

P. A. NILSON.
 FLYING MACHINE.
 APPLICATION FILED SEPT. 26, 1911.

1,033,452.

Patented July 23, 1912.

4 SHEETS-SHEET 1.

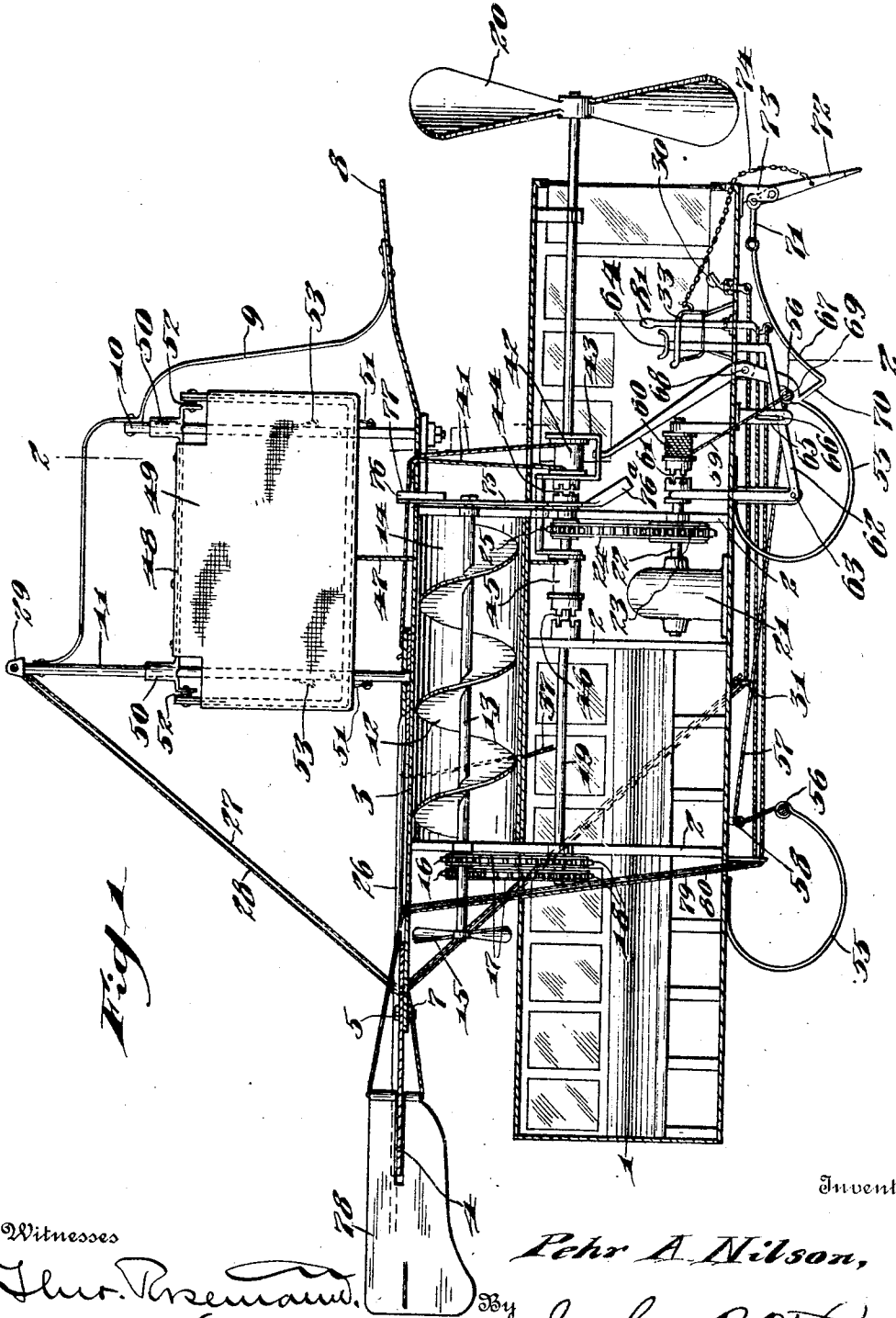


Fig. 1

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Witnesses

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 R. H. Krentzel.

By

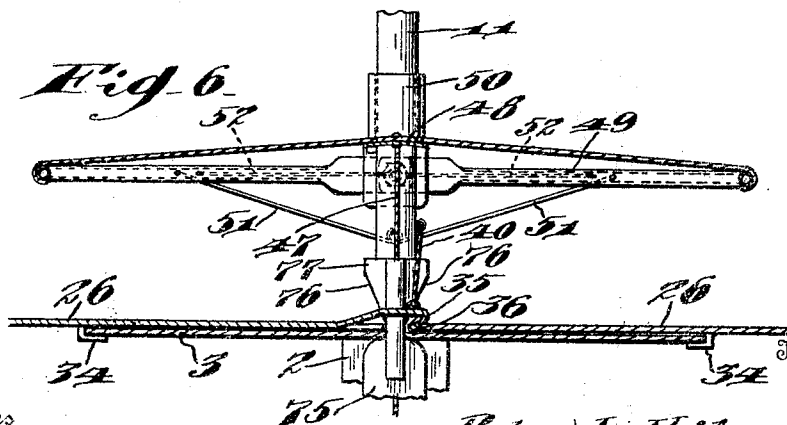
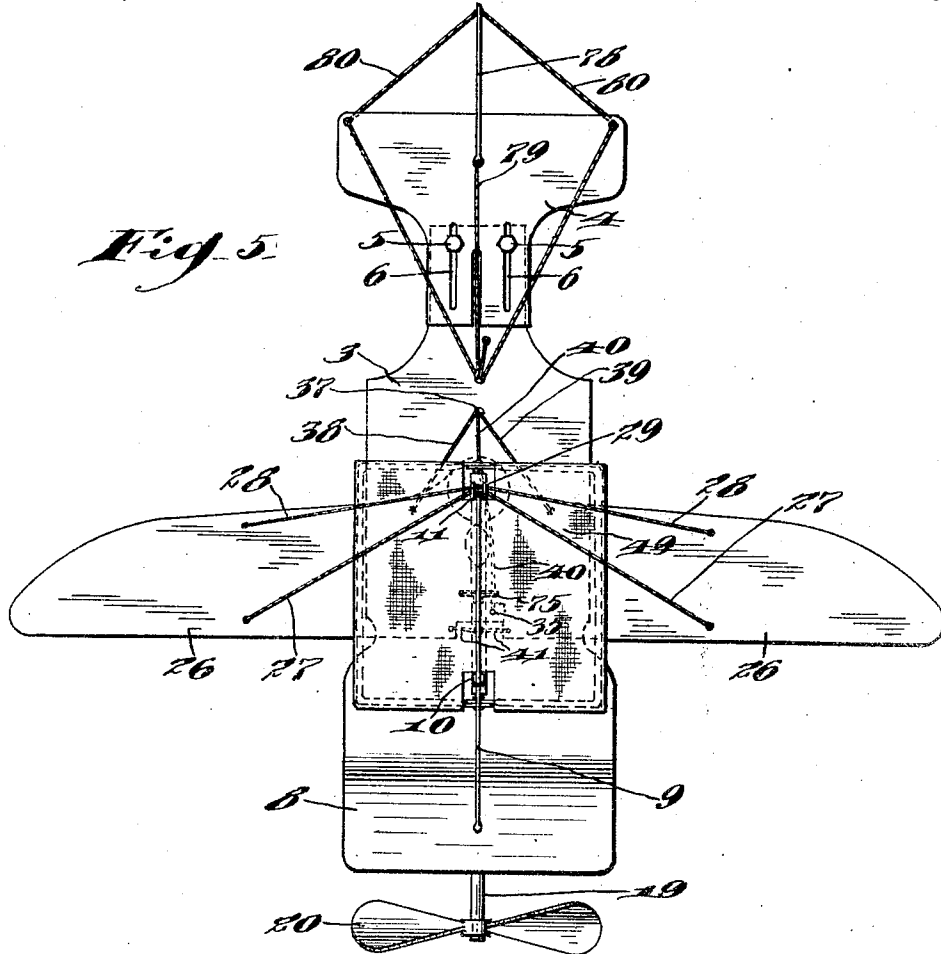
Joshua R. H. Totten,
 Attorney.

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4 SHEETS—SHEET 3.



Witnesses

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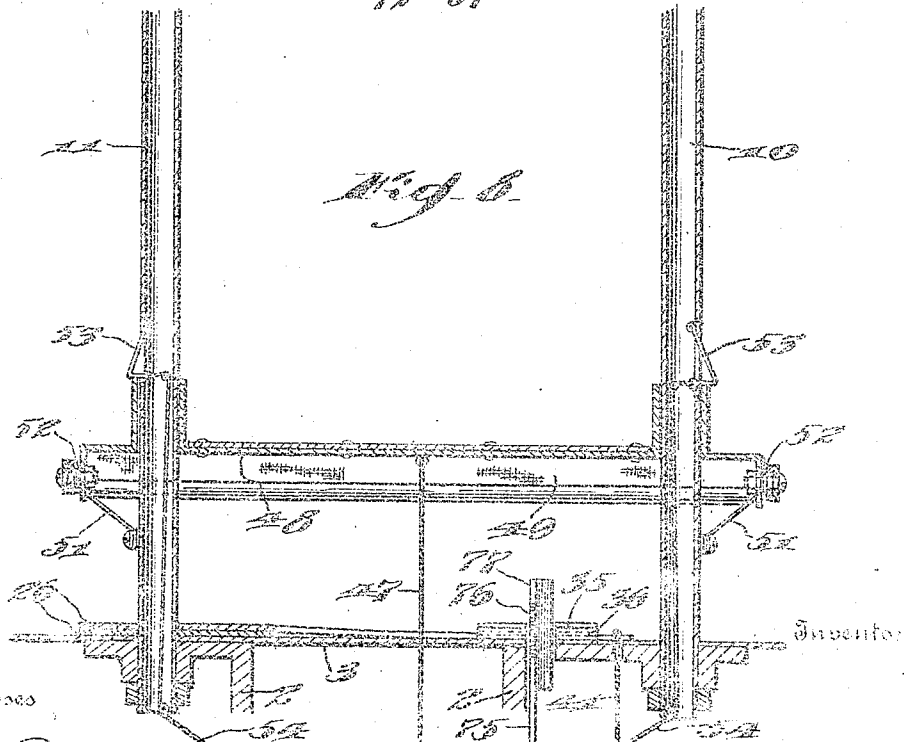
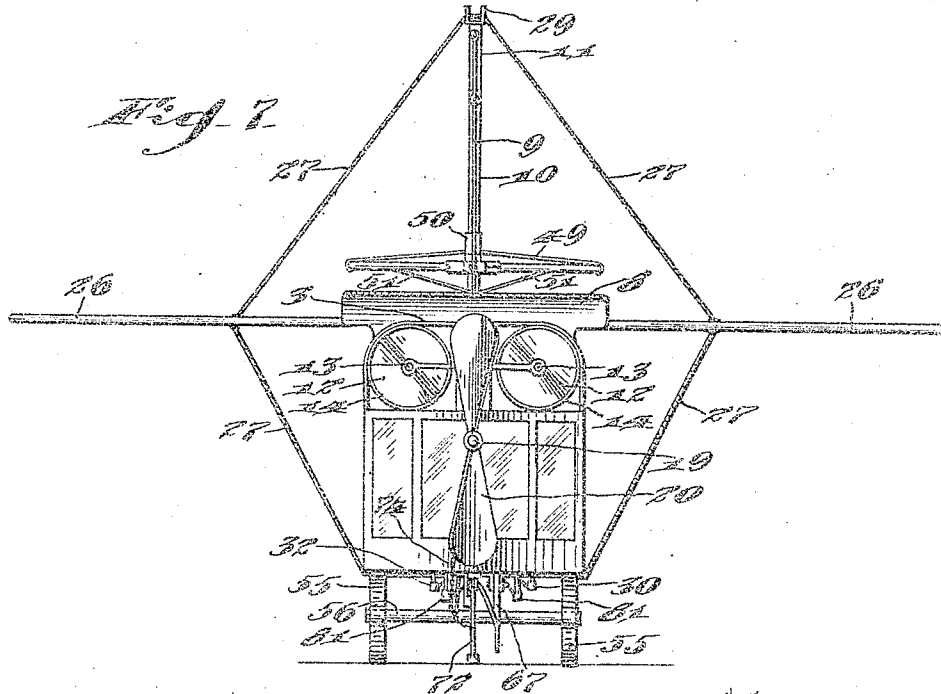
By Joshua R. A. Potts,
Attorney

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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

PEHR A. NILSON, OF PHILADELPHIA, PENNSYLVANIA.

FLYING-MACHINE.

1,033,452.

Specification of Letters Patent.

Patented July 23, 1912.

Application filed September 26, 1911. Serial No. 651,450.

To all whom it may concern:

Be it known that I, PEHR A. NILSON, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Flying-Machines, of which the following is a specification.

My invention relates to improvements in flying machines, the object of the invention being to provide improved means which permit the machine to rise directly from the ground overcoming the necessity of a running start.

A further object is to provide improved spring kickers which when released elevate the machine, and at the same time cause the wings of the machine to be spread, and the device quickly take the air and move through space.

A further object is to provide a flying machine having folding wings and planes, in combination with spring kickers and propelling means, whereby when the propelling means exert sufficient forward motion to the machine, the kickers will be automatically released to elevate the machine in the air, and the wings and planes will be promptly drawn to operative position so as to sustain the machine in the air while the propeller carries it forwardly.

A further object is to provide a machine of this character in which the several operations are rendered automatic, so that the machine will, as far as possible, take care of itself when it springs into the air, so that it will begin its flight easily and gracefully, very much as a bird begins its flight.

A further object is to provide an improved construction of wings which are capable of folding, so as to occupy but relatively small space when the air ship is in its garage, and which will automatically swing out into open position when the machine begins its flight, and provide improved means for warping said wings to maintain an equilibrium in flight.

With these and other objects in view, the invention consists in certain novel features of construction and combinations and arrangements of parts, as will be more fully hereinafter described and pointed out in the claims.

In the accompanying drawings: Figure 1, is a view in longitudinal section illustrating my improvements in set position ready to

begin its flight. Fig. 2, is a view in section on the line 2—2 of Fig. 1. Fig. 3, is a view in front elevation. Fig. 4, is a fragmentary view of the forward part of the machine shown in Fig. 1, but showing the parts in position after the machine has begun its flight. Fig. 5, is a top plan view on a reduced scale showing the machine in flight. Fig. 6, is a transverse section on an enlarged scale illustrating the manner of connecting the wings, and also illustrating the upper supporting folding plane. Fig. 7, is a view in front elevation illustrating the position of the several parts when the machine is in flight, and Fig. 8, is a fragmentary view on an enlarged scale illustrating in section the structure shown in Fig. 6.

1, represents the body portion of my improved flying machine, which may be made in various ways, but preferably constructed as light as possible, and may be arranged for carrying many or few passengers as desired. This body 1 is connected by uprights 2 with a top 3, and on this top 3 at its rear end a tail 4 is adjustably secured by means of bolts 5. The bolts 5 are projected through slots 6 in the tail, and in the body, and are secured by means of nuts 7, so that the device may be extended or shortened as desired. The top 3 and the tail 4 are preferably of light metal, and the forward end 8 of the body is flared upwardly as shown most clearly in Fig. 1, and is connected by a brace 9 with the forward upright 10. This upright 10, as well as the main upright 11 are disposed parallel to each other, and are preferably connected by the brace 9, which is extended from one to the other as shown. Between the top 3 and the body 1, worm propellers 12 are mounted upon shafts 13 in cylindrical casings 14, and these shafts 13 may or may not be provided at their rear ends with blade propellers 15. On these shafts 13, sprocket wheels 16 are mounted, and are connected by chains 17 with sprocket wheels 18 on a longitudinal shaft 19. This shaft 19 extends throughout the greater portion of the length of body 1, and is provided on its forward end with a propeller 20. In the body 1, a motor 21 is mounted, and turns a shaft 22. On this shaft 22 a sprocket wheel 23 is located, and is connected by a chain 24 on a sprocket wheel 25 on shaft 19, so that motion is transmitted from the motor to the propeller shaft.

26, 26, represent the two main wings of

my machine. These wings are pivotally supported on the post 11, and are adapted to be swung to a position either longitudinally of the machine or transversely of the machine, so that they may be folded into small compass or extended for flight. These wings 26 are made preferably of metal or of some elastic or flexible material which is capable of warping or flexing, and they are provided with two cords 27 and 28. The rear cord 28 extends from a point centrally of the body in line with post 11, thence upwardly to and secured to one of the wings 26, thence through an eye 29 on the upper end of post 11, thence to and secured to the rear portion of the opposite wing 26, and thence to its starting point. The front cord 27 is connected at one end to a foot lever 30, and thence through an eye 31 at the center of the body where cord 28 is secured, thence to and secured to the forward edge of one wing 26, thence passed through the eye 29, thence to and secured to the forward edge of the other wing 26, thence through the eye 31 and to, and secured to, a foot lever 32. By manipulating these foot levers 30 and 32, the wings 26 may be flexed or warped. In other words, the manipulation of the cord 27 will cause the forward edge of one wing to rise, and the other to lower in accordance with the position of the machine, so as to establish an equilibrium. This motion is readily accomplished by the foot levers 30 and 32, which are located adjacent the operator's seat 33.

To prevent any possibility of the wings lifting from the body when the machine is in flight, said wings are provided with L-shaped lugs 34 to engage under the side edges of top 3, and the inner ends of the wings are interlocked by providing a bent tongue 35 on one wing to engage over a lug 36 on the other. To swing these wings back to folded position, an operating cord 37 is provided and extends through the top 3, and is provided with three branch cords 38, 39, and 40. The cords 38 and 39 are secured to the wings 26 respectively, while the cord 40 is connected to the bent tongue 35. The cords 38 and 39 contain more slack than the cord 40, so that the first pull on cord 37 serves to lift the tongue 35, and unlock the wings before they are pulled back to folded position. The opening of the wings to spread, or sailing position, is accomplished automatically as will now be explained. Cords 41 are secured to the wings 26, and are also secured to a drum 42 mounted loosely on shaft 19 in a frame 43. The drum 42 is adapted to be moved on the shaft 19 so as to lock the drum to a clutch 44 fixed to the shaft. The movement of the drum is controlled by the frame 43, and this frame also moves a drum 45 on the

shaft 19, so as to engage or disengage a clutch 46 fixed to the shaft. The drum 45 has secured thereto a cord 47 which is connected at its upper end to the center bar 48 of a folding plane 49. This folding plane 49 comprises two hinged members having bearing sleeves 50 which slide on the uprights 10 and 11. Pivoted links 51 compel said members to move to horizontal position when the bar 48 is drawn downwardly, while springs 52 compel the plane to collapse or fold when permitted to elevate.

To secure the device in its lowered position, spring catches 53 are provided in the uprights, and to said catches cords 54 are secured and are adapted when drawn downward to move the catches inwardly, and permit the plane to fold as shown in Fig. 1. To the bottom of body 1, my improved spring kickers 55 are secured at one end. These kickers each comprise two bow springs which are connected at their free ends by transverse rods 56. Rod 56 of the rear kicker is connected by a cord 57 with the rod of the front kicker, and is passed over a pulley 58 on the bottom of the body 1, so as to compel the kickers to move in unison. The front kicker is connected by a cord 59 with a drum 60 on motor shaft 22. This drum 60 is adapted to be locked to the shaft 22 by means of a clutch 61 which is controlled by a lever 62 fulcrumed at 63, and provided with a handle 64 in convenient reach of the operator. The movement of this lever is limited by a slotted bracket 65 through which a pin 66 on the said lever projects.

The kickers are held in normal set position by means of a spring member 67, which not only constitutes a catch, but has other functions, and for convenience of description, I refer to this part as a member and will separately describe its parts and functions. This member 67 is pivotally connected to the body as shown at 68, and one end is connected to the frame 44, so that the movement of the member on its pivot serves to move the frame, and the drums 42 and 45. The intermediate portion of the member below the body is shaped to form a hook 69 to receive the cross rod 56 of the front kicker, and hold it in said position. Adjacent this hook, the member is shaped forming a cam face 70 which is adapted to be engaged by the cross rod 56, when the kicker moves to set position so as to compel the member to move far enough to allow the kicker to engage the hook. The extreme forward end of the member 67 is connected by a link 71 with a kicker releasing arm 72, which is pivotally supported between its ends on a bracket 73 secured to the front end of the body 1. The lower end of this arm 72 is sharp, and while I some times refer to this part as a resister because it resists the

forward motion of the machine when the machine obtains a sufficient forward momentum, the arm will be swung on its pivot and the kickers released as will be readily understood. A chain 74 is secured to this arm 72, and is located in close proximity to the operator's seat, so that the operator may lift the arm at his pleasure.

As above stated, the movement of the member 67 in one direction causes the drums 42 and 45 to be thrown into engagement with their clutches, and locked to turn with shaft 19. This, of course, compels the cords to wind on these drums, and move the wings 26 to spread or open position, as well as draw the plane 49 to open horizontal position. To prevent these drums from overwinding, which would cause damage, a vertical bar 75 is provided, and has a cam end 76^a to engage the frame 43 and move it in the direction opposite to that caused by the member 67. That is, this bar 75 releases the drums when the bar is elevated, and its elevation is due to the action of the ends of wings 26 against the cam faces 76 of a block 77 on the upper end of said bar. Hence, this movement of the wings 26 together causes their operating mechanism to be stopped.

To steer the machine through the air, various means may of course be employed, a simple means being to render the tail 4 flexible and provide a vertically positioned vane 78, and to the tail and to said vane, cords 79 and 80 are provided, so that they may be swung by a suitable lever 81 in convenient reach of the operator.

Certain parts of the machine are omitted for purposes of clearness, but it is to be understood of course, that the machine is to be equipped with all necessary appliances for steering as well as for the comfort of the passengers.

The operation is as follows: By reference to Fig. 1, it will be seen that the several parts are shown in set position, ready for starting. When the motor is started, shaft 19 will be turned through the medium of chain 24 and its sprocket wheels to revolve the propeller 20, as well as the propellers 12 and 15. The starting arm or resister 72 engages the ground. When the propellers attain sufficient speed to move the machine forwardly, such movement will cause the arm 72 to swing on its fulcrum and move member 67 to release the kickers 55 to throw the frame 43, so as to move the drums 42 and 45 into locked engagement with their clutches. When the kickers are released, they will strike the ground, and throw the machine upwardly. At the same time, the drums 42 and 45 will wind their cords 41 and 47 respectively, so that the wings 26 will be swung out to operative position, and the plane 49 drawn downwardly to its

operative position. When the wings 26 complete their outward movement, they will elevate the bar 75 as above described, so as to force the frame 43 forwardly and release the drums from their clutches, preventing any overwinding. The wings will automatically lock together as above explained, and they are permitted the free swinging movement to open or closed position by reason of the arrangement of the cords 27 and 28. To maintain an equilibrium in flight, it is simply necessary for the operator to flex or warp the wings 26 as above explained, and the steering mechanism above pointed out enables him to direct the flight as he desires. After the machine is well along its way, the operator depresses the lever 62, so that the drum 60 will be locked to this clutch 61, and the kickers will be drawn up to the set position shown. When they do reach this position, the cross bar 56 of the front kicker will engage lever 62, and throw the clutch 61, so as to prevent overwinding of the drum 64.

It will therefore be noted that not only can the machine be folded so as to occupy but relatively small compass in its garage, but that it will jump into the air when the propellers attain a sufficient forward velocity, and the wings and the plane will be automatically spread so as to take the air and allow the machine to gracefully glide away. This machine therefore needs no running start, as is common to most machines, and may be started readily from the deck of a ship or elsewhere without much space being required. The machine does not jump into the air until its forward velocity is sufficient to carry it along, and as soon as it does spring into the air, its wings are spread and sustain the same. When the machine alights, the spring kickers act as runners to allow it to glide easily along the ground without shock or jar, and if it is upon the earth, the arm or resister 72 may be dropped so as to act as a brake, and quickly stop the machine.

Throughout the specification I have referred to a number of parts as cords, I would have it understood that by the use of this term, I mean any flexible connecting device such as cables, chains or the like.

Various slight changes might be made in the general form and arrangement of parts described without departing from my invention, and hence I do not limit myself to the precise details set forth, but consider myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a flying machine, the combination with a body, of a spring kicker secured at

one end to said body and adapted at its free end to engage the ground, substantially as described.

2. In a flying machine, the combination with a body, of a spring kicker secured at one end to said body and adapted at its free end to engage the ground, means for holding the kicker in set position, and means for releasing the kicker, substantially as described.

3. In a flying machine, the combination with a body, spring kickers on said body, and each kicker comprising two flat springs, cross rods connecting the springs of each kicker, a fixed pulley on the body, a flexible connecting device connecting said rods and passed over said pulley whereby said kickers are compelled to operate in unison, and means for holding said kickers in set position, substantially as described.

4. In a flying machine, the combination with a body, spring kickers on said body, and each kicker comprising two flat springs, cross rods connecting the springs of each kicker, a fixed pulley on the body, a flexible connecting device connecting said rods and passed over said pulley whereby said kickers are compelled to operate in unison, means for holding the kickers in set position, means for releasing the kickers from set position, and means for drawing said kickers into set position, substantially as described.

5. In a flying machine, the combination with a body, spring kickers on said body, and each kicker comprising two flat springs, cross rods connecting the springs of each kicker, a fixed pulley on the body, a flexible connecting device connecting said rods and passed over said pulley whereby said kickers are compelled to operate in unison, means for holding the kickers in set position, means for releasing the kickers from set position, means for drawing said kickers into set position, said last-mentioned means comprising a drive shaft, a drum on the drive shaft, a clutch on the drive shaft locking said drum to the shaft, a flexible connecting device connecting the drum with one of said rods, and means for moving said clutch, substantially as described.

6. In a flying machine, the combination with a body, of a spring kicker on said body, a pivoted arm or resister adapted to engage the ground, and said arm or resister constructed to release the kickers when the machine attains a forward momentum, substantially as described.

7. In a flying machine, the combination with a body, of a spring kicker on the body, means for holding the kicker in set position, and means for releasing the kicker, a pivoted arm or resister adapted to engage the ground, and said arm or resister constructed to release the kickers when the machine at-

tains a forward momentum, substantially as described.

8. In a flying machine, the combination with a body, spring kickers on said body, and each kicker comprising two flat springs, cross rods connecting the springs of each kicker, a fixed pulley on the body, a flexible connecting device connecting said rods and passed over said pulley whereby said kickers are compelled to operate in unison, and means for holding said kickers in set position, a pivoted arm or resister adapted to engage the ground, and said arm or resister constructed to release the kickers when the machine attains a forward momentum, substantially as described.

9. In a flying machine, the combination with a body, spring kickers on said body, and each kicker comprising two flat springs, cross rods connecting the springs of each kicker, a fixed pulley on the body, a flexible connecting device connecting said rods and passed over said pulley whereby said kickers are compelled to operate in unison, means for holding the kickers in set position, means for releasing the kickers from set position, means for drawing said kickers into set position, a pivoted arm or resister adapted to engage the ground, said arm or resister constructed to release the kickers when the machine attains a forward momentum, substantially as described.

10. In a flying machine, the combination with a body, spring kickers on said body, and each kicker comprising two flat springs, cross rods connecting the springs of each kicker, a fixed pulley on the body, a flexible connecting device connecting said rods and passed over said pulley whereby said kickers are compelled to operate in unison, means for holding the kickers in set position, means for releasing the kickers from set position, means for drawing said kickers into set position, said last-mentioned means comprising a drive shaft, a drum on the drive shaft, a clutch on the drive shaft locking said drum to the shaft, a flexible connecting device connecting the drum with one of said rods, means for moving said clutch, a pivoted arm or resister adapted to engage the ground, and said arm or resister constructed to release the kickers when the machine attains a forward momentum, substantially as described.

11. In a flying machine, the combination with a body, of a spring kicker on said body, pivotally supported wings, and means automatically operated when the kickers are released to throw said wings to open flying position, substantially as described.

12. In a flying machine, the combination with a body, of a spring kicker on the body, means for holding the kicker in set position, means for releasing the kicker, pivotally

supported wings, and means automatically operated when the kickers are released to throw said wings to open flying position, substantially as described.

13. In a flying machine, the combination with a body, spring kickers on said body, and each kicker comprising two flat springs, cross rods connecting the springs of each kicker, a fixed pulley on the body, a flexible connecting device connecting said rods and passed over said pulley, whereby said kickers are compelled to operate in unison, means for holding said kickers in set position, pivotally supported wings, and means automatically operated when the kickers are released to throw said wings to open flying position, substantially as described.

14. In a flying machine, the combination with a body, spring kickers on said body, and each kicker comprising two flat springs, cross rods connecting the springs of each kicker, a fixed pulley on the body, a flexible connecting device connecting said rods and passed over said pulley whereby said kickers are compelled to operate in unison, means for holding the kickers in set position, means for releasing the kickers from set position, means for drawing said kickers into set position, pivotally supported wings, and means automatically operated when the kickers are released to throw said wings to open flying position, substantially as described.

15. In a flying machine, the combination with a body, spring kickers on said body, and each kicker comprising two flat springs, cross rods connecting the springs of each kicker, a fixed pulley on the body, a flexible connecting device connecting said rods and passed over said pulley whereby said kickers are compelled to operate in unison, means for holding the kickers in set position, means for releasing the kickers from set position, means for drawing said kickers into set position, said last-mentioned means comprising a drive shaft, a drum on the drive shaft, a clutch on the drive shaft locking said drum to the shaft, a flexible connecting device connecting the drum with one of said rods, means for moving said clutch, pivotally supported wings, and means automatically operated when the kickers are released to throw said wings to open flying position, substantially as described.

16. In a flying machine, the combination with a body, of a spring kicker on said body, a pivoted arm or resister adapted to engage the ground, and said arm or resister constructed to release the kickers when the machine attains a forward momentum, pivotally supported wings, and means automatically operated when the kickers are released to throw said wings to open flying position, substantially as described.

17. In a flying machine, the combination with a body, of a spring kicker on the body, means for holding the kicker in set position, and means for releasing the kicker, a pivoted arm or resister adapted to engage the ground, said arm or resister constructed to release the kickers when the machine attains a forward momentum, pivotally supported wings, and means automatically operated when the kickers are released to throw said wings to open flying position, substantially as described.

18. In a flying machine, the combination with a body, spring kickers on said body, and each kicker comprising two flat springs, cross rods connecting the springs of each kicker, a fixed pulley on the body, a flexible connecting device connecting said rods and passed over said pulley whereby said kickers are compelled to operate in unison, means for holding said kickers in set position, a pivoted arm or resister adapted to engage the ground, and said arm or resister constructed to release the kickers when the machine attains a forward momentum, pivotally supported wings, and means automatically operated when the kickers are released to throw said wings to open flying position, substantially as described.

19. In a flying machine, the combination with a body, spring kickers on said body, and each kicker comprising two flat springs, cross rods connecting the springs of each kicker, a fixed pulley on the body, a flexible connecting device connecting said rods and passed over said pulley whereby said kickers are compelled to operate in unison, means for holding the kickers in set position, means for releasing the kickers from set position, means for drawing said kickers into set position, a pivoted arm or resister adapted to engage the ground, said arm or resister constructed to release the kickers when the machine attains a forward momentum, pivotally supported wings, and means automatically operated when the kickers are released to throw said wings to open flying position, substantially as described.

20. In a flying machine, the combination with a body, spring kickers on said body, and each kicker comprising two flat springs, cross rods connecting the springs of each kicker, a fixed pulley on the body, a flexible connecting device connecting said rods and passed over said pulley whereby said kickers are compelled to operate in unison, means for holding the kickers in set position, means for releasing the kickers from set position, means for drawing said kickers into set position, said last-mentioned means comprising a drive shaft, a drum on the drive shaft, a clutch on the drive shaft locking said drum to the shaft, a flexible connecting device connecting the drum with one of said rods, means for moving said

clutch, a pivoted arm or resister adapted to engage the ground, said arm or resister constructed to release the kickers when the machine attains a forward momentum, pivotally supported wings, and means automatically operated when the kickers are released to throw said wings to open flying position, substantially as described.

21. In a flying machine, the combination with a body, of a spring kicker on said body, horizontally movable pivoted wings, a propeller shaft, a vertically movable collapsible plane, drums loose on said propeller shaft, flexible connecting devices between said wings and said drums, clutches on said shaft adapted to lock the drums to the shaft, kicker holding means adapted when released to move the drums into locked engagement with their clutches, and means operated by the wings when they reach their open position to throw said drums out of engagement with said clutches, substantially as described.

22. In a flying machine, the combination with a body, of a spring kicker on the body, means for holding the kicker in set position, means for releasing the kicker, horizontally movable pivoted wings, a propeller shaft, a vertically movable collapsible plane, drums loose on said propeller shaft, flexible connecting devices between said wings and said drums, clutches on said shaft adapted to lock the drums to the shaft, kicker holding means adapted when released to move the drums into locked engagement with their clutches, and means operated by the wings when they reach their open position to throw said drums out of engagement with said clutches, substantially as described.

23. In a flying machine, the combination with a body, spring kickers on said body, and each kicker comprising two flat springs, cross rods connecting the springs of each kicker, a fixed pulley on the body, a flexible connecting device connecting said rods and passed over said pulley whereby said kickers are compelled to operate in unison, means for holding said kickers in set position, horizontally movable pivoted wings, a propeller shaft, a vertically movable collapsible plane, drums loose on said propeller shaft, flexible connecting devices between said wings and said drums, clutches on said shaft adapted to lock the drums to the shaft, kicker holding means adapted when released to move the drums into locked engagement with their clutches, and means operated by the wings when they reach their open position to throw said drums out of engagement with said clutches, substantially as described.

24. In a flying machine, the combination with a body, spring kickers on said body, and each kicker comprising two flat springs, cross rods connecting the springs of each kicker, a fixed pulley on the body, a flexible

connecting device connecting said rods and passed over said pulley whereby said kickers are compelled to operate in unison, means for holding the kickers in set position, means for releasing the kickers from set position, means for drawing said kickers into set position, horizontally movable pivoted wings, a propeller shaft, a vertically movable collapsible plane, drums loose on said propeller shaft, flexible connecting devices between said wings and said drums, clutches on said shaft adapted to lock the drums to the shaft, kicker holding means adapted when released to move the drums into locked engagement with their clutches, and means operated by the wings when they reach their open position to throw said drums out of engagement with said clutches, substantially as described.

25. In a flying machine, the combination with a body, spring kickers on said body, and each kicker comprising two flat springs, cross rods connecting the springs of each kicker, a fixed pulley on the body, a flexible connecting device connecting said rods and passed over said pulley whereby said kickers are compelled to operate in unison, means for holding the kickers in set position, means for releasing the kickers from set position, means for drawing said kickers into set position, said last-mentioned means comprising a drive shaft, a drum on the drive shaft, a clutch on the drive shaft locking said drum to the shaft, a flexible connecting device connecting the drum with one of said rods, means for moving said clutch, horizontally movable pivoted wings, a propeller shaft, a vertically movable collapsible plane, drums loose on said propeller shaft, flexible connecting device between said wings and said drums, clutches on said shaft adapted to lock the drums to the shaft, kicker holding means adapted when released to move the drums into locked engagement with their clutches, and means operated by the wings when they reach their open position to throw said drums out of engagement with said clutches, substantially as described.

26. In a flying machine, the combination with a body, of a spring kicker on said body, horizontally movable pivoted wings, a propeller shaft, a vertically movable collapsible plane, drums loose on said propeller shaft, flexible connecting devices between said wings and said drums, clutches on said shaft adapted to lock the drums to the shaft, kicker holding means adapted when released to move the drums into locked engagement with their clutches, means operated by the wings when they reach their open position to throw said drums out of engagement with said clutches, and means for moving said wings and said plane into folded inoperative position, substantially as described.

27. In a flying machine, the combination with a body, of a spring kicker on the body, means for holding the kicker in set position, means for releasing the kicker, horizontally movable pivoted wings, a propeller shaft, a vertically movable collapsible plane, drums loose on said propeller shaft, flexible connecting devices between said wings and said drums, clutches on said shaft adapted to lock the drums to the shaft, kicker holding means adapted when released to move the drums into locked engagement with their clutches, means operated by the wings when they reach their open position to throw said drums out of engagement with said clutches, and means for moving said wings and said plane into folded inoperative position, substantially as described.

28. In a flying machine, the combination with a body, spring kickers on said body, and each kicker comprising two flat springs, cross rods connecting the springs of each kicker, a fixed pulley on the body, a flexible connecting device connecting said rods and passed over said pulley whereby said kickers are compelled to operate in unison, means for holding said kickers in set position, horizontally movable pivoted wings, a propeller shaft, a vertically movable collapsible plane, drums loose on said propeller shaft, flexible connecting device between said wings and said drums, clutches on said shaft adapted to lock the drums to the shaft, kicker holding means adapted when released to move the drums into locked engagement with their clutches, means operated by the wings when they reach their open position to throw said drums out of engagement with said clutches, and means for moving said wings and said plane into folded inoperative position, substantially as described.

29. In a flying machine, the combination with a body, spring kickers on said body, and each kicker comprising two flat springs, cross rods connecting the springs of each kicker, a fixed pulley on the body, a flexible connecting device connecting said rods and passed over said pulley whereby said kickers are compelled to operate in unison, means for holding the kickers in set position, means for releasing the kickers from set position, means for drawing said kickers into set position,

tion, horizontally movable pivoted wings, a propeller shaft, a vertically movable collapsible plane, drums loose on said propeller shaft, flexible connecting devices between said wings and said drums, clutches on said shaft adapted to lock the drums to the shaft, kicker holding means adapted when released to move the drums into locked engagement with their clutches, means operated by the wings when they reach their open position to throw said drums out of engagement with said clutches, and means for moving said wings and said plane into folded inoperative position, substantially as described.

30. In a flying machine, the combination with a body, spring kickers on said body, and each kicker comprising two flat springs, cross rods connecting the springs of each kicker, a fixed pulley on the body, a flexible connecting device connecting said rods and passed over said pulley whereby said kickers are compelled to operate in unison, means for holding the kickers in set position, means for releasing the kickers from set position, means for drawing said kickers into set position, said last-mentioned means comprising a drive shaft, a drum on the drive shaft, a clutch on the drive shaft locking said drum to the shaft, a flexible connecting device connecting the drum with one of said rods, means for moving said clutch, horizontally movable pivoted wings, a propeller shaft, a vertically movable collapsible plane, drums loose on said propeller shaft, flexible connecting device between said wings and said drums, clutches on said shaft adapted to lock the drums to the shaft, kicker holding means adapted when released to move the drums into locked engagement with their clutches, means operated by the wings when they reach their open position to throw said drums out of engagement with said clutches, and means for moving said wings and said plane into folded inoperative position, substantially as described.

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

PEHR A. NILSON.

Witnesses:

R. H. KRENKEL,
CHAS. E. POTTS.