

Nov. 11, 1930.

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1,781,182

SAFETY AEROPLANE

Filed March 25, 1929

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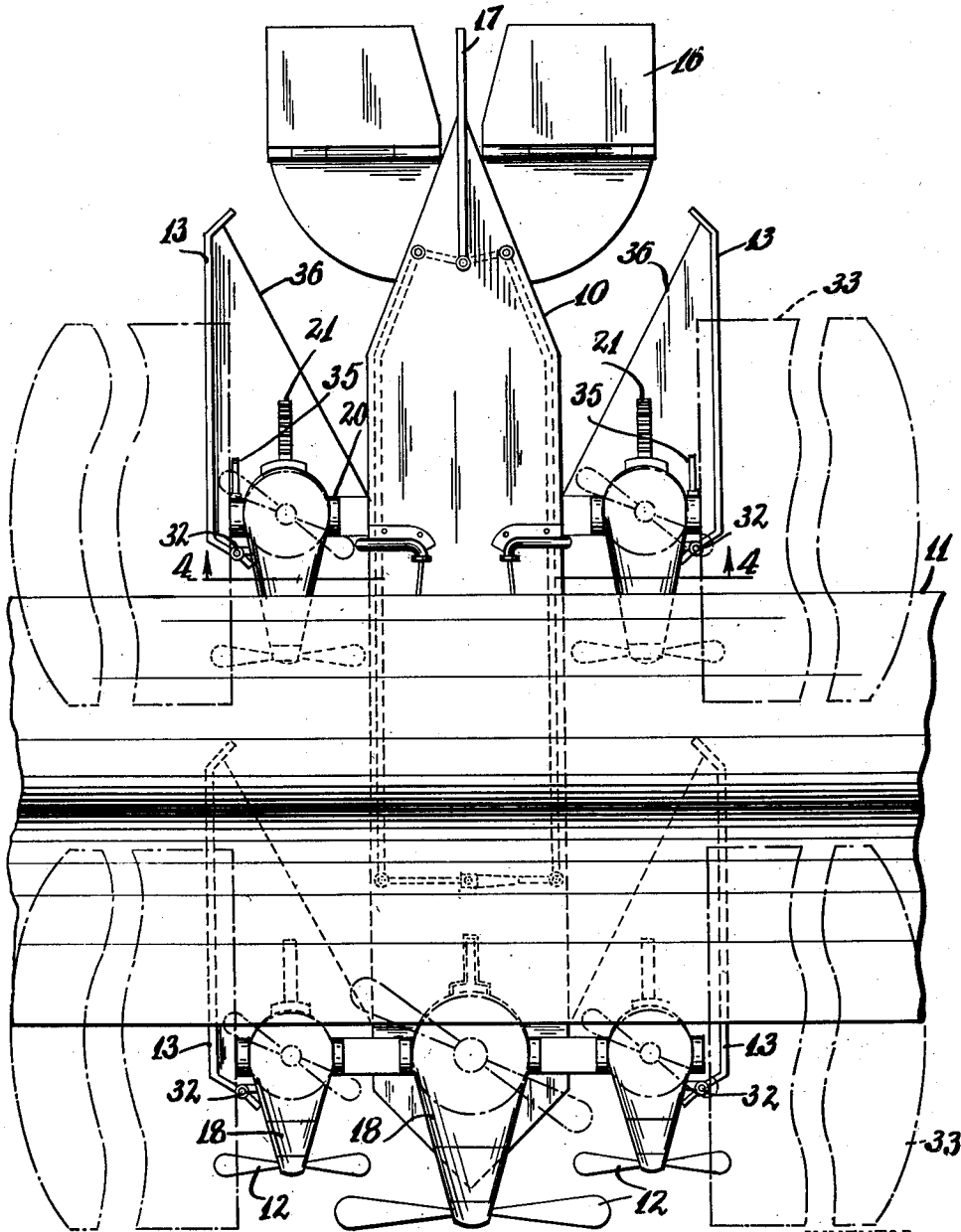


FIG 1

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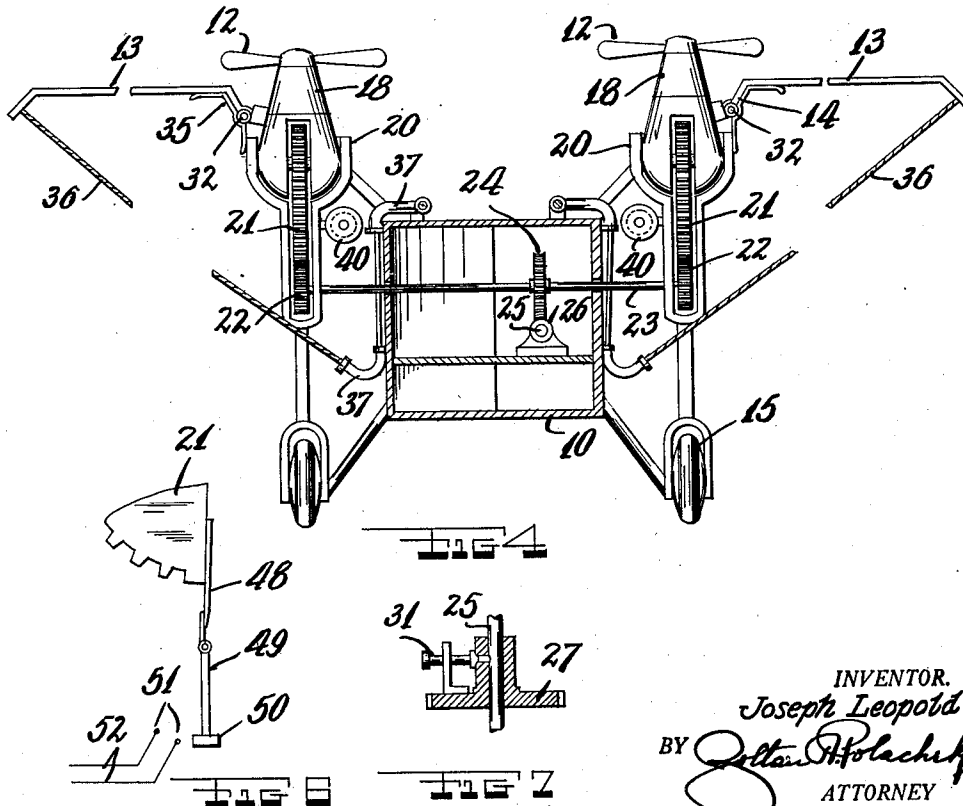
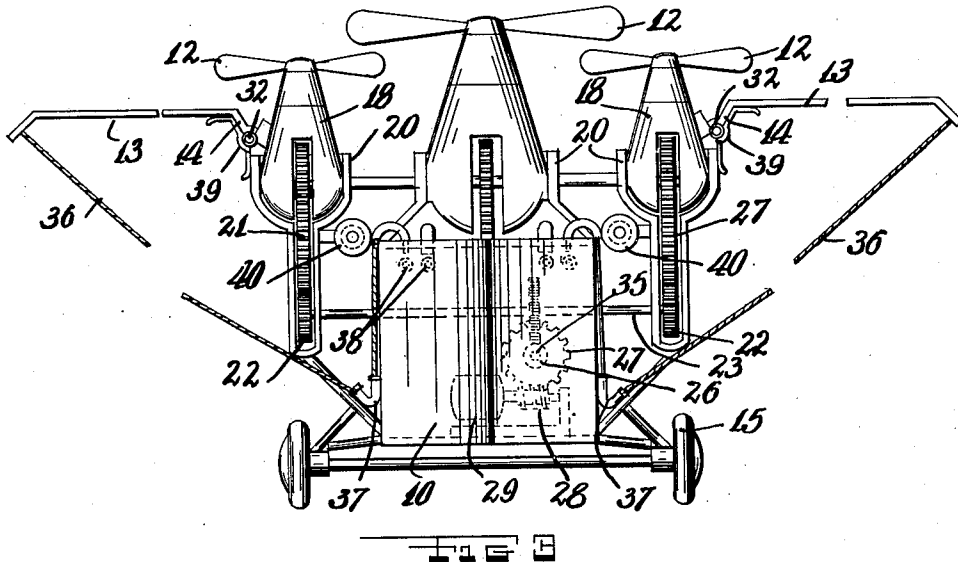
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SAFETY AEROPLANE

Filed March 25, 1929

3 Sheets-Sheet. 2



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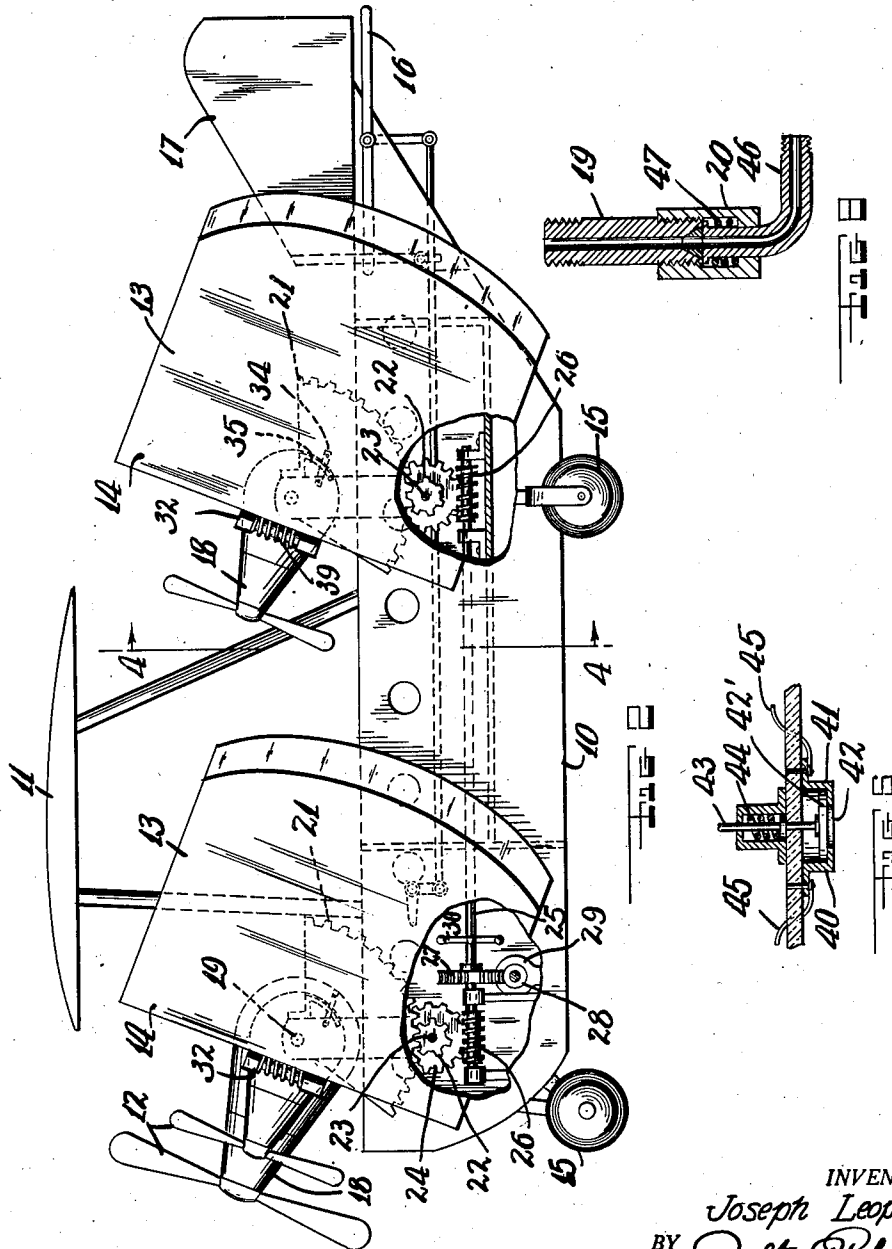
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SAFETY AEROPLANE

Filed March 25, 1929

3 Sheets-Sheet. 3



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SAFETY AEROPLANE

Application filed March 25, 1929. Serial No. 349,722.

This invention relates to similar subject matter to that disclosed in my copending application, Serial No. 347,412 filed on March 15, 1929 (originally filed September 3, 1927, under Serial No. 217,361).

This invention relates to a flying machine and has more particular reference to a novel type flying machine which has foldable reserve wings for the purpose of preventing accidents when the propellers suddenly cease to function during flying, and said reserve wings open and spread out automatically as a safety device.

The invention particularly proposes resilient means for normally urging the reserve wings into the open position, and means for manually moving the reserve wings from the open to the closed position while propellers connected for motion with the wings are directed vertically upwards.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:—

Fig. 1 is a plan view of a device constructed according to this invention.

Fig. 2 is a side elevational view of Fig. 1.

Fig. 3 is a front elevational view of Fig. 1.

Fig. 4 is a vertical sectional view taken on the line 4—4 of Fig. 2.

Fig. 5 is an enlarged detailed view of an automatic switch used to control the operation of the reserve wings.

Fig. 6 is a fragmentary schematic view of means for automatically stopping the spreading of the reserve wings.

Fig. 7 is a fragmentary sectional view of a portion of Fig. 2.

Fig. 8 is a sectional view of one of the trunnions used for supporting motor driven propellers connected with the reserve wings.

The safety aeroplane consists of a flying machine body 10 with wings 11, a plurality of motor driven propellers 12 movably mounted for action horizontally to the front or verti-

cally upwards, means for moving said propellers from one to the other of said positions, reserve wings 13 hingedly mounted at their front edges 14 on the casing of said motor driven propellers 12 so as to be capable of assuming positions in the vertical and extending rearwards in the position of the propellers for action horizontally to the front and to be capable of assuming positions in the horizontal and extending outwards in positions of the propellers for action vertically upwards, means for holding the reserve wings in the first positions, resilient means for urging the reserve wings into the second positions, and means for manually moving the reserve wings from the horizontal to the vertical while the propellers are positioned for action in the vertical.

The flying machine body 10 includes a landing gear 15, an elevator 16, a tail wing 17, and other elements generally known. While a monoplane has been illustrated on the drawing, the invention could be applied to a biplane or other type of aeroplane. The propellers 12 are shown to the front of motor casings 18 provided with trunnions 19 pivotally mounted in standards 20 so that the casings may be moved to different positions to direct the propellers towards the front or upwards. In all, five propellers have been shown, three to the front of the machine and two towards the rear, but all of these propellers operate frontwards and are of the traction type.

The means for moving the propellers 12 for action horizontally to the front or vertically upwards, consists of a segmental gear 21 on each of the motor casings 18 and meshing with pinions 22 on shafts 23 carrying worm wheels 24. A longitudinal shaft 25 is rotatively mounted in the aeroplane body 10 and is provided with worm pinions 26 meshing with the worm wheels 24. A worm wheel 27 is fixed upon the shaft 25 and meshes with a worm pinion 28 upon the shaft of a motor 29.

A hand wheel 30 is fixed upon the shaft 25 for manual rotation of the shaft, if this is desired. Before the shaft can be manually rotated it is necessary to disengage the worm

27 from the pinion 28. For this reason the worm 27 is provided with a catch 31 normally holding it engaged upon the shaft 25 and adapted for manual releasing. When the worm wheel 27 has been released from the shaft it may be slightly moved towards one side so that it is out of mesh with the worm pinion.

Hinges 32 are arranged upon the front edges 14 of the reserve wings 13 and connect these wings with the motor driven propeller casings 18. As shown on the drawing, there are only four reserve wings, one for each of the motor driven propellers at the sides of the aeroplane body. The fifth propeller, that is, the central motor driven propeller, is not provided with any reserve wings. In Fig. 1 the dot and dash lines 33 indicate the spread conditions of the reserve wings. As shown in this figure the reserve wings are closed, that is, they extend in vertical planes and rearwards. When opened they assume horizontal positions and extend sideways.

The means for holding the reserve wings in the vertical and extending rearwards, consists of eye elements 34 attached upon the reserve wings 13 and engageable by hooks 35 upon the standards 20. These parts are so arranged that when the reserve wings 13 are in the vertical and the propellers 12 directed upwards, and then the motor driven propellers are moved so that they are disposed towards the front, the eye elements automatically engage on the hook elements and maintain the closed positions of the wings.

The resilient means for urging the reserve wings into the spread positions, that is, horizontal and extending sideways, consists of coaxial springs 39 arranged upon the pivot points of the hinges 32 and acting between the wings and the standards 20. The ends of these coaxial springs are clearly shown in Figs. 3 and 4 and they are shown acting between the wings and the standards 20. The means for manually moving the reserve wings 13 from the horizontal to the vertical while the propellers are positioned for action in the vertical, consists of cables 36 attached to the tips of the wings 13 and extended thru a plurality of guide tubes 37 upon the aeroplane body 10 so as to terminate in the vicinity of the pilot's chamber. Rings 38 are attached upon the free ends of the cables 36 so that the pilot may manually grasp the rings and thus draw upon the cables to collapse the wings.

Several air pressure switches 40 are mounted upon the aeroplane body and are connected for operating the motor 29 for automatically moving the motor driven propellers 12 from positions for action in the horizontal to the front to positions for action vertically upwards. Each of these switches 40 consists of a casing 41 open at the front 42 to receive air pressure during the flying of the machine,

and housing a piston 42' connected with a stem 43 normally urged outwards by a spring 44. Leads 45 connect the switch with the motor in the manner recited. During flight of the safety aeroplane and upon loss of flying speed, the pressure upon the pistons 42' decreases, permitting the springs 44 to move the pistons outwards and close a circuit for energizing the motor 29 so as to move the propellers to be directed upwards and thus support the machine as helicopters.

In Fig. 8 a swivel joint has been shown for providing gasoline to the motors within the casings 18. This joint consists of the said standards 20 and the said trunnions 19. An elbow pipe 46 connects with the standard 20 and is urged against the nipple by a spring 47 so as to provide a liquid tight joint. In the event that the motors within the casing 18 are electrical, electrical leads may be passed thru the passages in the swivel joint for the protection of these leads during the moving of the motors. Fig. 6 shows a means for automatically stopping the motor 29 after the propellers 12 have assumed their upwardly directed positions. This means consists of a finger 48 attached upon the segment 21 and engageable against one end of a pivoted lever 49 provided with a contact 50, at its other end engageable with contacts 51 of a circuit 52 to the said motor 29.

The operation of the device may be traced by assuming it in flight with the propellers 12 directed towards the front. If for some reason or other the device loses its head-on flying speed the pilot may energize the motor 29 for moving the propellers 12 so that they are directed upwards and that the wings 13 assume their spread positions. In the event that the pilot does not do this, it occurs automatically in that the pressure upon the pistons 42' fall and the switches close for energizing the motor 29.

The pilot may manually draw the rings 38 so as to close and open the wings 13 as desired for directing the proper landing of the device. It should be noticed that upon drawing the cable 36, the wings move to their closed position and upon a release the coaxial springs serve to open them. This arrangement permits landing in a very small compass.

While I have shown and described the preferred embodiment of my invention, it is to be understood that I do not limit myself to the precise construction herein disclosed and the right is reserved to all changes and modifications coming within the scope of the invention as defined in the appended claims.

I claim:

1. In combination with a safety aeroplane having a flying machine body with wings, a plurality of motor driven propellers movably mounted for action horizontally to the front or vertically upwards, means for moving said propellers from one to the other of

said positions, reserve wings hingedly mounted at their front edges on the casing of said motor driven propellers so as to be capable of assuming positions in the vertical and extending rearwards in the positions of the propellers for action horizontally to the front and to be capable of assuming positions in the horizontal and extending outwards in the position of the propellers for action vertically upwards, and means for holding the reserve wings in the first positions, of means for urging the reserve wings into the second positions, and means for manually moving the reserve wings from the horizontal to the vertical while the propellers are positioned for action in the vertical.

2. In combination with a safety aeroplane having a flying machine body with wings, a plurality of motor driven propellers movably mounted for action horizontally to the front or vertically upwards, means for moving said propellers from one to the other of said positions, reserve wings hingedly mounted at their front edges on the casing of said motor driven propellers so as to be capable of assuming positions in the vertical and extending rearwards in the positions of the propellers for action horizontally to the front and to be capable of assuming positions in the horizontal and extending outwards in the position of the propellers for action vertically upwards, and means for holding the reserve wings in the first positions, of means for urging the reserve wings into the second positions, and means for manually moving the reserve wings from the horizontal to the vertical while the propellers are positioned for action in the vertical, said means for urging the reserve wings into the second positions consists of coaxial springs arranged upon the pivot points of the wings and acting between the wings and a relatively stationary contact.

3. In combination with a safety aeroplane having a flying machine body with wings, a plurality of motor driven propellers movably mounted for action horizontally to the front or vertically upwards, means for moving said propellers from one to the other of said positions, reserve wings hingedly mounted at their front edges on the casing of said motor driven propellers so as to be capable of assuming positions in the vertical and extending rearwards in the positions of the propellers for action horizontally to the front and to be capable of assuming positions in the horizontal and extending outwards in the position of the propellers for action vertically upwards, and means for holding the reserve wings in the first positions, of means for urging the reserve wings into the second positions, and means for manually moving the reserve wings from the horizontal to the vertical while the propellers are positioned for action in the vertical, consisting of cables attached to the free ends of the wings and

guided thru guide tubes to the pilot's chamber.

4. In combination with a safety aeroplane having a flying machine body with wings, a plurality of motor driven propellers movably mounted for action horizontally to the front or vertically upwards, means for moving said propellers from one to the other of said positions, reserve wings hingedly mounted at their front edges on the casing of said motor driven propellers so as to be capable of assuming positions in the vertical and extending rearwards in the positions of the propellers for action horizontally to the front and to be capable of assuming positions in the horizontal and extending outwards in the position of the propellers for action vertically upwards, and means for holding the reserve wings in the first positions, of means for urging the reserve wings into the second positions, and means for manually moving the reserve wings from the horizontal to the vertical while the propellers are positioned for action in the vertical, consisting of cables attached to the free ends of the wings and guided thru guide tubes to the pilot's chamber, and terminating in rings for manual manipulation of the cables.

Signed at New York city, in the county of New York and State of New York, this 19th day of March, A. D. 1929.

JOSEPH LEOPOLD.