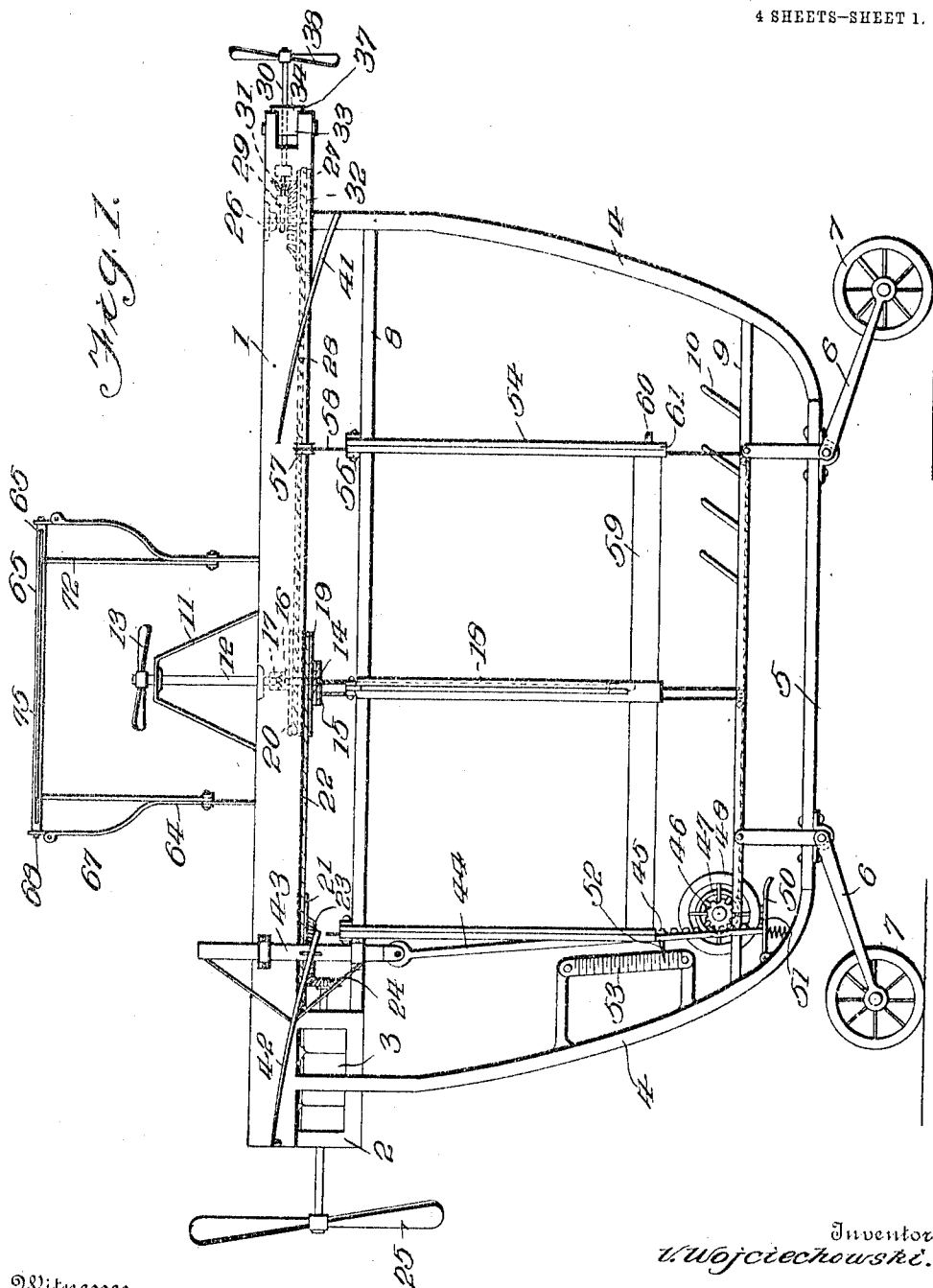


V. WOJCIECHOWSKI.
FLYING MACHINE.
APPLICATION FILED OCT. 31, 1911.

1,040,600.

Patented Oct. 8, 1912.

4 SHEETS-SHEET 1.



Witnesses

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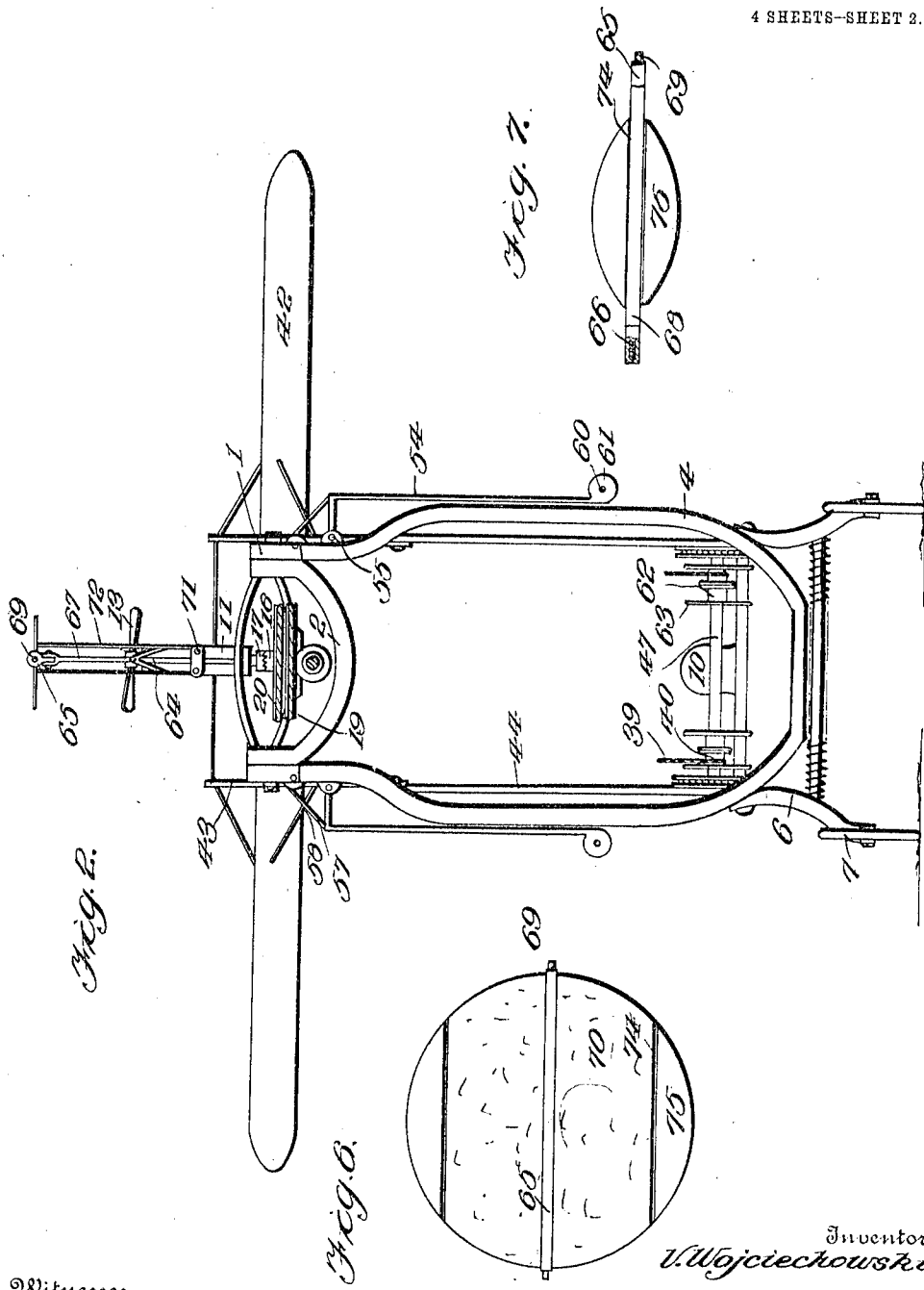
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4 SHEETS-SHEET 2.



Witnesses

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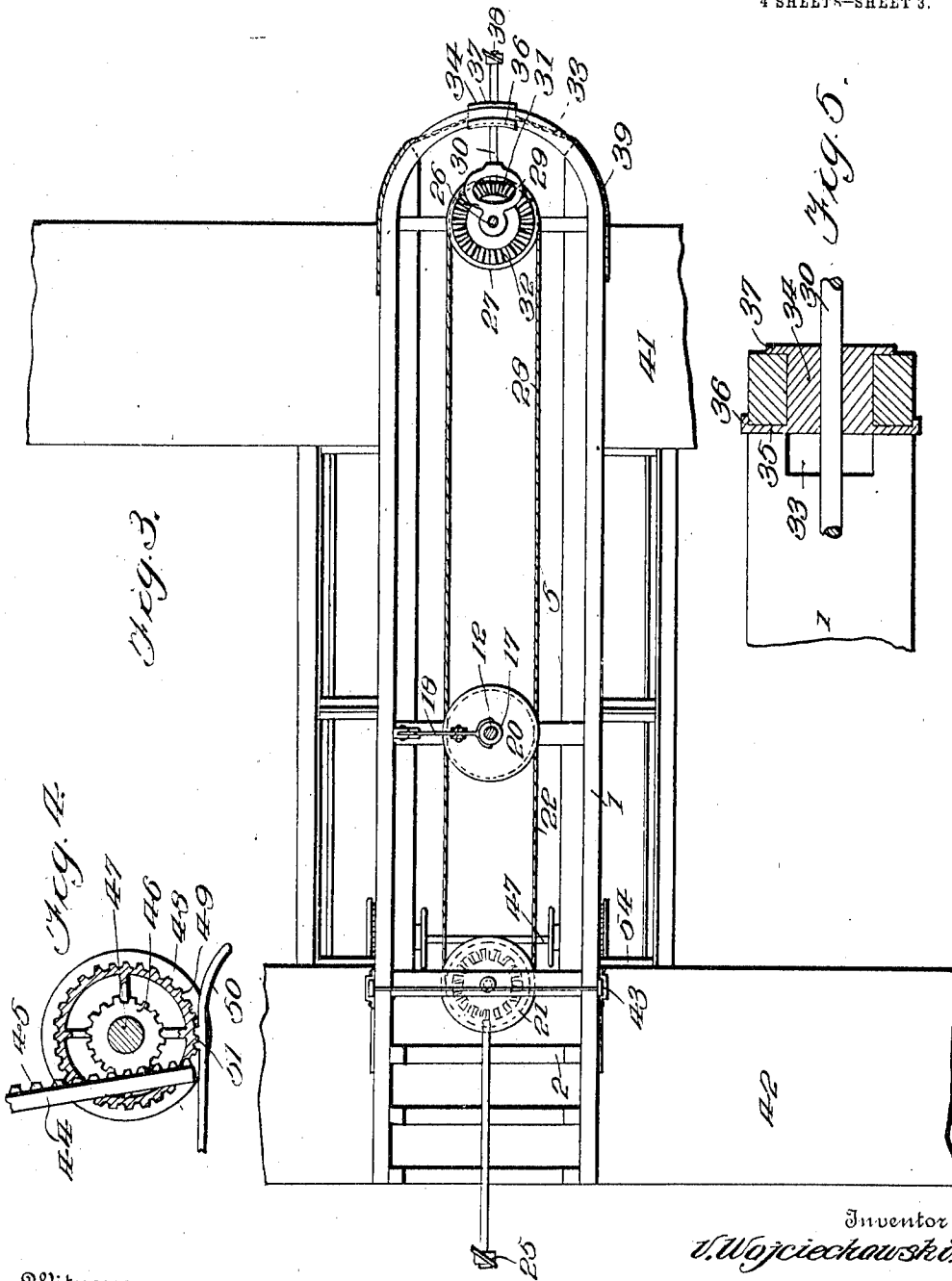
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4 SHEETS—SHEET 3.



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4 SHEETS-SHEET 4.

Fig. 8.

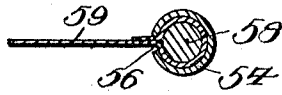


Fig. 9.

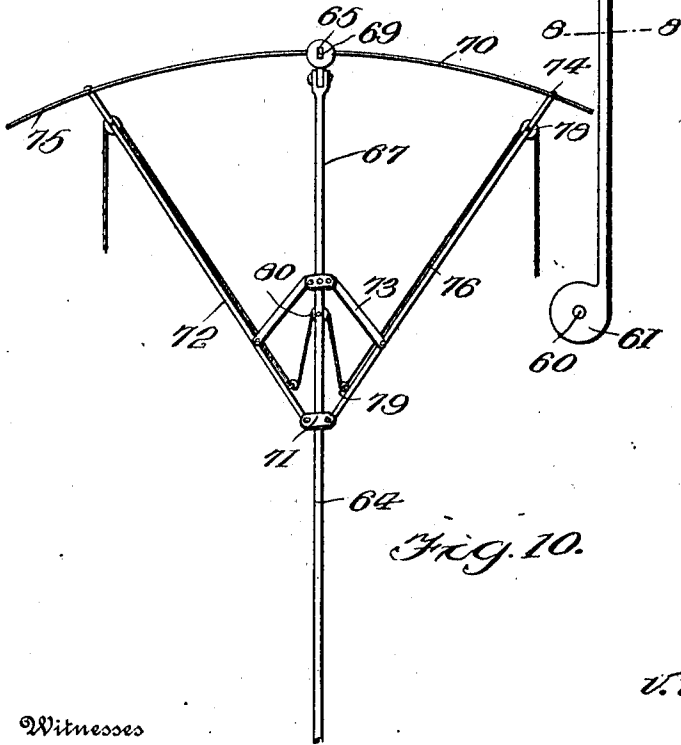
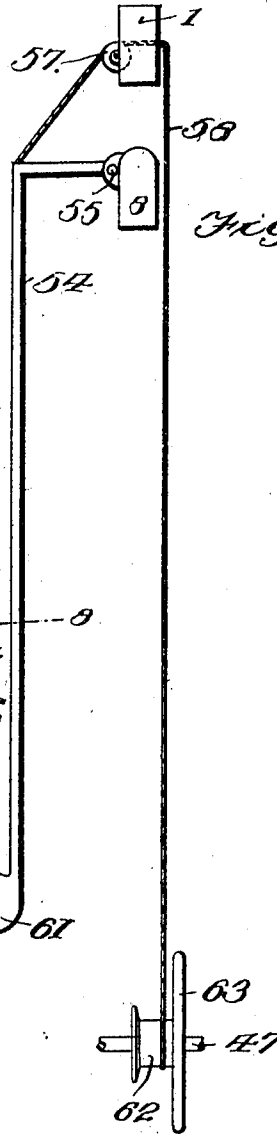


Fig. 10.

Witnesses

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UNITED STATES PATENT OFFICE.

VALENTINE WOJCIECHOWSKI, OF BROCKTON, MASSACHUSETTS.

FLYING-MACHINE.

1,040,600.

Specification of Letters Patent.

Patented Oct. 8, 1912.

Application filed October 31, 1911. Serial No. 657,880.

To all whom it may concern:

Be it known that I, VALENTINE WOJCIECHOWSKI, citizen of Russia, residing at Brockton, in the county of Plymouth and State of Massachusetts, have invented certain new and useful Improvements in Flying-Machines, of which the following is a specification.

This invention has relation to flying machines of the aeroplane type, and has for its object to provide a structure which may be easily and quickly transformed from a flying machine proper into a parachute and vice versa.

In case of accident or refusal of the engine to operate upon aeroplane machines as constructed at present there is no provision made for converting the machine into a parachute in order that it may gravitate slowly toward the earth and thereby prevent accident or damage.

Therefore in the present invention the principal aim is to provide means adapted to cooperate with the planes of the machine for converting the structure into a parachute so that it may descend gradually. With this and other objects in view the machine includes a frame having propellers and an operating engine, as will be explained. The stern propeller is so mounted that it may be swung about an axis while it is rotating and by this arrangement the machine may be steered horizontally or approximately so. Planes are carried at the upper portion of the frame, one at the front and the other at the rear. The forward frame is composed of sections the rear edge portions of which may be swung vertically so that the forward planes may be moved from a position in which its forward edge is upwardly disposed into a position in which its forward edge portion is downwardly dipped. Frames are hingedly mounted at the sides of the first mentioned frame between the said planes and the last mentioned frames carry curtains which are normally rolled up but may be unrolled so as to bridge the space between the rear edge of the forward plane and the forward edge of the rear plane, thus transforming the machine into a parachute. There is space left between the inner edges of the curtains and the adjacent edges of the said planes and over this space a supplemental

structure is mounted, means being provided for extending and collapsing the last mentioned parachute.

A still further object of the invention is generally to improve this class of devices so as to increase their utility, durability and efficiency.

Further objects and advantages will appear in the following description, it being understood that various changes in form, proportions and minor details of construction may be resorted to within the scope of the appended claims.

For a full understanding of the invention reference is to be had to the following description and accompanying drawings, in which:

Figure 1 is a side elevation of the flying machine; Fig. 2 is an end elevation of the same with parts removed and parts in section; Fig. 3 is a top plan view of the same with parts removed and parts in section; Fig. 4 is a detailed sectional view of part of a plane adjusting mechanism mounted upon the machine; Fig. 5 is a transverse sectional view of the rear portion of the top member of the frame of the machine; Fig. 6 is a top plan view of a parachute mechanism used on the machine showing the parts extended; Fig. 7 is a top plan view of the parachute mechanism showing the parts collapsed; Fig. 8 is a detail sectional view enlarged of a rib used upon the machine; Fig. 9 is an edge elevation of one of the ribs of the wings of the machine; and Fig. 10 is a side elevation of the parachute mechanism shown in Fig. 6.

Corresponding and like parts are referred to in the following description and indicated in all the views of the accompanying drawings by the same reference characters.

The frame of the machine consists of a top member 1 which is rounded at its rear end and which is approximately U-shaped in plan. The forward end portions of the member 1 are connected together by downwardly curved cross beams 2 which serve as a support for an engine or motor 3. End pieces 4 depend from the top member 1 and are approximately U-shaped in side elevation. The lower portions of the end pieces 4 curve toward each other and are connected together by a floor 5. Standards 6 are attached to the floor 5 and carry journaled

wheels 7. The upper portions of the forward and rear end pieces 4 are connected together by side bars 8. These bars extend longitudinally of the frame in parallel relation to the side portions of the top member 1. The lower portions of the end pieces 4 are connected together by side bars 9 upon which seats, indicated at 10, may be mounted for the accommodation of an operator or passengers. The parts of this frame are made of wood or other light and durable material and the parts are so arranged as to cleave the air and present minimum resistance against the same when the machine is in flight.

A standard 11 is mounted upon the intermediate portion of the top member 1 and a vertically disposed shaft 12 is journaled for rotation in the said standard. The shaft 12 carries at its upper end an approximately horizontally disposed propeller 13. A stub shaft 14 is journaled upon a plate 15 which is also mounted at the intermediate portion of the top member 1, and the shafts 12 and 14 are in longitudinal alinement. A clutch member 16 is fixed to the stub shaft 14 and a clutch member 17 is slidably mounted upon the shaft 12 but is constrained to rotate with the same. Any suitable lever mechanism, as for instance that indicated at 18, may be provided for shifting the clutch member 17, so that the shafts 12 and 14 may be connected with each other to rotate in unison, or the shaft 12 may remain at rest while the shaft 14 rotates. Pulleys 19 and 20 are fixed to the stub shaft 14. A pulley 21 is journaled for rotation at the forward portion of the top member 1, and a cable or belt 22 is trained around the pulleys 19 and 20. The pulley 21 is provided upon its under side with a set of beveled gear teeth 23 which mesh with a beveled pinion 24 fixed to the rear end of the shaft of the engine 3. A propeller 25 is fixed to the forward end of the shaft of the engine 3 and is located in advance of the forward end of the top member 1.

A shaft 26 is located at the rear end portion of the top member 1 in a position concentric with the arc of the rear end of the said top member 1. A pulley 27 is mounted for rotation upon the shaft 26 and a cable or belt 28 is trained around the pulleys 20 and 27. A yoke 29 is pivotally mounted upon the shaft 26 at a point above the pulley 27 and one end portion of a shaft 30 is journaled in the yoke 29 and the said shaft 30 carries at its forward end a beveled pinion 31 which meshes with a set of beveled gear teeth 32 mounted upon the upper side of the pulley 27. The rear arcuate end of the top member 1 of the frame is provided with a slot 33, and a block 34 is slidably mounted in the said slot. The block 34 is provided at its forward end with a flange

35 which extends along the forward surface of the rear portion of the top member 1 and which is provided with extremities 36 which fit snugly against the upper and lower surfaces of the said member 1. The block 34 is provided at its rear end with a flange 37 which fits snugly against the rear surface of the intermediate portion of the top member 1. A propeller 38 is fixed to the rear end of the shaft 30 and is located behind the block 34 and behind the rear end of the top member 1 of the frame. The shaft 30 is free to rotate in its bearing in the yoke 29 and in the block 34 but the said shaft is restrained against longitudinal movement. The block 34 may slide along the slot 33 and the yoke 29 is free to swing upon the shaft 26 as a pivot.

Any suitable means may be provided for moving the block 34 along the slot 33 and for holding said block in an adjusted position in the said slot. The means employed in the present instance consists of cables 39 which are connected at their rear ends with the opposite sides of the block 34 and which are trained around the opposite side portions of the top member 1 of the frame and are led to a drum 40 upon which they are wound in opposite directions. The said drum is provided with any suitable attachment whereby it may be rotated so that as one of the cables 39 is wound thereon the other is unwound therefrom and vice-versa. Thus by rotating the said drum the block 34 will be carried along the slot 33 and therefore the shaft 30 may be moved from a position in alinement with the median longitudinal dimension of the top member 1 to an angle of any desired degree at either side of the said median line. The movement of the shaft 30 may be accomplished while the said shaft is rotating and thus the propeller 38 is carried to one side or the other of the median line of the frame, and by this means the machine is steered horizontally while in flight.

By shifting the clutch member 17 into engagement with the clutch member 16 the shaft 12 is caused to rotate, and as the propeller 13 rotates with the shaft 12 the said propeller will lift the machine while in flight.

A plane 41 is located at the rear end portion of the top member 1 of the frame and projects beyond the opposite sides thereof. This plane 41 is held in a fixed position and is curved in a downward direction from its forward to its rear edge. A plane 42 is hingedly mounted at the forward portion of the top member 1 of the frame and this plane is made up of two sections, one located at each side of the top member 1 of the frame. The sections of the plane 42 are parallel with the plane 41, but the sections of the plane 42 are hinged at their

inner ends at points in alinement with their forward edges and the sections of the plane 42 are curved transversely from their forward to their rear edges. The rear edge portions of the sections of the plane 42 are free to swing vertically. Consequently the said plane 42 may be positioned so that its forward portion is downwardly disposed with relation to its rear portion or its rear portion may be positioned below its forward portion.

Any suitable means may be provided for shifting the sections of the plane 42. That shown in the present instance consists of bars 43 slidably mounted for vertical movement at the sides of the member 1 and the sides of the bars 8. Rods 44 are pivotally connected at their upper ends to the lower ends of the bars 43 and the rods 44 carry at their lower ends gear teeth 45 which mesh with the gear wheels 46 journaled upon a shaft 47 carried at the forward portion of the frame of the machine. Wheels 48 are fixed to the gear wheels 46 and carry at their peripheries gear teeth 49. Pawls 50 are carried at the lower forward portion of the frame of the machine and provided with teeth 51 which are adapted to engage the teeth 49 upon the wheels 48 and hold the wheels at the positions to which they are turned. The rear ends of the pawls may be pressed down by the foot of an operator so as to disengage the teeth of the pawls from the teeth of the wheels so that the said wheels are free to rotate. Therefore it will be seen that by rotating the wheels 46 the rods 44 will be moved longitudinally and the bars 43 will be raised and lowered. Thus the rear edge portions of the sections constituting the plane 42 may be raised or lowered.

When it is desired that the machine shall soar in an upward direction or move approximately in a horizontal line, or a line parallel thereto, the rear edge portions of the sections constituting the plane 42 are moved below the forward edge portions of the said plane. When, however, it is desired that the machine should gravitate gradually the rear edge portions of the sections constituting the plane 42 are moved to positions above the forward edge portions of the said sections. Each rod 44 is provided at its lower portion with a pointer 52 which operates over or adjacent a fixed scale 53. The scale and pointer are so positioned that they are in view of the operator of the machine and consequently the operator may observe the position of the pointer over the scale and ascertain to what extent the rear edge portions of the sections constituting the plane 42 are depressed with relation to the forward edge portions thereof.

As hereinbefore stated, it is the design to provide in conjunction with a machine in-

tended to be used for flight through the air, means for rendering the same safe when descending. This means will now be described. It consists of wings the parts of which are foldable or collapsible so that under ordinary conditions they occupy but small space, but when in operation are spread in the spaces between the forward and rear planes of the machine. These wings are located at the opposite sides of the frame and as they are both alike, a description of one will answer. Each wing consists of ribs 54 which are L-shaped in edge elevation. These ribs are hingedly connected at their upper shorter ends to the bar 8 as at 55. The upper shorter portions of the ribs 54 are adapted to bear against the sides of the top member 1 when the longer portions of the said ribs are swung to horizontal positions. The ribs 54 are hollow and each rib is provided with a longitudinal slot 56. Pulleys 57 are journaled to the sides of the top member 1 adjacent the terminal ribs 54 of each series and cables 58 are trained over these pulleys. The outer end portions of the cables 58 pass down through the hollow interiors of the ribs 54 and are connected at their lower ends with the corner portions of linen curtains 59. The outer or lower portions of these curtains are arranged to wind upon a shaft 60 which is journaled in heads 61 carried at the lower or outer ends of the ribs 54. Drums 62 are journaled upon the shaft 47 or any other suitable support and are provided with hand wheels 63 by means of which they may be rotated. The inner end portions of the cables 58 are arranged to wind upon the drums 62. The cables 58 are carried along the edges of the curtains 59 and the edge portions of the curtains are folded around the cables and sewed so that the thickness of the material is such that the edge portions of the curtains cannot pass transversely through the slots 56 provided in the sides of the ribs 54, but the edge portions of the curtains are free to be moved along the said slots. Each wing is of a length sufficient to have its forward and rear edge portions lying under the rear edge portion of the forward plane 42 and the forward edge portion of the rear plane 41. Therefore in case of accident or when it is desired to permit the machine to gravitate gradually to the earth the cables 58 are wound upon the drums 62, whereby the curtains 59 are unwound from the shaft 60 and are extended along the lower longer portions of the ribs 54. When the said curtains have been drawn tight and when the pull upon the cables 58 is continued the longer portions of the ribs 54 will be swung from approximately vertical positions to horizontal positions and thus the curtains will bridge the space between the forward

and rear planes. This will confine the air in a great measure under the said curtains and the planes so that the machine may descend gradually and cannot precipitate rapidly.

5 A supplemental parachute mechanism is provided over the top member 1 of the frame at the space between the inner edges of the curtains when the wings are extended
10 and between the adjacent edges of the planes. This supplemental parachute consists of standards 64 which are mounted upon the top member 1 on the line of the median long dimension thereof. A shaft 65
15 is journaled at the upper ends of the standards 64 and its end portions project beyond the forward and rear sides of the said standards. The shaft 65 is made of material which may flex or bend slightly. Consequently
20 bearings at the upper ends of the standards 64 are sufficiently large to permit the intermediate portion of the shaft 65 to bow or bend in an upward direction. Springs 66 are provided in the shaft 65 and
25 are under tension with a tendency to rotate the said shaft in one direction. However, the said shaft may be rotated in the opposite direction when the curtains which will be explained hereinafter and which are attached thereto are spread. Arms 67 are carried
30 by the standards 64 and eyes 68 are pivotally attached to the upper ends of the arms 67 and receive gudgeons 69 which are attached to the ends of the shaft 65. When the intermediate portion of the shaft 65 is
35 bowed in an upward direction, the eyes 68 will swing slightly so that the shaft may rotate notwithstanding the fact that it is bent from a straight into a curved line. The inner ends of the curtains 70 are connected
40 to the shaft 65 and are arranged to swing thereon in opposite directions. Sleeves 71 are slidably mounted upon the standards 64 and the inner ends of rods 72 are pivoted to the sleeves. Links 73 are pivoted at their
45 inner ends to the standards 64 and at their outer ends to the rod 74 at points between the ends thereof. The upper or outer ends of the rods 72 are connected with the outer
50 edge portions of the curtains 70 and the said rods 72 are provided at their upper or outer ends with bars 74 which extend along the outer edges of the curtains and prevent the curtains from folding. Thin plates of metal
55 or other rigid material are attached to the bars 74 and form continuations of the edge portions of the curtains when the same are extended. When the curtains are wound upon the shaft 65 the said plates 75 are approximately horizontal and extend along the
60 opposite sides of the shaft 65. A cable 76 passes through eyes 78 provided at the outer or upper ends of the rods 72. The cable thence extends along the rods 72 and passes
65 through eyes 79 provided at the inner end

portions of the said rods. From the eyes 79 the intermediate portion of the cable 76 passes through an eye 80 provided upon the standards 64. Therefore it will be seen that
70 when the end portions of the cable 76 are pulled down the upper ends of the rods 72 will be swung in a downward direction. The bars 74 will carry the end portions of the curtains 70 in opposite directions and the
75 said curtains will unwind from the shaft 65 against the tension of the springs 66. Thus the curtains of the supplemental parachute are spread. This operation is resorted to when it is desired to permit the machine to
80 gravitate gradually. As soon as the pulling strain is released from the ends of the cable 76 the tension of the springs 66 will come into play and the curtains are rewound upon the shaft 65 and the rods 72 will be swung
85 to vertical or closed positions against the sides of the standards 64.

Having thus described the invention, what is claimed as new is:

1. A flying machine comprising a frame, a fixed sustaining plane carried at the rear
90 portion of the frame, a movable sustaining plane carried at the forward portion of the frame, and foldable wings carried by the frame and located between the forward and rear planes.
2. A flying machine comprising a frame a fixed sustaining plane carried at the rear
95 portion of the frame, a pivoted sustaining plane carried at the forward portion of the frame, means for swinging the last mentioned plane vertically, wings hingedly
100 mounted at the sides of the frame, rolled curtains carried by the wings, means for extending the wings between the forward and rear planes, and means for unrolling the curtains to stretch the same between the
105 ribs of the wings.
3. A flying machine comprising a frame, a sustaining plane fixed at the rear portion thereof, a sustaining plane pivoted at the
110 forward portion thereof for vertical swinging movement, means for swinging the foremost plane and for holding the same at a desired angle, wings hingedly mounted at the sides of the frame and consisting of ribs
115 spaced from each other, curtains rolled between the ribs, means for swinging the ribs to approximately horizontal positions, and means for unrolling the curtains to stretch the same between the ribs of the wings and
120 between the forward and rear planes.
4. A flying machine comprising a frame, a fixed plane carried at the rear end thereof, a pivoted sustaining plane carried at the
125 forward end thereof, means for swinging the last mentioned plane vertically, wings hingedly attached to the sides of the frame between the inner edges of the planes, means for extending said wings in horizontal positions between the planes, and a foldable
130

parachute carried by the frame and located between the inner edges of the wings and between the adjacent edges of the planes.

5 A flying machine comprising a frame, a fixed sustaining plane located at the rear end thereof, a pivoted sustaining plane located at the forward end thereof, means for swinging the last mentioned plane vertically, foldable wings hingedly mounted at
10 the sides of the frame, means for extending the said wings in the space between the adjacent edges of the planes, a foldable parachute carried at the top of the frame between the inner edges of the wings and between the adjacent edges of the planes, and
15 means for extending said parachute over the frame.

6. In combination with a flying machine comprising a frame carrying sustaining
20 planes, a parachute located over the intermediate portion of the frame and consisting of a flexible shaft, return springs operatively connected with the shaft, curtains arranged to wind upon the shaft, rods connected with

the outer portions of the curtains and slid- 25 ably engaging the support of the parachute, and means for swinging the free ends of the said rods away from the shaft against the tension of the springs.

7. A flying machine comprising a frame, 30 sustaining planes carried by the frame, wings hingedly mounted at the sides of the frame between the sustaining planes and consisting of hollow ribs, a shaft carried by each set of ribs at the free ends thereof, cur- 35 tains arranged to roll upon the shafts and having edge portions which are confined within the ribs but which are free to slide along the same, means for swinging the free end portions of the ribs from approximately 40 vertical to horizontal positions, and means for drawing the curtains along the ribs.

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

VALENTINE WOJCIECHOWSKI. [L. s.]

Witnesses:

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