

Dec. 23, 1930.

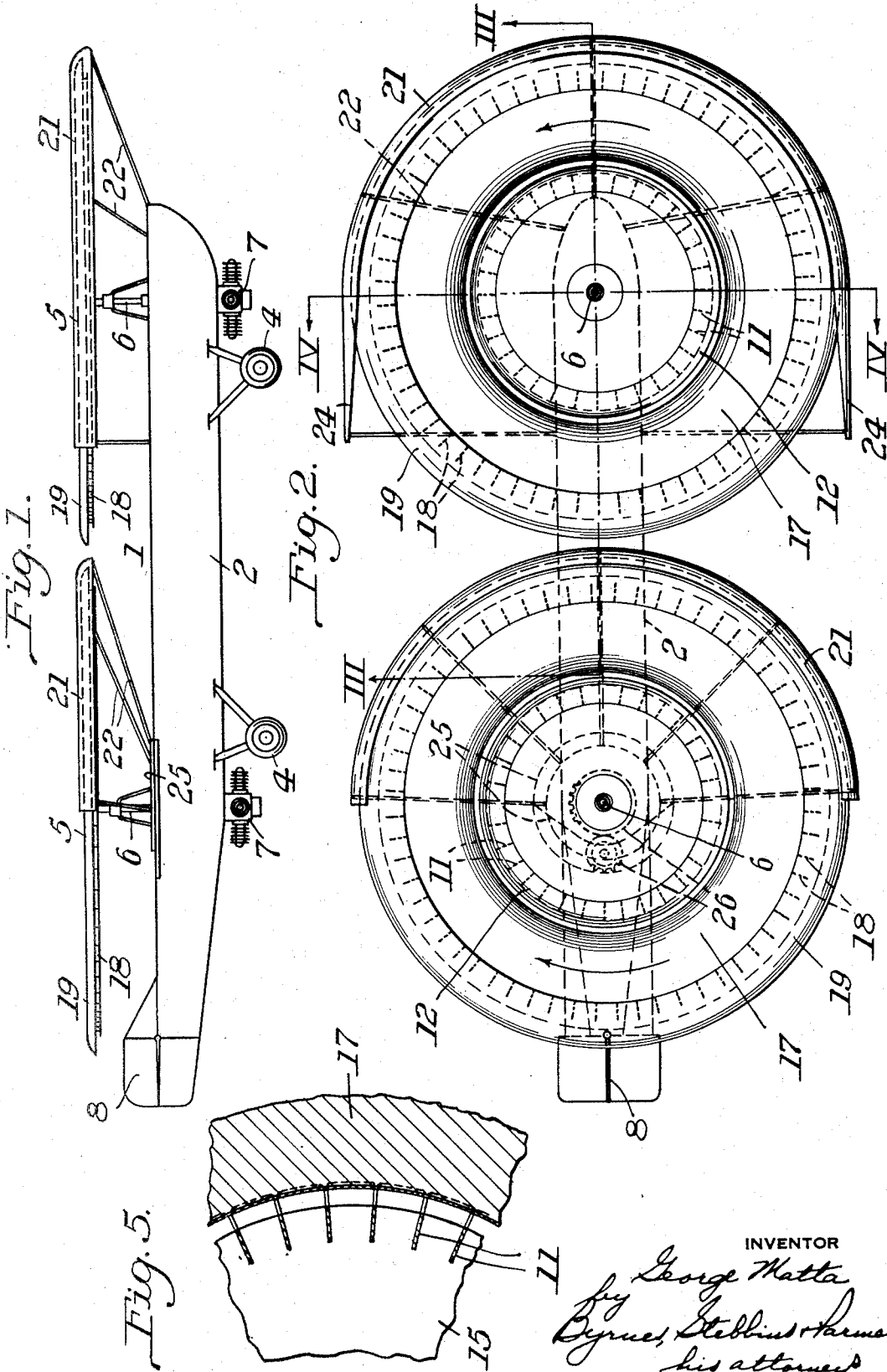
G. MATTA

1,786,017

HELICOPTER

Filed Aug. 8, 1928

2 Sheets-Sheet 1



INVENTOR

George Matta
by Byrne, Stebbins & Carmichael
his attorneys

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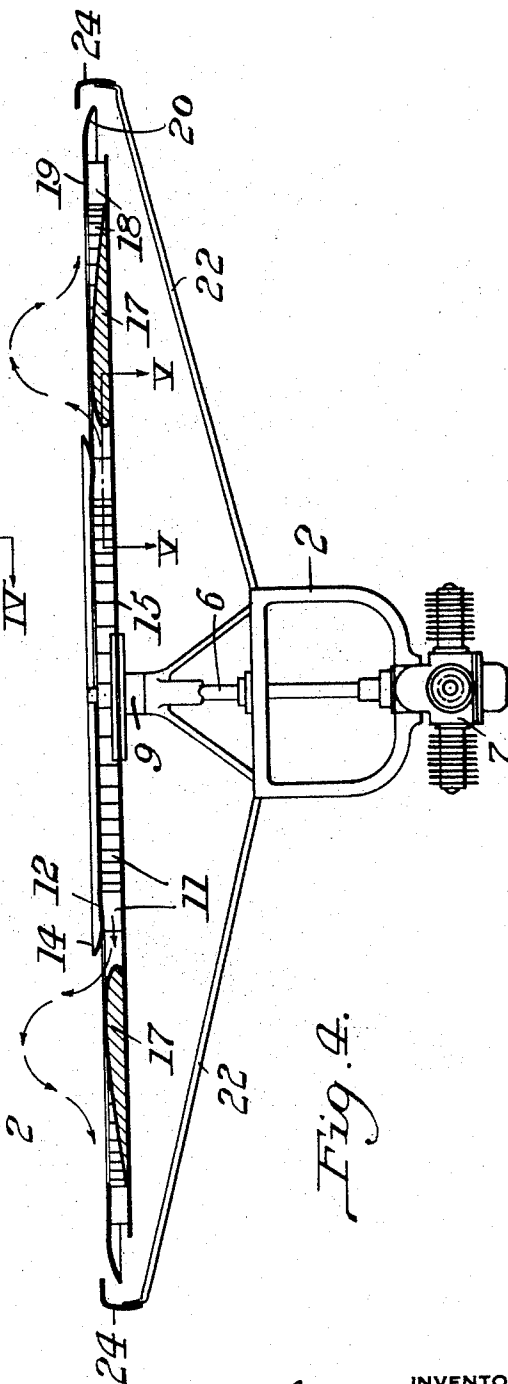
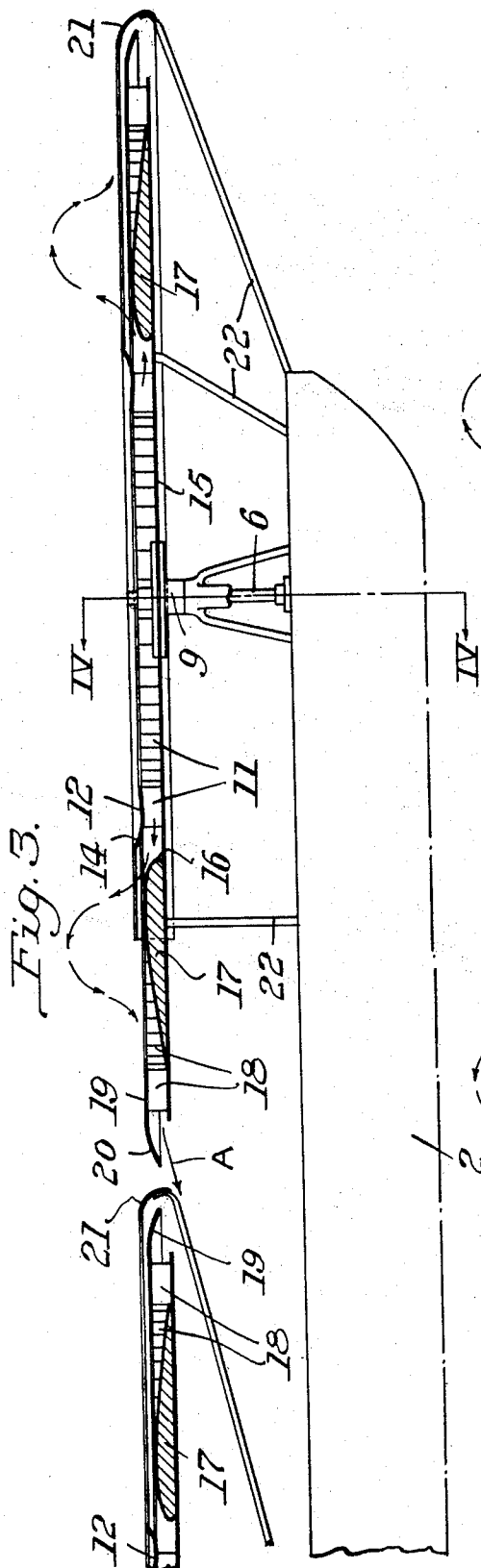
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HELICOPTER

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

GEORGE MATTA, OF BRADDOCK, PENNSYLVANIA

HELICOPTER

Application filed August 8, 1928. Serial No. 298,258.

My invention relates to heavier than air flying craft and more particularly to helicopters.

Heavier than air flying machines now in common use require considerable space over which they travel before leaving the ground by reason of their inability to rise substantially perpendicularly. Efforts have heretofore been made to construct helicopters in which the reaction between whirling blades and a column of air is utilized for lifting the machine. In such constructions, however, the air is drawn through the machine and discharged at high velocity. The lifting effect of the machine is dependent upon maintaining a vacuous state above the helicopter, and the lifting effect of the air moved by the blades has not heretofore been utilized.

I provide a helicopter in which the air discharged by a fan is caused to impinge upon one or more lifting vanes of annular form, the cross section of each of which is made in accordance with the mathematical considerations governing the design of airplane wings. The air discharged by the fan is directed against the lifting vanes for creating a condition of vacuum above the vanes and for exerting a direct lifting effect on the vanes. Provision is also made for utilizing the air from the fan for moving the helicopter in a forward direction.

The accompanying drawings illustrate the present preferred embodiment of the invention in which,

Figure 1 is an elevational view of a helicopter embodying my invention;

Figure 2 is a plan view thereof;

Figure 3 is a sectional view of a portion of the helicopter taken substantially along the section line III—III of Figure 2;

Figure 4 is a transverse sectional view taken substantially along the section line IV—IV of Figure 2; and

Figure 5 is an enlarged sectional view in plan of a portion of the lifting mechanism taken substantially along the section line V—V of Figure 4.

Referring to the drawings, a helicopter 1 comprises a body or fuselage 2 mounted on wheels 4 and provided with a pair of lifting

units 5. Each of the lifting units comprises a driving shaft 6 extending upwardly through the fuselage 2 and a driving engine 7 for each shaft 6. The fuselage 2 is also provided with a rudder 8.

Each of the lifting units 5 is a complete unit. Each unit comprises a hub 9 on which is mounted a disc 15 as shown in detail in Figures 3 and 4. Spaced from the hub 9 the disc 15 carries a plurality of substantially radially disposed fan blades 11. The blades 11 are covered by an arcuate plate 12 opening inwardly and having an upwardly directed flange 14 at its outer circumference.

With the foregoing construction, upon the rotation of the shaft 6 the blades 11 are rotated at high speed for constituting a centrifugal fan that directs a current of air outwardly from the shaft in all directions. As part of the air is drawn from above the disc 15 the operation of the fan tends to create a vacuum thereabove for causing a lifting action on the helicopter.

The air discharged by the blades 11 impinges upon the nose 16 of a lifting vane 17. The lifting vane 17 is annular in shape and is mounted on the disc 15. It is to be understood that the lifting vane 17 may be made continuous or may be constituted by a plurality of separate units, although I prefer to use a continuous annular vane. The shape of the vane 17 in radial cross section conforms to the mathematical laws by which airplane wings are designed for deflecting a current of air upwardly from the point of the vanes for creating a condition of vacuum above the body of the vane. The vane 17 rotates with shaft 6. The shape of the flange 14 is such as to direct the air discharged by the blades 11 upwardly along the vane. Such air as is discharged beneath the vane exerts a direct lifting effect thereon.

At the outer circumference of the vane 17 other blades 18 are mounted. A cover plate 19 for the blades terminates in a downwardly directed flange 20 for a purpose hereinafter described. The blades 18 draw air from above the vanes 17, thereby assisting in maintaining a vacuous condition above the vanes.

While a helicopter is operable with a single unit, I prefer to mount the units in pairs in order to overcome the spinning effect produced by a single unit. The units of each pair are operated in opposite directions to neutralize their spinning effects.

For imparting a movement to the helicopter in a horizontal direction, a curved shield 21 is carried by supports 22 extending upwardly from the fuselage. The shield 21 does not extend around the entire circumference of the unit but conforms to the radius of the flange 20 for substantially a semicircle. Beyond the diameter of the curved section, tangential portions 24 extend in substantial parallelism with the body of the fuselage.

To prevent horizontal movement of the helicopter when it is desired to rise vertically, the shield 21 of the rear unit and its supports 22 are mounted on a ring 25 stationed in the fuselage. The ring 25 is driven by a gearing 26, either manually driven or connected to one of the engines 7. The shields 21 of the two units are disposed at the opposite ends of the helicopter thereby neutralizing the horizontal directional components of the forces pressed upon the shields 21. For convenience in turning the rear shield its ends 24 are omitted when desired.

When it is desired to move the helicopter in a horizontal direction, the rear shield 21 is turned so that the air directed against it tends to move the helicopter in the same direction as does the air directed against the forward shield 21. In this position air from substantially half of the blades 18 of both units impinges against the shields 21. The reaction of the air discharged from the open portions of the lifting units reacts upon the atmosphere and also tends to drive the helicopter forward in a horizontal direction. It is to be understood that the number of lifting vanes 17 and the number of concentric groups of blades may be varied as desired.

Where lifting units are disposed longitudinally of the fuselage, the air discharged from the blades 18 at the rear of the forward unit would impinge upon the outer surface of the shield 21 of the succeeding unit but for the downwardly reflecting flange 20. This flange is shaped to divert the discharged air in a direction beneath the succeeding lifting unit as shown by the arrow A in Figure 3.

While I have shown and described the preferred embodiment of my invention, it is to be understood that it may be otherwise embodied within the scope of the following claims.

I claim:

1. A helicopter comprising a fuselage, an engine carried thereby, a lifting unit mounted above the fuselage and comprising a circular lifting vane and a plurality of fan blades disposed internally and externally of and concentrically with said vane for direct-

ing air against the lifting vane, and means for connecting the engine to the lifting unit.

2. A lifting unit for a helicopter comprising a hub, radially extending blades rotatably mounted about the hub, and a substantially continuous lifting vane of annular shape disposed concentrically of the hub and internally and externally of the blades for receiving air discharged from the blades.

3. A lifting unit for a helicopter comprising a hub, a plurality of concentrically arranged groups of fan blades disposed about the hub and a lifting vane disposed between the groups of fan blades.

4. A lifting unit for a helicopter comprising a hub, a lifting vane disposed concentrically of the hub, fan blades for directing a stream of air against one edge of the lifting vane and fan blades mounted externally of the lifting vane for developing a radially extending stream of air externally of the lifting vane.

5. A lifting unit comprising an annular lifting vane, one surface of the vane being curved for developing a condition of vacuum thereabove, a rotatable fan disposed internally and externally of and concentrically with said vane for directing a stream of air against one edge of the lifting vane, and means for supporting the lifting vane and fan.

6. A helicopter comprising a plurality of rotating lifting units, each lifting unit comprising fan blades at the outer edge thereof for creating a current of air, a shield partially enclosing each of the lifting units and against which the air stream from one of the units impinges for moving the helicopter in substantially a horizontal plane, and a flange associated with the fan blades curved to deflect an air stream away from an adjacent lifting unit.

7. A lifting unit for a helicopter comprising a hub, a plurality of radially disposed blades supported in spaced relation to the hub, a lifting vane disposed externally of the blades for receiving air discharged therefrom, and another group of blades mounted externally of the lifting vane.

8. A helicopter having a rotating driving element comprising a plurality of groups of rotating radially disposed fan blades, a lifting vane cooperating with the fan blades, and a shield enclosing a portion of the lifting unit for directing the helicopter in a horizontal direction.

In testimony whereof I have hereunto set my hand.

GEORGE MATTA.

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