This invention relates to airship mooring means and more particularly to a mooring drumtherefor capable of drawing in and releasing a ship moored thereto.

It is well known to those skilled in the art that an airship, for instance, a balloon, must have exceedingly strong moorings in order to prevent its breaking away therefrom in a high wind, but as it is also necessary to prevent straining the cable, the nose or portion of the balloon to which the cable may be attached or the mooring means due to sudden stress, provision must be made to reduce the shock of such a sudden stress to a minimum.

It is therefore one of the objects of this invention to provide a strong and durable mooring means capable of resisting the greatest stress that may be put upon it by airships of enormous size.

It is another object of the invention to provide means whereby all pulling stress may be resiliently and gradually taken up and the load gradually placed on the mooring means to absorb shocks. In this connection, means are provided for limited rotation of the drum under a sudden stress on the cable. A further object is to provide means whereby any over-load may be taken up without straining the mooring operating means, the mooring means, the mooring cable or the airship.

Further objects are to provide improved details of construction and of operation, which will more particularly appear from the following description and claims and from the drawings in which:

Figure 1 is a side elevation of the drum and its mounting, locking and operating means.

Figure 2 is an end elevation looking at the left hand end of Figure 1 and showing the direction of winding in.

Figure 3 is a longitudinal elevation partly in section taken on a longitudinal diametral plane of the drum showing the compression spring and reel in normal position.

Figure 4 is a view similar to that of Figure 3 but showing the reel and spring in a position occupied under abnormal conditions.

Figure 5 is an end view of the ratchet and torque mechanism, looking from the right in Figure 1.

Referring more particularly to the drawing, 2 indicates the mounting frame for the drum housing 4, which is provided with bearings 6 and 8. The bearing 8 is provided for the drum 28, which is in turn journaled at 10 on the shaft 12. The shaft 12 extends through the bearings, is revolvel within, and is connected at its right hand end through appropriate gearing with a driving means here shown as an electric motor 14 designates the strengthening ribs on the drum casing. On one end of shaft 12 is a gear 16 meshing with a gear 18 carried by a shaft of the electric motor 20. The motor is secured to an extension 22 of the base of the mounting frame 2 and the drum housing is secured to the frame in any suitable manner such as by bolts 24 as shown. A cup-shaped reel or drum 28 provided with suitable flanges 26, is mounted to overhang in bearing 8. The drum has a centrally upstanding bearing portion 22 bearing on the shaft 12 and adapted to be operatively connected thereto by means of a plug or key 30 screwed into the drum bearing portion and slidably engaging in a spirally cut keyway 34 in the shaft. This keyway may be cut to permit the wheel to make one or more complete revolutions of the shaft. In the drawings it is shown as permitting the drum to make two complete revolutions relative to the shaft. The key 30 will abut against one of the ends 36 or 38 of the keyway preventing further relative rotation between the shaft or drum in that respective direction.

Mounted on hub 22 between suitable antifriction means such as bearings 40 and 42, more particularly referred to hereinafter, is a spring 44 which is adapted to expand and to be compressed as shown in Figures 3 and 4 respectively. The spring 44 abuts against the bearings 40, 42 and at the open end of the reel is enclosed in a suitable guide and retainer 46, which may be secured to an abutment 48 formed on the bearing member 6 by screw-thread as shown or in any other desirable manner. While a bearing has been shown within the retainer 46, it is to be understood that it may be dispensed with at this end and the spring secured to the abutment 48.

The cable C may pass through a suitable opening in the form of a slot S in the housing 4, the slot S being made wide enough to allow the cable free play from end to end of
the drum cylinder and the cable may be desirably secured to the drum reel by passing its inner end through an opening 50 in the reel cylinder.

In order to prevent the spring 44 from "jumping" or chattering when the wheel is rotating, the bearings 40, 42 are provided. Thus also, when the reel rotates with the spring under compression, "biting" and chattering will be obviated.

The shaft is locked by an ordinary ratchet and dog as shown at D, Fig. 1, and more particularly shown in Figure 5; as any suitable shaft locking means may be employed, the showing is conventional only.

The operation of the device is as follows:

The cable is secured to the airship and the motor started, driving the shaft 12 through gears 16 and 18 to reel the ship in. The electric motor 20 may be connected to a power line in any suitable manner, but preferably through a reversing switch; however, the invention is not limited to electric motor driving means.

During normal operation the key 30 is held snugly against the end 36 of the keyway by the action of the spring, and the shaft and reel rotate together clockwise as shown in Figure 2. Should an overload be placed on the drum due to any cause, i.e., a gust of wind against the ship, uncompensated or unanticipated starting torque of the driving means, or the cable catch during the reeling in of the ship, (the shaft turning clockwise as shown in Figure 2) the shock absorbing means will operate. The spring 44 is of sufficient strength to overcome the tendency of the pull of the ship on the cable under all normal loads to compress it, although on slight overload the reel will rotate for an instant slower than the shaft 12 compressing the spring and absorbing the shock gradually. This shock-absorbing characteristic is of course independent of whether the shock be due to an increased pull on the cable, suddenly starting torque or increased torque of the shaft; whether it be driven by motor or otherwise as will be readily apparent from an inspection of the drawing. It will also be seen that the shock absorbing means operates in substantially the same manner should the drum be slowed down to a stop at any time during the unreeling operation as the reel may momentarily rotate faster than the shaft, the spring gradually absorbing the shock, bringing the ship to a stop resiliently.

While I have shown and described my invention as applied to a mooring drum for airships, it is to be understood that the invention is not so limited as, for instance, it may be used for any sort of hoisting means or as a mooring means for marine vessels. Various modifications, details of construction and mode of operation may also be made without departing from the spirit of my invention.

What I claim and desire to secure by Letters Patent is:

1. In a device of the character described, a driving shaft, a cable drum mounted concentrically of, revolubly of and slideable longitudinally with respect to said shaft, a fixed key in one of said members adapted to travel in a groove in the other of said members, a coiled spring governing the relative longitudinal and rotational positions of said drum and said shaft, and bearings on said shaft in contact with the ends of said spring.

2. In a device of the character described, a driving shaft, a cable drum mounted concentrically of, revolubly of and slideable longitudinally with respect to said driving shaft, said cable drum being substantially cup-shaped but provided with a central bearing portion adapted to bear on said shaft, an annular recess between said bearing portion and the inner walls of said drum, a lug fixed in said bearing portion adapted to bear in a groove in said shaft to govern the relative positions of said shaft and said drum revolubly and longitudinally with respect to each other.

3. In a device of the character described, a driving shaft, a cable drum mounted concentrically of, revolubly of and slideable longitudinally with respect to said driving shaft, said cable drum being substantially cup-shaped but provided with a central bearing portion adapted to bear on said shaft, said cable drum being substantially cup-shaped but provided with a central bearing portion adapted to bear on said shaft, an annular recess between said bearing portion and the inner walls of said drum, a lug fixed in said bearing portion adapted to bear in a groove in said shaft to govern the relative positions of said shaft and said drum revolubly of and longitudinally with respect to each other, and resilient means governing the position of said key in said groove.

4. In a device of the character described, a driving shaft, a cable drum mounted concentrically of, revolubly of and slideable longitudinally with respect to said driving shaft, said cable drum being substantially cup-shaped but provided with a central bearing portion adapted to bear on said shaft, an annular recess between said bearing portion and the inner walls of said drum, a lug fixed in said bearing portion adapted to bear in a groove in said shaft to govern the relative positions of said shaft and said drum revolubly of and longitudinally with respect to each other, and a coiled spring governing the position of said key in said groove.

5. In a device of the character described, a driving shaft, a cable drum mounted concentrically of, revolubly of and slideable longitudinally with respect to said driving shaft, said cable drum being substantially cup-shaped but provided with a central bearing portion adapted to bear on said shaft, said cable drum being substantially cup-shaped but provided with a central bearing portion adapted to bear in a groove in said shaft to govern the relative positions of said shaft and said drum revolubly of and longitudinally with respect to each other, and said drum revolubly of and longitudinally with respect to said driving shaft.
longitudinally with respect to said driving shaft, said cable drum being substantially cup-shaped but provided with a central bearing portion adapted to bear on said shaft, an annular recess between said bearing portion and the inner walls of said drum, a lug fixed in said bearing portion adapted to bear in a groove in said shaft to govern the relative positions of said shaft and said drum revolubly of and longitudinally with respect to each other, a housing for said drum, a support for said housing, and a coiled spring having friction-reducing bearings with said housing and with said drum and adapted to govern the position of said key in said groove.

In testimony whereof I affix my signature.

ROBERT M. GETCHELL.