AUTOMATICALLY CONTROLLED CIRCULATING SYSTEM FOR OILS OR OTHER LIQUIDS

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Inventor:
Edwin W. H. Rennick

By Oviscrum & Clark Atty.
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EDWIN W. H. RENNICK, OF FOBT WAYNE, INDIANA, ASSIGNOR TO S. T. BOWSER & COMPANY, INC., OF FOBT WAYNE, INDIANA, A CORPORATION OF INDIANA

AUTOMATICALLY-CONTROLLED CIRCULATING SYSTEM FOR OILS OR OTHER LIQUIDS


My invention relates in general to an automatically controlled circulating system for oils and other liquids which has been designed primarily for circulating cutting oil to and from a machine; a lathe, as one example, which uses it when in operation.

As heretofore practiced, cutting oil has usually been supplied to lathes, and other machines which use it, with a more or less constant feed up to the cut-off of the feed, ordinarily located at the nozzle end or discharge just over the machine. It so happens that the machinist frequently neglects to cut off the supply of cutting oil by turning the discharge valve at the nozzle end of the feed with the result that after the machine has been stopped and there is no need of the cutting oil, it still continues to drop from the feed line and considerable oil is thus wasted.

I have devised a system which may be used to advantage for supplying this cutting oil to machines with means in combination with the system for effecting an automatic cut-off of the oil feed when the machine is stopped. In this way, I can effect not only a saving of the cutting oil but also prevent unnecessary wear and tear on the operating parts of the system by discontinuing the operation thereof when the cutting oil is not required for the machine.

The salient features of the invention are exemplified in the combination and arrangement of parts illustrated in the accompanying drawings in which I have selected a practical embodiment of the invention as an illustration. In said drawings:

Fig. 1 is a somewhat diagrammatic view of the system;

Fig. 2 is a vertical section through the automatic control valve therefor showing the valve in closed position; and

Fig. 3 is a similar view on a smaller scale showing the valve open.

Referring now to the drawings in detail, 4 represents an oil filter which serves as a source of supply for the cutting oil. The cutting oil supplied to the machine which, according to the present illustration, is a lathe 5, is pumped from the filter 4 by the pump 6 driven by the motor 7 and forced through the pressure feed comprising the pipe 8, through the automatic control valve 9 to the discharge end 10 of the pipe 11. The discharge end 10 of the feed terminates above the lathe in a position which will deliver cutting oil to the work piece operated on by the lathe. The oil, after serving its purpose, is collected and returned to the filter 4 for cleansing purposes through the return feed comprising the pipe line 12. The oil will be pumped through this return line by the pump 13 driven by the motor 14. The pump passes the oil under pressure through the pipe 15, through the valve 9, into the pipe 16, and then into the filter 4. After being filtered, it is again returned through the supply feed.

The construction of the valve 9 is illustrated in Figs. 2 and 3 and the same preferably comprises a cast housing 17 having an inlet connection 18 on one side for the feed pipe 8 and an outlet connection 19 on the other side for the pipe 11. The return pipe 15 communicates with the valve housing by the inlet connection 20 and the pipe 16 communicates with the housing through the outlet connection 21. The valve is constructed to assume an upstanding position in the system and the pipes which connect it will serve as a suitable support therefor. The housing 17 is made to accommodate a plunger 22 which is elongated so as to control all of the inlets and outlets. Intermediate its ends, the plunger is made with a reduced diameter 23 and this portion is surrounded by a recess 24 within the housing from the side of which the outlet connection 19 communicates. Disposed at the bottom of the recess 24 is a reduction 25 in the internal diameter of the housing which snugly fits the end 26 of the valve. The valve, of course, is mounted for free reciprocating movement in the housing but the circumference of the end 26 has a ground fit with the restricted diameter 25 so as to close off the recess 24 and the space into which the intake 20 of the return communicates. Another cut-off is provided between the outlet connection 21 for the return and the inlet connection 20 by a restricted diameter 27 in the housing between the intake 20 and the...
outlet 21. The end 26 of the valve fits this restriction 27 with freedom of sliding movement. Above the recess 24 is a restriction 29 on the inside of the valve housing which fits the diameter 29 of the valve so as to provide a cut-off between the space 24 and the inlet connection 18. To insure a positive cut-off at this point, the head 30 of the valve is made somewhat larger than the diameter of the restriction 28 above the shallow recess 31 which is cut in the circumference of the valve to leave a shoulder which, when the valve is in closed position, will rest upon the top of the restriction 28, as clearly shown in Fig. 2.

The intake 18 communicates with an irregular space 32 which extends around the head 30 of the valve, the irregularities and the space, for the most part, serving as a guide for the valve head and comprising a cylinder-like wall 33. The valve head 30 is made with an internal bore 34 which is occupied by the coil spring 35, the spring being held under tension by the head 36 which is threaded into the top of the housing and has a shallow internal bore 37 which is occupied by the opposite end of the spring. Under the influence of the spring 35, the valve is normally seated, as shown in Fig. 2, to close the inlets and outlets which communicate with the housing thereof. When the valve is opened against the resistance of the spring 35, it will be moved into a position as shown in Fig. 3 and when in this position, the reduced diameter 23 of the valve will be moved above the restriction 28 so as to leave a passage 38 around the valve between the recess 32 and the recess 24. The cutting oil under pressure in the pipe 8 will then be forced through the valve into the pipe 11 where it will be supplied to the machine. When the communication between the pipes 8 and 11 is open, the end 26 of the valve will be in a position out of contact with the restriction 27 in the housing which will establish a communication between the return pipes 15 and 16 and the space 39 so that oil may be supplied to the filter 4 from the machine 5 through the valve. As previously stated, when the valve is closed, the oil circulation is and from the machine is interrupted.

The valve is provided with a release port 40 which extends axially through the center thereof, a radial release port 41, and still another but restricted release port 42 in the axis of the end 26. The purpose of these release ports is to permit the air and any oil on top of the valve to be forced down through the port 40 and out through the port 42.

The automatic features of the system reside in the construction of the valve 9 and its combination with the pressure return for the oil. The pump 13 develops this oil pressure and since the end 26 of the valve terminates over the intake 20, the pressure created will force the valve up against the resistance of the spring 35 and open the outlets and inlets through the valve so long as the pressure is maintained. When the pressure is interrupted, the spring 35 will return the valve to its closed position, arresting the circulation of the oil through the valve.

In order to effect an automatic control for the pump, I prefer to place the operation of the same under the control of the machine 5, that is to say, the hook-up will be such as to start the pump 13 when the lathe 5 is started and to stop the pump 13 when the lathe 5 is stopped. In this way, just as soon as the lathe is started, cutting oil will be delivered from the discharge end 10 of the feed and when the lathe stops, it will be cut off.

The pump 6 for the feed which is driven by the motor 7 need not be under the control of the lathe or other machine 5, so far as stopping and starting the same is concerned, although this possibility is contemplated. When the valve 9 is closed, it makes no difference whether the pump 6 is operating or not; in fact, it may be important to operate the same independently of the operation of the lathe or other machine 5 since it may be hooked up as a primary pump for several of these systems, in which event it would be necessary that the same operate to supply some of the systems while others were closed down. In other words, oil may be supplied to several machines by a single pump and it need not follow that all of the machines would be in operation at the same time.

This pressure feed for supplying the oil is only necessary where the source of oil supplied, such as the filter 4, is located at a level where the oil will not gravitate through the valve 9. So far as the automatic features of the system is concerned, it will operate just as well with the gravity feed as a force feed. Obviously those skilled in the art may make various changes in the details and arrangement of parts without departing from the spirit and scope of the invention as defined by the appended claims, and I wish therefore not to be restricted to the precise construction herein disclosed.

I claim:

1. In a circulating system of the class described, a source of oil supply, means for feeding oil from said source of supply to a machine while the machine is operating, means for removing used oil from the machine, and valve mechanism operated by the pressure in said removing means for controlling the flow of the oil to the machine and for automatically interrupting the feed when the machine stops.

2. In a circulating system of the class described, a source of oil supply, an oil feed from said supply source to a machine, means comprising a pressure line for returning used oil from the machine to the source of supply, and valve mechanism operated by the
pressure in said pressure line for opening the oil feed while the machine is operating to cut off the feed when the machine stops.

3. A system for circulating cutting oil from an oil filter to a machine while the machine is running and returning it from the machine to the filter, comprising an oil feed from the machine to the filter, an oil return from the machine to the filter, and a valve operated automatically to close the feed from the filter to the machine when the machine stops.

4. In a circulating system of the class described, a source of oil supply, an oil feed to a machine therefrom, a control valve for said oil feed having spring tension means closing the same when the machine is stopped, and means for automatically holding the valve open against the resistance of said spring tension means while the machine is running.

5. In a circulating system of the class described, a source of oil supply, an oil feed to a machine therefrom, a control valve for said oil feed having spring tension means closing the same when the machine is stopped, and means for automatically holding the valve open against the resistance of said spring tension means while the machine is running comprising a pressure feed which returns the oil from the machine to the supply source through said valve.

6. In a circulating system of the class described, a source of oil supply, a pressure oil supply feed from said supply source to a machine, a pressure return feed for the oil from the machine to said supply source, and a control valve in said pressure supply feed having spring tension means closing the same when the machine is stopped.

7. In a circulating system of the class described, a source of oil supply, a pressure oil supply feed from said supply source to a machine, a pressure return feed for the oil from the machine to said supply source, and a control valve in said pressure supply feed having spring tension means closing the same when the machine is stopped, said pressure return feed returning the oil through said valve to the supply source when the machine is running with the pressure of the oil holding the valve open.

8. In a system for circulating lubricant, the combination with a filter, of means for feeding lubricant from said filter to a machine, means for returning used lubricant from the machine to the filter, interconnected valves for controlling the flow to the machine and the other for controlling the flow from the machine, one of said valves being subject to the pressure in the returning means to open both valves, and means for automatically closing both valves when the pressure in said returning means is relieved.

9. In a system for circulating cutting oil from a filter to and from a machine which uses the same when operating, the combination of a feed control valve through which the oil circulates to and from the machine, and a pump operated when the machine is running for returning the oil under pressure from the machine to the filter, said valve being responsive to said oil pressure for opening the feed to the machine, and a spring for closing the valve when the oil pressure return feed is interrupted.

10. An automatic control valve having an inlet and an outlet for oil passing in one direction through the valve, an inlet and outlet for the oil passing through the valve in the opposite direction, and means for cutting off the flow of oil through the valve in both directions.

11. An automatic control valve, comprising a housing, two sets of inlet and outlets therein, and a valve in said housing responsive to fluid pressure introduced at one of said inlets for opening all of said inlets and outlets.

12. An automatic control valve, comprising a housing, two sets of inlet and outlets therein, and a spring-closed valve in said housing responsive to fluid pressure introduced at one of said inlets for opening all of said inlets and outlets.

13. An automatic control valve comprising an inlet and outlet through which a liquid is passed from a source of supply to a machine, an inlet and outlet in the valve through which the liquid is returned from the machine under pressure, and a plunger in said valve responsive to the pressure of the returning liquid for opening all of said inlets and outlets.

14. An automatic control valve comprising an inlet and an outlet through which a liquid is passed from a source of supply to a machine, an inlet and outlet in the valve through which the liquid is returned from the machine under pressure, and a spring-closed plunger in said valve responsive to the pressure of the returning liquid for opening all of said inlets and outlets.

15. An automatic control valve comprising an inlet and outlet through which a liquid is passed from a source of supply to a machine, an inlet and outlet in the valve through which the liquid is returned from the machine under pressure, and a spring-closed plunger in said valve responsive to the pressure of the returning liquid for opening all of said inlets and outlets.

16. An automatic control valve comprising a housing having one passageway between an inlet and an outlet and another passageway between another inlet and another outlet, interconnected valves for controlling said pas-
sageways, one of said valves being subject to pressure of liquid flowing through the pas-
sageway controlled thereby to effect the opening of both valves, and means for closing
both valves when such pressure is relieved.

17. A system for circulating lubricant from a source of supply to a machine while the
latter is operating and removing used lubricant from the machine, comprising means
for feeding lubricant to the machine, means for removing used lubricant from the ma-
chine, and valve mechanism operated automatically by the pressure in the said remov-
ing means for controlling the feed of the lubricant to the machine.

18. A system for circulating lubricant from a source of supply to a machine while the
latter is operating and removing used lubricant from the machine, comprising
means for feeding lubricant to the machine, means for removing used lubricant from the
machine, and valve mechanism operable automatically by pressure in said removing
means for controlling the flow to the machine and from the machine including the auto-
matic cutting off of both of such flows when the pressure in the returning means is re-
lieved.

19. A system for circulating lubricant from a source of supply to a machine while the
latter is operating and removing used lubricant from the machine, comprising
means for feeding lubricant to the machine, means for removing used lubricant from the
machine, a valve opened by pressure in said removing means for controlling the flow from
the machine, another valve connected to said first-named valve to be opened when the lat-
ter is opened to control the flow to the ma-
chine, and means for closing both valves to cut off the flow to and from the machine when
such pressure is relieved.

In testimony whereof I have signed my name to this specification on this 22d day of
August, A. D. 1927.

EDWIN W. H. RENNICK.