C. L. MOORE.

AEROPLANE.

APPLICATION FILED SEPT. 9, 1911.

1,019,987.

Patented Mar. 12, 1912.

3 SHEETS—SHEET 1.

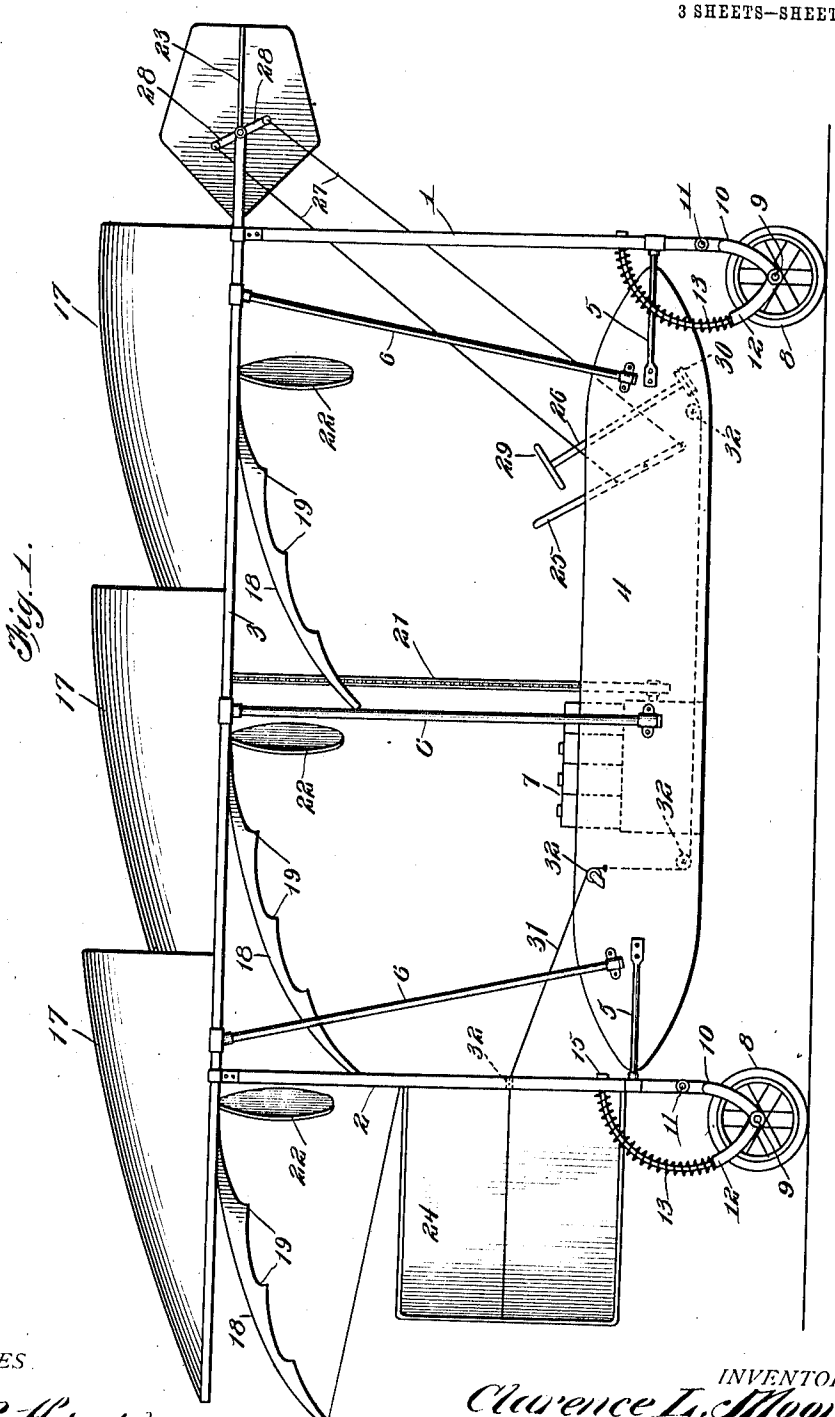

Fig. 1.

WITNESSES

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3 SHEETS—SHEET 2.

Fig. 2.

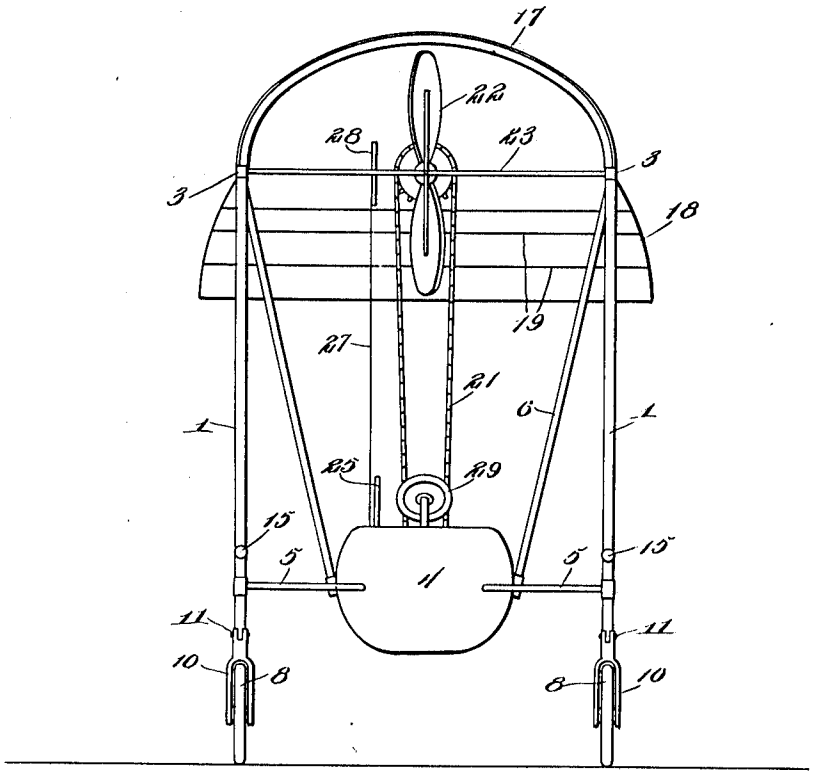
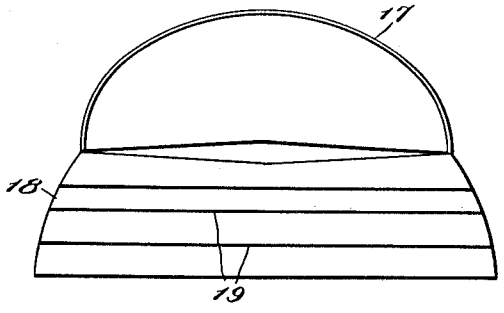


Fig. 4.



WITNESSES

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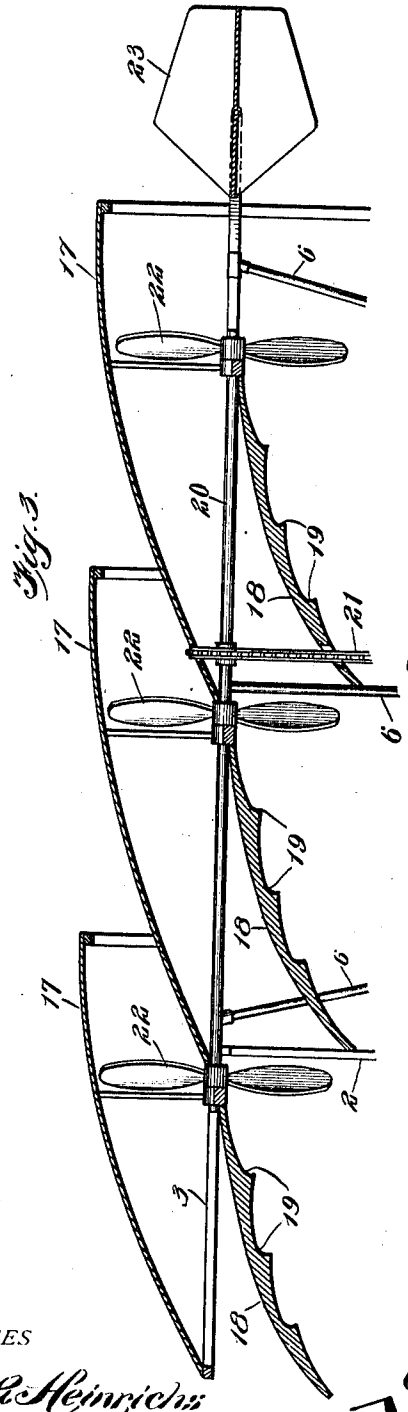

Fig. 3.

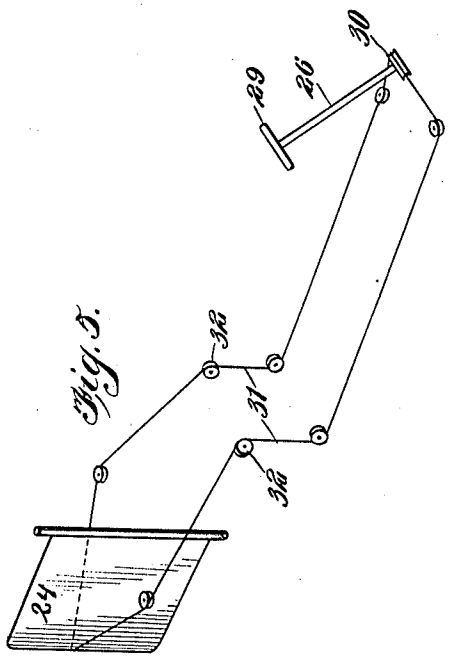

Fig. 5.

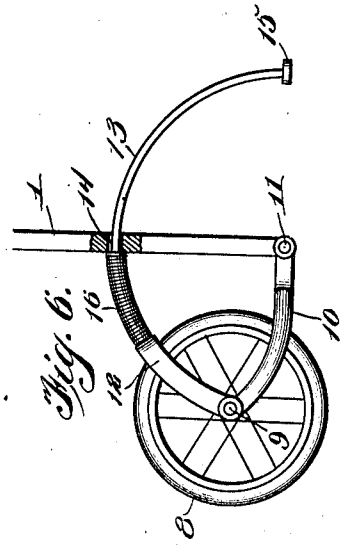

Fig. 6.

WITNESSES

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UNITED STATES PATENT OFFICE.

CLARENCE L. MOORE, OF ALLENHURST, NEW JERSEY.

AEROPLANE.

1,019,987. Specification of Letters Patent. Patented Mar. 12, 1912.

Application filed September 9, 1911. Serial No. 648,472.

To all whom it may concern:

Be it known that I, CLARENCE L. MOORE, a citizen of the United States, residing at Allenhurst, in the county of Monmouth and State of New Jersey, have invented certain new and useful Improvements in Aeroplanes, of which the following is a specification.

My invention relates to flying machines of the aerodynamical type, in which sustentation is secured by the compression and reaction of the air upon the supporting surface or surfaces of the machine when the latter is propelled through the air at or above a determined rate of speed.

The primary object of the invention is to provide a machine of this character embodying a novel construction and arrangement of sustaining elements forming a supporting surface, whereby the area of the supporting surface as a whole is increased in a fore-and-aft direction, and whereby increased inherent longitudinal and lateral stability is obtained and skidding or side drift prevented or diminished to a material degree.

A further object of the invention is to provide a construction and arrangement of superposed longitudinal series of aerofoils or sustaining surfaces whereby the air reacting upon the surfaces of one series will be guided and deflected and also caused to act upon the surfaces of the other series, and whereby the air acting upon each of the surfaces of the latter-named series will be caused to exert a plurality of supporting impulses, thus multiplying the number of air reactions and increasing the lifting power of the machine.

A still further object of the invention is to provide a novel relative arrangement of the aerofoils and driving propellers, by which the latter will operate to impel the air compressed thereby against the aerofoils to further increase and promote the lifting power of the machine; to provide a supporting surface which, in the event of the failure of the motive power, will serve as a parachute to insure the slow and safe descent of the machine to the ground; and to provide a simple, reliable and efficient type of launching and landing gear.

With these and other objects in view, the invention consists of the features of construction, combination and arrangement of parts hereinafter fully described and claimed, reference being had to the accompanying drawings, in which:

Figure 1 is a view in side elevation of a flying machine embodying my invention. Fig. 2 is a front elevation of the same with the front horizontal rudder omitted. Fig. 3 is a vertical longitudinal section through the supporting surface of the machine. Fig. 4 is a sectional front elevation of one of the channeled supporting surfaces and the underlying plane. Fig. 5 is a diagrammatic perspective view of the vertical rudder and its operating means. Fig 6 is a side elevation of one of the supporting wheels showing the yielding action thereof.

In the illustrated embodiment of the invention, I provide a main frame or fusilage comprising front and rear pairs of transversely-alined corner posts, standards or uprights 1 and 2, which may be suitably tied and braced, and which carry and support an upper horizontal frame 3. Extending longitudinally between said pairs of standards is a boat-shaped car or carriage 4 secured to the standards by rods or bars 5 and to the frame 3 by hangers 6, the parts being properly combined and arranged to insure strength with the requisite degree of lightness and rigidity. The car or carriage is designed to contain one or more seats for the aviator and passengers, if any, the driving motor 7, and the operating or controlling devices of the steering gear.

The machine is supported upon the ground by rubber-tired wheels 8 mounted upon the lower ends of the respective standards 1 and 2. Each wheel is journaled on an axle 9 carried by a downwardly and rearwardly curved fork 10 pivoted at its upper end to its supporting standard, as at 11, to swing in a fore-and aft direction. The lower arms of the fork 10 carry an upwardly and rearwardly curved fork 12, to which is rigidly connected a segmentally-curved arm 13. This arm 13 is slidably mounted in a guide opening 14 formed in the standard and carries at its free end a stop collar or head 15. A coiled cushioning or shock-absorbing spring 16 surrounds the arm between the fork and standard and normally serves to hold the wheel in supporting position, as shown in Fig. 1, in which position the pivoted end of the fork lies vertically and the collar or head 15 bears against the standard to prevent forward swinging movement of the wheel. The combined

strength of the springs is sufficient to sustain the weight of the machine when at rest and in running over level ground. It will be observed that the curvature of the forks 10 throws the wheels in rear of the plane of the standards, so that when the machine runs over rough ground in launching or landing the wheels are at liberty to swing upwardly and rearwardly against the resistance of the springs, in an arc coinciding with the arc of movement of the arms 13, whereby a proper cushioning action is established to relieve the machine of all shocks and jars. When the machine strikes the ground in landing, the wheels yield to the extent required and the landing shock is taken up and sustained by the springs, whereby liability of injury to the machine is obviated under all ordinary conditions. The forks of each wheel form substantially V-shaped brackets possessing maximum strength, and this, in connection with the mode of yieldingly mounting the bracket, enables a launching and landing gear of simple and effective construction to be provided, whereby all the shocks, vibrations and strains to which the machine is subjected in launching and landing will be taken up and absorbed.

Supported upon the frame structure 3 is a series of hood-shaped or channeled supporting surfaces or aerofoils 17, extending longitudinally in the line of flight, and each having its top wall curved or inclined downwardly and rearwardly, so as to travel at a desired angle of incidence for an efficient dynamical reaction of the air thereon. The enlarged ends of these hood-shaped aerofoils face forwardly, and the reduced rear end of each aerofoil in advance of the rear one of the series nests or extends into the enlarged end or mouth of the succeeding aerofoil. By this construction and arrangement of a series of channeled aerofoils, disposed in tandem or following relation, so as to track one another in flight, the supporting action of a compressed and confined volume of air on each aerofoil is obtained, and the resistance of such volumes of air to lateral and vertical deflection of the machine prevents sidewise drift or skidding of the machine and diminishes its tendency to tilt unduly on its longitudinal axis, thus giving it increased lateral stability. At the same time by securing a series of successive supporting reactions in the line of travel of the machine, the lifting power of the machine is increased, as well as its longitudinal stability. It will be observed that the efficiency of the aerofoils is further promoted through the action of the rarefaction surface of each front aerofoil in guiding and deflecting the air into the next succeeding aerofoil and against the reaction surface thereof.

Suitably secured to the frame structure 3 below each aerofoil 17 is a lower or secondary series of aerofoils 18, each consisting of a downwardly and rearwardly curved or inclined plane, and each preferably ribbed or corrugated on its underside to provide a series of reaction surfaces 19. These aerofoils 18 coöperate with the aerofoils 17 to multiply the supporting surfaces of the machine in such a manner as to augment its lifting power without increase of head resistance. The reaction surfaces give increased efficiency, and the sustaining action of the intermediate and rear aerofoils of the series 18 is promoted by arranging them in the path of the air impelled downward from the front and intermediate aerofoils of the series 17, as shown.

A longitudinal shaft 20 is journaled on the frame 3 and is driven by a sprocket chain 21 or any suitable type of gearing from the motor 7. This shaft carries a series of driving propellers 22 which respectively rotate at points in their paths of movement within the hoods 17 and in advance of the aerofoils 18. The air banked or compressed by these propellers is thus projected against the supporting surfaces 17 and 18, giving still further lifting capacity to the machine.

Horizontal and vertical rudders 23 and 24 are suitably arranged and mounted upon the machine and are adapted to be operated by controlling devices 25 and 26. The controlling device 25 comprises a hand lever pivoted to swing fore-and-aft, from which lead connecting cables 27 to crank arms 28 on the shaft or axis of the rudder 23, whereby the latter may be tilted to steer the machine vertically. The controlling device 26 is shown in the form of a steering post or shaft journaled to turn laterally and provided with a hand-wheel 29. Carried by said shaft or post is a drum or pulley 30 about which are oppositely wound the forward ends of a pair of cables 31, which lead over suitable guide pulleys 32 to the rudder 24, whereby said rudder may be adjusted in an obvious manner to steer the machine laterally.

In practice, ailerons or other stabilizers, and proper operating means therefor, may be employed, for use in emergencies or under adverse conditions.

Having fully described the invention, what is claimed as new and useful is:—

1. In a flying machine, a supporting surface comprising a plurality of hood-shaped aerofoils arranged in following order, and each having the form of a section of a cone.

2. In a flying machine, an aerofoil comprising a longitudinally extending, channeled, longitudinally tapering hood-shaped body, having the form of a section of a cone, said body being open to provide an air conduit of some depth and restricted width and having its top wall curved parabolically in a downward and rearward direction.

3. In a flying machine, a supporting surface comprising a plurality of tapered hood-shaped aerofoils arranged in following order, each aerofoil having the form of a section of a cone with its top surface curved parabolically downwardly and rearwardly, said aerofoils having their enlarged ends open and facing forwardly and each fore aerofoil having its reduced end partially projecting into the open front end of the succeeding aerofoil.

4. In a flying machine, a curved aerofoil having transverse corrugations forming a plurality of fore and aft reaction surfaces.

5. In a flying machine, a series of curved sustaining planes arranged one in rear of the other, each having its reaction side corrugated in a transverse direction to provide a plurality of fore and aft reaction surfaces.

6. A flying machine embodying a frame, an upper supporting surface formed of a longitudinal series of hood-shaped aerofoils, and a lower supporting surface formed of a series of curved planes, one or more of said planes being arranged in the path of the air impelled from said aerofoils.

7. A flying machine embodying a frame, a longitudinal series of channeled upper sustaining surfaces, and a longitudinal series of lower sustaining surfaces arranged below and in the path of the air impelled from said channeled sustaining surfaces.

8. A flying machine embodying a frame, a longitudinal series of channeled sustaining members, a longitudinal series of sustaining planes arranged below said sustaining members, and propellers arranged to rotate at points in their paths of movement within said channeled sustaining members and in advance of said sustaining planes, to force the air compressed thereby against the reaction surfaces of said sustaining members and planes.

9. A flying machine embodying a frame, a longitudinal series of channeled sustaining members, a longitudinal series of sustaining planes arranged below said sustaining members and having corrugated faces, and propellers arranged to rotate at points in their paths of movement within said channeled sustaining members and in advance of said sustaining planes, to force the air compressed thereby against the reaction surfaces of said sustaining members and planes.

10. In a flying machine, an upper longitudinal series of channeled sustaining members, and a companion lower longitudinal series of sustaining members each having transverse corrugations forming a plurality of fore and aft reaction surfaces.

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

CLARENCE L. MOORE.

Witnesses:

CLARENCE CLAYTON,

DAVID THURSTON.