March 16, 1948. C. A. DANA 2,437,999

LOCKING APPARATUS FOR ELEVATOR PLATFORMS

Filed Feb. 28, 1946 4 Sheets-Sheet 1

Fig. 1.

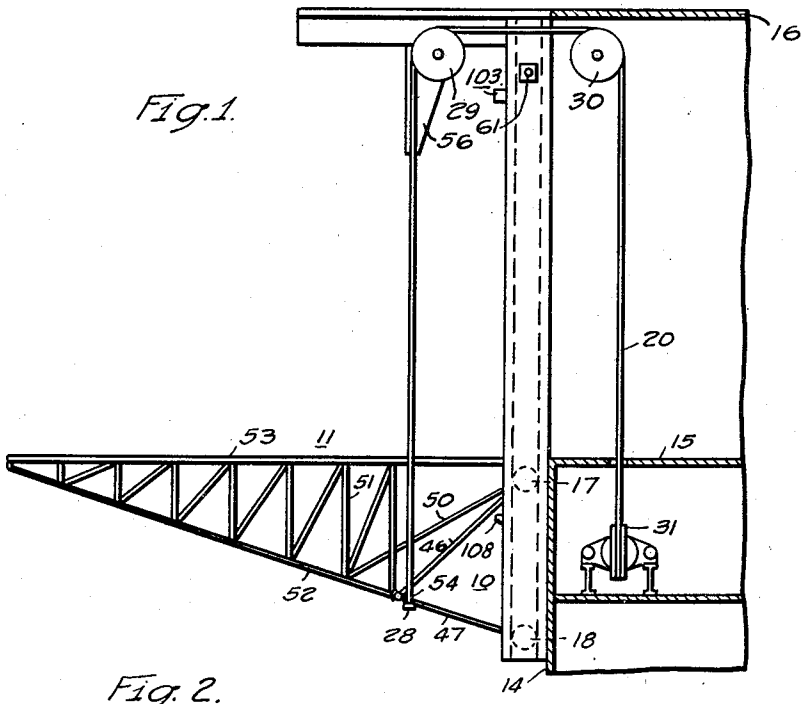
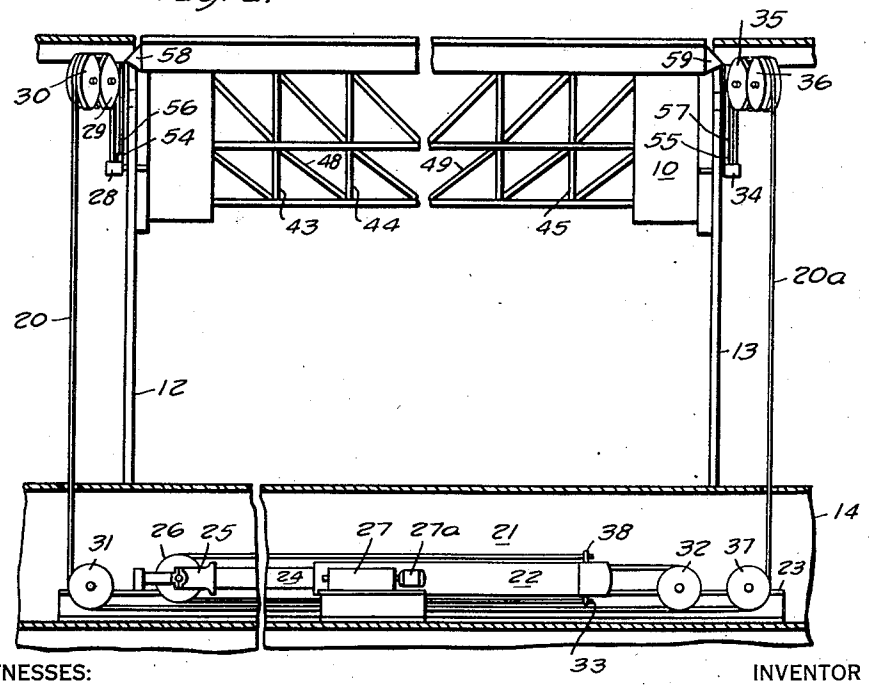


Fig. 2.



WITNESSES:

E. A. McCloskey

INVENTOR

Charles A. Dana.

BY

ATTORNEY

March 16, 1948. C. A. DANA 2,437,999

LOCKING APPARATUS FOR ELEVATOR PLATFORMS

Filed Feb. 28, 1946 4 Sheets-Sheet 2

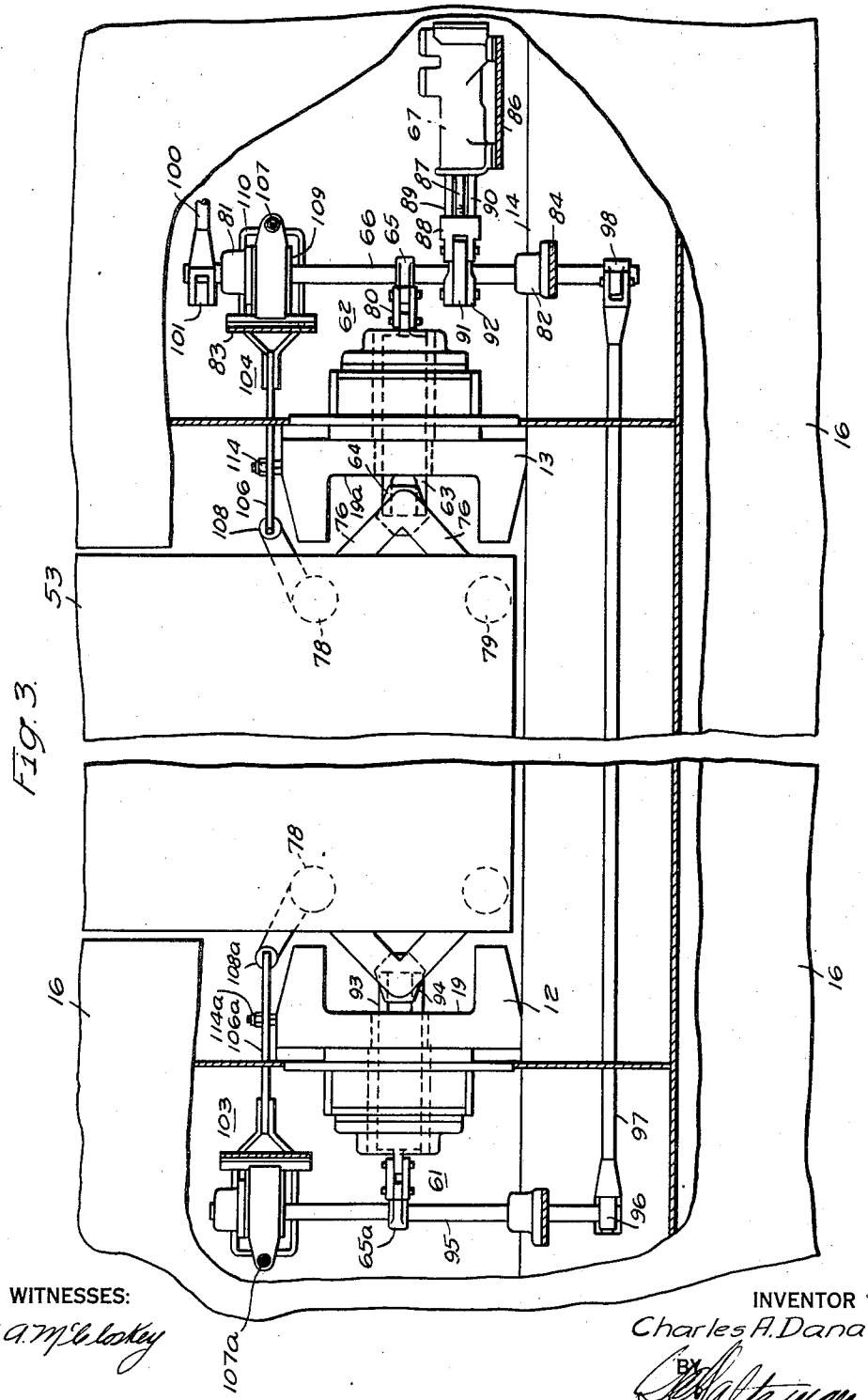


FIG. 3.

WITNESSES:

E. A. McCloskey

INVENTOR

Charles A. Dana.

BY

ATTORNEY

March 16, 1948. C. A. DANA 2,437,999

LOCKING APPARATUS FOR ELEVATOR PLATFORMS

Filed Feb. 28, 1946 4 Sheets-Sheet 3

Fig. 4.

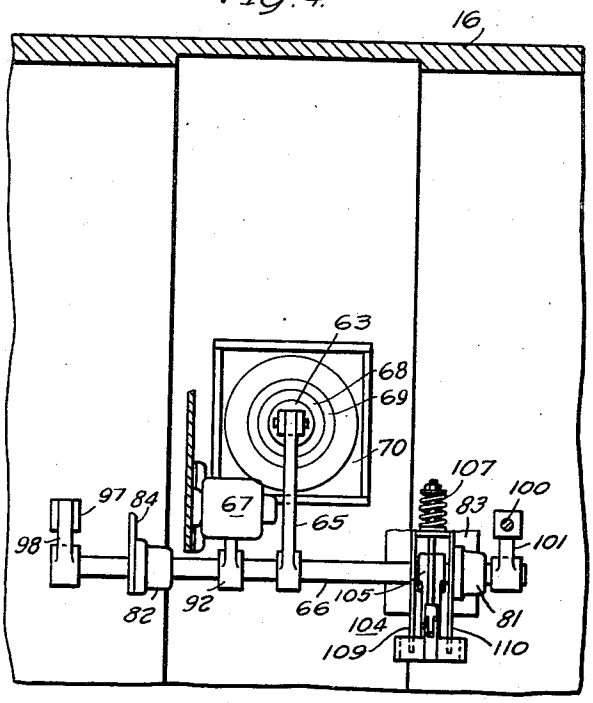
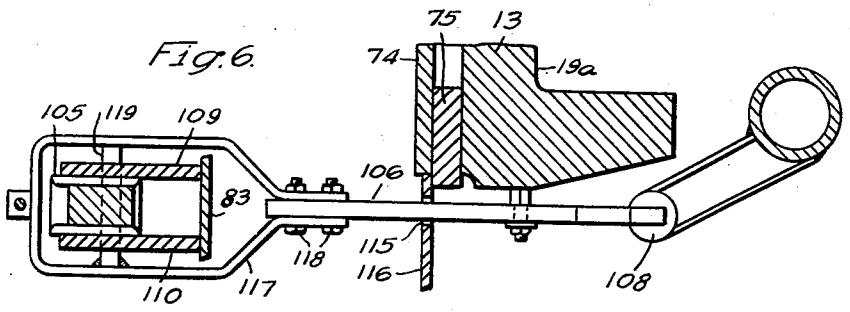


Fig. 6.



WITNESSES:
E. A. McCloskey

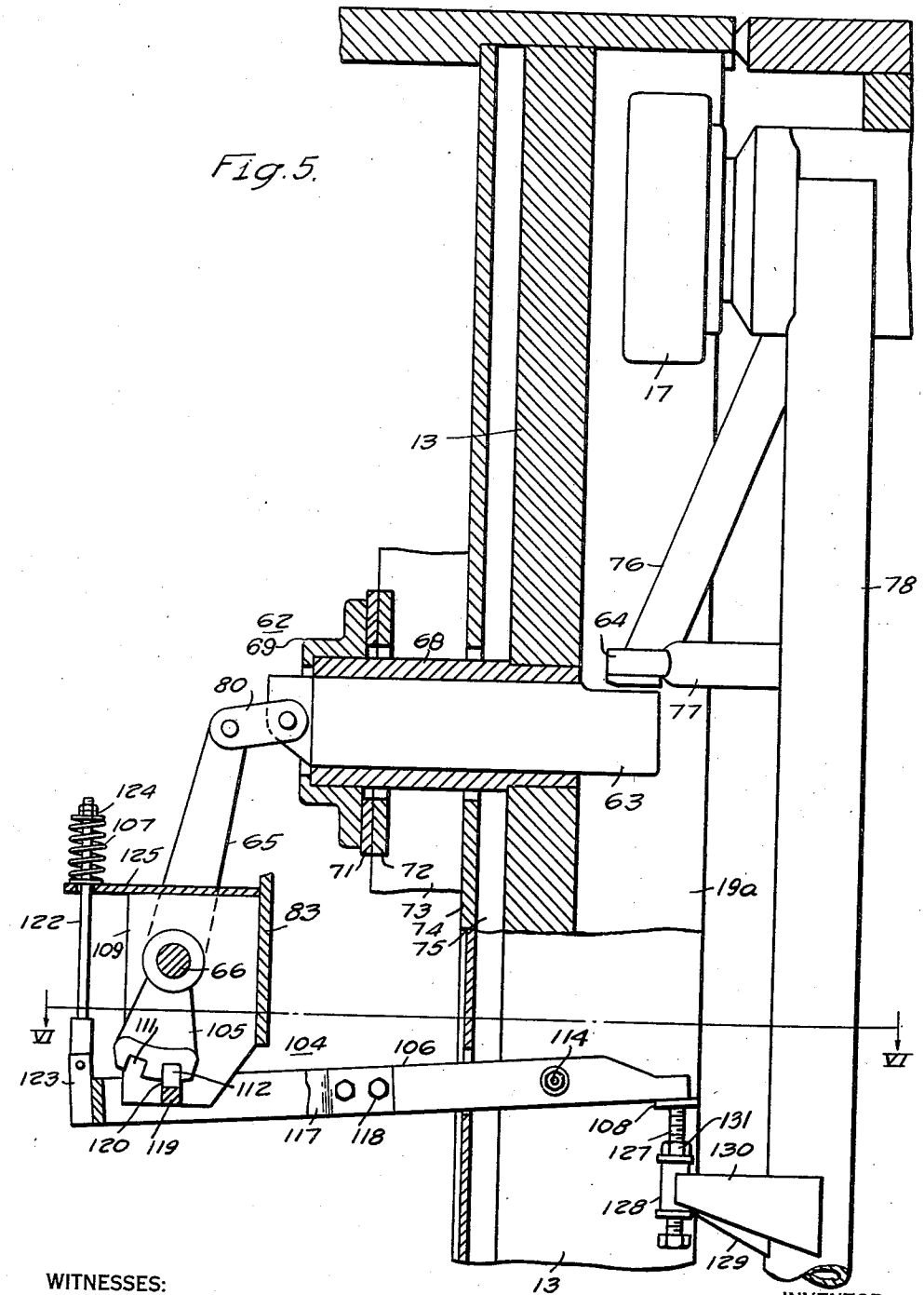
INVENTOR
Charles A. Dana.
BY
ATTORNEY

March 16, 1948. C. A. DANA 2,437,999

LOCKING APPARATUS FOR ELEVATOR PLATFORMS

Filed Feb. 28, 1946 4 Sheets-Sheet 4

Fig. 5.



WITNESSES:

E. A. McCloskey.

INVENTOR

Charles A. Dana.

BY

ATTORNEY

Patented Mar. 16, 1948

2,437,999

UNITED STATES PATENT OFFICE

2,437,999

LOCKING APPARATUS FOR ELEVATOR PLATFORMS

Charles A. Dana, North Plainfield, N. J., assignor to Westinghouse Electric Corporation, East Pittsburgh, Pa., a corporation of Pennsylvania

Application February 28, 1946, Serial No. 650,950

9 Claims. (Cl. 187—75)

1

My invention relates to locking apparatus for elevator platforms and more particularly to means for locking large elevator platforms in position at a floor landing.

One object of my invention is to provide a mechanical interlocking means for preventing a locking operation of the locks at an elevator parking floor when the elevator platform is not at that floor.

Another object is to provide a mechanical interlocking for maintaining the locks at a parking floor at which an elevator platform is parked in their locking position when the means for raising and lowering the platform does not have sufficient power to fully support the platform.

It is also an object to provide an interlocking mechanism at a parking floor for an elevator platform which will prevent any dangerous operation of the locking mechanism at that floor, either when the platform is at that floor or is away from that floor.

For a better understanding of the invention, reference may be had to the accompanying drawings, in which:

Figure 1 is a view in aft end elevation of a deck edge elevator for an airplane carrier ship, with the elevator platform disposed at the lower deck;

Fig. 2 is a view of the elevator illustrated in Fig. 1, in side elevation, taken from the inside of the ship and looking in the outboard direction, with the platform at the upper deck;

Fig. 3 is an enlarged top-plan view of the elevator platform locked in position at the upper or flight deck, part of the deck being broken away to disclose my improved locking apparatus and interlocking mechanism and with the platform shown in broken parts to conserve space.

Fig. 4 is an enlarged view in fore end elevation of the interlocking mechanism illustrated in Fig. 3;

Fig. 5 is an enlarged sectional view in side elevation of the fore interlocking lever and its connection to the fore locking bar as illustrated in Fig. 4 looking in toward the hull of the ship, and

Fig. 6 is taken on the line VI—VI of Fig. 5, to give a top plan view of the interlocking lever at the fore end of the elevator.

The invention is illustrated as applied to a deck edge elevator on an airplane carrier ship. In

2

a typical ship of this character, the flight deck overhangs the edge of the ship about 16 feet and out of this overhanging part is notched a space for an elevator platform. Such a platform may be about 60 feet long and about 34 feet wide and may weigh as much as 60 tons. The outboard portion of the platform may extend approximately 18 feet beyond the overhanging edge of the flight deck.

Although the invention is described in connection with a deck edge elevator, it may be used in connection with any movable body which should be securely locked in particular position.

Referring more particularly to Figs. 1, 2 and 3, I have illustrated a deck edge elevator comprising a truss or base section, 10 provided with a platform section 11 disposed between a pair of guide rails 12 and 13 mounted on the outer side of a ship hull 14 for serving its lower or main deck 15 and its upper or flight deck 16. An upper roller 17 and a lower roller 18 are rotatably mounted on each end of the base section 10 in position to ride in vertical guiding slots 19 and 19a in the sides of the guide rails facing each other for guiding the vertical movement of the elevator as it is raised or lowered and for maintaining the base section in its desired angular relation to the hull of the ship.

A plurality of hoisting cables 20 and 20a, operated by a hydraulic hoisting engine 21, are provided for supporting the elevator platform and base and for raising and lowering them. The hydraulic engine has a single cylinder 22 mounted in a horizontal position on a frame or engine bed 23 and a power plunger 24 with its inner end disposed in the cylinder. The outer end of the plunger is provided with a power head 25 in which a pair of power sheaves 26 are rotatably mounted.

In operation, the plunger moves back and forth horizontally and thus moves the power sheaves 26 back and forth with it, for operating the hoisting cables to raise and lower the elevator. The plunger is designed for operation by a suitable hydraulic medium such as oil, placed under pressure by any suitable equipment (not shown) and is controlled by a valve 27 operated by a valve motor 27a which may be controlled by any suitable control apparatus (not shown).

The outer ends of the cables 20 are secured to the aft end of the base section by suitable hitches

28 mounted thereon and pass upwardly and over an idler sheave 29 fastened to the ship structure underneath the overhanging portion of the flight deck, thence inwardly over a second idler sheave 30 mounted on the ship frame inside the hull, thence downwardly and under a deflector sheave 31 mounted on the engine bed 23, thence around a stationary sheave 32 mounted on the engine bed at the rear of the engine, and thence around one of the power sheaves 26 to a plurality of hitches 33 mounted on the underside of the engine cylinder.

The outer ends of the cables 20*a* are secured to the fore end of the base section by a suitable cable hitch 34 and pass upwardly over an idler sheave 35 fastened to the ship structure underneath the overhanging portion of the flight deck, thence inwardly over a second idler sheave 36 mounted on the ship frame inside the hull, thence downwardly and under a deflector sheave 37 mounted on the right-hand end of the engine bed, and thence under and over one of the power sheaves 26 in the plunger head to suitable hitches 38 secured to the upper rear part of the engine cylinder. Although I have illustrated a hydraulic engine for operating the hoisting cables, it is to be understood that any other suitable engine or motor may be used as a power means for operating the hoisting cables.

The base member 10 comprises a plurality of vertical truss members, such as 43, 44 and 45 and a plurality of angularly disposed trusses, such as 46 and 47. A plurality of inner bracing trusses, such as 48 and 49, are applied to the truss structure for increasing its strength and stability. The trusses and bracing trusses are constructed of high tensile steel tubing, structural steel and steel plate welded together in bridge-like construction to form a relatively light but strong base for supporting the elevator platform 11 and any load which may be placed thereon.

The platform section 11 is constructed of high tensile steel tubing, such as 50, 51 and 52, welded together in bridge-like construction to form a relatively light but strong frame upon which any suitable flooring 53 may be laid.

The platform section 11 may be hinged on the base section 10, so that it may be tilted upwardly and stowed against the side of the ship if desired, as is more fully illustrated and described in patent application Serial No. 639,274, filed January 5, 1946.

A stop block 54 is mounted on the upper face of the cable hitch 28 and a similar block 55 is mounted on the upper face of the cable hitch 34. A dead stop flange 56 is mounted on the underside of the overhanging edge of the upper deck adjacent to the sheave 29 and a similar dead stop flange 57 is mounted on the underside of the overhanging edge of the upper deck adjacent to the sheave 35. The stop block 54 is disposed to engage the stop flange 56 and the stop block 55 is disposed to engage the stop flange 57 when the elevator platform is raised to its correct position at the upper deck and thereby provide a positive stopping means for the platform at the upper deck to prevent the engine from raising it above its correct position at that deck. Beveled flanges 58 and 59 are provided on the ends of the elevator platform for engaging cooperating beveled flanges 60 and 60*a* on the flight deck for centering the platform when it is raised to that deck.

An aft lock 61 and a fore lock 62 are provided for locking the elevator platform in its parking position at the flight deck while it is not in service

or when its cables are to be renewed or at any other desirable time.

The fore lock 62 comprises a cylindrical lock bolt 63 disposed to extend through the guide rail 13 and under a projecting block 64 on the platform, an arm 65 for operating the bolt, a shaft 66 for operating the arm and an air engine 67 for operating the shaft. The lock bolt 63 is slidably disposed in a sleeve 68 which is horizontally mounted in the guide rail 13 and held in position by a collar 69. The collar is securely fastened to the guide rail by means of a box-like housing 70 which is mounted on the guide rail by means of a plurality of structural steel plates 71 to 75, inclusive. These plates are welded to each other and to the guide rail and to the underside of the flight deck to form a strong and sturdy construction. The projecting block 64 is rigidly mounted on the platform section by a plurality of steel tubes 76 and 77 which are welded to the vertical trusses 78 and 79 which form a part of the platform section 10. The position of the block 64 on the platform frame should be so selected that there will be a clearance of approximately $\frac{3}{8}$ inch to $\frac{1}{4}$ inch between it and the lock bolt when the lock bolt is in its locking position and the platform is pulled tightly against the dead stops 56 and 57 at the flight deck.

The free end of the arm 65 is connected to the locked bolt by a link 80 while its lower end is firmly fixed on the operating shaft 66. The shaft 66 is rotatably mounted in a pair of bearings 81 and 82 which are supported by structural steel plates 83 and 84 depending from the overhanging edge of the flight deck.

The air engine 67 is supported from the underside of the overhanging flight deck by a structural steel plate 86 and is provided with a piston rod 87 for operating a power head 88 slidably disposed on a pair of slides 89 and 90 attached to the engine. The power head is connected by a link 91 to the upper end of an operating arm 92, the lower end of which is fixed on the rotatable shaft 66 so that operation of the engine in one direction will rock the shaft to withdraw the bolt 63 from its locking position and operation of the engine in the opposite direction will push the bolt forward into locking position. The air engine may be connected for operation to any suitable source of air power (not shown) mounted in the ship.

The lock 61 at the aft end of the platform comprises a lock bolt 93 mounted in the guide rail 12 in position to be moved into and out of locking position underneath a lock block 94 on the platform section by an operating shaft 95 and is constructed, mounted and operated in the same manner as the fore lock 62.

An arm 96 is fixed on the inner end of the operating shaft 95 and its outer end is connected by a rod 97 to the outer end of an arm 98 fixed on the inner end of the operating shaft 66 so that rotation of the shaft 66 by the air engine 67 to move the lock bolt 63 into or out of locking position will also cause the shaft 95 to rotate and thereby move the lock bolt 93 into or out of locking position in accordance with the movement of the bolt 63.

An additional operating rod 100 which may be connected to any suitable manually operative means (not shown) is attached to the free end of an arm 101 mounted on the outer end of the operating shaft 66 so that the locks may be operated by hand when it is not desired to use the air engine for operating them.

When the elevator platform is locked at the

flight deck, the locking bolts must not be removed from their locking position unless the hoisting means has sufficient power to maintain the hoisting cables with full power to support the platform at the flight deck. Therefore, I have provided mechanical interlocking mechanisms 103 and 104 for preventing movement of the lock bolts from their locking positions when the power of the hoisting engine is not sufficient to support the elevator platform and hold it tightly against the dead stops 56 and 57.

The safety mechanism 104 at the fore end of the elevator comprises a locking shoulder or notch means having a fixed connection with the bolt 63, such as a notched cam 105, an interlocking lever 106, a biasing device, such as a spring 107, and an operating bracket head 108. The upper end of the cam 105 is attached to the operating shaft 66 and its free end extends downwardly between a pair of housing plates 109 and 110 which are welded to the supporting plate 83 attached to the overhanging edge of the flight deck. The cam moves with the shaft 66 and its lower end is provided with an unlocked notch 111 and a locked notch 112.

The interlocking lever 106 is pivotally mounted on the guide rail 13 by a pivot pin 114 with its outer end extending through a slot 115 in a steel plate 116 attached to the steel plates 74 and 75 mounted on the guide rail. The length of the slot 115 limits the downward movement of the interlocking lever when it is freed from its operating devices. A horizontal rectangular-like frame 117 of steel plate is attached to the outer end of the lever 106 by a plurality of bolts 118 in position to surround the lower ends of the housing plates 109 and 110 and the lower end of the cam 105. A latching device or cross bar 119 is welded in and extends across the frame 117 at right angles to the body of the lever 106. The position of the cross bar and the position of the notches 111 and 112 are so arranged that the cross bar may enter the notch 111 when the lock bolt 63 is withdrawn from its locking position or it may enter the notch 112 when the lock bolt 63 is in its locking position. A suitable guide slot 120 is disposed in the housing plate 109 and a similar slot is provided in the housing plate 110 for guiding the cross bar in its up and down movements.

The compression spring 107 is provided for biasing the cross bar upwardly toward the notches 111 and 112 and is concentrically mounted on the upper end of a rod 122, the lower end of which is pivotally attached to a block 123 welded to the outer end of the rectangular frame 117. The spring is disposed between a nut 124 on the rod and a steel plate 125 which is welded to and extends from the upper ends of the housing plates 109 and 110 so that the spring will exert a constant biasing upward pull on the outer end of the interlocking lever 106 to force the cross bar 119 into the one or the other of the notches 111 and 112.

The bracket head 108 is mounted on the upper end of an adjustable screw threaded bolt 127 disposed in a screw threaded aperture in a body 128 mounted on the outer ends of a pair of bracket arms 129 and 130, the inner ends of which are welded to the vertical truss 78 forming a part of the frame of the platform section so that the bracket head will move with the platform section. A nut 131 is provided for securing the bolt 127 in the position to which it may be adjusted in the body 128.

The bracket head should be so mounted in the platform section that it will engage the inner end of the interlocking lever 106 and move it upwardly when the elevator platform is hoisted upwardly to the flight deck and held tightly against the dead stops 56 and 57 by the hoisting engine and thereby move the frame 117 downwardly and thus move the cross bar 119 downwardly against the pull of the biasing spring 107 and out of engagement with the cam 105.

The interlocking mechanism 103 disposed at the aft end of the platform is constructed in the same manner as the fore interlocking mechanism 104 and has its interlocking lever 106*a* for locking the shaft 95 pivotally mounted by a pivot pin 114*a* on the guide rail 12 in position to be operated by a bracket head 108*a* attached to the vertical truss 78*a* of the platform frame.

The positions of the levers 106 and 106*a* with relation to their cooperating bracket heads 108*a* and the distances between the lock bolts 63, 93 and the stop blocks 64, 94 should be so selected and arranged that when the elevator platform is against the dead stops 56 and 57, the interlocking levers 106 and 106*a* will hold the cross bars 119 out of the locking notches, but, when the platform is lowered to rest on the lock bolts in their locking position, the interlocking levers will push their cross bars to the locked position notches in the cams and prevent unlocking of the lock bolts.

Assumed operation of the apparatus

It will be assumed that the elevator platform is at the upper deck, as shown in Fig. 2, that the hoisting engine 21 is holding it tightly against the dead stops 56 and 57 and that the lock bolts 63 and 93 are in locking position, as shown in Fig. 3. Under these conditions, there is a clearance of from $\frac{3}{16}$ inch to ¼ inch between the lock bolt 63 and the lock block 64 and between the lock bolt 93 and the lock block 94. Also the bracket heads 108 and 108*a* have raised the inner ends of the interlocking levers 106 and 106*a* to release the locking shafts 66 and 95.

It will be assumed now that the air engine 67 is operated to unlock the bolts 63 and 93. As the air engine operates, its power head moves inwardly thus pulling on the link 91 and the arm 92 to rock the shaft 66 and thus move the arm 65 to withdraw the bolt 63 from its locking position. The rotation of the shaft 66 also operates its arm 98 and thus rotates the shaft 95 by means of the rod 97 and the arm 96 to move the bolt 93 out of its locking position. As the shaft 66 rotates to its unlocked position, it moves its cam 105 to a position where its notch 111 may be entered by the cross bar 119. Likewise, the rotation of the shaft 95 moves its interlocking mechanism where the unlocked notch in its cam may be entered by its cross bar due to operation of the interlocking lever 106*a*.

It will be assumed now that the hydraulic engine 21 is operated to lower the platform to the lower deck. As the platform moves downwardly, the bracket heads 108 and 108*a* leave the ends of the levers 106 and 106*a* and thus release them to operation by the biasing springs 107 and 107*a*. The biasing spring 107 now moves the outer end or frame 117 of the interlocking lever 106 upwardly which causes its cross bar 119 to move upwardly into the slot 111 in the cam 105 and thus lock the shaft 66 and also the shaft 95 against rotation by the air engine or the hand rod 100 to move the lock bolts 63 and 93 into locking position while

the platform is away from the flight deck. The biasing spring 107a on the mechanism 103 also operates in the same manner to effect the locking of the shafts 95 and 96 by reason of the connecting rod 97 and the arms 96 and 98. Locking of either the shaft 66 or the shaft 95 will lock both shafts.

It will be assumed now that the platform has moved to and stopped at the lower deck and that the hydraulic engine 21 is operated to move it to the upper deck. As the platform approaches closely to the upper deck and moves into engagement with the dead stops 56 and 57, the bracket heads 108 and 108a engage the inner ends of the interlocking levers 106 and 106a and move them upwardly thereby releasing the operating shafts 66 and 95 so that the locked bolts 63 and 93 may be operated to lock the platform at the upper deck, if desired. The movement of the lever 106 effects its release of the shafts 66 and 95 by moving the cross bar 119 downwardly out of the notch 111 so that the cam 105 is free to move with the shaft 66. The movement of the interlocking lever 106a effects its release of the shafts 95 and 66 by moving its corresponding cross bar downwardly in the same manner. Both lock bolts 63 and 93 may now be moved to their locking position if desired.

It will be assumed now that the platform is held tightly against the dead stops 56 and 57 at the flight deck and that the air engine 67 is operated to move the lock bolts 63 and 93 into their locking position to lock the platform at the flight deck. If the air engine is operated, its power head 86 pushes outwardly against the arm 92 and thereby rocks the shaft 66 and the shaft 95 to cause the arms 65 and 65a to push the lock bolts 63 and 93 into their locking positions. The rocking movement of the shaft 66 moves its cam 105 to a position where the cross bar 119 may enter its slot 112 if the platform should move downwardly to a slight extent. The rocking movement of the shaft 95 effects a similar action in the interlocking mechanism 103.

It will be assumed now that the attendants desire to leave the platform at the upper deck for some time and shut down the hydraulic engine 21 or that the power of the engine decreases to such an extent that it fails to hold the platform tightly against the flight deck. In either case the platform will leave its position against the dead stops and, as it settles down on the lock bolts 63 and 93, its bracket heads 100 and 108a will leave the inner ends of the interlocking levers 106 and 106a and thus free them for operation by their biasing springs 107 and 107a.

As the inner end of the lever 106 is free from the upward pressure of the bracket head 108, the biasing spring 107 raises its outer end or frame 117 and thereby moves its cross bar 119 into the notch 112 in the cam 105 and thereby locks the shaft 66 and also the shaft 95 against any rocking movement to move the lock bolts out of their locking positions. The freeing of the inner end of the lever 106a by the downward movement of the bracket head 108a also permits its biasing spring 107a to raise the outer end of that lever and thereby also lock the shafts 95 and 66 against any rocking movement to unlock the lock bolts 93 and 63. With the operating shafts 95 and 66 locked against any rocking movement, it will be apparent that the lock bolts 63 and 93 cannot be removed from their locking positions until the hoisting engine develops sufficient power to raise and does raise the elevator platform from its position on the lock bolts until it is held tightly against the dead stops 56 and 57.

From the foregoing operation, it will be apparent that I have provided a very simple and efficient mechanical means for preventing any locking action of its lock bolts when the platform is away from the flight deck and for preventing any unlocking operation of the lock bolts when the elevator platform is in locked condition at the flight deck and there is insufficient power on the hoisting engine to support the platform and hold it tightly against the dead stops at the flight deck.

Although I have shown and described only one specific embodiment of my invention, it is to be understood that many modifications thereof and changes therein may be made without departing from the spirit and scope of the invention.

I claim as my invention:

1. In an elevator for serving a floor, a hoisting means for the elevator, dead stop means disposed at the floor for positively stopping the elevator thereat, locking means mounted at the floor for locking the elevator to within a predetermined distance of the floor, and interlocking means responsive to movement of the elevator a predetermined distance from the dead stop means while the locking means is in its locking position for preventing unlocking operation of the locking means.

2. In an elevator, a platform for serving a parking floor, dead stop means at the parking floor for stopping the platform thereat, a hoisting engine for operating the platform and holding it against the dead stop means, locking means mounted at the floor for locking the platform within a predetermined distance of that floor, means for operating the locking means into and out of locking position, and means responsive to movement of the platform a predetermined distance from the dead stop means while the locking means is in locking position for preventing withdrawal of the locking means from its locking position and responsive to movement of the platform a greater predetermined distance away from the dead stop means while the locking means is in its unlocked position for preventing movement of the locking means to its locking position.

3. In an elevator, a platform for serving a parking floor, a dead stop at the parking floor at each end of the platform for stopping the platform thereat, a hoisting engine for operating the platform and holding it against the dead stop, a lock mounted at the parking floor for each end of the platform, means for moving the locks into and out of locking position, and means responsive to movement of the platform a predetermined distance from the dead stops while the locks are in locking position for preventing withdrawal of the locks from their locking position.

4. In an elevator, a platform for serving a parking floor, a dead stop at the parking floor at each end of the platform for stopping the platform thereat, a hoisting engine for operating the platform and holding it against the dead stops, a lock block mounted on each end of the platform, a lock bolt mounted at the parking floor for each end of the platform and disposed to extend under the lock block at that end of the platform and a predetermined distance from it when moved into locking position, when the platform is against the dead stops, means for moving the locking bolts into and out of locking posi-

tion, and means responsive to movement of the platform a predetermined distance from the dead stops while the lock bolts are in locking position for preventing withdrawal of the lock bolts from their locking position and responsive to movement of the platform away from the dead stops while the lock bolts are in their unlocked position for preventing movement of the bolts to their locking position.

5. In an elevator, a platform for serving a parking floor, dead stop means at the parking floor for stopping the platform thereat, a hoisting engine for operating the platform and holding it against the dead stop means, a lock block mounted on each end of the platform, a lock bolt mounted at the parking floor for each end of the platform and disposed to extend under the lock block at that end of the platform and a predetermined distance under it when moved into locking position, means for moving the locking bolts into and out of locking position, an interlocking lever pivotally mounted on the ship at each end of the platform for interlocking the lock bolts, means for biasing the levers into position for preventing a locking operation of the bolts or an unlocking operation of the bolts, and bracket heads mounted on the platform and responsive to movement thereof for moving the levers against their biasing means when the car is within a predetermined distance of the parking floor and thereby freeing the bolts for locking or unlocking movement.

6. In a deck edge elevator for an airplane carrier ship, an elevator platform for serving a main deck and a flight deck, a hoisting engine for supporting and raising and lowering the platform, a pair of dead stops mounted at the flight deck, one for each end of the platform, a lock bolt mounted on the ship for each end of the platform, a lock shaft rotatably mounted on the ship at each end of the platform for operating the lock bolts to locking position and to unlocking position, a cam fixed on each lock shaft, an interlocking lever pivotally mounted on the ship at each end of the platform for engaging the cam thereat, and holding it in its locked position or its unlocked position, means for biasing each interlocking lever toward its associated cam, and a bracket head mounted on each end of the platform for operating the interlocking lever for that end away from its associated cam when the platform approaches closely to the dead stops and for releasing that lever for operation by its biasing means when the platform moves downwardly a predetermined distance from the dead stops.

7. In a deck edge elevator for an airplane carrier ship, an elevator platform for serving a main deck and a flight deck, a hoisting engine for supporting and raising and lowering the platform, a pair of dead stops mounted at the flight deck, one for each end of the platform, a lock block mounted on each end of the platform, a lock housing mounted at the flight deck at each end of the platform, a lock bolt slidably disposed in each lock housing in position to be moved into locking position a predetermined distance below the lock block at its end of the platform when the platform is held against the dead stops, a lock shaft rotatably mounted on the ship at each end of the platform and operably connected to the lock bolts, means for rocking the lock shafts to move the lock bolts into or out of locking position, a notched cam fixed on each shaft and provided with a notch for the locked position of the lock bolt associated with that shaft, an interlocking lever pivotally mounted on the ship at each end of the platform and provided with a latching lever for the cam thereat, a spring for each lever for biasing its latch end toward the notch in the cam associated with it, and a bracket head mounted on each end of the platform for operating the interlocking lever for that end to move its latch bar away from the notch in the associated cam when the platform is moved to the dead stops at the flight deck and for releasing that lever for operation by its biasing spring when the platform moves downwardly a predetermined distance from the dead stops, whereby the latch bars will enter the notches when the lock bolts are in locking position while the platform is at the flight deck and the engine is unable to hold it against the dead stops and thus prevent unlocking of the bolts until the engine can raise the platform against the flight deck and the bolts are moved to their unlocking position.

8. In a deck edge elevator for an airplane carrier ship, an elevator platform for serving a main deck and a flight deck, a hoisting engine for supporting and raising and lowering the platform, a pair of dead stops mounted at the flight deck, one for each end of the platform, a lock housing mounted at the flight deck at each end of the platform, a lock bolt slidably disposed in each lock housing in position to be moved into locking position to lock the platform at the flight deck, a lock shaft rotatably mounted on the ship at each end of the platform and operably connected to the lock bolts, means for rocking the lock shafts to move the lock bolts into or out of locking position, a cam fixed on each shaft and provided with a locked notch for the locked position and an unlocked notch for the unlocked position of the lock bolt associated with that shaft, an interlocking lever pivotally mounted on the ship at each end of the platform adjacent to the cam thereat, means for biasing each lever toward the notches in the cam associated with it, and a bracket head mounted on each end of the platform for operating the interlocking lever for that end to move it away from the notches in the associated cam when the platform approaches closely to the dead stops and for releasing that lever for operation by its biasing spring when the platform moves downwardly a predetermined distance whereby the levers will engage the locking notches if the lock bolts are in locked position and will engage the unlocked notches when the platform is at least a predetermined distance away from the flight deck.

9. In a deck edge elevator for an airplane carrier ship, an elevator platform for serving a main deck and a flight deck, a hoisting engine for supporting and raising and lowering the platform, a pair of dead stops mounted at the flight deck, one for each end of the platform, a lock block mounted on each end of the platform, a lock housing mounted at the flight deck at each end of the platform, a lock bolt slidably disposed in each lock housing in position to be moved into locking position a predetermined distance below the lock block at its end of the platform when the platform is held against the dead stops, a lock shaft rotatably mounted on the ship at each end of the platform and operably connected to the lock bolts, means for rocking the lock shafts to move the lock bolts into or out of locking position, a notched cam fixed on each shaft and provided with a locked notch for the locked position and an unlocked notch for the unlocked

position of the lock bolt associated with that shaft, an interlocking lever pivotally mounted on the ship at each end of the platform and provided with a latching bar for the cam thereat, a spring for each lever for biasing its latch bar toward the notches in the cam associated with it, and a bracket head mounted on each end of the platform for operating the interlocking lever for that end to move its latch bar away from the notches in the associated cam when the platform moves to the dead stops at the flight deck and for releasing that lever for operation by its biasing

spring when the platform moves downwardly a predetermined distance from the dead stops, whereby the latch bars will enter the locking notches when the lock bolts are in locking position and thus prevent unlocking of the bolts if the engine is unable to raise the platform against the dead stops after it is locked and when the lock bolts are in unlocked position the latching bars will enter the unlocked notches and prevent locking operation of the bolts while the platform is away from the flight deck.

CHARLES A. DANA.