(No Model.)

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G. KOCH.

AIR SHIP.

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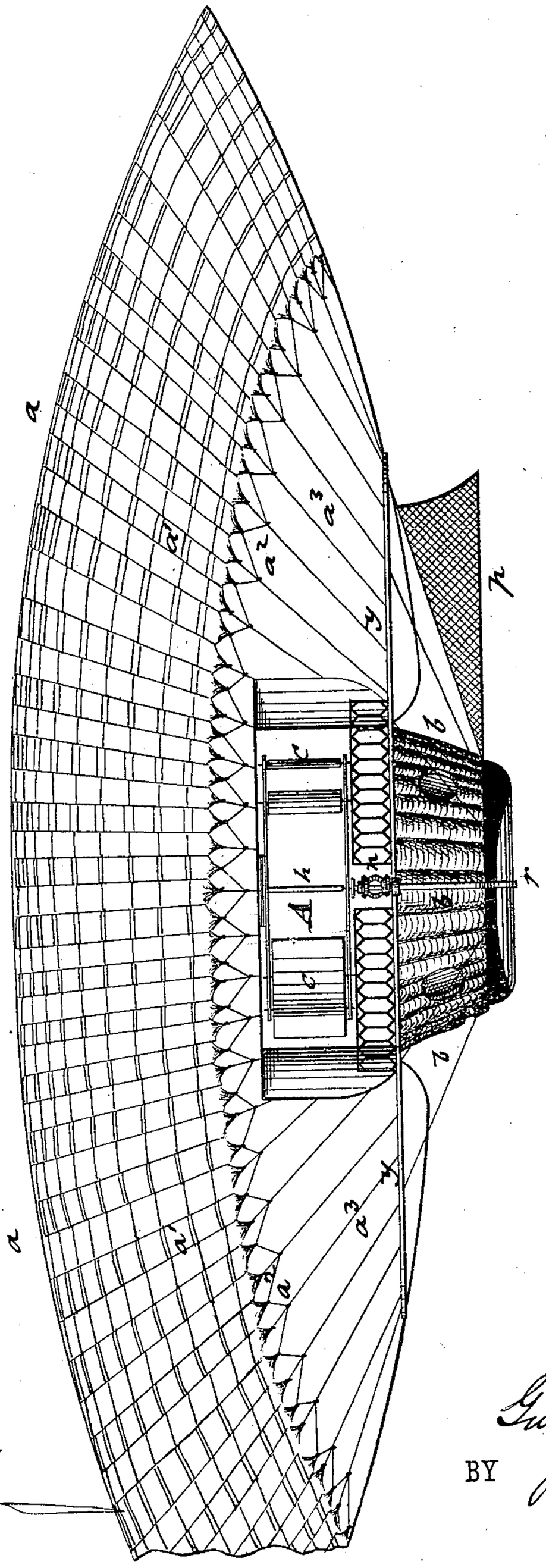

Fig: 1.

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(No Model.)

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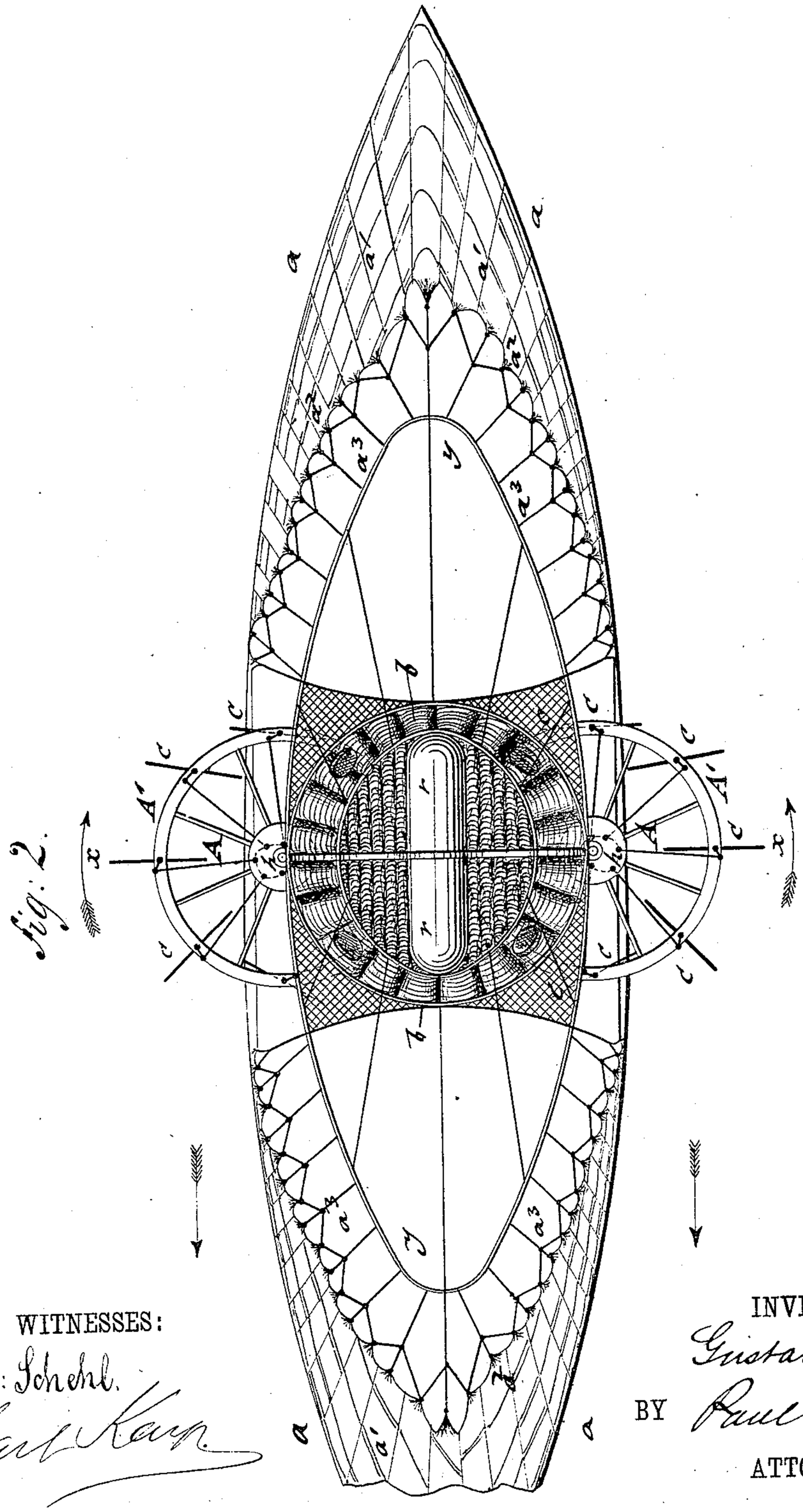

Fig. 2.

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(No Model.)

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No 282,647.

Patented Aug. 7, 1883.

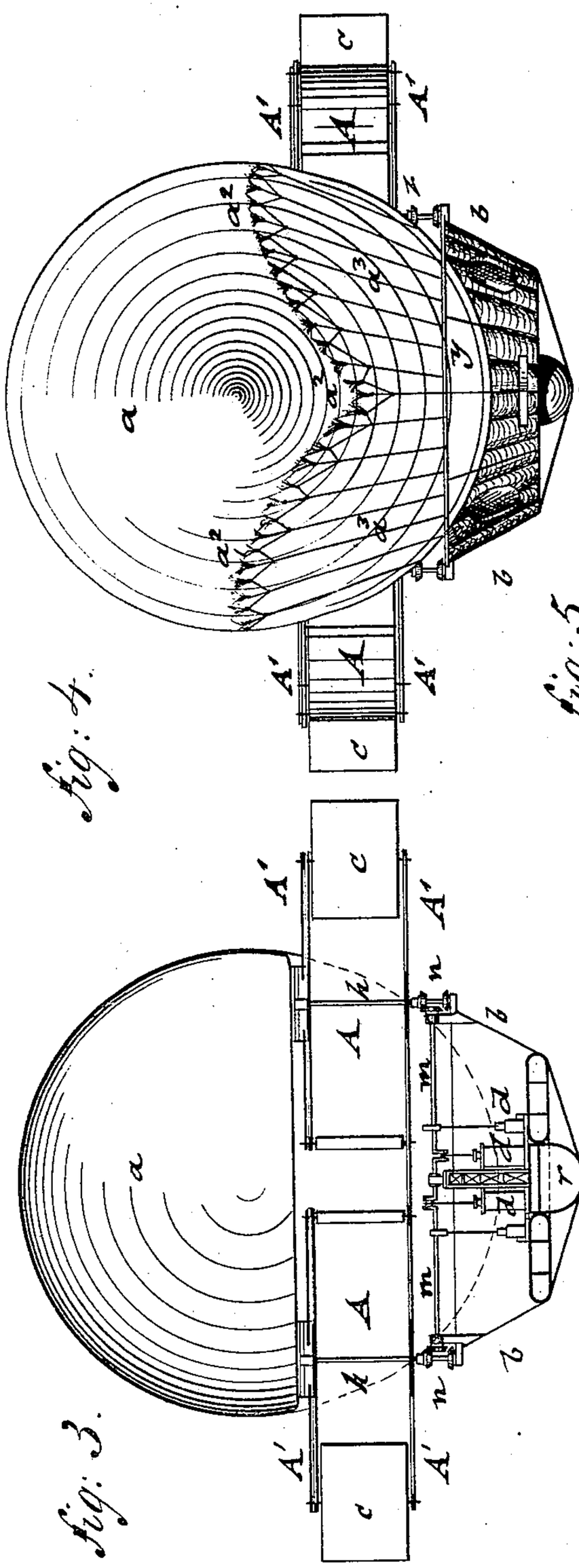

Fig: 4.

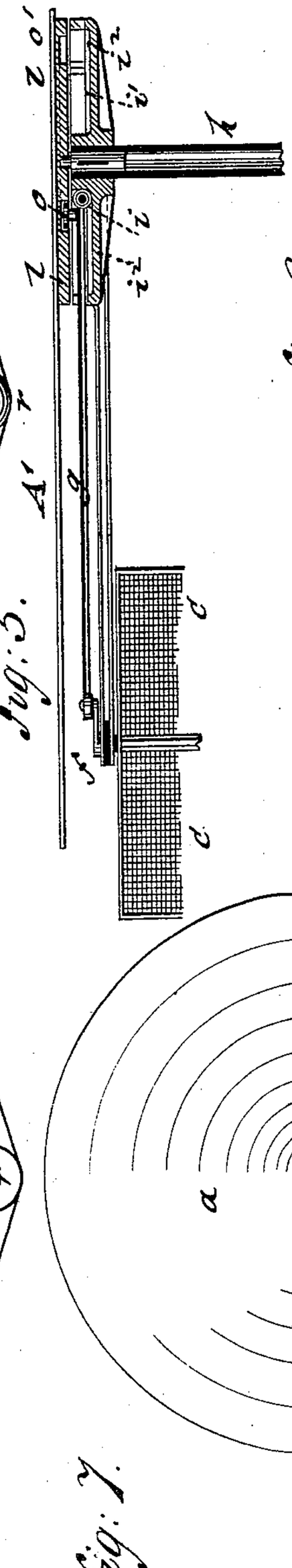

Fig: 5.

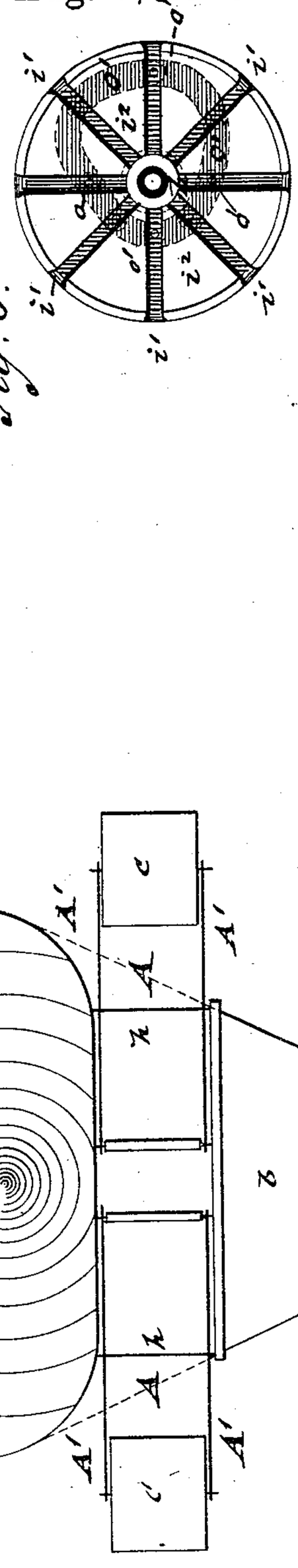

Fig: 6.

Fig: 3.

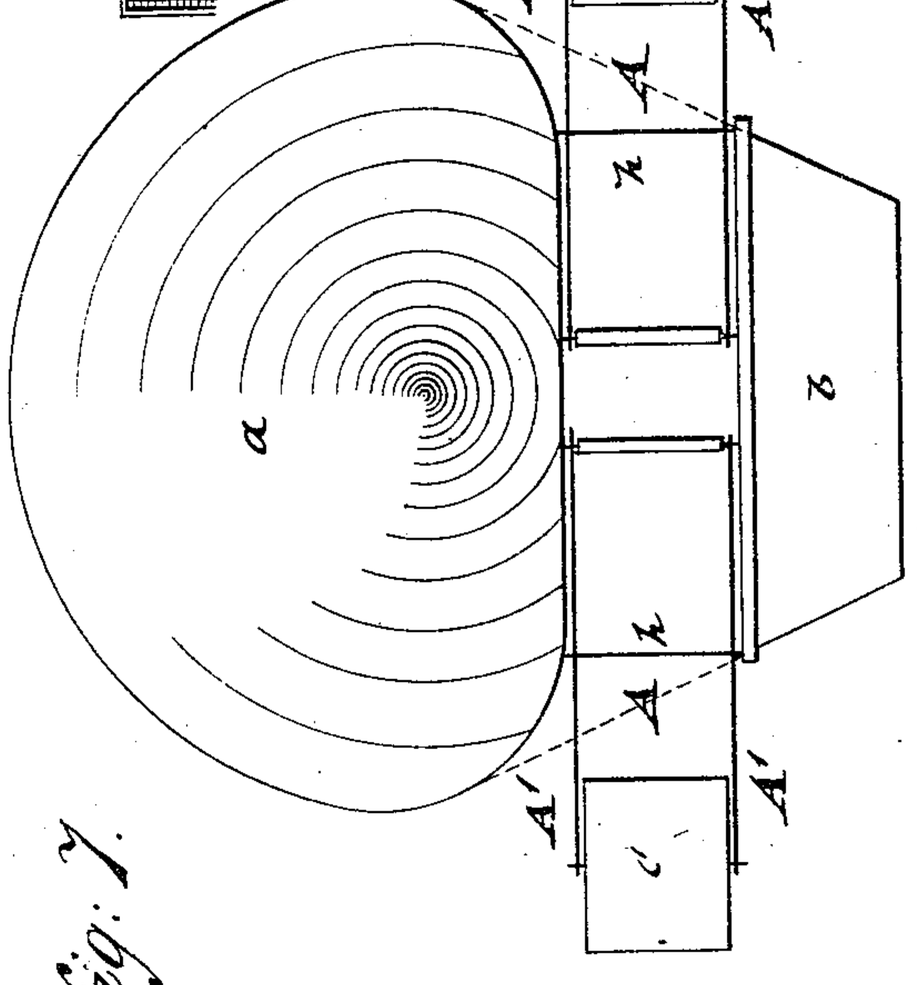

Fig: 7.

WITNESSES:

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UNITED STATES PATENT OFFICE.

GUSTAV KOCH, OF MUNICH, BAVARIA, GERMANY.

AIR-SHIP.

SPECIFICATION forming part of Letters Patent No. 282,647, dated August 7, 1883.

Application filed December 20, 1882. (No model.)

To all whom it may concern:

Be it known that I, GUSTAV KOCH, a subject of the Kingdom of Bavaria, residing at the city of Munich, in the Kingdom of Bavaria, German Empire, have invented certain new and useful Improvements in Air-Ships, of which the following is a specification.

This invention has reference to improvements in the construction of air-ships, and in means for propelling and steering the same; and the invention consists of an elongated balloon, the body of which is covered at the upper part with a layer of intersecting air and water proof silk ribbons, the lower ends of which are formed into strings to which the suspension-cords of the basket and stiffening-frame are tied. The balloon is propelled by means of horizontal paddle-wheels, which are arranged intermediately between the bottom of the balloon and the basket, in a transverse cavity of the balloon, their axes being located in the vertical transverse center plane of the balloon. The paddle-wheels are set in motion by a suitable motor and transmitting mechanisms, and steered by stopping or reversing one or the other of the transmitting-gears. The motion of the paddles is so controlled that they assume a position at right angles to the longitudinal axis of the balloon when outside of the cavity, but are placed in line with the direction of motion of the wheel when in the cavity.

In the accompanying drawings, which fully illustrate my invention, Figure 1 represents a side elevation of my improved air-ship. Fig. 2 is a bottom view; Fig. 3, a vertical transverse section on line *x x*, Fig. 2; Fig. 4, an end view. Figs. 5 and 6 are detail views, showing the mechanism for working the individual paddles of the horizontal paddle-wheels; and Fig. 7 is a vertical transverse section of a modified form of the air-ship.

Similar letters of reference indicate corresponding parts.

The balloon *a* is made of elongated cigar shape, with tapering and pointed ends, and constructed in the customary manner of silk and hemp that are made air and water proof. The balloon is filled with hydrogen gas, or with any other suitable gas the specific gravity of which is less than that of atmospheric air. The netting heretofore employed in suspending the basket from the balloon is dispensed with, and in place thereof the balloon is covered by a layer of air and water proof silk ribbons, *a'*, which extend longitudinally and transversely over the top surface of the balloon *a*, so as to intersect each other, and form thereby a perfectly smooth surface, which enables the balloon to move easier and with less resistance through the air.

At that part of the balloon where the netting usually leaves the balloon the ends of the covering silk ribbons are twisted and braided into strings a^2, from which the suspension-cords a^3 of the basket are tied, said cords being applied to the basket *b* and the elongated frame *y*, which latter extends forward and backward from the upper part of the basket, as shown in Figs. 2 and 4. The silk ribbons *a'* furnish an air and water tight covering-layer for the top part of the balloon, by which the same is stiffened and protected and the diffusion of the gas considerably diminished. The upper stiffened part of the balloon forms, furthermore, an effective parachute, in case the balloon should burst or be otherwise injured, so as to furnish a means of safety for the occupants of the basket.

The balloon *a* is provided at the central bottom part with a transverse cavity above the basket *b*, within which two horizontal paddle-wheels, A, are arranged. The greater parts of the paddle-wheels A are within the transverse cavity of the balloon, their smaller parts projecting at both sides of the balloon. The paddle-wheels A receive their motion from suitable motors, *d*, located at the center of the basket. The paddles *c* of the paddle-wheels are so guided that they assume a position at right angles to the longitudinal axis of the balloon when outside of the transverse cavity, so as to offer great resistance, but assume a position as near as possible to the circumference of the supporting guide-frames A' of the paddle-wheels when inside of the cavity, so as to offer as little resistance to the air as possible. For this purpose the vertical axes of the paddle-wheels *c* are provided at one or both ends with cranks *f*, which are pivoted to the connecting-rods *g*, as shown in Fig. 5. The opposite ends of the connecting-rods are guided in a twofold manner—first by an anti-friction

roller, *i*, in radial slots *i'* of disks i^2, which are secured to the vertical driving-shaft *h*, and, secondly, by means of a horizontal roller, *o*, applied to a short vertical shaft near the rollers *i* of each guide-rod *g*, in an eccentric groove, *o'*, of a disk, *l*, that is rigidly attached to the paddle-wheel frame A'. The relative positions of the slots *i'* and of the eccentric groove *o'* are shown in Fig. 6. The shape of the eccentric groove *o'* is such that the wings or paddles *c* are gradually placed into a position at right angles to the longitudinal axis of the balloon, where they project at both sides of the balloon, but assume at the inside of the cavity a position in line with the direction of motion of the paddle-wheels, so as to cause as little resistance to the motion of the paddle-wheels as possible. The vertical shafts *h* receive rotary motion from horizontal transmitting-shaft *m m* and reversing-gears *n n*, which latter are formed either of conical friction or gear wheels, as desired. By raising or lowering either one or both of the transmitting-shafts *m*, so as to gear with one or both of the upper or lower transmitting-gears *n*, either one or both the paddle-wheels are revolved, or the motion of either one or of both may be reversed, as desired. The reversing-gear may be, furthermore, so constructed that the horizontal paddle-wheels can be revolved at different degrees of speed.

If gas-motors are used, the gas which is required for running them is stored in compressed state in a reservoir, *r*, arranged at the lower part of the basket *b*.

If both horizontal paddle-wheels are moved at the same rate of speed in opposite directions, as in Fig. 2, the air-ship is propelled, when in still air, in the direction of its longitudinal axis. If one paddle-wheel only is allowed to rotate while the other is thrown out of gear into a position of rest, or if both paddle-wheels are revolved in the same direction, the balloon is moved to either side, or when moving along with a current of air propelled in a direction differing somewhat from the direction of the current. It is consequently possible to steer the air-ship, to some extent, by means of the propelling paddle-wheels, which is assisted by the fixed rudder or vane *p* at the lower part of the balloon. The paddles *c* are made of a light frame, over which a suitable fabric is stretched. Owing to the resistance of the air, the paddles are bulged out like sails, and are thereby more effective than when made of rigid material, along which the air would have to pass. Instead of arranging the horizontal paddle-wheels in a transverse cavity at the central bottom part of the balloon, the central bottom part of the same may be horizontally flattened, as shown in Fig. 7. The paddle-wheels have to be located in either case intermediately between the balloon and the basket.

In case gas-motors are employed, the cylinders are preferably cooled with air instead of water, the air being conducted to the motors by a longitudinal tube or channel, which extends from the front end of the balloon to the basket, and from the same to the rear end after the same has passed around the cylinders of the motors.

An Archimedean screw may preferably be arranged in the air-channel, so as to increase the supply of air required for cooling the cylinders of the motors.

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

1. The combination, with a balloon, of covering and intersecting air and water proof silk ribbons, which are united into strings at the points where they leave the balloon, and connected to the suspension-strings of the basket and stiffening-frame of the same, substantially as specified.

2. The combination, of a balloon having a transverse cavity at its central bottom part, with horizontal paddle-wheels arranged in said cavity and above the basket, and with means for imparting motion to the paddle-wheels, substantially as set forth.

3. The combination of a balloon, a basket suspended therefrom, horizontal paddle-wheels interposed intermediately between the balloon and basket, and means for revolving the paddles and moving them simultaneously, so that they assume a position at right angles to the longitudinal axis of the balloon when projecting at both sides of the same, but are set in a position coinciding with the direction of motion when inside of the body of the balloon, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GUSTAV KOCH. [L. S.]

Witnesses:
EDWARD BRETSCHNEIDER,
EAUG. GIRZ.