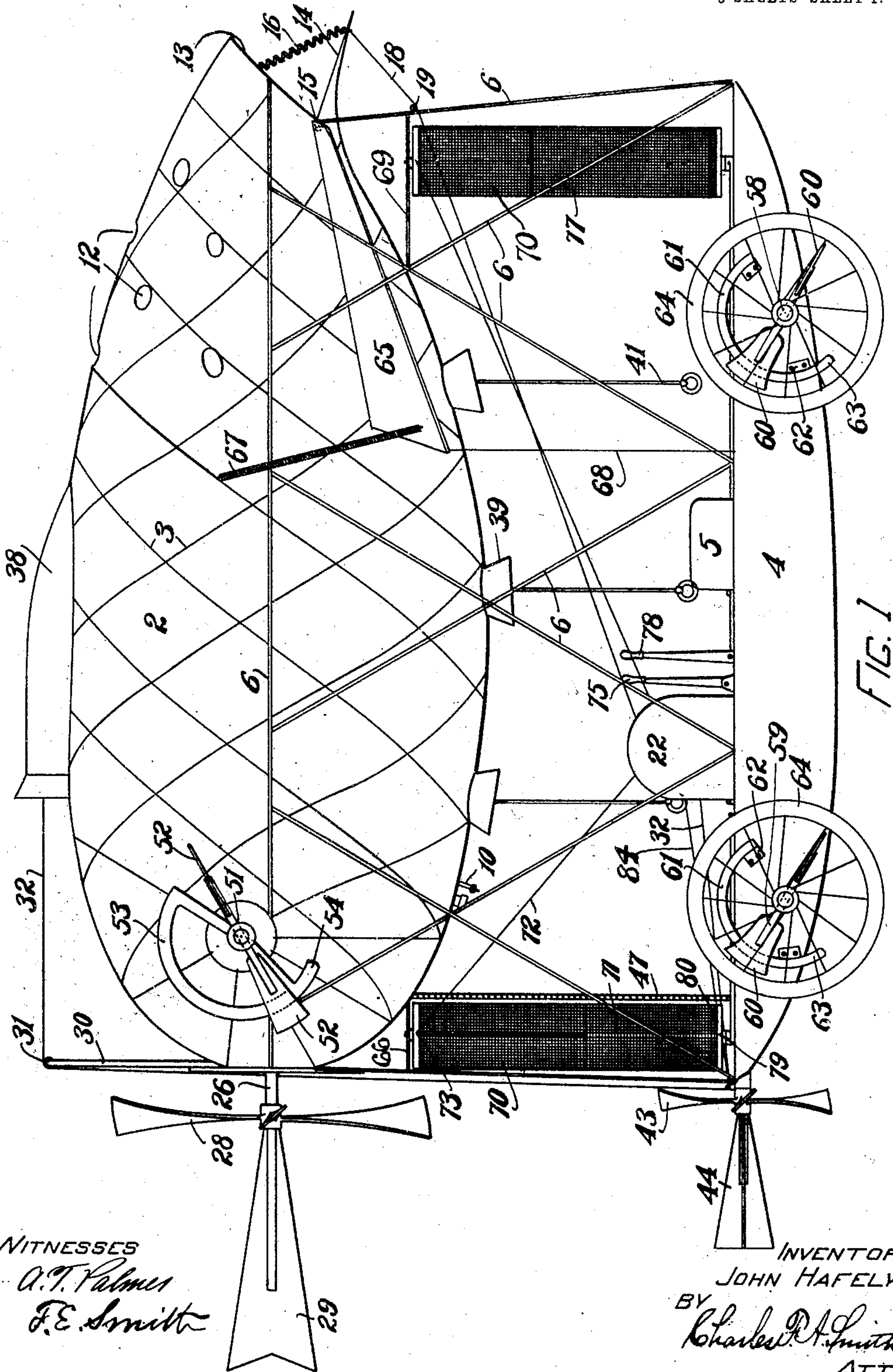


J. HAFELY.
SCREW PROPELLED CHANNÉLED BALLOON.
APPLICATION FILED JUNE 18, 1910.

997,496.

Patented July 11, 1911.

3 SHEETS—SHEET 1.



WITNESSES

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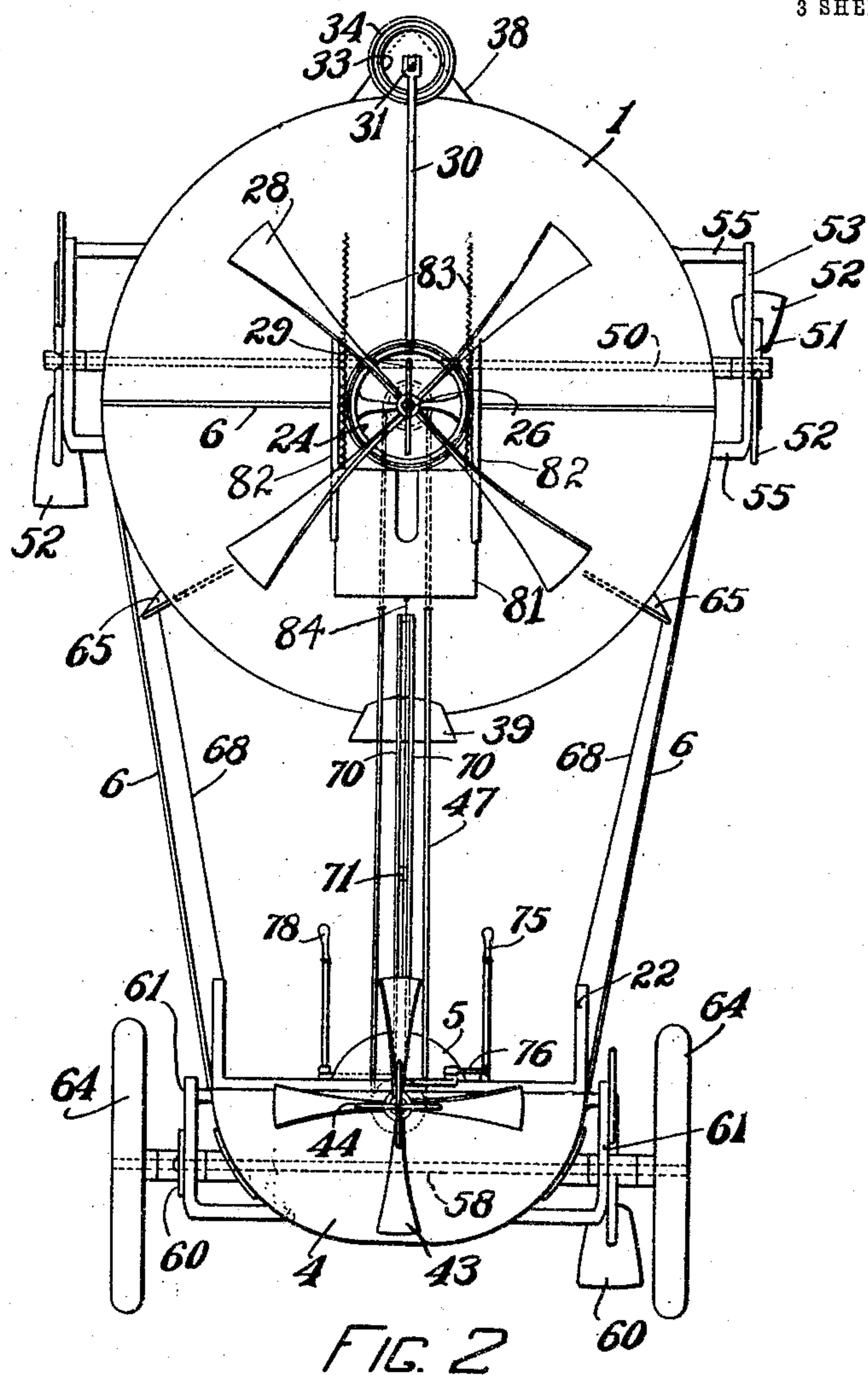


FIG. 2

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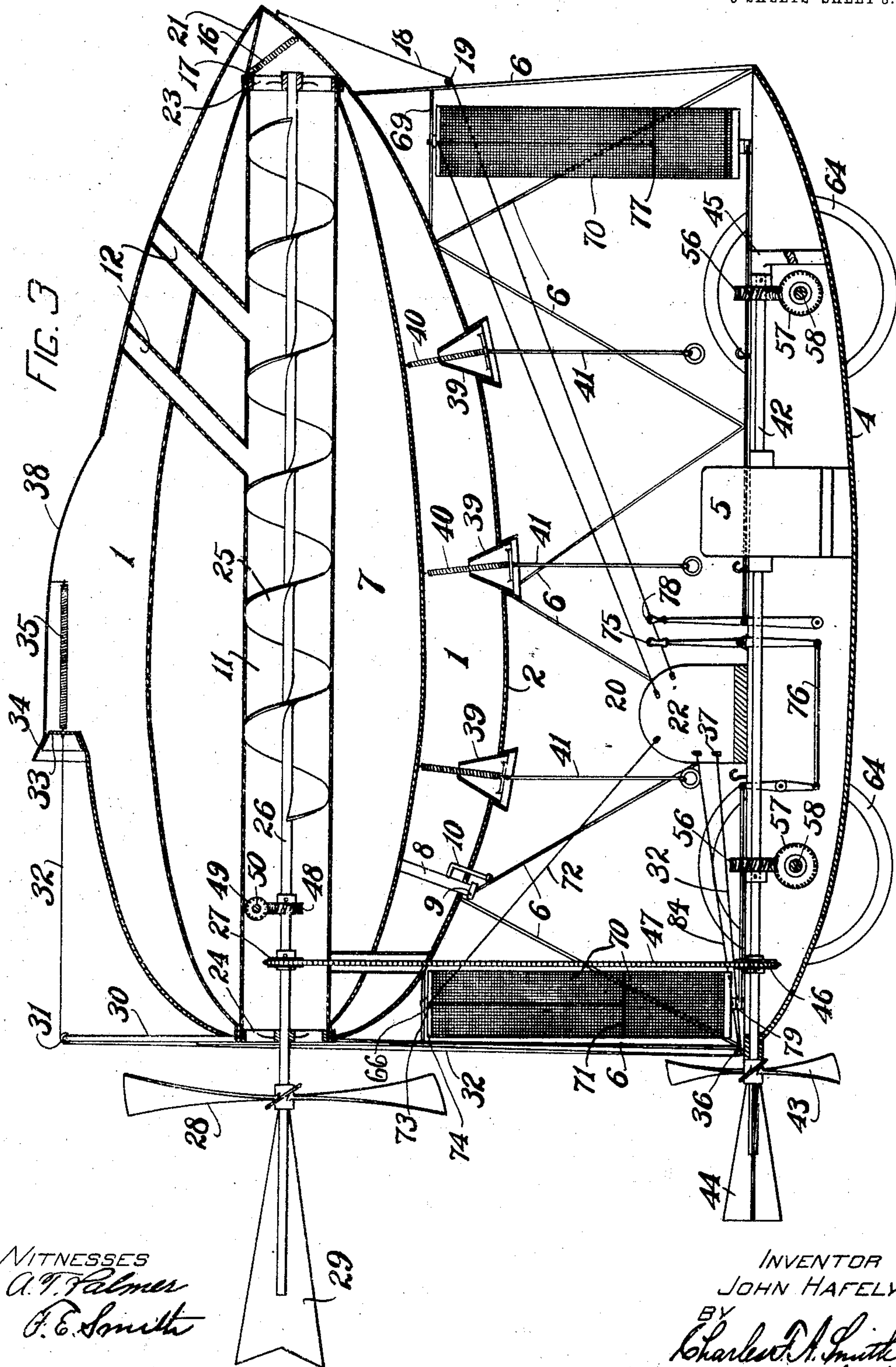
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SCREW-PROPELLED CHANNELED BALLOON.

997,496.

Specification of Letters Patent. Patented July 11, 1911.

Application filed June 18, 1910. Serial No. 568,015.

To all whom it may concern:

Be it known that I, JOHN HAFELY, a citizen of the Republic of Switzerland, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Screw-Propelled Channeled Balloons, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to improvements in aerial vessels of a character which I have designated as screw propelled channeled balloons, the car being canoe shape and the upper tank portion being preferably in the shape of a fish which may contain one or more gas balloons, cigar shaped or otherwise, and embodying improvements for adjusting the parts to correspond to the conditions existing or the purposes to be attained.

The object of my invention is to provide such lifting, sustaining and propelling mechanism for an air-ship of greater specific gravity than the air as to allow the ship to be propelled and guided in any direction through the air with the minimum resistance from the air in its flight; and to provide other improvements as will appear hereinafter.

The invention consists in the combination of elements and in certain parts of construction included in the combination of said elements to obtain the desired result.

A full understanding of the invention can best be given by a detailed description of a preferred construction embodying the various features of the invention, and such a description will now be given in connection with the accompanying drawings, and I attain my object by the mechanism there illustrated, showing such preferred construction, and the features forming the invention will then be specifically pointed out in the claims.

In said drawings, Figure 1 is a side elevation of my complete machine. Fig. 2 is a rear end elevation of the same. Fig. 3 is a central vertical longitudinal section of the same machine.

The details may be changed or varied at will without departing from the spirit of my invention.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

The upper or fish shaped portion of the

machine consists of a hollow buoyant tank 1 constructed of a light wire mesh frame work covered with air tight silk 2 and protected by the straps or cables 3 which may consist of narrow strips of aluminium or bamboo so lashed as to secure the tank in its fish shaped form. The canoe shaped car 4 which holds the motor 5 for driving the propellers is connected to the tank by the cables or rods 6 in a manner allowing of the tank always being suspended at the proper height above the car even though the gas bag or balloon 7 within the tank has been removed from the tank or the gas partly or wholly removed from the balloon.

The balloon 7 is provided with a suitable vent pipe 8 extending to a point without the tank and protected by the cap 9; the extension of the vent pipe and its closing cap preferably being on the underside so as to be within easy reach of the occupant of the car in case it is desired to remove the cap to allow of the rapid out-flow of gas. The supply pipe 10 may extend directly to the balloon but is preferably attached to the vent pipe so that it is only necessary to have one opening into the bag of the balloon. This balloon is preferably formed around the air shaft, channel or tube 11 that extends longitudinally of the tank about midway thereof; this tube is constructed of light and thin strips of wood matched together or of aluminium so that the balloon has only to be secured gas tight to the fore and aft ends of tube within the tank of this air ship. In the drawings, I have, however, showed a series of open air supply pipes 12 which extend from the forward upper portion of the tank, at an incline through the balloon into the upper portion of the tube, being diagonally inclined to the tube through which pipes air is drawn when the machine is rising in the air, and in such a case it is also necessary to fit the balloon snugly and leakage tight around the said pipes. The tube is open at each end forming an air channel through the tank when the mouth of the tank is open as shown in Fig. 1. This mouth is shaped somewhat similar to the mouth of a fish, and consists of the upper rigid lip 13, extending on an incline upward as shown in Fig. 1, and the lower movable lip 14 pivoted or hinged as at 15 to the upper portion of the two front parallel rods 6, and normally held in the closed position shown in Fig. 3 by the spring

16 having its lower end attached to the inner side of the lower lip and its upper end secured to cross brace or support 23 in the upper forward end of the tube, as at 17; but
 5 opened by the cord 18 attached to the forward under portion of the lower lip, said cord passing over pulley 19 on one of the forward parallel rods 6 and secured in any desirable manner on the inner side of one
 10 of the side walls 22 which extend upward from the car 4 at about the position of the operator.

The nose 21 extends forward of the support 23 so as to form with the lower lip,
 15 when it is closed, a sort of cone shaped point to pierce the air. When the lower lip is open, it serves as a wing or deflector to throw air toward and into the mouth of the channel or tube 11 where it is met by the
 20 Archimedes screw or other shaped propeller 25 on the shaft 26 mounted in suitable bearings formed in the supporting members 23, 24, the latter support being at the extreme end of the tank 1, so that when the shaft 26
 25 is turned by the gearing 27, the air is forced rapidly through the channel or tube 11 and the machine forced forward. The shaft extends beyond the brace 24 and without the rear end of the tank and carries a four
 30 bladed rotary propeller 28 and at its rear end a two bladed fin shaped propeller 29.

Extending upward from the support 24 is an arm 30 carrying pulley 31 over which
 35 runs the cord 32 attached to the valve 33 normally closing the passage 34 by action of the spring 35; when this valve is opened the extra or compressed air within the tank will escape. This cord passes down the rear
 40 of the machine and over pulley 36 and is secured on one of the side walls 22 as at 37 in any desirable manner. The tank may also be supplied on its upper side with the fin 38 and is provided on its lower side with
 45 a series of air inlet valves 39 closed by action of springs 40 and opened by power applied to the cords 41, which cords may be pulled down and secured to the side of the car and air will then pass into the tank and around
 50 the balloon and tube and out the passage 34. The cap or stopper of the valve 39 is preferably formed with a downwardly-extending circumferential rim or flange to form a parachute to assist in preventing a too rapid descent.

55 A driving shaft 42 extends through the motor 5 and longitudinally of the car 4 and carries at its rear end without the car the four bladed rotary propeller 43 and at its rear end the two bladed fin shaped propeller
 60 44, these two propellers being of about one half the size of the upper two propellers, 28 and 29 and the propeller 43 being forward of the propeller 28. The driving shaft 42 has its forward end mounted in a suitable
 65 bearing in the supporting member 45 within

the car and its rear portion having a bearing in the aft end of the car.

The chain 47 connects the sprocket wheels 46 and 27 so that the shaft 26 is turned by
 70 the motor 5 and the spiral gear 48 on this shaft turns the spiral gear 49 on shaft 50 which latter shaft extends through the tank 1 carrying on each end thereof the stems 51, each stem extending across the shaft and each end provided with a fan shaped blade
 75 52, the said blades being at right angles to each other. These blades are so arranged to allow the blade about to descend to be turned with its face to the front by the opposite
 80 blade on the same stem striking the inclined nose 54 on the end of the semi-circular arm or guide-way 53 secured as at 55 to the side of the tank so as to force the air downward and backward as it completes this half of
 85 the movement; each blade in its turn as it strikes the nose 54 and passes up onto the arm or guide-way being turned so as to be end on or parallel with the machine longitudinally, and the blade on the other end
 90 of the stem being turned so as to press upon the air.

The spiral gears 56 on shaft 42 are in mesh with the spiral gears 57 on the shafts 58, each shaft extending through the car and
 95 carrying ground wheels 64 mounted thereon, and a stem 59 with blades 60, similar to one of the stems 51 and blades 52, mounted on the shaft between the ground wheel and the car and adapted to be revolved by the shaft,
 100 and each blade 60 to meet in its turn the nose 63 of the segmental arm or guide-way 61 secured as at 62 to the side of the car 4. It will be noticed that the blades 52 press the air more downward than backward,
 105 while the blades 60 are arranged to press the air about equally downward and backward.

The gill sails or wing extensions 65 are hinged on the forward portion of the tank and are held in a downward position against
 110 the action of the spring 67 by the cord 68, but when said cord is released the spring causes the wings to turn so as to be in an upward position, this latter position being used when the balloon is descending and the
 115 position shown in Fig. 1 being used when the machine is soaring upward.

The machine is steered by the two rudder curtains 71, 77, which are pivotally mounted
 120 in the frame-works 66, 69, and respectively controlled by the two levers 75, 78. Each frame-work carries parallel oblong screens 70 of wire mesh and between which the curtain on the roller 80 is pulled up the desired amount, according to the strength of
 125 the wind, by the cord 72 which passes over the pulley 73 in the upper cross-bar 74 of the screens. It will be noticed that in Fig. 1 the curtains are shown as raised to a higher position than in Fig. 3. The lever 75 130

is shown as connected with the lower cross-bar 79 through a series of connecting rods 76, and the lever 78 may be connected with its rudder curtain in this or any other desirable manner. The rear end of the cylindrical piping or tube 11 is preferably closed, when desired, by the shutter 81 running in the runways 82 and normally closed by the springs 83 but opened by the cord 84 as against the action of said springs when it is desired that air may pass in or out of the rear end of this tube. It is apparent that the motor if desired may be placed in the rear of the seating apparatus. Also that the shaft 42 need not be extended forward of the motor and that the forward wheels need not be geared to the shaft but may be provided with any of the well known types of steering apparatus, common in automobiles, so that the machine may be steered by its forward wheels while upon the ground.

The balloon 7 is preferably formed of a screen framework of wire mesh with the silk bag within it so that the shape of the balloon when inflated is always uniform and the springs 40 be attached to the wire mesh portion of the balloon. When it is desired to raise the machine into the air the inlet valves 39 are opened the desired amount before starting the propellers.

Having thus described my invention I claim as new and desire to secure by Letters Patent:—

1. In a machine of the character described, a fish-shaped tank provided with a channel therethrough; a shaft extending through the channel, a horizontal flight propeller mounted on said shaft in the rear of the tank, a screw propeller extending nearly the entire length of the channel mounted on the shaft within the channel, and a series of air supply pipes extending through the upper portion of the tank on an incline downward and into the channel.

2. In a machine of the character described, a tank, a central air shaft extending longitudinally through the tank, an Archimedes screw within said air shaft extending rearward from the mouth of the shaft, inclined air supply tubes extending into the air shaft, independently valve controlled air inlet valves on the under side of the tank through which air can pass into the under side of the tank, and a horizontally movable outlet valve on the upper side of the tank.

3. In a machine of the character described, a fish-shaped tank, a car, means securing the tank above the car, an air shaft extending longitudinally of the tank, a spring for normally holding closed the mouth of the air shaft, a driven shaft extending through the air shaft from its mouth and to its rear end, vertically movable means for substantially closing the rear end of the air shaft, a spiral propeller mounted

on the driven shaft within the air shaft and extending from said mouth rearward nearly the entire length of the shaft, a horizontal flight propeller mounted on the rear end of the driven shaft, and means for driving the driven shaft, substantially as shown and described.

4. In a machine of the character described, a car, a tank secured above the car, a series of propellers carried by the tank, a series of propellers carried by the car, means within the car for driving all of the propellers, and vertically movable rudder curtains mounted fore and aft of the car and between the car and the tank, substantially as shown.

5. In a machine of the character described, a canoe-shaped car, a fish-shaped tank, propelling means, a pair of vertical parallel oblong screens rotatably mounted between the tank and the car at the rear of the car and beneath the tank, a vertically movable roller curtain between the screens and means for raising and lowering the curtain.

6. In a machine of the character described, a car, an air tank secured to and above the car, means for propelling the car and tank, and steering apparatus consisting of a pair of vertical, rotatable screens mounted in the forward portion of the car beneath the air tank, a lever for rotating the screens, a roller curtain adapted to be raised vertically as desired between the screens and secured at the desired height, substantially as shown.

7. In a machine of the character described, a fish-shaped tank, a canoe-shaped car, means securing the tank above the car, a channel extending through the tank, a shaft within the channel, a cross-shaft geared to the shaft and extending without the tank on both sides thereof, a driving shaft extending longitudinally of the car, a pair of cross shafts geared to the driving shaft and extending without the car on both sides thereof, means connecting the driving shaft and the shaft within the channel, and each cross shaft provided on each of its ends with a pair of propeller blades and means for turning each propeller blade alternately to face the front of the machine on the forward portion of its down stroke, substantially as shown and described.

8. In a machine of the character described, a canoe-shaped car, a fish-shaped tank, a motor within the car, a driving shaft longitudinally of the car, a driven shaft within the tank parallel with the driving shaft, means connecting the shafts, parallel cross shafts extending through the car and in mesh with the driving shaft, ground wheels on the ends of the cross shafts, fan propellers on each cross shaft between the wheels and the car, propellers on the rear

ends of the driving and driven shafts, an
air shaft within the tank surrounding the
driven shaft, a screw propeller carried by
the driven shaft within the air shaft, a lip
5 for closing the mouth of the air shaft, a
shutter for the rear end of the air shaft,
means for admitting air to the air shaft
other than through its ends, means for caus-
ing a circulation of air through the tank

and around the air shaft, and a pair of rud- 10
der curtains in the fore and aft parts of the
car between the car and the tank.

In testimony whereof I affix my signature
in presence of two witnesses.

JOHN HAFELY.

Witnesses:

CHARLES F. A. SMITH,
FRANKLIN S. FRISBEE.