PATENT SPECIFICATION

411,409

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COMPLETE SPECIFICATION.

Improvements relating to Tappets for the Valves of 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 preventing noise during the operation of the valves, whilst permitting of the actuating parts or tappets expanding due to increase in temperature.

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

The invention consists in feeding oil or liquid to the gaps or clearances of the sliding actuating parts or tappets of the valves of the several cylinders of a radial engine through a common supply pipe or conduit disposed at the front of the engine, the said common supply pipe or conduit being preferably of a ring-like or loop formation and extending around the front or nose of the engine, so as to serve as an oil cooler.

The accompanying drawing is a diagrammatic view showing a common supply pipe for feeding oil to the valve tappet clearances of the several cylinders of a radial aero engine, in which the said pipe is arranged, in accordance with this invention, around the front or nose of the engine, one of the tappets only being shown.

Referring to the drawing, the valves of the several cylinders of the engine are each operated by means of a tappet which is formed in two parts, and comprises a pair of short rods 1 and 2 arranged in alignment within a closely-fitting tubular guide 3. These parts 1 and 2 of the tappet are adapted to be moved up within the guide 3, in order to operate the valve through a push-rod (not shown) in konwn manner, by means of a cam 4, whilst the opposed ends of the two said parts 1 and 2 of the tappet are normally separated by a small gap or clearance 5 to allow for expansion of the valve mechanism due to increase in temperature. In order to prevent noise when the valves are in operation oil is arranged to be supplied under pressure to the clearance 5 between the two parts of each tappet, so as to form a fluid cushion, and for this purpose the tubular tappet guide 3, which is fixed to the engine casing, is formed adjacent the gap or clearance 5 with ports 6 leading into an annular groove 6^a around the exterior of the tappet guide, the said groove 6^a being in communication with a branch pipe 7 through the medium of a passage 8 in an arm 9^a of a ring-like connecting member 9. When the two parts of the tappet are in their lowermost inoperative positions, as shown in the drawing, with the valve closed, the upper end of the lower part 2 of the tappet extends slightly above the ports 6 in the tappet guide, and leaves a narrow passage through which the oil, which is fed through the branch pipe 7, may pass into the gap or clearance 5 between the two tappet parts. When the tappet is moved upwards by the cam to open the valve the lower part 2 of the tappet almost immediately closes the ports 6 in the tappet guide, with the result that the oil is trapped in the space 5 and forms, as stated, a fluid cushion which effectively prevents noise. The oil is thus maintained between the two tappet parts during substantially the whole movement of the tappet, and when the tappet moves down into its original position the clearance 5 is again placed in communication with the ports 6, so that the pressure is reduced, and as the clearance varies during the running of the engine, due to in-

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crease in temperature, the quantity of oil between the tappet parts is automatically adjusted according to requirements, so that it does not prevent the closing of the valve.

The valve tappets of the valves of all of the cylinders of the engine are of a similar construction, the clearances between the two parts of the respective tappets communicating with branch pipes, similar to the pipe 7, spaced peripherally around the forward end 10 of the engine. In order to feed the oil to these several branch pipes a common supply pipe or conduit 11 is provided with which the branch pipes communicate. This common supply pipe 11 is of a ring-formation and extends, as shown, almost completely around the forward or nose end 10 of the engine, whilst integral with, or connected to, the ends of the ring are extension pipes 12 and 13, the pipe 12 communicating with a passage 14 leading from a pump, and the pipe 13 communicating with a passage 15 which is adapted to communicate with an oil release passage 16 controlled by a spring-loaded relief-valve 17. The pump is not only adapted to maintain the oil supplied to the tappet clearances of the valves of the engine under pressure, but is also adapted to supply oil to the engine for lubrication purposes, this oil being forced through the passage 18 leading from the pump passage 14. The oil supplied by the pump is more than sufficient for lubrication purposes, and the surplus oil is caused to pass through the pipe 12 into the circular feed-pipe 11, from which it is fed through the various branch pipes, such as 7, to the clearances of the respective valve tappets. After the oil has passed around the feed-pipe 11 and has filled all the tappet clearances it returns along the pipe 13 past the relief-valve 17 to the release passage 16 and passes back to the sump. The common supply pipe 11 not only enables the oil to be fed to all of the tappet clearances in an efficient manner, but by arranging the said pipe to extend around the forward nose end 10 of the engine it is subjected to the full force of the air current when the aeroplane is in flight, so that the oil passing through the said pipe is effectively cooled. If desired, in order more readily to dissipate the heat the pipe 11 may be fitted with fins.

In order to prevent any oil which may leak past the tappets from disfiguring the front of the engine the upper portion of each tappet guide 3 may be fitted with a cup 19 forming a socket within which is fitted the lower end of a tubular push-rod cover 20. The upper end of the cup 19 is enclosed by a cap 21 fitting closely around the push-rod cover and any oil escaping past the top tappet member is free to flow to a chamber housing the valve rocker, although it is prevented from running down over the front of the engine.

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 supply pipe or conduit disposed at the front of the engine.

2. 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 supply pipe or conduit of a ring-like or loop formation extending around the front or nose-end of the engine.

3. A radial-cylinder internal combustion engine, as claimed in claim 1 or 2, in which the common supply pipe or conduit serves as an oil cooler.

4. A radial-cylinder internal combustion engine, as claimed in claim 1, 2 or 3, in which the valves are each actuated by a tappet comprising two aligned rods normally separated by a gap or clearance and housed within a closely-fitting tubular guide, the latter having a port communicating with the common supply pipe or conduit by a branch pipe, and communicating also with the gap or clearance between the tappet parts when the valve is closed, the lower rod or tappet part closing the said port when the valve opens.

5. A radial-cylinder internal combustion engine, as claimed in claim 4, in which the upper end of the guide for the two parts of the tappet carries a cup or socket into which is fitted the lower end of a housing for a push-rod for operating the valve.

6. A radial-cylinder internal combustion engine, as claimed in any one of the preceding claims, in which the one end of the common supply pipe or conduit communicates with a pump, the other end being adapted to communicate with an outlet or release passage controlled by a spring-loaded relief valve.

7. A radial-cylinder internal combustion engine, as claimed in claim 6, in

which the one end of the common supply pipe is in communication with a conduit through which oil is forced by the pump to the engine for lubrication purposes, the arrangement being such that oil in excess of the amount required for lubrication is caused to pass into the common supply pipe.

8. A radial-cylinder internal combustion engine substantially as herein described with reference to the accompanying drawing.

Dated this 6th day of February, 1934.

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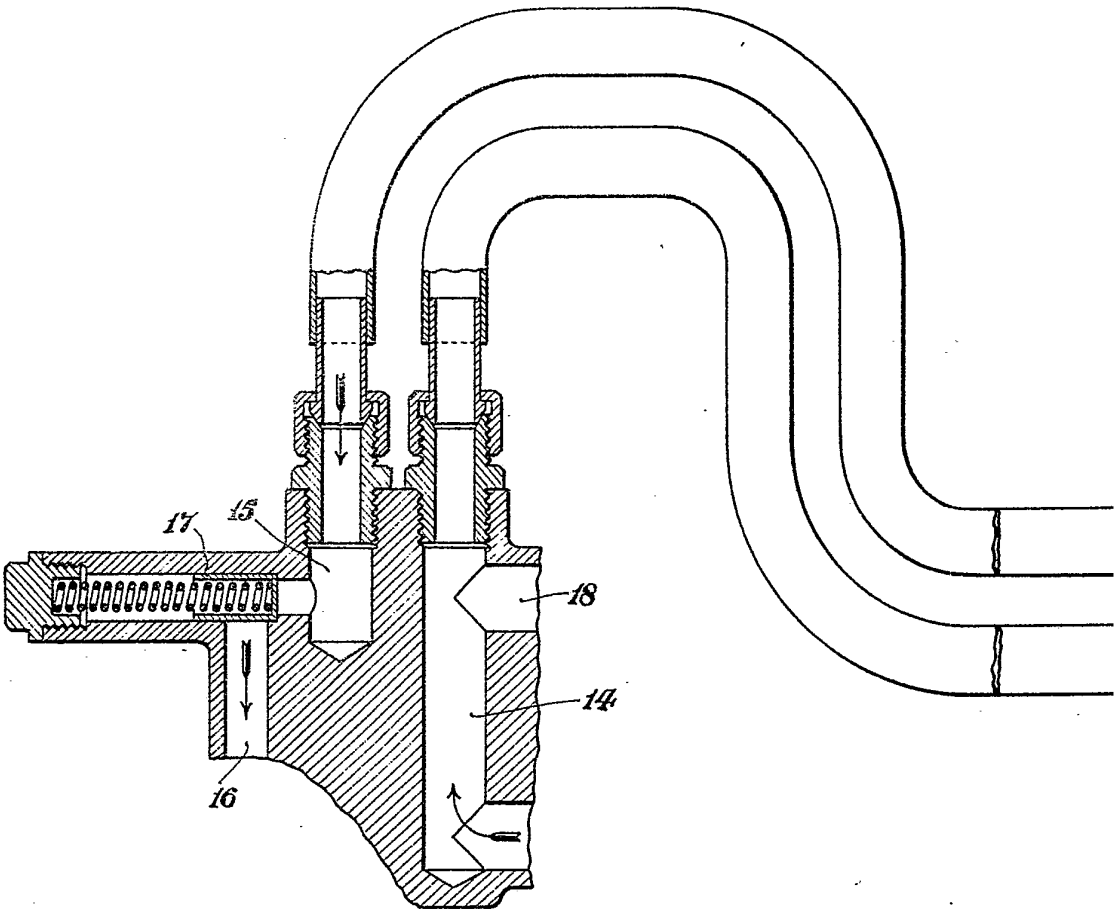

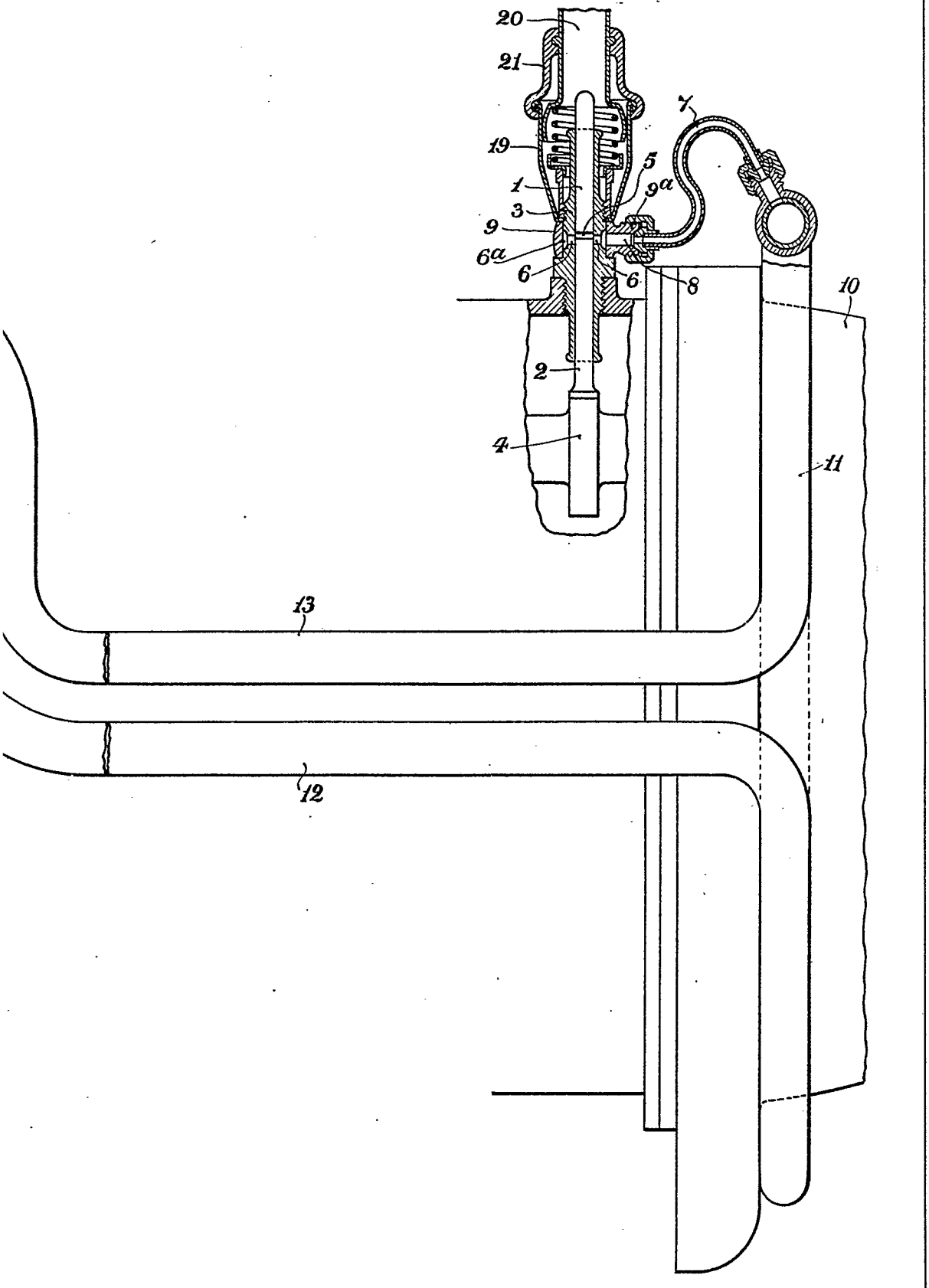

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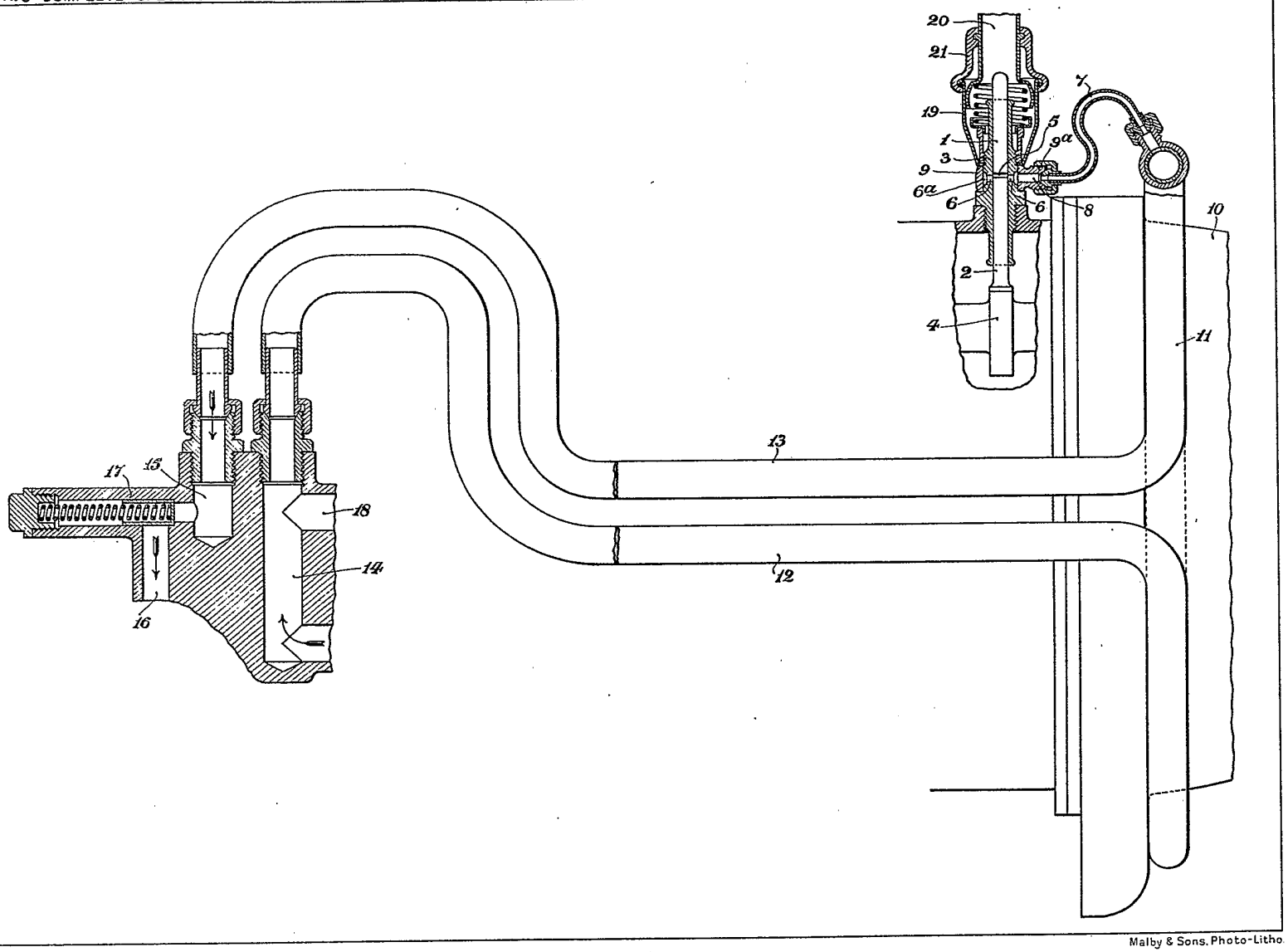

[This Drawing is a reproduction of the Original, on a reduced scale.]

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