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AIRPLANE REFUELING SYSTEM

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2 Sheets-Sheet 1

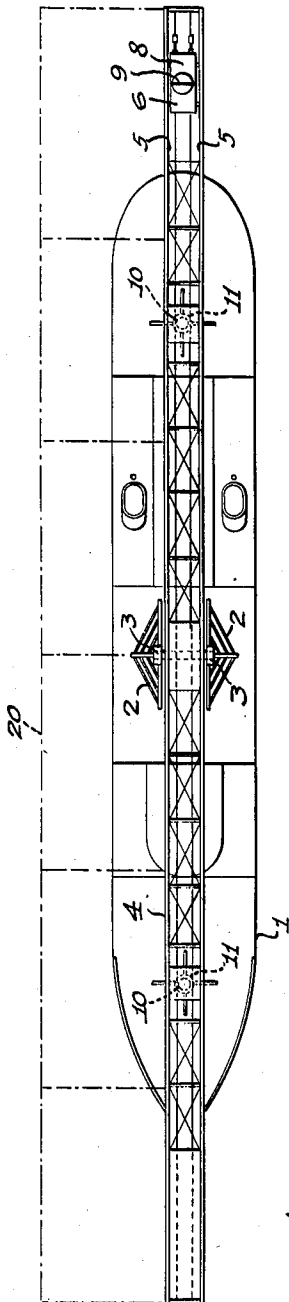


Fig. 1.

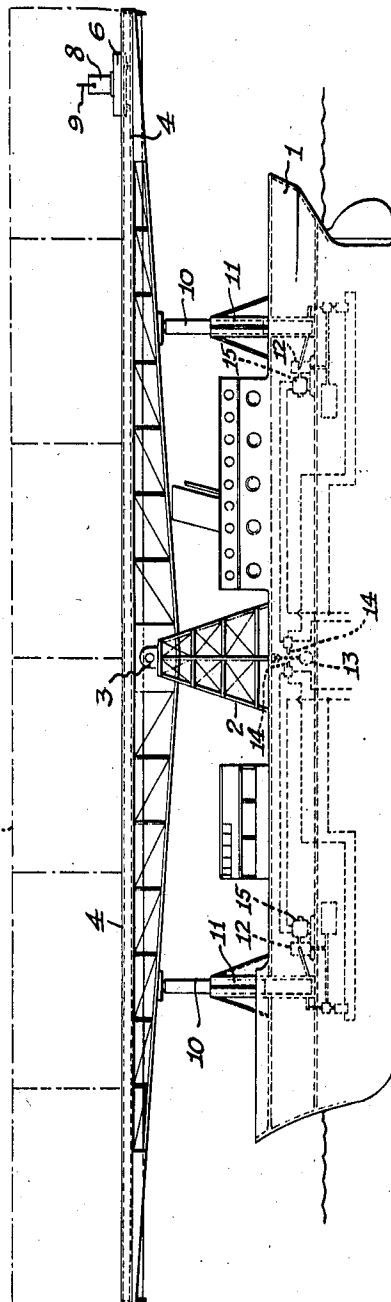


Fig. 2.

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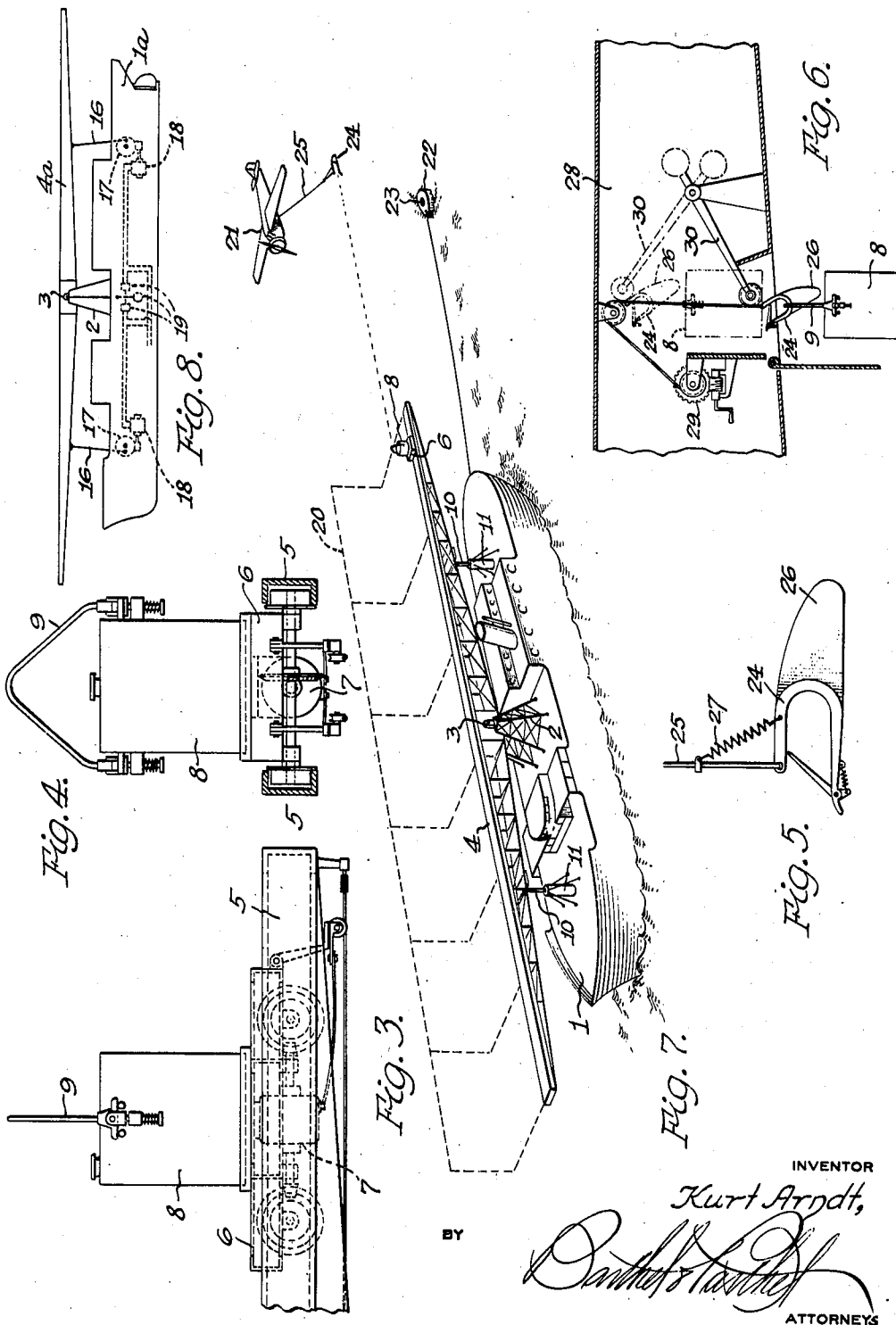
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UNITED STATES PATENT OFFICE

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AIRPLANE REFUELING SYSTEM

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1 Claim. (Cl. 244—137)

This invention relates to the refueling of airplanes and has for its object to provide feasible means for rendering fuel supplies available from time to time to a plane in flight across an ocean or any other large body of water.

Numerous attempts of varying degrees of success have been made to pick up packages by planes in flight, the greatest success having been encountered when the package is in motion as by catapulting or otherwise. No attempt, as far as I am aware, has heretofore been made to accomplish pick ups over water. It is, therefore, an object of this invention to provide means by which this may be safely accomplished.

Seadromes have been suggested for anchoring at intervals across the ocean. Such structures are very expensive to construct, scarcely portable for shifting with the seasons, would probably be destroyed almost momentarily in time of war, and are proposed in contemplation of wasting time in an ocean crossing rather than in eliminating stops. It is an object of this invention to provide a pick up device mounted on a ship or vessel so that it may be readily portable and hence adapted to a shifting of the route for summer and winter crossings, which will refuel a plane in flight and hence save the time of stopping for this purpose, which will carry facilities for repairing planes in case a landing should become necessary due to improper functioning of the engines or other reason, and which may be constructed at a fraction of the cost of the proposed seadromes.

The difficulty in transferring packages to planes in flight over water revolves around the fact that a vessel or ship is constantly in movement by the action of the waves. It is an object of this invention to provide means in the form of a superstructure for a ship from which packages may be transferred to a plane in flight, the superstructure being movable in a manner to counteract the movement of the ship due to the waves.

It is understood that a ship is given to heaving, rolling and pitching. If the ship is heading into the waves, the rolling motion becomes a minimum. The period of heaving is quite long and easily reckoned by a practiced eye. It therefore becomes necessary to provide for the pitching motion alone. It is therefore another object to provide a superstructure, as described above, which may pivot about a point at or near the center of the ship, and to provide a track and car means on this superstructure by which a package may be given very substantial speed in the direction of a plane flying thereabove.

Another object is to provide means for coordinating the release of the package along its runway with the position of the approaching plane.

A further object is to provide guide means for aiding the pilot in estimating the correct height of the plane while traversing the runway by which heaving may be corrected.

A further object is to provide an improved pick up hook to be carried by the plane.

Other objects and advantages will become hereinafter more fully apparent as reference is had to the accompanying drawings, wherein my invention is illustrated by way of example and in which—

Figure 1 is a top plan view of a vessel equipped with my improved fuel or package launching device;

Fig. 2 is a side elevation of the construction shown in Figure 1;

Fig. 3 is an enlarged view of one end of the launching runway showing the car in starting position;

Fig. 4 shows an end view of the car of Fig. 3, mounted on rails shown in cross section;

Fig. 5 is an enlarged detail of the pick-up hook carried by a plane;

Fig. 6 is a vertical section through a portion of the fuselage of a plane receiving a package thereinto;

Fig. 7 is a perspective view of the vessel of Figs. 1 and 2 showing a plane approaching and the car starting signal means behind the vessel, and

Fig. 8 is a schematic detail of a modified form of runway oscillating means.

More particularly, 1 refers to a vessel intended to be of sufficient size to withstand the rigors of indefinite ocean cruising. Projecting well above the decks of the vessel 1 is a support or standard 2 having a hinge 3 at the top thereof for carrying a platform 4. Integral with this platform or runway are tracks 5 upon which is mounted a car 6 adapted to travel the length of said tracks under propulsion of a prime mover 7, conveniently carried directly on the car. The prime mover is here illustrated as an electric motor but might suitably be a hydraulic or other type device, the requirement being that it be capable of driving the car at a constant high speed after a rapid acceleration thereof, and that it lend itself to rapid deceleration of the car as the end of the track is approached. A package 8, for instance a can of fuel, is adapted to rest on the car. A bar or handle 9 is resiliently connected

to the package 8 to damp the impact of pick-up by a plane in flight.

In order to rock the runway 4 so that the package 8 will traverse substantially a horizontal course, I provide retractible and extensible fore and aft supports 10. These supports may be slidably mounted in the cylinders 11 and connected to a hydraulic actuating system 12. The actuation of these supports 10 is automatically controlled by a suspended weight 13 which makes contact with the terminals 14 in accord with the pitching of the ship to energize the motors 15, forming the actuating means for the hydraulic systems.

Numerous arrangements for rocking the runway might be employed, a different type being illustrated in Figure 8 wherein the runway 4a on the vessel 1a has crank arms 16 connected to oscillable means 17 connected to motors 18 for energization by a pendulum switch 19. A height guide 20 of substantially equal length with the runway may be provided to assist a pilot in estimating his distance above the runway both before and after attachment of the airplane hook to the package. This assists in eliminating all slack prior to the loss of track support by the package.

In Fig. 7 the runway 4 is illustrated with the car 6 loaded with a package 8 ready to be picked up by an approaching plane 21. It is intended that the ship will proceed in the direction of flight of the plane and in the direction such that the minimum amount of rolling will occur. A trailer 22 is provided to float at a distance behind the ship 1. This trailer may be provided with any suitable type of signal means 23, as the so called electric eye for indicating the moment the plane 21 arrives directly thereabove. The signal automatically energizes the motor 7 of the car and the car thereupon travels along the track at a speed slightly less than that of the plane so that the

hook 24 suspended from the plane by the cable or rod 25 may engage the handle 9 without shock.

The hook 24 is best shown in Fig. 5. A fin or vane 26 is provided to stabilize the hook in flight and yieldable means such as a helical spring 27 is provided to maintain the hook in horizontal position pending contact with the handle 9. The hook 24 swings to the vertical under assumption of the load of the package 8 and is ready for hoisting into the fuselage 28 of the plane by means of the winch 29. A guide 30 may be provided to assist the package 8 through the doorway.

Various modifications may be made without departing from the spirit of my invention and I therefore desire to be extended protection as defined by the scope of the appended claim.

What I claim is:

Means for refueling airplanes in flight from a mother ship having a runway lengthwise thereof and said airplanes having pick-up mechanism, a car adapted for travel on said runway, motive means for propelling said car along said runway, means on said car enabling it to carry a loaded container of airplane fuel, control means for said motive means and including an electric eye tethered a predetermined distance from said ship for controlling the time and speeds of the motive means with the eye active to signal the beginning of the motive means cycle and with such eye activity controlled by the position of the airplane to thereby cause said car with the container to be accelerated to its maximum speed along said runway concurrently with the arrival of the plane at such point along said runway to permit the pick up mechanism on said airplane to co-operate with said container to transfer the container from the car to the plane before the car reaches the end of the runway and while the speed of the car has its nearest approach to the airplane speed.

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