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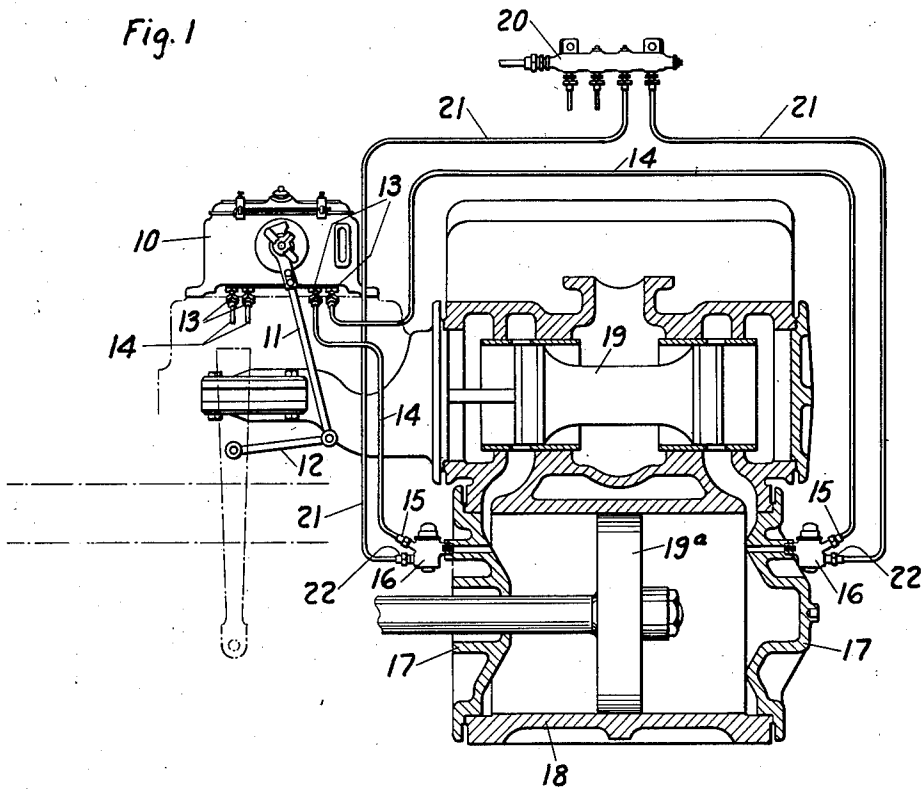
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2,329,040

LUBRICATOR OIL CONTROL VALVE

Filed May 8, 1942

2 Sheets-Sheet 1



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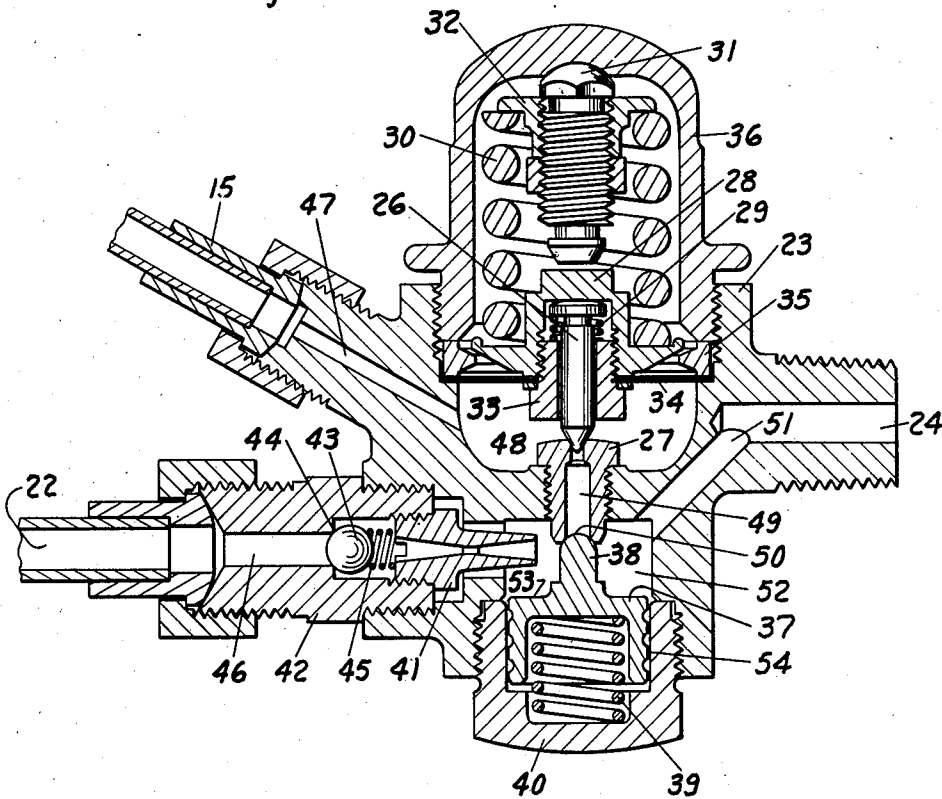
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Fig. 2



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LUBRICATOR OIL CONTROL VALVE

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4 Claims. (Cl. 184—56)

It is one of the objects of the invention to provide means whereby oil delivered from a source of supply under pressure, such as a mechanical lubricator, for instance, will be injected into the device to be lubricated at proper intervals to effect most efficient lubrication.

More particularly, it is an object to provide means to discharge oil delivered from a mechanical lubricator to, for example, a steam cylinder, during the period when steam is admitted into the cylinder.

Another object is to provide a terminal check or control valve which will discharge oil into a steam engine at regular intervals and which will prevent admission of oil during the exhaust part of the stroke.

Still further objects will become apparent in the following specification and in the drawings showing a preferred embodiment of the invention in which

Fig. 1 is a general view of the application of two control valves in connection with a mechanical lubricator on a steam locomotive cylinder, and

Fig. 2 shows a longitudinal section through the control valve at an enlarged scale.

Like characters of reference denote similar parts throughout the several views and the following specification.

Referring to Fig. 1, 10 shows a mechanical lubricator operated by a drive lever 11, connected to a suitable moving member 12. Lubricant is supplied through pumping units 13 and pipe lines 14 to oil inlets 15 of an oil control valve 16, located in the cylinder heads 17 of a steam cylinder 18. A locomotive piston valve is indicated more or less diagrammatically at 19 and a main steam piston at 19a.

Steam from a suitable supply as at 20, is admitted through pipes 21 to steam inlets 22 of control valves 16.

Referring to Fig. 2, the control valve consists of a body 23 having an oil inlet 15, a steam inlet 22 and a discharge connection 24. 26 is a valve member operating against a valve seat 27 and held against an abutment 28 by means of spring 29. The valve 26 is forced towards its seat 27 by a regulating spring 30 acting against abutment 28. A screw 31 and a nut 32 are provided for regulating the tension of spring 30. The valve 26 is guided in a diaphragm nut 33, supported by a diaphragm 34. The diaphragm 34 is held in place by a diaphragm ring 35 and a spring cap 36.

A piston 37 is provided with a valve extension 38 and is urged towards valve seat 27 by means of a spring 39 held in position by a spring cap 40.

A steam nozzle 41 is screwed into adapter 42.

A non-return check valve 43 held against its seat 44 by means of a spring 45 prevents return flow through passage 46.

The operation of the control valve is as follows:

Oil discharged from the mechanical lubricator through one of the pumping units 13 and oil line 14 enters the oil control valve 16 at 15, passes through an oil passage 47 and fills a central oil cavity 48. After a pressure has been built up under the diaphragm 34 sufficient to overcome the tension of spring 30, valve member 26 will be lifted from its seat and oil will be discharged into a passage 49 in the valve seat 27, exerting pressure on an end 50 of the valve 38.

In a manner well known in the art, the pressure in steam cylinder 18 fluctuates from a maximum, when steam is admitted into the cylinder by means of the piston valve 19, to a minimum, when steam is exhausted to the atmosphere also by action of the valve 19. These pressure fluctuations occur in each end of the steam cylinder 18 and are communicated through connection 24 and a passage 51 to a space or chamber 52 above the piston 37. The passage 51 is sufficiently large to permit the pressure fluctuations occurring in the cylinder to be transmitted to chamber 52 almost instantaneously. When the pressure in the cylinder 18 is approaching its maximum, the steam pressure on surface 53 of the piston 37 in addition to the oil pressure on surface 50 of valve extension 38 moves valve 38 away from seat 27, permitting a small amount of oil to enter chamber 52. As the pressure acting on surface 53 of the piston 37 is gradually being equalized by the pressure leaking past the annular clearance space 54 around the piston and acting on the opposite side of the piston 37, the valve 38 will again be moved against seat 27 by means of the spring 39.

As the pressure in cylinder 18 begins to drop during the expansion stroke, the pressure in control valve chamber 52 communicated through passage 51 will likewise drop, thus relieving the pressure on surface 53 of the piston 37 and permitting valve 38 to be held firmly against seat 27 during the exhaust stroke. When the steam in the chamber 52 expands with the decreasing pressure in cylinder 18, oil previously injected around valve 38 into chamber 52 will be discharged through passage 51 into cylinder 18.

In order to assure immediate discharge of oil from chamber 52 into cylinder 18 as soon as oil has been discharged into chamber 52, an atomizing steam nozzle 41 has been provided. Steam, under substantially boiler pressure from a source 20, conducted through pipe 21 enters connection

22 and passage 46, lifts ball check 43 from its seat and is discharged at high velocity through the atomizing nozzle 41. The boiler pressure being at all times higher than the cylinder pressure, a steady flow of steam will be discharged through the atomizing nozzle 41, immediately delivering oil, as it is discharged around valve 38, through passage 51 into the steam cylinder 18. It should be noted that the opening through the atomizing steam nozzle 41 is substantially less than the area through passage 51, so that the steam entering through the steam nozzle 41 is not sufficient to increase the pressure in chamber 52 to any measurable degree and the steam entering from said nozzle does not in any way affect the pressure fluctuations in chamber 52. Only a sufficient amount of steam enters through said steam nozzle to assure immediate discharge of oil into the passage 51 and hence to the steam cylinder 18. In this manner, oil will have been discharged from chamber 52 into steam cylinder 18 during the high pressure interval, and the oil discharge will be completed before the end of the expansion stroke and the beginning of the exhaust stroke of the piston 19a, and thus no oil will be discharged into the cylinder during the exhaust part of the stroke.

During the exhaust part of the stroke extension 38 of piston 37 is held firmly against seat 27 closing passage 49. At this time the tension of spring 39 is supplemented by the pressure on the spring side of piston 37, which pressure entered around the clearance space 54 during the maximum pressure period as explained above.

It will be understood that, when the locomotive is drifting and no steam used in the cylinders, the oil pressure in passage 49 acting on the surface 50 of valve 38 will open valve 38 against spring 39 without the aid of steam pressure.

It is furthermore apparent that if the valve member 26 is opened while valve 38 is held to its seat, the valve member 26 will remain open until valve 38 opens and relieves the pressure, at which time valve member 26 will be seated, as the pressure drops in the oil space below diaphragm 34.

While I have explained the operation of the oil control valve in connection with a steam engine, it is obvious that the same valve may be used with an air engine, in fact any type of engine in which the cylinder pressure is subject to periodic fluctuations.

It is understood that various changes in form,

proportions and minor details of construction may be resorted to without departing from the principles or sacrificing any of the advantages of the invention as defined in the appended claims.

5 What I claim as new, is:

1. An oil control valve having an inlet for oil under pressure, a primary chamber having a valved outlet, a secondary chamber having a valved inlet in communication with said valved outlet and a main outlet to the cylinder of an engine, and means in said secondary chamber to open momentarily said valved inlet during the pressure stroke in said cylinder and to keep said valved inlet closed during the exhaust stroke in said cylinder.

2. An oil control valve having an inlet for oil under pressure, a primary chamber having a valved outlet, a secondary chamber having a valved inlet in communication with said valved outlet and a main outlet to the cylinder of an engine, means in said secondary chamber to open momentarily said valved inlet during the pressure stroke in said cylinder and to keep said valved inlet closed during the exhaust stroke in said cylinder, and an atomizing jet discharging into said secondary chamber to accelerate the ejection of oil from said secondary chamber.

3. An oil control valve having an inlet for oil under pressure, a primary chamber having a valved outlet, a secondary chamber having an inlet port in communication with said valved outlet and a main outlet to the cylinder of an engine, and a piston in said secondary chamber having means to close said inlet port, said piston being adapted to open momentarily said inlet port during the pressure stroke in said cylinder and to keep said inlet port closed during the exhaust stroke in said cylinder.

4. An oil control valve having an inlet for oil under pressure, a primary chamber having a valved outlet, a secondary chamber having an inlet port in communication with said valved outlet and a main outlet to the cylinder of an engine, a piston in said secondary chamber having means to close said inlet port, said piston being adapted to open momentarily said inlet port during the pressure stroke in said cylinder and to keep said inlet port closed during the exhaust stroke in said cylinder, and an atomizing jet discharging into said secondary chamber to accelerate the ejection of oil from said secondary chamber.

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