

March 24, 1942.

J. A. TRAYLOR

2,277,171

APPARATUS FOR SUSPENDING SELF-LEVELING PLATFORMS

Filed Jan. 22, 1940

2 Sheets-Sheet 1

FIG. 1.

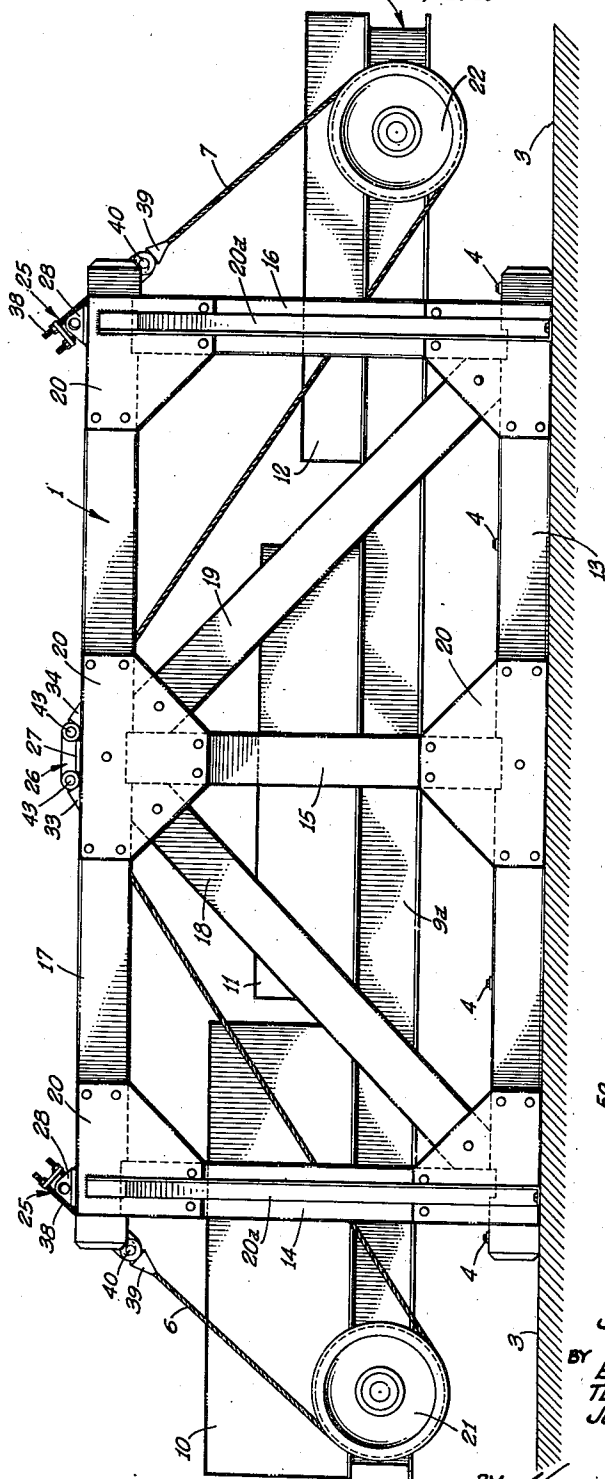
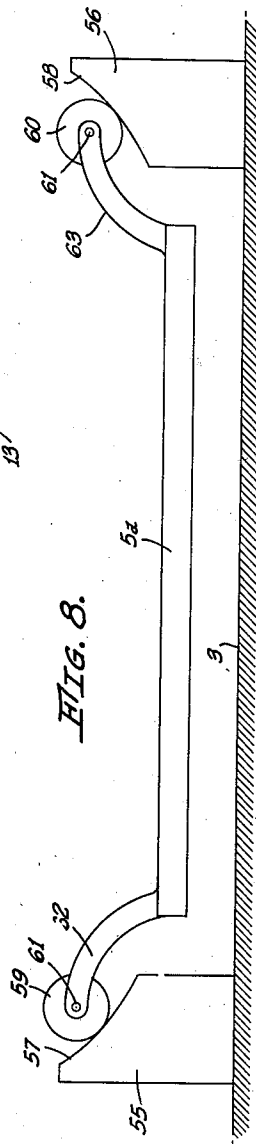


FIG. 8.



INVENTOR
JOHN A. TRAYLOR
DECEASED
BY EDNA T. EISENHARD,
TESSIE S. TRAYLOR AND
JOHN B. TRAYLOR
EXECUTORS

BY *Harold W. Harty*
ATTORNEY.

March 24, 1942.

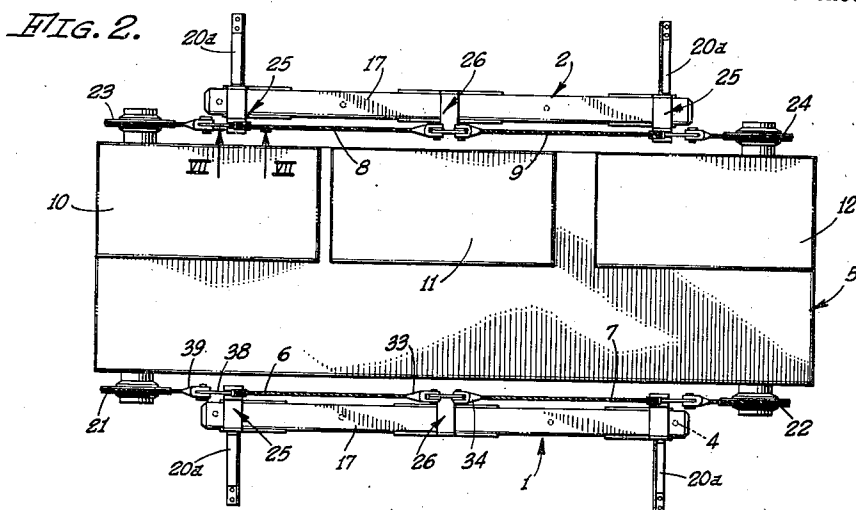
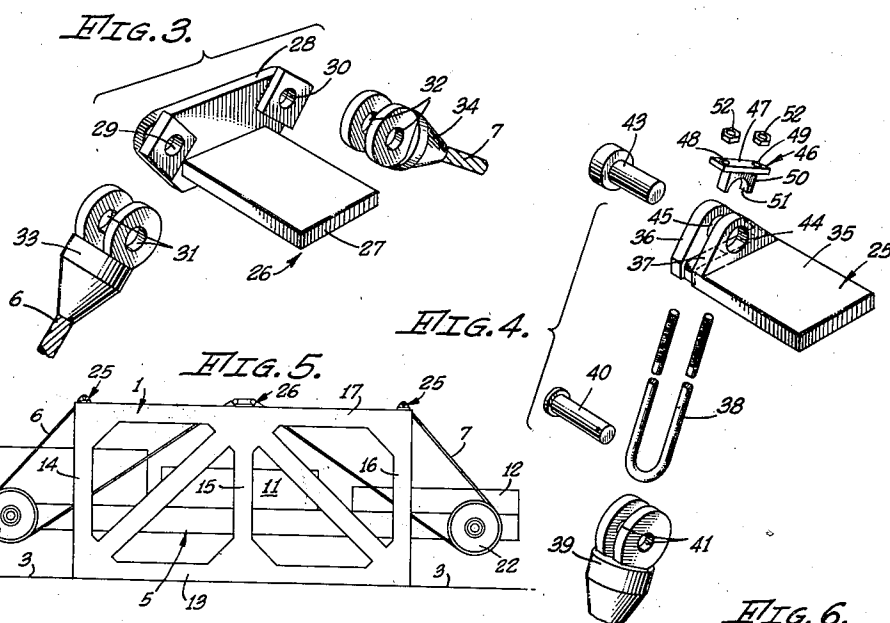
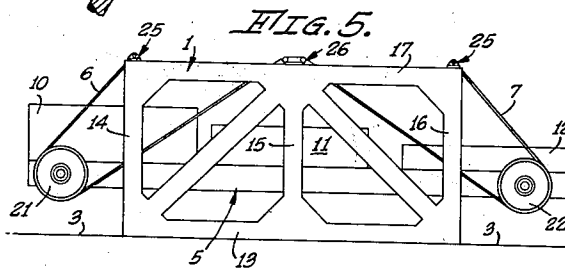
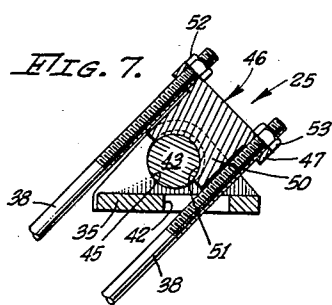
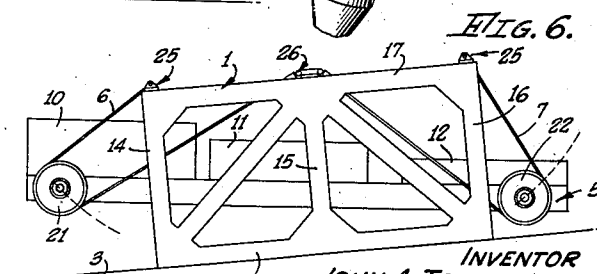
J. A. TRAYLOR

2,277,171

APPARATUS FOR SUSPENDING SELF-LEVELING PLATFORMS

Filed Jan. 22, 1940

2 Sheets-Sheet 2



INVENTOR
13 JOHN A. TRAYLOR,
DECEASED
BY EDNA T. EISENHAND, TESSIE S. TRAYLOR
AND JOHN B. TRAYLOR, EXECUTORS.
BY

JOHN A. TRAYLOR

DECEASED

DECEASED
BY EDNA T. EISENHAND, TESSIE S. TRAYLOR

BY *AND JOHN B. TRAYLOR, EXECUTORS.*

BY

Harold R. Mattingly
ATTORNEY.

ATZORNEY

UNITED STATES PATENT OFFICE

2,277,171

APPARATUS FOR SUSPENDING SELF-LEVELING PLATFORMS

John A. Traylor, deceased, late of Denver, Colo.,
by Tessie S. Traylor, Edna T. Eisenhand, and
John B. Traylor, executors, Denver, Colo.

Application January 22, 1940, Serial No. 314,956

12 Claims. (Cl. 114—191)

This invention relates to self-leveling platforms and has particular reference to a method and apparatus for use on ships, barges, and the like for maintaining machinery on an even keel regardless of position of the ship, and which finds particular utility when employed for supporting gold recovery apparatus on dredges and the like.

In the art of recovering precious metals and particularly in the gold recovery art, it is common practice to employ dredges for working large placer deposits. These dredges comprise a boat which is fitted with digging and conveying machinery for lifting the gold bearing gravels from the bottom of the river or lake to the boat deck. The gravels so obtained are treated in various fashions and then passed through recovery apparatus, such as classifiers, Wilfley tables, jigs, and the like, which separate the gold or other precious metal from the gangue.

The boat, although ordinarily reposing in still water, is subjected to a rocking movement comprising primarily a pitching motion because of the varying load imposed upon the bow by the dredging or digging equipment. The gold recovery apparatus, should, therefore, be mounted upon the boat deck in such fashion that this apparatus is maintained substantially level since the efficiency of such apparatus is seriously impaired whenever it is shifted out of the plane for which it has been adjusted.

It is accordingly an object of this invention to provide a method of supporting a platform upon a structure subjected to a rocking movement in such fashion as to maintain the platform substantially level at all times.

It is also an object of this invention to provide a method of supporting a platform upon a structure subjected to a pitching movement as set forth in the preceding paragraph in which the movement of the structure relative to the platform is characterized by the predominance of the vertical component.

It is a further object of this invention to provide a method of suspending platforms of the character set forth in the preceding paragraphs which comprises suspending the platform for movement relative to the structure along the shorter radius portions of an elliptical path.

It is a still further object of this invention to provide a method of supporting platforms of the character set forth in the preceding paragraphs which comprises suspending the platform from the structure by means of flexible tension members so arranged as to limit the movement of the platform relative to the structure to the shorter radius portions of an elliptical path.

It is also an object of the invention to provide a means for suspending a platform from a structure subjected to a rocking movement in

such fashion as to maintain the platform horizontal at all times.

It is a further object of this invention to provide a suspension of the character set forth in the preceding paragraph which includes cable means defining an elliptical path of movement of the platform relative to the structure.

It is also an object of this invention to provide a suspension means of the character set forth in the preceding paragraphs in which means is also provided for varying the eccentricity of the elliptical path.

It is an additional object of this invention to provide a platform suspension of the character set forth in the preceding paragraphs in which means is provided for limiting the movement of the platform along the elliptical path to the shorter radius portions of such path.

Other objects and advantages of this invention will be apparent from a study of the following specification, read in connection with the accompanying drawings, wherein:

Fig. 1 is an elevational view illustrating the preferred embodiment of this invention as applied to the suspending of a platform particularly adapted for supporting gold recovery apparatus;

Fig. 2 is a plan view of the structure illustrated in Fig. 1 and showing additional details of construction;

Fig. 3 is an exploded perspective view illustrating one means of cable attachment which may be used with the device illustrated in Figs. 1 and 2;

Fig. 4 is an exploded perspective view illustrating an adjustable type of cable attaching means;

Fig. 5 is a schematic view illustrating in elevation the relative positions between the suspended platform and the deck of a boat when the boat is on an even keel;

Fig. 6 is a view similar to Fig. 5 but illustrating the position of the platform relative to the boat deck when the boat is subjected to a pitching movement;

Fig. 7 is a fragmentary vertical section taken substantially along the line VII—VII of Fig. 2 and illustrating additional details of construction of the adjustable cable terminal shown in Fig. 4; and

Fig. 8 is an elevational view illustrating schematically an alternative type of suspension providing for a self-leveling action of the platform associated therewith.

The method of suspending or supporting a platform in a self-leveling fashion according to this invention consists generally in providing a means for guiding the ends of the platform for vertical movement relative to the boat deck along the shorter radius portions of an elliptical path,

It has been illustrated in Figs. 1 through 7 one form of apparatus comprising a cable suspension for so guiding the platform movement and in Fig. 8 another form of apparatus comprising a race and roller construction.

Referring to the drawings, it has been illustrated in Figs. 1 and 2 one way in which the method of this invention may be practiced as comprising the preferred embodiment of the apparatus adapted to carry out this method. The device which is illustrated in Figs. 1 and 2 includes a pair of vertically extending frames 1 and 2 which are disposed in spaced relation to each other and secured to a deck 3 of a ship, barge or gold recovery dredge as by means of bolts or screws 4. In the space defined between the frames 1 and 2 is placed a platform 5 which may be suspended from the frames 1 and 2 by means of port side cables 6 and 7 and starboard side cables 8 and 9. The platform 5 preferably includes a rigid subframe 9a upon which is disposed one or more jig supporting platforms, such as those indicated in Figs. 1 and 2 at 10, 11 and 12.

The supporting frames 1 and 2 may be of any suitable construction but preferably include a sill member 13 upon which is erected three vertically extending columns 14, 15 and 16. The upper ends of the ends of the columns may be intertied by a beam member 17 secured thereto and additional rigidity may be imparted to the structure by employing diagonal braces such as is indicated at 18 and 19. The frames 1 and 2 may be made of any suitable material but wood is ordinarily preferred because of its light weight. The joints between the various members in a frame constructed of wood may be reinforced, if desired, by means of fish plates or connection plates, such as indicated at 20 in Fig. 1 and side braces 20a may also be added, if desired, to resist the tendency of the frames to pull in toward each other.

In order that the platform 5, which is suspended by means of the cables 6, 7, 8 and 9 from the frames 1 and 2, may automatically remain in a substantially level position as the deck 3 or boat is subjected to a pitching movement to move the frames 1 and 2 about the platform 5, it has been preferred to provide a pair of port side pulleys 21 and 22 and a corresponding pair of starboard side pulleys 23 and 24 which are rotatably mounted upon the sub-frame 9a and disposed equal distances fore and aft of the center of gravity of the platform and the gold recovery apparatus which is placed upon the supporting structures 10, 11 and 12.

The cable 6 is preferably pivotally attached to the upper end of the column 14 by means of an adjustable attaching means 25 passed downwardly around the pulley 21 and then extended upwardly to the upper end of the central column 15 to which it is pivotally secured by means of a pivotal attaching means 26. The corresponding starboard side cable 8 is similarly extended from the fore column of the frame 2 about the pulley 23 and returned to the center column. A similar arrangement is employed for the cables 7 and 9, these cables being secured at one end to the aft column 16 and at the other end to the center column 15 and pass about the pulleys 22 and 24.

It will be observed that the path of movement of the pulley 21, for example, which is defined by the cable 6 comprises an ellipse having the attaching means 25 and 26 as its foci. It has been preferred to adjust the length of the cable

6, the distance between the pulleys 21 and 22 and the distance between the points of attachment 25 and 26 so that when the deck 3 of the dredge is substantially level, as indicated in Fig. 1, the pulley 21 will be disposed in the shorter radius portions of this ellipse.

It will be observed that if the deck 3 is moved out of a substantially level position, as indicated in Figs. 1 and 5, to an inclined position, as indicated in Fig. 6, the forward end of the platform 5 will move upwardly along the elliptical path of movement previously described while the rearward end will descend along a similar path. By arranging the cables as previously described so that the ends of the platform 5 are caused to normally travel along the shorter radius portions of these elliptical paths, the movement of the ends of the platform will be primarily vertical so that a number of such platforms and their suspension equipment can be placed in closely adjacent positions without danger of interference between these platforms as a result of relatively large horizontal movements of the platform relative to the deck.

It will be further noted that the eccentricity of the elliptical path may be readily controlled by changing the lengths of the suspension cables so that the ends of the platform may be caused to normally oscillate along a very steeply rising path or along a more gradually curving path as desired.

The fact that the paths of movement of the forward and rearward ends of the platform 5 are separate and independent ellipses tends to cause the platform to shift slightly out of a level position whenever the deck 3 is inclined at a considerable angle. The amount of such discrepancy, however, has been found to be sufficiently small as to in no way affect the operation of the jigs and classifiers supported by the platform. On the other hand, the employment of independent elliptical paths for opposite ends of the platform provides a damping action which effectively prevents any overtravel of the platform relative to its supporting structure.

It has been found that the efficacy of the device is greatly enhanced if the cables are pivotally secured at their ends to the upper ends of the columns. It has been illustrated in Fig. 3 a type of pivotal connection which is particularly adapted for use on the center columns 15. This connection may include a sole plate 27 which is adapted to rest upon the upper end of the columns 15 and be secured thereto by bolts or any suitable attaching means. The sole plate 27 is preferably made of a sufficient length to extend a vertically rising flange portion 28 secured thereto into the space defined by the side frames 1 and 2 and into alignment with the pulleys 21 and 22. The flange 28 is preferably bored, as indicated at 29 and 30, at its upper and outer corners to receive a pin (not shown) which may be passed through corresponding bores 31 and 32 provided in cable terminal clevises 33 and 34 affixed in any suitable manner to the ends of the cables 6 and 7.

It will be observed that this form of attaching means 26 disposes the cable terminals in alignment with the pulleys 21 and 22 and also provides for pivotal movement of the clevises 33 and 34 about this attaching means.

While a similar form of attaching means may be employed for the terminal 25 it is preferred to include in this terminal a means for adjusting the effective lengths of the cables. This may be readily provided by employing a construction

such as that illustrated in Figs. 4 and 7 in which the attaching means 25 is illustrated as including a sole plate 35 adapted to be secured to the upper end of the column 14. A pair of upwardly extending flanges 36 and 37 are secured to or formed integrally with the sole plate 35 and disposed in a position to lie in alignment with the pulleys 21 and 22 when the sole plate is secured to the upper end of the column. The flanges 36 and 37 are spaced from each other a sufficient distance to permit passage therebetween of an elongated U-bolt 38. The U-bolt 38 may be pinned to a cable end clevis 39 secured to the end of the cable 6 by means of a pin 40 adapted to pass through pin receiving bores 41 provided in the clevis 39 and through the bottom of the U-bolt 38.

As is clearly shown in Fig. 7 that portion of the sole plate which is disposed between the flanges 36 and 37 is provided with an elongated opening 42 through which one leg of the U-bolt 38 is passed. A pivot pin 43 may be passed through aligned bores 44 and 45 provided in the flanges 36 and 37 so that when the U-bolt 38 is passed over the pin 43, in the fashion indicated in Fig. 7, a saddle member 46 may be secured to the arms of the U-bolts 38 in a position to bear against the pin 43.

The saddle member 46 preferably includes a plate portion 47 having openings 48 and 49 adapted to receive the arms of the U-bolt 38. Secured to the plate portion 47 is a bearing member 50 which may include a semi-circular recess 51 adapted to partially encircle the pin 43. Nuts or similar adjusting means 52 and 53 threadably engaged with the arms of the U-bolt 38 may be employed to pull the U-bolt through the openings 48 and 49 in which it is received to shorten the effective length of the cable 6. Loosening of these attaching means will allow the U-bolt 38 to move downwardly relative to the pin 43 and increase the effective length of the cable associated therewith.

The bores 44 and 45 are preferably made somewhat larger than the diameter of the body of the pin 43 so that the pin will contact the bore surfaces along a line or small surface rather than a full cylindrical contact. This construction permits a certain amount of rolling of the pin 43 so as to materially reduce friction opposing pivotal movement of the U-bolt 38.

From the foregoing it will be observed that by varying the spacing between the pulleys along the length of the platform 5, the spacing between the ends of each cable, and the lengths of the cables themselves, the path through which the ends of the platform is caused to travel relative to the deck of the boat may be altered, as desired, from substantially a circular path to an exaggerated elliptical path. It will be readily appreciated that whenever the paths of movement of the ends of the platform 5 closely approach circular paths, the device operates, in effect, as a pendulum without any appreciable damping characteristics so as to be of great utility in only those applications where the motion of the deck of the boat is of a substantially uniform period. Whenever the paths of movement of the ends of the platform 5 comprise an exaggerated elliptical shape, the damping characteristic is greatly enhanced so that overtravel and persistent oscillation of the platform after the deck 3 has come to rest are minimized. Whenever an exaggerated elliptical path is employed, however, the amount of angular pitch

of the deck 3 which may be compensated for by the suspension is correspondingly reduced.

Furthermore, the lengths of the cables determine which portion of the elliptical paths will be traversed by the ends of the platform, relatively long cables causing the ends to travel along the longer radius portions so that a movement including a given vertical component will be accompanied by a relatively large horizontal movement. It accordingly has been preferred to make the cables relatively short so as to cause the platform ends to normally travel along the shorter radius portions of the path. Since these portions are steeply inclined, a movement including a given vertical component will be accompanied by a horizontal component which is a great deal smaller than if longer cables were used.

Referring now to Fig. 8, it has been illustrated an alternative form of apparatus which may be employed in the practice of this invention. This apparatus may include a pair of end supporting members 55 and 56 disposed at opposite ends of a platform 5a and securely affixed to the boat deck 3. The inner faces of the members 55 and 56 are formed to provide races 57 and 58 along which rollers 59 and 60 are adapted to move. The rollers 59 and 60 may be rotatably secured to the platform 5a by means of pivots 61 engaged with roller supporting brackets 62 and 63. The brackets 62 and 63 are preferably made of such length as to dispose the rollers 59 and 60 at a level higher than the center of gravity of the platform 5a and the load carried thereby so as to insure stability of the platform. The races 57 and 58 define an elliptical path of movement for the rollers 59 and 60 and, for the reasons pointed out hereinbefore, preferably define a steeply inclined shorter radius portion of such an elliptical path.

In the gold recovery art for which the above described types of apparatus are particularly designed, the dredges employed are subjected, in practically all cases, to only a pitching operation so that the devices just described will operate to maintain the classifiers, jigs and the like which are supported upon the platforms at a substantially even keel regardless of this pitching motion. Should it be desired to employ such equipment upon the deck of a boat where that deck is subjected to a rolling motion as well as to a pitching motion, the same principles pointed out hereinbefore may be utilized by employing an additional suspension directed at right angles to a suspension directed longitudinally as just described, or a longitudinally directed cable suspension may be used with a laterally directed roller and race suspension by securing the frames 1 and 2 to the platform 5a.

From the foregoing it will be observed that a method and apparatus is provided for suspending a platform of such type that the platform will be maintained in a substantially horizontal position independently of any rocking motion of the deck upon which the supporting members are secured.

While the description and the preferred embodiment of this invention has been shown, it is not desired to be limited to any of the details of construction shown or described herein, except as defined in the appended claims.

What is claimed is:

1. In a device for maintaining level a platform to be carried by a deck subjected to a rocking motion, the combination of: a frame secured to

said deck; and means supporting said platform from said frame for movement of the ends of said platform relative to said deck along paths each comprising a portion of an ellipse.

2. In a device for maintaining level a platform to be carried by a deck subjected to a rocking motion, the combination of: a pair of vertically extending frames secured to said deck on opposite sides of said platform and extending thereabove; a pair of pulleys rotatably secured to each side of said platform and near opposite ends thereof; and a cable for each of said pulleys passed thereabout and having its ends secured to the adjacent frame at points spaced along the length of said platform.

3. In a device for maintaining level a platform to be carried by a deck subjected to a rocking motion, the combination of: a pair of vertically extending frames secured to said deck on opposite sides of said platform and extending thereabove; a pair of pulleys rotatably secured to each side of said platform spaced equal distances from the center of gravity of said platform and the load carried thereby; and a separate cable passed under each of said pulleys and having its ends pivotally secured to the adjacent frame at points spaced along the length of said platform.

4. In a device for maintaining level a platform to be carried by a deck subjected to a rocking motion, the combination of: a pair of vertically extending frames secured to said deck on opposite sides of said platform and extending thereabove; a pair of pulleys rotatably secured to each side of said platform spaced equal distances from the center of gravity of said platform and the load carried thereby; a separate cable passed under each of said pulleys and having its ends pivotally secured to the adjacent frame at points spaced along the length of said platform; and means for adjusting the length of each of said cables comprising a U-bolt pivotally secured to one end of said cable, a saddle member engaged with both arms of said U-bolt, and a bearing member interposed between said saddle and said frame.

5. In a device for maintaining level apparatus to be carried by a deck subjected to a rocking motion, the combination of: a platform on said deck for supporting said apparatus; supporting means interposed between said deck and said platform; and means extending from said platform near the ends thereof and engaging said supporting means at a point above the center of gravity of said platform for defining for said ends upright paths of movement each comprising a portion of an ellipse.

6. In a device for maintaining level a platform to be carried by a deck subjected to a rocking motion, the combination of: a pair of vertically extending frames secured to said deck on opposite sides of said platform and extending thereabove; a pair of pulleys rotatably secured to each side of said platform spaced equal distances from the center of gravity of said platform and the load carried thereby; and a separate cable passed under each of said pulleys and having its ends pivotally secured to the adjacent frame at points spaced along the length of said platform and between said pulleys.

7. In a device for maintaining level apparatus to be carried by a deck subjected to a pitching motion, the combination of: a platform on said deck for supporting said apparatus disposed with

its length extended longitudinally of said deck; a pair of vertically extending frames secured to said deck on opposite sides of said platform and extending thereabove; a pair of pulleys rotatably secured to each side of said platform spaced equal distances from the center of gravity of said platform and the load carried thereby; and a separate cable passed under each of said pulleys and having its ends pivotally secured to the adjacent frame at points spaced along the length of said platform and between said pulleys.

8. In a device for maintaining level apparatus carried by a deck subjected to a rocking motion, the combination of: a platform on said deck for supporting said apparatus; a supporting means disposed at each end of said platform and interposed between said deck and said platform, each of said supporting means including an upwardly inclined raceway having a contour comprising a shorter radius portion of an upright ellipse; and roller means rotatably secured to each end of said platform in positions to engage said raceways.

9. In a device for maintaining level apparatus carried by a deck subjected to a rocking motion, the combination of: a platform on said deck for supporting said apparatus; a supporting means disposed at each end of said platform and interposed between said deck and said platform, each of said supporting means including an upwardly inclined raceway having a contour comprising a shorter radius portion of an upright ellipse; supporting arms secured to the ends of said platform and extending upwardly and outwardly from said platform ends to dispose the ends of said arms above the center of gravity of said platform and apparatus; and roller means rotatably secured to the upper ends of said arms in positions to engage said raceways.

10. In a device for maintaining level a platform to be carried by a deck subjected to a rocking motion, the combination of: a frame secured to said deck; and means supporting said platform from said frame for movement of the ends of said platform relative to said deck along paths each comprising a portion of an ellipse, said supporting means being so arranged that the normal movement of said ends of said platform is limited to the shorter radius portions of said ellipse.

11. In a device for maintaining level a platform to be carried by a deck subjected to a rocking motion, the combination of: a frame secured to said deck; and means supporting said platform from said frame for movement of the ends of said platform relative to said deck along independent elliptical paths.

12. In a device for maintaining level a platform to be carried by a deck subjected to a rocking motion, the combination of: a frame secured to said deck; and means supporting said platform from said frame for movement of the ends of said platform relative to said deck along independent elliptical paths, said supporting means being so arranged that the normal movement of said ends of said platform is limited to the shorter radius portions of said elliptical paths.

TESSIE S. TRAYLOR,
EDNA T. EISENHAND,
JOHN B. TRAYLOR,

*Executors of the Estate of John A. Traylor,
Deceased.*