Aug. 12, 1924. 1,504,403

S. R. WARREN

AIRSHIP MOORING DEVICE

Filed Oct. 31, 1922 2 Sheets-Sheet 1

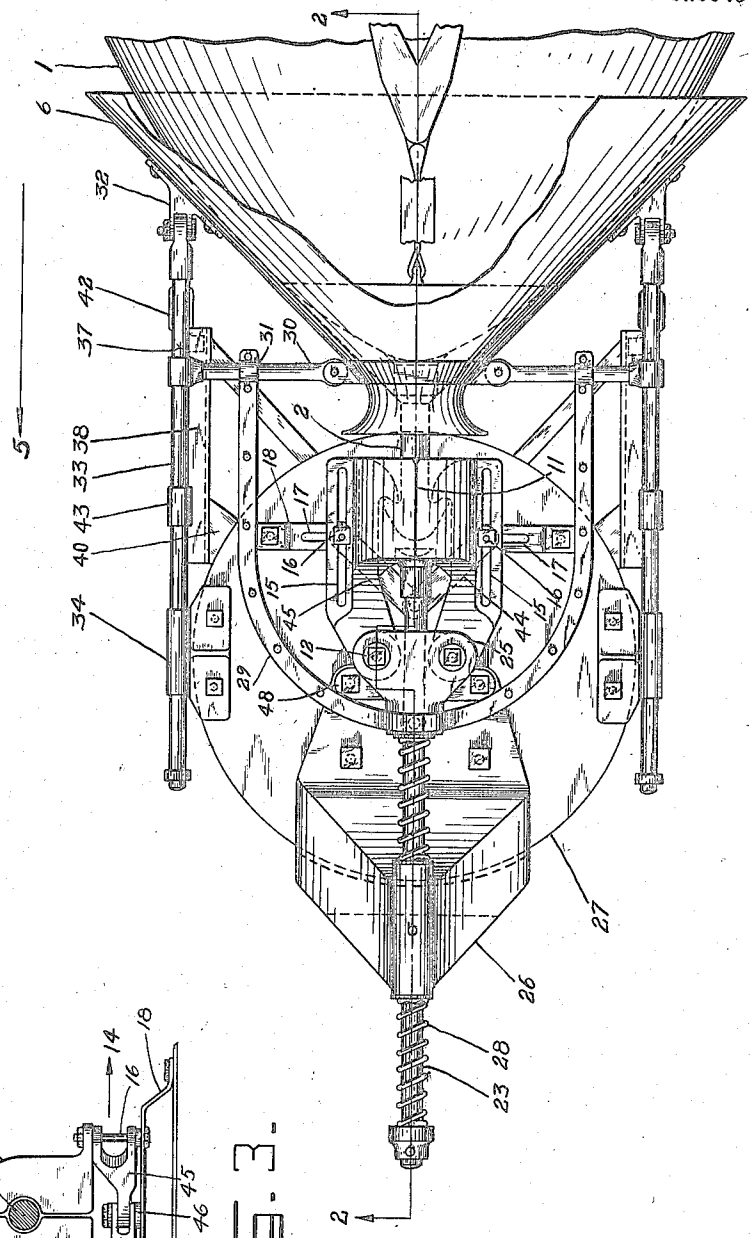


Fig. 1.

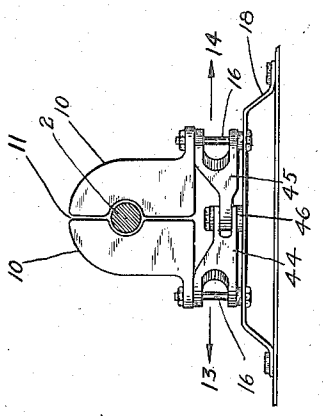


Fig. 3.

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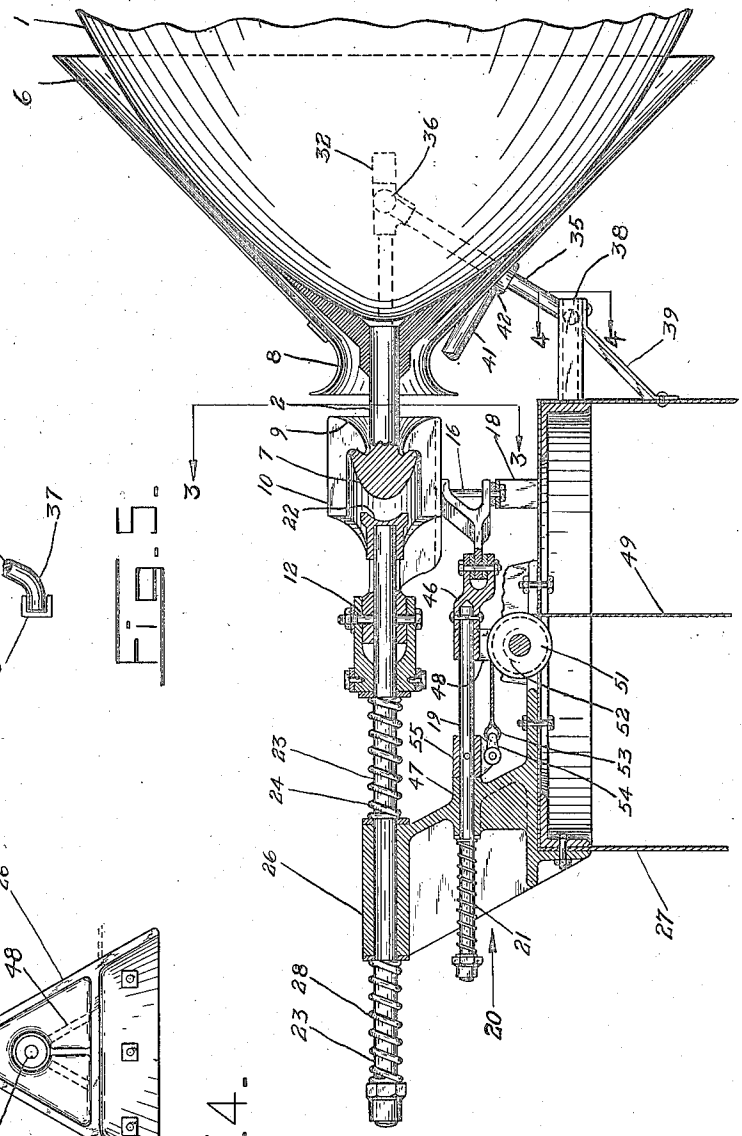


Fig. 2.

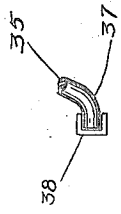


Fig. 5.

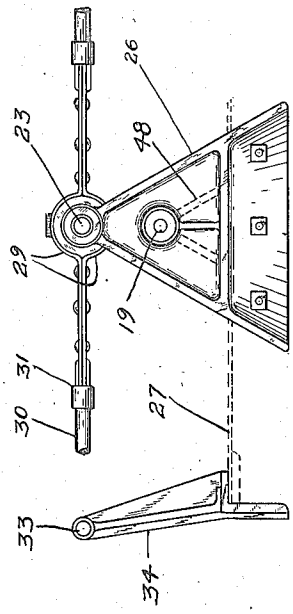


Fig. 4.

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Patented Aug. 12, 1924. 1,504,403

UNITED STATES PATENT OFFICE.

STEPHEN R. WARREN, OF DAYTON, OHIO.

AIRSHIP-MOORING DEVICE.

Application filed October 31, 1922. Serial No. 598,137.

To all whom it may concern:

Be it known that I, STEPHEN R. WARREN, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Airship-Mooring Devices, of which the following is a specification.

This invention relates to a novel and improved means for mooring airships of the lighter-than-air type.

In the devices of this general character heretofore and at present in use a mooring cable is employed. When such a cable is used, it is necessary to drop a cable from the airship, this cable having at its free end, a device for connecting the airship cable to a mast cable, which must also have a connection at its free end to enable the two cables to be joined before the ship can be pulled in. This inconvenience is all in addition to the difficulties encountered in the design of such a connection and a certain amount of time consumed in effecting the connection, the airship meanwhile being swayed by the wind unless held in position by a large attending crew.

It is therefore the object of this invention to provide an airship mooring device which will eliminate the necessity of employing cables and consequently do away with the objections above referred to, and further to construct such a mooring device as will allow the pilot to moor the airship practically without the air of an attending ground crew.

It is therefore proposed to provide a mooring mast generally consisting of a steel cone for guiding a stud attached to the nose of the airship into a suitable female coupling provided with ample shock absorbing means. By the proposed construction, the airship may be satisfactorily moored by means of the airship's propulsion and the pilot's maneuvering with practically little or no aid from a ground attending crew.

With the foregoing and other objects in view, which shall appear as the description proceeds, the invention resides in the combination of parts and in the details of construction hereinafter described and claimed, it being understod that changes may be made in the precise embodiment herein disclosed without departing from the spirit of the invention, such embodiment being illustrated in the accompanying drawings, in which:

Fig. 1 is a plan view partly in section of the mooring device showing the nose of the moored airship.

Fig. 2 is a view in section taken along line 2—2 of Fig. 1.

Fig. 3 is a view in section taken along line 3—3 of Fig. 1.

Fig. 4 is a partial side elevation of the frame work of the mast supporting structure.

Fig. 5 is a view in section taken along line 4—4 of Fig. 1.

Referring more particularly to the drawings, the airship 1 is shown in moored position. The airship is provided with a coupling stud 2 with an enlarged head. When the airship 1 is to be moored, it is moving in the direction 5 and guided so that the coupling stud 2 is headed for the inner surface of the guide cone 6. When the nose 7 of the coupling stud 2 strikes the surface of the guide cone 6, the momentum of the ship will cause the coupling stud 2 to travel along the surface of guide cone 6 to the bell opening 8. Coupling stud 2 will then proceed through the opening 8 in guide cone 6, into receiving jaws 9 of coupling blocks 10, which are divided vertically at 11, each member hinging at a point 12. Should the coupling block be closed, the entrance of coupling stud point 7 into jaws 9 will force blocks 10 open, in respective directions 13 and 14, simultaneously as shown in Figure 3. This opens the coupling block 10 thus actuating toggle mechanism by means of slots 15 in the flange of blocks 10 carrying bolt 16 in directions 13 and 14 respectively along slot 17 in the guide strap 18, thus pulling operating rod 19 in direction 20 and compressing spring 21 until the flange on coupling stud point 7 clears the corresponding flange of coupling blocks 10.

The momentum of the airship is arrested by reason of the stud point 7 striking the stop 22 which is secured to the end of plunger bar 23, as shown in Figure 2, the motion in direction 5 being checked by compression of spring 24 between the hinge block 25 and the main casting 26, the hinge block 25 being secured to plunger bar 23 which continues through the hinge block 25. Figure 1 shows the main casting 26 bolted to the turning drum 27.

When the flange on stud point 7 clears the flange of coupling blocks 10, the force of spring 21 will snap coupling blocks 10 back to normal position, thus enclosing stud

point 7 within coupling blocks 10. The removal of stud point 7 therefrom is prevented by the flanges described and any shock or sudden tendency of the airship to move in direction 20 is checked by the pull of plunger rod 23 compressing spring 28, springs 24 and 28 equalizing each other as will be apparent by reference to the drawings.

Relative positions of guide cone 6 and coupling blocks 10 are maintained longitudinally by means of tie straps 29 which are bolted to hinge block 25 and fastened to a brace 30 at 31, brace 30 being a part of alignment or supporting structure which consists of fittings 32, of which there are two fastened to guide cone 6, one on each side, to which is attached a sliding member 33.

Member 33 slides through a casting 34 which is secured to the mast turning drum 27, supporting strut 35 which is secured at one end to fitting 32 at 36, the other end being bent as shown at 37 the bent end sliding along guide channel 38 which is secured to the turning drum at 39 and 40. Strut 35 is further braced to sliding member 33 by the brace 41, secured to strut 35 at 42, and to sliding member 33 at 43. Thus the guide cone 6 is at all times held in constant alignment with clutch blocks 10, vertical alignment or position of clutch blocks 10 being assured as especially well illustrated in Figure 3. The airship now being secured to the mast, the turning drum will revolve with the wind about the center line (Fig. 2) in the usual manner.

In order to release the airship, it is apparent that with the opening of the jaws of clutch blocks 10, stud coupling 7 is free to emerge in direction 20, the force acting on the airship ordinarily being applied by the wind, as direction 20 is indicated as parallel to the direction of the wind in relation to the mast.

The jaws of clutch block 10 are opened by means of the motion of bolts 16 in directions 13 and 14 respectively, along slot 17 in guide strap 18, this motion being effected by action of toggle arms 44 and 45 which are actuated by operating rod 19, which is connected to toggle arms 44 and 45 by means of a clevis 46. The operating rod 19 is guided at 47 in the main casting and by a guide casting 48, motion being applied by pull of cable 49, which is operated from below, and which passes through the center of the turning drum at 50, passing over a sheave 51 which rotates on a shaft housed at 52, which may be part of the main casting 26. The end of cable 49 is fastened by means of a standard thimble 53 running through a standard shackle 54 which is pinned to a lug collar 55 which in turn is secured to the operating bar 19.

Thus it is obvious that a pull of cable 49 pulls operating bar 19 in direction 20, forcing toggle arms 44 and 45 outwardly in directions 13 and 14 guided by slot 17 in guide strap 18, thus opening the jaws of coupling block 10 and allowing the removal of coupling stud 7 from coupling block 10 in direction 20. Catching of the flange of stud nose 7 on guide cone 6 is prevented by the shape of the bell mouth 8 as will be apparent.

An important function of slot 15 in the flange of coupling block 10 is to allow motion in either direction, 5 or 20, and at the same time permitting motion of the coupling blocks 10 in either direction 13 or 14, regardless of the position of the coupling block 10, in relation to guide strap 18, which is stationary, being bolted to the turning drum 27.

I claim:

1. In combination, a device for mooring airships, a coupling stud provided with an enlarged head and mounted on the nose of said airship, coupling blocks mounted on a mooring mast and adapted to receive said coupling stud, means for automatically clamping and retaining said coupling stud in said coupling blocks when forced therein, and manual means for disengaging said coupling blocks from said coupling stud to allow the removal of said airship from said mooring mast, said manual disengaging means comprising hinged members connected to said coupling blocks and to a shaft supported by the mast supporting structure said shaft being provided with shock absorbing means and carrying a fixed collar, a cable attached to said collar and arranged about a pulley, a pull on said cable by the operator being adapted to swing said coupling blocks open and out of engagement with said coupling stud.

2. In combination in a device for mooring airships, a coupling stud provided with an enlarged head and mounted on the nose of said airship, coupling blocks mounted on said mooring device and adapted to receive said coupling stud, resilient means for automatically clamping and retaining said coupling stud in said coupling blocks, a guiding cone, arranged on and supported by said mooring device, for receiving said coupling stud and guide same into locking position, and manual means for disengaging said coupling blocks from said coupling stud, said means comprising hinged members guided by slotted supports and connected to said coupling blocks, resilient means for absorbing shock and a cable and pulley device attached to said hinged members for expanding said coupling blocks against the action of both of said resilient means.

In testimony whereof I affix my signature.

STEPHEN R. WARREN.