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1,702,396

W. J. ANDRES

SWITCH MECHANISM

Original Filed July 25, 1925

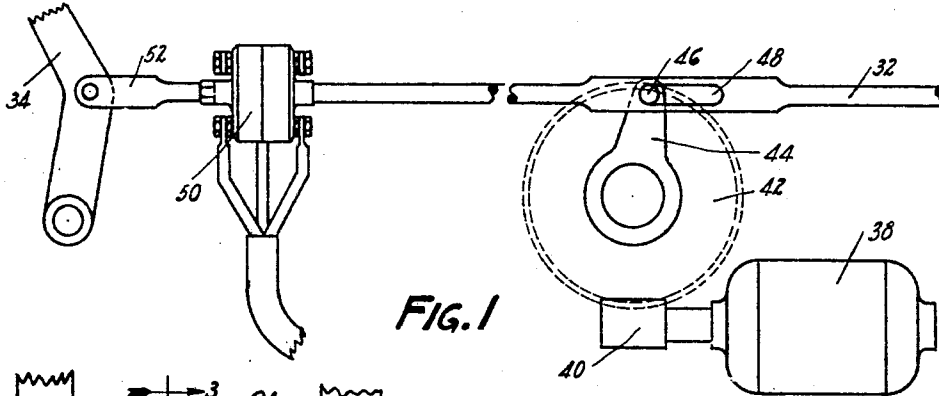


FIG. 1

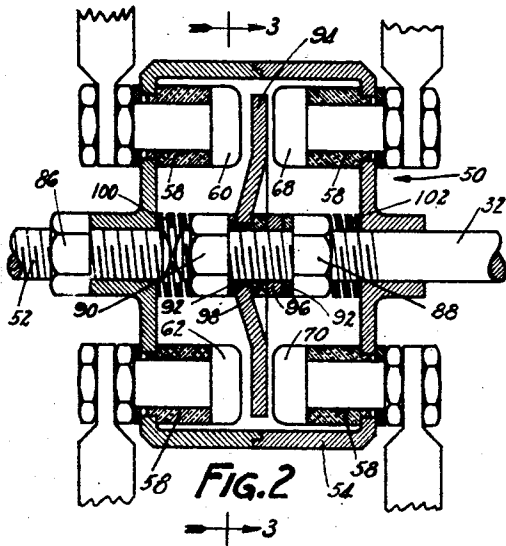


FIG. 2

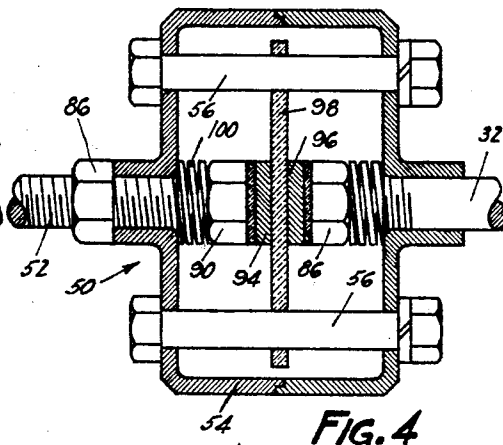


FIG. 4

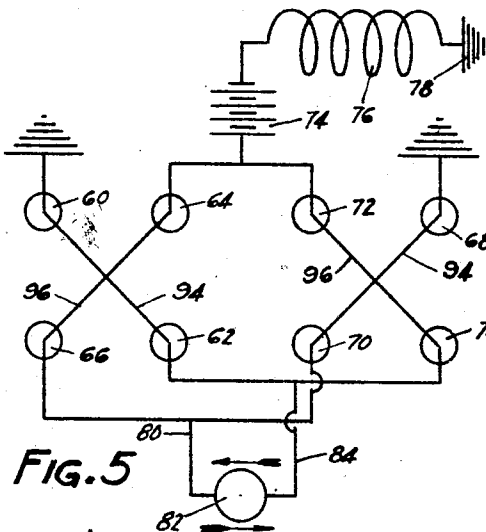


FIG. 5

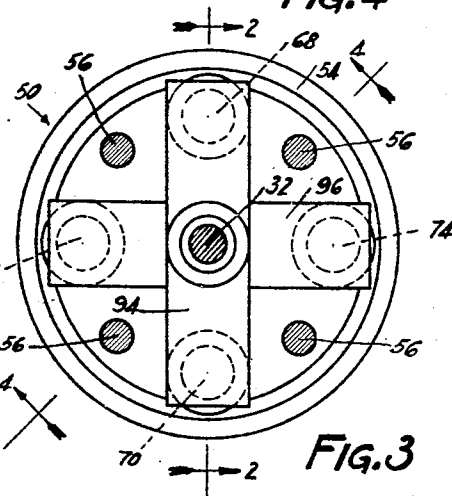


FIG. 3

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SWITCH MECHANISM.

Original application filed July 25, 1925, Serial No. 46,039, now Patent No. 1,625,444, dated April 19, 1927.
Divided and this application filed April 6, 1927. Serial No. 181,354.

This invention relates to switches, and is illustrated as embodied in a reversing switch for controlling a motor.

An object of the invention is to provide a switch which is simple and compact in construction, and which preferably is adapted to serve as a tension element in a system of operating connections, and to be operated by tension in one direction or the other on the connections.

The above and other objects and features of the invention, including various novel combinations of parts and desirable particular constructions, will be apparent from the following description of one illustrative embodiment shown in the accompanying drawing, in which:

Figure 1 is a side elevation of the motor and adjacent parts of the operating connections;

Figure 2 is a section vertically through the novel reversing switch;

Figure 3 is a section through the switch on the line 3—3 of Figure 3;

Figure 4 is a section through the switch substantially on the line 4—4 of Figure 3; and

Figure 5 is a wiring diagram.

The novel switch is shown as controlling an electric motor 38, preferably operating through irreversible gearing illustrated as a worm 40 on the armature shaft and driving a worm wheel 42 connected to an arm 44 having a pin or roller 46 projecting into a slot 48 in a brake rod 32. Slot 48 is long enough so that the projection 46 does not interfere with applying the brakes manually in case the motor cannot be operated. The switch is adapted to be interposed as a tension element connecting a rod or link 52 from a brake pedal 34 to a second rod or link 32 leading to the brakes, and formed, as just described, with the slot 48.

The novel reversing switch is indicated at 50, and includes a casing 54, made in two parts held together by bolts 56, and formed with openings for insulating bushings 58 carrying four left contacts 60, 62, 64, and 66, and four right contacts 68, 70, 72, and 74. As shown in Figure 5, contacts 60 and 68 are grounded, contacts 64 and 72 are connected to each other and through battery 74 and field 76 of motor 38 to ground at 78, contacts

66 and 70 are connected to one lead 80 of armature 82 of the motor, and contacts 62 and 74 are connected to the other lead 84 of the armature.

As appears in Figure 2, the continuation brake rod 52 from pedal 34 may be threaded into the left wall of the casing 54 and held by a locknut 86. Rod 32 is slidably received in a perforated boss on the right wall of the casing, and has on its end inside the casing two nuts 88 and 90 clamping between them insulating washers 92 and a pair of crossed contact-bridging member 94 and 96 separated by an insulating plate 98 guided on bolts 56 (Figure 4). A spring 100 is confined between nut 90 and the left wall of casing 54 and a spring 102 is confined between nut 88 and the right wall. Normally these two springs 100 and 102 hold the contact-bridging device 94—96 in central neutral position, with the field and armature circuit both open. No matter which set of contacts is bridged by device 94—96, the field current is in the same direction, flowing through a circuit including the battery 74 and the field 76 and grounded at 78 at one end and connected to contacts 64 and 72 at the other end (see Figure 5).

In operation, depression of pedal 34 pulls on casing 54 to compress spring 102 and cause member 94 to bridge contacts 68 and 70, and member 96 to bridge contacts 72 and 74. The circuit now includes the battery grounded through field 76, member 96, contact 74, lead 84, armature 82, lead 80, contact 70, member 94, and contact 68, which is grounded. This causes operation of the motor 38 in a direction to swing projection 46 to the left (Figure 1) to apply the brakes. When the brakes are applied in an amount which is a function of the angular position of pedal 34, projection 46 has moved rod 32 to the left far enough to permit spring 102 to open the circuit. With the circuit open, worm gearing 40—42, which is substantially irreversible, holds the brakes applied without any expenditure of current.

If pedal 34 is depressed further, the above cycle is repeated, additional pressure being applied to the brakes. If, however, the pedal is entirely released, projection 46 holds the members 94 and 96 stationary, while the pedal-returning spring (not shown), which is much stronger than the small springs 100 and 102, moves casing 54 in a direction to

compress spring 100, bridging the left-hand contacts. The circuit now includes the field and battery, contact 64, member 96, contact 66, lead 80, armature 82, lead 84, contact 62, member 94, and contact 60, which is grounded. It will be seen that this reverses the armature current, and, since the field current is not reversed, the motor is reversed to swing projection 46 to the right to release the brakes. When the brakes are released, springs 100 and 102 again balance, with the motor circuit open.

If pedal 34 is not entirely released, but only let part way up, the circuit will open as described while gearing 40—42 still maintains a pressure on the brakes which is a function of the new angular position of the pedal,—i. e. the pressure is reduced in an amount corresponding to the amount the pedal is moved upwardly.

While one illustrative embodiment of the invention has been described in detail, it is not my intention to limit its scope to that particular embodiment, or otherwise than by the terms of the appended claims. The present application is a division of my prior application No. 46,039, filed July 25, 1925, granted April 19, 1927, as Patent No. 1,625,444.

I claim:

1. A reversing switch comprising, in combination, a casing, a set of contacts on each side of the casing, a contact-bridging circuit closing device between the sets of contacts, springs on opposite sides of said device holding it yieldingly centered in neutral position, and oppositely-extending connections from the casing and from said device, the parts being so arranged that operation of said connections to distort one or the other of the springs will cause said device to bridge one or the other of the sets of contacts.

2. A reversing switch adapted to serve as a tension element between two operating members, and comprising, in combination with said members, a casing, and two sets of circuit-determining contacts within said casing, one set of which is closed by tension on one of said members and the other set of which is closed by tension on the other member.

3. A reversing switch adapted to serve as a tension element between two operating members, and comprising, in combination with said members, a casing, and two sets of circuit-determining contacts within said casing, one set of which is closed by tension on one of said members and the other set of which is closed by tension on the other member, both sets being open when the tensions on said members are balanced.

4. A reversing switch adapted to serve as a tension element between two operating members, and comprising, in combination with said members, a casing connecting said mem-

bers to transmit tension from one to the other, two sets of circuit determining contacts within the casing, means responsive to tension by one of said members to bridge one set of contacts and responsive to tension by the other of said members to bridge the other set of contacts.

5. A reversing switch adapted to serve as a tension element between two operating members, and comprising, in combination with said members, a rigid portion connecting said members to transmit tension mechanically from one to the other, said portion provided with two pairs of switch contacts, and a movable portion responsive to tension by one member to bridge one set of contacts and to tension by the other member to bridge the other set of contacts.

6. In combination with a tension element consisting of two sections, a reversing switch having a casing connecting said sections to transmit mechanical tension from one to the other, two pairs of switch contacts carried by said casing, movable switch means arranged within said casing and responsive to tension by one of said sections to close one set of contacts and to tension by the other of said sections to close the other of said contacts.

7. In combination with a tension element consisting of two sections, a reversing switch having a casing connecting said sections to transmit mechanical tension from one to the other, two pairs of switch contacts carried by said casing, movable switch means arranged within said casing and connected with one of said sections to be actuated by the tension thereof to bridge one set of contacts and adapted upon actuation of the casing by the other section to bridge the other set of contacts.

8. In combination with a tension element consisting of two sections, a reversing switch having a casing mechanically connecting said sections to transmit tension from one to the other, two pairs of contacts carried by the casing, and means responsive to tension by one section of the tension element to close a circuit through one pair and to tension by the other section of the tension element to close a circuit through the other pair.

9. In combination with a tension element consisting of two sections, a reversing switch having a casing mechanically connecting said sections to transmit tension from one to the other, said casing provided with two sets of contacts, one section being rigidly connected with said casing and the other section being yieldingly connected therewith to have a limited movement with respect thereto, means connected directly with said last named section to be actuated directly by tension thereof to bridge one set of contacts and responsive to tension of the other section to bridge the other set of contacts.

10. In combination with a tension element

consisting of two sections, a reversing switch mechanically connecting said sections together to transmit tension from one to the other through the switch, said switch mechanism including two pairs of contacts and being responsive to tension by each section to be actuated in one direction by one section to bridge one pair of contacts and in the other direction by the other section to bridge the other pair of contacts.

In testimony whereof, I have hereunto signed my name.

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WILLIAM J. ANDRES.