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F. W. SCHROEDER.

Steerable Air-Ship.

Patented July 20, 1875.

No. 165,881.

Fig. 1.

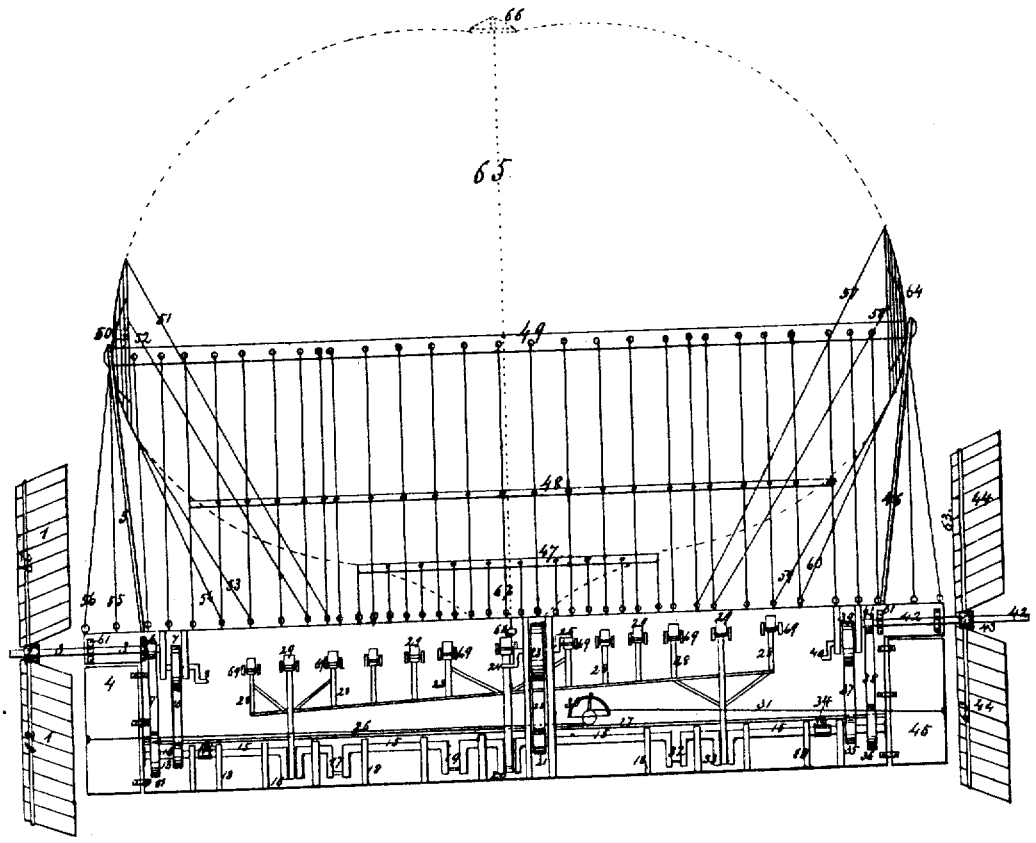

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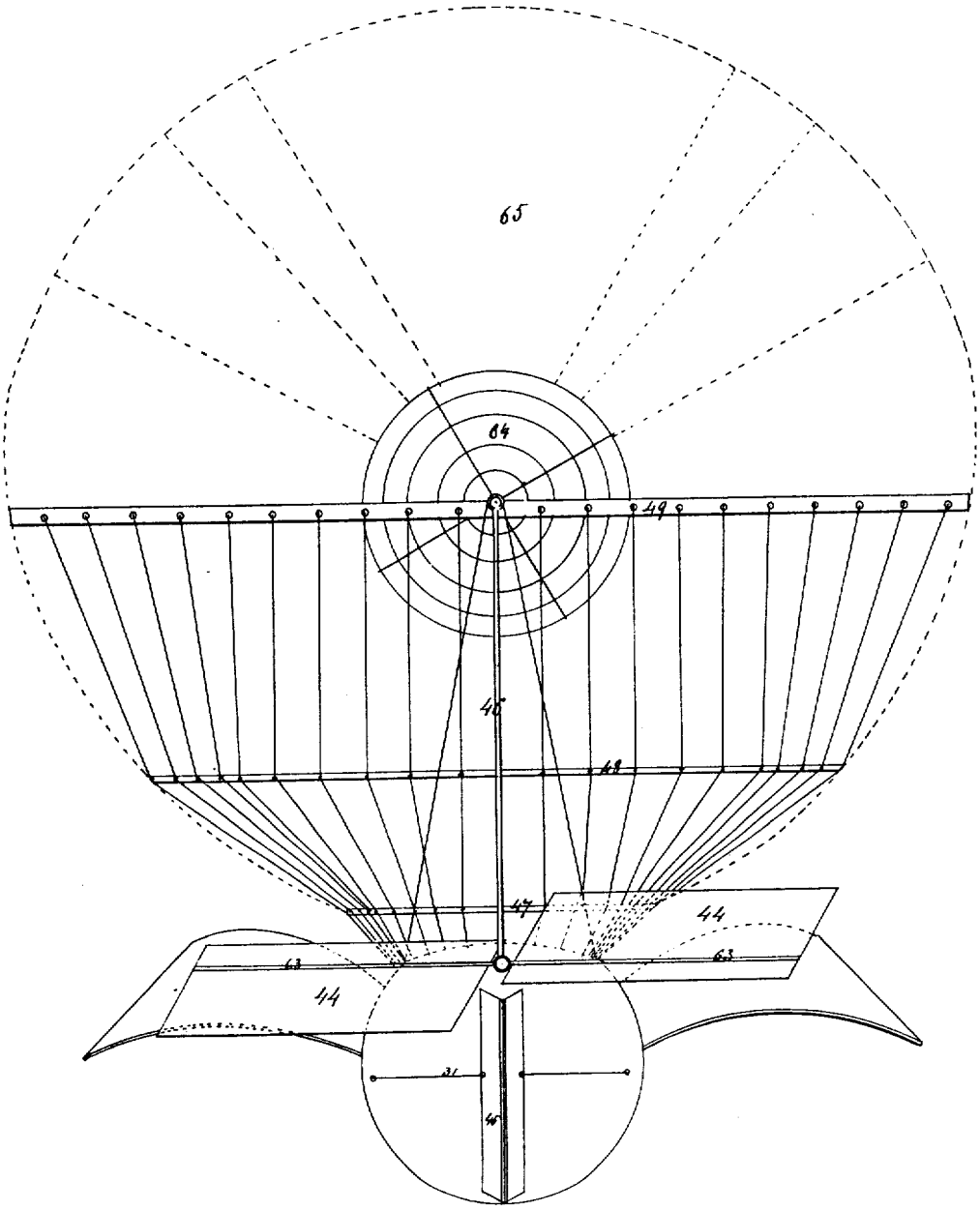
Fig. 2.



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Steerable Air-Ship.

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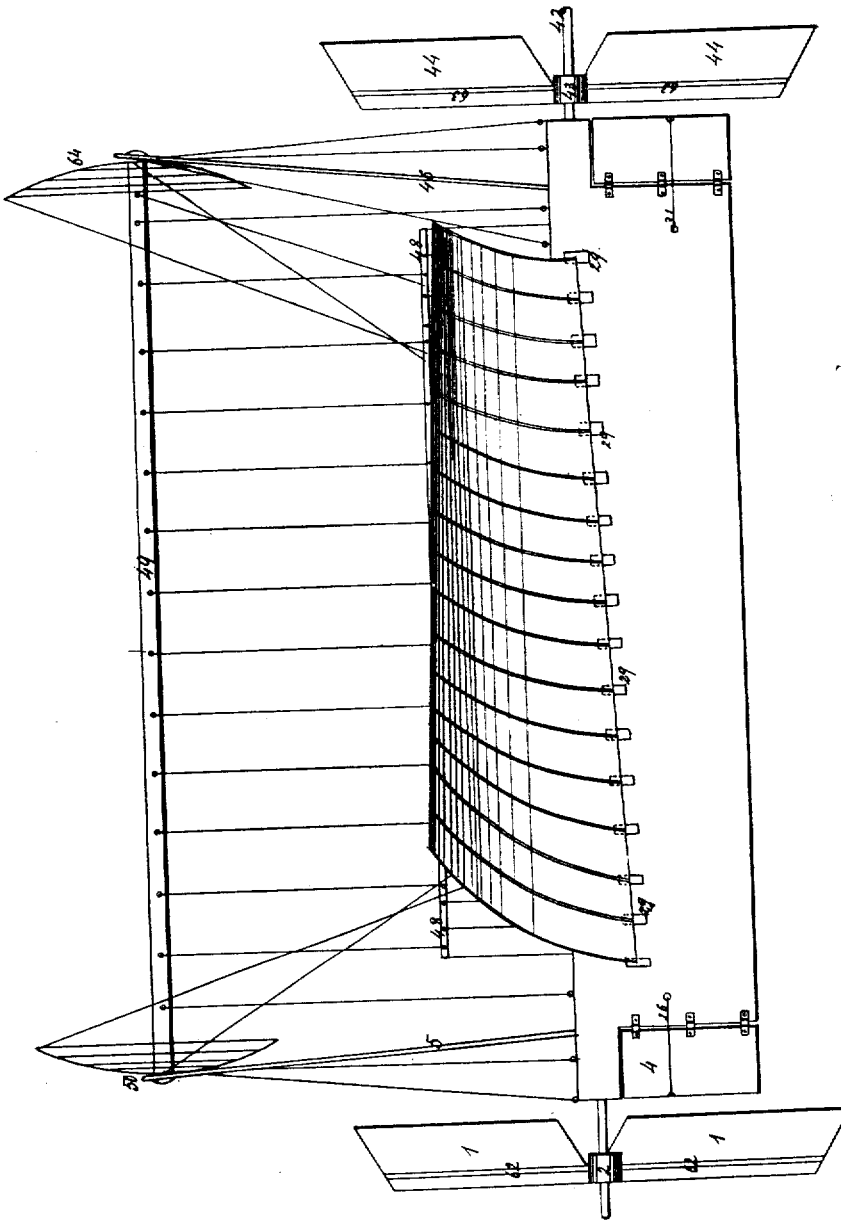

Fig. 3.

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UNITED STATES PATENT OFFICE.

FREDERICK W. SCHROEDER, OF BALTIMORE, MARYLAND, ASSIGNOR TO HIMSELF AND GEORGE W. GAIL, OF SAME PLACE.

IMPROVEMENT IN STEERABLE AIR-SHIPS.

Specification forming part of Letters Patent No. **165,881**, dated July 20, 1875; application filed July 1, 1875.

To all whom it may concern:

Be it known that I, FREDERICK WM. SCHROEDER, of Baltimore city, State of Maryland, have invented a new and Improved Steerable Air-Ship; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, forming a part of this specification, in which—

Figure 1 is a side elevation with the balloon in dotted lines, and the body of the ship in section; Fig. 2, a rear end elevation; Fig. 3, a side elevation without the balloon.

This invention relates to certain improvements in ships for navigating the air; and it consists in a ship made of woven wire or wicker-work, provided with front and rear propellers, and front and rear rudders for steering, together with side oscillating wings, the said propellers and wings being connected with and operated by a revolving shaft, actuated by any suitable power. To said ship is attached a balloon of ordinary construction, secured by end caps, a girdle, and steel bands to the ship, so as to form a part of the ship and afford the elevating-power.

In the drawings, No. 1 represents wings of fore propeller; 2, hub of the propeller-shaft; 3, fore propeller-shaft; 4, forward rudder; 5, iron rod, braced and fastened to the ship like a mast on a sailing-vessel; 6, small eight-inch pulley; 7, twenty-four inch pulley, with crank for disconnecting use; 8, crank for turning independent machinery to work the pulling fore propeller when disconnected; 9 and 10, belts; 11, thirty-six-inch pulley; 13, fore shaft; 14, shaft-coupling with two pins; 15, main or middle shaft; 16, 20, 33, cranks for making starboard-side wing flap up and down; 18, shaft-supporters; 21, main small pulley, eight inches; 22, main belt; 23, main pulley, forty-eight inches; 24 and 25, cranks to turn main pulley by, to connect with actuating mechanism; 26 and 31, wire for working the fore and aft rudder; 27, floor; 17, 19, 32, cranks for operating the wings upon the port side; 28, arms or ribs of wing on starboard side—it represents the working-arms and non-working arms; 29, openings in the sides to allow the arms to move up and down; 30, apparatus to work the fore and aft rudder by; 34, rear shaft-coupling; 35, aft eight-inch pulley; 36, aft thirty-six-inch pulley; 37, 38, belts; 39, aft independent twenty-four-inch pulley; 40, crank to work independent aft pulley and aft propeller when disconnected; 41, aft eight-inch pulley; 42, shaft for rear pushing-propeller; 43, hub of shaft; 44, aft propeller-wings; 45, rear rudder; 46, aft iron rod, same as the fore one; 47, 48, iron or steel bands or hoops, which are fastened in the net-work, and to which are fastened the lower carrying-ropes or lifters; 49, girdle, which is fastened in the net-work, and in the fore and aft wire caps, and to which the balloon is fastened again, which girdle can be made out of hemp, leather, or regular canvas; 50 and 64, wire caps, which are fastened to the steel or iron rod fore and aft, and serve for holding the balloon in its position and push it forward—these caps are held by rope braces in their position; 51, 52, 53, 57, 58, and 60, rope braces for wire caps; 54, 55, 56, 59, rope braces for the fore and aft rods; 61, collars of fore and rear propeller-shafts, to prevent them from moving to and fro; 62, 63, shaft of the aft propeller-wings; 65, balloon, egg-shaped, and made out of the best balloon material; 66, valve to let the gas escape; 67, opening of the balloon to inflate the same; 68, rope to open the valve; 69, pivots or axles of arms or ribs of wings.

The balloon which I use as a raising-power for my steerable air-ship can be made of any size and any shape, but I prefer the long egg-shape, as a balloon of such a shape has a large carrying capacity, and gives less resistance to the air.

In the first place, from both ends, fore and aft, two iron rods (or steel) stand up as high as is necessary for the size of the balloon and the ship. These are fastened in the ship in the same way as masts on sailing-vessels; also braced from all parts of the ship. At the top of these rods I have fastened strong wire caps, which just reach around the round-pointed ends of the egg-shaped balloon. These wire caps are also held in position by rope braces from different parts of the ship, and also, being fastened to the net-work of the balloon, (which net-work entirely incases the balloon,)

aids considerable in holding the balloon in its position, and pulls and pushes it along with the air-ship. At both points of the balloon, from both round ends all around the balloon, a girdle (made out of any suitable material, either hemp, leather, sail-cloth, or canvas) is fastened in the net-work, and to this girdle the balloon is fastened. The balloon being fastened to the girdle, and the girdle to the net-work, and the net-work to the wire caps at both ends, and the wire caps being fastened to the upright rods at both ends, which rods are fastened to the ship, braced from all sides, they cannot get out of their perpendicular position. To this girdle, at about two feet intervals, ropes are fastened. At the same intervals, all along on both sides, the ropes hang down to the ship, and are here on both sides securely fastened to the rings of the ribs of the ship. By this means the balloon is fastened to the ship at its largest part, and the ship is equally, at all parts, by ascending, lifted up; at the same time the carrying of the air-ship is equally divided all over the balloon, and each carrying-rope helps in pulling the balloon along.

At the lower end of the balloon, about five or six feet above the ship, a steel ring, oblong-shaped, is fastened in the net-work, and this ring is fastened again by ropes to the ship. This forms the second or middle fastening to the ship, and is also the middle carrier of the ship, which assists also in pulling the balloon along with the ship. At the lowest end of the balloon's net-work is a smaller steel ring fastened in the same manner to the ship, and forms the third fastening of the balloon to the ship.

Now, by this general combined fastening of the balloon to the steerable air-ship it is impossible for the balloon to get out of its perpendicular position, and it is compelled to move along with the ship. By these combined fastenings the balloon forms part of the ship.

The balloon and net-work must be constructed out of the best material, and has its valve and other arrangements like any other balloon.

For crossing the ocean it must be necessarily built large, both balloon and ship. The balloon, being fastened by both rods at both ends, and being fastened to the girdle, forms, by bursting, a parachute in the net-work, which prevents, in such an event, the fearful descent.

The frame or skeleton of my ship can be made out of different material, and the whole frame-work can be made strong, yet very light. Each single rib running upward at both sides forms at the top a ring all along the ship. To these rings the different carrying-ropes and rope-braces are fastened. These ribs are braced at intervals. The braces, running all along the whole length of the ship, form a strong, yet light, skeleton or frame-work of a long-boat; but the boat must be always built longer than the full length of the balloon, the fore and after upper part projecting at least from four to six feet over the main part of the ship, and under these projecting parts, fore and aft, the fore and after rudders are fastened, and work combined—that is, they assist each other in steering, and form accordingly a double-acting steering apparatus. They are made out of the same material—wire frame-work—square-shaped, and covered, as also the boat is, with the best of air and water proof canvas, prepared by being boiled in linseed-oil.

The ship, being covered with air and water proof canvas, and being shaped like a regular ship, will float on the water like any other floating vessel. It has a regular deck, rounded a little, which deck can be made of any material. I would prefer canvas of the same kind as the boat is covered with.

My steerable air-ship has two propellers—one fore and one aft. The one fore is a pulling motive power, and the one rear a pushing motive power. They can be made of any size. The wings are set on the same principle as the screw on a steamer, both wings are covered with the same material as the ship, and rudders are made of strong steel frames forged or riveted to their shafts. The shafts or arms are fastened to the working-shaft at a place where the working-shaft has a hub. This gives the whole a greater strength. These two propellers are worked, by machinery inside of the ship, by pulleys and cranks, which can either be worked by a steam-engine or by men turning the cranks.

In attempting long voyages, as in crossing the ocean, I carry my own gas-generator, that, in case I have to descend on the ocean, in order to get water for the boiler, I am able to inflate the balloon again in order to ascend. The machinery to drive these propellers is constructed in such a manner that it will give to the propellers at least from a thousand to fifteen hundred revolutions per minute. The machinery is so constructed that the fore and aft propeller can be disconnected from each other and work independently. By this disconnection I can make one propeller turn at great speed one way, and the other turns slowly the opposite way. The propeller that works with the wind I give slow speed, and the other that works against the wind the fastest speed, and compel by this operation the balloon and steerable air-ship to stand still in the air over any given point, the side wings standing still at the time. If the wind is against me from the front, the side wings assist in making the air-ship stand still. The advantage of having but two wings upon the propeller is such that, when I put the propellers in a horizontal position and then stop the machinery, the ship can be lowered upon the ground, so as to allow the ship to rest flat upon the same.

The main shaft at the lower part of the ship consists of three parts, the fore, middle, and rear shafts. The fore shaft, when disconnected

from the middle shaft, has its own special arrangement, that it can be worked independent; it has its own crank and pulleys, that the propeller can be worked by, and can be made to turn one way or the other. The same arrangement is with the rear shaft and propeller. When fore and rear shafts are disconnected from the middle shaft, then this shaft, or main shaft, only works the two side wings. This is all worked, then, by its own middle pulleys and cranks. The disconnecting apparatus is a very simple arrangement. The outer ends of the middle shaft and the two inner ends of the fore and rear shafts come very close together. A strong box of brass or iron encircles these four ends. This box is well fitted on the shafts, but so that it can be moved or pushed to and fro. Pushed at the forward end from the middle shaft to the fore shaft, it disconnects these two shafts; pushed aft from the rear shaft to the middle shaft, it disconnects these two also. Both pushed back again and fastened by running pins through the holes in the boxes, as well as in the shafts, they are connected there again.

My steerable air-ship has also two side wings, which are not only a means of propulsion, but also a raising power. From the ship at both sides, through openings, ribs or arms project, from eight to twelve feet long, or any other size, according to the size of the ship and balloon, forming at the outside of the ship a semicircle, with the round part upward and hollow part downward. According to the size of the ship, more or less ribs or arms are needed, each of which arms has its own independent pivot or axle inside the ship, on which it works or swings. Outside these arms are braced together, forming a full frame-work, and are, above and below, covered with canvas, by means of which they form a solid wing. The cuts or openings in the sides of the boat must be large enough to allow the arms to move up and down, as is necessary for the stroke of the wings. Inside the ship these arms run down toward the middle or main shaft in a pointed angle, but only one out of four runs down as far as the cranks of the main shaft. This one has a race or guide at the lower end, long and wide enough to admit the crank of the middle shaft to move to and fro in it with ease. The crank turning around, making its revolution with the shaft, causes these working-arms to move up and down, the inside short or not-working arms being fastened with a strong brace to all the working-arms, so as to make them all work together. This inside up-and-down motion causes the outside extension of the ribs or arms to make the same motion, and, forming outside a solid wing, flap up and down like the wings of a large bird. These wings are of a curved form, being hollow and round at the top, so as to afford very little resistance in moving upward, but catch the air on the downward stroke and become a lifting-power. The two side wings being at the front from two to four feet lower than the extreme rear part of the wings, they become by their flapping motion also a motive power, pressing on the air rearwardly, so as to push the steerable air-ship forward with great force. These side combination-wings can be shaped differently, but I prefer the shape mentioned; and would mention yet that the arms can be made out of any light material strong enough to do the work, and can be made also to shorten to the rear, so that if the first arm was about twelve feet long the extreme rear one would be about eight feet long. This would compress the air rearward underneath the wings, and would render them more effective.

Now, by this combined mechanism my steerable air-ship will do the same that a steamer does on the water, and having a double-acting steering apparatus, and making, by its triple-moving mechanism, a great speed, the whole is compelled to obey the steering apparatus.

Having thus described my invention, what I claim as new is—

1. The combination of the girdle 49, rings 47 and 48, and the ship constructed of woven wire, covered by canvas, and attached by ropes to the balloon through the said connections, substantially as described.

2. The combination, with the ship, of the end caps 50 64, and the supporting-rods 5 46, held in place by stay-ropes, as and for the purpose described.

3. The combination, with the main shaft 15, provided with cranks and couplings 14 34, of the propellers 1 44, and the side wings having ribs 28, and the extension 61 connecting with the cranks of the main shaft, as and for the purpose set forth.

The above specification of my invention signed by me this 21st day of June, 1875.

F. W. SCHROEDER.

Witnesses:

SOLON C. KEMON,
CHAS. A. PETTIT.