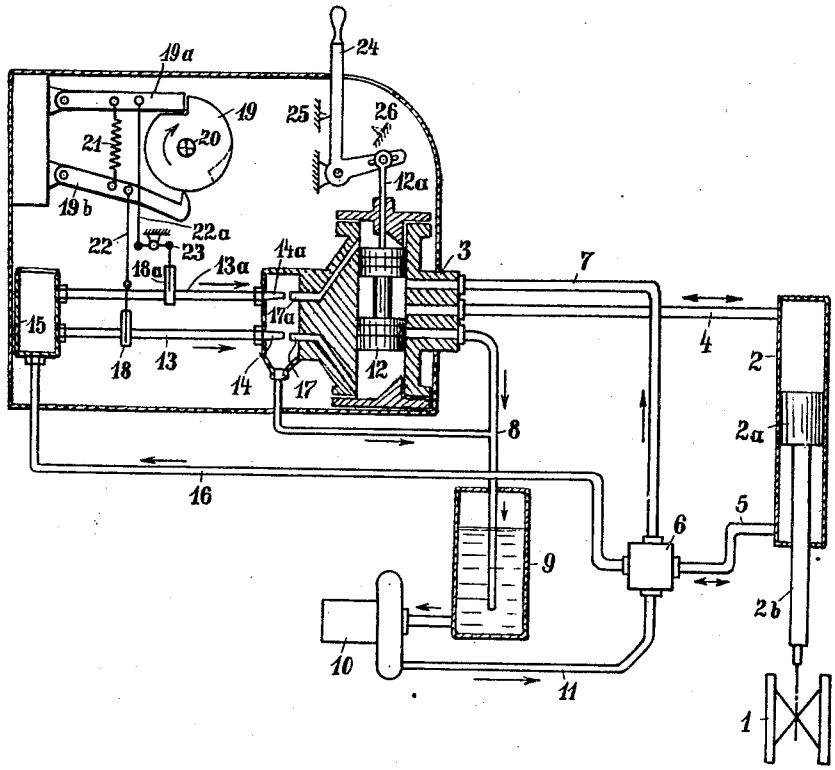
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AUTOMATIC REVERSING APPARATUS FOR CONTROLLING THE CLOSURE MEMBERS OF PERIODICALLY OPERATING GAS PRODUCERS

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AUTOMATIC REVERSING APPARATUS FOR CONTROLLING THE CLOSURE MEMBERS OF PERIODICALLY OPERATING GAS PRODUCERS

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In automatic controls for intermittent gas producers, the direction of flow of the pressure medium (for example water or oil under pressure) supplied to the lifting or actuating cylinders for the closure members of the producer is, in many cases, reversed by means of small control cylinders. In many instances, the reversing of the pistons in these control cylinders is also effected by a pressure medium, small throttle members which periodically regulate the supply and escape of the said pressure medium being controlled by means of a rotary cam shaft and suitable levers and rods. This pressure medium may be the same as that for the actuating cylinders.

In such an arrangement it is necessary that the small throttle members controlled by the cam shaft should not only alternately open and close the passages for the pressure medium to the control cylinders, but also that, simultaneously with each closing, a way of escape should be open for the amount of pressure medium present in the cylinder side concerned, said way of escape being closed again at the next reversal.

Whereas special members (cocks or the like) have hitherto been used for providing these means of escape, this purpose is accomplished, in accordance with my invention, by the insertion of jet nozzles arranged to provide an interruption point or zone, which does not require to be specially closed, in the pipe between the small throttle members and the control cylinders. By means of said nozzles, the full pressure in the pipe can be transmitted to the control cylinders across the interruption zone when the throttle members are open, while the contents of the cylinders can pass away through said zone, without restriction, when said members are closed.

A typical embodiment of the invention is illustrated on the accompanying drawing.

1 denotes one of the closure members of the gas producer, 2 the corresponding actuating cylinder, 2*a* the piston, and 2*b* the piston rod. By means of pipes 4 and 5, the actuating cylinder is connected with a control cylinder 3, on the one hand, and with a pressure accumulator 6 on the other. A pipe 7 connects the control cylinder 3 with the accumulator 6, and a pipe 8 connects the control cylinder 3 with a liquid tank 9 which is under atmospheric pressure. A pump 10 delivers the pressure liquid into the accumulator 6 through a pipe 11.

The control cylinder 3 houses a movable, balanced piston 12, the piston rod 12*a* of which passes through the cylinder head.

Disposed laterally of the control cylinder 3 are two freely discharging nozzles 14 and 14*a*, each of which is connected, by a tube 13 or 13*a* with a collector 15 and, beyond this latter, with the accumulator 6, by means of a pipe 16. Situated a short distance in front of the nozzles 14 and 14*a* are the ends of two tubes 17 and 17*a*, the former of which communicates with the under side of the piston valve 12 in the control cylinder 3, and the other with the upper side of said piston. The pipes 13 and 13*a* are adapted to be closed by the closure or throttle members 18 and 18*a*. By means of a shaft 20, which is provided with cams 19, and corresponding follower levers 19*a* and 19*b*, the two control rods 22*a* and 22 are raised or lowered, under the action of the spring 21, in accordance with the positions of recesses in the adjacently disposed cams 19. Since the throttle member 18 is coupled direct to the rod 22, it is opened or closed in accordance with the position of the control cams. The movement of the control rod 22*a* is transmitted to the throttle member 18*a* through an intermediate lever 23 with arms of equal length.

In the event of a failure in the supply of pressure medium, the control can also be effected by actuating the piston valve 12 by hand, by means of a lever 24, which engages the piston rod 12*a*. Stops 25 and 26 limit the movement of the lever 24.

The method of operation is as follows:—

The control shaft 20, for jointly actuating the several closure members in the gas producer is set in uniform rotation by a driving means not shown in the drawing and thus rotates the two adjacently mounted control cams 19 provided for each system. Each of said cams is provided with a notch. The one cam serves to actuate the throttle member 18, the other to actuate the throttle member 18*a*.

In a given position of the cams, either the lever 19*b* or 19*a* is caused to fall into the notch of the corresponding cam by the tension of the spring 21. The movement of the latching lever is transmitted to the throttle member 18 or 18*a*, as the case may be, through the control rod 22 or 22*a*. Thus, when one of the two levers 19*b* or 19*a* engages in the notch in its cam, the throttle member 18 or 18*a*, connected therewith by the rod 22 or 22*a*, is opened. In the drawing, the lever 19*a* is shown engaging in the notch of its cam and the throttle member 18*a* is thereby opened. Under the action of the pressure liquid, which flows from the accumulator 6, through the pipe 16, the collector 15, the pipe 13*a*, the nozzle 14*a* and the tube 17*a* to the upper chamber of the cylinder 13, the piston 12 is forced downwards. The piston of the actuating cylinder 2, which, prior to the reversal, received pressure on its upper side, through the pipes 7 and 4, and therefore shut the closure member 1, is now lifted by the pressure of the liquid admitted into the cylinder through the pipe 5, owing to the free outlet from the upper half of the cylinder afforded by the pipes 4 and 8, thereby causing the closure member 1 to open. During the further rotation of the cams 19, the closure member 18*a* is again closed, and therefore no more pressure medium is supplied to the control cylinder 3. The piston valve 12 remains in its bottom position, however, until the cams 19 have turned so far that the lever 19*b* comes into engagement, and thus effects the opening of the throttle member 18 whereupon the control piston 12 is again moved into the position shown.

During the movement of the piston valve 12 from below upwards, the pressure medium situated above the piston is able to flow away freely through the air gap between the nozzle 14*a* and the tube 17*a*, and similarly, during the reverse movement of the piston, through the air gap between 14 and 17. Should the automatic reversal get out of order, the control piston 12 can be actuated by hand through the piston rod 12*a* and the handle 24.

I claim:—

1. Means for controlling the pressure fluid actuated closure members of periodically operating gas producers, comprising, in combination, a control cylinder with a piston displaceable therein by pressure fluid supplied through ports in the cylinder, nozzles spaced from the port inlets, means for supplying the pressure fluid to said nozzles and across the intervening space to said ports, throttle members for controlling the supply to said nozzles, and mechanism for periodically and successively opening and closing said throttle members, said space providing a means of fluid escape from said control cylinder when said throttle members are closed.

2. Means for controlling the pressure fluid actuated closure members of periodically operating gas producers, comprising, in combination, a control cylinder with a piston displaceable therein by pressure fluid supplied through ports in the cylinder, nozzles spaced from the port inlets, pipes for supplying the pressure fluid to said nozzles and across the intervening space to said ports, throttle members in the supply pipes, and means for periodically and successively opening and closing said throttle members, said space providing a fluid escape from said control cylinder when said throttle members are closed.

3. Means for controlling the pressure fluid actuated closure members of periodically operating gas producers, comprising, in combination, a control cylinder with a piston displaceable therein by pressure fluid supplied through ports in the cylinder, nozzles spaced from the port inlets, means for supplying the pressure fluid to said nozzles and across the intervening space to said ports, throttle members for controlling the supply to said nozzles, rotatable cams, and levers co-operating with said cams and connected with said throttle members for periodically and successively opening and closing them, said space providing a means of fluid escape from said control cylinder when said throttle members are closed.

4. Means for controlling the pressure fluid actuated closure members of periodically operating gas producers, comprising, in combination, a control cylinder with a piston displaceable therein by pressure fluid supplied through ports in the cylinder, nozzles spaced from the port inlets, pipes for supplying the pressure fluid to said nozzles and across the intervening space to said ports, throttle members in the supply pipes, rotatable cams, and levers co-operating with said cams and connected with said throttle members for periodically and successively opening and closing them, said space providing a fluid escape from said control cylinder when said throttle members are closed.

In testimony whereof I affix my signature.

CARL MIEDBRODT.