

May 1, 1934.

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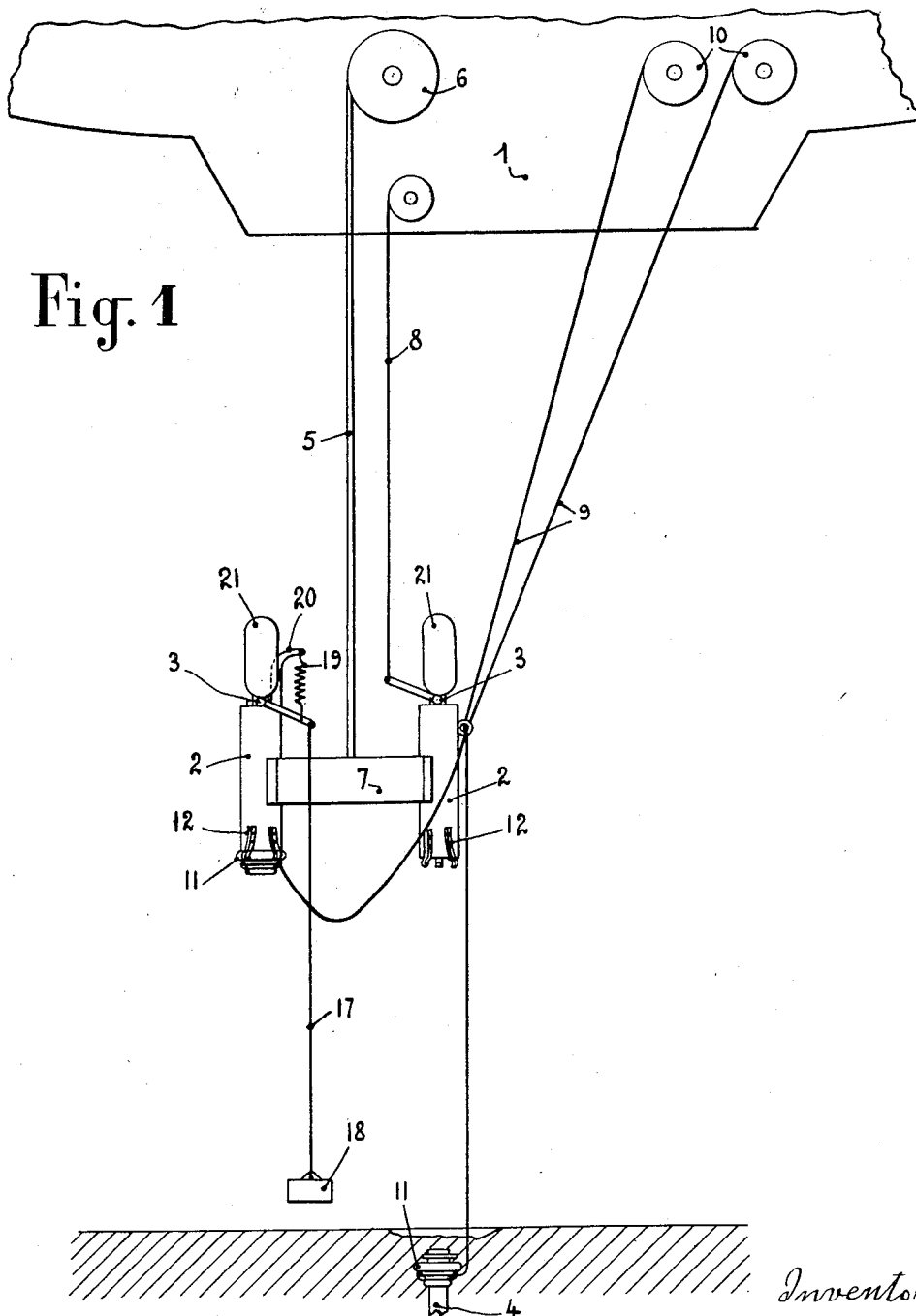
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DEVICE FOR THROWING ANCHORS FROM AIRCRAFT

Filed Nov. 3, 1932

2 Sheets-Sheet 1

Fig. 1



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Fig. 2

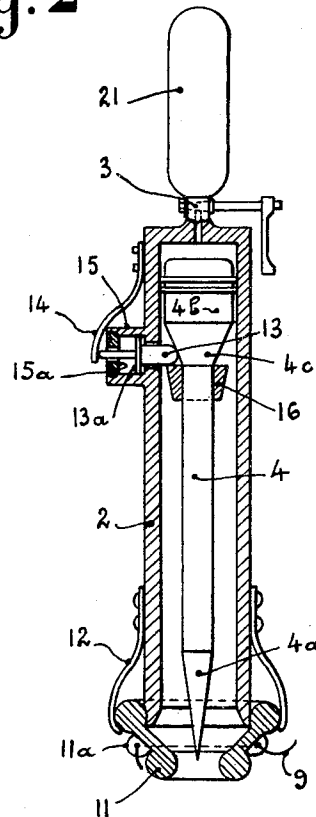


Fig. 3

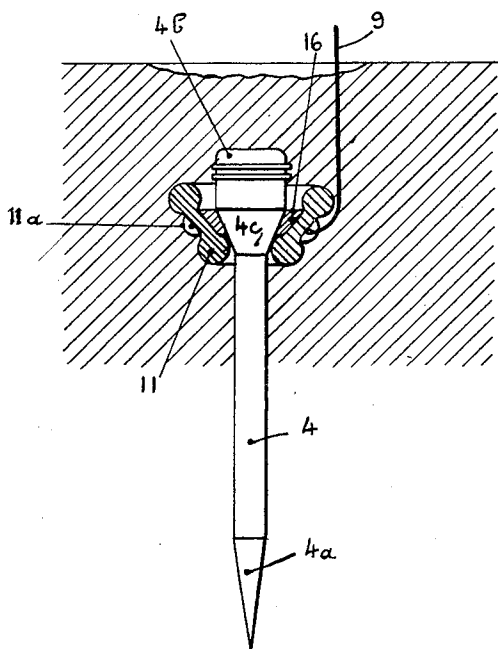
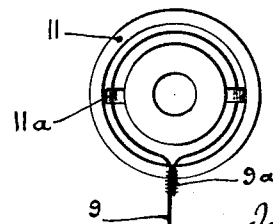


Fig. 4



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DEVICE FOR THROWING ANCHORS FROM
AIRCRAFTEtienne Edmond Oehmichen, Valentigney,
FranceApplication November 3, 1932, Serial No. 640,931
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8 Claims. (Cl. 244—2)

The present invention relates to devices for throwing anchors from aircraft. The device is carried by the aircraft and comprises one or more barrels for discharging anchor rods. The barrels may be either rigidly fixed or suspended from the aircraft and anchor rods may be discharged and projected into the ground from the barrels by the expansion of an elastic propelling agent. Each anchor rod is connected by a rope or cable to a pulley or drum mounted upon the aircraft which enables the unwinding or paying out of the rope to be braked after the anchor has been thrown into the ground, and also enables the rope to be drawn in by winding same upon the drum for the purpose of moving the aircraft against the action of the wind towards the point or points at which the anchors have been dropped.

In order that the anchor rod should penetrate to a sufficient depth into the ground, even in cases in which the ground is very hard, for instance on roads, it is necessary that the velocity of the anchor rod be very high and consequently a comparatively long launching or discharging barrel or tube must be used in which the force of expansion of the driving fluid can be efficiently utilized. At the same time, as the weight of the barrel or tube must be kept as low as possible so as not to reduce unnecessarily the useful load of the aircraft, it is impossible to use an explosive agent for discharging the anchor rods, as this would necessitate the use of a very thick-walled tube or barrel, and instead of an explosive a pressure gas must be used as the driving medium. Two other conditions must be fulfilled in order to obtain sufficient penetration of the anchor into the ground, namely:

First.—The projecting anchor rod must draw the mooring rope by its head, that is, by its extreme end lying near the bottom of the launching tube or barrel, as otherwise the resistance of the mooring rope would tend to divert the anchor rod from its trajectory and would prevent the anchor rod from striking the ground in a substantially vertical position.

Secondly, the trajectory of the anchor rod must be as short as possible in order to ensure the correct direction and sufficient force of penetration.

It is somewhat difficult to fulfill these conditions in practice. In fact, if the rope is attached to the head of rear end of the anchor and the launching tube is of fairly considerable length, it may occur that upon discharge of the anchor from the barrel the inertia and the lack of rigid-

ity of the rope attached to the anchor will cause an accumulation and jamming of the rope in the barrel and this may have a very considerable braking effect or even cause a fracture of the rope. On the other hand, if the barrel or tube is only at a short distance from the ground, the gas discharged from the tube or barrel behind the anchor may violently strike the ground and disintegrate and hollow out the ground at the point of entry and above the anchor, whereby the resistance of the anchor against any outward pull may be considerably lowered.

The object of the invention is to avoid the above-mentioned drawbacks and defects. With this object in view, the rope is not attached directly to the anchor, but is attached to a ring which is detachably held at the discharge end of the launching tube or barrel in such a manner that it allows the forward pointed end and the main body of the anchor rod to pass freely, but is carried by the head or rear end of the anchor upon the latter leaving the barrel. The driving agent for discharging the anchor is a pressure gas of very low density, for instance hydrogen. Consequently the gaseous mass which follows the anchor expelled from the tube is so weak that it cannot hollow out or disintegrate the ground at the anchoring point even when the discharge takes place from a short distance, for instance, say one-and-a-half metres.

Other objects of the invention will be indicated in the following particular description of the invention with reference to the accompanying drawings, which illustrate a constructional form of the invention, and in which:

Fig. 1 is a diagrammatic elevation of the complete anchor throwing device suspended from the frame of an aircraft, one of the anchors being shown in the anchored position in the ground.

Fig. 2 is a sectional elevation of a launching tube or barrel containing an anchor rope.

Fig. 3 is a detail view showing the anchoring rope in its operative position within the ground, and

Fig. 4 is a detail plan view of the ring by means of which the rope is attached to the anchor upon discharge.

Referring to the drawings, particularly Fig. 1, 1 indicates the lower portion of an aircraft by which the anchor throwing device is carried. Each anchor throwing device comprises a barrel or tube 2 of fairly considerable length to which a charge of hydrogen or other very light gas may be admitted, said gas being kept under sufficient pressure in a reservoir or cylinder 21, the admis-

sion of the gas from the reservoir 21 into the tube 2 being controlled by a valve 3. The anchor rod 4 has a pointed front end 4a and a head or rear end 4b, the latter end being constructed as a piston and located near the bottom of the launching barrel or tube 2.

One or two ropes 5 wound upon a drum 6 carry a frame or platform 7 to which are secured two or more launching tubes 2. One or more ropes 8, which may be paid out from the aircraft, serve for operating the valve or valves 3 for discharging the anchors. It will be understood that during the lowering of the platform 7 the pull exerted by the unwinding rope or ropes 8 upon the lever operating the valve 3 should not be sufficient to turn the lever. The mooring ropes 9 may be either carried by the frame or platform 7, or they may be wound upon drums 10 carried by the aircraft, as shown in the drawings.

Each mooring rope 9 is attached to a ring 11 of truncated conical shape which is removably held at the muzzle of a launching tube 2. In the construction shown, the ring 11 is mounted with its wider end upon the muzzle of the tube and is held in this position by flat springs 12 fixed to the outer wall of the tube. The springs exert a light pressure upon the circumference of the ring. The narrow opening of the ring is sufficiently large to allow the point and the main portion of the anchor rod to pass freely, but does not allow the head 4a of the anchor rod to pass.

The anchor rod is held in the launching tube 2 by means of a locking bolt 13 which is mounted in an opening of the wall of the tube and engages the anchor just below the head 4b under the action of a spring 14. In order to avoid any escape of pressure gas around the locking bolt 13, the locking bolt is provided with a collar 13a guided in a tubular casing 15 integral with the tube 2, and co-operates in its outward position with the bottom 15a and the casing 15 thus forming a substantially airtight joint.

In order to dampen the impact of the head 4b against the ring 11, it is advisable to provide the anchor rod or the ring with a rubber ring 16. This rubber ring should preferably have a truncated conical shape and should preferably be mounted as shown at the top end of the main portion 4 of the anchor rod and below a conical portion 4c joining portion 4 to the head 4b.

Upon discharge of the anchor rod by the expansion of the pressure gas, the conical portion 4c of the rod forces the locking bolt 13 outwards and the rubber ring 16 strikes the ring 11. By the violent impact, the ring 16 is forced towards the head and is at the same time transversely expanded by the conical portion 4c of the rod. The ring 11 is then carried by the head and detached from the launching tube. It carries with it the mooring rope 9.

Fig. 4 shows the preferred mode of attaching the mooring rope to the ring. It will be seen that the end of the mooring rope is passed through eyes 11a formed upon the periphery of the ring 11 and forms a loop which is closed at 9d by means of a spring. This mode of attaching the mooring rope avoids any sharp bending of the rope upon a small radius of curvature and thus avoids any risk of breaking of the mooring rope under the action of the sudden shock upon the discharge of the anchor.

The drawings shown in Fig. 1 two anchor throwing devices. The two anchors may be discharged either simultaneously or successively at will by suitably manipulating the valves 3.

After the anchors have engaged the ground, the airship is allowed to descend it being assumed that the airship is directed with its nose towards the wind and is allowed to move under the action of the wind.

The mooring ropes 9 are then in an approximately horizontal position and do not have any tendency to pull the anchors out. When the ship has moved back a sufficient distance to tension the mooring ropes, the drums 10 are manipulated to anchor the airship by means of the dropped anchors.

The valves may be automatically opened for discharging the anchors without the intervention of an operator, whenever the frame 7 is at a suitable height above the ground. This automatic discharge may be obtained by means of a simple device shown in Fig. 1, but it will be understood that any other suitable device may be used. The automatic device shown comprises a rope 17 of suitable length carrying a weight 18, which is suspended to the valve operating lever. A spring 19 fixed to the lever and fixed at the other end to a fixed arm 20 of the casing, acts upon the valve lever in the opposite direction. As soon as the weight 18 strikes the ground, the spring 19 opens the valve and the anchor is discharged.

It will be understood that any number of anchor throwing devices may be used and that these devices may be actuated either separately or simultaneously, the mooring ropes 9 being arranged either separately or in groups. Any number of drums 10 may be used without departing from the scope of the invention.

It will also be understood that the automatic release may be effected by any other mechanism controlled by the distance of the airship from the ground, or by the distance of the frame 7 from the ground. Instead of valves or cocks 3, any other suitable means for admitting a sufficient quantity of pressure gas from the reservoirs 21 into the tubes 2 may be used. The shape of the anchor may be varied and the launching may take place at any required angle relatively to the ground.

I claim:

1. In devices for throwing anchors from aircraft the sub-combination of: a launching tube; an anchor held within said tube; a pressure gas reservoir; a communication conduit between said reservoir and said launching tube; a valve controlling said conduit; and automatic means for opening said valve operable by the descending movement of the aircraft, said automatic means comprising spring means tending to open the valve; and a weight tending to close the valve, said weight being suspended from a rope of a length corresponding to the distance of the aircraft from the ground whereby upon the weight touching the ground the valve is automatically opened.

2. In devices for throwing anchors from aircraft, the combination of: a launching tube; a compressed air reservoir; a valve for establishing communication between said reservoir and said launching tube; an anchor; a piston on said anchor snugly fitting in said launching tube; a ring of truncated conical shape on said launching tube having its base upwardly directed and having a wide opening at its lower end; spring members fixed to said launching tube and retaining said ring in position at the lower end of the latter; a resilient buffer on said anchor co-operating with said ring; a mooring rope attached to said ring; and unwinding means fixed on the

aircraft to which means said mooring rope is connected, substantially as described.

3. In devices for throwing anchors from aircraft, the combination of: a launching tube; a compressed air reservoir; a valve for establishing communication between said reservoir and said launching tube; an anchor; a piston on said anchor snugly fitting in said launching tube; a ring of truncated conical shape on said launching tube having its base upwardly directed and having a wide opening at its lower end; spring members fixed to said launching tube and retaining said ring in position at the lower end of the latter; a buffer comprising a rubber ring fixed to said anchor and co-operating with said first named ring; a mooring rope attached to said ring; and unwinding means fixed on the aircraft to which means said mooring rope is connected, substantially as described.

4. In devices for throwing anchors from aircraft, the combination of: a launching tube; a compressed air reservoir; a valve for establishing communication between said reservoir and said launching tube; an anchor; a piston on said anchor snugly fitting in said launching tube; a ring of truncated conical shape on said launching tube having its base upwardly directed and having a wide opening at its lower end; spring members fixed to said launching tube and retaining said ring in position at the lower end of the latter; a resilient buffer on said anchor co-operating with said ring; a mooring rope attached to said ring, unwinding means fixed on the aircraft to which means said mooring rope is connected; said anchor terminating in a sharp point extending into the opening of said ring when the device is in the position of rest, substantially as described.

5. In devices for throwing anchors from aircraft, the combination of: a launching tube; a compressed air reservoir; a valve for establishing communication between said reservoir and said launching tube; an anchor; a piston on said anchor snugly fitting in said launching tube; a spring controlled locking bolt on said launching tube engaging said anchor at its end adjacent to said piston to retain said anchor in said launching tube; the said anchor being provided with a conical part adapted to displace said locking bolt from the locking position when the device is put in operation; a ring of truncated conical shape on said launching tube having its base upwardly directed and having a wide opening at its lower end; spring members fixed to said launching tube and retaining said ring in position at the lower end of the latter; a resilient buffer on said anchor co-operating with said ring; a mooring rope attached to said ring; and unwinding means fixed on the aircraft to which means said mooring rope is connected, substantially as described.

6. In devices for throwing anchors from aircraft, the combination of: a launching tube; a

compressed air reservoir; a valve for establishing communication between said reservoir and said launching tube; an anchor; a piston on said anchor snugly fitting in said launching tube; a ring of truncated conical shape on said launching tube having its base upwardly directed and having a wide opening at its lower end; spring members fixed to said launching tube and retaining said ring in position at the lower end of the latter; a resilient buffer on said anchor co-operating with said ring; a mooring rope; means for attaching said mooring rope to said ring, comprising a loop passing around the latter and through openings on the latter; and unwinding means fixed on the aircraft to which means said mooring rope is connected, substantially as described.

7. In devices for throwing anchors from aircraft, the combination of: a launching tube; a compressed air reservoir; a valve for establishing communication between said reservoir and said launching tube; an anchor; a piston on said anchor snugly fitting in said launching tube; a ring of truncated conical shape on said launching tube having its base upwardly directed and having a wide opening at its lower end; spring members fixed to said launching tube and retaining said ring in position at the lower end of the latter; a resilient buffer on said anchor co-operating with said ring; a mooring rope attached to said ring; unwinding means fixed on the aircraft to which means said mooring rope is connected; and automatically operating means for opening said valve, said means being controlled by the descending movement of the aircraft, substantially as described.

8. In devices for throwing anchors from aircraft, the combination of: a launching tube; a compressed air reservoir; a valve for establishing communication between said reservoir and said launching tube; an anchor; a piston on said anchor snugly fitting in said launching tube; a ring of truncated conical shape on said launching tube having its base upwardly directed and having a wide opening at its lower end; spring members fixed to said launching tube and retaining said ring in position at the lower end of the latter; a resilient buffer on said anchor co-operating with said ring; a mooring rope attached to said ring; unwinding means fixed on the aircraft to which means said mooring rope is connected; and automatically operating means for opening said valve, said means being controlled by the descending movement of the aircraft and comprising spring means tending to open said valve, and a weight tending to close said valve, said weight being suspended from a rope of a length corresponding to the distance of the aircraft from the ground whereby upon the weight touching the ground the valve is automatically opened, substantially as described.

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