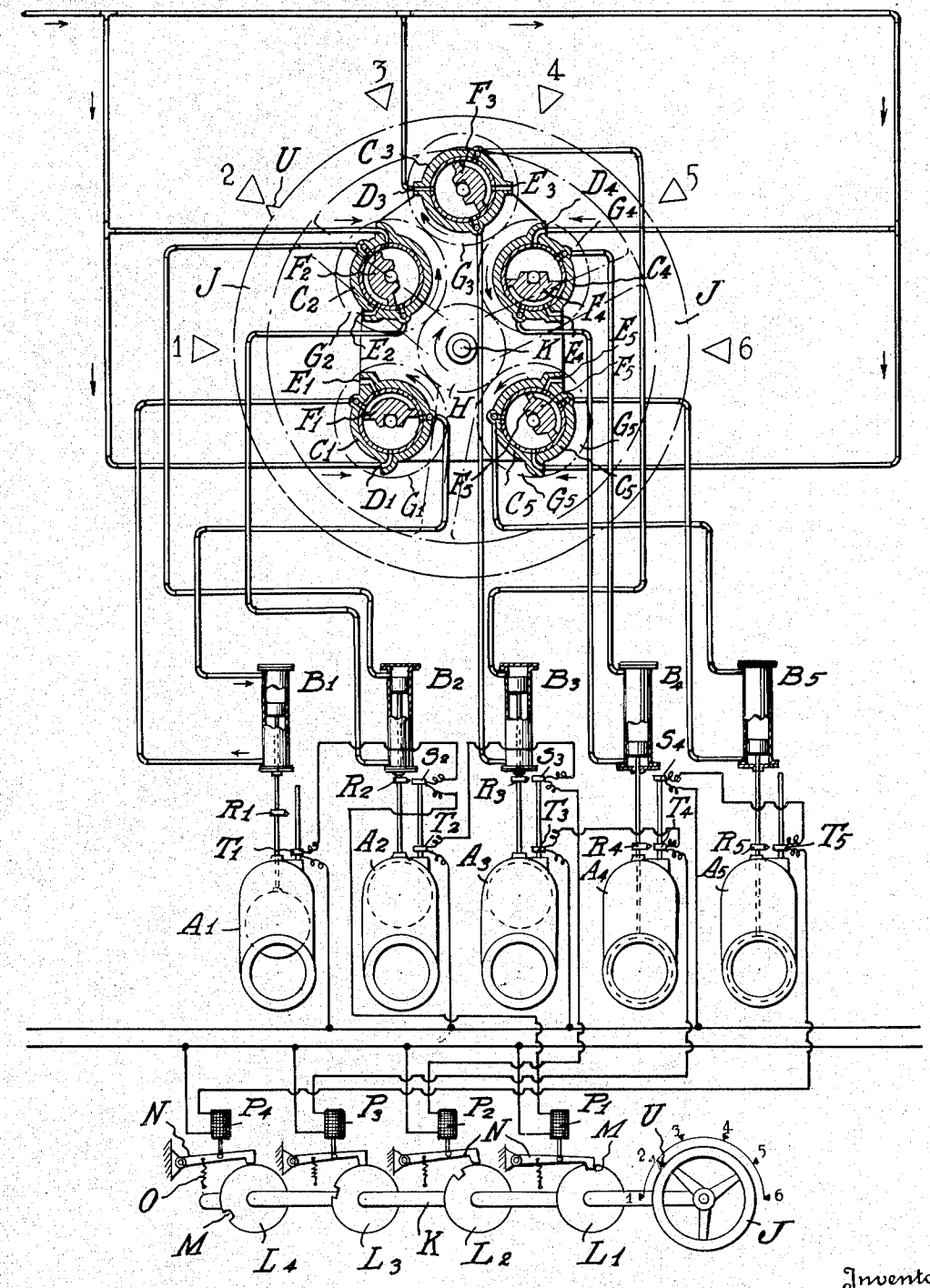
July 27, 1937. H. DIENENTHAL 2,088,261

SYSTEM OF CONTROL FOR GROUPS OF GATE VALVES OR THE LIKE

Filed Feb. 17, 1934



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Patented July 27, 1937 2,088,261

UNITED STATES PATENT OFFICE

2,088,261

SYSTEM OF CONTROL FOR GROUPS OF GATE-VALVES OR THE LIKE

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Application February 17, 1934, Serial No. 711,800
In Germany February 17, 1933

1 Claim. (Cl. 137—144)

This invention relates to a system of control for groups of gate-valves, sliding sluice valves or the like which are inserted into pipe conduits, such as are used in connection with air heating plants.

In order to actuate valves of the aforementioned kind which are operated in groups, various schemes have been proposed. Thus, for instance, control-systems are known in which the gate-valves are controlled by slides, in case said gate-valves are actuated by means of compressed air, and by electrical switches, in case said gate-valves are operated by motor means and a mechanical gearing, said slides, or as the case may be, said switches being connected in series so that said gate-valves can only be actuated in a predetermined sequence. Systems of this kind, however, do not permit any changes in the sequence of operating the gate-valves. In addition to this, the driving medium in the pressure-conduits or the current in the electrical conduits must pass a relatively long and rather complicated way which is due to the series connection of the slides or electrical switches, with the result that the operations of control can only be slowly performed and that there will be necessary a relatively long system of pressure or electrical conduits that are rather difficult to supervise.

These drawbacks are avoided by my present invention essentially by connecting the driving mechanisms for the several gate-valves or the like in parallel to each other and by imparting motion to their control devices by means of an organ common to all of said devices. By this, the system of conduits for the driving mechanisms of the gate-valves or the like will be materially simplified and the possibilities of troubles diminished, owing to the fact that the actuation of each drive for a gate-valve is performed individually and independently of the actuation of the other drives. The aforementioned organ which drives all control-devices in common is coupled with the latter in such a manner that upon actuation of said organ all control-devices may be operated in succession and in such a way that a definite position of one or more of the control-devices will correspond with a definite position or length of the operating stroke of the driving organ. This position is indicated by a mark on the driving organ so that an indication is made as to which control-device, and therewith which gate-valve is in operation at the end of each operating stroke of the driving organ.

In the drawing which forms part of this specification I have shown one form of construction of my present system of control in diagrammatic representation showing my new control system and some details thereof in connection with the employment of gate-valves or the like operated by a pressure-medium acting upon pistons within cylinders and controlled by slides.

Referring now more particularly to the drawing, the gate-valves A_1, A_2, A_3, A_4 and A_5 forming one of the aforementioned groups are represented side by side and are operated by pistons each moving within one of the compressed air cylinders B_1, B_2, B_3, B_4 and B_5. Said cylinders are connected each by means of two pipe-conduits with one of the rotary valves C_1, C_2, C_3, C_4 and C_5. However, also two or more of said cylinders may be actuated by a single rotary valve. The casings of the rotary valves are provided in addition to these two pipe connections for said cylinders with further inlet connecting branches D_1, D_2, D_3, D_4 and D_5 serving for the supply of pressure-medium and with further outlet openings E_1, E_2, E_3, E_4 and E_5. The valve-discs F_1, F_2, F_3, F_4 and F_5 mounted within the casing of said rotary valves C_1, C_2, C_3, C_4 and C_5 are connected with the gear-wheels G_1, G_2, G_3, G_4 and G_5 which are preferably in mesh with a common gear-wheel H rotatable by a crank or hand-wheel J. The valve-discs F_1, F_2, F_3, F_4 and F_5, however, may also be arranged to be mutually driven by each other by means of the gear-wheels G_1, G_2, G_3, G_4 and G_5 connected thereto or may also be arranged to be mutually driven by each other as shown, for instance, in connection with the valve-disc F_3. In the present case the gear-wheel G_3 is driven, for instance, by the gear-wheels G_2 and G_4.

The control system described in the foregoing operates as follows: If the indicator U on the hand wheel J is moved from the mark 1 to the mark 2, then the rotary valve F_1 will enter into the position shown in the drawing and then compressed air will flow in the direction shown by the arrows in the drawing. In the moving of the hand-wheel from the mark 1 to the mark 2 thus the gate valve A_1 closes. The other rotary valves F_2, F_3, F_4 and F_5 will now likewise be rotated; these valves, however, are so constructed that during such rotation no opening or closing of the remaining gate-valves can take place. Opening or closing of said gate-valves is effected only upon further rotation of the hand-wheel J. If the hand-wheel J is rotated with the pointer U as far as to the mark 3, the rotary valve F_2 will have been rotated to such an extent that compressed air may enter from above into the cyl-

inder B_2 and that the compressed air underneath the piston in said cylinder may discharge through the outlet opening E_2, so that the gate-valve A_2 will be closed. Upon rotation of the hand-wheel J with the pointer U as far as to the mark 4 the rotary valve F_3 is rotated to such an extent that the gate-valve A_3 will be closed. In this manner the gate-valves A_1, A_2, A_3, A_4 and A_5 may be individually operated, the pointer U at the hand-wheel J indicating the gate-valve at any time in operation.

In order to prevent further rotation of the hand-wheel J and therewith interruptions in the motion of the valves before completion of the several piston strokes, that is, while the gate-valve is still in motion, said hand-wheel is locked during actuation of said gate-valves. For this purpose discs L_1, L_2, L_3 and L_4 are fixed to the driving shaft K of the gear-wheel H and of the hand-wheel J, said discs being provided at their peripheries with notches M, all as shown in the lower part of the illustration. Pawls N co-operate with said discs L_1, L_2, L_3 and L_4 in such a manner that they may engage within said recesses M in said discs. Engagement of said pawls within said recesses may be effected either by the mere weight of said pawls or by means of springs O associated therewith. The pawls N are operated by lifting electromagnets P in such a manner that the pawls are disengaged from the notches M, if said electromagnets P are energized. The piston-rods which operate the several gate-valves A_1, A_2, A_3, A_4 and A_5 are equipped with contact-members R_1, R_2, R_3, R_4 and R_5 which may engage with companion contact-members S_1, S_2, S_3, S_4 and T_1, T_2, T_3, T_4 and T_5, respectively. The contact-members S_2, S_3 and S_4 as well as the contact-members T_1, T_2, T_3, T_4 and T_5 are conductively connected with the lifting electromagnets P so that during engagement of the contact-members R_1, R_2, R_3, R_4 and R_5 with the contact members S_2, S_3 and S_4 and T_1, T_2, T_3, T_4 and T_5 the lifting electromagnets P are energized, causing the pawls to be lifted out of the recesses M on the discs L_1, L_2, L_3 and L_4, thus releasing the latter. A pawl N, therefore, is lifted out of the appertaining notch only if the gate-valve has been moved either into open or closed position. Evidently also a single disc L with all the notches M thereon and accordingly a single pawl and a single lifting electromagnet may be used. In this case the lifting electromagnet would have to be energized by all contacts, so that the pawl may subsequently be engaged within the several recesses M and successively lifted out of the latter. The mode of action of the control system as such will therefore not be altered.

By positioning the inlets and outlets on the casings of the rotary valves C_1, C_2, C_3, C_4 and C_5 and by properly selecting the cross-sectional form of the valve-discs F_1, F_2, F_3, F_4 and F_5 there may be attained every desired position of one valve with respect to another. Several gate-valves may therefore be kept open and others closed and likewise several gate-valves may be kept open or closed for some longer time and others for some shorter time. By this it will be possible to accomplish an opening and closing of the gate-valves in any pre-determined sequence. The several motions are controlled by the hand-wheel J, the position of the latter indicating the position of the gate-valves A_1, A_2, A_3, A_4 and A_5. The hand-wheel J may of course be rotated clockwise or counter-clockwise, the end positions 1 and 8 being secured in any desired manner by means of stops. The hand-wheel J is locked only when the operating rod for one gate-valve is in motion. The contact-members S_2, S_3 and S_4 and the contact-members T_1, T_2, T_3, T_4 and T_5 may be located in this case at the end position of the contact-members R_1, R_2, R_3, R_4 and R_5 but may also be located a small distance in the rear, so that engagement of the contact members will take place only after the pistons have moved a short way. The electromagnets P may of course also be used for engaging the pawls N within the recesses M and the springs O may accordingly be used for lifting the pawls out of the recesses. Instead of the springs O evidently also a second electromagnet may be used.

Instead of the rotary valves C_1, C_2, C_3, C_4 and C_5 and the valve-discs F_1, F_2, F_3, F_4 and F_5 there may evidently also be used slide-valves or similar control organs. Such slide-valves may be arranged side by side or also one in the rear of the other and reciprocated by a single rod by means of a lever or the like. The inlet and outlet openings are in this case so arranged that the desired connections are established by the several positions of the slide-valves.

I claim:

Apparatus for controlling a group of valves of air heating installations and the like, each valve having a movable closure member, including in combination a separate piston for each valve, means whereby said piston moves said closure member, a cylinder for each piston, separate conduits for conveying a pressure medium to said cylinder at each side of said piston, a separate control member for each cylinder, said control member being connected to said conduits, whereby the pressure medium may be admitted to said cylinder selectively on either side of said piston, a common operating member, all the control members being operatively associated therewith and arranged around the same, said common operating member comprising a drive shaft, and a hand wheel connected with said drive shaft for actuating it, thus causing the control members to be operated in definite succession, and means associated with said drive shaft to indicate which one of the control members is in operation at any time.

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