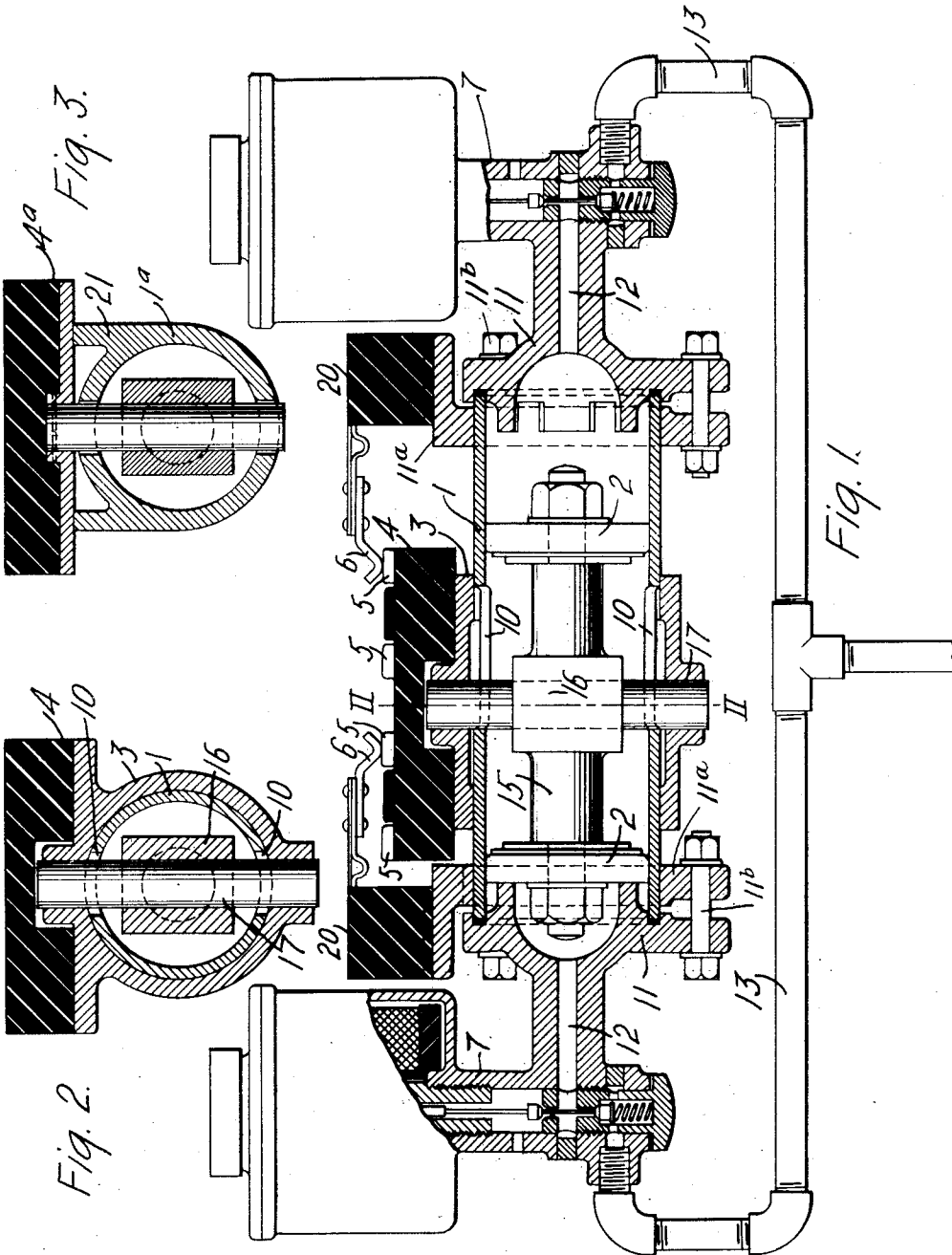


K. A. SIMMON.
 SWITCHING APPARATUS.
 APPLICATION FILED FEB. 19, 1914.

1,217,513.

Patented Feb. 27, 1917.



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UNITED STATES PATENT OFFICE.

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SWITCHING APPARATUS.

1,217,513.

Specification of Letters Patent.

Patented Feb. 27, 1917.

Application filed February 19, 1914. Serial No. 819,760.

To all whom it may concern:

Be it known that I, KARL A. SIMMON, a citizen of the United States, and a resident of Wilksburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Switching Apparatus, of which the following is a specification.

My invention relates to switching apparatus, and it has particular reference to such pneumatically operated switching devices as are employed in control systems for electric motors for the purpose of reversing the direction of rotation thereof.

The object of my invention is to provide a device of the above indicated character which shall be simple and durable in construction, and effective and reliable in operation, and one that shall embody a particularly compact arrangement of parts.

According to my invention, I propose to locate the pneumatic operating mechanism of a reversing switch or other type of switching device within or immediately adjacent to the drum or movable carrier upon which the movable contact members are disposed, whereby the carrier shall have a bearing and slide upon the cylinder of the fluid-operated device, thus effecting material economy of space and of weight.

In the accompanying drawing, Figure 1 is a view, partially in section and partially in side elevation, of apparatus constructed in accordance with my invention. Fig. 2 is a sectional view taken along the line II—II of Fig. 1, and Fig. 3 is a similar view of a slightly modified construction embodying my invention.

Referring to Figs. 1 and 2 of the drawing, the apparatus shown comprises a cylinder 1, a plurality of movable pistons 2 disposed therein, a slidable carrier or drum 3 surrounding the cylinder 1 and having a bearing thereon, a member 4 of insulating material, a plurality of movable contact members 5 secured thereto, a plurality of stationary contact fingers 6 and a plurality of electrically controlled valves 7 for governing the admission and release of operating fluid to and from the respective ends of the cylinder 1.

The middle portion of the cylinder 1 is

provided with a plurality of diametrically opposite longitudinally disposed slots or openings 10, and cooperating with the ends of said cylinder, are suitable end caps 11 which are secured to end members 11^a by bolts 11^b, said end member 11^a being rigidly associated with the cylinder 1 in a suitable manner, and said caps 11 are severally provided with passages 12 to be placed in communication with a fluid supply system 13 through the agency of the electrically controlled valves 7.

The pistons 2 may be of any suitable construction and are associated with the respective ends of a piston rod 15 which has an enlarged central portion 16. A rod or pin 17 projects through an opening in the enlarged central portion of the piston 15 and through the oppositely disposed longitudinal slots 10 in the cylinder 1. The ends of the rod 17 are mechanically associated with the drum or carrier 3, whereby said carrier is moved upon said cylinder in a longitudinal direction in accordance with the movements of the pistons 2.

The electrically controlled valves 7 may be of any well known and suitable structural form for performing their intended functions and preferably are fashioned to occupy their closed positions under normal conditions when their respective operating electro-magnets are deenergized. It is preferable also that the valves establish a communication to the atmosphere from their respective ends of the cylinder 1 when the supply of operating fluid is cut off.

The insulating block 4 is suitably secured to the carrier 3 and supports and insulates the contact terminals 5.

The contact terminals 5 are arranged in a plurality of sets for the purpose of cooperating with the several sets of stationary contact fingers 6 which are mounted in a suitable manner upon insulating blocks or members 20 that are, in turn, supported upon the respective end members 11^a. The movable switching member embodying the carrier 3, insulating block 4 and contact terminals 5, is adapted to occupy a plurality of positions, whereby electrical connections or circuits may be arranged for the purpose intended. No detailed description of the arrangement

of contact terminals is deemed necessary, inasmuch as it is immaterial to the present invention, except in so far as said terminals constitute parts of a switching device.

5 Assuming the parts of the apparatus to occupy the positions shown, the switching device may be thrown either to its neutral or to its opposite extreme position by caus-
 10 ing the electrically controlled valve 7 at the left of the apparatus to be opened, thus admitting operating fluid into the correspond-
 15 ing end of the cylinder 1. The admitted operating fluid acts upon one of the pistons 2 to cause the associated pistons and the
 20 movable parts of the switching apparatus to be moved longitudinally to the right until the valve is again closed or the limit of
 25 travel has been reached. Hence, any desired amount of movement may be effected and the apparatus brought to rest at the will of
 the operator. Upon the closure of the valve 7, the operating fluid contained within the cylinder is permitted to escape to the atmos-
 30 phere. Obviously, movements in the opposite direction may be accomplished in a similar manner.

Referring to Fig. 3, a casting 1^a that constitutes the operating cylinder, is provided with projecting lugs 21 upon which the carrier 4^a rests and has a sliding bearing.

Although, I have shown and described my invention as embodying specific structural details and arrangement and location of parts, I desire to include all modifications thereof which fall within the scope of the
 35 appended claims.

I claim as my invention:

1. The combination with a fluid-operated device comprising a cylinder and a piston
 40 movable therein, of a plurality of stationary contact terminals, a plurality of cooperating contact terminals, a supporting member for said cooperating terminals slidably mounted upon and surrounding said cylinder, and
 45 means for coupling said piston to said supporting member.

2. The combination with a fluid-operated device comprising a cylinder and a piston movable therein, of a member slidably
 50 mounted upon and surrounding said cylinder, and means projecting through said cylinder for coupling said piston to said movable member.

3. The combination with a fluid-containing device comprising a cylinder and a piston movable therein, of a contact-carrying
 55 device surrounding said cylinder and having a bearing thereon, and means for mechanically coupling said contact-carrying
 60 device to said piston.

4. The combination with a cylinder, a contact-carrying device surrounding said cylinder, and a shaft having oppositely-
 65 posed within said cylinder, of means for

mechanically connecting said pistons to said contact-carrying device for longitudinal movement relative to said cylinder.

5. The combination with a fluid-operated device, a plurality of stationary contact
 70 terminals, a plurality of cooperating contact terminals, and a movable supporting member for said cooperating terminals surrounding said fluid-operated device, of means for
 75 mechanically connecting said fluid-operated device to said supporting member for effecting movements thereof.

6. The combination with a cylinder having a longitudinal slot therein, oppositely-
 80 acting pistons disposed within said cylinder, and a supporting member surrounding said cylinder and adapted to be moved into a plurality of positions relative thereto, of a
 85 plurality of contact members mounted upon said supporting member, stationary contact members cooperating with said first-named
 90 contact members, and means for mechanically connecting said pistons to said supporting member for actuating said support-
 95 ing member.

7. The combination with a fluid-operated device comprising a cylinder having a slot therein, a movable piston within the cylin-
 100 der, and means for governing the admission and release of an operating fluid, of a member surrounding said cylinder and movable
 105 longitudinally thereon, a member projecting through said cylinder slot and coupling said piston and said movable member together, and contact terminals associated with said
 110 movable member.

8. The combination with a cylinder having diametrically disposed longitudinal slots therein, a movable piston within the cylin-
 105 der, valves associated with the respective ends of the cylinder for governing the admission and release of operating fluid there-
 110 to, and a plurality of contact members associated with the respective ends of the cylinders, of a longitudinally movable carrier surrounding said cylinder and having a
 115 bearing thereon, a plurality of movable contact members mounted upon said carrier and adapted for engagement with the stationary contact members, and a member associated
 120 with the movable piston and projecting through the diametrically disposed slots of the cylinder into engagement with the carrier, whereby said carrier and associated
 125 movable contact members are actuated by the piston.

9. The combination with a cylinder, clamping members rigidly associated with the respective ends thereof, controllable
 130 valves cooperating with the respective ends of the cylinder and secured to said clamping members, and a movable piston disposed within said cylinder, of a supporting mem-
 135 ber surrounding the cylinder and adapted to be moved thereon, means for operatively

connecting said supporting member with
said piston and cooperating stationary, and
movable contact members respectively dis-
posed upon the end clamping members and
5 said supporting member.

In testimony whereof, I have hereunto

subscribed my name this 13th day of Feb.
1914.

KARL A. SIMMON.

Witnesses:

LYNN G. RILEY,
B. B. HINES.