Feb. 3, 1959 K. STUTZ 2,871,985

LIFT CONTROL DEVICE

Filed Nov. 13, 1956 3 Sheets-Sheet 1

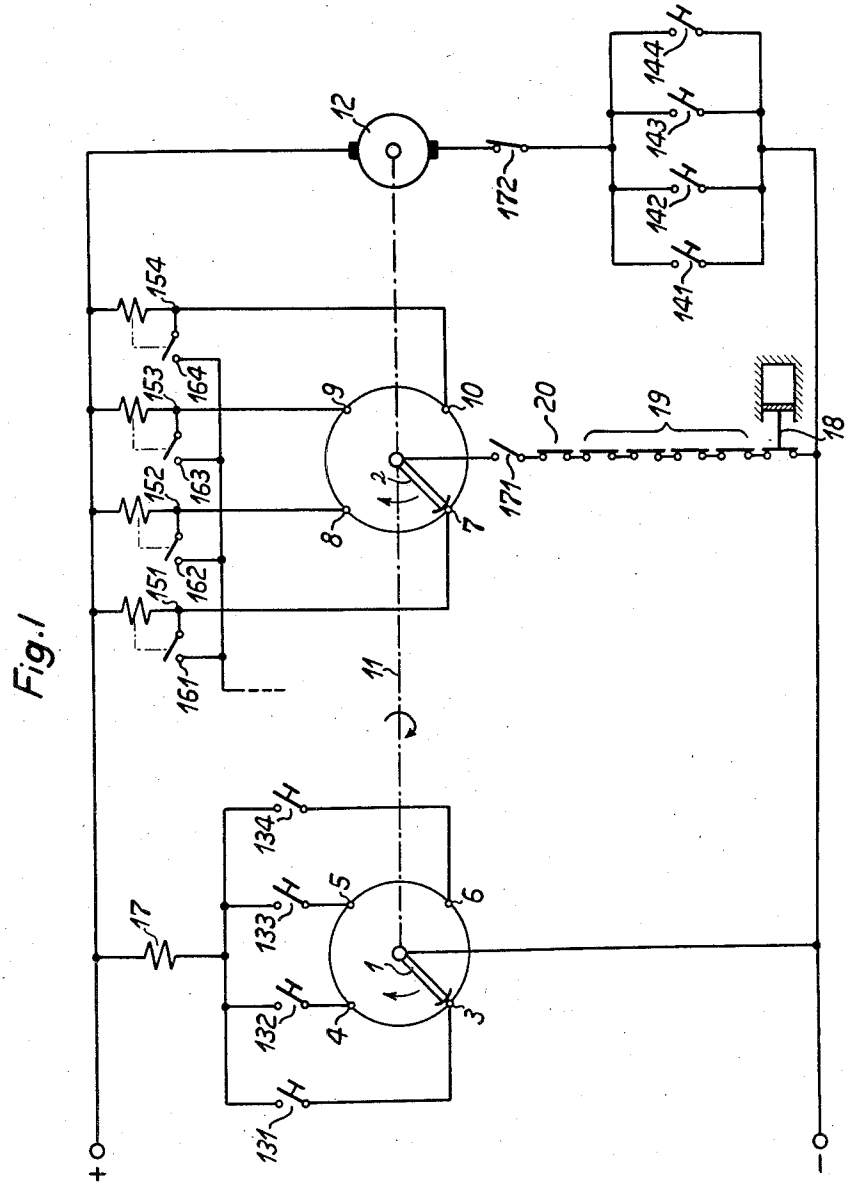



Fig. 1

INVENTOR:
K. Stutz
By
Richards & Geier
ATTORNEYS

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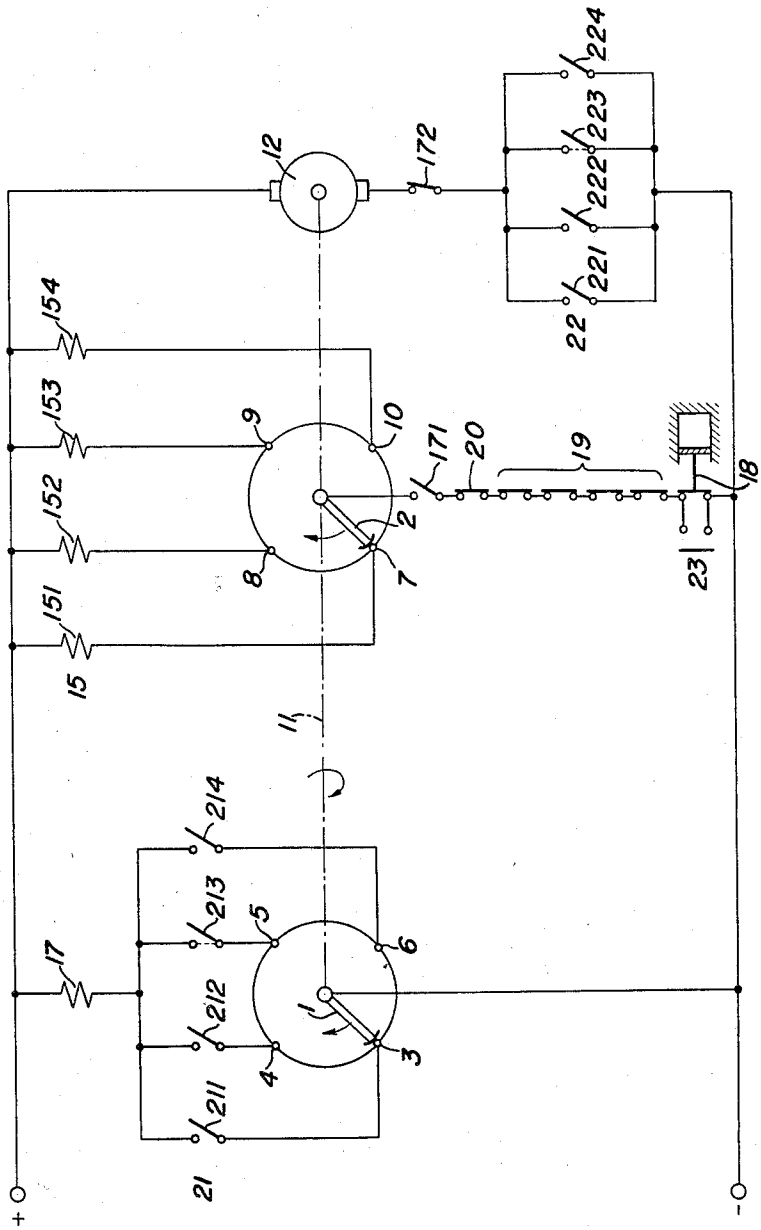



Fig. 2

INVENTOR
Karl Stutz

BY Richards & Geier
ATTORNEYS

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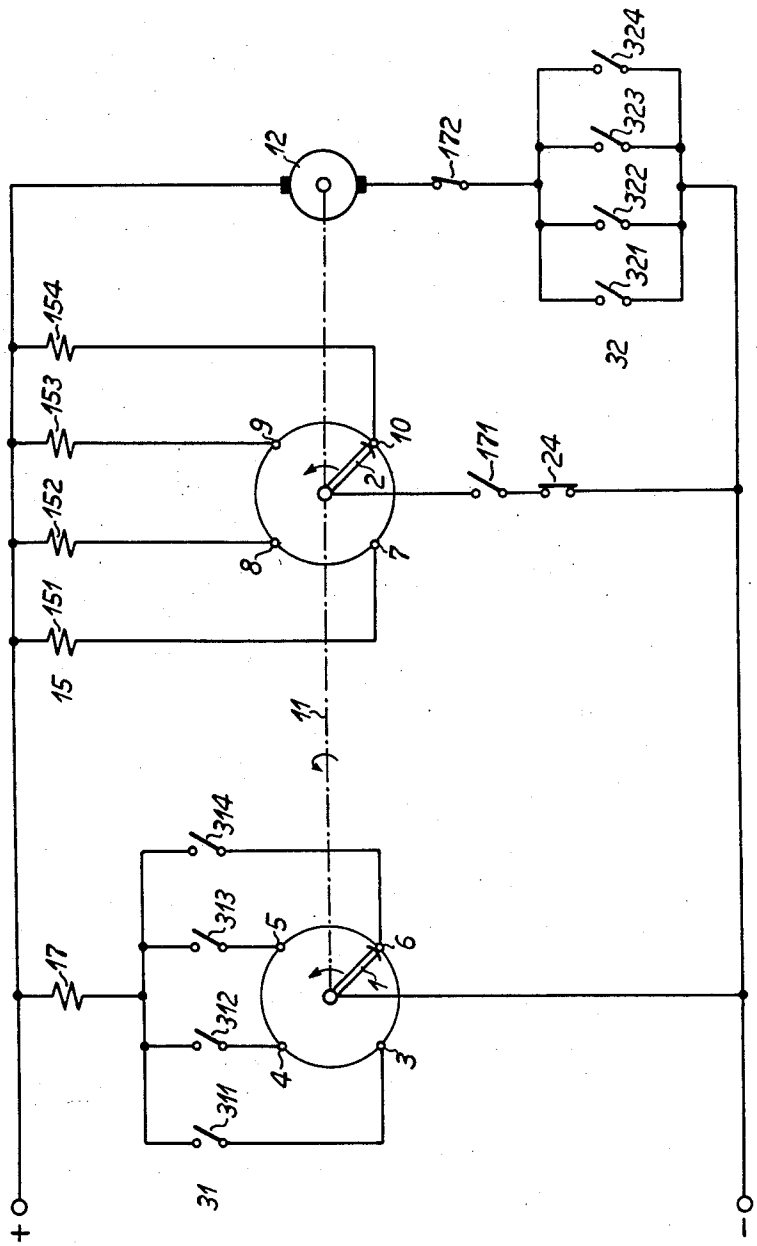



Fig. 3

INVENTOR:
K. Stutz
BY
Richards & Geier
ATTORNEYS

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2,871,985

# LIFT CONTROL DEVICE

Karl Stutz, Lucerne, Switzerland, assignor to Inventio A. G., Hergiswil Nidwalden, Switzerland, a corporation of Switzerland

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5 Claims. (Cl. 187—29)

The present invention relates to lift control devices and more particularly concerns devices for arranging the order of operational sequence of outside calls in lifts having outside call apparatus actuated by press-buttons.

Existing press-button controls for lifts, non-accumulating press-button controls, and accumulating press-button controls with storage of outside calls, have the admitted disadvantage that, in the event of simultaneously occurrence of several outside calls, these are dealt with according to a fixed unalterable sequence. With heavy traffic the calls occurring last in this sequence only receive attention if no other calls are made from points lying nearer the origin of the operational sequence. For this reason greatly diverging waiting time periods at various levels can result in dealing with the calls.

The object of the present invention is to remove these disadvantages in such a manner as to achieve an equal service for all outside calls, still, however, making it possible to give preference to calls from individual stopping places in a predetermined manner.

According to the present invention, a lift control device for arranging the other of operational sequence of outside calls in lifts with outside call apparatus actuated by press buttons, has a selector arrangement placed in circuit between at least one part of the outside call apparatus and the motion control for the lift, which arrangement searches the call apparatus step-by-step in a predetermined sequence and causes the actuated members of said apparatus to operate one by one on the motion control of the lift according to said predetermined order of sequence.

The invention will now be further described by way of example with reference to the accompanying drawings, in which:

Fig. 1 shows a form of the device according to the invention applied to a lift with non-accumulating press-button control without storage of outside calls;

Fig. 2 shows a similar arrangement, but with storage of said calls; and

Fig. 3 is an application of the device to a lift with accumulating press-button control and storage of calls.

The device embodies a selector mechanism which is connected in circuit between the outside call apparatus and the motion control.

As shown in the drawings the selector device is provided with two rotatable selector arms **1** and **2**, which are associated respectively with fixed contacts **3** to **6** and **7** to **10**.

Both selector arms **1** and **2** are fixed on the same shaft **11** which can be rotated by a motor **12**.

Referring to Fig. 1, the call buttons at the stopping levels are formed by pushes **131, 132, 133** and **134** one contact of each of which in turn is connected to one of the fixed contacts **3** to **6**. Contacts **141** to **144** are in operational connection with the pushes **131** to **134** in such a way that actuation of a call button simultaneously closes the associated contacts, i. e. actuation of button **131** closes contacts **141, 132** closes **142** and so on. Contacts **141** to **144** are arranged in the circuit of motor **12**. Relays **151** to **154**, one for each floor are associated with fixed contacts **7** to **10** of selector arm **2**. These floor relays serve to control the motion of the lift in known manner and comprise automatic holding contacts **161** to **164** through which the attracted relay can be automatically held until motion of the lift ceases. Floor relays **151** to **154** operate in known manner and in such a way that they set the lift in motion towards the calling level and bring it to rest when it has reached such level.



A relay **17** actuating switch members **171** and **172**, is connected in circuit. Switch **171** is arranged in the supply lead to selector arm **2**, and completes said lead upon operation of relay **17**.

Switch **172** is connected in the circuit of motor **12** and is arranged so as to break said circuit upon operation of relay **17**.

A further switch **18** is inserted in the supply lead to selector arm **2**, this switch forming a unilateral delay contact on the lift brake by means of dash-pot action. On releasing the brake switch **18** is immediately opened, and is closed with a retarded action on application of the brake.

The contacts arranged on the lift and lift-shaft doors are designated **19** and these are arranged in the lead to arm **2** so that the lift can only be set in motion when said doors are completely closed. **20** indicates a contact on the movable floor of the lift cabin which contact opens when the cabin is occupied and prevents outside calls operating relays **151** to **154** until the cabin is empty again. The action of the operating buttons in the lift cabin is of no significance with regard to the understanding of the invention, and consequently these are not shown in the drawings.

The device as described operates as follows:

Suppose the call button **133** on the third floor is pressed, closing the contacts of button **133** and contacts **143**. Selector motor **12** receives a current supply through contacts **143** and the closed switch **172**. The motor turns both selector arms **1** and **2** in the direction of the arrows. When arm **1** touches fixed contact **5** the following circuit is completed: negative terminal, contact arm **1**, fixed selector contact **5**, actuated call-button contacts **133**, coil of relay **17**, positive terminal. The relay **17** comes into action and operates its switch **171** (to close it) and switch **172** (to open it) whereupon the latter interrupts the circuit of motor **12**, consequently stopping rotation of both selector arms **1** and **2**. In the event of the lift being unoccupied (i. e. switch **20** is closed) the call is now directed to floor relay **153**; the following circuit being completed: negative terminal, delayed brake switch **18**, door switches **19**, lift-floor switch **20**, switch **171**, contact arm **2**, fixed selector contact **9**, floor relay, positive terminal. The floor relay **153** comes into action and causes automatic holding-in of its contacts **163**. The call-button **133** is released, with the result that relay **17** is de-energised thereby opening switch **171** and closing switch **172**. If no further call-button is actuated, the selector will remain in the position it now occupies. Contacts (not illustrated) associated with relay **153** operate in known manner on the motion control of the lift, bringing the cabin to its stopping place at the third floor. The supply for the automatic holding of floor relays **151** to **154** is interrupted at the end of every journey, these being released immediately. Switch **18** interrupts the supply to the call-buttons during the journeys so that no second call can be effective during that time. It is usually found that, in the event of heavy traffic, the call buttons at various floors are pressed and not released until the lift arrives at the calling point. After release of a call-button the selector motor **12** turns both selector arms **1** and **2** further to the point where arm **1** selects one of the fixed

selector contacts 3 to 6 whose associated call-button contacts 131 to 134 is closed, whereupon relay 17 is again energised, stopping selector motor 12 by opening switch 172. As soon as the lift is free again, this signal is now given over switch 171 and selector arm 2 to the corresponding floor relays 151 to 154. By means of the step-by-step examination of all the call-button connections each outside call is attended to once before a call from any floor is attended to a second time. A uniform service is thereby assured to all outside calls.

A variant of the device described above is shown in Fig. 2 which illustrates the use of the controlling device on a lift equipped with non-accumulating press-button control with storage of outside calls, similar parts being given the same references as those employed in Fig. 1. With this type of control, outside calls are registered by a pressure of short duration on the appropriate call button. A storage relay is provided for each stop which is activated by the call-button of the relevant stop.

The relay is held after release of the call-button by means of an automatic holding contact and does not drop out until the unoccupied cabin stops at the floor from which the call has been made. Such a circuit is known and is not illustrated in Fig. 2. These storage relays possess two further operating contacts indicated in Fig. 2 by 21 and 22. The points of contact are designated by 211 to 214 and 221 to 224. The selector device again comprises two rotary selector arms 1 and 2 which search the fixed contacts 3 to 6 and 7 to 10.

Both selector arms are mounted on the same shaft 11 and are rotated by motor 12. The floor relays of the known motion control of the lift are indicated by 151 to 154. In this case the relays do not possess any automatic holding circuits as the storage relays 21 and 22 store the signal until a response has been made. Relays 151 to 154 operate in known manner in such a way that they set the lift in motion in the direction of the call, and bring it to a standstill when it reaches the calling point. As before circuit relay 17 has two switches: one 171 which controls the current supply to the selector arm 2, and another 172 is in the circuit of the selector motor 12. A unilateral delayed switch 18 on the lift brake opens immediately upon release of said brake, and closes with delayed action upon application of same. 23 designates a contact on the relay for switching in the brake release motor, which contact is closed when said motor is switched on. The switches 19 are on the shaft doors and allow the lift to be set in motion only when the doors are closed. The switch 20 is again on the movable floor of the lift cabin, preventing outside calls operating upon relays 151 to 154 when the cabin is occupied. Operation of the transmission buttons in the lift cabin is not shown or described as it is not necessary for understanding the invention.

The device shown in Fig. 2 operates as follows: assuming call button 213 is pressed at the stop at the third floor, relay 21, 22 is actuated, closing contacts 213 and 223.

Selector motor 12 receives current supply through contact 223 and the closed switch 171 and turns both selector arms in the direction of the arrows. If selector arm 1 touches fixed contact 5, the following circuit is completed: negative terminal, selector arm 1, fixed selector contact 5, storage relay contact 213, coil of relay 17, positive terminal. Relay 17 is energised and operates its switches 171 and 172. Switch 172 interrupts the circuit of motor 12, stopping further movement of arms 1 and 2. If the lift is unoccupied (i. e. switch 20 is closed) the signal is now directed to floor relay 153. The following circuit is thereby completed: negative terminal, delay switch 18, shaft-door switches 19, lift floor switch 20, switch 171, contact arm 2, fixed selector contact 9, floor relay 153, positive terminal. The floor relay 153 comes into action and operates through contacts (not shown) in a known manner for the motion control of the lift, allowing the lift cabin to travel to its stop at the third floor. When the lift cabin stops at this floor, contact 213 opens the circuit of relay 17 which drops out. Contact 223 opens in the same way. If no further outside call is registered, the selector remains in the present occupied position. If several calls are registered, motor 12 again receives current after the first call has been attended to, through the parallel circuited contacts 221 to 224 and switch 172, and turns both selector arms 1 and 2 further until selector arm 1 engages with one of the fixed selector contacts 3 to 6, whose associated storage relay contact 21 is closed, thereby energising relay 17 again, stopping the selector by means of switch 172. As soon as the lift is free again, this call is now passed through switch 171 and contact arm 2 to the corresponding floor relay. By means of the step-by-step examination of the floor relays 21–22, each call that has been registered is attended to once before a call coming a second time from the same stop is attended to. Uniform attention to all outside calls is assured.



Fig. 3 illustrates the application of the control device to a lift with press-button accumulation control storage of outside calls.

With press-button accumulation control a button is generally provided at each floor for an "Up" or a "Down" journey. If calls are made from several floors for "Down," the cabin, in known manner, travels up to the highest of the downward calls, and stops at each registered "Down" call on its descending journey. By means of a hand-operated or automatic switch device in the cabin, it will cease to stop at said calling points after its load has surpassed the normal limit. In the event of heavy downwards traffic, as might for example occur at the termination of work in an office building, the lift cabin may become filled at the upper stops, and travels past the "Down" calls at the lower floors, already full. If in the meantime further "Down" calls are made from the upper stopping places, the lift recommences first with the uppermost of said calls. Again the lift cabin gets filled, the calls from the lower stops again going unanswered. This procedure will continue as long as passengers continue to stream in at the upper floors. The waiting times at the lower stops thus become significantly greater than at the upper ones. A storage relay is provided for each "Down" signal which is actuated by the call button at the relevant stop. The relay holds after release of the button by means of an automatic holding circuit, but will be released if the lift cabin serves that stop during its descent. Such switching arrangements are already known and are therefore not shown in Fig. 3. These storage relays possess two further operating contacts, which are designated in Fig. 3 by 311 to 314 and 321 to 324.

The selector device again consists of two rotation contact arms 1 and 2 which seek out fixed contacts 3 to 6 and 7 to 10 respectively. Both contact arms are attached to the same shaft and are rotated by motor 12. The downwards-call storage relays 31, 32 are explored in a sequence corresponding to the descent of the lift cabin. 15 designates the floor relays of the known motion control of the lift, and they set the lift in motion towards the signalling stopping point, and bring the cabin to a standstill when it reaches said stop.

Circuit relay 17 possesses, as has already been explained, two switches: one 171 arranged in the supply lead to selector arm 2, and another 172 which controls the current supply to the selector motor 12. A switch 24 in the lift cabin is opened when the load being carried exceeds the permitted maximum. Once again the transmission buttons and their associated circuits are not illustrated in the figure.

The arrangement of Fig. 3 operates as follows: operation of the call button for "Down" actuates the storage relays 31, 32 of the relevant stop, which in turn closes a pair of their contacts 311 to 314 and 321 to 324. Selector motor 12 receives current through

the parallel circuited contacts **321** to **324** and the switch **172**, and sets selector arms **1** and **2** in rotation. As soon as selector arm **1** engages with one of the fixed contacts **3** to **6**, whose attached storage relay contact **31** is closed (due to actuation of a "Down" button) relay **17** is energised switch **172** interrupts the current to selector motor **12**, thereby bringing to rest the selector arms **1**, **2**. As long as the lift cabin is not full, switch **24** remains closed and the signal is directed to floor relay **17** is energised, switch **172** interrupts the current to as the cabin has served the stop, the relay **31**, **32** is released and relay **17** falls away. If more "Down" calls are registered, motor **12** is again actuated and turns selector arms **1**, **2** further until arm **1** selects the next stored "Down" call. If the lift cabin becomes full during the downwards journey, switch **24** interrupts the supply to arm **2**, rendering further outside downwards calls ineffective upon floor relays **15**. The selector arms however remain in position at the last selected call, and the cabin will attend to that call first after emptying, and will accumulate further calls henceforth.

According to this principle all registered "Down" calls are served once during a revolution of the selector arm. A uniform attention to all outside downwards calls is thus assured.

The embodiments described serve to give uniform attention to all outside calls, or outside downwards calls. If by chance one of the stops is of especial importance and it is desired to serve such a stop more frequently than the rest, additional fixed contacts may be provided for that stop between two other stops on the selector device, connected with the relevant contacts electrically. Calls from that stop will then be dealt with twice or more during one revolution of the arm.

In the same way, in the case of a lift with a plurality of stops, an order of preference may be arranged for individual stops by application of additional fixed selector contacts suitably arranged, in such a way that calls from one stop are, for example, selected three times during one revolution of the selector arm, those from another stop twice, and all the remainder once only.

The selector device may consist of fixed contacts and corresponding movable contact fingers which are actuated by a cam shaft driven by a motor.

Instead of the motor for driving the selector arms or the cam shaft, an electromagnet may be used.

Finally the selector device may consist of a relay chain such as are known for telephone circuits.

What I claim is:

1. A lift control device for arranging the order of operational sequence of outside calls in lifts with outside call apparatus actuated by press-buttons, in which a selector arrangement is placed in circuit between at least one part of the outside call apparatus and the motion control for the lift, said selector arrangement embodies



two selector arms arranged on a common shaft driven by a motor, and two sets of fixed contacts, one set associated with each selector arm, the selector arrangement is controlled by a circuit relay which comprises two switches, one of which is connected in the circuit of one of the selector arms and the other of which switches is arranged in the circuit of said motor, the first-mentioned switch being open until said relay operates and the second-mentioned switch being closed until said relay operates, said arrangement searches the outside call step-by-step in a predetermined order of sequence and causes the actuated members of said apparatus to operate one by one the motion control of the lift according to the predetermined order of sequence.

2. A device according to claim 1 in which one set of the fixed contacts are each directly connected with one of the floor relays.

3. A lift control device for arranging the order of operational sequence of outside calls in lifts with outside call apparatus actuated by press-buttons, in which a selector arrangement is placed in circuit between at least one part of the outside call apparatus and the motion control for the lift, said selector arrangement embodies two selector arms arranged on a common shaft driven by a motor, and two sets of fixed contacts, one set associated with each selector arm, the selector arrangement is controlled by a circuit relay which comprises two switches, one of which is connected in the circuit of one of the selector arms and the other of which switches is arranged in the circuit of said motor, the first-mentioned switch being open until said relay operates and the second-mentioned switch being closed until said relay operates, one set of the fixed contacts are directly connected through call-button contacts to said circuit relay, and said call-button contacts are connected in parallel and are in operational connection with a further set of contacts in the circuit of said motor, which arrangement searches the outside call step-by-step in a predetermined order of sequence and causes the actuated members of said apparatus to operate one by one the motion control of the lift according to the predetermined order of sequence.

4. A device according to claim 3, in which the fixed contacts of one set are connected through the outside call storage apparatus to said circuit relay.

5. A device according to claim 4, in which the fixed contacts, of the set associated with the selector arm connected with a switch normally open until said relay operates, are connected through the outside downwards call storage apparatus contacts of the lift to said circuit relay.

**References Cited** in the file of this patent

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