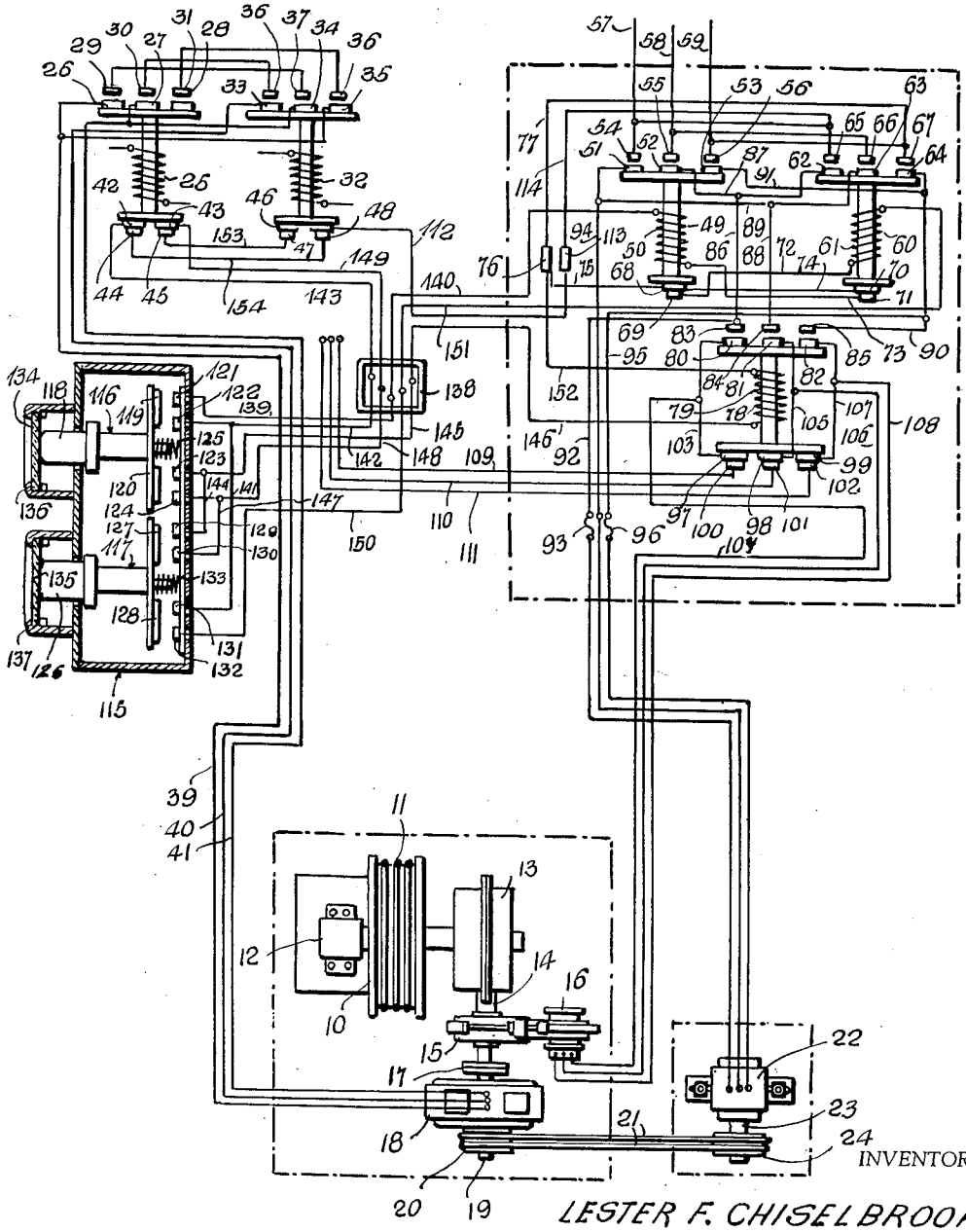
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EMERGENCY ELEVATOR CONTROL SYSTEM

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EMERGENCY ELEVATOR CONTROL SYSTEM

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This invention relates to building equipment and more particularly to an auxiliary or emergency control system for elevators of the operator controlled or automatic variety.

As is well known present day elevators incorporate extremely complex control systems and as a consequence thereof temporary failures of such systems are not infrequent since such failures may result from any one of several hundred causes. All present day elevator cars are provided with escape features which in the case of a plurality of elevators installed in adjacent shafts comprise escape doors in the sides of the cars which permit transfer of passengers from one car to another in the event a car becomes stalled between floors or in the event the regular doors cannot be opened. In the case of a single elevator installation, there is usually provided an escape hatch in the roof of the car and passengers are removed through this hatch and to the floor above by means of ladders or other suitable devices.

In the latter case, frequent difficulty is experienced due to the necessity of communicating the fact that failure of the elevator has occurred and thereafter obtaining the necessary ladders or other devices to effect an escape. Likewise, in leaving the elevator car through the roof, the passengers and their clothing frequently become soiled due to contact with the elevator cables and other mechanism commonly found on the upper side of an elevator car which mechanism is usually covered with a relatively heavy collection of oily dirt or grease and there is also the ever present danger that passengers escaping by this route will become injured due to contact with the surrounding mechanism or by reason of falls.

The failure of elevator control mechanism with consequent stoppage of the car between floors becomes particularly important and may very well contribute to the loss of life in hospital installations where seriously ill or injured patients must be transported in the elevator. Obviously, if such an installation were of the single elevator type, removal of sick or critically injured patients through an escape hatch in the roof of the elevator is extremely difficult if not actually impossible. In fact, there are many actual recorded instances of lives being lost due to the stoppage of elevator cars between floors.

While it is necessary that escape doors or hatches be provided in elevator cars, nevertheless, it is extremely desirable that some means be provided to permit the removal of passengers from stalled elevator cars through the regular doors leaving the escape doors or hatches for use only in cases of extreme emergency where it is absolutely impossible to move the stalled car either up or down to the next floor or landing. The problem of moving stalled elevator cars and effecting the safe, simple and comfortable removal of passengers has long been present in the art and any practical solution thereof represents a very real step forward.

It is accordingly an object of this invention to provide an auxiliary or emergency control system for an elevator which permits the occupants thereof to move a stalled elevator car at a relatively slow speed either up or down to the next adjacent floor or landing.

A further object of the invention is the provision of an auxiliary or emergency control system for an elevator which system in no way interferes with the normal operation of the elevator but only becomes operative upon failure of the regular control system.

A still further object of the invention is the provision of an auxiliary or emergency control system for an elevator which requires no special skill or knowledge in order to effect the efficient operation thereof.

Another object of the invention is the provision of an auxiliary or emergency control system for an elevator which may be conveniently and economically added to present installations without requiring extensive rewiring and necessitating the installation of only a minimum of equipment.

A further object of the invention is the provision of an auxiliary or emergency control system for an elevator which may be utilized to perform its intended function regardless of whether the elevator is of the operator controlled or automatic variety.

Another object of the invention is the provision of an auxiliary or emergency control system for an elevator which permits movement of a stalled elevator car by the occupants thereof up or down to the next adjacent floor or landing thereby permitting removal of the passengers through the regular doors thus precluding the necessity for utilizing escape doors or hatches.

A still further and important object of the invention is the provision of an auxiliary or emergency control system for an elevator which permits convenient emergency operation of a stalled elevator by the occupants thereof resulting in prompt removal of such occupants and eliminating injury or loss of life due to the stoppage of the elevator.

Further objects and advantages of the invention will become apparent from the following description taken in conjunction with the accompanying drawing wherein the single figure is a diagrammatic layout and circuit diagram of the auxiliary or emergency elevator control of this invention.

With continued reference to the drawing there is shown an elevator mechanism including a winding drum **10** receiving a hoisting cable **11**, the drum **10** being mounted for rotation in bearings **12** and being driven through a speed reducing gear transmission **13** from a power input shaft **14**. Shaft **14** carries a drum **15** forming part of an electromagnetic brake **16**, the shaft **14** being driven through a coupling **17** by a main drive motor **18**. The shaft **19** of motor **18** projects from the opposite side of the motor from the coupling **17** and receives pulleys **20** which serve to engage V-belts **21**. An auxiliary motor **22** is provided with a power output shaft **23** on which is mounted pulleys **24** which drivingly engage belts **21**. Motor **22** is sufficiently powerful to raise or lower the elevator through rotation of the winding drum **10** but the resulting movement of the elevator car is at a relatively slow speed with relation to the normal speed of operation thereof. Obviously, if desired, the V-belts **21** may be replaced by any other suitable or desired power transmission means.

A conventional control system for normal operation of the main drive motor **18** and the elevator car may include a solenoid operated Up-switch **25** having movable contacts **26**, **27** and **28** which upon energization of the solenoid engage fixed contacts **29**, **30** and **31**, respectively. There is also included in this conventional control system a solenoid operated Down-switch **32** provided with movable contacts **33**, **34** and **35** which upon energization of the solenoid engage fixed contacts **36**, **37** and **38**, respectively. Fixed contacts **29**, **30** and **31** as well as **36**, **37** and **38** are connected to a suitable source of power. Movable contacts **26**, **27** and **28** as well as **33**, **34** and **35** are connected through conductors **39**, **40** and **41** to the main drive motor **18** and operation of the Up and Down switches **25** and **32** normally control operation of the elevator car.

Up-switch **25** is also provided with movable contacts **42** and **43** which when the associated solenoid is de-energized engage fixed contacts **44** and **45**, respectively. Down-switch **32** is provided with a shorting bar **46** which when the associated solenoid is de-energized engages fixed contacts **47** and **48** to provide a path for the flow of current therebetween. The purpose of movable contacts **42** and **43**, fixed contacts **44** and **45**, shorting bar **46** and fixed contacts **47** and **48** will be later described.

The auxiliary or emergency control system of this invention may include a solenoid operated Up-switch **49**

having a coil 50 and movable contacts 51, 52 and 53. Upon energization of coil 50, contacts 51, 52 and 53 engage fixed contacts 54, 55 and 56, respectively. Contacts 54, 55 and 56 are connected to conductors 57, 58 and 59 from a suitable power source.

A solenoid operated Down-switch 60 having a coil 61 is provided with movable contacts 62, 63 and 64 which upon energization of coil 61 are engageable with fixed contacts 65, 66 and 67, respectively which in turn are connected to conductors 57, 58 and 59.

Up-switch 49 is also provided with a movable contact 68 which when the coil 50 is de-energized engages a fixed contact 69. Down-switch 60 is also provided with a movable contact 70 which when the coil 61 is de-energized engages a fixed contact 71. Fixed contact 69 is connected through a conductor 72 with one side of coil 61 of Down-switch 60 and fixed contact 71 is connected through a conductor 73 with one side of coil 50 of Up-switch 49. Movable contacts 68 and 70 are tied together through a conductor 74 and are also connected through a conductor 75 with a fuse 76 and through conductor 77 with power supply conductor 59.

The auxiliary or emergency control system also includes a solenoid operated brake switch 78 having a coil 79 and being provided with movable contacts 80, 81 and 82. Upon energization of coil 79 contacts 80, 81 and 82 engage fixed contacts 83, 84 and 85, respectively. Contact 83 is connected through a conductor 86 and conductor 87 to movable contacts 52 and 62 on Up and Down switches 49 and 60, respectively. Contact 84 is connected through conductor 88 and conductor 89 with contacts 51 and 63 on Up and Down switches 49 and 60, respectively. Contact 85 is connected through conductor 90 and conductor 91 with contacts 53 and 64 on Up and Down switches 49 and 60, respectively. Contacts 83, 52 and 62 are connected through conductor 92 and overload protector 93 with the auxiliary motor 22. Contacts 84, 51 and 63 are connected through conductor 94 with the auxiliary motor 22 and contacts 85, 53 and 64 are also connected with the auxiliary motor 22 through conductor 95 and overload protector 96.

Brake switch 78 is also provided with movable contacts 97, 98 and 99 which when the coil 79 is de-energized are engageable with fixed contacts 100, 101 and 102, respectively. Contact 97 is connected through conductor 103 with contact 80 and through conductor 104 with the electromagnetic brake 16. Contact 98 is connected through conductor 105 with contact 81 and through conductor 106 with the brake 16. Also, contact 99 is connected through conductor 107 with the contact 82 and through conductor 108 with the brake 16. Contacts 100, 101 and 102 are connected through conductors 109, 110 and 111, respectively with the conventional control system of the elevator.

Shorting bar 46 on conventional Down-switch 32 is connected through conductor 112, a fuse 113 and a conductor 114 with contacts 54 and 65 and power supply conductor 57.

An emergency control 115 is provided in the elevator car and this control may include Up and Down push button switches 116 and 117, respectively, switch 116 having a finger engaging push button 118, movable contacts 119 and 120, contact 119 being engageable with fixed contacts 121 and 122 and contact 120 being engageable with fixed contacts 123 and 124. Contacts 119 and 120 are normally held out of engagement with fixed contacts 121, 122, 123 and 124 by a compression spring or other suitable means 125.

Down-switch 117 is provided with a finger engaging push button 126 and movable contacts 127 and 128 Contact 127 is engageable with contacts 129 and 130 and contact 128 is engageable with contacts 131 and 132. Contacts 127 and 128 are normally held out of engagement with contacts 129, 130, 131 and 132 by a compression spring or other suitable means 133.

Since push button switches 116 and 117 are for use only in an emergency, the finger engaging buttons 118 and 126 are covered by transparent frangible disks of glass or other suitable material 134 and 135 which when the necessity arises may be broken to permit access to the push buttons 118 and 126. The disks of glass 134 and 135 may be secured in the outer ends of sleeves 136 and 137, respectively, surrounding the push buttons 118 and 126 and means will normally be provided for permitting the convenient replacement of the glass disks 134 and 135 in the event of breakage thereof.

A conventional junction box 138 which permits the transmission of electrical energy from and to the moving elevator car is provided at any convenient location and through this box 138 the fixed contact 121 is connected by a conductor 139 and a conductor 140 with coil 50 of Up-switch 49. Contact 122 is connected through conductor 141 with contact 131 and through conductor 142, box 138 and conductor 143 with the contact 42 on conventional Up-switch 25. Contact 123 is connected through a conductor 144 with contact 129 and through a conductor 145, box 138 and conductor 146 with the coil 79 of brake switch 78. Contact 124 is connected through a conductor 147 with contact 130 and through conductor 148, box 138 and conductor 149 with contact 43 on conventional Up-switch 25. Contact 132 is connected through conductor 150, box 138 and conductor 151 with coil 61 of down-switch 60. Coil 79 of brake switch 78 is also connected through conductor 152, fuse 76 and conductor 77 with power supply conductor 59.

The above completes the description of the elevator control system of this invention as well as the components incorporated therein, and the operation of such system will now be described.

Assuming that the elevator has become stalled between floors as a result of any one or a combination of several hundred possible failures of equipment, improper operation or power failure, and that it is desired to move the car downwardly to the next adjacent floor or landing, the glass disk 135 is broken and the push button 126 depressed and held in such position until the car has moved to the next adjacent floor or landing as a result of the following described operation of the auxiliary or emergency control system.

Depression of the push button 126 of emergency down-switch 117 results in engagement of movable contacts 127 with fixed contents 129 and 130 thus providing for the flow of electrical energy from power supply conductor 57 through conductor 114, fuse 113, conductor 112, shorting bar 46 on conventional Down-switch 32, contact 47, connected to contact 45 by conductor 153, contact 43, conductor 149, conductor 148, conductor 147 through contacts 130, 127 and 129, conductor 144 conductor 145 and conductor 146 to coil 79 of the brake switch 78, the opposite side of coil 79 being connected to conductor 152, fuse 76 and conductor 77 with the power supply conductor 59. This results in energizing coil 79 and engagement of contacts 80, 81 and 82 with contacts 83, 84 and 85, respectively. Contacts 80, 81 and 82 are connected to the electromagnetic brake 16 through conductors 104, 106 and 108 as mentioned above.

At the same time contacts 131 and 132 are closed by the movable contact 128 of emergency Down-switch 117 and this results in the flow of electrical energy from power supply conductor 57 through conductor 114, fuse 113, conductor 112, shorting bar 46, contact 48, connected to contact 44 through conductor 154, contact 42, conductor 143, conductor 142, conductor 141, and contact 131 through contact 128 and contact 132, conductor 150, conductor 151 to coil 61 of emergency Down-switch 60, the opposite side of coil 61 being connected through conductor 72, contact 69, contact 68, conductor 75, fuse 76, and conductor 77 with power supply conductor 59. This results in energizing coil 61 of emergency Down-switch 60 thus engaging movable contacts 62, 63 and 64 with the fixed contacts 65, 66 and 67 which are connected to the power supply conductor 57, 58 and 59. Since movable contacts 62, 63 and 64 are connected to fixed contacts 83, 84 and 85 of the brake switch 78 and through conductors 92, 94 and 95 to the auxiliary motor 22 such motor will be energized to initiate rotation thereof and simultaneously the electromagnetic brake 16 will be released to permit rotation of the shaft 14 and winding drum 10. The rotation of auxiliary motor 22 is transmitted to the winding drum 10 through pulley 24, belts 21, pulley 20, shaft 19, coupling 17, shaft 14 and speed reduction transmission 13. Since the auxiliary motor 22 operates at a greatly reduced speed when compared to the normal speed of operation of the main drive motor 18, the elevator car will move downwardly at a very slow rate of speed and may be stopped at the next lower adjacent floor or landing by releasing the push but-

ton 126 of emergency Down-switch 117 which results in de-energizing the auxiliary motor 22 and de-energizing of the electromagnetic brake 16 to lock the shaft 14 and winding drum 10 against further rotation.

If it is desired to move the stalled elevator car upwardly to the next adjacent floor or landing, glass disk 134 is broken and the push button 118 of the emergency Up-switch 116 depressed to engage the contacts 119 and 120 with the fixed contacts 121, 122, 123 and 124, respectively. This results in energization of the coil 79 of brake switch 78 to engage the contacts 80, 81 and 82 with the fixed contacts 83, 84 and 85 and also results in energizing coil 50 of emergency Up-switch 49 to engage contacts 51, 52 and 53 with contacts 54, 55 and 56, respectively. Such operation of emergency Up-switch 49 and brake switch 78 results in energization of auxiliary motor 22 and simultaneous energization of electromagnetic brake 16 which permits rotation of the shaft 14 and winding drum 10 at a slow rate of speed by reason of rotation of auxiliary motor 22. This operation, of course, causes the elevator car to move upwardly at a slow rate of speed to the next adjacent floor or landing where the same may be stopped by release of the push button 118 of emergency Up-switch 116.

Inadvertent operation of the emergency Up-switch 49 when the emergency Down-switch 60 is energized is prevented by opening of the contacts 70 and 71 which prevents energization of the coil 50 of emergency Up-switch 49. In a similar manner operation of emergency Down-switch 60 is prevented during operation of the emergency Up-switch 49 by reason of the separation of contacts 68 and 69 which prevents energization of the coil 61 of emergency Down-switch 60.

It is of course assumed that during use of the emergency control system described above that the conventional Up and Down switches 25 and 32 will be de-energized and that consequently shorting bar 46 will engage fixed contacts 47 and 48 and that movable contacts 42 and 43 will engage fixed contacts 44 and 45 which establishes and maintains circuit continuity between the power supply conductors 57 and 59 and the emergency Up and Down push button switches 116 and 117 and the coil 50 of emergency Up-switch 49, coil 61 of emergency Down-switch 60 and coil 79 of brake switch 78.

It will be seen that by the above described invention there has been provided a relatively simple, yet highly efficient and foolproof auxiliary or emergency control system for use in moving a stalled elevator car up or down to the next adjacent floor or landing in order to permit removal of the occupants of the elevator car through the regular doors and precludes the necessity of utilizing escape doors or hatches and further it will be seen that the emergency control system of this invention in no way interferes with the normal or conventional operation of the elevator and at the same time provides a system which may be added to existing elevator installations without material change therein to provide an emergency control system operable by the occupants of a stalled elevator who need have no special skill or knowledge but merely the ability to depress a push button which may be plainly marked by a sign or suitable indicia indicating the proper mode of procedure.

It will be obvious to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and therefore the invention is not limited by that which is shown in the drawing and described in the specification but only as indicated in the appended claims.

What is claimed is:

1. In combination with an elevator apparatus including a car, a winding drum for raising or lowering said car, a main drive motor for said winding drum, an electromagnetic brake for locking said winding drum against rotation and up and down regulator control switches for said main drive motor, an emergency control system comprising a relatively low speed, reversible auxiliary drive motor coupled to said winding drum for raising or lowering said car at a relatively slow rate of speed, a solenoid operated emergency up-switch, normally open auxiliary motor control contacts on said emergency up-switch and normally closed contacts thereon whereby upon energization of said solenoid said normally open contacts will be closed to energize said auxiliary motor and raise said car and said normally closed contacts will be opened, a solenoid operated emergency down switch, normally open auxiliary motor control contacts on said emergency down switch and normally closed contacts thereon whereby upon energization of said last named solenoid said normally open contacts will be closed to energize said auxiliary motor and lower said car and said normally closed contacts will be opened, the normally closed contacts on said emergency up-switch being connected in series with the solenoid of said emergency down switch and the normally closed contacts on said emergency down-switch being connected in series with the solenoid of said emergency up-switch thereby preventing energization of either solenoid when the other is energized, a solenoid operated emergency brake switch connected between said emergency up and down switches and said brake whereby said brake will be released only while said auxiliary motor is energized, an emergency push button up-switch disposed in said car, an emergency push button down-switch disposed in said car, frangible transparent means covering said push button switches to prevent inadvertent actuation thereof during normal operation of said elevator, said push button up-switch being connected to the solenoid of said emergency up-switch and to the solenoid of said brake switch, said push button down-switch being connected to the solenoid of said emergency down switch and to the solenoid of said brake switch whereby upon actuation of either push button up or down switch said auxiliary motor will be energized and said brake released to move said car in the indicated direction under continuous control of said push button switches and means incorporated in said regular control switches for preventing operation of said emergency control system during normal operation of said elevator.

2. In combination with an elevator apparatus including a car, a winding drum for raising or lowering said car, a main drive motor for said winding drum, an electromagnetic brake for locking said winding drum against rotation and up and down regular control switches for said main drive motor, an emergency control system comprising a relatively low speed, reversible auxiliary drive motor coupled to said winding drum for raising or lowering said car at a relatively slow rate of speed, a solenoid operated emergency up-switch, normally open auxiliary motor control contacts on said emergency up-switch and normally closed contacts thereon whereby upon energization of said solenoid said normally open contacts will be closed to energize said auxiliary motor and raise said car and said normally closed contacts will be opened, a solenoid operated emergency down-switch, normally open auxiliary motor control contacts on said emergency down-switch and normally closed contacts thereon whereby upon energization of said last named solenoid said normally open contacts will be closed to energize said auxiliary motor and lower said car and said normally closed contacts will be opened, the normally closed contacts on said emergency up-switch being connected in series with the solenoid of said emergency down-switch and the normally closed contacts on said emergency down-switch being connected in series with the solenoid of said emergency up-switch thereby preventing energization of either solenoid when the other is energized, a solenoid operated emergency brake switch connected between said emergency up and down switches and said brake whereby said brake will be released only while said auxiliary motor is energized, a manually operable emergency up-switch disposed in said car, a manually operable emergency down-switch disposed in said car, said manually operable up-switch being connected to the solenoid of said emergency up-switch and to the solenoid of said brake switch, said manually operable down-switch being connected to the solenoid of said emergency down switch and to the solenoid of said brake switch whereby upon actuation of either manually operable up or down switch said auxiliary motor will be energized and said brake released to move said car in the indicated direction under continuous control of said manually operable switches and means incorporated in said regular control switches for preventing operation of said emergency control system during normal operation of said elevator.

3. In combination with an elevator apparatus including a car, a winding drum for raising or lowering said car, a main drive motor for said winding drum, an electrically operated brake for locking said winding drum

against rotation and up and down regular control switches for said main drive motor, an emergency control system comprising a relatively low speed, reversible auxiliary drive motor coupled to said winding drum for raising or lowering said car at a relatively slow rate of speed, a solenoid operated emergency up-switch, normally open auxiliary motor control contacts on said emergency up switch and normally closed contacts thereon whereby upon energization of said solenoid said normally open contacts will be closed to energize said auxiliary motor and raise said car and said normally closed contacts will be opened, a solenoid operated emergency down switch, normally open auxiliary motor control contacts on said emergency down switch and normally closed contacts thereon whereby upon energization of said last named solenoid said normally opened contacts will be closed to energize said auxiliary motor and lower said car and said normally closed contacts will be opened, the normally closed contacts on said emergency up-switch being connected in series with the solenoid of said emergency down switch and the normally closed contacts on said emergency down-switch being connected in series with the solenoid of said emergency up-switch thereby preventing energization of either solenoid when the other is energized, a solenoid operated emergency brake switch connected between said emergency up and down switches and said brake whereby said brake will be released only while said auxiliary motor is energized, a manually operable emergency up-switch disposed in said car and a manually operable emergency down-switch disposed in said car, said manually operable up-switch being connected to the solenoid of said emergency up-switch and to the solenoid of said brake switch, said manually operable down-switch being connected to the solenoid of said emergency down switch and to the solenoid of said brake switch whereby upon actuation of either manually operable up or down switch said auxiliary motor will be energized and said brake released to move said car in the indicated direction under continuous control of said manually operable switches.

4. In combination with an elevator apparatus including a car, a winding drum for raising or lowering said car, a main drive motor for said winding drum, an electrically operated brake for locking said winding drum against rotation and up and down regular control switches for said main drive motor, an emergency control system comprising an auxiliary drive motor coupled to said winding drum for raising or lowering said car, an electrically operated emergency up-switch, normally open auxiliary motor control contacts on said emergency up-switch and normally closed contacts thereon whereby upon actuation of said emergency up-switch said normally open contacts will be closed to energize said auxiliary motor and raise said car and said normally closed contacts will be opened, an electrically operated emergency down-switch, normally open auxiliary motor control contacts on said emergency down-switch and normally closed contacts thereon whereby upon actuation of said last named switch said normally open contacts will be closed to energize said auxiliary motor and lower said car and said normally closed contacts will be opened, the normally closed contacts on said emergency up-switch being connected in series with the operating means of said emergency down switch and the normally closed contacts on said emergency down-switch being connected in series with the operating means of said emergency up-switch thereby preventing actuation of either switch when the other is actuated, an electrically operated emergency brake switch connected between said emergency up and down switches and said brake whereby said brake will be released only while said auxiliary motor is energized, a manually operable emergency up-switch disposed in said car and a manually operable emergency down-switch disposed in said car, said manually operable up-switch being connected to the operating means of said emergency up-switch and to the operating means of said brake switch, said manually operable down-switch being connected to the operating means of said emergency down-switch and to the operating means of said brake switch whereby upon actuation of either manually operable up or down switch said auxiliary motor will be energized and said brake released to move said car in the indicated direction under continuous control of said manually operable switches.

5. In combination with an elevator apparatus including a car, a winding drum for raising or lowering said car, a main drive motor for said winding drum, an electrically operated brake for locking said winding drum against rotation and up and down regular control switches for said main drive motor, an emergency control system comprising an auxiliary drive motor coupled to said winding drum for raising or lowering said car, an emergency up-switch, normally open auxiliary motor control contacts on said emergency up-switch whereby upon actuation of emergency up-switch said normally open contacts will be closed to energize said auxiliary motor and raise said car, an emergency down-switch, normally open auxiliary motor control contacts on said emergency down switch whereby upon actuation of said last named switch said normally open contacts will be closed to energize said auxiliary motor and lower said car, an emergency brake switch connected between said emergency up and down switches and said brake whereby said brake will be released only while said auxiliary motor is energized, a manually operable emergency up-switch disposed in said car and a manually operable emergency down-switch disposed in said car, said manually operable up-switch being connected to said emergency up-switch and to said brake switch, said manually operable down-switch being connected to said emergency down switch and to said brake switch whereby upon actuation of either manually operable up or down switch said auxiliary motor will be energized and said brake released to move said car in the indicated direction under continuous control of said manually operable switches.

No references cited.