

PATENT SPECIFICATION

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(54) WORK PLATFORMS OR STAGING

(71) We, SUZUKI MECHANICAL ENGINEERING CO., LTD., a Japanese Company, of No. 3-3, Shimo 3-chome, Kita-ku, Tokyo, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

This invention relates to work platforms or staging (hereinafter referred to generally as "staging") for use in docks or for similar purposes and it has for its principal object the provision of an improved form of staging having a work platform and means for supporting it so that it can be moved both laterally and up and down to bring it into the desired working position.

Many forms of staging or similar equipment using adjustable stages or work platforms have been proposed in which the platform or stage is mounted on the upper end of a supporting arm which is itself carried by a wheeled truck or the like. Various means have been proposed for mounting the work platform on the arm and for keeping it horizontal when the position of the arm is adjusted but these have suffered from a number of limitations or drawbacks. It is one of the important objects of the present invention to provide an improved form of connection between the platform and the arm carrying it.

Another object of the invention is to provide an improved form of staging which is particularly designed and suitable for use in dockyards, although the invention is not limited to this and many of its features are applicable to and provide advantages in staging intended for other purposes.

According to the invention an adjustable staging is provided which comprises a trolley having wheels for travel along rails, a boom one end of which is pivoted to the trolley for up and down tilting of the boom and the

other end of which carries a working platform, means being provided for raising and lowering the boom and thereby the platform, wherein the platform is connected with the boom by means comprising at least one rail, which is curved along its length and is mounted on the boom, and a guide member or members mounted on the platform so as to engage the rail or rails, and wherein means are provided connecting the platform with the trolley for causing the guide member or members to travel along the curved rail or rails so as to keep the platform horizontal during raising and lowering of the boom.

It would also be possible to reverse the connection between the platform and boom by mounting the rail or rails on (generally under) the platform and mounting the guide member or members, which are preferably wheels or rollers running in or on rails of suitable section, on the boom.

Further features of the invention will be clear from the following description and the accompanying drawings, which show certain preferred embodiments of the invention. In these drawings:-

Figure 1 is a side view, partly diagrammatic and in section, showing one form of dockyard staging which exemplifies the invention;

Figure 2 is a plan view of the staging shown in Figure 1;

Figure 3 is a side view showing the work platform and part of the arm or boom used for supporting it in the staging shown in Figures 1 and 2;

Figure 4 is a side view, partly diagrammatic and in section, showing the base or trolley part of another form of dockyard staging exemplifying the invention;

Figure 5 is a detail, part-sectional view showing an example of mechanism which may be used in either of the above forms of staging.

Referring first to Figures 1 to 3, the staging shown comprises a travelling trolley 7, which

is supported by wheels 4, 5 and 6. As shown in figure 1, these engage on two rails 2 and 3, which are mounted respectively on the top and side of the side wall 1 of a dock.

5 A base 9 is turnably mounted on the trolley 7 so that it can be turned about a vertical axis by a suitable slewing mechanism. A tilting boom 11 is mounted on the base 9 by a shaft 12, on which the inner end of the boom 11 is pivotable so that the boom 11 can be raised or lowered to a desired position by means of a hydraulic ram 13.

10 As shown in broken lines in Figure 1, the boom 11 can be moved to positions both above and below the horizontal position, which is indicated at (A). (B) and (C) show examples of raised and lowered positions.

The free end of the boom 11 has fixed to it an arcuate or curved rail 14 or preferably a pair of such rails. Each rail 14 is of channel section. The rails 14 carry a platform support member 17, which is provided with a guide assembly 16 comprising a number of rollers 15. Two such rollers per rail are shown in the drawing, these being arranged so that the rollers running in each rail are spaced along it.

A work platform 19 is rotatably mounted on the support member 17 and a suitable slewing mechanism 18, which is shown generally in Figure 3, is provided by means of which the platform 19 can be turned about its axis of rotation to bring it into any desired position suitable for the work to be done. This axis is kept substantially vertical so that the platform is kept horizontal, regardless of the raising and lowering of the boom 11, by mechanism which will now be described.

This mechanism comprises at least one and preferably a pair of connecting rods 22 the outer ends of which are pivotally connected to the member 17 at 23 and the inner ends of which are pivotally connected at 21 to the base 9. The distance L between the connection 21 and the axis of the shaft 12 is equal to the radius r (Figure 3) of curvature of the rails 14.

The staging is provided with suitable mechanism for causing it to travel along the dock side and for effecting and controlling the raising and lowering and the turning of the boom 11 and the turning of the platform 19. This mechanism may include a prime mover 24 (Figure 2), such as diesel engine, which is mounted on the trolley 7, together with a hydraulic control unit 25 and an air compressor 26 which is driven by the engine 24. A control box is indicated at 27, while a hand rail 28 is provided along the boom 11.

60 The wheels 4 carry the overall weight of the staging and allow it to travel along the side of the dock on the flanged rail 2, while the wheels 5 and 6, which engage respectively under the top flange of the rail 2 and against the rail 3 on the dock wall, prevent

the staging from tilting over into the dock.

Figure 4, in which the same of similar references are used where convenient to indicate corresponding parts, shows another embodiment of the invention, which avoids the need for mounting a rail (the rail 3) on the side of a dock wall. In this case two load-carrying rails 31 and 32 are mounted on the top of the dock wall 1 and carry smaller rails 2 and 2', respectively. Alternatively the rails 2 and 2' could be formed by parts of the rails 31 and 32.

The trolley has wheels 4 and 4' which run on and engage the rails 2 and 2', both to take the weight of the staging and also to help prevent it from tilting over. Tilting into the dock is prevented by wheels 33 and 34, it being noted that there is another wheel (not shown) similar to the wheel 33 mounted behind the wheel 34. These wheels engage under the top flange and against a side of the rail 31, while the risk of the trolley tilting back away from the dock is prevented by a hook part 35 which projects beneath the upper flange of the rail 32.

Figure 5 shows diagrammatically an example of a mechanism 18 which may be used to effect the turning or slewing of the base 9 on the trolley 7 and of the platform 19 on the boom 11. Such mechanism includes a pinion 37 which is driven by a motor 38 and engages a gear or rack 36. This latter is mounted on (or forms part of) the base 9 or platform 19. The motor 38, which may be hydraulically or electrically operated, can thus be used to rotate the jib or platform, as the case may be, in either a clockwise or anticlockwise direction.

In use, the trolley 7 is moved along the dock side and the boom 11 is raised or lowered and also turned angularly, relatively to the trolley, in order to bring the platform 19 into the required position near to or against the side or other part of the ship on which work is to be carried out. The platform 19 is also turned to ensure that its working side faces in the direction required.

A number of modifications are possible in the staging which has been described and which is shown in the drawings. These include:-

(1) Although it is preferred to use a pair of arcuate rails 4 it would be possible to use a single rail or to increase the number of them.

(2) In the constructions shown, the rails 14 are mounted on the end of the boom 11, while the rollers 15 are carried by the support 17 of the platform 19. It would, however, be possible to reverse this arrangement and to mount the rails 14 on the support 17 and the rollers 15 on the end of the boom.

(3) Instead of the rollers 15 it would be possible to use slides or the like to engage the rails 14.

(4) The platform 19 could be connected

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directly with the end of the boom 11, instead of having its base 17 separate from and rotatable on the boom.

(5) In the construction shown the rails 14 are of strictly arcuate form, having a radius r which is equal to the distance L between the axis of the shaft 12 and that of the pivotal connection 21, but if these distances are not the same the curve of the rails 14 could be modified providing that the platform 19 is kept substantially horizontal within the range of tilting movement of the boom which will be used in practice.

The use of curved (preferably arcuate) rails with rollers or the like engaging in them to connect the platform 19 with the end of the boom 11 provides a particularly effective and reliable form of connection which gives a number of advantages over a simple pivotal connection. The platform is supported in a particularly strong and stable manner and is not liable to tilt or vibrate when in use. Its position can be accurately controlled and maintained and it is very suitable for many uses in docks and elsewhere.

WHAT WE CLAIM IS:-

1. A staging comprising a trolley having wheels for travel along rails, a boom one end of which is pivoted to the trolley for up and down tilting of the boom and the other end of which carries a working platform, means being provided for raising and lowering the boom and thereby the platform, wherein the platform is connected with the boom by means comprising at least one rail, which is curved along its length and is mounted on the boom, and a guide member or members mounted on the platform so as to engage the rail or rails, and wherein means are provided connecting the platform with the trolley for causing the guide member or members to travel along the curved rail or rails so as to keep the platform horizontal during raising and lowering of the boom.

2. A staging according to claim 1, wherein the guide members are provided in the form of rollers at least two of which rollers engage the or each curved rail.

3. A staging according to claim 1 or claim 2 having a pair of guide rails which lie parallel to and spaced from each other.

4. A staging according to any of the preceding claims, wherein the boom is pivoted at its lower end to a base which is turnable at a vertical axis on the trolley to allow slewing of the boom.

5. A staging according to any of the preceding claims, wherein the platform is connected with the boom through a connecting member and is itself turnable relatively to this member about a substantially vertical axis.

6. A staging according to any of the preceding claims, wherein the means connecting the platform with the trolley comprise one or more links the ends of each of which are connected to the platform and the trolley respectively.

7. A staging according to claims 4, 5 and 6, wherein the or each of said links is pivotally connected at its one end with the base and at its other end with the connecting member carrying the platform.

8. A staging according to any of the preceding claims, wherein the wheels of the trolley are adapted to run on and engage a pair of rails one of which is mounted on the top of a dock wall and the other of which is mounted on the side of this wall.

9. A staging according to any of claims 1 to 7, wherein the wheels of the trolley are adapted to run on a pair of parallel rails mounted on the top of a dock wall or other level surface and the trolley includes means engaging under a flange or like part of at least one of these rails to prevent tipping of the trolley.

10. A staging as claimed in claim 1, substantially as herein described with reference to the accompanying drawings.

11. A modification of the staging claimed in any of the preceding claims, wherein the curved rail or rails is or are connected with the platform and the guide member or members is or are mounted on the boom.

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15 The use of curved (preferably arcuate) rails with rollers or the like engaging in them to connect the platform 19 with the end of the boom 11 provides a particularly effective and reliable form of connection which gives a number of advantages over a simple pivotal connection. The platform is supported in a particularly strong and stable manner and is not liable to tilt or vibrate when in use. Its position can be accurately controlled and maintained and it is very suitable for many uses in docks and elsewhere.

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45 2. A staging according to claim 1, wherein the guide members are provided in the form of rollers at least two of which rollers engage the or each curved rail.

50 3. A staging according to claim 1 or claim 2 having a pair of guide rails which lie parallel to and spaced from each other.

4. A staging according to any of the preceding claims, wherein the boom is pivoted at its lower end to a base which is turnable at a vertical axis on the trolley to allow slewing of the boom. 55

5. A staging according to any of the preceding claims, wherein the platform is connected with the boom through a connecting member and is itself turnable relatively to this member about a substantially vertical axis. 60

6. A staging according to any of the preceding claims, wherein the means connecting the platform with the trolley comprise one or more links the ends of each of which are connected to the platform and the trolley respectively. 65

7. A staging according to claims 4, 5 and 6, wherein the or each of said links is pivotally connected at its one end with the base and at its other end with the connecting member carrying the platform. 70

8. A staging according to any of the preceding claims, wherein the wheels of the trolley are adapted to run on and engage a pair of rails one of which is mounted on the top of a dock wall and the other of which is mounted on the side of this wall. 75

9. A staging according to any of claims 1 to 7, wherein the wheels of the trolley are adapted to run on a pair of parallel rails mounted on the top of a dock wall or other level surface and the trolley includes means engaging under a flange or like part of at least one of these rails to prevent tipping of the trolley. 80

10. A staging as claimed in claim 1, substantially as herein described with reference to the accompanying drawings. 85

11. A modification of the staging claimed in any of the preceding claims, wherein the curved rail or rails is or are connected with the platform and the guide member or members is or are mounted on the boom. 90

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