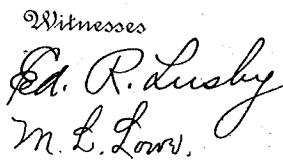


APPLICATION FILED DEC. 15, 1909.

Patented Jan. 9, 1912.

3 SHEETS—SHEET 1.



By Woodward & Chandler
Attorney

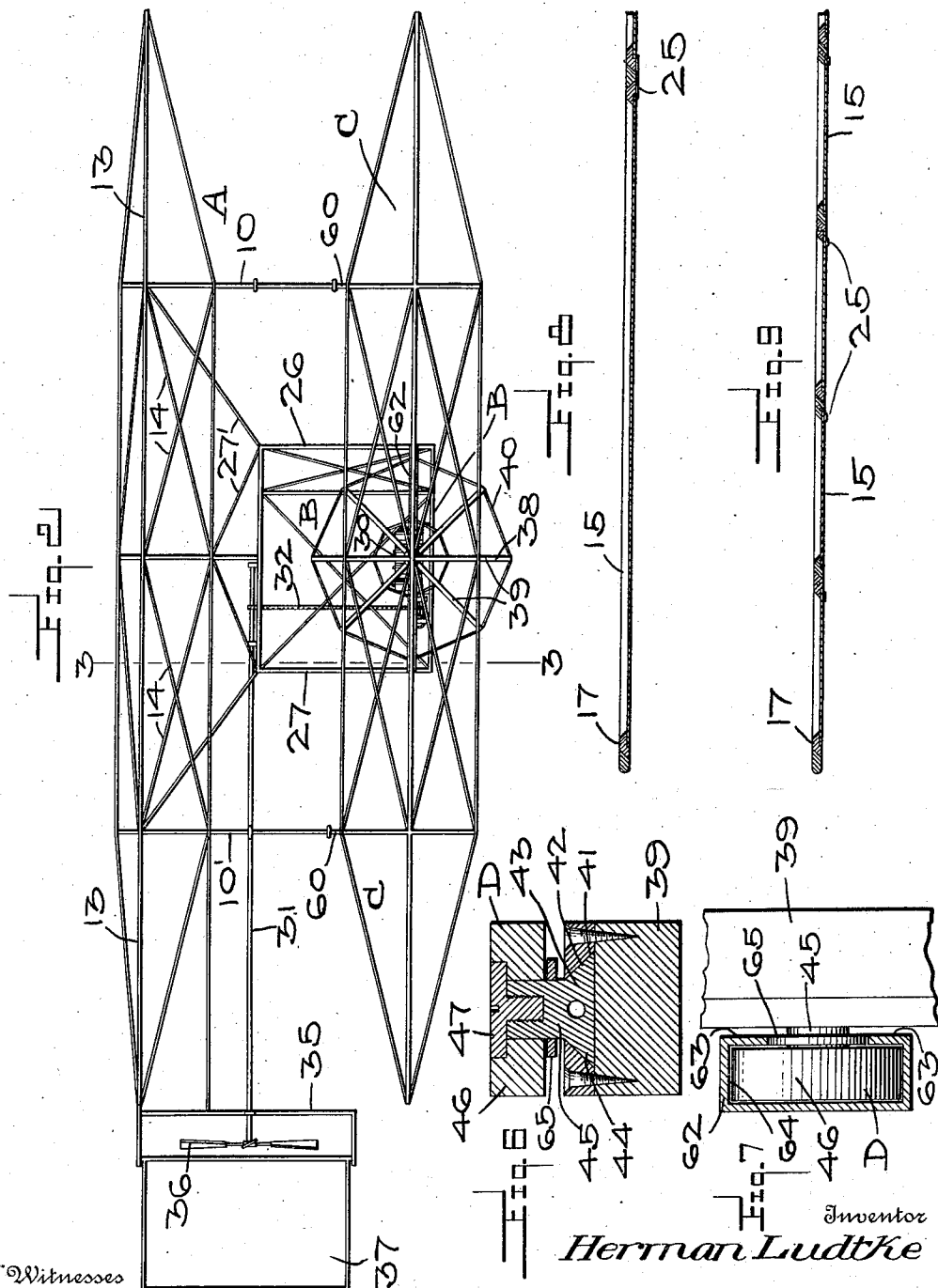
H. LUDTKE.
FLYING MACHINE.

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Witnesses

Ed. R. Lushy
M. L. Lorr.

Inventor
Herman Ludtke

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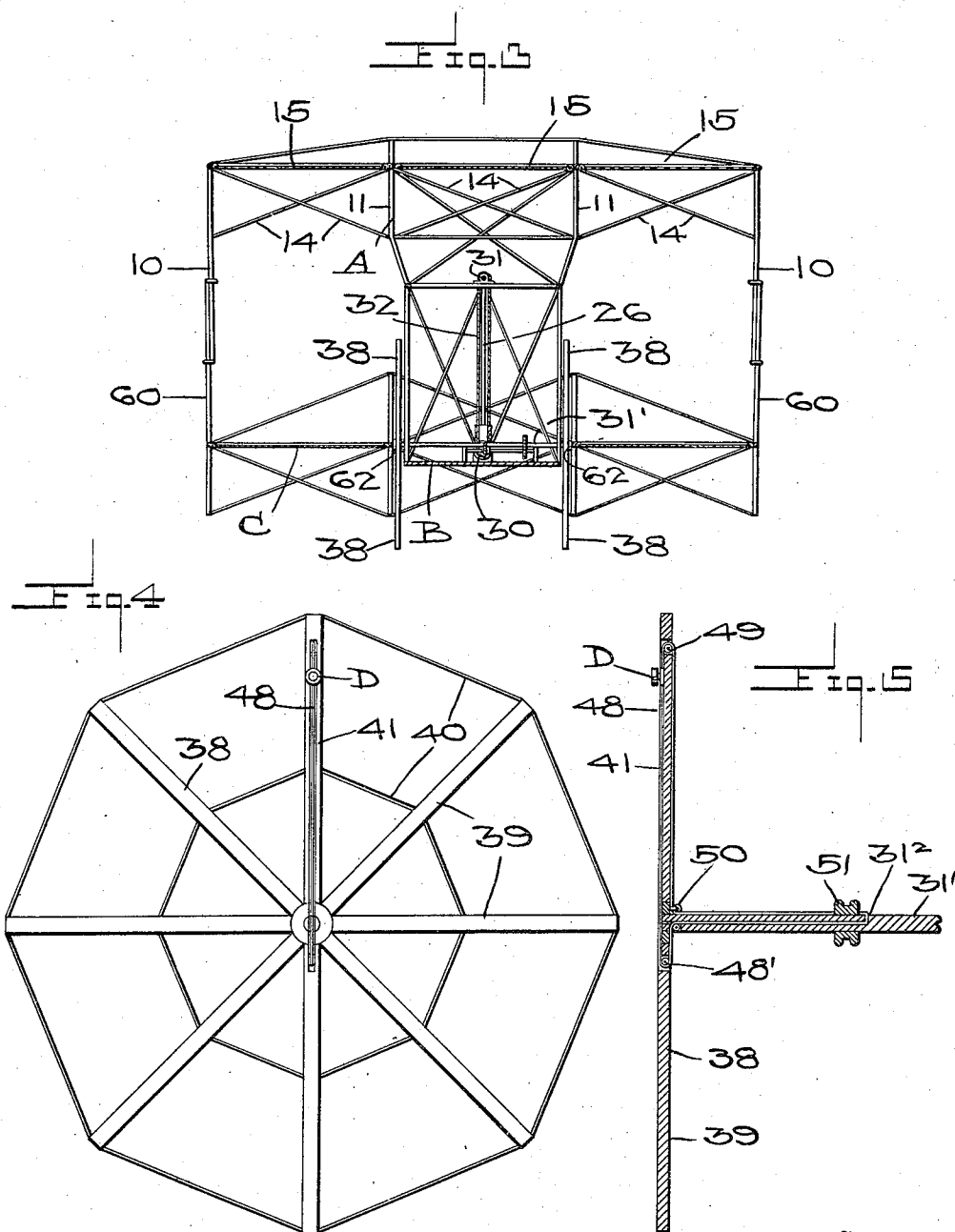
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Witnesses
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UNITED STATES PATENT OFFICE.

HERMAN LUDTKE, OF OTTAWA, ILLINOIS.

FLYING-MACHINE.

1,014,239.

Specification of Letters Patent.

Patented Jan. 9, 1912.

Application filed December 15, 1909. Serial No. 533,185.

To all whom it may concern:

Be it known that I, HERMAN LUDTKE, a citizen of the United States, residing at Ottawa, in the county of Lasalle and State of Illinois, have invented certain new and useful Improvements in Flying-Machines, of which the following is a specification.

This invention relates to improvements in flying machines of the aeroplane type, in which vertically reciprocating wings or members are used, and has for its object to provide a novel mechanism of this kind.

An important object of the invention is to provide a principal and a secondary wing, the first to be attached rigidly to the car in which the mechanism and operator are carried, and the second to be reciprocated adjacent thereto.

It is a further object in attaining this end to provide a novel form of mechanism for producing the reciprocative movement of the secondary wing.

Another object is to provide a novel means for governing the extent of movement of the secondary wing.

Other objects and advantages will be apparent from the following description, and it will be understood that changes in the specific structure shown and described may be made within the scope of the claims without departing from the spirit of the invention.

In the drawings forming a portion of this specification, and in which like numerals of reference indicate similar parts in the several views, Figure 1 is a bottom plan view of the device, Fig. 2 is a side elevation thereof, Fig. 3 is a cross section on the line 3—3 of Fig. 2, Fig. 4 is a detail side elevation of the propelling wheel, Fig. 5 is a section thereof, Fig. 6 is a detail of the construction of the wrist pin of the driving wheel and its mounting, Fig. 7 is a fragmentary detail showing the wrist pin in engagement with the guideway of the secondary wing, Fig. 8 is a longitudinal sectional view of one of the shutter members and adjacent frame portion, Fig. 9 is a cross sectional view of a series of the shutter members, Fig. 10 is a similar view of a plurality of the shutter members in open position, Fig. 11 is a detail perspective view of the hinge.

Referring to the drawings, there is shown a framework A comprising the superstructure forming the primary wing, which comprises a plurality of upright members 10

having downwardly extending guide portions, and inner upright members 11 performing the function of truss members in the structure of the frame.

Supported upon certain of the upright members, there are transversely extending beams 12 and longitudinally extending stringers 13. These members are suitably braced by diagonal stays 14 extending in various directions yet adapted to support the different parts of the frame in rigid relation. Mounted pivotally between the longitudinal stringers 13, there is a multiplicity of shutter members 15 pivoted for movement upon an axis adjacent one longitudinal edge. The stringers 13 are beveled on their under sides, and the ends of the shutters are similarly beveled on their upper sides and adapted to lie snugly against the beveled surface of the stringers. The shutters comprise rectangular frames 17, and have a shoulder portion 18 set in a suitable seat 19 formed in the edges of the stringers 13, and the longitudinal outer edges of the frames are beveled inwardly toward the lower side thereof adjacent their axial edge, and similarly toward the upper side upon their free edge. The shutters are pivoted by means of suitable trunnion members 19' projecting from their ends and engaged in suitable sockets 20 formed in the inner edges of the stringers 13. The trunnions are inserted in suitable channels 21 formed in the ends of the frame 17, from which there open recesses 22 in the upper surface of the frame. The trunnions are provided with head portions 23 extending laterally by which they may be reciprocated in the channels, and when forced outwardly and into the sockets 20 are held in such engagement by means of a screw or other suitable member 24. It will be observed that by the construction of the frame as described, when in horizontal or closed position, each frame lies with its free edge seated upon the axial edge of the adjacent frame, whereby no additional framework is needed for the provision of seats. Suitable leaf springs 25 are secured to the under side of the stringers, and engaged against the lower side of the frames 17 to hold them resiliently in nearly closed position.

Suspended rigidly beneath the superstructure A, there is a car B within which the operating mechanism is disposed. The car B comprises the central forward upright

26, and the two rear corner uprights 27 connected in a suitable manner with supporting stays 27', and held in rigid relation by suitable side stays and cross stays, as shown. Carried in the lower portion of the car there is a suitable motor 30 of any suitable type, arranged to drive the propeller shaft 31 through the agency of the chain 32, the shaft being suitably journaled between the rear uprights 10' of the superstructure and in suitable bearings carried at the upper portion of the car B. A suitable framework 35 is suspended from the rear ends of the two central stringers 13, in which the rear end of the shaft 31 is supported, and within which rotates the propeller 36 carried upon the shaft. A pair of rudders 37 are also disposed upon the rear framework 35, which may be operated in any suitable manner from the car, such means not being illustrated.

The engine 30 is connected to a transverse shaft 31' carried by the car and projecting slightly from opposite sides of the car, upon the outer ends of which there are mounted the driving wheels 38. Each of these wheels comprises a skeleton frame formed of the radial spokes 39, connected by the concentric stays 40. One of the spokes is provided on its outerside with a longitudinally extending dovetail guideway 41 formed by opposed strips having their inner edges undercut as at 42, and secured to the spoke in spaced relation. Engaged slidably in the guideway, there is block 43 having flanges 44 at opposite sides engaged beneath the undercut strip, and carrying centrally the laterally projecting centrally recessed circular lug 45 revoluble upon which there is the wheel 46 centrally recessed on its outer side and held upon the lug by means of a headed screw member 47 threaded in the recess in the lug. Secured to opposite ends of the block, there is a flexible adjusting member 48 extending in opposite directions in the guideway 41, being carried through the spoke to its opposite side adjacent the outer end, over a pulley 49 located therein, whence a flexible member extends inwardly to the base of the spoke where it passes beneath the pulley 50 and inward parallel with the shaft 31' for a spaced distance. The shaft is tubular for a short distance from its extremities, and a lateral opening communicates with the tubular portion, as shown at 31² and the flexible member 48 is extended through this opening and axially outward through the end of the shaft, from whence it is carried to the block 48', as shown. By means of a sleeve 51 slidably upon the shaft 31', and to which the flexible member is secured, the block 48' may be reciprocated to any desired position upon the spoke by movement of the lever having a bifurcated portion embracing

sleeve and carrying swiveled segments engaged in a suitable groove in the sleeve as is customary in such construction.

It will be noted that the forward upright 10 and the rear uprights 10' project some distance below the superstructure A, and engaged with these are suitable guide members 60 carried by the lower wing C. This wing comprises a construction similar to that of the wing of the superstructure with the exception that a suitable opening 61 is provided centrally thereof of a size and shape corresponding to that of the car. The framework of the wing C carries a plurality of guide members projecting into the opening 61 and engaged respectively with the uprights 26 and 27 of the car. The lower wing is adapted to be reciprocated vertically upon the uprights with which its guide members are connected, the reciprocating motion being accomplished by engagement of the wrist member D of the wheel in a suitable horizontal longitudinally extending pair of guideways 62 carried upon the sides of the opening 61. The guideways are provided with opposed inwardly extending retaining flanges 63 and a track surface 64, the periphery of the wheel engaging against the track surface and the flanges 63 engaging inwardly of the wheel to prevent its disengagement from the guideway. A suitable washer or flange 65 is carried upon the lug 45 inwardly of the wheel, to act as a buffer between the guideway 62 and the wheel.

In operation, the engine may be started with the wrist member located on the axis of the wheel, whereby no operation of the lower wing will occur. The machine being definitely disposed in proper operative position, the sleeve 51 may be operated to displace the wrist member from the axis of the wheel when reciprocative action of the wing will be produced. The movement of the wrist member may be gradually increased until the full stroke of the wing is attained. Under this operation, each time the lower wing is drawn upward, the shutters will be depressed downwardly by the pressure of air thereupon, allowing the air to pass through, and upon downward movement of the wings the shutters will be closed, whereby the inertia of the air will tend to resist the movement of the wing, lifting the superstructure. As the superstructure is lifted, the shutters carried thereby will operate in a similar manner to allow the escape of air downwardly therethrough, and when the lower wing makes its upward stroke, the superstructure is prevented from moving downward by closing of the shutters thereon, whereby its fall is retarded by the inertia of the air therebelow.

The shutter members should be pivoted adjacent their forward edges, whereby upon upward movement of either of the wings, a

slight forward impulse is given to the machine, as will be readily understood.

It will be understood that additions to the construction shown may be made as desired to provide means for balancing the device, or governing its position with respect to the horizontal, which details have not been illustrated, as comprising no novel feature of my invention.

What is claimed is:

1. A flying machine, comprising a frame, a main supporting frame therefor, a reciprocable plane slidably supported by the frame and having horizontally extending guide-ways formed thereon, a wheel rotatably mounted in the frame, a wrist member adjustably mounted on the wheel and projecting therefrom into the guide-ways, means for rotating the wheel, and means for adjusting the position of the wrist member while the wheel is rotating.

2. In a flying machine, the combination with the frame of a plane slidably supported thereby and formed with a guide-way, a wheel rotatably mounted in the frame and having a radially extending guide-way formed therein, a wrist member slidably engaged in the guide-way and having its outer end projecting in the guide-way of the plane, and flexible connections secured to the wrist

member for securing the same in adjusted position.

3. In a flying machine, the combination with a frame, of a shaft journaled therein, means for rotating the shaft, wheels secured on the shaft and having radially extending guide-ways formed therein, a wrist member mounted in each guide-way, guide sheaves secured to the wheels at the ends of the guide-ways, flexible connections passing over the sheaves and secured to the wrist member, a plane slidably supported by the frame and having guide-ways extending therein at right angles to the direction of movement of the plane, the ends of the wrist members being engaged in the guide-ways of the plane, and means for shifting the flexible connections to vary the distance of the wrist member from the shaft, whereby the size of the circle of movement of the wrist members will be varied to cause the same to impart a greater or less reciprocal movement to the sliding plane.

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

HERMAN LUDTKE.

Witnesses:

A. E. BACH,
O. W. BOLLMEYER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."