

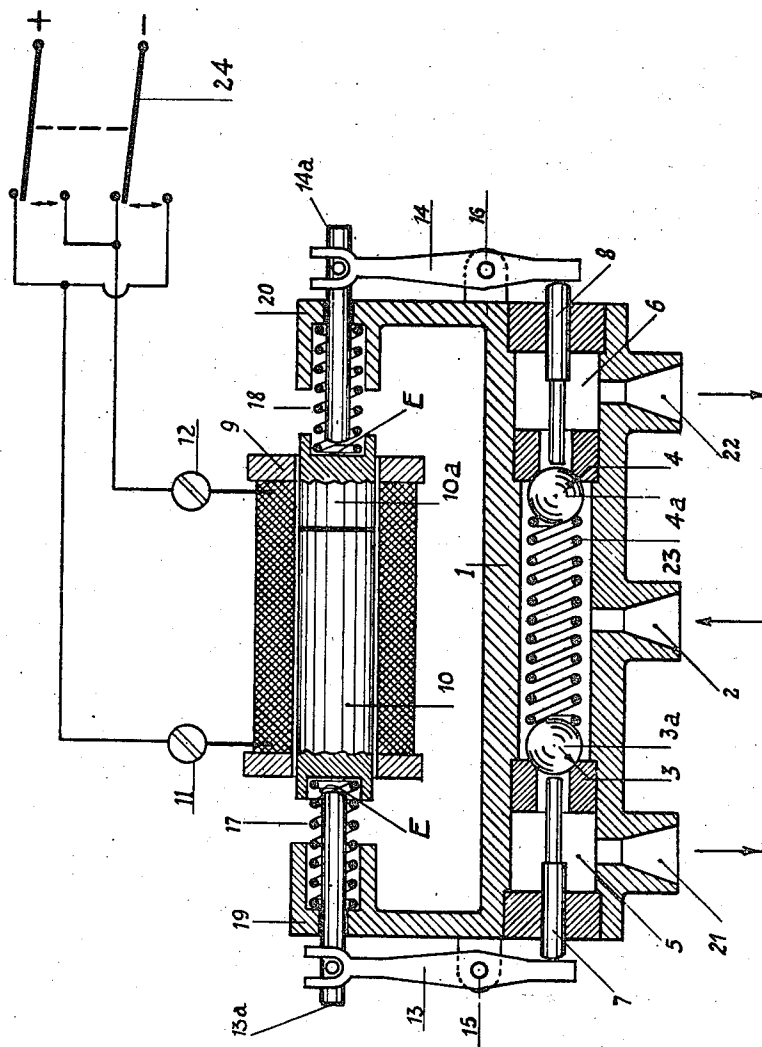
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FIRE CONTROL DEVICE

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FIRE CONTROL DEVICE

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The present invention relates to so-called "electro-valves" intended to control either the resetting into firing position or the firing of an automatic fire-arm.

The object of the present invention is to provide an improved fire-arm control electro-valve which is better adapted to meet the requirements of practice than those used for the same purpose up to the present time, and more especially an electro-valve capable of controlling at will either the resetting into firing position or the firing of the fire-arm through a simple operation and by means of a single electro-magnet.

According to the invention, I provide an electro-magnet, including a stationary armature and a movable core, or inversely, so as to be capable of acting in two opposed directions, the movable part being displaced in one direction or the other according as the current that flows through at least one of the parts of the electro-magnet is itself sent in one direction or the other. With this arrangement, it suffices to reverse the direction of an electric current for automatically producing either the resetting of the arm into firing position or the firing of said arm.

Therefore, the essential feature of my invention consists in providing an electro-valve intended to perform the two above mentioned operations with a single electro-magnet adapted to act either in one direction or in the opposite one.

Other features of the present invention, embodied in practical constructions thereof, will result from the following detailed description of some specific embodiments.

A preferred embodiment of the present invention will be hereinafter described, with reference to the accompanying drawing, given merely by way of example, and in which:

The only figure is a diagrammatic sectional view of an embodiment of the fire control device according to the invention.

In this drawing, I have shown at 1 a case or chamber fed with compressed air or any other fluid under pressure through a conduit 2. This case 1 is provided with two valves 3 and 4, including respective balls 3a and 4a adapted to cooperate with two seats provided in the case in question. These valves control the communication between the inside of this case 1 and two chambers 5 and 6, respectively, connected with conduits 21 and 22. The device (adapted to be operated by compressed air or another fluid under pressure) which produces the resetting of the fire-arm into firing position is fed with com-

pressed air or fluid under pressure through conduit 21, while the device which produces the firing is fed through conduit 22.

Valves 3 and 4 are respectively operated by push-pieces 7 and 8.

I have shown at 9 the armature of an electro-magnet and at 10—10a the core thereof.

In the embodiment of my invention illustrated by the drawing, the armature 9 is stationary and it is energized by an electric current fed to terminals 11 and 12.

The core is for instance constituted by a permanent magnet. In order to obtain that the flow of an electric current through armature 9 in one direction or the other may displace the core toward the right or toward the left, this core must be of disymmetrical structure, being for instance divided into two portions 10 and 10a by a partition, diagrammatically illustrated by a solid black line in the drawing.

The direction of the current fed to terminals 11 and 12 of the electro-magnet armature is controlled, for instance, by a reversing switch such as 24.

Therefore, when this switch is in one of its active positions, the core of the electro-magnet is moved in one direction, for instance toward the right. When the switch is in the other of its active positions, this core is moved in the opposite direction, toward the left.

In the example shown, the displacements of the electro-magnet core in one direction or the other are transmitted, through push-pieces 13a and 14a, to levers 13 and 14, respectively, pivoted, at 15 and 16, to the frame which comprises the valve casing 1.

These levers in turn operate push-pieces 7 and 8 which control valves 3 and 4, respectively.

Two return springs 17 and 18, interposed between the ends of the electro-magnet core, and fixed abutments, respectively designated by reference characters 19 and 20, are adapted to bring back the core into its intermediate neutral position after it has performed one operation in one direction or the other.

The ends of levers 13 and 14 which cooperate with push-pieces 13a and 14a are fork-shaped and engage corresponding transverse pins carried by said push-pieces.

Valve 3 controls, for instance, the resetting of the fire-arm into firing position, the fluid under pressure from conduit being fed to conduit 21 by the opening of said valve 3. Likewise, valve 4 controls the firing of the fire-arm, the fluid from

conduit 2 being sent into conduit 22 by the opening of said valve 4.

Such a device is in itself capable of working in a fully satisfactory manner. However, in mechanisms of the type with which the present invention is concerned, it is important to ensure a very sudden operation of the device to be controlled, which of course necessitates a very quick opening of the valves.

For this purpose, according to an interesting feature of my invention, I provide, between each end of the core of the electro-magnet supposed to be in its neutral position and the end of the corresponding push-piece 13a or 14a, a certain play E, whereby the core of the electro-magnet is given the possibility of gathering speed before striking said push-piece, and thus ensures the quick and accurate opening of the corresponding valve 3 or 4.

Of course, I may employ any suitable means for ensuring the sudden and quick opening of these valves.

Whatever be the particular embodiment that is chosen, the operation of the fire control device according to my invention results sufficiently clearly from the preceding description for making it unnecessary to enter into further details of its working.

The particular description above given is a mere illustration of an example. I may of course utilize any desired or advantageous relative displacements of the parts of the electro-magnet with respect to each other. The mechanical means for transmitting the movement of said parts with respect to each other to the valves may be of any suitable structure.

While, in the example illustrated by the drawing, the mechanical means in question includes levers such as 13 and 14, the shape and arrangement of the levers shown have no limitative character. Also, such levers may be dispensed with, the movable part of the electro-magnet then acting directly on the valves. Any suitable transmission may be used for performing the function of these levers.

Of course the electro-magnet may be of any type whatever, within the scope of the invention, and the part thereof that is stationary is not necessarily the armature as shown.

In a general manner, while I have, in the above description, disclosed what I deem to be practical and efficient embodiments of the present invention, it should be well understood that I do not wish to be limited thereto as there might be changes made in the arrangement, disposition and form of the parts without departing from the principle of the present invention as comprehended within the scope of the appended claims.

What I claim is:

1. In connection with a fire-arm provided with a device for resetting said arm into firing position and a device for firing said arm, both of these devices being operable by a fluid under pressure, a control system for operating either of said two devices which comprises, in combination, a source of fluid under pressure, means for controlling the communication between said source of fluid under pressure and said devices respectively, an electro-magnet including two parts movable with respect to each other, means for transmitting the relative displacements of said parts to said communication controlling means such that a displacement in one direction corresponds to the operation of one of said devices while displacement in the opposite direction corresponds to the operation of

the other device, means for feeding energizing electric current to said electro-magnet, and means for reversing at will the direction of said current.

2. In connection with a fire-arm provided with a device for resetting said arm into firing position and a device for firing said arm, both of these devices being operable by a fluid under pressure, a control system for operating either of said two devices which comprises, in combination, a source of fluid under pressure, two valve means for controlling the communication between said source of fluid under pressure and said devices respectively, an electro-magnet including two parts movable with respect to each other, means for transmitting the relative displacements of said parts to said valve means such that a displacement in one direction operates one of said valve means while a displacement in the opposite direction operates the other valve, means for feeding energizing electric current to said electro-magnet, and means for reversing at will the direction of said current.

3. In connection with a fire-arm provided with a device for resetting said arm into firing position and a device for firing said arm, both of these devices being operable by the feed of a fluid under pressure thereto, a control system for operating either of said two devices which comprises, in combination, means for feeding fluid under pressure to said two devices, respectively, two valves mounted in said means so as to cut off, in their closed positions, the feed of fluid under pressure to said devices respectively, an electro-magnet including two parts movable with respect to each other, means for transmitting the relative displacements of said parts to said valves such that a relative displacement in one direction opens one of said valves while a relative displacement in the opposite direction opens the other valve, means for feeding energizing electric current to said electro-magnet, and means for reversing at will the direction of said current.

4. In connection with a fire-arm provided with a device for resetting said arm into firing position and a device for firing said arm, both of these devices being operable by the feed of a fluid under pressure thereto, a control system for operating either of said two devices which comprises, in combination, means for feeding fluid under pressure to said two devices, respectively, two valves mounted in said means so as to cut off, in their normal closed positions, the feed of fluid under pressure to said devices respectively, an electro-magnet including two parts, an armature and a core, one of said parts being stationary and the other being movable, means for transmitting the displacements of said movable part in one direction to one of said valves for opening it, means for transmitting the displacements of said movable part in the opposite direction to the other valve for opening it, means for feeding energizing electric current to said electro-magnet, and means for reversing at will the direction of said current.

5. In connection with a fire-arm provided with a device for resetting said arm into firing position and a device for firing said arm, both of these devices being operable by a fluid under pressure, a control system for operating either of said two devices which comprises, in combination, a source of fluid under pressure, means for controlling the communication between said source of fluid under pressure and said devices, respectively, an electro-magnet including two parts movable with

respect to each other, means for transmitting the relative displacements of said parts to said communication controlling means such that a displacement in one direction corresponds to the operation of one of said devices while displacement in the opposite direction corresponds to the operation of the other device, said transmission means being provided with a certain play so as to permit, at the beginning of their relative movement, a free displacement of said parts with respect to each other, whereby at least one of them has acquired a certain living force when connected by said transmission means to said communication controlling means so as suddenly and quickly to operate said last mentioned means, means for feeding energizing electric current to said electro-magnet, and means for reversing at will the direction of said current.

6. In connection with a fire-arm provided with a device for resetting said arm into firing position and a device for firing said arm, both of these devices being operable by the feed of a fluid under pressure thereto, a control system for operating either of said two devices, which comprises, in combination, means for feeding fluid under pressure to said two devices, respectively, two valves mounted in said means so as to cut off, in their normal closed positions, the feed of fluid under pressure to said devices respectively, an electro-magnet including two parts, an armature and a core, one of said parts being stationary and the other being movable with respect to the first in one direction or the other according as the electro-magnet is energized by current flowing in one direction or the other, means for feeding energizing electric current of one direction to said electro-magnet, means for feeding energizing electric current of opposed direction to said electro-magnet, means for transmitting the displacements

of said movable part in one direction to one of said valves for opening it, and means for transmitting the displacements of said movable part in the opposed direction to the other valve for opening it, said transmission means being provided with a certain play so as to permit, at the beginning of the displacements of said movable part, a free displacement thereof whereby it has already acquired a certain momentum when it opens one of the valves through said transmitting means.

7. In connection with a fire-arm provided with a device for resetting said arm into firing position and a device for firing said arm, both of these devices being operable by the feed of a fluid under pressure thereto, a control system for operating either of said two devices, which comprises, in combination, means for feeding fluid under pressure to said two devices, respectively, two valves mounted in said means so as to cut off, in their normal closed positions, the feed of fluid under pressure to said devices respectively, an electro-magnet including two parts, an armature and a core, one of said parts being stationary and the other being movable with respect to the first in one direction or the other according as the electro-magnet is energized by currents flowing in one direction or the other, means for feeding energizing electric current of one direction to said electro-magnet, means for feeding energizing electric current of opposed direction to said electro-magnet, means for transmitting the displacements of said movable part in one direction to one of said valves for opening it, means for transmitting the displacements of said movable part in the opposed direction to the other valve for opening it, and spring means for urging said movable part toward its intermediate position.

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