M. DINGFELDER.

FLYING MACHINE.

APPLICATION FILED DEC. 2, 1909.

991,770. **Patented May 9, 1911.**

2 SHEETS—SHEET 1.

Fig. 7.

Fig. 8.

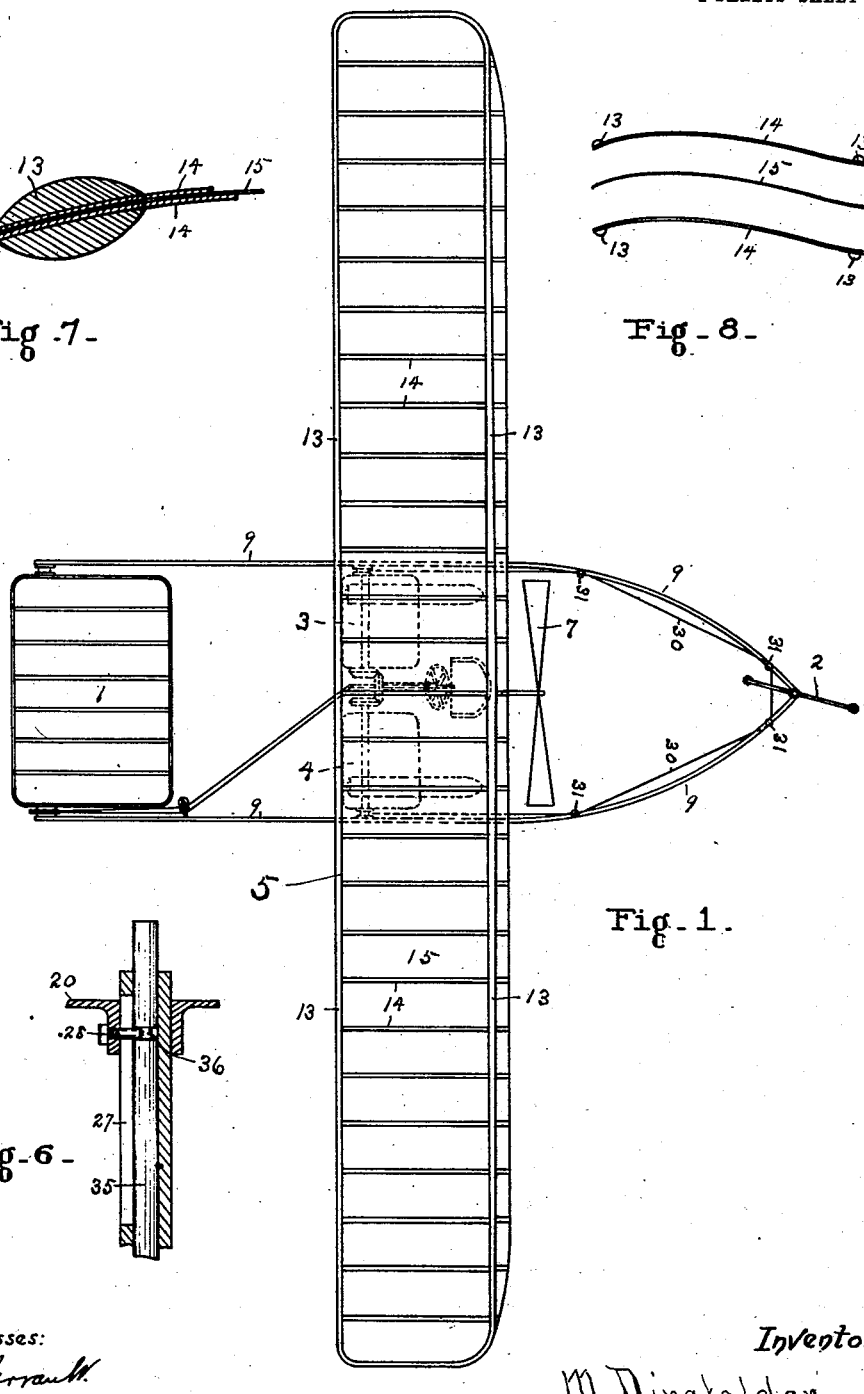

Fig. 1.

Fig. 6.

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2 SHEETS—SHEET 2.

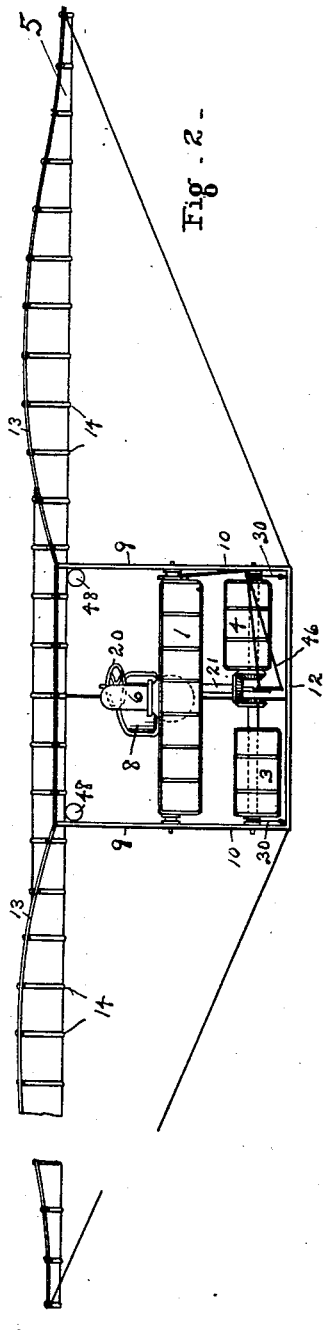

Fig. 2.

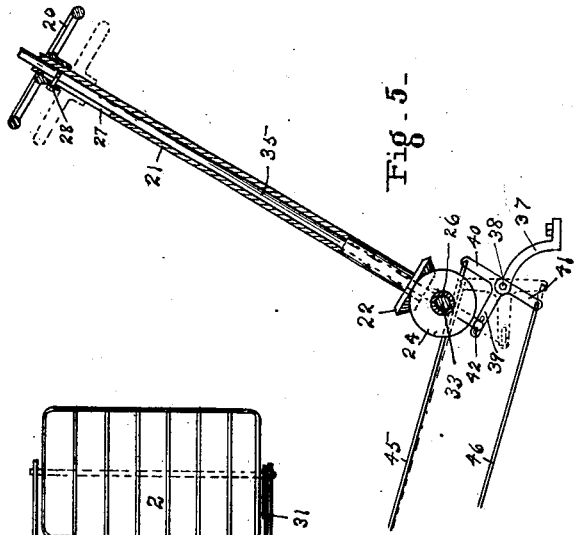

Fig. 5.

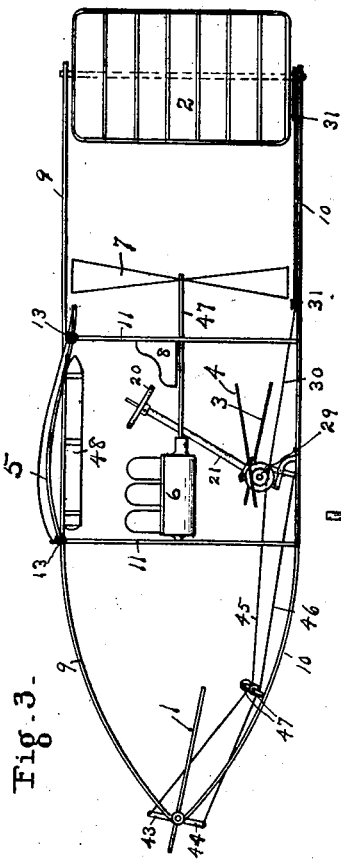

Fig. 3.

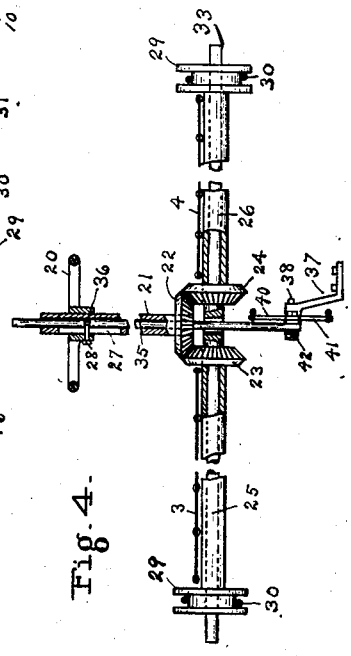

Fig. 4.

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UNITED STATES PATENT OFFICE.

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FLYING-MACHINE.

991,770. Specification of Letters Patent. Patented May 9, 1911.

Application filed December 2, 1909. Serial No. 530,926.

To all whom it may concern:

Be it known that I, MAX DINGFELDER, a citizen of the United States, and a resident of Detroit, in the county of Wayne and State of Michigan, have invented a new and useful Flying-Machine, of which the following is a specification.

This invention relates to flying machines of the mono-plane class, and the object of my improvements is to provide a flying machine which shall be easily controlled and in which the planes shall have great stiffness for the weight of the same.

In the accompanying drawings, Figure 1 is a plan of the entire machine. Fig. 2 is a front and Fig. 3 is a side elevation of the machine. Figs. 4, 5 and 6 are details of the steering device. Figs. 7 and 8 are details of the planes.

Similar reference characters refer to like parts throughout the several views.

The machine shown has at its forward end the horizontal rudder 1, adjustable for causing the front of the machine to turn up or down, and at its rear end the vertical rudder 2; the auxiliary or leveling planes 3 and 4 to cause the machine to dip laterally when turning, the main plane 5, the engine 6, the screw 7, and a frame to support and connect the various parts as well as the necessary controlling devices. While all the necessary bracing devices may be employed, none are shown, as they may be inserted wherever found desirable.

The body of the machine is but partially shown, and consists of the uprights 11, and transverse bars 12 of the central cage, and the main frames 9 and 10. These main frames are parallel to each other at the middle of the machine and are bent toward their ends, the upper and lower frames on each side meeting each other at their forward ends while the two upper frames meet at their rear ends and the two lower frames are similarly bent to also meet at their rear ends. The front ends of the frames on one side are parallel to those on the other side, while the rear end of each upper frame is parallel to the lower frame on the same side. The front ends of the frames carry bearings for the horizontal rudder 1, while the rear ends carry bearings for the vertical rudder 2.

The planes and rudders may all be built up in a similar manner, with longitudinal and cross supports. Referring to Figs. 1, 7 and 8, it will be observed that the main plane has longitudinal frames 13 and transverse ribs 14. The transverse ribs are in pairs, one above and the other below the canvas or other fabric 15. The frames 13 are also formed in two parts extending above and below the pairs of transverse ribs. The halves of the ribs and frames are secured together in any desirable manner, and the ends of the frames may be bent and joined at the ends of the plane.

The main plane 5 may be bent or curved to the desired proper form as shown in Figs. 2, 3, 6 and 7. The frames 13 connect to the uprights 11 and thus form the upper transverse bars of the central cage. The rear ends of the ribs 14 may project rearwardly from the rear frame 13 as shown in Figs. 1 and 8.

The course of the flying machine is controlled by the horizontal rudder 1, the intermediate auxiliary planes 3 and 4, and the vertical rudder 2. It is desirable that these rudders and planes should all be under the direct control of the operator at all times, without necessitating the moving of his hands. The mechanism illustrated enables the operator to control the various planes by means of the wheel 20, in the following described manner.

The inclined tube 21 has a bevel gear 22 at its lower end, which gear meshes with the gear 23 on the sleeve 25 and the gear 24 on the sleeve 26. The plane 3 is secured to the sleeve 25 and the plane 4 to the sleeve 26. The wheel 20 is slidable on the tube 21, which tube has a slot 27 through which the pin 28, carried by the wheel 20, may slide up and down. The tube will therefore turn with the wheel but the wheel may slide freely on the tube. At the outer ends of the sleeves 25 and 26 are the rope sheaves 29, which carry the ropes 30 which connect to the rudder 2. Wheels 31 on the lower frames 10 guide these ropes. If now the operator turns his wheel 20 to the right, the sleeve 25 turns back and the sleeve 26 turns forward, the plane 3 tips up and the plane 4 tips down, the ropes 30 wind up on the right and off on the left sheave 29, swinging the rudder to the left, thus causing the machine to turn to the left with the left wing of the main plane depressed.

The sleeves 25 and 26 are journaled on a

shaft 33 supported by the frames 10 by any desirable proper bearings which have been omitted for the sake of clearness.

For the purpose of operating the horizontal rudder, 1, the following described construction may be employed. The wheel 20 is slidable on the tube 21 as before stated. The wheel is revoluble on the rod 35, but the pin 28 enters the circumferential groove 36 in this rod so that any movement of the wheel longitudinally of the tube 21 will cause the rod 35 to move with the wheel. A bracket 37, carried by the bottom of the cage, supports a short shaft 38 on which is mounted a crank having three arms 39, 40 and 41. The arm 39 has a slot in which is slidable a pin 42 carried by the lower end of the rod 35. Secured to the horizontal rudder are two arms 43 and 44 which are connected to the arms 40 and 41 by the wires 45 and 46, which pass around the guide wheels 47.

By pulling up on the wheel 20, the rod 35 and arm 39 move upward, while the arms 40 and 43 and wire 45 move rearwardly, and the arms 41 and 44 and wire 46 move forwardly. The result of the upward movement of the wheel will be to tip the horizontal rudder upwardly, causing the machine to turn up.

Swinging the wheel 20 and the tube 21 forward on the shafts 33 as an axis will turn the auxiliary planes 3 and 4 downward, thus causing the machine to turn down, while swinging the wheel and tube back will cause the machine to turn up. As the pull of the planes 3 and 4 is below the main plane, the force is not so effective in proportion as that of the front rudder 1.

The various parts of the machine may be of any desirable material, but I prefer to form the ribs and frames of rock-elm. The motor will preferably be supported in such a manner that the shaft 47 will be equal distances from the upper frames 9 and the lower frames 10. The seat 8 is preferably just above the shaft so that the operator will straddle the shaft and have the tube 21 between his knees. The engine will be immediately in front of him so he can observe its operations at all times. The fuel may be stored in the tanks 48 just below the main plane. The rudders and planes may be curved in any desired manner and reinforcements may be employed wherever needed.

The relative proportions of the planes and rudders may be modified to suit the conditions of service and the locality where the machine is to be used. In a prairie country, the planes 3 and 4 will be much smaller than where the machine is to be used in a rolling country. The planes 3 and 4 may be increased in proportion to the main plane where quick maneuvering is desired. A flat or slightly curved main plane would permit this machine to fly backward as well as forward.

Having now explained my improvements, what I claim as my invention and desire to secure by Letters Patent is:—

1. In a flying machine, the combination of a body, a main plane, auxiliary planes and rudders, the main plane being formed of a sheet of fabric, ribs on opposite sides of the fabric, and frames extending along the ends of ribs on both sides of the fabric, the ribs and frames being secured together.

2. In a flying machine, the combination of a frame, horizontal and vertical rudders carried thereby, auxiliary planes mounted transversely to the machine and having their axes in line with each other, sleeves upon which the planes are mounted, a bevel gear on the inner end of each sleeve, an upwardly extending tube, a wheel at the upper end thereof, a bevel gear at the lower end of the tube meshing with the gears on the sleeves, rope sheaves at the outer ends of the sleeves, and ropes extending from the sheaves to the vertical rudder, the turning of the wheel and tube swinging the planes in opposite directions and simultaneously swinging the rudder.

3. A plane for flying machines comprising a sheet of fabric, ribs on opposite sides of the fabric, and frames extending along at the ends of the ribs on both sides of the fabric, the ribs and frames being secured together.

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

MAX DINGFELDER.

Witnesses:
EDWARD N. PAGELSEN,
ELIZABETH M. BROWN.