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2,700,965

HYDRAULIC TAPPET

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Fig. 1.

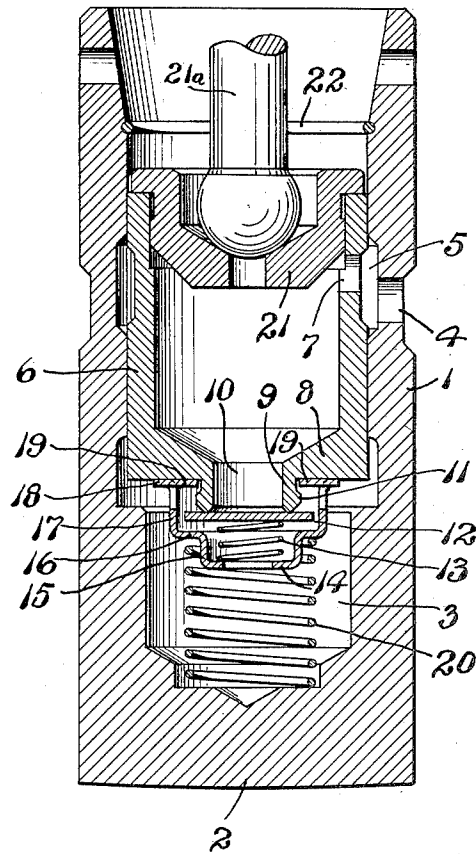


Fig. 2.

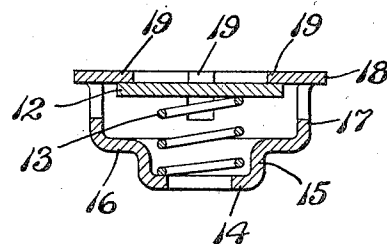
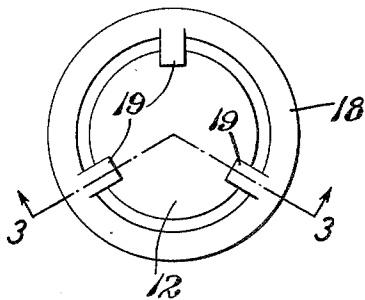


Fig. 3.

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2,700,965

HYDRAULIC TAPPET

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3 Claims. (Cl. 123—90)

This invention relates to an improvement in hydraulic tappets, and is more particularly concerned with novel and very desirable means for maintaining the valve of hydraulic tappets in connection with the piston within the body of the tappet, so that they do not separate in the assembly or disassembly of the tappet.

Heretofore, in such assembly because of separation of the parts in the process of introduction of the piston and valve into the tappet body, such assembly has been awkward, and in disassembly the tendency for separation of the valve from the piston has increased the possibility of improper assembly.

In the present invention, by a very simple structure, the valve and the cage or housing which surrounds it, are connected to the tappet piston by snap-action of the valve cage being pushed over a retaining rib on the tappet piston, so that when once assembled and engaged with each other, their separation, either accidentally or otherwise without effort being required to separate them, is substantially impossible. With such structure the assembly and disassembly of the tappet is easy and certain, with a saving of time and expense and a greater certainty of better assembly being made.

An understanding of the structure which embodies my invention, by means of which the described desirable results are obtained, may be had from the following description, taken in connection with the accompanying drawings, in which,

Fig. 1 is an enlarged, central, vertical section through a tappet equipped with my invention.

Fig. 2 is a plan view, enlarged, of the flat disc valve used and the cage within which it is located, and

Fig. 3 is a transverse section substantially on the plane of the broken line 3—3 of Fig. 2.

Like reference characters refer to like parts in the different figures of the drawings.

The tappet body of the usual cylindrical form has vertical walls 1 and a closed integral lower end 2, with an axial opening from its upper end downwardly in the body until the bottom is reached. In the lower part of and within the body a chamber 3 for holding oil is located. Intermediate the ends of the body a passage 4 is provided through the wall for supplying oil from the lubricating system of the engine, the oil passing through said passage and being delivered to an annular space 5, made by complementary grooves within the wall 1, and in the wall 6 of a piston which is inserted in the upper end of the body and extended downwardly substantially to the chamber 3. The wall 6 of the body has an opening 7 communicating with the annular space 5 so that oil may pass through the opening 4, whatever may be the position of the piston within the body, and then through the passage 7 to the interior of the piston.

The piston in addition to its vertical wall 6 has a lower end 8 closing the piston at its lower end except for a central passage, indicated at 10, through a downwardly extending projection 9 at the lower side of the bottom 8 of the piston. The passage 10 has its vertical axis substantially coincident with the vertical axis of the tappet. The projection 9 below the piston is formed with a continuous annular rib 11 which, at its lower portion has an upwardly and outwardly inclined conical surface, as shown, for a purpose later described.

The passage 10 is closed by a thin disc valve 12 located against the lower end of the projection 9, normally held thereagainst by a light weight coiled com-

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pression spring 13. The spring 13 at its upper end bears against the under side of the disc valve 12 and at its lower end rests upon the bottom 14 of a cage holder, or receiver, for the valve. The cage is made from a single piece of flat metal having a circular bottom 4, with a central opening therethrough, from which short annular walls 15 extend upwardly a short distance and thence continue in a horizontal ledge 16. The ledge at its outer edges is continued in vertical walls 17 which terminate in an outwardly extending continuous flange 18. Integral with the flange 18, and in the same plane therewith, are a number of radially located, inwardly extending tongues 19 which are provided by striking metal from the walls 17 as best shown in Fig. 3.

With the spring 13 located in the holding cage and its lower end against the bottom 14, and with the valve 12 located in place underneath the inner free ends of the tongues 19, the spring holds said valve against said tongues. Such cage with the valve assembled therewith may then be snapped over the annular rib 11 of the stem or projection 9, the inner ends of the tongues 19 riding or camming against the conical lower portions of the rib 11 until it passes by such rib. When thus assembled the valve, spring 13, and the holding cage for the valve and spring are connected with the hydraulic tappet piston and will not readily separate therefrom. In order to obtain their separation force must be used to get the tongues 19 past the ribs 11. Such connection of the holding cage with its inner spring 13 and its valve 12 snapped over the annular rib 11 provides an assembly unit which will not accidentally or otherwise separate when, in the assembly, the piston having the wall 6 is inserted downwardly into the body 1. With the present structure the cage is connected to the piston, remains connected thereto and the two in a unit may be inserted at the same time. Previously the cage with spring and valve therein was with some difficulty inserted downwardly against the spring 20 and afterward the piston pushed downwardly hoping that it would properly assemble with the cage. The present invention eliminates troubles previously occurring and is less costly and expensive.

The tappet is completed by securing in the upper end of the piston, and within the upper portions of the vertical walls 6 thereof, a head 21 against which the lower end of the valve stem, or of a push rod 21a, is adapted to bear when the tappet is installed in an internal combustion engine. The hole in the lower end of the head 21 provides a balanced air pressure upon the oil within the chamber below said head and relieves any back pressure against oil coming into said chamber. A split spring wire ring 22 inserted in the upper end of the body of the tappet enters a groove to partially receive it located above the head 21 to hold the parts from disassembly during handling or shipment.

With the tappet structure described the assembly of the piston valve, the valve spring and the holding cage therefor with the tappet body is quickly accomplished by merely inserting them, after they have been connected together, downwardly into the tappet body until the ledge 16 of the valve cage comes against the upper end of a relatively strong compression spring 20, the lower end of which bears against the bottom 2 of the tappet body at the lower end of the chamber 3. It is also evident that on removing or disassembling the tappet, all that is necessary is to withdraw the piston, whereupon all parts within the body except the lower compression spring 20 will be simultaneously removed. This may be done at times for reconditioning or cleaning the tappets or for replacing some of the parts thereof with new parts.

The invention is of a very practical and useful character, and is particularly desirable in connection with the manufacture of the tappets and the assembly of the parts thereof at the factory.

Such assembly with the structure as described is made much more easy and there is a certainty of a proper assembly being made. The invention is defined in the claims appended hereto, and is considered comprehensive of all forms of structure coming within their scope.

I claim:

1. In a hydraulic tappet, having a body, a piston in

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said body movable lengthwise thereof, said piston having a passage for liquid therethrough, the piston at its inner end having a projection of less diameter than the body through which the liquid passage passes, and a valve closing said passage, with a holding cage for said valve telescoping over said projection and a spring within the cage acting to normally move the valve against said projection to yieldingly close the passage, the improvement comprising, keeper means on said projection and cooperating latching means on the valve holding cage for releasably connecting the cage with said projection, providing an assembled unit of piston, valve, cage and valve spring for entrance into or removal from the tappet body.

2. Structure as defined in claim 1, said means on said projection comprising, an outwardly extending annular rib, and the interengaging means on the cage comprising a plurality of spaced yielding fingers located around said projection between the rib and the adjacent end of the piston.

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3. In a sub-assembly of hydraulic tappets, such sub-assembly having a piston with a passage for liquid therethrough, the outlet end of which is at one end of the piston, a valve and a spring to move it to closing position at such passage outlet end, and a holder for said valve and spring located at said outlet end of the piston, the improvement comprising, inwardly extending yielding latching means on said holder, and engaging means on the piston within said holder with which said latching means has connection to hold said valve, spring and holder against disassembly from said piston.

References Cited in the file of this patent

UNITED STATES PATENTS

2,203,952	Eshbaugh	June 11, 1940
2,325,932	Banker	Aug. 3, 1943