United States Patent

[11] 3,532,186

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[21] Appl. No. **758,298**
[22] Filed **Sept. 9, 1968**
[45] Patented **Oct. 6, 1970**
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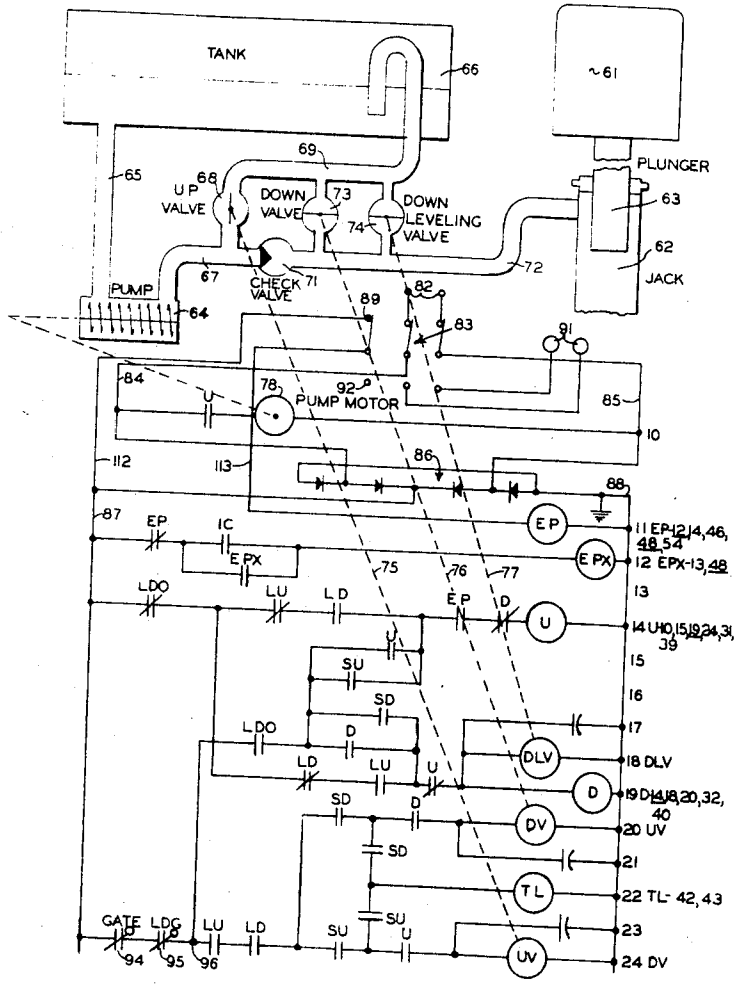
[54] **EMERGENCY POWER OPERATION CONTROL FOR HYDRAULIC ELEVATORS**
8 Claims, 2 Drawing Figs.

[52] **U.S. Cl.** **187/29**
[51] **Int. Cl.** **B66b 1/04**
[50] **Field of Search** 187/29

[56] **References Cited**
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ABSTRACT: A hydraulic elevator control which modifies conventional controls while connected to a secondary power source to run the car automatically, when above a lower landing, under the influence of gravity to said lower landing. The system requires only limited power and can block operation of the pump motor and control circuits unnecessary to down travel while the secondary source is supplying power. Control of descent is through operation of down valve solenoid and its normal control means when the secondary source is connected to the system.



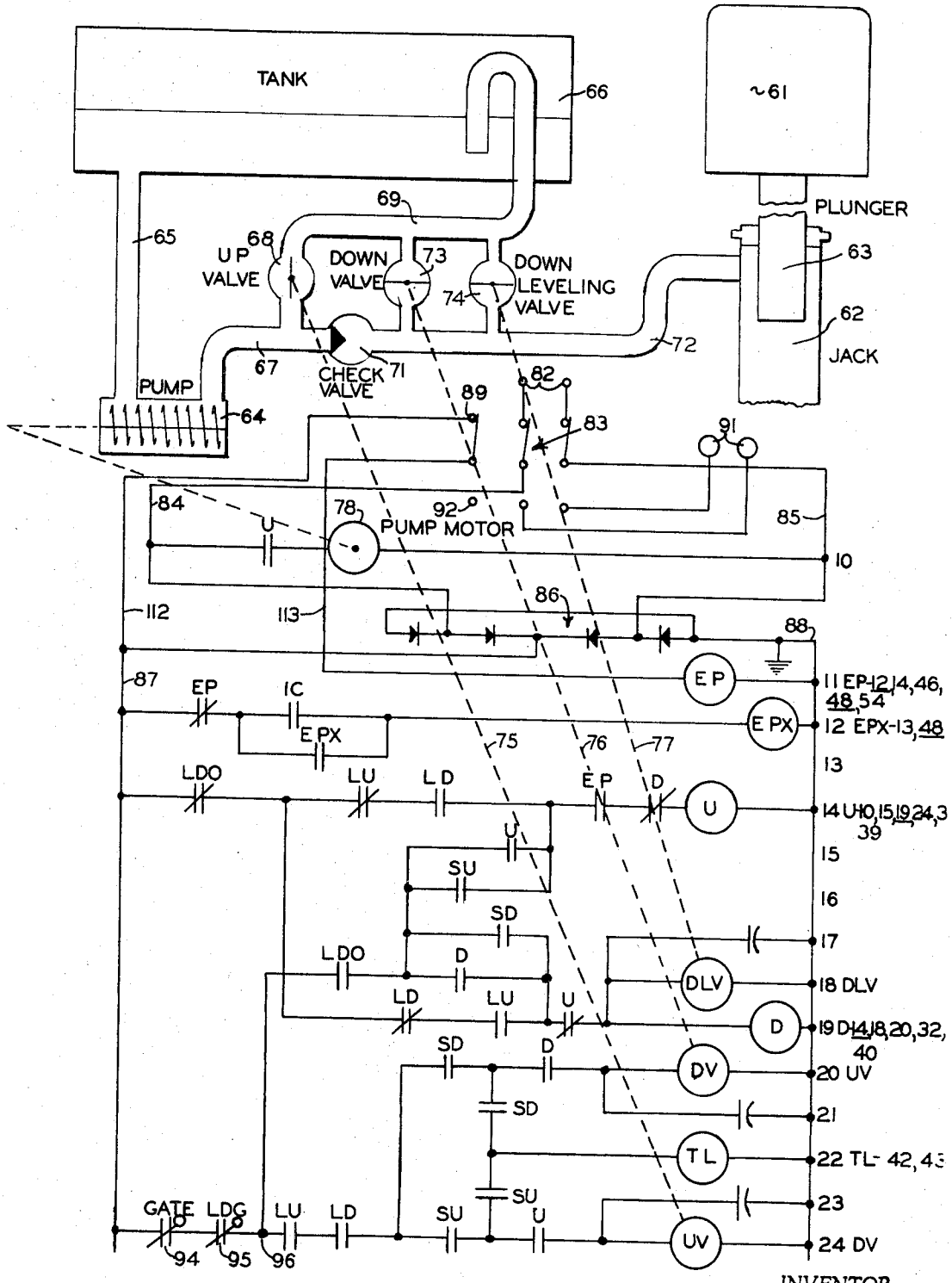


FIG. 1

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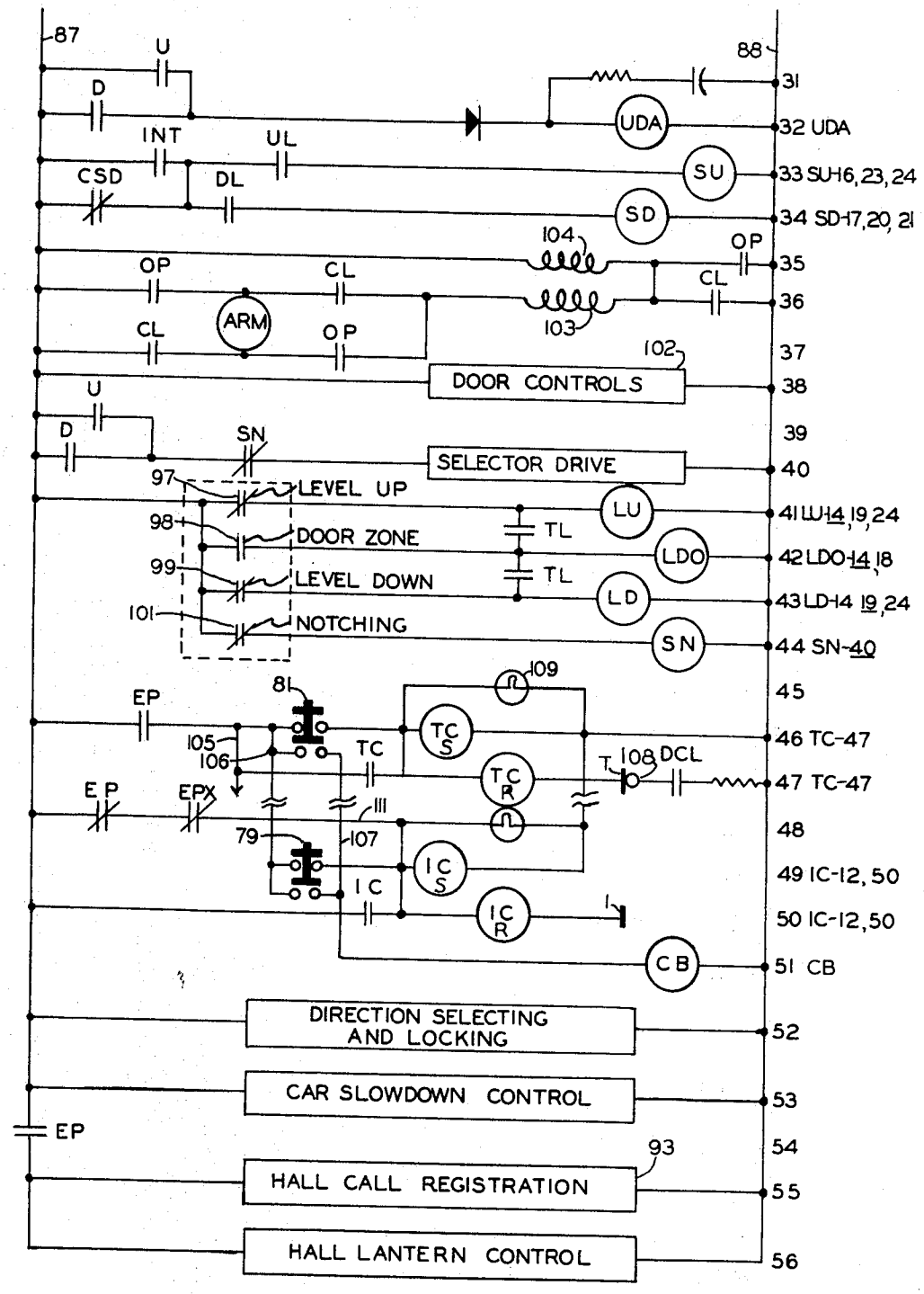


FIG. 2

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EMERGENCY POWER OPERATION CONTROL FOR HYDRAULIC ELEVATORS

BACKGROUND OF THE INVENTION

This invention relates to elevator controls and more particularly to controls for hydraulic elevators.

Heretofore it has been known to provide means for moving elevators to a main floor when the normal source of power fails and an alternative source of power of a magnitude to drive one or more hoist motors is connected to the system. Usually the application of emergency power under these circumstances causes a selection of individual cars for travel to a main floor for shutdown as shown in Robertson U.S. Pat. No. 2,968,364 of January 17, 1961.

This invention enables hydraulic elevators in a system for which the main power source has failed to be sent to a lower floor by energizing appropriate control circuits with an auxiliary power source without energizing the hoisting mechanism. Transfer downward is accomplished under the influence of gravity utilizing only the power required to control down valve solenoids and to operate the door motor. Ancillary operating equipment can be deenergized as in the case of hall call and car call stopping circuits, or can be maintained active by the emergency power, as in the case of position indicators; however the baring of operation of the pump motors employed in hoisting the elevator greatly reduces the demand imposed on the emergency power source and enables emergency service to be afforded with emergency power source of a capacity much reduced from that of traction type elevators.

An object of the invention is to improve elevator service under conditions where the main power source of a system has failed.

Another object is to move hydraulic elevators to a landing to permit occupants to depart from the elevators where only limited power is available following a failure of a main power source.

A further object is to control the descent of hydraulic elevators to a predetermined landing where the main power source has failed.

SUMMARY OF THE INVENTION

In accordance with the above objects one feature of this invention involves disconnecting the motor for the hoisting pump of a hydraulic elevator in response to the transfer from a main power source to a source of emergency power.

A second feature is the disconnection of hall call and car call controls for an elevator transferred from a main power source to an emergency power source whereby manual call registering means are made ineffective.

A third feature involves means to set a car to run to a given station automatically when it is transferred from a main power source to an emergency power source.

A further feature resides in controls for operating down valves of a hydraulic elevator when it is transferred from a main power source to an emergency power source and which maintain safety features during such operation.

DESCRIPTION OF THE DRAWINGS

The above objects and features will be more fully appreciated from the following detailed description when read with reference to the accompanying drawings in which:

FIG. 1 is a combined hydraulic schematic diagram and an across-the-line wiring diagram of a portion of the electrical controls for a hydraulic elevator according to one embodiment of the invention; and

FIG. 2 is an across-the-line diagram of additional electrical controls which cooperate with those of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The electrical circuits are depicted in across-the-line form to facilitate their understanding. Actuating coils of relays and motors are shown in horizontal bands which are indexed in the

right-hand margin to a numbered line location. Relay coils are correlated to their line location by reference characters set forth in the margin in horizontal alignment with the coil symbols of the diagram. The contacts actuated by the relays are not shown physically related to the coils, but rather are shown in alignment with the elements they control. The contacts are related to their coils by the index such that each contact shown which is actuated by an illustrated coil is indicated by the notation in the right-hand portion of the index of its line location adjacent the coil's reference character. Line numerals for back contacts, those which are closed when the relay armature is dropped out and are opened when the relay armature is pulled in, are set forth underlined in the index. Front contacts, those normally open, and closed when the relay armature is pulled in, have their line locations set forth in the index without underlining.

Correlation of the hydraulic circuit and electrical circuit is accomplished by showing dashed lines between the pump motor and a schematic representation of the impeller and between the control valves and the solenoids which control those valves.

As a further aid in understanding the present invention, tables listing in alphabetical order the short functional names of the relays, their corresponding reference characters, and the line locations for those coils shown are set forth in Table A and names and characters for those contacts for which no coils are shown are set forth in Table B:

TABLE A

Symbol:	Functional Name	Line
CB	Car Call	51
D	Down Direction	19
EP	Emergency Power	11
EPX	Auxiliary Emergency Power	12
LD	Level Down	43
LDO	Door Zone	42
LU	Level Up	41
SD	Down High Speed	34
SU	Up High Speed	33
TL	High Speed	22
U	Up Direction	14
UDA	Up or Down Direction	32
1C to TC	1st to Top Floor Car Call	50-46

TABLE B

Symbol:	Functional Name	Line
CL	Door Close	
CSD	Car Slowdown	
DCL	Door Close Limit	
DL	Down Direction Locking	
INT	Selector Interuptor	
OP	Door Open	
UL	Up Direction Locking	

FIG. 1 shows a hydraulic elevator comprising a car **61** supported in a column of oil or other suitable hydraulic fluid contained in a jack cylinder **62** into which a plunger **63** telescopes. A pump **64** draws the fluid through a hydraulic line **65** from reservoir **66** and advances it to a manifold **67** from which it is returned through up valve **68** and return line **69** to tank **66**. In order to raise the car, the up valve **68** closes causing the fluid in manifold **67** to pass check valve **71** and flow through line **72** to jack **62**. Check valve **71** hydraulically locks the elevator in position. It has a spring loaded piston arranged to move toward the closed position as the flow decreases and to fully close before any reversal of flow can occur to cause shock or hammer in line **72**. When the car is to be lowered, fluid flows from jack **62** through line **72** and through the down valve **73** and/or the down leveling valve **74** to return line **69** and reservoir **66**. Check valve **71** prevents reverse flow of fluid to the pump side of manifold **67**.

The up valve **68**, the down valve **73** and the down leveling valve **74** are solenoid operated respectively by solenoids UV

at 24, DV at 20 and DLV at 18 as represented by the dashed lines 75, 76 and 77 representing actuating linkages. Up valve 68 is the only valve employed to operate the elevator in the up direction. It serves as a starting valve for smooth acceleration, an up leveling valve providing a stabilized leveling speed and a soft stop, and a relief valve to prevent shock when the pump is started. The down valve opens and closes at a controlled rate to control the rate of fluid flow from the jack without shock or hammer in the system, while the down leveling valve is a smaller capacity version of the down valve to bring the car level with the floor by finer control of the fluid flow.

In normal operation a signal requiring travel upward starts motor 78 driving pump 64 to force fluid through up valve 68 to return to tank 66. The up valve slowly closes so that the fluid is forced against the closed check valve 71 to open that valve and pass the fluid to the jack 62 gradually increasing the rate at which the lifting force is applied to the jack. When the up valve is completely closed, all fluid issued by the pump is passed to the jack and the cab 61 is raised at its maximum speed.

Just prior to the arrival of the car at floor level, a car position sensing device, which may be a magnetically closed switch, is actuated to initiate its slowdown. The up valve 68 is opened partially thereby permitting a portion of the fluid issuing from pump 64 to return to tank 66 while the remainder is passed by check valve 71 to jack 62. When the car is level with the floor, the motor is stopped. The up valve is fully open at this time and the hydraulic system is conditioned as shown in FIG. 1. As the fluid flow decreases, the check valve closes gradually so that it is fully closed before the fluid can reverse its flow, thereby avoiding shock or hammer in the line. The car is supported at rest on the column of fluid in the jack.

Down travel is instituted by first gradually opening down leveling valve 74 and then gradually opening the down valve 73 to their fully open positions so that the weight of the car and its load forces the fluid from the jack 62 through the valves to return line 69 and the tank. Acceleration in down travel depends on the rate at which the valves open and the friction between the packing and plunger. As the car approaches a landing, a leveling device is actuated to slowly close the down valve 73 so that in the final approach to the floor only the down leveling valve 74 is open to pass fluid from the jack to the tank. This slows the car to leveling speed. When the car is level with the floor, down leveling valve 74 is closed to close all paths from the jack to the tank and hold the car at the floor.

Electrical control of the hydraulic operation, described in greatly simplified form above, is by means of the circuits shown in FIGS. 1 and 2 and is in response to the registration of calls for service on either hall call devices (not shown) or car call devices such as push buttons 79 and 81 for the first and top floors respectively. Power is normally supplied from an alternating current source at terminals 82 to emergency power transfer switch 83, a triple pole double throw switch, and leads 84 and 85. Pump motor 78 is energized through up direction relay contact U at 10 from leads 84 and 85. The remainder of the disclosed controls is energized from rectifier bridge 86 connected across leads 84 and 85 to supply direct current to leads 87 and 88.

Emergency power relay EP at 11 is connected and energized across leads 87 and 88 through pole 89 of switch 83 when it is positioned to connect the system to the primary power source and is deenergized when switch 83 is transferred to the emergency power source at terminals 91 since pole 92 is connected to no power source. Auxiliary emergency power relay EPX at 12 is normally deenergized by open back contact EP. Relays EP and EPX cooperate to transfer the elevator controls to the emergency power operating mode when the system is transferred from its primary power source at 82 to its emergency power source at 91 by switch 83. In practice, switch 83 can be controlled either automatically or manually. With relay EP deenergized its closed back contact at 12 enables relay EPX, its open front contact at 14 disables up direction relay U preventing the pump motor from operating, its open front contact at 46 disables the car call buttons to prevent manual registration of car calls by passengers, its closed back contact at 48 automatically registers a car call for the first landing, and its open front contact at 54 disables the hall call registration circuits 93 and the hall lantern controls. Relay EPX prevents repetitive operation of the automatic registration of the first landing car call. It is energized on the first registration by the coincidence of closed contacts EP and IC at 12. Open back contact EPX at 48 prevents further automatic car calls while closed contact EPX at 13 seals relay EPX until primary power is restored to the system through switch 83 to energize relay EP and open its back contact at 12.

Movement of the elevator is controlled by the operation of the hydraulic valves 68, 73 and 74 and pump motor 78 all of which are controlled by up direction relay U at 14 and down direction relay D at 19. The direction relays U and D are controlled by leveling relay contacts LDO, LU and LD, safety switches 94 and 95, high speed relay contacts SU and SD, and interlocking contacts U and D. Gate contact 94 is closed when the car door is closed. The landing door contacts 95 (only one of which is shown) are closed when all landing doors are closed and locked. These safety switches complete a circuit to junction 96. When the car is outside a leveling door zone for a landing at which it is to stop back contact LDO at 14 is open and front contact LDO at 18 is closed. The direction relays are then energized through gate switch 94, landing switch 95, junction 96, contact LDO at 18, and for up travel, up high speed relay contact SU at 15, emergency power relay contact EP and interlocking down direction relay back contact D at 14 to energize up direction relay U. For down travel the energization is through down high speed relay contact SD at 17 and interlocking up direction relay back contact U at 19 to down direction relay D.

When the car is in the leveling door zone for a landing at which it is to stop, back contact LDO at 14 is closed and contact LDO at 18 is open so that up direction relay U is energized when relay LU is deenergized to close back contact LU and relay LD is energized to close contact LD at 14. This condition prevails while the car is below landing level. When the car is above landing level, down direction relay D is energized by closed back contact LD of deenergized relay LD and closed contact LU at 14. When the car is level with a landing, both of relays LU and LD are energized to open their back contacts in the paths to relays U and D.

Up direction relay U when energized energizes pump motor 79 through closed contact U at 10, seals itself by contact U at 15, locks out down direction relay D by its open back contact U at 19, enables up valve solenoid UV at 24 by closing contact U at 24 to close that valve, and energizes up or down direction relay UDA by closing contact U at 31.

Down direction relay D when energized locks out up direction relay U by open back contact at 14, seals itself for running at 18, enables down valve solenoid DV by closing its contact D at 20 and energizes up or down direction relay UDA by closing contact D at 32.

Down valve solenoid when energized urges down valve 73 to an open position. The valve's motion, as with valves 68 and 74, is retarded hydraulically (by means not shown) to provide a gradual transition between its open and closed position. It is energized when the car is set to descend through closed gate contact 94, landing door contact 95, up and down leveling contacts LU and LD, up high speed contact SU and up direction contact U all at 24.

Down leveling valve solenoid DLV at 18 is energized with down direction relay D.

High speed relay TL is energized when either of the up high speed or down high speed relays SU or SD are energized, provided safe running conditions prevail and both up and down leveling relays are energized to close contacts LU and LD at 24. High speed relay seals in the leveling relays for the start of a car from a floor and for running past a floor by closing contacts TL at 42 and 43 when energized. It remains dropped out

for releveling so that releveling is controlled by the down leveling solenoid DLV at **18** as relay D is energized and by the differential in hydraulic pressure on the input and output side of the up valve when the pump develops pressure after relay U is energized. In down releveling, valve **74** is opened to bleed fluid from the jack to the tank. In up releveling, valve **68** is at least partially closed so that the fluid pressure developed by pump **64** is applied to check valve **71** sufficiently to open that valve and pass fluid to the jack.

In FIG. **2**, up or down direction relay UDA at **32** is energized whenever either of relays U or D are energized to condition the car to move. It initiates opening of the car door when dropped out (by means not shown) and complements car door operation so that direction locking circuits (not shown) and car slowdown relay circuits (not shown) are enabled during the time the car is set to run.

Up high speed relay SU at **33** and down high speed relay SD at **34** are energized. When the selector switch interrupter relay INT is energized to close its contact INT at **33**, or the car slowdown relay is deenergized to close contact CSD at **34** provided the appropriate direction locking relay has been energized to close up direction locking contact UL at **33** and energize SU for up travel or to close down direction locking relay contact DL at **34** and energize SD for down travel. Interrupter relay INT (not shown) operates a bidirectional stepper switch (not shown) providing the usual floor selector function of indicating the position of the car along the hatch. It is energized three times in the travel of the car between adjacent floors, once at the midpoint to the next adjacent floor, and once at each of the slowdown points above and below the floor.

As a call is registered or conditions established by expiration of a door time interval so that a start signal is imposed, car slowdown relay CSD (not shown) drops to close back contact CSD at **34**. The calls establish direction locking, by means not shown, so that relay SU is energized through contacts CSD at **34** and UL at **33** or relay SD is energized through contacts CSD at **34** and DL at **34**. Relays SU or SD condition the controls to energize direction relay U or D when the doors are closed. When the running car reaches the slowdown floor, it is conditioned to stop if a call for the floor and service direction is registered before or while relay INT is energized since relay CSD is energized so that upon the dropout of relay INT as it passes the slowdown point the registered call retains CSD energized (by means not shown) thereby deenergizing SU or SD.

With both relays SU and SD deenergized relay TL at **22** drops to enable the leveling switches **97**, **98** and **99** to control the leveling relays LU, LD and LDO at **41**, **43** and **42** respectively by opening contacts TL at **42** and **43**. The leveling switches **97**, **98** and **99** are shown in the condition they assume when the car is level with a landing. Each switch is mounted on the car in vertical array and is normally closed when out of the range of a ferromagnetic vane (not shown) mounted in the hatch. Door zone switch **98** is centered between level up switch **97** and level down switch **99**. The vanes are each of a length and so positioned to span most of the distance between switches **97** and **99** so that the switches are both just out of the range of influence of the vane for a landing when the car is level with the landing.

A second set of vertically aligned hatchway vanes cause notching switch **101** to be opened at the midpoint between each landing and at the slowdown point above and below each landing. This switch momentarily deenergizes stepper notching relay SN to permit it to close its back contact SN at **40** and cock the selector drive for its advance. The drive is advanced as switch **101** is closed to pickup SN and open back contact SN at **40**.

The ascending car approaching a landing first opens and closes contact **101** to define the initiation of slowdown by dropping relay SU to deenergize up valve solenoid UV at **24** and initiate gradual opening of up valve **68**. Motor **78** continues to operate at this time and sufficient hydraulic pressure is imposed on valve **68** to prevent its complete opening. When the car reaches the up leveling point, switch **97** is opened. Since relay TL dropped at slowdown contacts TL at **42** and **43** are open and relay LU is dropped to close its back contact at **14** and to open its contacts at **19** and **24** to prepare for final leveling to the floor. Further travel of the car brings switch **98** into the range of influence of the leveling vane to open that switch and drop relay LDO. Relay LU remains energized at this time. The final leveling circuit is established through back contact LDO at **14** while open contact LDO at **18** disconnects the normal running circuits for the up direction relay U. As the car levels relay U is dropped by the reenergization of relay LU since the car moves to a position carrying switch **97** above and out of the range of influence of the leveling vane. This stops the pump motor **78** to stop the car.

If the car overshoots and travels above the level position, switch **99** is brought into the range of influence of the leveling vane to open its contacts and drop level down relay LD at **43**. This opens contacts LD at **14** and **24** with no effect, and closes back contact LD at **19** to energize down direction relay D at **19** and down leveling valve solenoid DLV at **18** through closed back contacts LDO at **14**, and LD at **19**, closed contact LU at **19** and closed back contact V at **19**. The down leveling valve **74** gradually opens permitting the car to sink as fluid flows from the jack through valve **74** to tank **66**.

A descending car operates the leveling switches in the inverse order. The car movement to the down slowdown point opens notching switch **101** to drop relay SN and thereby drop relay SD and TL and deenergize down valve solenoid DV at **24**. The down valve **73** gradually closes to slow the flow of fluid from jack **62** to tank **66** and slow the car descent. As the car reaches the leveling zone, down leveling switch **99** is opened to drop down level relay LD at **43**. Contacts LD at **14** and **24** open and back contact LD at **19** closes to condition the leveling controls for operation. Further descent of the car opens door zone switch **98** to drop relay LDO for setting the final leveling control by closing back contact LDO at **14** and opening contact LDO at **18**. When the car is level with the landing, switch **99** is below the range of influence of the leveling vane and switch **97** has not yet entered that range, hence contacts of those switches are closed while contacts of switch **98** are open and relays LU and LD are energized while relay LDO is deenergized. Down valves **73** and **74** are closed since their solenoids are deenergized and the car is held on the column of fluid in jack **62**.

With the car at a landing the door controls **102** are set to open the door and after a suitable load transfer interval, close the door (by means not shown). These controls include door open relay DO and door close relay CL controlling the series field **103** and shunt field **104** of the door motor having armature ARM. Thus with contacts CL at **36** and **38** closed, the door is driven in a closing direction and with contacts OP closed at **35**, **36** and **37** the door is driven in an opening direction.

Typical car call registration circuits are shown at lines **46** to **51**. When operating under normal power contact EP at **46** is closed to connect lead **87** to lead **105** for the holding circuit of each of the car call relays but that for the first landing and to lead **106** for the circuit to the common car call relay CB at **51**. The arrowheaded extension on lead **105** indicates its connection to car call relays for other floors in the same manner as for relay TC. Relay CB is energized when any car call button is depressed to close its second set of contacts to lead **107**. CB abbreviates the door open interval when an entering passenger registers his car call (by means not shown). Each car call relay has a set and reset coil indicated by the suffix letters S and R respectively. Registration of a call energizes the set coil TCS at **46** to seal the relay as at contact TC at **47**. When the car is at a landing, as indicated by the selector brush **108** in engagement with the landing contact T for the top landing, and when the car door is initially opened to energize door close limit relay DCL and close its contacts DCL at **47**. While a car call is registered, the indicator lamp at **109** is lighted.

First floor car call operation differs in the automatic car call registration feature provided through back contacts EP and EPX at **48**. The circuit for manual call registration through push button controlled contacts **79** is paralleled by a circuit which registers a car call for the first floor when the system has been switched to emergency power operation from source **91**. Failure of the main power drops relay EP at **11** to close back contact EP at **48**. Relay EPX remains dropped during normal operation. When emergency power is applied by operation of switch **83** it energizes ICS at **49** through lead **87** back contacts EP and EPX at **48** and lead **111**. Closure of contact IC at **12** energizes relay EPX to provide a seal at **13** and open the automatic car call registration circuit at **48**.

Under emergency power operation the demands imposed on the supply at terminals **91** is limited by excluding operation of the pump motor **78** and the car automatically runs to the first floor, opens its doors and, with automatic door reclosing in the system, automatically closes the doors after a suitable unloading interval. Although the emergency power source is connected to the normal operation circuits by switch **83** and direct current is applied to leads **87** and **88** relay EP is dropped by the disconnecting of lead **113** from lead **112** at pole **89** of switch **83** to restrict power consumption.

Open contact EP at **14** deenergizes relay U so that contact U at **10** opens the circuit to the pump motor and the up valve remains open since its solenoid UV is deenergized by open contact U at **24**. No power is required for hall lanterns or for the hall call registration circuits, hence these circuits are disconnected by opening contact EP at **54**. Only the first floor car call circuit remains effective to control the travel of the car to the first floor and the remaining car call circuits are disconnected by opening contact EP at **46**.

With the emergency power supply connected the system automatically registers a car call for the first floor. This call actuates the direction selecting and locking circuits at **52** (by means not shown) according to conventional control means for normal operation to set the car for down travel if it is above the floor for which the car call is automatically registered. The controls for down travel of the car are energized so that the down valve solenoid DV and down leveling valve solenoid DLV are controlled, the down high speed relay SD is energized to open those valves and permit fluid to flow from the jack **62** to the tank **66**. Such flow is in a normal down travel control sequence since the leveling and selector advance controls operate in response to the descent of the car so that as the car approaches its slowdown zone for the first floor relay SN drops to energize relay CSD and when relay SN is reenergized it drops relay INT, thereby opening all energizing paths for relay SD at **34**. The solenoid DV is deenergized to begin the slowdown of the car by permitting down valve **73** to close gradually and relay TL is dropped to enable the leveling relays LU, LDO and LD. When upon further descent of the car into the leveling zone LD and LDO are dropped relay D and solenoid DLV are deenergized. Down leveling valve **74** is then controlled by relay LD so that upon the descent of the car to the level position with the first floor relay LD is energized to open its back contact LD at **19** and deenergize the valve solenoid DLV at **18**. This stops the car at the floor and holds it on the column of fluid remaining in jack **62**.

The leveling relays can be arranged to control the door controls **102**, for example, so that upon the reenergization of relay LD while relay LDO is deenergized the door open relay OP is energized to cause the car and hall doors to be driven open. The door controls **102** can further include a timer which causes the door close relay CL to be energized and drive the door closed after expiration of the usual door open interval.

The system maintains the car at the floor for which the automatically registered car call is provided until normal power is restored and switch **83** is connected to terminals **82**. At that time relay EP is energized from lead **87** through lead **112**, pole **89**, lead **113** and coil EP to lead **88**. Back contact EP at **12** opens to drop relay EPX thereby resetting the emergency power actuated automatic car call circuit for the first floor. Back contact EP at **48** opens to open the automatic car call circuit. Closure of contact EP at **14** enables the circuit for the up direction relay U so that the car can be run upward. The car call circuits are enabled by closing contact EP at **46**. Hall call registration circuits **93** and the hall lantern control circuits are restored by closing contact EP at **54**. Thus the system is returned to normal operation when relay EP is energized and is conditioned to recycle for emergency power operation.

I claim:

1. A hydraulic elevator, a primary source of electrical power, secondary source of electrical power, a fluid pump for imposing a lifting force on said elevator, an electrical motor for said pump, electrical circuits for controlling the ascent and descent of said hydraulic elevator, means to connect selectively said primary source of electrical power and said secondary source of electrical power to said electrical circuits, and means responsive while said primary source of electrical power is disconnected from said electrical circuits for preventing operation of said electrical motor by power from said secondary source.

2. A system according to claim **1** including an up valve to control the application of fluid causing said elevator to ascend, a solenoid in said electrical circuits for operating said up valve, and means responsive while said primary source of electrical power is disconnected from said electrical circuits for preventing operation of said solenoid to a condition applying fluid to cause said elevator to ascend by power from said secondary source.

3. A system according to claim **1** wherein said electrical circuits include manually operable call registering means for registering calls for service at floors served by said elevator, and means responsive while said primary source of electrical power is disconnected from said electrical circuits for preventing operation of said manually operable call registering means.

4. A system according to claim **1** including means responsive to the connection of said secondary source of electrical power to said electrical circuits for automatically registering a call for a floor to cause said elevator to run to said floor.

5. A system according to claim **1** including a down valve to control the flow of fluid causing said elevator to descend, a solenoid in said electrical circuits for operating said down valve, and means responsive while said secondary source of power is connected to said electrical circuits for operating said down valve solenoid to cause said elevator to descend to a given landing.

6. A system according to claim **5** including means to automatically register a call for service by said elevator to a predetermined landing in response to the connection of said secondary source of electrical power to said electrical circuits, and wherein said means for operating said down valve solenoid is responsive to said call registering means to cause said elevator to descend to the landing of said call registering means.

7. A combination according to claim **5** including a door for said elevator, means to sense the position of said elevator at said given landing, and means responsive to said positioning means when at said given landing for driving said door open.

8. A hydraulic elevator, a pump for developing elevator lifting force in hydraulic fluid; electrically energized means for controlling the application of hydraulic lifting force to said elevator; electrically energized means for controlling the descent of said elevator under the influence of gravity; a primary source of electrical power; a secondary source of electrical power; means for selectively coupling said electrically energized means to said primary source of power and to said secondary source of power; and means responsive while said secondary source of power is connected to said electrically energized means for preventing the application of hydraulic lifting force to said elevator.