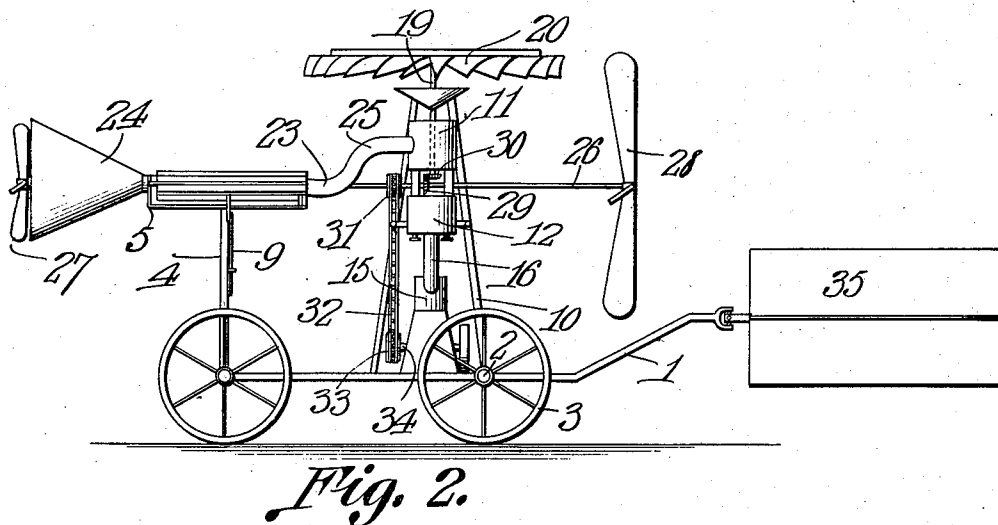
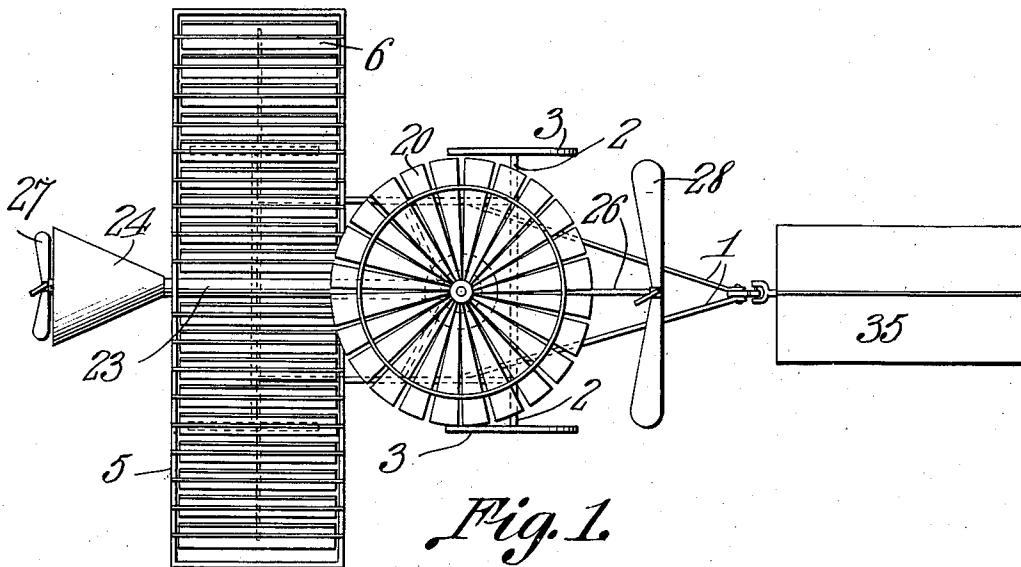


1,001,160.

Patented Aug. 22, 1911.

2 SHEETS—SHEET 1.



Witnesses

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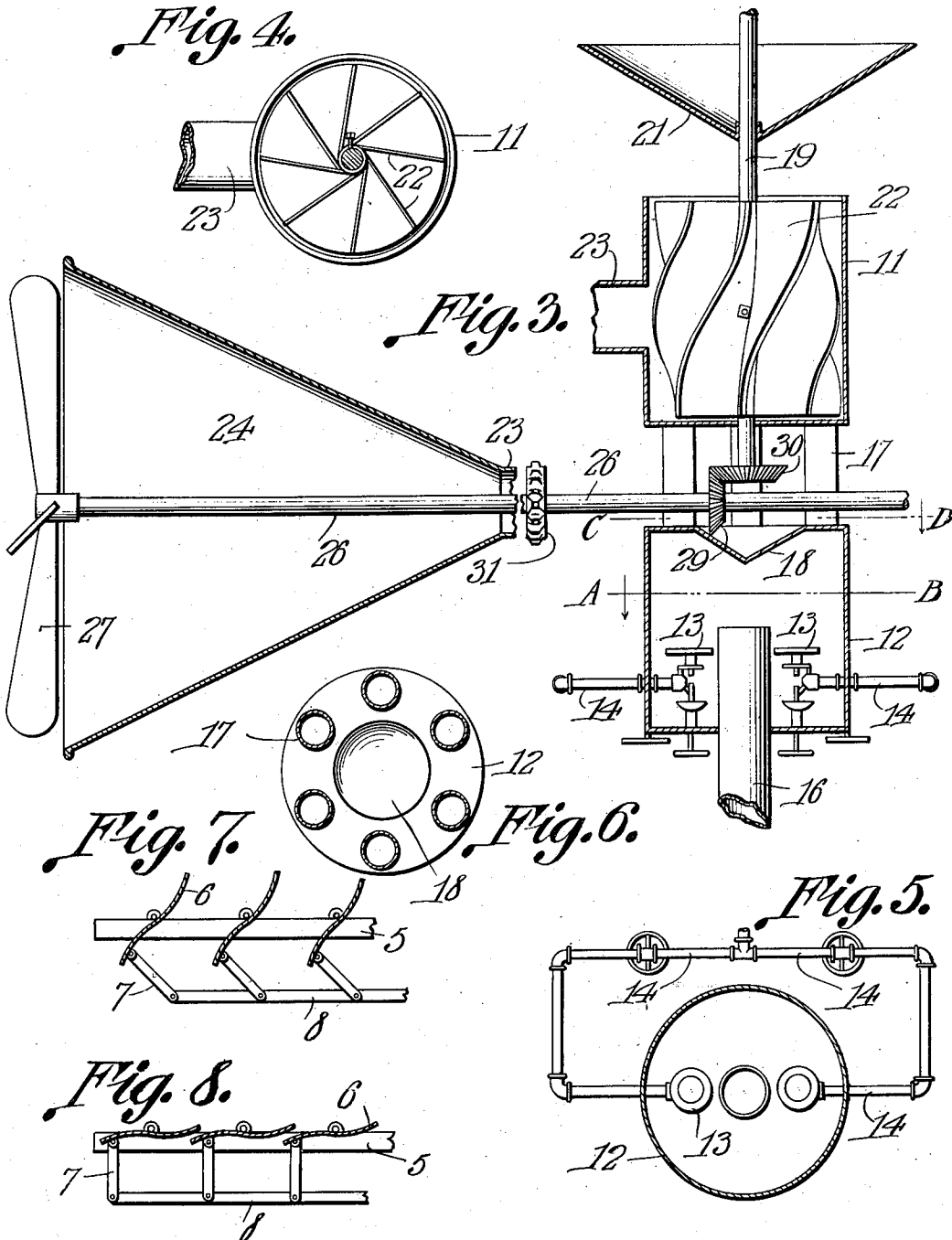
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AERODROME.

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1,001,160.

Patented Aug. 22, 1911.

2 SHEETS-SHEET 2.



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UNITED STATES PATENT OFFICE

PAUL A. OTTO, OF TIFFIN, OHIO.

AERODROME.

1,001,160.

Specification of Letters Patent. Patented Aug. 22, 1911.

Application filed April 5, 1910. Serial No. 553,478.

To all whom it may concern:

Be it known that I, PAUL A. OTTO, a citizen of the United States, residing at Tiffin, in the county of Seneca and State of Ohio, have invented a new and useful Aerodrome, of which the following is a specification.

This invention relates to aerodromes or flying machines of the heavier than air type.

One of the objects of the invention is to provide a combined monoplane and a helicopter, the elevating wheel constituting means for maintaining the machine at a desired elevation above a fixed point and the aeroplane coöperating with said wheel for sustaining the machine during its forward flight.

Another object of the invention is to provide a motor for actuating the elevating wheel, the gases exhausted from said motor being employed for the purpose of expanding cold air within a mixing chamber, the said air, during the expansion thereof, operating to drive a wheel operatively connected to the elevating wheel, and thus greatly increasing the efficiency of the motor.

A further object is to provide means whereby cold air may be forced into the mixer, this forcing action resulting in the forward propulsion of the machine.

With these and other objects in view the invention consists of certain novel details of construction and combinations of parts hereinafter more fully described and pointed out in the claims.

In the accompanying drawings the preferred form of the invention has been shown.

In said drawings:—Figure 1 is a plan view of a machine embodying the present improvements. Fig. 2 is a side elevation thereof. Fig. 3 is an enlarged central vertical section through the mixer and adjacent parts the cold air conducting flue having its metal portion removed. Fig. 4 is a plan view of the wheel within the mixing chamber. Fig. 5 is a section on line A—B Fig. 3. Fig. 6 is a section on line C—D Fig. 3. Fig. 7 is a front elevation of a portion of the aeroplane, the blades thereof being shown open. Fig. 8 is a view similar to Fig. 7 and showing the blades closed.

Referring to the figures by characters of reference 1 designates a frame supported by axles 2 which are in turn preferably carried by wheels 3.

Standards 4 are mounted upon the front portion of the frame 1 and the upper ends

of these standards are connected to an elongated rectangular frame 5 extending equal distances beyond the two sides of the frame 1 and constituting supports for a series of centrally pivoted blades 6. These blades extend from front to rear of the frame 5 and are preferably ogee curved as shown particularly in Figs. 7 and 8, the blades, when closed, being adapted to lap. Links 7 are pivotally connected to and extend downwardly from the blades and are pivotally connected to an actuating rod 8 which may be operated in any suitable manner, as by means of a lever 9 extending downward toward the frame 1 and within convenient reach of the aviator. It is of course to be understood that while in flight, the blades 6 are to be closed as shown in Fig. 8, but, during the upward movement of the machine while propelled by the elevating wheel hereinafter described, it is desirable that the blades 6 be swung to open positions so as to offer the minimum resistance to the air.

An upstanding frame 10 is mounted on the frame 1 and supports an upper casing 11 and a lower casing 12. Said lower casing has a heating compartment therein within which are located a desired number of hydro-carbon burners 13 which may be supplied with fuel from any suitable source through pipes 14. An engine 15 is located below the casing 12 and the exhaust therefrom is adapted to be conducted into the casing 12 by a pipe 16. An annular series of outlet flues 17 extend from the top of the casing 12 and opens into the bottom of the casing 11, the top of said casing being formed with a central conical depression 18 constituting a deflector for directing the exhausted gases toward the flues 17 after leaving the pipe 16.

The casing 11 is open at the top and has a shaft 19 journaled in the bottom thereof and provided at its upper end with an elevating wheel 20 which may be of any desired construction. An inverted conical deflector 21 is secured to and rotates with the shaft 19 between the upper end of the casing 11 and the wheel 20. Curved blades 22 extend radially from that portion of the shaft 19 located within the casing 11 and the outer edges of these blades are disposed close to the wall of the casing 11. An air conducting flue 23 is arranged longitudinally above the center of the frame 1 and extends through the center portion of the frame 5, the front end of

this flue being formed with a conical inlet 24 while the rear end thereof is curved upwardly as shown at 25 and opens into the casing 11. A shaft 26 extends longitudinally through the flue 23 and is provided at its front end with a fan 27 adapted to draw air into the inlet 24 and force it longitudinally within the flue 23. A propeller 28 is connected to the rear end of the shaft 26 and is located above the rear portion of the frame 1. A gear 29 is secured to the shaft 26 at a point between the casings 11 and 12 and meshes with a gear 30 which is secured to the shaft 19 heretofore referred to. A sprocket 31 may be secured to the shaft 26 and a chain 32 serves to transmit motion thereto from a wheel 33 which is driven by the engine 34. A combined vertical and horizontal rudder 35 is preferably connected to the rear end of the frame 1 and this rudder may be operated by any suitable mechanism, not shown. It is of course to be understood, also, that a suitable arrangement of clutches etc., may be provided for the purpose of separately actuating the elevating wheel 20 and the propeller 28. It has not been deemed necessary to illustrate any such mechanism as the same can be of any well known type.

In operation the blades 6 are first shifted to their open positions and when the motor 34 is set in motion power will be transmitted therefrom through chain 32 to shaft 26 and thence through gears 29 and 30 to the shaft 19. The wheel 20 will thus be rotated and will operate to elevate the machine above a fixed point. The rotation of the shaft 26 will produce a corresponding movement of the fan 27 and this fan will direct air into the funnel shaped inlet 24 and thence longitudinally through the flue 23 and into the casing 11. The hot gases exhausted from the motors 34 will pass into the casing 12 and be superheated by the burners 13. These superheated gases will pass through the flues 17 and into the casing 11 where they will mix with the cold air forced into said casing from the flue 23. This cold air will therefore be expanded and drive the blades 22 annularly within the casing thus supplementing the direct drive from the engine through the chain 22 and greatly increasing the efficiency of the motor. The spent gases pass upwardly from the open top of the casing 11 and against the conical deflector 21 which directs them against the blades of the wheel 20. It will of course be understood that the fan 27 coöperates with the propeller 28 for driving the machine forward and when a desired elevation has been reached the blades 6 may be closed and will thus coöperate to form a sustaining plane for the purpose of maintaining the machine in its elevated position.

Various changes can of course be made

in the construction and arrangement of the parts without departing from the spirit or sacrificing any of the advantages of the invention as defined in the appended claims.

What is claimed is:—

1. An aerodrome including an elevating wheel, a propelling wheel revoluble therewith, a motor, means operated by the motor for actuating the elevating wheel, means for directing the exhaust from the motor and against the propelling wheel, and means operated by the motor for directing cold air against said propelling wheel to mix with the exhaust.

2. An aerodrome including an elevating wheel, a propelling wheel movable therewith, a motor for actuating the elevating wheel, a mixing chamber housing the propelling wheel, means for directing cold air into said chamber, said means being operated by the motor, and means for directing exhaust gases from the motor and into said chamber.

3. An aerodrome including an elevating wheel, a propelling wheel movable therewith, a mixing chamber housing said propelling wheel, a motor for actuating the elevating wheel, means for directing exhaust gases from the motor and into the mixing chamber, means for superheating the gases prior to their admission to the mixing chamber, and means operated by the motor for directing cold air into the mixing chamber.

4. An aerodrome including an elevating wheel, a propelling wheel movable therewith, a mixing chamber constituting a housing for the propelling wheel, a motor for actuating the elevating wheel, means operated by the motor for directing cold air into the mixing chamber, and means for heating the air admitted to said chamber.

5. An aerodrome including an elevating wheel, a mixing chamber therebelow, a propelling wheel within the mixing chamber and movable with the elevating wheel, a longitudinally extending air flue opening into the mixing chamber, means in front of the flue for directing air longitudinally therein and into the mixing chamber, a motor for actuating the elevating wheel, and means for directing exhaust gases from the motor and into the mixing chamber to expand the air therein.

6. An aerodrome including an elevating wheel, a propelling wheel movable therewith, a mixing chamber in which said propelling wheel is mounted, means for directing cold gases into said chamber, and means for heating said gases while in the mixing chamber, to expand them, and actuate the propelling wheel.

7. An aerodrome including an elevating wheel, a mixing chamber, front and rear propellers mounted for simultaneous rotation, means for directing air from the front

propeller and into the mixing chamber, a motor for driving the propellers, means for directing exhaust gases from the motor and into the mixing chamber, and a propelling wheel within said chamber and adapted to be actuated by the mixed gases therein.

8. In an aerodrome, a propeller, an elevating wheel, motor actuated means for driving said wheel and propeller, means for directing displaced air from the propeller to the wheel driving means, means for expanding said air, and means for transmitting the force of the expanded air to said wheel driving means.

9. An aerodrome including a plurality of blades mounted for tilting movement, means for simultaneously tilting the blades to vary the distance therebetween, a longitudinal flue intersecting the sustaining plane formed by the blades, said flue having a flared inlet, motor propelled means for forcing air into said inlet and flue, a mixing chamber for receiving the air from the flue, means for directing hot gases from the motor and into said chamber, an elevating wheel, and means within the chamber and actuated by mixed gases for rotating the wheel.

10. An aerodrome including an elevating wheel, a mixing chamber, a flue for directing air into said chamber, a propeller for forcing air into the flue and chamber, a motor for actuating said propeller, means for directing hot exhaust gases from the motor and into the mixing chamber to expand the air admitted from the flue, and means within said chamber and operated by the mixing gases for actuating the elevating wheel.

11. An aerodrome including an elevating wheel, a mixing chamber, a propelling wheel

mounted for rotation within the mixing chamber and revoluble with the elevating wheel, and separate means for directing hot and cold gases into the mixing chamber to actuate the propelling wheel.

12. An aerodrome including an elevating wheel, a propelling wheel, a mixing chamber, said propelling wheel being mounted for rotation within the mixing chamber, a deflecting element above the mixing chamber, said chamber being open at the top, a motor, means for superheating the gases exhausted from the motor, means for directing the superheated gases into the mixing chamber, and means for directing cold air into said chamber.

13. An aerodrome including an elevating wheel, a mixing chamber, a propelling wheel mounted within the mixing chamber and operatively connected with the elevating wheel, a motor, means for superheating the gases exhausted from the motor, means for directing the superheated gases into the mixing chamber, and means operated by the motor for directing cold air into said mixing chamber.

14. In an aerodrome, a wheel, motor operated means for rotating the wheel, a chamber, means for setting up a current of air through said chamber, means for expanding the air in said chamber by heat, and means for transmitting the force of the expanded air to the wheel rotating means.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

PAUL A. OTTO.

Witnesses:

JOHN B. FIEGE,

HAL W. MICHAELS.