March 26, 1929. B. SCHNITZER 1,706,414

AIRSHIP MOORING AND TRANSPORTING DEVICE

Filed Feb. 28, 1925 4 Sheets-Sheet 1

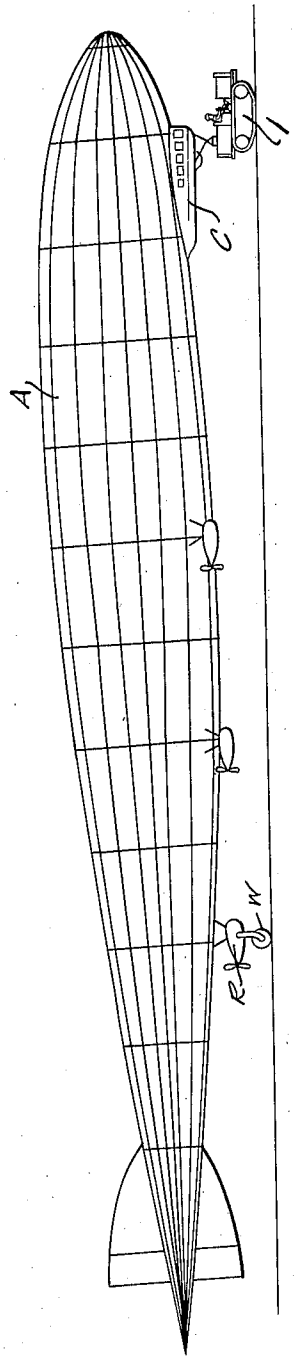



Fig. 1.

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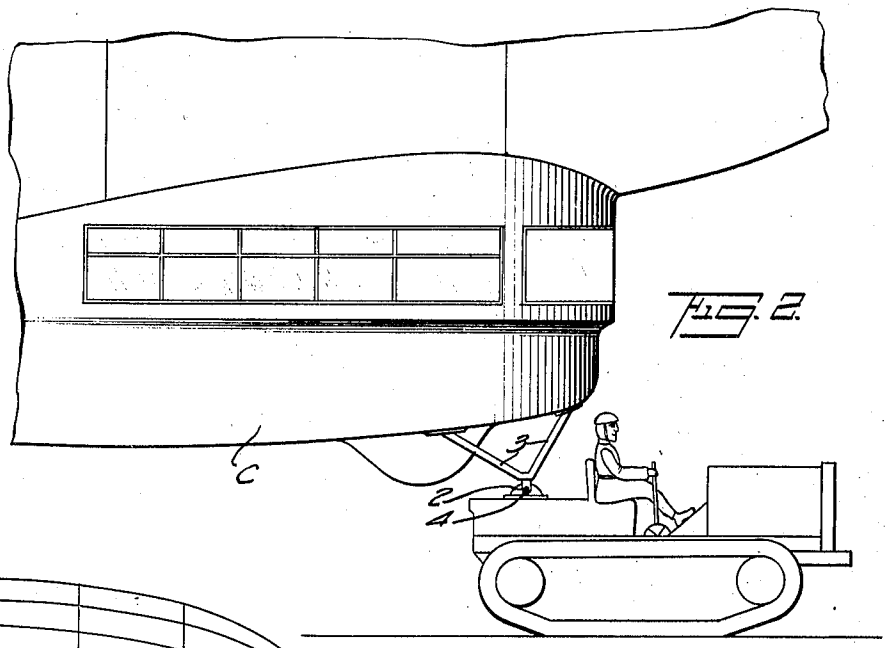



FIG. 2.

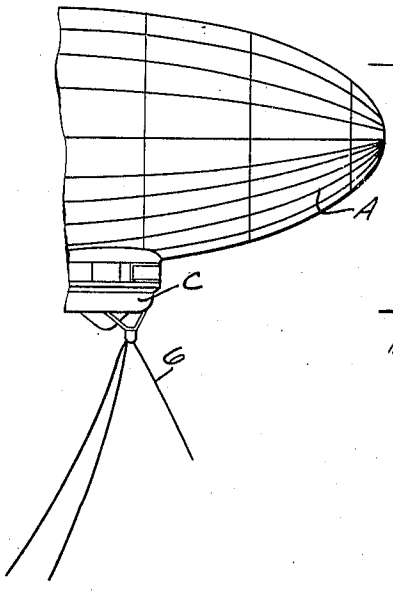
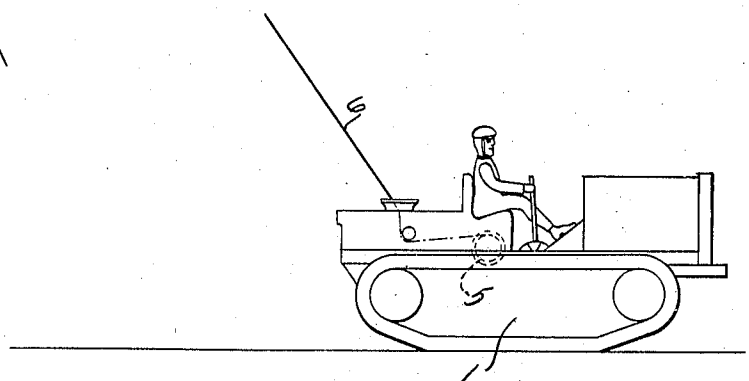



FIG. 3.




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AIRSHIP MOORING AND TRANSPORTING DEVICE

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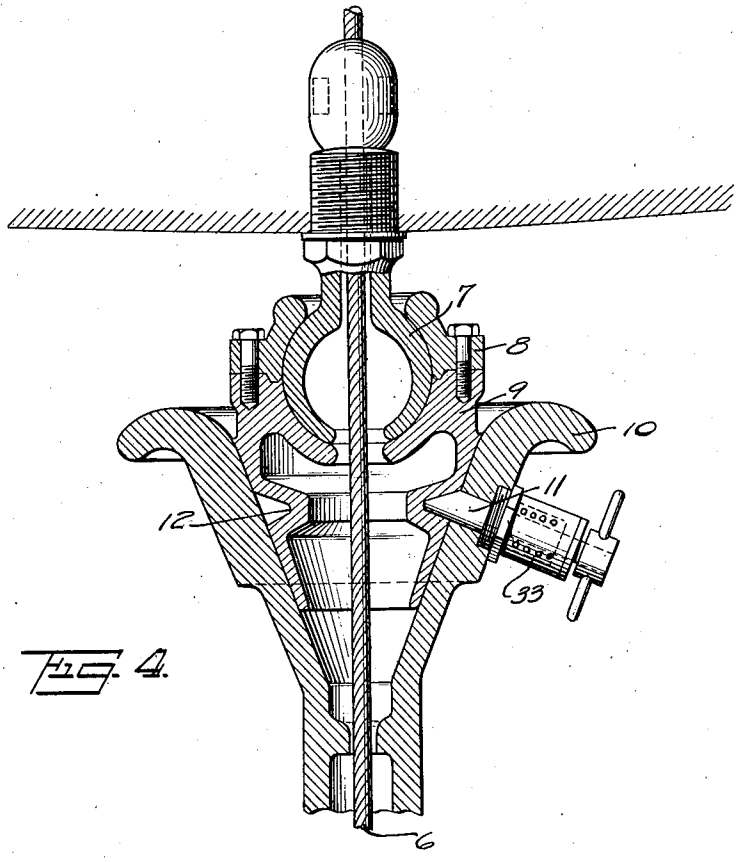



FIG. 4.

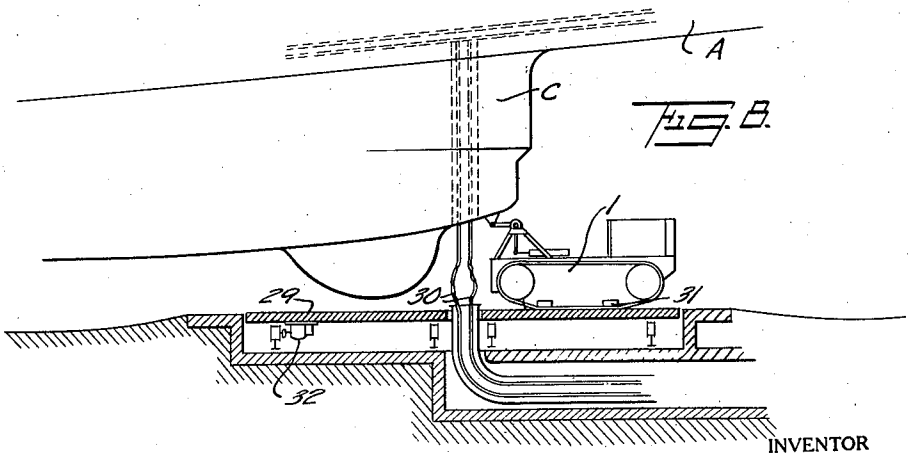



FIG. 8.

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AIRSHIP MOORING AND TRANSPORTING DEVICE

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FIG. 5.

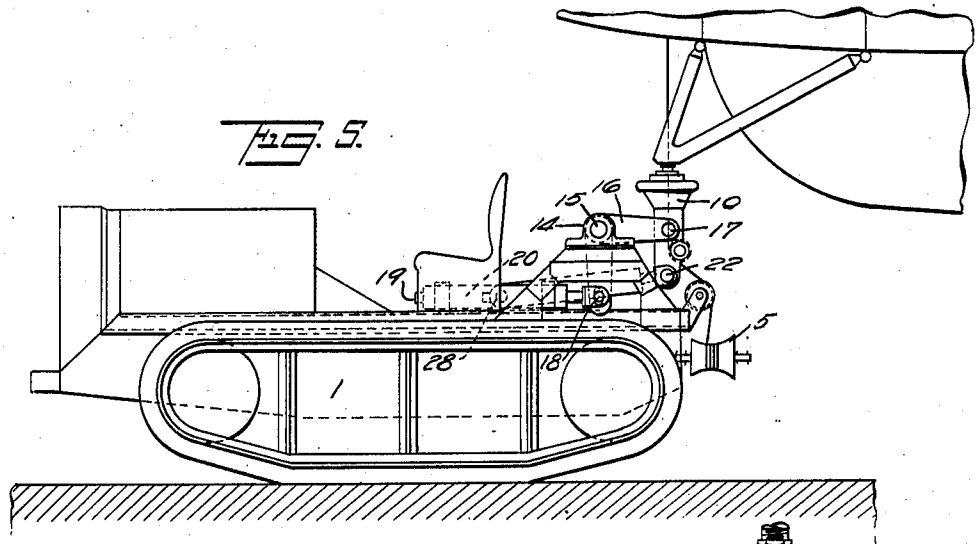



FIG. 6.

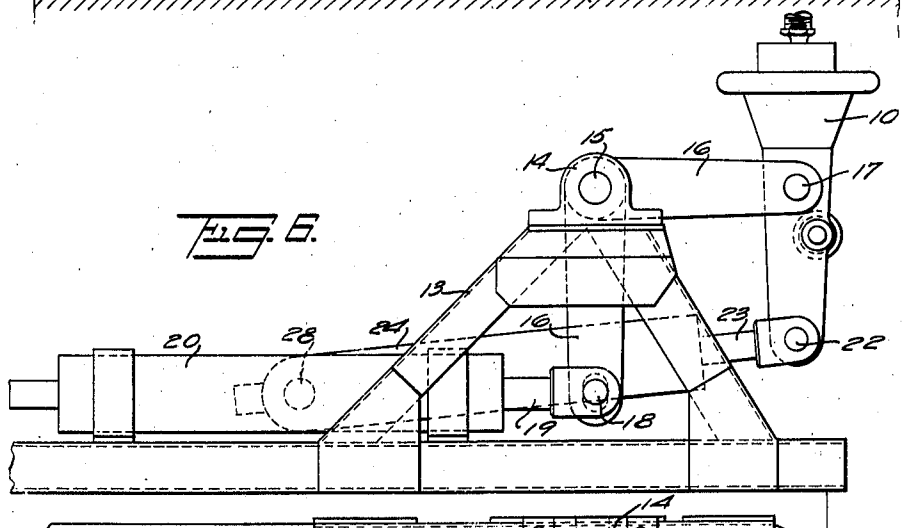
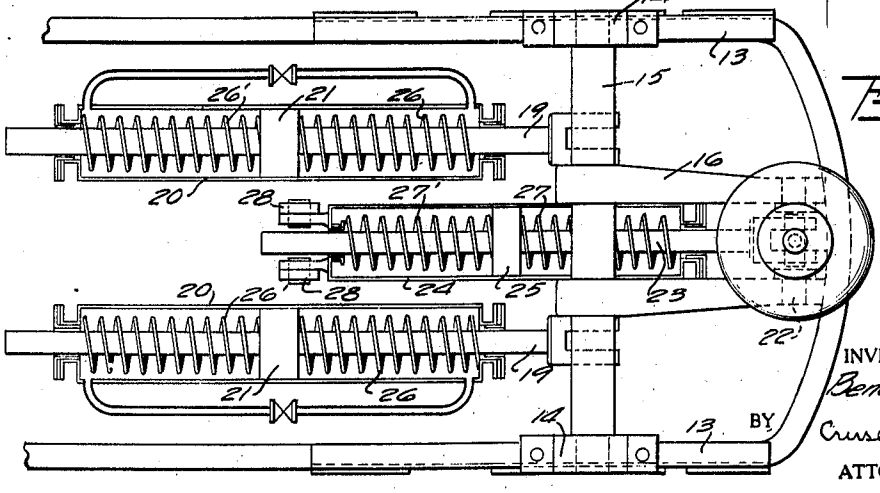



FIG. 7.




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# UNITED STATES PATENT OFFICE.

BENO SCHNITZER, OF AKRON, OHIO, ASSIGNOR TO LUFTSCHIFFBAU ZEPPELIN GESELLSCHAFT MIT BESCHRANKTER HAFTUNG, OF FRIEDRICHSHAFEN, BODENSEE, GERMANY.

## AIRSHIP MOORING AND TRANSPORTING DEVICE.

Application filed February 28, 1925, Serial No. 12,238, and in Germany April 7, 1924.

My invention relates to a device for mooring an airship and transporting it on the ground or on water. It may serve as well for facilitating the moving of an airship into and out of its hangar.

According to my invention the airship is not moored to a fixed point but to a machine capable of moving or being moved about. This machine has of course to be kept down by its own weight or by some other suitable means so that a safe mooring is warranted. I prefer to select a point at the bow of the ship for being moored to the machine, so that the rear part of the ship may swing around in accordance with the direction of the wind. But it will be advantageous to provide for the attachment in the rear of some wheels when on the ground, or of a float when on water. By this a smooth swinging of the rear part of the ship will be attained. It may be advisable to make this attachment in the rear so heavy that under normal conditions the stern of the ship will not be lifted by the wind from the ground or from the water while the ship is moored down.

If, in accordance with my invention, the airship is moored to a float or ship on water there does not exist any difficulty for the floating mooring machine to turn round with the airship when the latter is swung into a different direction by the wind, as the water will easily allow such movement. This is different with a vehicle on the ground. Here it will be best to provide for a ball-and-socket joint in the connecting means between airship and mooring machine, or the latter may be moved on to a turntable while the rear wheel or wheels may revolve on special concentric tracks. In the centre of such turntable connections may be provided for replenishing the airship with lifting gas, gasoline and water.

The connection between the airship and the movable mooring machine may be accomplished by means of one of the cars suspended underneath the airship's body or a special intermediate structure may be provided. This structure may be made a part of the airship or a part of the mooring machine, or it may constitute a structure of its own to be connected to the ship at one side and to the mooring machine at its other side.

Furthermore it will be useful to provide a winch on the mooring machine so as to be able to haul in a line which may have been thrown from the airship when landing, whereafter the ship is moored to the machine.

The connection between the airship and the mooring machine may also provide elastic means for the purpose of avoiding bumps and sudden strains on the airship.

Having given a general description of my invention I now want to point it out more in detail referring to the drawings which show an example embodying my invention.

Fig. 1 is the side elevation of an airship with a mooring machine. Fig. 2 is the same but only of a portion of the ship connected to the machine, and on a larger scale. Fig. 3 shows the bow of an airship which is being hauled down to the mooring machine, represented diagrammatically in side elevation. In Fig. 4 means for connecting airship and mooring machine are shown in vertical cross section. Fig. 5 represents a mooring machine in side elevation. The elastic spring arrangement on the machine is shown in side elevation in Fig. 6, and in plan view in Fig. 7, on which some portions are given in horizontal cross section. Fig. 8 is a cross section showing how the mooring machine may be put on a turntable to facilitate replenishing of the airship with gas, water and gasoline while being moored to the ground.

In the example represented the airship A is connected to the mooring machine 1 by means of the forward car C and the rear car R is provided with a wheel W serving as a support. The mooring machine 1 is a kind of a tractor which will allow transportation over practically any kind of soil. Struts 3 connected to car C are provided with a joint 2 which fits into a socket 4 on the tractor 1. A winch 5 on the mooring machine serves to pull the airship down by means of a rope 6 which is fastened to the airship A. The rope 6 runs through the ball 7 which is enclosed by embracing socket parts 8 and 9. Part 9 at the same time constitutes a coupling part fitting into and engaging with the corresponding part 10 which forms a portion of the mooring machine. It is provided with an annular groove 12 into which bolt 11 is pressed by a spring 33, thereby automatically securing cone 9 within the conical socket 10, when the proper position is attained. By means of a handle, the bolt 11 may again be withdrawn from groove 12 against the pressure exerted by spring 33, for the purpose of releasing the airship.

This socket 10 is mounted on an arrangement of spring brakes forming part of the mooring machine. In its middle portion it is provided with two pivot pins 17 which are held by a pair of crank levers 16 pivoted on shaft 15. This shaft 15 is supported in bearings 14 which are provided in two side structures 13 mounted on the mooring machine. The downward pointing portions of the crank levers 16 are connected to rods 19 by means of pins 18. These rods 19 at their middle portions are provided with pistons 21 inside of brake cylinders 20.

The lower portion of socket 10 has two pivot pins 22 which are connected to a rod 23 likewise forming a piston 25 in its middle portion working within a brake cylinder 24. This cylinder is pivoted on pins 28.

The cylinders 20 and 24 may contain a liquid or gaseous fluid capable of acting as an adequate braking means. Springs 26, 26', 27 and 27' may serve for braking instead of the fluid or in addition thereto.

Cylinder 24 with piston 25 provides for braking action mainly in opposition to horizontal movements of the airship, while cylinders 20 with pistons 21 will counteract vertical movements.

Furthermore it will be possible, if so desired, to exert an upward pushing effect on the starting airship in the moment of release from the socket 10 if this for instance has first been pressed down.

For the purpose of facilitating the replenishing of the airship with fuel, water and lifting gas while moored to the mooring machine it may be useful to provide a turntable 29 shown in Fig. 8 on to which the mooring machine 1 may be shifted and secured by adequate means 31. A motor 32 may be provided for the purpose of turning the turntable. This motor may be controlled by automatically acting means (not represented) so as to always make certain that the airship's longitudinal axis will be substantially in the direction of the wind. In the center of the turntable pipes or hoses 30 extend upward from underneath through which fuel, gas and water may be fed to the airship.

I do not want to limit myself to the details described or shown in the drawing as many variations will occur to those skilled in the art.

What I claim is:

1. A device of the type described comprising a heavy conveyance, and a lever and spring arrangement mounted on said conveyance, said arrangement having a point adapted to receive a mooring point underneath the bow of an airship and allowing for said mooring point to be moved resiliently in horizontal and vertical direction.

2. A device of the type described, comprising a tractor and a spring and lever arrangement mounted on said tractor, said arrangement having a point adapted to receive a mooring point underneath the bow of an airship and allowing for said mooring point to be moved horizontally and vertically.

3. A device of the type described, comprising a tractor, a winch on said tractor adapted for hauling down an airship, and a spring and lever arrangement mounted on said tractor, said arrangement having a point adapted to receive a mooring point underneath the bow of an airship and allowing for resilient horizontal and vertical movement of said mooring point.

In testimony whereof I affix my signature.

BENO SCHNITZER.