MOORING APPARATUS FOR AIRSHIPS

Filed Feb. 16, 1931
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MOORING APPARATUS FOR AIRSHIPS

Application filed February 16, 1931. Serial No. 515,996.

This invention relates to an apparatus for mooring airships and for controlling their landing movements.

It has for one of its objects to provide an apparatus of this character which is designed to simply and effectually control the movement of the ship after being moored to the mast, whether it be to lower the ship to an elevation to permit of the admission or discharge of passengers or freight, or whether it be to guide the ship into its hangar.

Another object of the invention is the provision of an apparatus of this character having a revolvable mooring mast or turret and companion revolvable elevator means for controlling the movements of the ship to and from the tower.

A further object is to provide a mooring mast having means for guiding the ship radially relatively thereto in conjunction with a portable device for guiding the ship to and from its hangar.

Other features of the invention reside in the combination and structural arrangement of parts hereinafter described and particularly pointed out in the appended claims.

In the accompanying drawings:—

Figure 1 is a side elevation of a mooring apparatus embodying my invention. Figure 2 is a front view thereof. Figure 3 is a fragmentary perspective view of the radial guide track and associated parts. Figure 4 is a perspective view of the portable mast for propelling the ship to and from its hangar. Figure 5 is an enlarged fragmentary transverse vertical section taken on line 5—5, Figure 2. Figure 6 is an enlarged horizontal section taken on line 6—6, Figure 1. Figure 7 is a fragmentary horizontal section taken on line 7—7, Figure 3. Figure 8 is a front perspective view of the mooring mast and the portable towers associated therewith.

Similar characters of reference indicate corresponding parts throughout the several views.

In its general organization, this mooring apparatus comprises a stationary central tower or mast, a revolvable tower or turret mounted at the upper end of the central mast, a shiftable coupling device applied to the turret for connecting the airship thereto, a carrier revolvably mounted on the central mast below the turret and having elevator means for shifting the coupling device from the turret to a lower level, and portable masts to which the lowered airship is connected or supported for conveying the same to its hangar.

The stationary tower 10 may be made of structural steel or of any other appropriate construction and it is preferably provided at its upper end with a platform 11 on which a revolvable turret 12 is mounted, the same being shown supported on an upright post 13 and on casters or wheels 14 which ride over the platform. This turret may be revolved in any suitable manner and the same may constitute a control room for the attendant of the mooring mast. Mounted at one side of this turret and firmly anchored there to by brackets 15, is a guide member or channel 16 disposed in a substantially upright position and containing a vertically slideable cross-head 17 to which a coupling member 18 is applied, the latter serving as a medium for connecting the airship thereto. By way of example, the coupling member is shown provided with a hook 19 and the airship is provided at its nose end with a coupling eye 20 for detachable engagement therewith.

Projecting outwardly from the turret and on opposite sides of the guide member 16 are bumper arms 21 which project forwardly some distance beyond the coupling hook 19 and serve to cushion the ship during the act of mooring it to the mast.

As shown in Figure 5, the cross-head 17 is normally held against downward movement by a retractable stop or abutment 22 which projects into the channel way of the guide member 16 and is controlled by an actuating lever 23 disposed with the turret 12.

Mounted on the mast 10 below the turret 12 are upper and lower annular tracks 24 and 24a, respectively, on which is guided a substantially upright carrier preferably consisting of a guide rail 25 provided at its upper end with a suspension roller 26 engaging the track 24 and at its lower end with a shoe 27 engaging the lower track 24a. This carrier
may be propelled around its guide tracks in any suitable manner and it is adapted to be presented in vertical alinement with the guide member 16 on the turret when it is desired to raise or lower the airship. For the purpose of raising and lowering the airship, the carrier 26 is provided with a suitable elevator consisting of an endless belt or cable 28 disposed lengthwise of this carrier and passing at its upper end around a pulley 29 and at its lower end around a pulley 30 adapted to be driven in one direction or the other by a reversible electric motor 31 suitably supported at the lower end of the carrier. Secured to the elevator-cable 28 for movement therewith is a cross-head 32 guided in a longitudinal slot 33 of the carrier-rail 25 and having a hook 34 or like coupling element for detachably connecting the cross-head 32 with the companion cross head 17 to which the airship is adapted to be connected in the manner heretofore described. As shown in Figure 5, the hook 34 is adapted to interlock with a companion latching element 35 on the cross-head 17, and a spring 36 normally urges this hook in a direction to automatically interlock with the element 35, a deflecting member 37 being provided to guide and direct said hook into interlocking engagement with the cross-head 17 preparatory to the latter being lowered by the elevating head 32 when it is desired to bring the airship to a lower level, say for discharging passengers or freight, or for taking the ship into its hangar.

For the purpose of directing the airship into its hangar, I provide portable masts 38 and 39, each of which is preferably mounted on wheels 40 engaging a track 41 having a portion 42 which extends circumferentially around the stationary mast 10, in the manner shown in Figure 8. One of these portable masts is provided with a suitable coupling device 43 with which the coupling eye 20 of the airship is adapted to engage, while the other portable mast 39 has a supporting yoke 44 at its upper end to which the tail end of the airship is suitably connected, the ship being sustained between the two masts in the manner shown in Figure 8, making it an easy task to propel the same over the tracks to and from the hangar.

In order to facilitate the transference of the airship from the lower end of the carrier 25 to the portable mast 38 and vice versa, I provide a laterally projectible guide rail or arm 45 which acts as a support or extension for the carrier in transferring the coupling head 18 from the carrier to a point where the ship can be conveniently coupled to or uncoupled from the portable mast 38. To this end, the arm 45 is preferably fulcrumed at 46 to the lower end of the carrier and is adapted to swing in a vertical plane to assume the inoperative position shown by full lines in Figure 2 or the operative position shown by dotted lines in said figure and by full lines in Figures 3 and 7. This guide rail or arm 45 is shiftable to the positions just described by means of a cable 47 connected at one end to the arm and passing at its other end around a windlass 48 suitably mounted on the carrier, as shown in Figure 2. Said guide rail 45 has a longitudinal slot or guide-way 49 which is adapted to receive the coupling member 18, the latter being shiftable into and out of the cross-head 17 during the act of preparing the ship for taking off and for preparing for its removal from the mast into the hangar. In order to effect the ready application and removal of the coupling member 18 to and from its cross-head 17 for the purpose just described, said cross-head has a slot 50 which is open at one end and which is adapted in its lowered position to register with the guide-way 49 in the arm 45, as seen in Figure 3. In this position of the parts, the coupling member 18 can be readily transferred from the cross-head 17 to the arm 45 and vice versa. The shiftable guide arm may be reliably supported in its horizontal position by an abutment or brace 51.

During the transference of the airship on to the portable tower 38, the latter is brought into engagement with the outer end of the arm 45 and for this purpose said tower has an anchoring yoke or rest 52 in which the end of the arm is adapted to seat.

Briefly stated, the operation of this mooring apparatus is as follows:

Assume the parts to be in the position shown in Figure 1 and that an airship is approaching the mast to be anchored thereto. When approaching the mast, a guy line may be dropped from the ship to the attendant of the mooring mast or the ship may be guided by its own power directly to the mast, after which its eye 20 is connected to the hook 19 on the coupling member 18. Should it be desired to lower the ship to discharge passengers or direct the same into its hangar, the cross-head 32 is raised by the elevating cable 28 to the elevated position shown in Figure 5, its hook 34 being coupled with the companion element 35 on the cross-head 17; at this time the arm 45 is lowered to the horizontal position shown in Figure 3. The retractable stop 21 which normally supports the cross-head 17 is now retracted and power is applied to the elevating cable 28, to cause the cross-head 32 to be lowered on its carrier 35 and pull the cross-head 17, to which the airship is coupled, with it. Thus the ship is brought to a lower level and when the coupling member 18 reaches a position opposite the horizontally disposed guide arm 45, its motion is arrested, and the same is then transferred to said guide arm to move the ship outwardly from the mooring mast to a position.
where the same can be conveniently coupled to the portable mast 38.

It is to be understood that my invention is not limited to the exact details of construction herein shown and described, and that various changes therein and modifications thereof may be made within the scope of the appended claims without departing from the spirit of the invention or sacrificing its advantages.

I claim as my invention:

1. A mooring apparatus for airships, comprising a mast, a revolving turret mounted on the upper end of said mast and including a shiftable element for coupling an airship thereto, a carrier revolvably mounted on the mast below said turret and including a guideway, and an elevating element movable in said guideway and adapted for operative engagement with said shiftable coupling element.

2. A mooring apparatus for airships, comprising a mast, a revolving turret mounted on the upper end of said mast and including a shiftable element for coupling an airship thereto, a carrier revolvably mounted on the mast below said turret and including a guideway, an elevating element movable in said guideway, and a hook applied to said elevating element for detachable engagement with said shiftable coupling element.

3. A mooring apparatus for airships, comprising a mast, a revolving turret mounted on the upper end of said mast and having a guideway therein, a carrier revolvably mounted on the mast below said turret and having a guideway therein arranged for alignment with said turret-guideway, an elevating element movable in said carrier-guideway, a shiftable coupling head for an airship normally seated in said turret-guideway, and means for connecting the elevating element with said coupling head to cause the latter to move with the former.

4. A mooring apparatus for airships, comprising a mast, a revolving turret mounted on the upper end of said mast and having a guideway therein, a carrier revolvably mounted on the mast below said turret and having a guideway therein arranged for alignment with said turret-guideway, an elevating element movable in said carrier-guideway, a shiftable coupling head for an airship normally seated in said turret-guideway, a releasable stop for normally supporting said coupling head in its guideway, and a hook applied to said elevating element for detachable engagement with said shiftable coupling element.

5. A mooring apparatus for airships, comprising a mast, a turret mounted on the upper end of said mast, a shiftable element for coupling an airship thereto, and a carrier revolvably mounted on the mast below said turret, and including a longitudinal and lateral guideway for said shiftable coupling element.

6. A mooring apparatus for airships, comprising a mast, a turret mounted on the upper end of said mast, a shiftable element for coupling an airship thereto, a carrier revolvably mounted on the mast below said turret and including a longitudinal guideway, an elevating element movable in said guideway and adapted for operative engagement with said shiftable coupling element, and a vertically-swinging arm fulcrumed on said carrier and having a guideway for said coupling element in intersecting relation to said longitudinal guideway.

7. A mooring apparatus for airships, comprising a mast, a revolving turret mounted on the upper end of said mast and having a guideway therein, a carrier revolvably mounted on the mast below said turret and having a guideway therein arranged for alignment with said turret-guideway, an elevating element movable in said carrier-guideway, a cross-head normally arranged in said turret guideway and adapted for connection to said elevator for movement in said carrier-guideway, a coupling element applied to said cross-head and to which an airship is adapted to be connected, and an arm projecting from the lower end of said carrier and having a guideway therein intersecting the carrier-guideway, said coupling element being releasable from the cross-head in the lowermost position of the latter and transferable therefrom to said arm-guideway.

8. A mooring apparatus for airships, comprising a mast, superposed members mounted on said mast for relative movement about the same, shiftable means on one of said members for coupling an airship thereto, and elevating means on the other of said members adapted for operative engagement with said coupling means for shifting the same lengthwise of the mast.

9. A mooring apparatus for airships, comprising a stationary tower and a substantially upright guideway thereon, a guide member engaging said guide and having a transferable coupling element thereon to which an airship is adapted for connection, an arm extending laterally from said tower and having a guideway therein for receiving said transferable coupling element, and a portable tower movable toward and from the stationary tower and having means for temporarily joining it to the outer end of said arm, said portable tower also including means for connecting the airship thereto.

10. A mooring apparatus for airships, comprising a stationary tower and a substantially upright guideway thereon, a guide member engaging said guide and having a transferable coupling element thereon to which an airship is adapted for connection, elevator
means for raising and lowering said guide member, an arm extending laterally from said tower adjacent the lower end of its guideway and having a guideway therein for receiving said transferable coupling element, and a portable tower movable toward and from the stationary tower and having means for temporarily joining it to the outer end of said arm, said portable tower also including means for connecting the airship thereto.

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