M. CHASE.

SAFETY FLYING MACHINE.

APPLICATION FILED APR. 30, 1910.

1,020,945.

Patented Mar. 19, 1912.

3 SHEETS—SHEET 1.

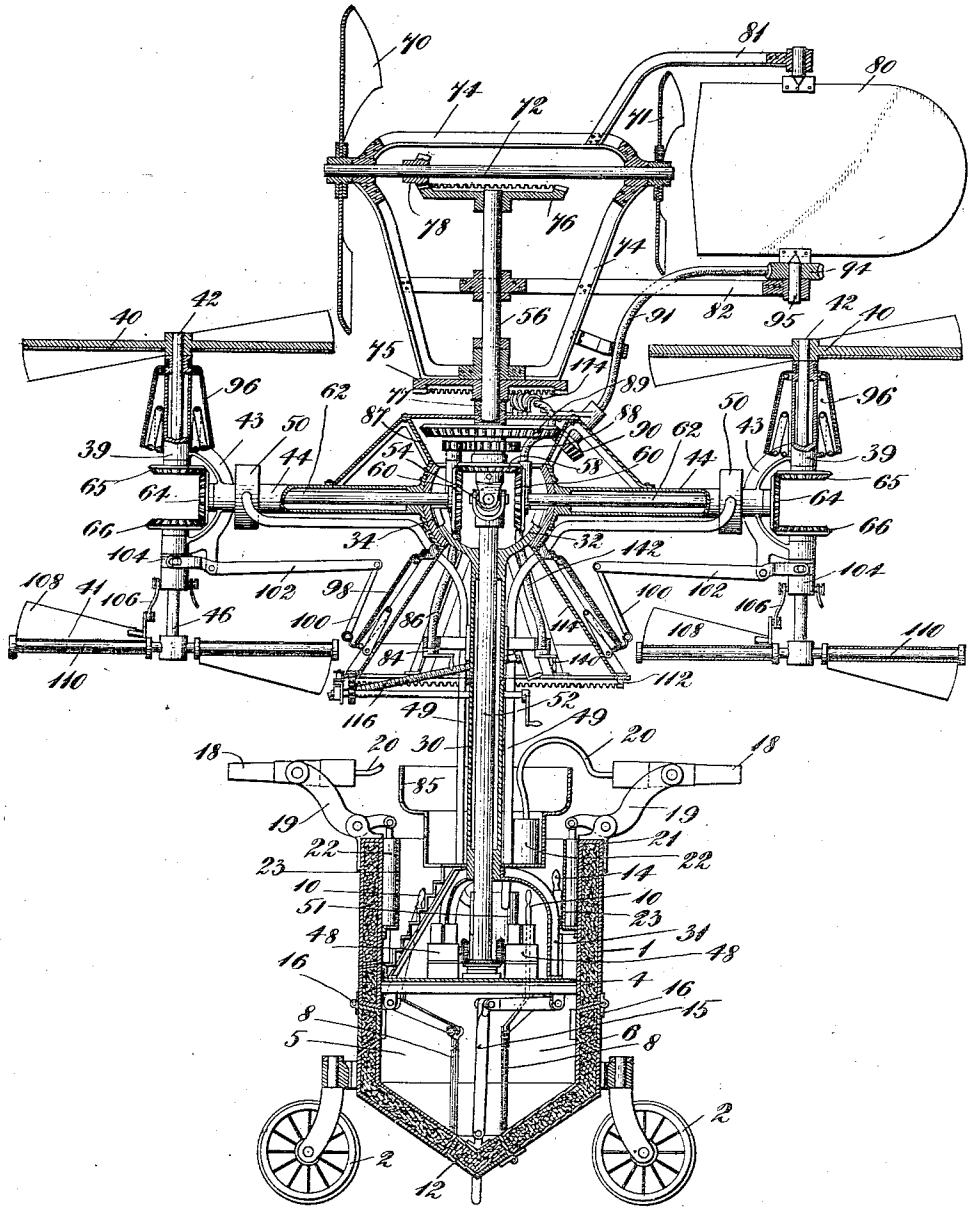

FIG. 1.

WITNESSES

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INVENTOR

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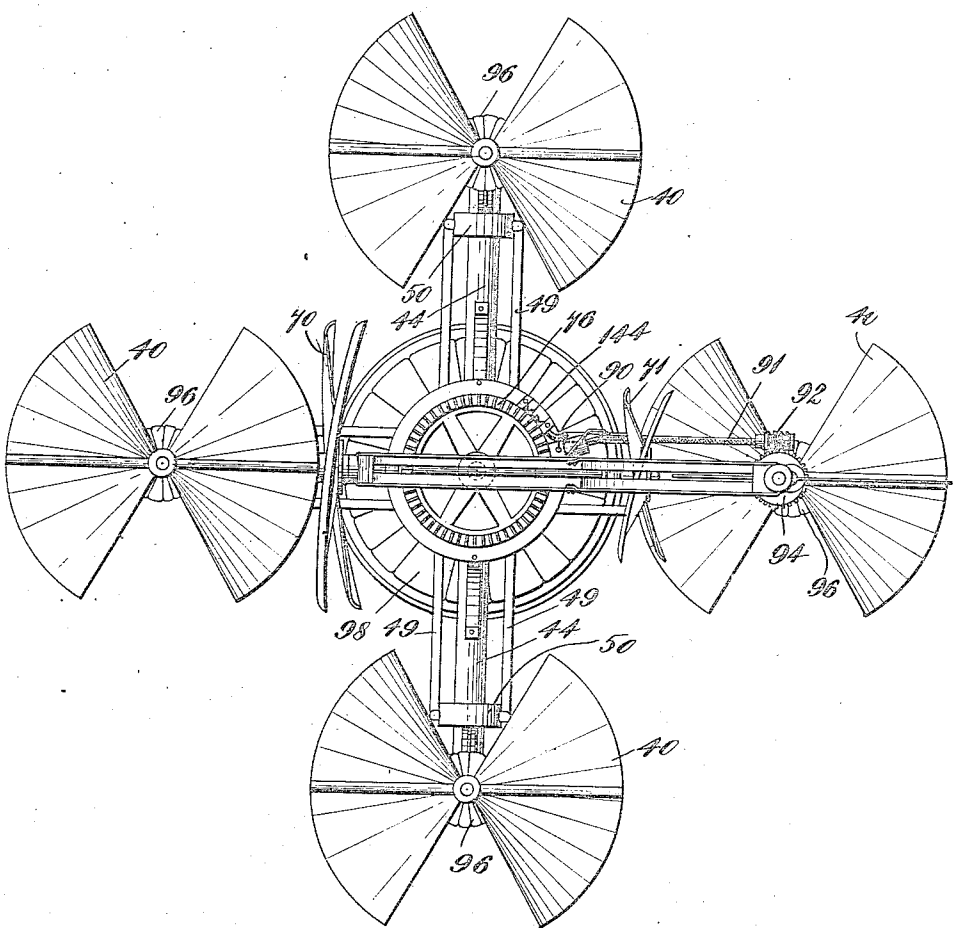

Fig. 2.

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3 SHEETS—SHEET 3.

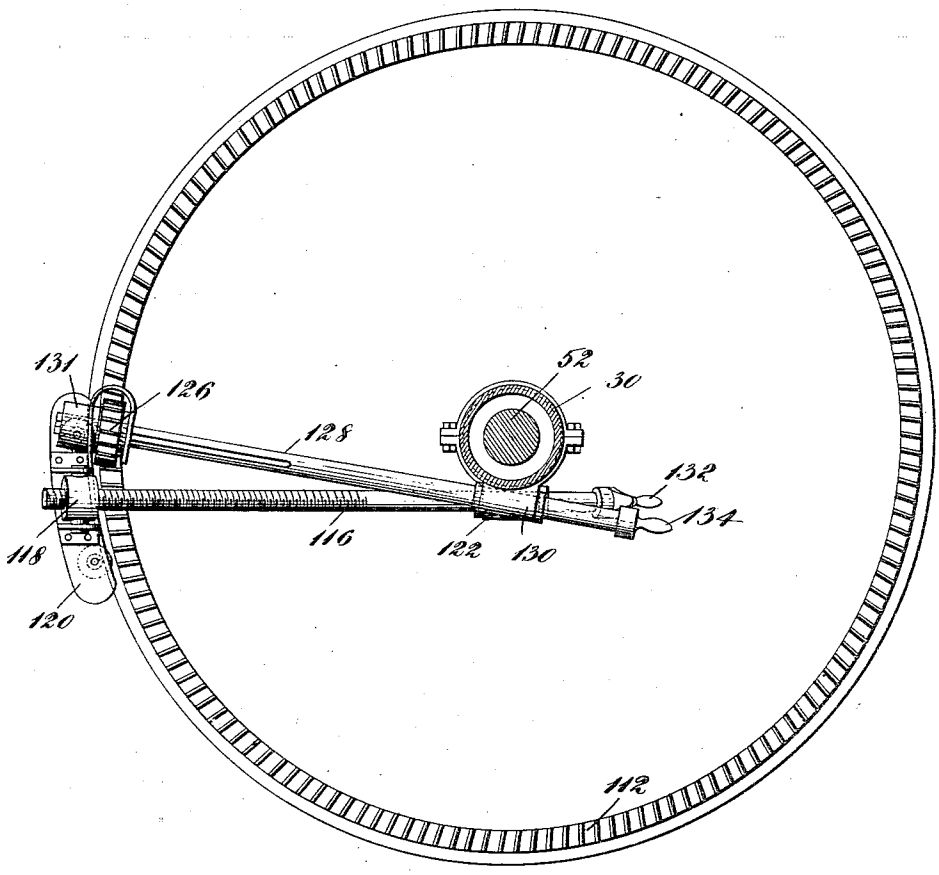

Fig. 3.

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UNITED STATES PATENT OFFICE.

MILTON CHASE, OF HAVERHILL, MASSACHUSETTS, ASSIGNOR OF ELEVEN-TWENTIETHS TO IRA J. WEBSTER AND TWO-TWENTIETHS TO J. FRANK BATCHELDER, BOTH OF HAVERHILL, MASSACHUSETTS.

SAFETY FLYING-MACHINE.

1,020,945. Specification of Letters Patent. Patented Mar. 19, 1912.

Application filed April 30, 1910. Serial No. 558,727.

To all whom it may concern:

Be it known that I, MILTON CHASE, of Haverhill, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Safety Flying-Machines, of which the following is a specification.

This invention relates to air ships and has for its object the provision of an air ship which is adapted for the transportation of passengers, or for military use.

With the above object in view the present embodiment of the invention comprises a radially arranged skeleton or framework carrying a plurality of aerial propellers. The framework is so mounted about a universal joint as to permit a movement in all directions above the horizontal, in order to provide dirigibility and ease in steering. This framework with the propellers may also be supplemented by an auxiliary framework carrying a balanced rudder and one or more propellers which may be turned to any point of the horizon. In the present instance, four sets of superposed propellers are shown, and to the upper one of each set a parachute is connected which opens automatically should the ship drop owing to a failure in the motive power. The lower propeller of each set is formed with hinged vanes connected to a large parachute mounted upon the central stem of the framework so that as the parachute opens, the vanes are tilted until flat, and thus act also as parachutes to aid those above.

For military purposes an armored car or body may be provided, equipped with means for throwing projectiles or explosives. To this end light guns are provided which are operated by compressed air or other gases. Within the armored car is the pilot house or operating platform, and means are also provided for storing supplies and the accommodation of passengers. The weight of the load and equipment is located well below the center of gravity, thus insuring stability.

As an additional safeguard, the propellers may be connected with auxiliary motors which may be run by compressed air supplied from storage tanks in the car.

In addition to the features of the invention above referred to the present invention also consists of certain devices, combinations and arrangements of parts hereinafter described and claimed, the advantages of which will be obvious to those skilled in the art, from the following description.

In the accompanying drawings Figure 1 is a view partly in elevation and partly in vertical section; Fig. 2 is a plan view; and Fig. 3 is an inverted plan view on an enlarged scale showing details of the mechanism for tilting and rotating the framework.

As shown in the drawings, the ship comprises a car or body part 1 composed of metallic outer and inner shells, the space between them being filled with some suitable yielding material. The walls of the car are constructed to resist shot and shell when used for military purposes. For convenience in landing, a suitable number of wheels 2 may be attached to the lower end of the car, as shown in Fig. 1.

Within the car is a platform or floor 4, upon which the motors are mounted and to which the superstructure of the ship is attached. Below the floor 4 are lockers 5 and 6, having sliding doors 8, each of which is operated by a bell-crank lever 10 extending above the floor. An outlet or discharge door 12 is provided in the bottom of the car, which may be opened by a bell-crank lever 14, projecting above the floor 4, and connected to the door by a link 15. Two side doors 16 are also provided for convenience in loading and unloading supplies, freight and the like.

If the ship is intended for military purposes, a number of cannon or guns 18 may be pivotally mounted upon levers 19, fulcrumed above the upper edge of the car so that they may be tilted downward at any angle. These guns may be operated by compressed air, which is supplied through flexible pipes 20, connected to an air tank 21. In order to absorb the shock of the recoil after firing the gun, the inner end of each lever 19 is connected to a plunger 22 moving within a cylinder 23, and having a supply of air to absorb the shock transmitted by the plunger.

The superstructure and propelling mechanism of the ship is mounted on a tube 30 supported at its lower end in standards 31, carried by the floor 4. The upper end of the tube 30 is formed with a spherical

flange 32, received within a spherical shell 34, by which the superposed propellers are carried. This construction provides a universal joint about which the propelling mechanism may be swung in all directions above the horizon to steer the ship in the desired direction.

The mechanism for elevating and propelling the ship comprises a plurality of pairs of superposed propellers 40 and 41. As these pairs of propellers are alike a description of one pair will suffice for all. The propeller 40 is secured to a shaft 42 journaled to rotate in a sleeve 39 on one arm of a frame 43, at one end of a tube 44 projecting radially from the shell 34. The propeller 41 is secured to a shaft 46 journaled to rotate in the lower arm of the frame 43. For the purpose of rotating the propellers I provide primary motors 48, and auxiliary motors 50. A suitable reservoir holds the necessary fuel for supplying the primary motors, which may be hydro-carbon engines. The auxiliary motors 50 are connected to the compressed air reservoir 51 by pipes 49 and may be used to assist the main motor or they may be used independently. The motors 48 are connected by suitable gearing to a main driving shaft 52 running within the tube 30, and connected by a universal joint 54 on its upper end to a shaft 56. A bevel gear 58 is secured to the shaft 56 and meshes with bevel gears 60, carried by shafts 62 journaled to rotate in the tubes 44. A bevel gear 64 is secured to the outer end of each shaft 62 and meshes with bevel gears 65 and 66 secured to the adjacent ends of the shafts 42 and 46 respectively. The propellers 40 and 41 are pitched in opposite directions so that they may operate to drive together, since they rotate in opposite directions.

In order to aid in steadying the machine and to aid in directing the same, a balanced rudder and one or more propellers are provided. The propellers 70 and 71 rotate in planes at right angles to the planes of the superposed lifting propellers, and are mounted upon a shaft 72, journaled in an auxiliary framework 74, resting upon a plate 75, supported by a collar 77 fast on the shaft 56, said plate having a circular rack on its under side. A bevel gear 76 is secured to the upper end of the shaft 56 and meshes with a bevel pinion 78 on the shaft 72, so that the rotation of the shaft 56 causes the rotation of the propellers 70 and 71.

The rudder 80 is pivotally mounted upon arms 81 and 82 projecting laterally from the auxiliary framework 74. The rudder is controlled by a handle 84 accessible from the platform or pilot house 85. This handle is connected to one end of a flexible shaft 86, having a spur pinion 87 on its upper end. This pinion 87 meshes with a gear 88 rotatable loosely about the shaft 56 and secured to a bevel gear 89 also rotatable about the shaft 56. The bevel gear 89 meshes with a bevel pinion 90 connected to one end of a flexible shaft 91, having at its other end a worm 92, which engages a worm wheel 94, secured to a stem 95 on the lower edge of the rudder 80 and journaled in the end of the arm 82.

The ship is also provided with safety appliances consisting of a large central parachute 98 connected to one of each pair of superposed propellers, which is formed with pivoted vanes, which may be flattened out to offer additional resistance to the downward movement of the ship. Small auxiliary parachutes 96 may also be provided, carried by the sleeves 39 on the upper arms of the frames 43. These parachutes open automatically to aid the main parachute. The main parachute is mounted about the central tube 30, and is connected by links 100 to levers 102, fulcrumed in the frame 43, and having collars 104 slidably mounted on the shafts 46. These collars are connected by means of links 106 to the vanes 108, which are pivotally mounted on the arms 110 of the propeller. Thus as the parachute 98 opens the levers 102 will be tilted to force down the collars 104 and flatten the vanes 108.

An extremely important feature of the invention resides in the fact that the entire propelling and guiding apparatus of the machine has a controllable tilting movement in all directions about the universal joint 54. All of the propelling and guiding apparatus is connected to and supported by the spherical shell 34 which is rotated in all directions about the spherical flange 32. To accomplish this a large face gear ring 112 is provided, shown in inverted plan view on an enlarged scale in Fig. 3, supported by bars 114 connected to the shell 34. A screw 116 coöperates with a nut 118 pivotally mounted upon a plate 120, adjacent to the ring 112, said screw being rotatably mounted in a sleeve 122 rotatable on the tube 30. By rotating the screw 116 the ring 112 may be drawn in or out and thus tilt all of the superstructure about the universal joint 54 as a center. In order to rotate the superstructure in any direction, a gear 126 is provided which meshes with the face gear on the plate 112, and is slidably mounted on a shaft 128, journaled in a sleeve 130 rotatable on the tube 30. The outer end of the shaft 128 is journaled to rotate in a boss 131 on the plate 120. The screw 116 and shaft 128 are provided with handles 132 and 134 respectively, which are conveniently located with respect to the deck or pilot house 85.

For the purpose of rotating the frame 74 and the propellers and rudder about the shaft 56, a handle 140 is provided, con-

venient to the operator in the pilot house 85, and connected to the lower end of the flexible shaft 142, the upper end of which is connected to a worm 144, coöperating with the teeth on the under side of the plate 75.

From the construction above set forth it will be seen that all parts of the machine can be controlled from the pilot house and that the propelling mechanism and entire superstructure of the ship can be tilted at any angle above the horizon and swung around to any direction. For some purposes, as when simply carrying passengers, the upper set of propellers and the rudder may be dispensed with and the entire steering accomplished by tilting and rotating the framework with the superposed propellers. It will be understood that the number of pairs and their size may be varied to suit various requirements without departing from the scope of the invention.

While I have illustrated and described a preferred embodiment of the invention, I am aware that many modifications can be made therein by any person skilled in the art without departing from the scope of the invention as expressed in the claims. Therefore I do not wish to be limited to all the details of construction shown and described, but

What I claim is:—

1. An airship, having, in combination, a car, a framework above the car, propellers carried by the framework, and means whereby said framework may be tilted and rotated in any direction.

2. An airship, having, in combination, a car, a framework above the car, propellers carried by said framework, a ring carried by the framework, means coöperating with said ring for rotating said framework, and means coöperating with said ring for tilting the framework.

3. An air ship, having, in combination, a car, a central tubular stem, a framework, a universal joint connecting said stem and framework, a plurality of propellers carried by said framework and means for tilting said framework about said universal joint.

4. An air ship, having, in combination, a car, a central tubular stem, a framework, a universal joint connecting said stem and framework, a plurality of propellers carried by said framework, and means for turning said framework in any direction.

5. An air ship, having, in combination a car, a main framework connected to said car, a universal joint within the framework, superposed propellers carried by the framework, an auxiliary framework mounted to rotate, propellers carried by said auxiliary framework, a rudder on said auxiliary framework, and means for rotating said framework.

6. An air ship, having, in combination, a car, a framework above the car, propellers mounted on said framework having pivoted vanes, a parachute mounted on said framework, and connections between said parachute and vanes, whereby the latter will be tilted by the opening of the former to aid in preventing a too rapid descent of the ship.

7. An air ship, having, in combination, a car, a framework above said car, a plurality of pairs of propellers carried by said framework, a primary motor connected to drive said propellers, auxiliary motors carried by the framework, and a safety device comprising a parachute supported by said framework.

8. An airship, having, in combination, a car, a framework, a universal joint within the framework, means for tilting said framework relatively to the car, means for rotating said framework, propellers carried by said framework, and means for rotating said propellers.

9. An air ship, having, in combination, a car, a main framework, a universal joint within the framework, means for tilting said main framework relatively of the car, means for rotating said main framework, auxiliary framework mounted to rotate relatively to said main framework, means for controlling the rotation of said auxiliary framework, propellers carried by said frameworks, and means for rotating said propellers.

10. An air ship, having, in combination, a framework, a plurality of propellers having hinged vanes and rotatably mounted in said framework, means for rotating said propellers, and means automatically operable upon the sudden descent of the ship for tilting the vanes of the propellers to prevent a too rapid descent of the ship.

11. An air ship, having, in combination, a main framework, means for rotating said framework, propellers carried by said main framework, an auxiliary framework carried by said main framework, propelling means on said auxiliary framework, and means for rotating said auxiliary framework.

In testimony whereof I have affixed my signature, in presence of two witnesses.

MILTON CHASE.

Witnesses:
WILLIAM J. SPERL,
HENRY O. SILSBEE, 2d.