R. J. McLAUGHLIN.

CENTRIFUGAL AEROCYCLE.

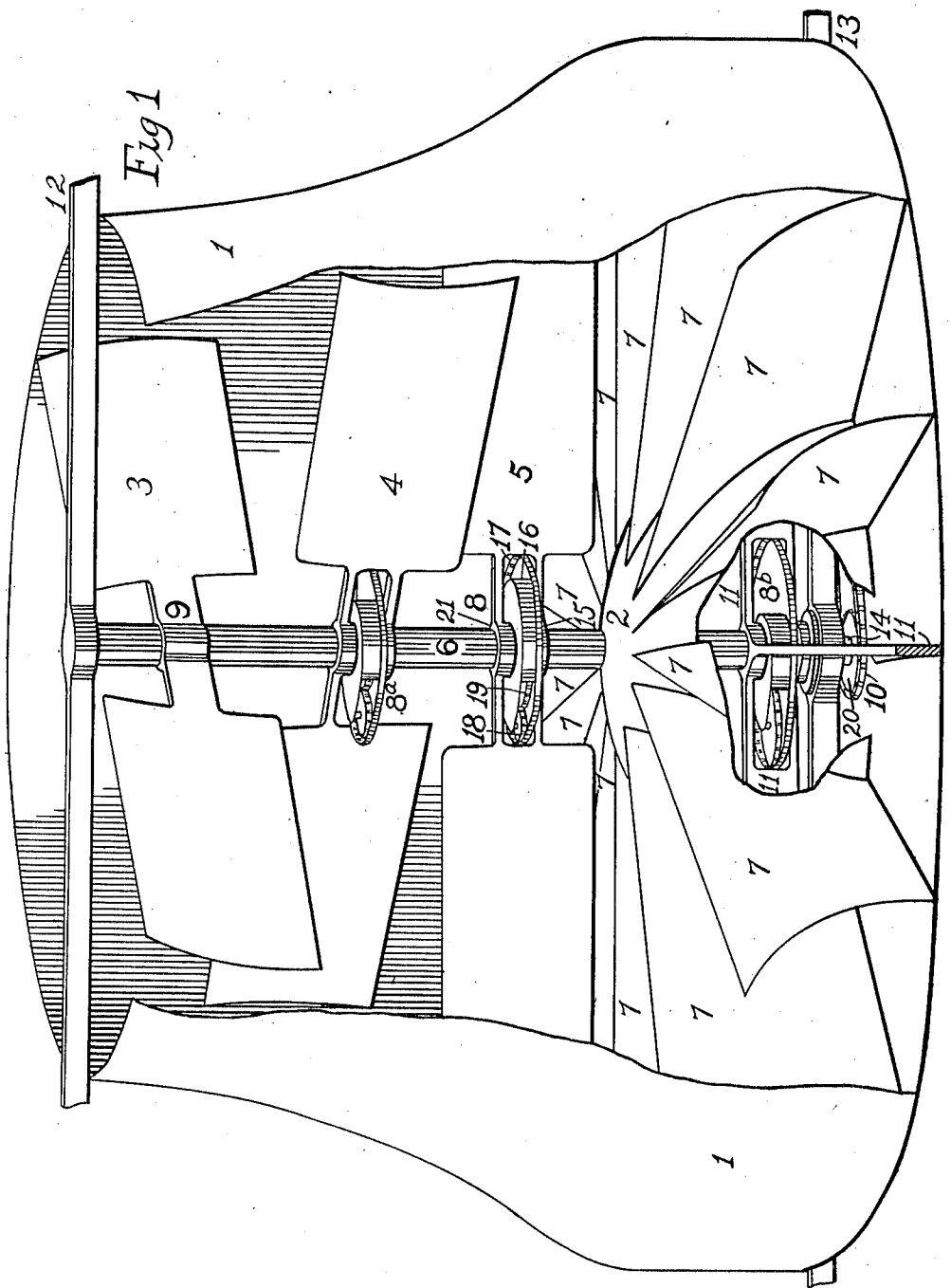
APPLICATION FILED MAY 6, 1913.

1,090,322.

Patented Mar. 17, 1914.

2 SHEETS—SHEET 1.

Fig 1



Witnesses.

Selden B. McLaughlin

Beverley F. McLaughlin.

Inventor.

Robert J. McLaughlin

R. J. McLAUGHLIN.

CENTRIFUGAL AEROCYCLE.

APPLICATION FILED MAY 5, 1913.

1,090,322.

Patented Mar. 17, 1914.

2 SHEETS—SHEET 2.

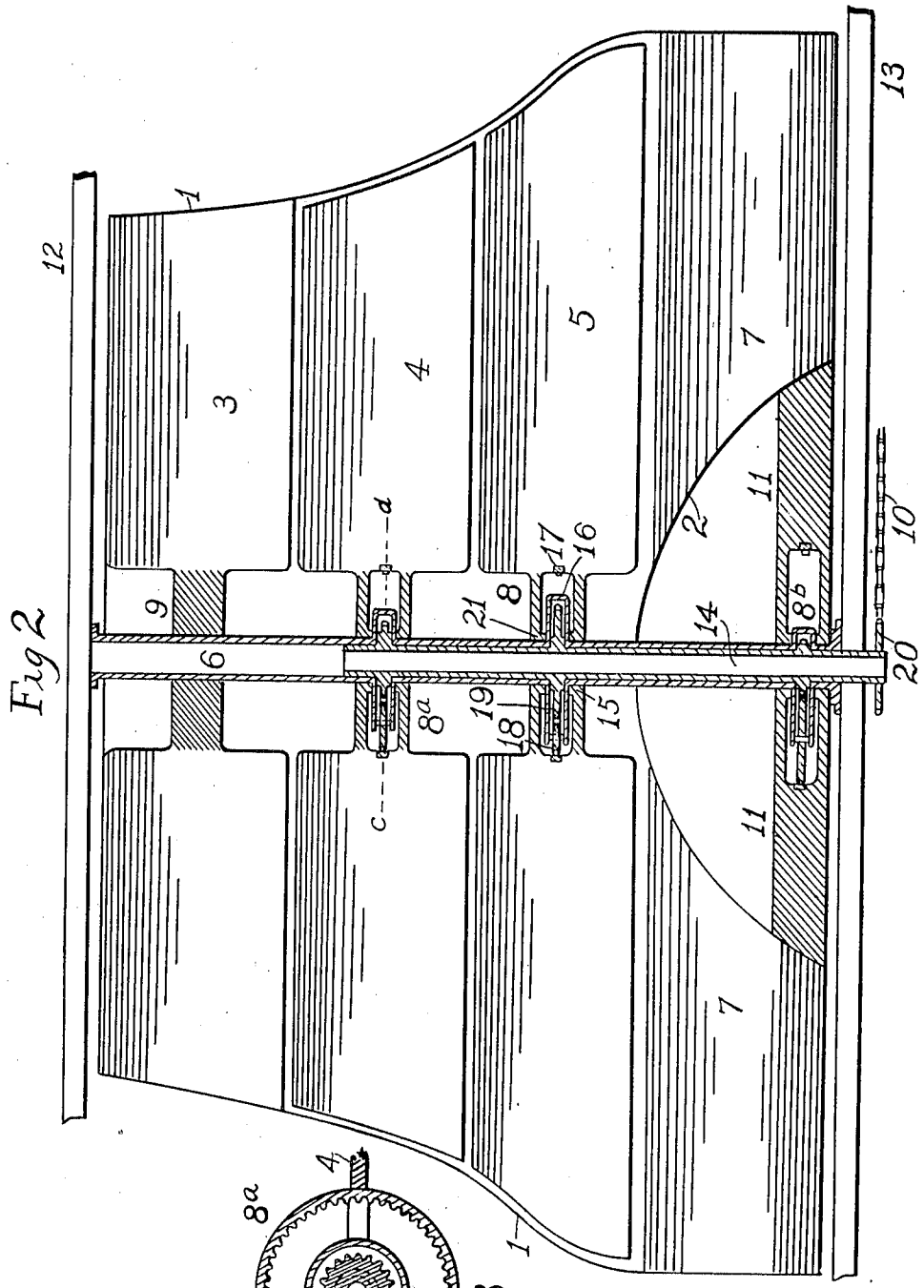


Fig 2

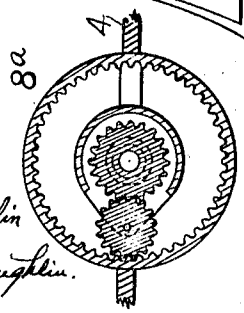


Fig 3

Witnesses

Selden B. McLaughlin

Beverley F. McLaughlin.

Inventor

Robert J. McLaughlin.

UNITED STATES PATENT OFFICE.

ROBERT J. McLAUGHLIN, OF NEW YORK, N. Y.

CENTRIFUGAL AEROCYCLE.

1,090,322. Specification of Letters Patent. Patented Mar. 17, 1914.

Application filed May 5, 1913. Serial No. 765,600.

To all whom it may concern:

Be it known that I, ROBERT J. McLAUGHLIN, a citizen of the United States, residing at 528 Fordham road, borough of the Bronx, in the county of New York and State of New York, have invented a new and useful Centrifugal Aerocycle, of which the following is a specification.

My invention relates to improvements in the centrifugal aerocycle in which two air chambers geared together revolve around the same vertical axis, discharging air downward, and receiving an upward reacting thrust; and the objects of my improvement are, first, to simplify the machine and increase its efficiency by combining the two air chambers into one vessel; second, to increase the efficiency by substituting a series of vertically arranged blades in place of the vertical vanes of the upper bell shaped vessel; third, to simplify the gearing devices by arranging them on one axis; fourth, to increase the efficiency by substituting a semispherical hood at the base of the chamber in place of the circular plate of the lower cylindrical vessel; and fifth to provide means for equalizing the effects of skin friction. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1, is a view in perspective of the entire machine with portions broken away; Fig. 2, a vertical section of the entire machine; and Fig. 3, a detailed horizontal section of a part of the machine on the line *c*—*d*, Fig. 2.

Similar numerals refer to similar parts throughout the several views.

A metallic bell shaped vessel consisting of a wall 1, a hood 2, blade 3, and vanes 7 is revolved around a stationary hollow axis shaft 6. Centrifugal force causes a partial vacuum along this axis which induces a current of air from above. The entrance of air from below is blocked by the semispherical hood 2 situated at the base of the chamber, and revolving with it as a fixed member around the shaft 6. Inside shaft 6 is a revolving hollow shaft 14 carrying three similar, rigidly attached cog wheels 19 which revolve in similar gear boxes forming parts of shaft 6. This shaft 6 consists of sections of tubing which are connected with the upper and lower sides of the gear boxes but do not pass through them. The central gearing device 8 consists of a gear box 16 which contains one of the cog wheels 19. The gear box 16 is attached rigidly to the stationary shaft 6. This box consists of a hollow, metallic, flat drum with central openings above and below for connection with shaft 6, and the accommodation of shaft 14. There is an opening on the side of the gear box 16 for a pinion 18 which revolves on a vertical pin connecting extensions of the upper and lower sides of the gear box 16 and which meshes with one of the cog wheels 19. The pinion 18 serves to transmit the power to the hoop 17, which consists of a steel rim with teeth on the inside, fastened at two opposite points to blade 5. This construction is clearly seen in Fig. 3 showing the device 8^a which is one of three similar gearing devices 8^a, 8 and 8^b. Each gearing device consists of a gear box, a cog wheel, a pinion and a hoop. Shaft 14 is cut off directly above the gearing device 8^a. Blade 3 revolves around shaft 6 at the hub 9. Blade 5 revolves around shaft 6 on the hubs 15 and 21, which rest on the upper and lower sides of gear box 16. Blade 4 revolves in a similar manner to blade 5 around the upper and lower sides of the gearing device 8^a.

The hood 2, the vanes 7, the wall 1, and blade 3 are supported on four flat bars 11 which revolve on bearings on the upper and lower sides of gearing device 8^b around shaft 6. The cog wheel 20 is rigidly fastened to shaft 14, and is driven by a chain 10 connecting shaft 14 with the engine. Shaft 6 is rigidly fixed to two supporting braces 12 and 13 which carry the machine, and are part of the frame work of an airship.

The wall 1 is built to approximately parallel the course of the air descending into the chamber until a point or reverse curvature is reached. The course of the air is governed by two forces, namely, the atmospheric pressure driving the air downward into the partial vacuum constantly maintained around the axis of the vessel, and the centrifugal force both caused by the action of a series of revolving blades 3, 4, and 5. These blades are vertically arranged, curving slightly in the direction of motion at their upper part, and inclining downward vertically at their lower part, and revolve around the axis shaft 6 with regularly graduated velocities, driving the air against the sloping wall 1. They are geared together so that blade 3 revolves around

the axis shaft with a relative velocity of 1, blade 4 revolves around the axis shaft with a relative velocity of 2, and blade 5 revolves around the axis shaft with a relative velocity of 3. In this manner the rotary velocity of the air is accelerated until discharged by the blade 5 into the spaces between the vanes 7. The hood 2 serves to convey the current of air away from the axis and against the vanes 7 with the least resistance. These vanes are rigidly connected with the wall 1 and the hood 2. They are radially arranged, and receive a spiral current of air from the upper part of the chamber. This spiral current is the resultant of the horizontal and vertical motions of the air in the upper part of the vessel. The convex sides of the vanes 7 face the direction of revolution. Their upper parts incline backward toward the descending current of air at an angle of about 55° to the horizontal, and their lower parts also curve backward from the direction of revolution at an angle of about 80° to the horizontal. Concentric zones of rare faction and compression are developed around the axis of the vessel, and extend under the sloping wall 1 against which the air is deflected downward, exerting at the same time an upward reacting thrust.

One of the principles underlying this invention is the great gain in efficiency obtained by gradually increasing the velocity of the air passing through the apparatus by successive stages, at the same time distributing the reactions among several sets of revolving blades. The gradual increase in the velocity of rotation of the air is attained by the movement of the air from the axis of the vessel to the wall 1, and by the action of the blades 3, 4, and 5. Blade 3 revolves around the axis at one unit of velocity. Blade 4 revolves at two units of velocity, and blade 5 revolves at three units of velocity. The relative velocity of rotation of blade 3 to the entering air is 1 to 0. When the air encounters blade 4 it has one unit of velocity of rotation derived from blade 3, while blade 4 has two units of velocity. Therefore the relative velocity of blade 4 to the air engaged by it is 2 to 1. When the air encounters blade 5 it has two units of velocity of rotation derived from blades 3 and 4, and blade 5 has three units of velocity. Therefore the relative velocity of blade 5 to the air engaged by it is 3 to 2. Hence the relative velocity of rotation of each blade to the air engaged by it is the same. Skin friction retards the revolution of blades 4 and 5 by the adhesion of the revolving air to the inner surface of the wall 1, which thereby receives an acceleration of velocity. This acceleration is in turn transmitted by the gearing device back to the blades 4 and 5. The retardation and acceleration due to skin friction between these parts of the machine is therefore reciprocal. The upper parts of the vanes 7 are inclined at the angle of the descent of the air against them. These vanes serve to deflect the resultant motion of the air, and to discharge it backward just enough to neutralize the revolution imparted to the descending current of air by the rotary motion of the vanes themselves. It must be especially noted that these vanes 7 deflect, and do not check the resultant motion of the air, which performs a double duty, first by exerting its power to drive the vessel, and second by imparting a very heavy vertical reaction. As the radius of the vanes is small, and the velocity of the air is high, the intensity of centrifugal force is extreme, and this intense pressure is available principally for the operation of the aerocycle.

A unique feature of the invention is the development of a velocity of discharge not only greater than the velocity of the chamber but of the fastest moving member in the chamber, namely, blade 5. As power increases as the cube of the velocity it is an efficient principle and very desirable that the machine should impart to the air by direct and indirect action a velocity greater than that of any moving member. Rotation of air being developed and destroyed in the vessel the machine is in equilibrium.

Having described my invention what I claim is:

1. In a centrifugal bell shaped vessel a series of blades geared together revolving in the same direction around the axis of the machine with regularly graduated increasing velocities, said blades being vertically disposed with their upper parts curving in the direction of revolution and their lower parts inclining vertically downward.

2. In a centrifugal vessel with a lesser circular opening above, and a greater circular opening below, and a deflecting wall sloping from the lesser to the greater opening, a series of blades geared together revolving in the same direction around the axis of the machine with regularly graduated increasing velocities, said blades being vertically disposed with their upper parts curving in the direction of revolution and their lower parts inclining vertically downward, directly imparting a horizontal rotation, and indirectly imparting both a vertical deflection to the air against the inner sloping wall of the vessel, and a resultant spiral movement to the air, and indirectly exciting a partial vacuum around the axis of the vessel, and thereby inducing a vertical suction of air into the vessel from above.

3. In a centrifugal deflecting vessel a series of blades geared together revolving in the same direction around a stationary shaft with regularly graduated increasing velocities driven by a shaft revolving in the

said stationary shaft and carrying cog wheels which gear into pinions attached to the said stationary axis shaft and transmit to the said blades regularly graduated increasing velocities.

4. In a centrifugal aerocycle a bell shaped vessel, a series of blades revolving around the vertical axis of said bell shaped vessel, a gearing device between said vessel and said blades, the said blades tending to accelerate the revolution of the bell shaped vessel by the adhesion of the revolving air to the inner wall of the vessel by virtue of skin friction, and through the gearing device common to the said blades and the bell shaped vessel, receiving back the tendency to acceleration of the bell shaped vessel in a reciprocal manner so that the retardation of the blades by skin friction is in part counteracted.

5. The combination with a centrifugal bell shaped vessel and with a series of blades revolving horizontally around the axis of the said bell shaped vessel, of a series of curving vanes set in the lower part of the said bell shaped vessel, radially disposed, presenting their concave surfaces to a current of air descending spirally by virtue of the resultant motion of the air developed by the action of the said blades in revolving the air horizontally, and by the action of the said bell shaped vessel in deflecting the air vertically downward; said curving vanes having their upper parts nearly normal to the said descending current of air, which upon entering against the said vanes spirally, is deflected and discharged vertically, thereby imparting a vertical thrust and a rotary movement to the said vessel; said vanes having their lower parts curved backward from the direction of revolution, and having their convex surfaces facing the direction of revolution.

6. The combination with a centrifugal vessel, having a lesser circular opening above and a greater circular opening below, and a deflecting wall sloping from the lesser to the greater opening and with a series of blades revolving horizontally around the axis of the said centrifugal vessel, of a series of curving vanes set in the lower part of the said bell shaped vessel, radially disposed, presenting their concave surfaces to a current of air descending spirally by virtue of the resultant motion of the air developed by the action of the said blades in revolving the air horizontally, and by the action of the said bell shaped vessel in deflecting the air vertically downward; said curving vanes having their upper parts nearly normal to the said descending current of air which upon entering against the said vanes spirally, is deflected and discharged vertically, thereby imparting a vertical thrust, and a rotary movement to the said vessel; said vanes having their lower parts curved backward from the direction of revolution, and having their convex surfaces facing the direction of revolution.

7. The combination with a centrifugal vessel having a lesser circular opening above, and a greater circular opening below, and a deflecting wall sloping from the lesser to the greater opening; of a semi-spherical hood located in the center and lower part of the said vessel, revolving around the axis of the said vessel and presenting a spherical surface to a current of air descending by suction and vertical deflection in the said centrifugal vessel, thereby conducting the said current of air against curving vanes set in the lower part of the said vessel, and receiving a diminished shock from the said current of air.

8. In a centrifugal bell shaped vessel, curving vanes set in the lower part thereof, a semi-spherical hood located in the center and lower part of the said vessel, revolving around the axis of the said bell shaped vessel, and presenting a spherical surface to a current of air, descending by suction and vertical deflection in the said bell shaped vessel, thereby conducting the said current of air against said curving vanes set in the lower part of the said bell shaped vessel, and receiving a diminished shock from the said current of air.

9. In a centrifugal bell shaped vessel a semi-spherical hood located in the center and lower part thereof having its convex side adjacent to a series of revolving blades developing a partial vacuum along the axis of the upper part of the said bell shaped vessel, and above the said semi-spherical hood, and having its concave side below, and in contact with the air at the normal atmospheric pressure revolving around the axis of the said bell shaped vessel, and serving to block the entrance of air from below into the partial vacuum maintained along the axis of the upper part of the said vessel, and receiving an upward thrust from the atmospheric pressure below by virtue of the inequality of pressure on its convex and concave sides.

10. In a centrifugal bell-shaped vessel a series of blades successively arranged on a vertical axis, attached to arms and revolving in the same direction, a series of curving vanes set in the lower part of, and revolving with, the said bell shaped vessel, a hollow shaft rigidly fixed, a series of horizontally disposed gear boxes, each consisting of flat steel drums having extensions on their upper and lower surfaces and openings upon one side thereof, located on said shaft, pinions in said openings revolving on vertical pins journaled in said extensions; said pinions gearing with the teeth of circular horizontally

disposed hoops rigidly connected to the revolving blades and vanes for their operation; said pinions being operated by cog wheels revolving in the said gear boxes, and rigidly fixed to an inner shaft revolving in the said rigidly fixed hollow shaft; said revolving shaft being actuated by a chain and sprocket-wheel fixed to its lower end; said revolving shaft driving the said blades and vanes in the same direction with regularly graduated, increasing velocities so that the topmost blade revolves at the least velocity, and the lowermost blade at the greatest velocity, and said lowermost blade at three times the velocity of the said curving vanes for the purpose specified.

11. In a centrifugal vessel with a lesser circular opening above, and a greater circular opening below, and a deflecting wall sloping from the lesser to the greater opening, the combination of a series of blades, geared together, revolving in the same direction around the axis of the vessel with regularly graduated increasing velocities being vertically disposed with their upper parts curving in the direction of revolution and their lower parts inclining vertically downward, directly imparting a horizontal rotation, and indirectly imparting both a vertical deflection to the air against the inner sloping wall of the vessel, and a resultant spiral movement to the air, and indirectly exciting a partial vacuum around the axis of the vessel, and thereby inducing a vertical suction of air into the vessel from above; with a stationary hollow shaft in which revolves an inner shaft carrying cog wheels which mesh with pinions attached to the said stationary hollow shaft and transmit to the said blades regularly graduated increasing velocities; and with a semi-spherical hood located in the center and lower part of the said centrifugal vessel, revolving around the axis and presenting a spherical surface to the descending current of air thereby conducting the said current of air against curving vanes set in the lower part of the said centrifugal vessel and receiving a diminished shock from the said current of air; said curving vanes being attached to the said semi-spherical hood and radially disposed, presenting their concave surfaces to the descending current of air, with their upper parts nearly normal to the said descending current of air, and having their lower parts curved backward from the direction of revolution and having their convex surfaces facing the direction of revolution for the purpose specified.

ROBERT J. McLAUGHLIN.

Witnesses:
SELDEN B. McLAUGHLIN,
BEVERLEY F. McLAUGHLIN.