened tappet portions 4, 4', prevent the tappets 6, 6' from rotating. At the same time, the planar faces 15, 15' are at least of such an area that the ends 16, 16' of the roller pins 7, 7' do not slide beyond the outline of said area during the strokes of the tappets 6, 6'. Stated in different terms, if the peripheral outline of a roller pin is orthogonally projected onto the immediately adjacent planar face of the securing pin at any momentary position of the associated tappet during its reciprocation, at least one part of such projection intersects the last-named planar face of the securing pin. This arrangement may be well observed in FIG. 1 in which the two tappets are shown in opposite extreme positions. Or, it may also be said that — as it may be well observed in FIG. 1 — the planar faces of the securing pin lie in a plane that is parallel to the direction of reciprocation of the tappets and the dimension C of each planar face taken in the direction of reciprocation is at least as large as the amplitude B (indicated in FIG. 1 as the distance between the axes A of two adjacent roller pins depicted, as mentioned earlier, in the two opposite extreme positions). Furthermore, as it also may be observed in FIG. 1, each planar face of the securing pin is so arranged with respect to the adjacent reciprocating roller pin that the axis A of the latter, in both extreme positions of the roller pin and in any positions therebetween, passes through a point that is located on the adjacent planar face of the securing pin. The other ends 17, 17' of roller pins 7, 7' glide along the wall of the housing bore 5, 5'. In this manner, the roller pins 7, 7' are prevented from displacement in either axial direction.

The frontal faces 16, 16' and 17, 17' are rounded in order to improve their gliding properties. The securing pin 14, 14' has at the frontal face of the cylindrical terminal portion 14b, 14b' a slot 22, 22', the edges of which extend parallel to the faces 15, 15', thus permitting an accurate positioning during the force-fitting thereof into the pump housing 1, 1'.

In the second embodiment for securing the tappets in a multicylinder fuel injection pump (FIGS. 4, 5), preferably of the V-configuration, the roller tappets 6' have lower terminal portions 18 of reduced diameter to prevent an engagement of the roller tappets 6' of one pump series with a cam 3' of the cam shaft 2' associated with the other pump series. For the same purpose, the roller pins 7' have a notched or cut-out lower portion 7a'.

In order to prevent rotation of the roller pins 7' during operation, they are provided with integral stubs 19 which glide in grooves 20 provided in the securing pin 14' and extend parallel with the tappet axis. The securing pin 14' has in its mid-portion a planar face 21 confronting the cam 3' to permit a free passage thereof.

The embodiment described in connection with FIGS. 4–6 is particularly advantageous since it permits a substantial reduction of the overall dimensions of a V-type pump.

That which is claimed is:

1. In a guard means for tappets operating in a multicylinder fuel injection pump, said tappets are of the reciprocating type that carry a roller mounted by a roller pin, said guard means is of the known type that includes a securing pin fixedly held in the housing of said multicylinder device between two adjacent tappets, said securing pin cooperates with flattened areas of

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said tappets to prevent rotation of the latter, the improvement comprising, two diametrically opposed planar face portions provided in said securing pin, each said planar face portion extending parallel to and cooperating with a flattened area of said two adjacent tappets, said planar face portions of said securing pin being disposed immediately adjacent a terminus of each roller pin of said two adjacent tappets, each planar face portion lying in a plane disposed parallel with the direction of reciprocation of said tappets, the dimension of each planar face portion measured parallel with said direction of reciprocation being at least as large as the amplitude of said reciprocation, each planar face portion being so disposed with respect to the adjacent reciprocating roller pin that in both extreme momentary positions of the roller pin and in any momentary positions therebetween, the axis of said roller pin passes through a point located on the adjacent planar face portion of said securing pin.

2. In a guard means for tappets operating in a multicylinder device, particularly a fuel injection pump, said tappets are of the reciprocating type that carry a roller mounted by a roller

pin, said guard means is of the known type that includes a securing pin fixedly held in the housing of said multicylinder device between two adjacent tappets, said securing pin cooperates with flattened face portions of said tappets to prevent rotation of the latter, the improvement comprising, two diametrically opposed planar face portions provided in said securing pin, each said planar face portion extending parallel to and cooperating with a flattened face portion of said two adjacent tappets, said planar face portions of said securing pin being disposed immediately adjacent a terminus of each roller pin of said two adjacent tappets, each said roller pin remaining within the outline of said planar face portions at all times during the reciprocation of said tappets and a groove provided in each planar face portion of said securing pin, each groove extending parallel to the path of reciprocation of said tappets, each said terminus of said roller pins includes an integral lug extending into and guided in the groove of an immediately adjacent planar face portion of said securing pin.

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