PATENT SPECIFICATION

422,408

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COMPLETE SPECIFICATION

Improvements relating to Tappets for the Valves of Radial-Cylinder Internal Combustion Engines

We, WOLSELEY MOTORS (1927) LIMITED, a Company registered under the Laws of Great Britain, of Drews Lane, Ward End, Birmingham, 8, and CLIFFORD OWEN TOWLER, British Subject, of The Company's Works, Drews Lane, Ward End, Birmingham, 8, 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 valve operating mechanism for internal combustion engines, and of that kind in which the valves are actuated by sliding parts or tappets having gaps or clearances which are supplied with oil or liquid under pressure to provide fluid cushions for the purpose of taking up all clearance between the moving parts of the valve-actuating mechanism.

The object of the present invention is to apply the above means for taking up clearance in the valve-actuating mechanism, to a radial-cylinder engine, such, for example, as used on aeroplanes, and to provide improved means for feeding oil or liquid to the clearances of the tappets or valve actuating parts of the several cylinders of the engine.

According to this invention the oil or liquid is fed to the gaps or clearances of the sliding actuating parts or tappets of the valves of the several cylinders through a common annular or loop-shaped supply passage or conduit disposed within the crank-case of the engine, or within a compartment adjacent the crank-case. Preferably the oil is fed to the tappets through a common annular or like passage formed in the face of a wall or partition of the crank-case, the one side of the said passage being closed by a plate or ring which carries a plurality of projecting open-ended sleeves which constitute guides for the tappets of the respective valves. The tappets may be of the two part telescopic type fitting one within the other, with ports or apertures, controlled by the movement of the tappets, for placing the common annular passage or conduit in communication with the clearances between the tappet parts, the outer tappet parts sliding within the respective aforementioned sleeve-like guides on the closure plate or ring The improved arrangement provides a neat and compact construction, which has the advantage that should there be any leakage of oil the latter will drain back into the interior of the crank-case, instead of running down the outside of the same. It has been suggested in the Specification of our Letters Patent No. 411,409, relating to valve-operating mechanism of the kind referred to, to feed the oil or liquid to the tappet clearances of the valves of the several cylinders of a radial-cylinder engine through a common supply pipe disposed at the front of the engine, but the said supply pipe has been exposed and it has not been disposed within the crank-case of the engine, or within a compartment adjacent the crank-case, as in our present arrangement.

Figure 1 of the accompanying drawings represents a vertical section through the forward portion of the crank-case of a radial-cylinder engine, showing the tappet parts of one of the valves, in which a common interior supply passage, constructed in accordance with this invention, is provided for feeding the tappet clearances of the respective valves.

Figure 2 shows a cross-section on the line x—x, Figure 1.

Figure 3 represents a section on the line x^1—x^1, Figure 2.

Referring to the drawings, the valves of the several cylinders of the engine are each operated by a tappet formed in two telescopic parts, each tappet comprising an outer part 1 of a sleeve-like form, closed at its inner end, and an inner part 2 likewise in the form of a sleeve, but closed at top and bottom, the two parts of the tappet co-operating together and operating the valve through a push-rod 3. Each two-part tappet is adapted to be moved outwards, to operate the respective valve, by a cam 4 and rocker arm 5 in known manner, the outer part 1 of the tappet being then caused to slide through a fixed guide 6. In order to take up any clearance in the mechanism

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oil is arranged to be supplied under pressure to the gap or clearance 7 between the two parts of each tappet, and, according to this invention the oil is fed to all of the tappet clearances from a common annular passage 8. This passage 8 is contained within a crank-case 9 of the engine, and is formed in a vertical wall or partition 10 disposed near the forward end of the crank-case and surrounding the crank-shaft. For this purpose the said wall or partition 10 is formed upon its one face with an annular thickened portion 11, within which the passage 8, consisting of an annular groove, is formed. The aforesaid thickened portion 11 has a flat outer face, the passage or groove 8 being closed by a flat ring-shaped plate 12 forming one side of the annular passage and secured to the face of the thickened portion 11 by bolts 13 (Figure 2), so as to form a close joint. This flat ring 12 not only forms the one side of the common oil distribution passage 8, but it also carries the guides 6 for the outer parts of the whole of the tappet members, the said guides 6 being in the form of open-ended radial sleeves projecting from the face of the ring 12 and preferably integral therewith. The said ring 12 is provided at its outer edge with an annular locating flange 12a adapted to fit over the outer periphery of the thickened part 11 of the crank-case wall 10. Oil is supplied to the annular distributing passage 8 under pressure by a pump through an inlet passage 14 and tube 15, the latter fitting into a hole or socket in the crank-case wall 10 and thickened portion 11, as shown in Figure 3, and having an aperture 16 at one side near its lower end which places the interior of the tube in communication with the annular passage 8. A similar outlet passage 17 (Figure 2) communicates with the annular passage 8 by a second tube 18 in the same way, the inlet and outlet passages 14 and 17 being conveniently formed in a common casting 19 secured to the outside of the crank-case. The annular passage 8 is closed between the inlet and outlet tubes 15 and 18 by a plug 20, and the arrangement is such that the oil forced in through the inlet 14 is caused to pass right round the annular distributing passage 8 before reaching the outlet 17, the oil then passing through a pressure relief valve and hence back to the supply tank.

To enable the oil, forced around the annular passage 8 to gain access to the tappet clearances, the ring 12, which carries the tappet guides and which forms the one side of the said passage, is provided adjacent each two-part tappet with an aperture or port 21 in communication with the annular passage 8 whilst formed in the wall of the tubular outer part or shell 1 of each tappet is an aperture or port 22, so disposed that it is in communication with the port 21, and consequently with the annular passage 8, when the tappet is in its innermost inoperative position The inner part 2 of each tappet is a close sliding fit within the outer part 1 at its outer end or mouth, sufficient to provide an adequate oil seal, but the remaining length of the said inner tappet member 2 is relieved forming an enclosed space 23 which is in communication with the clearance 7 between the ends of the inner and outer tappet parts.

When the two parts 1 and 2 of a tappet are in their lowermost inoperative positions, as shown in the drawings, with the valve closed, the apertures or ports 21 and 22 are so disposed relatively to one another that they slightly overlap, so as to leave a narrow space through which the oil may enter from the annular distributing passage 8, the oil then passing through the space 23 to the clearance 7 between the ends of the two tappet parts. When the tappet is moved upwards by the cam to open the valve the lower outer part 1 of the tappet causes the apertures or ports 21 and 22 to move out of register almost immediately, with the result that communication with the annular passage 8 is closed and the oil is trapped in the clearance or space 7 between the tappet ends The oil is thus maintained between the two tappet parts during substantially the whole movement of the tappet and when the tappet moves back into its original position the clearance 7 is again placed in communication with the annular passage 8, by means of the apertures or ports 21 and 22. Since the clearance varies during the running of the engine, due to temperature variations, the quantity of the oil trapped between the tappet parts is automatically adjusted according to requirements. The tappets of all of the valves are of a similar construction, the oil being fed between all of the tappet clearances in the same way. By arranging the common annular supply passage, and the tappets and communicating ports, in the manner described, any slight oil leakage is not a serious disadvantage, since the oil merely drains into the crank-case. In addition, the arrangement provides a simple, neat and compact construction, which reduces the necessity for a large number of outside oil supply pipes.

In order to prevent the outer part or shell 1 of each tappet from rotating and

thus moving the port 22 out of its correct position, it is provided at its lower end with a tongue or web 24 engaging a groove in the rocker arm 5; or to dispense with the tongue or web the said outer part 1 of the tappet may be formed with an external annular groove, in communication with the port 22 and slightly overlapping the port 21 when the tappet is in its inoperative position. The tappet may thus rotate without interfering with the operation in any way.

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 radial-cylinder internal combustion engine having valve actuating mechanism of the kind referred to, in which oil or liquid is fed to the gaps or clearances of the sliding actuating parts or tappets of the valves of the several cylinders through a common annular or loop-shaped supply passage or conduit disposed within the crank-case of the engine, or within a compartment adjacent the crank-case.

2. A radial-cylinder internal combustion engine, as claimed in claim 1, in which the oil or liquid is fed to the gaps or clearances of the sliding actuating parts or tappets of the valves of the several cylinders through a common annular or like passage or conduit formed in the face of a wall or partition of the crank-case.

3. A radial-cylinder internal combustion engine, as claimed in claim 2, in which the one side of the annular passage in the wall or partition of the crank-case is closed by a plate or flat ring bolted or secured to the said wall or partition.

4. A radial-cylinder internal combustion engine, as claimed in claim 3, in which the plate or ring forming the one side of the annular passage carries a plurality of projecting open-ended sleeves which constitute guides for the tappets of the respective valves.

5. A radial-cylinder internal combustion engine, as claimed in claim 3 or 4, in which the oil is supplied to the tappet clearances through apertures or ports in the closure plate or ring.

6. A radial-cylinder internal combustion engine, as claimed in any one of the preceding claims, in which the common supply passage or conduit communicates with inlet and outlet pipes disposed outside the crank-case, the said supply passage or conduit being closed between the points where it communicates with the said inlet and outlet pipes.

7. A radial-cylinder internal combustion engine, as claimed in claim 5, in which the tappets each consist of two telescopic parts, comprising an inner part fitting within an outer part of a sleeve-like form closed at one end, the said outer part having a port or aperture in its wall adapted to overlap or move opposite the respective aperture or port in the closure plate or ring when the tappet is in its inoperative position, so that oil may then pass from the common annular supply passage to a clearance provided between the ends of the tappet parts, the said apertures or ports moving out of register as the tappet moves outwards, so that communication with the annular supply passage is cut off and the oil trapped in the tappet clearance.

8. Means for supplying oil to the tappet clearances of a radial-cylinder internal combustion engine, substantially as herein described with reference to the accompanyifng drawings.

Dated this 30th day of August, 1934.

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24, Temple Row, Birmingham, 2.
Agents for the Applicants.

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Fig. 1.

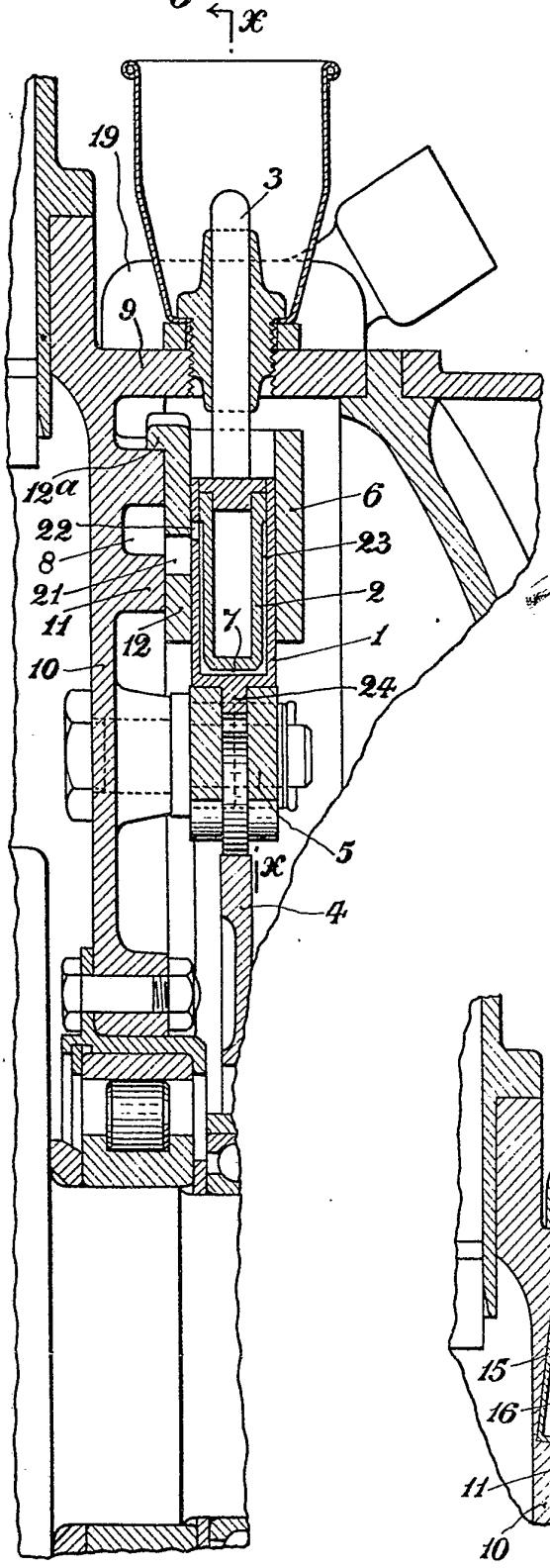

Fig. 2

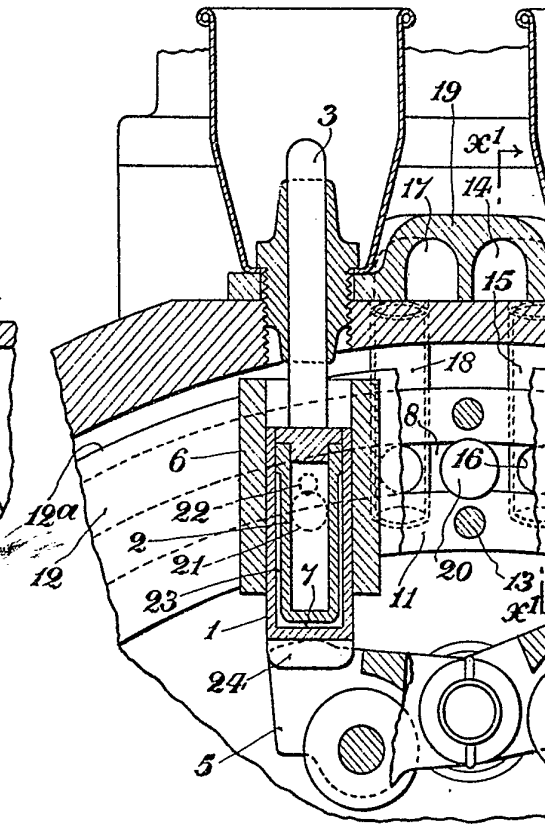

Fig. 3.

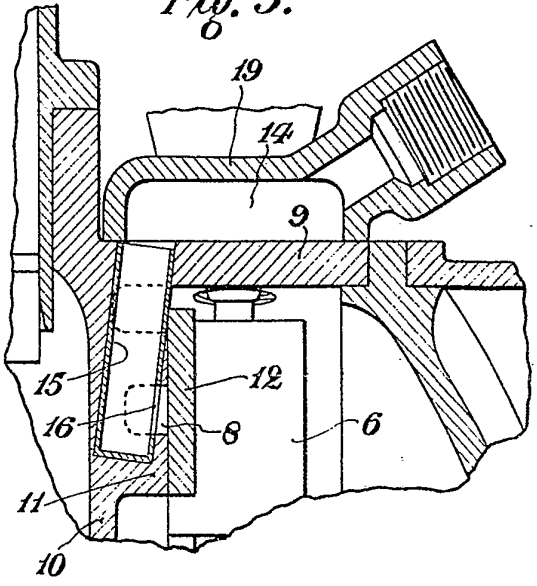

Fig. 2

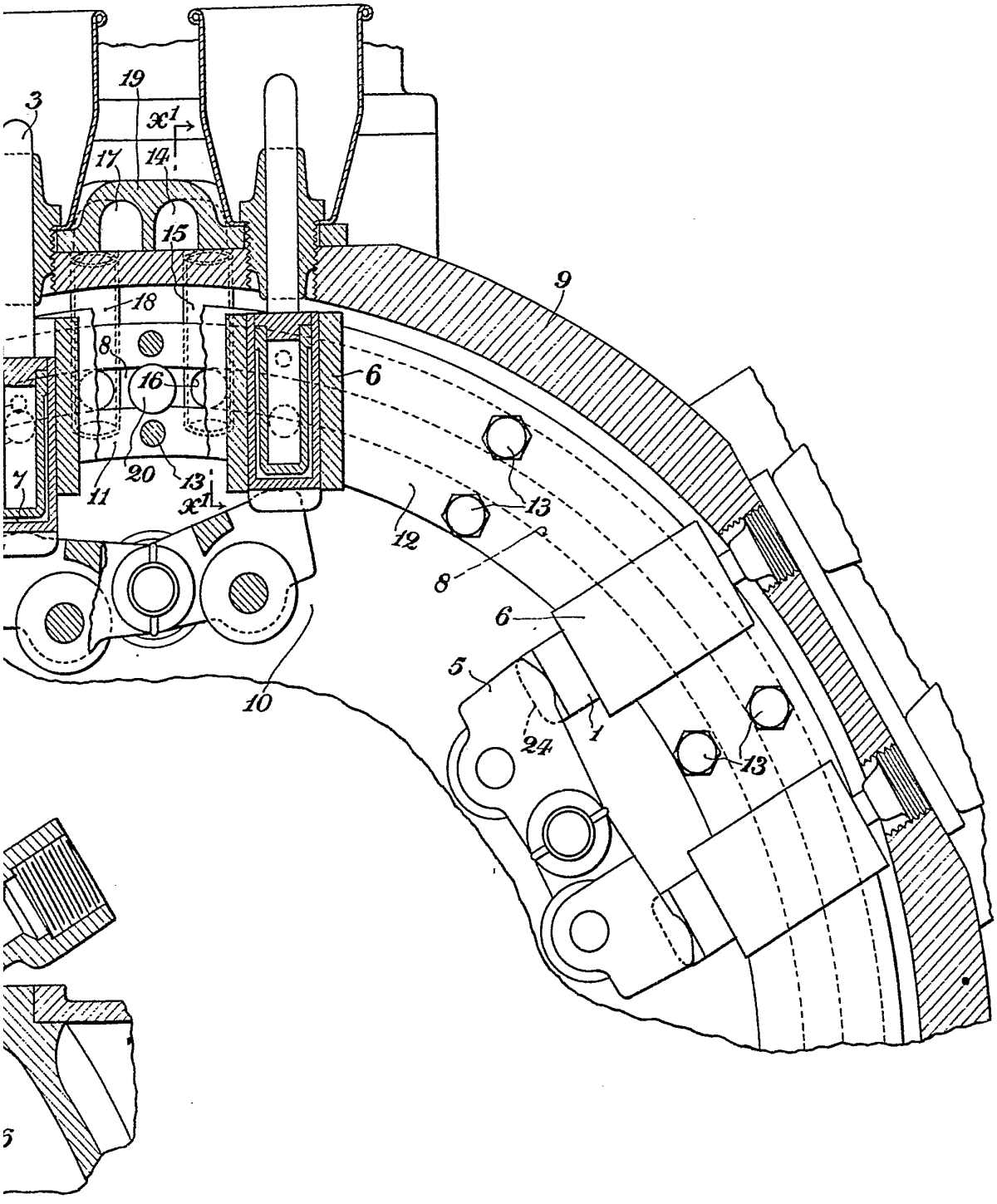

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Fig. 1.

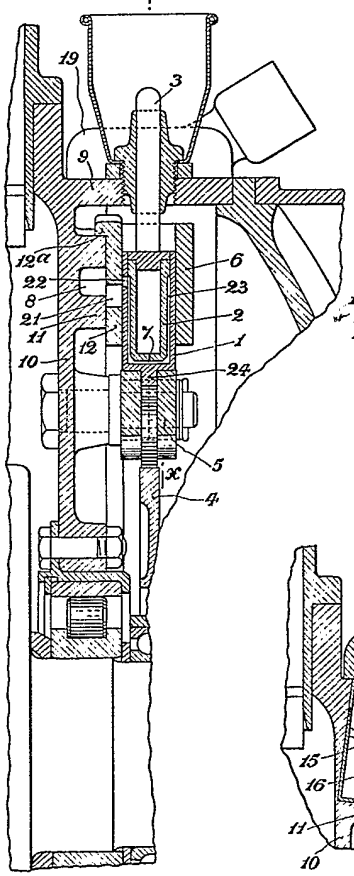


Fig. 2.

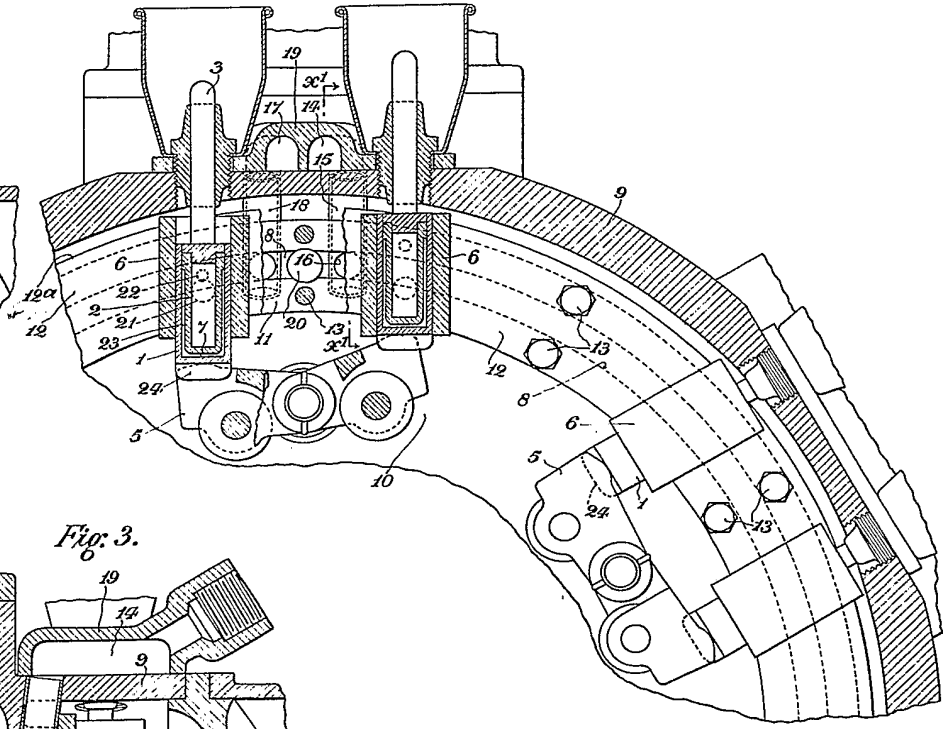
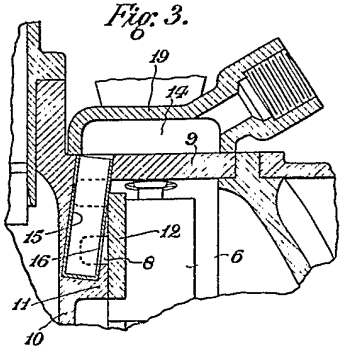


Fig. 3.



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