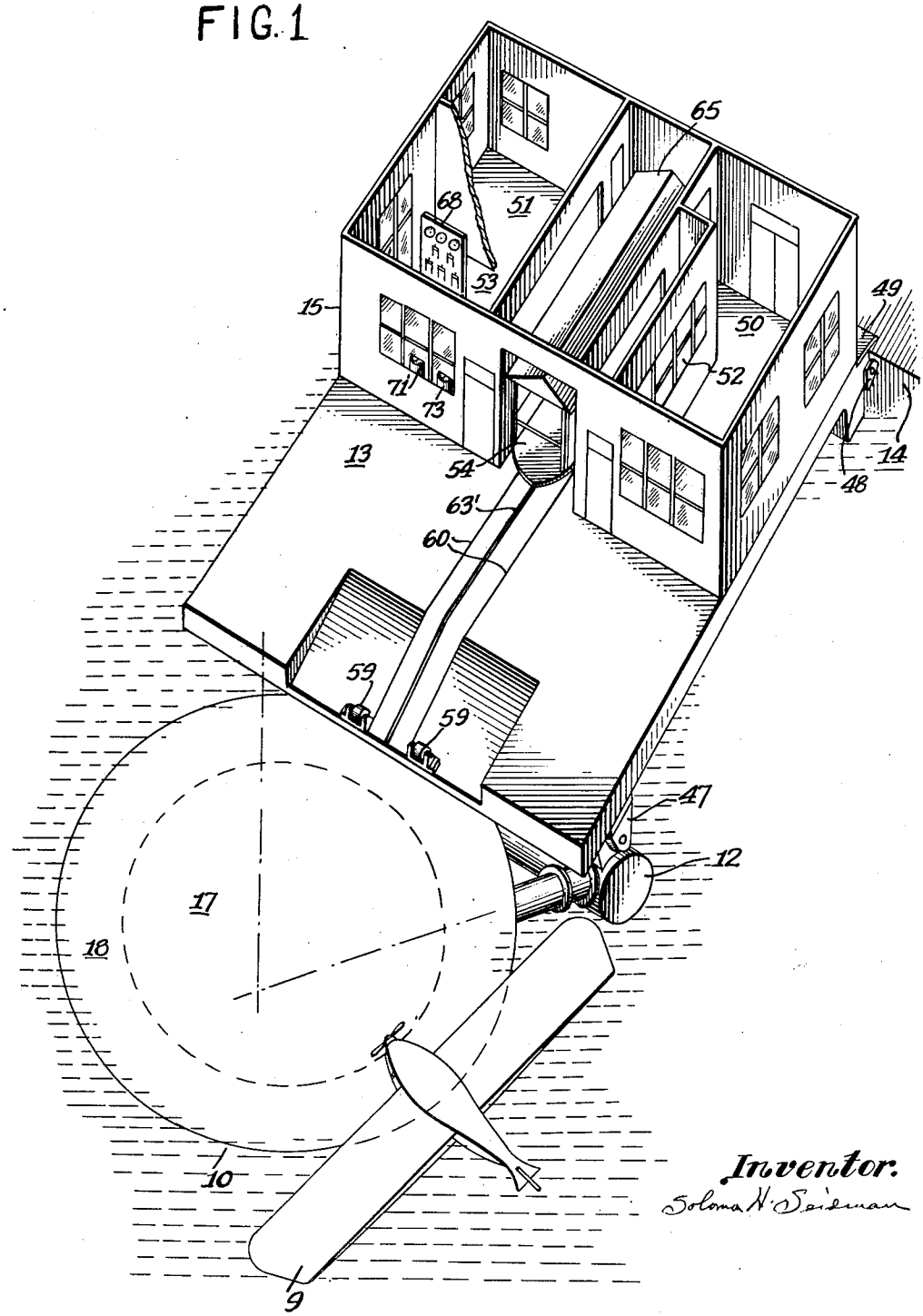
Oct. 18, 1938. S. H. SEIDMAN 2,133,721

AIRPLANE TERMINAL

Filed Aug. 14, 1935 2 Sheets-Sheet 1

FIG. 1



Inventor.

Solomon H. Seidman

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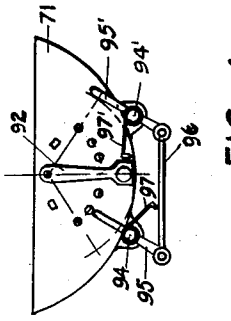

FIG. 4

FIG. 2

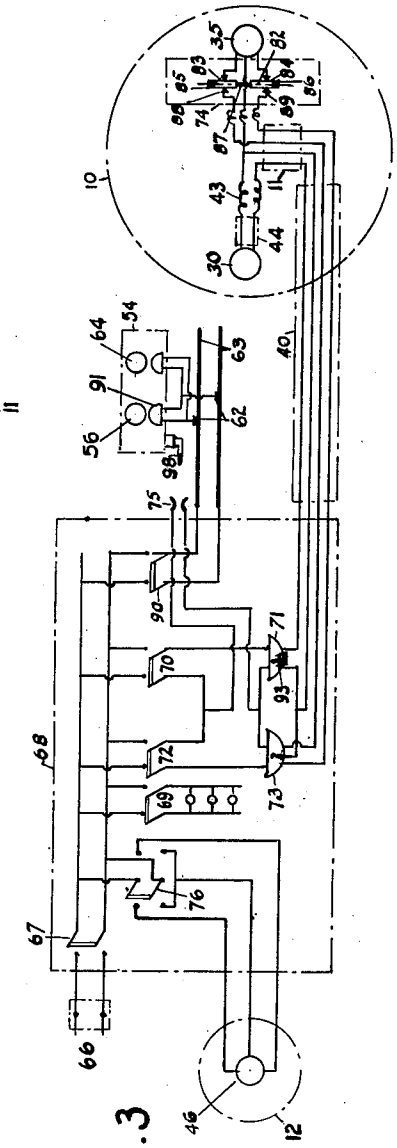

FIG. 3

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AIRPLANE TERMINAL

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16 Claims. (Cl. 244—114)

This invention relates to airplane terminals and more particularly to aquatic airplane terminals suitable for harbor, lake or river fronts.

A proper airplane terminal should have the following characteristics for best results:

Level landing space.

Suitable resistance to bring a plane to a stop where desired.

Landing and take off facilities in a wide range of directions.

Proximity to the heart of a city.

Speedy and safe handling of passengers, load and planes.

Protection against inclement weather.

Positiveness and consistency of operation under rigid schedules.

Low cost of terminal and upkeep.

Due to the level surface of water, the quietude of sheltered waterfronts, proximity of large cities to waterfronts, and the gradual adoption of pontoon landing gear on planes, aquatic airplane terminls of proper design should prove distinctly advantageous.

Accordingly, among the objects of this invention are—

To provide a safe terminal for one or more planes,—the equivalent to a ferry or railroad terminal, at the foot of a city street, so that passengers, mail and baggage may be landed safely and easily.

While large planes may be provided for, the immediate aim is to provide speedy facilities between suburban land airports, ocean liners at sea, suburban towns or sightseeing service.

To provide efficient means necessary to dock taxiing planes for easy discharge and reception of load, such means including elevation of the planes out of the water to prevent their unsteadiness and turning same around preparatory to resumption of flight.

To provide a floating turntable that is always level and which will require minimum power and servicing.

To provide the docking means with the necessary resistance for stopping the plane and with the minimum resistance preparatory to resumption of flight.

To provide a wide range of directions for receiving or discharging the planes.

Provision for self propulsion of the floating dock about its vertical axis as a pivot on a basis of minimum friction.

Provision of a gang plank and ramp between the plane and the city street so that passengers will be dry underfoot as well as overhead in all weather conditions.

Provision of remote automatic interlocking control of the turntable rotation, gang plank positioning relative to the airplane door and turntable dropping for launching the plane—all with maximum safety.

To provide every factor of safety and low cost by simple and positive mechanical and electrical arrangements.

These and other objects are attained by an exemplary construction described in the specification and illustrated in the drawings forming a part thereof, which is intended merely to show one of the various embodiments of means for attaining the objects of the invention.

In the drawings in which like symbols refer to like or similar parts,—

Fig. 1 is a perspective view of a terminal for handling and dispatching planes, parts belng cut away for clarity of illustration.

Fig. 2 is an elevation partly in section, with the gang plank car in position for loading a plane.

Fig. 3 is a diagrammatic showing of the electric circuit of the terminal controls.

Fig. 4 is a detail of control mechanism.

The terminal in its preferred simple form consists of a turntable 10 adapted to receive airplane 9 and to rotate about and move vertically along a pivot 11 which is at the apex of the triangle formed by pontoon float 12 of preferred construction; a ramp 13 hinged to the float 12 at one end and to the moorage 14 such as a pier or bulkhead, at the other end, and a terminal house 15.

In the preferred construction, the turntable 10 has a level circular platform 17 surrounded by an annular inclined conical portion 18 that acts as a ramp for the gradual elevation of the airplane from the water. The platform 17 is supported on a circular hull 19 and struts 20 from hull 19 aid in supporting the overhanging ramp 18 which is preferably of wood that in itself is adapted to float in water and which is preferable for landing of the planes.

The turntable 10 is restrained against lateral displacement by the hollow drum pivot 11 fixedly mounted on the float 12. The preferred connection between the turntable 10 and drum 11 is a bearing 21, of the roller type and extending throughout the full exposed length of the drum about which turntable 10 pivots. The bearing 21 includes the fixed portion 22 secured to the drum 11, the rollers 23, rotating shell 24 with

its vertical guides 25 along which the rollers 26 with their housing 27 and wall 28, on hull 19 are adapted to move during adjustment of the extent of submersion of the turntable 10. Suitable packing 28 prevents seepage of water past the bearing 21. Thus with the circular hull 19 floating in water and with the roller bearing pivot, friction is a minimum; consequently power for rotating the turntable 10 is a minimum. Similarly, friction between turntable 10 and drum 11 is a minimum so that any force tending to depress or elevate any portion of the turntable 10 will cause corresponding movement of the entire turntable. Tilting of turntable and/or distortion due to eccentric load such as wave action or landing of a plane is thereby prevented since the entire turntable is rendered movable vertically by the application of force at any portion thereof.

Rotation of the turntable is preferably accomplished by propellers 29 at the periphery of hull 19 and driven by electric motor 30 through suitable gearing 31. Two propellers 29 on opposite sides of housing 32 are preferred with the motor 30 reversible in order that propelling action is equal in either direction of rotation.

The motor 30 is in a sealed compartment 33 having a water tight door 34 in platform 17.

Adjustment of the turntable submersion is accomplished by varying the content of water in the hull 19. To that end it is preferred to utilize a gear pump 35 in water tight compartment 36 accessible through door 34', having a pipe 37 between pump 35 and the water outside the hull 19. When the electrically driven pump 35 is driven in one direction, water will be transferred into the hull 19 to cause deeper submersion of turntable 10; while reversal of pump operation will cause the water in the hull to be pumped out with the result that platform 17 of turntable 10 will rise above the water level.

The leads for the propeller motor and the pump motor extend preferably in rigid conduit 40 through the float 12 and up through drum 11; past the sealing flange 41 of bearing 21 into compartment 42 in which the leads are in flexible, water proof sheathing 43; thence in rigid conduits 44, 45 under platform 17 to compartments 33 and 36 respectively and to the respective motors therein.

The float 12 should be a water tight structurally rigid unit capable of supporting not only one end of ramp 13 by means of hinge 47, but also the turntable 10 against the possibility that the hull 19 for any reason may become filled with water and sink. As a safety measure, therefore, to permit repairs under such contingency, the float 12 is also adapted to be adjustable with regard to its submersion by means of gear pump 46. Thus, should the turntable 10 become overloaded or pump 35 fail to pump water out of hull, the water within the float 12 may be pumped out to raise the turntable 10 to the elevation desired.

The ramp 13 is preferably unobstructed, so that planes of large wing span may be handled with a terminal of minimum size. Hinge 47 on float 12 directly supports the free end of ramp 13 and maintains this end of the ramp a fixed elevation above water level regardless of tidal changes. The inshore end of ramp 13 is either connected to the moorage 14 by hinge 48 at the floor level of the bulkhead or pier constituting the moorage with a hinged plate 49 adapted to span the gap formed by hinge 48 as shown, or it may rest on the moorage flooring and be secured against lateral displacement by means of chains or ropes.

The terminal house 15 is shown in the drawings mounted at the inshore end of the ramp 13, and provides a waiting room 50 for passengers and guests, an office 51, ticket and dispatchers' booths 52, control room 53 for the handling of planes and load and a gang plank or car 54.

The gang plank is the equivalent of a gang plank for ships, and provides the direct passageway to a plane on the turntable 10, so that passengers will be dry under foot and make their embarkation or disembarkation with maximum safety.

In its simplest form the gang plank may be similar to the usual ship gang plank with its front portion movable manually onto and off the turntable 10.

In the preferred construction, however, it assumes the form of a car 54 pivotally mounted on a truck 55 driven by motor 56 at the inshore end and on truck 57, provided with suitable steering and control mechanism, at the opposite end. To permit smooth transfer of the truck 57 between ramp 13 and turntable 10 which would usually be at different elevations, runway guides 58 are provided at each side of truck 57, which is adapted to move on rollers 59 at the edge of ramp 13, during the period that the wheels of truck 57 are out of contact with either the ramp or turntable. Movement of the car 54 on ramp 13 is preferably guided on track 60, and member 61 carries power take-off contactors 62 to power rail 63 beneath a rail 63', slotted, with their leads to the car 54. The pivotal mounting of the car 54 on its trucks however, permits its positioning at any angle to the track 60 suitable for access to the plane entrance whose position on the turntable is not always the same.

It is furthermore preferred that the car platform over truck 57 be adapted for adjustment to proper elevation by means of a jack or hoist 64 on truck 57, so that this end of the car platform corresponds to the height of the plane entrance. A roof 65 over the car 54 is also provided to shelter passengers in inclement weather during their transfer between the plane and the terminal house 15.

The preferred means for controlling the terminal facilities to achieve most effective, safest and lowest cost operation is as follows:

All power for operation and lighting is obtained from electric power mains 66 suitably connected at the inshore end of the ramp 13 and fed to the main switch 67 on switchboard 68 in the control room 53. The essential elements of the important circuits in which fuses, meters, etc. would of course be included but are here not specifically indicated, are the lighting circuit connected through switch 69 and the power circuits.

The power circuits comprise the propeller motor circuit, the turntable pump circuit, the pontoon float pump circuit and the car motors circuit. The propeller motor circuit includes switch 70, motor 30 and controller 71 for operating motor 30 in either direction. The turntable pump circuit includes switch 72, pump motor 35, controller 73 for operating the gear pump motor in either direction and automatic cut-off 74 described later and which is adapted to open the pump circuit should the operator not have done so before the water in the hull 19 reaches either the predetermined low or high levels. Controllers 71 and 73 are connected through a common switch connection 75 which is closed only while

the car 54 is in the terminal house 15, so that rotating or adjusting the elevation of the turntable is rendered impossible at any other position of the car 54.

Cut-off switch 74 is provided in the pump circuit for automatically cutting off the operation of the pump 35 in one direction yet permit its reversal should the predetermined maximum or minimum amount of water in the hull 19 be reached. The cut-off switch 74 of the preferred construction shown consists essentially of a float 78 adapted to float in the water in hull 19, the float arm 79 pivoted preferably in the wall separating compartment 36 from the water compartment of hull 19, then in compartment 36, the switch enclosure 74 having a sliding member 82 carrying contactors 83, 84 and insulators 85, 86 and 87; and contact terminals 88, and 89. Through the normal range of water level variation within the hull, both contactors 83 and 84 are adapted to maintain the circuits between their respective terminals 88 and 89 closed. However, when the float 78 reaches a predetermined high level as a result of the continued action of pump 35, member 82 will move down to the point where insulator 85 will replace contactor 83 between terminals 88, causing automatic stoppage of the pump by virtue of the resulting break in the circuit. Contactor 84 will nevertheless still remain between terminals 89, permitting the operator in the control room to switch in for reversal of gear pump operation at his discretion. Conversely, if the float 78 reaches a predetermined low water level, contactor 84 will be replaced by insulator 86 between terminals 89, and cause stoppage of the pump. Thus, extent of submersion of the turntable is under control of the operator in control room 53 between predetermined limits at which automatic cut off takes place.

Control of rotation of the turntable is also from the control room 53 by means of controller 71 which is preferably of the conventional drum type with the off position of the control lever 92 in the center; lever movement to the left being for counterclockwise rotation of the turntable 10 and lever movement to the right for clockwise rotation. To insure alternation of the direction of rotation of the turntable so as to avoid undue twist in the leads to the motors, a reverse lock 93 is provided for lever 92. The exemplary reverse lock 93 construction indicated in Fig. 4 comprises bars 95, 95' on pivots 94, 94' respectively, one end of each bar linked to the other by link 96 and stop members 97, 97' on each pivot, all suitably arranged substantially as shown with respect to control lever 92. The essentials of the arrangement are that (1)—when lever 92 moves clockwise, it is adapted to rotate bar 95 about its pivot 94 causing link 96 to push bar 95' over so that member 97' is outside the scope of the lever movement, while member 97 is rotated into operative position; (2)—when lever 92 is returning to current off position in the center of the drum controller 71, it is adapted to resiliently deflect the stop member 97 until it passes by it; (3)—the end of the member 97 then acts as a stop for the lever should the operator again attempt rotation in the clockwise direction, thereby forcing the lever, hence the turntable to be rotated in the opposite direction instead. The action with respect to reverse lock 93 is similar in the counterclockwise direction to force rotation of turntable 10 in the opposite direction, stop member 97' being brought into lever stop position and member 97 out of the way of lever 92.

The pontoon float pump circuit includes preferably double throw switch 76 with its starter controller, adapted to operate the pump motor 46 in either direction so that the pontoon 12 may be raised or lowered to the desired elevation by varying the water therein.

The car motor circuits include switch 90, controllers 91, 91', driving motor 56 and hoist motor 64, power takeoff 62 and power rail 63. At the inshore end of the car 54 is also the bridging contactor 98 which is adapted to close the connection 75 for the circuits for propellers and pump on turntable 10.

In summary of operation:

While the inshore end of the ramp is level with the bulkhead, angularity of the ramp varies inversely as the tide rises or falls, the range of variation for a given tide range being determined by the length of the ramp between pivots. Of course, the amount of water in the pontoon 12 will also affect the angularity of the ramp 13, but the amount is fixed for the desired range of variation in submersion of the turntable 10.

Platform 17 is preferably somewhat above water level when the plane is awaited, the water content in the hull 19 being relatively low, and the circular, exposed turntable ramp 18 offers a wide range of approach for the oncoming plane which should be ample for all practical purposes.

As the plane rides up the ramp 18 and onto the platform 17, its added weight requires greater water displacement and the turntable submerges further, so that platform 17 is either still above, at or even somewhat below water level as found desirable. In the last instance only part of the plane weight is taken by the turntable.

The operator in the control room, having applied switch 70, then actuates controller 71 in the direction permitted by reverse lock 93. This closes the circuit including power main 66, switches 67 and 70, controller 71, switch connection 75, closed by contactor 98, and motor 30. Thereupon, propellers 29 are actuated and effect rotation of the turntable 10 to the end that the plane propellers face away from terminal house 15 and the plane entrance is on the side toward the ramp 13.

The control operator then opens the propeller motor circuit and closes the switch 90 to permit operation of car 54. The car operates to take passengers and load to the plane and from the plane thru actuation of motor 56 for driving the car and hoist 64 for adjusting the car platform to the height of the plane entrance, the power for same coming of course through the power rails 63 and contactors 62. As soon as the car 54 had left its berth in house 15, connector 98 moves away from contactors 75 and causes a break in the turntable propeller and pump motor circuits which prevents their operation.

Both truck wheels 55 and 57 travel on track 60 until truck 57 runs off the ramp 13. Thereupon the load of the front portion of the car is taken by rollers 59 on which the runways 58 travel until truck 57 wheels contact the platform 17, movement of car 54 between ramp 13 and turntable 10 being thus effected without undue shock.

Upon completion of load transfers between the plane and terminal, car 54 is run back to its berth, so that bridging member 98 closes connections 75. If the plane is facing in the proper direction for leaving and the platform 17 does not offer undue

resistance to its launching, the plane leaves without further aid. Otherwise, the control operator closes the hull pump circuit and operates controller 73 say clockwise for pumping more water into hull 19 until the turntable is sufficiently submerged to float the plane. The pump motor is then reversed by actuation of controller 73 in the counter direction until platform 17 is again at the desired level above the water. If the safety float switch 74 is set at such desired level or if not set at a higher lever and the operator fails to shut the power off at the desired level, float switch 74 will shut off the pump as previously described.

It will thus be seen that an efficient, safe and complete aquatic airplane terminal is invented and fully described, which meets the requirements of practical use and attains the objects of the invention.

It should be noted incidentally that in the exemplary construction described, the house terminal extends the full width of the ramp and a minimum distance outshore, and the entire ramp outshore of the house also the turntable are free of any obstruction. The advantage in such arrangement is that a terminal of moderate size can accommodate planes of a wide range of wing spans, the maximum wing span being substantially twice the distance from terminal house 15 to the center of the turntable 10.

Of course various changes can be made in the above construction without violating the spirit of the invention and many different embodiments of the invention could be made without departing from the scope thereof. It is therefore intended that all matter contained in the drawings and description be interpreted as illustrative and not in a limiting sense, except as defined in the appended claims.

Accordingly what is claimed and desired to secure by Letters Patent is:

1. In a waterfront terminal for airplanes, in combination, a partially submerged platform at one end of said terminal, means for adjusting the elevation of said platform whereby landing and launching of said airplanes is effected and means for rotating said platform about an axis therethrough to reverse the direction faced by said planes away from said terminal after landing on said platform.

2. In a marine base for planes, in combination, a float having a submerged platform adapted for a seaplane to taxi on to same, means for varying the submergence of said platform to carry any portion of the weight of said plane and means for rotating said submerged platform about its axis to face said plane away from said base after landing on said platform.

3. In a device of the class described, in combination, a circular hull adapted to float, a platform thereon, a guiding member coaxial with said hull and platform, a propulsion device for rotating said hull and platform about said guiding member and means on said hull for varying its displacement in water.

4. The combination of a float, means for varying the floatability of said float, supporting means for retaining said float in predetermined relation to the water level when the floatability of said float is nullified, a guiding member between said float and said supporting means and means for rotating said float about said guiding member.

5. The combination with a waterfront terminal for seaplanes of a floating platform adapted to support said planes, means for retaining said platform in spaced relation to one end of said terminal, a ramp to facilitate landing onto said platform of taxiing seaplanes approaching said terminal and means for rotating said platform about said retaining means and for moving said platform axially along said retaining means for controlling said seaplanes.

6. In a device of the class described, in combination, a platform, a circular hull adapted to float in water and to support said platform, propollers at the periphery of said hull, electrical means within said hull for driving said propellers, and means remote from said hull for actuating said electrical means.

7. In an aquatic airplane terminal, in combination, a float adapted to support airplane load, means for varying the buoyancy thereof, a pontoon adapted to support said float when the buoyancy thereof is nullified and means for varying the buoyancy of said pontoon and a guiding member for retaining said pontoon and float in vertically and pivotally movable relation to each other.

8. In combination with a moorage for an airplane terminal, a float adapted to support airplane load, means for operatively retaining said float in spaced relation to said moorage, means for moving said float along said retaining means for reception and discharge of floating airplanes and propulsion means for rotating said float about said retaining means as a pivot to change the direction faced by said planes after landing on float.

9. In a device of the class described, in combination, a circular turntable, adapted to float, an inclined approach all the way around the periphery of said turntable whereby airplanes can land on said turntable from a plurality of directions while said turntable is at standstill and means for rotating said turntable about the center thereof whereby the direction faced by said airplanes after landing is changed.

10. The combination of a turntable, means for rotating same, control means for actuating said rotating means and means for preventing consecutive operations of said turntable in the same direction.

11. In a terminal for airplanes, in combination, a circular platform adapted to support airplanes, a float for supporting said platform in water, an inclined approach all around the periphery of said platform, whereby taxiing airplanes may land from a wide range of directions and means connected to said float at the pivotal center of said platform for retaining same in pivotally movable relation to said terminal.

12. In a terminal for airplanes, in combination, a circular platform, a float supporting said platform in water, a curved ramp following the contour of said platform, whereby airplanes may land on said platform from a wide range of directions, a retaining member for said float at the vertical axis of said platform and means for moving said platform axially along said retaining member for alternately removing and restoring floatibility to seaplanes.

13. In a device of the class described, in combination, a platform of circular contour, a floating circular hull adapted to keep said platform afloat, a guiding member coaxial with the vertical axis of said hull, and a propulsion device at the periphery of the hull for rotating said hull and platform about said guiding member as a pivot.

14. An aquatic airplane terminal comprising in combination, a circular platform, an inclined airplane approach at the periphery of said platform,

a circular hull for supporting said platform afloat in water, a pontoon having a guiding member for said hull, means for moving said hull along and about said guiding member, a moorage, and transfer apparatus between said platform and said moorage, whereby a plane may be easily landed on said platform, load transferred between said plane and said moorage and said plane turned about and launched for flight.

15. In an aquatic airplane terminal including a moorage, in combination, a floating turntable, a ramp between said turntable and said moorage, a hinge connection between said ramp and said moorage, a pontoon float, a hinge connection between said ramp and said float, a guiding member on said float coaxial with said turntable and means for moving said turntable relative to said guiding member.

16. In combination with a mooring the elevation whereof is above the abutting water level, a ramp, one end of said ramp movably connected to said mooring at said elevation thereof, a float, said float and ramp movably connected for adjustment in predetermined relation to each other, a superstructure on said ramp and means in said superstructure for controlling movements of said float.

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