

W. E. ZELLS.
 COMBINED AEROPLANE AND DIRIGIBLE BALLOON.
 APPLICATION FILED FEB. 25, 1911.

1,019,579.

Patented Mar. 5, 1912.

4 SHEETS—SHEET 1.

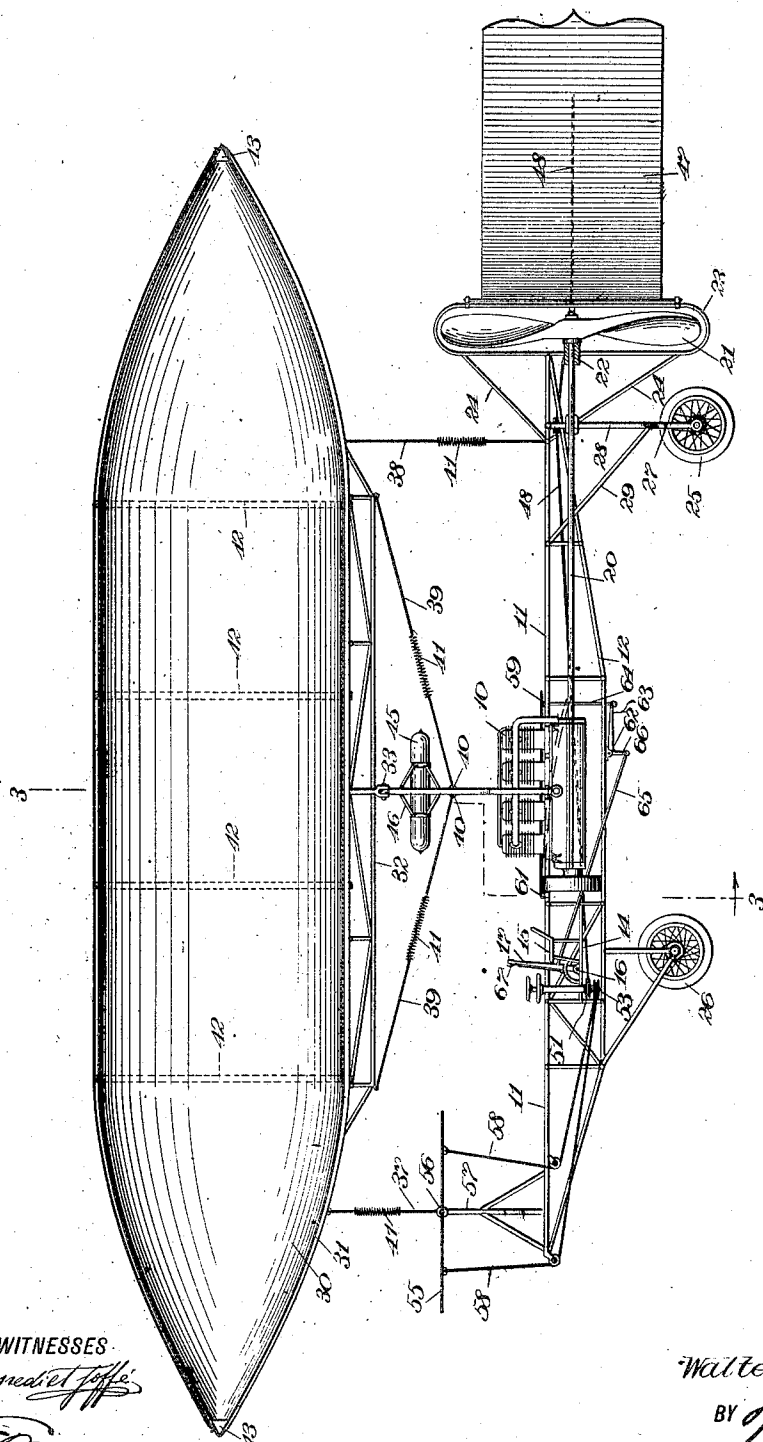


Fig. 1.

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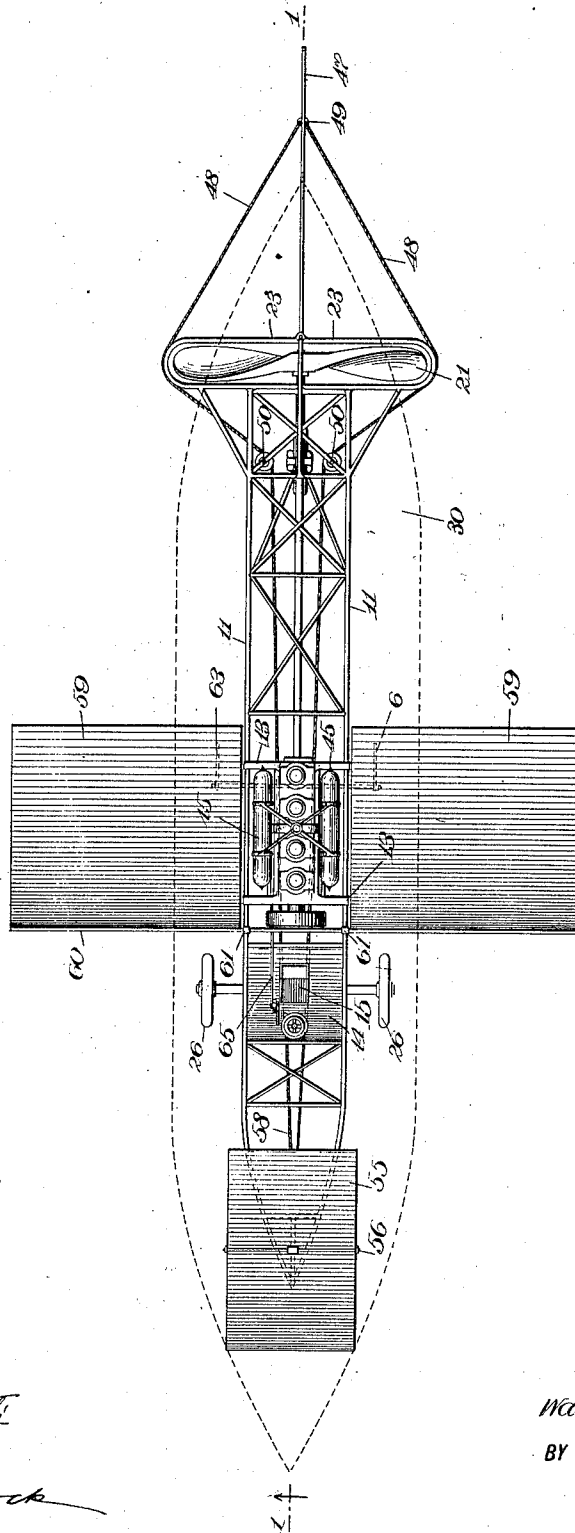
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Fig. 2.



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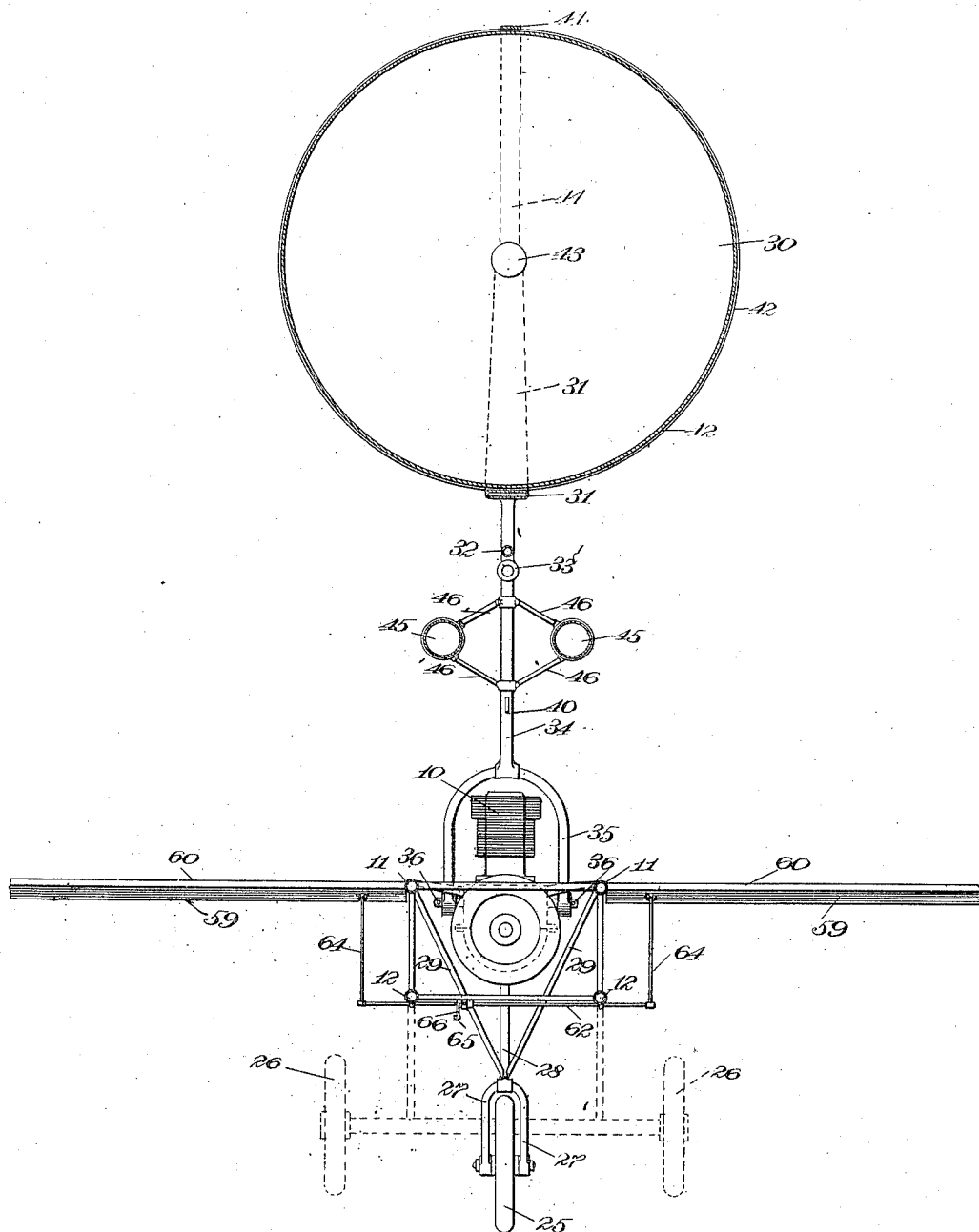


Fig. 3.

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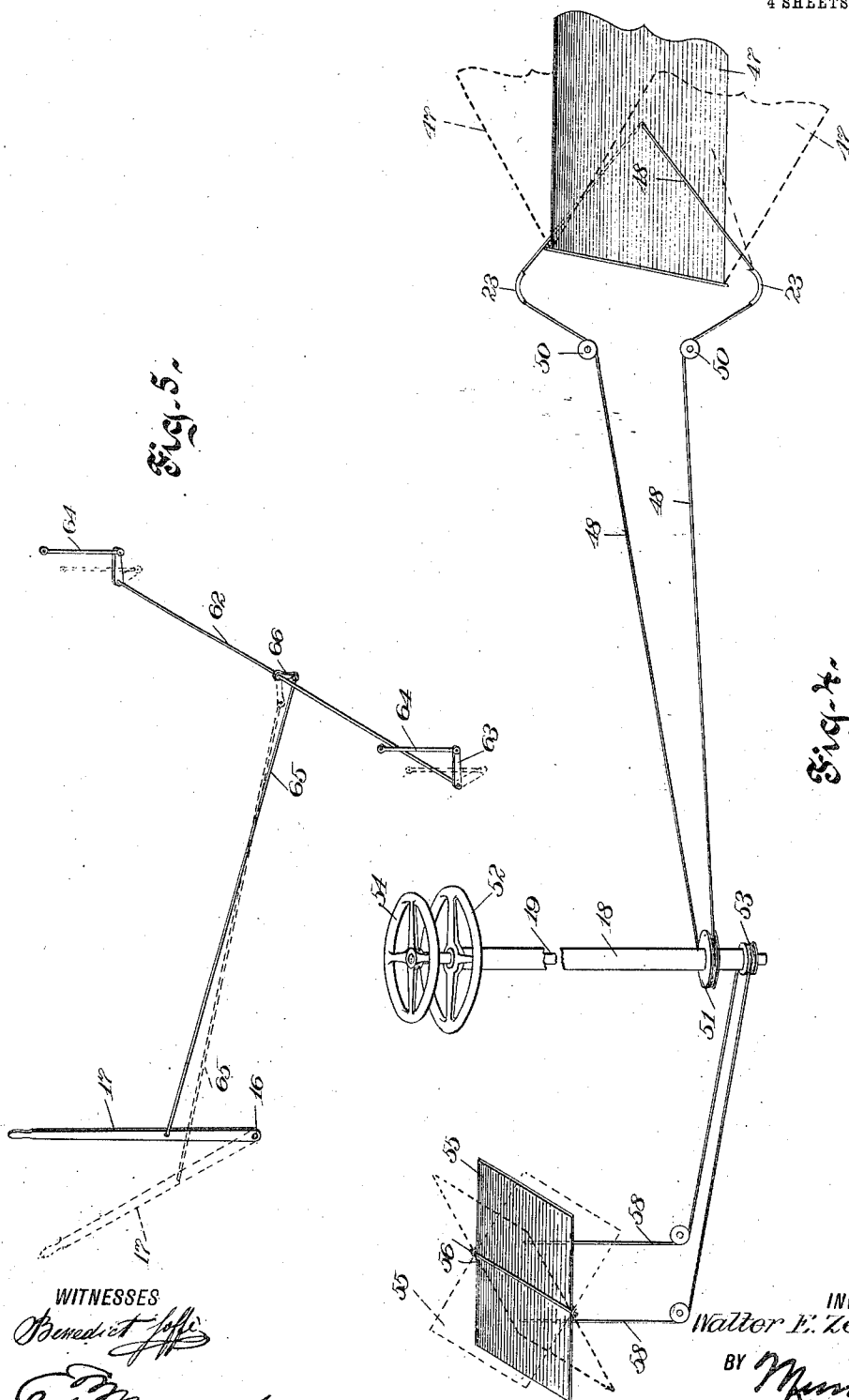
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

WALTER EDWARD ZELLS, OF ANN ARBOR, MICHIGAN.

COMBINED AEROPLANE AND DIRIGIBLE BALLOON.

1,019,579.

Specification of Letters Patent.

Patented Mar. 5, 1912.

Application filed February 25, 1911. Serial No. 610,674.

To all whom it may concern:

Be it known that I, WALTER E. ZELLS, a citizen of the United States, and a resident of Ann Arbor, in the county of Washtenaw and State of Michigan, have invented a new and Improved Combined Aeroplane and Dirigible Balloon, of which the following is a full, clear, and exact description.

Among the principal objects which the present invention has in view are: To provide in a machine of the character mentioned a flexible connection between the carrying frame and the air floated body; to provide an air floated body adapted to balance the weight of the carrying frame and load mounted thereon; to provide a harness for the floating body adapted to maintain the shape or form thereof and to prevent chafing or wear upon the body thereof; and to provide a construction and arrangement of planes and means for controlling the same to change the vertical and horizontal disposition of the machine.

One embodiment of the present invention is disclosed in the structure illustrated in the accompanying drawings, in which like characters of reference denote corresponding parts in all the views, and in which—

Figure 1 is a vertical section of a combined aeroplane and dirigible balloon constructed and arranged in accordance with the present invention, the section being taken on the line 1—1 in Fig. 2; Fig. 2 is a top plan view of the carrying frame and planes connected therewith, the position of the balloon body being indicated by dotted lines; Fig. 3 is a vertical cross section taken on the line 3—3 in Fig. 1; Fig. 4 is a detail view showing the arrangement of the steering mechanism for lifting the machine or changing the horizontal path thereof; and Fig. 5 is a detail view in perspective of the mechanism for changing the angle of incidence of the carrying planes of the aeroplane.

In the accompanying drawings the carrying frame provided to support the engine 10 is formed of a skeleton-like structure having side bars 11 and a dropped truss frame 12. The frame 12 is suitably reinforced, as shown best in Figs. 1 and 2 of the drawings. The engine is suitably braced in position, and is carried by means of the arms 13 upon the side bars 11. Forward of the engine, and dropped below the side bars 11, there is disposed a platform 14 upon which is mounted

the aviator's seat 15 and the pivotal bearing 16 of the controlling lever 17. The platform 14 also provides a mounting for the tiller posts 18 and 19. It is by the manipulation of the posts 18 and 19 and the lever 17 that the planes and rudders attached to the carrying frame are shifted to vary the path or to levitate the machine.

The engine 10 is provided with a driving shaft 20; at the end whereof is mounted an aero propeller 21. The propeller 21 is suitably mounted in bearings 22 and is surrounded by a protecting frame 23. The frame 23 is extended perpendicular to the side bars 11 and is reinforced by guy bars 24.

The frame consisting of the side bars 11 is carried on wheels 25, and 26, 26. The wheel 25 is mounted in the tines of a yoke 27, the yoke being formed at the end of a pivot post 28. The pivot post 28 is pivotally mounted in the frame and is reinforced in vertical position by a brace bar 29. This structure provides for the wheel 25 operating as a caster wheel to drag in harmony with the machine when the same pivots on the wheels 26, 26.

The frame 11, machinery carried thereby, and the aviator or passengers are normally supported by the elongated gas bag 30. The gas bag 30 is constructed in any approved manner and of any approved material. A frame is provided for maintaining the extended position of the bag, said frame having a curved keel brace 31. The keel brace 31 is reinforced by a truss brace 32. The brace 32 is extended lengthwise the bag 30, as best shown in Figs. 1 and 3 of the drawings.

At the median section of the brace 32 is dropped an eyelet bar 33. From the eyelet bar 33 is suspended, by means of a mast 34, the engine 10 and the carrying frame. For this purpose the yoke 35 is provided, the ends whereof are pivotally connected with the side extension pins 36. It will be noted that the connection of the mast 35 with the eyelet bar 33 permits a lateral swing of either the gas bag 30 or the carrying frame. Also it will be noticed that by reason of the pivotal connection of the arms of the yoke 35 with the pins 36 the carrying frame is permitted a longitudinal swing or vibration.

The extent of the longitudinal vibration of the carrying frame relative to the gas bag is controlled by guy cables 37, 38 and 39, 39. The cables 37 and 38 connect the carrying frame at the ends thereof with the

keel brace 31. The ends of the cables 39, 39 are anchored to the extremes of the truss brace 32 and to eyelets 40 on opposite sides of the mast 34. The cables 37, 38 and 39
5 are each divided, the sections thereof being connected by spiral springs 41. This construction of the cables provides a resiliency in the connection between the carrying frame and the gas bag 30 which avoids any
10 tearing strain being exerted upon the relatively fragile structure of the bag. The bag 30 is harnessed to the brace 32 by means of canvas straps 42.

The bag 30 is maintained, when inflated
15 or deflated, by the keel brace 31. To produce a non-tearing member I have provided the conical caps 43 disposed within the bag and suitably secured to the said keel brace. To the caps is also secured the framing
20 strap 44. The strap 44 is constructed of any suitable material, such as aluminium. To the strap 44 and the keel brace 31 is secured the strap 42.

To operate the engine 10 a supply of gaso-
25 lene or other fuel is carried in tanks 45. The tanks 45 are preferably suspended above the engine on the mast 34. For this purpose the outrigger arms 40 are provided.

As above stated, the bag 30, when in-
30 flated, has a flotation power sufficient to balance the gravity of the carrying frame and load carried thereby, inclusive of the aviator. The machine is raised and lowered, or guided to the right or left, by planes
35 pivotally mounted on the carrying frame and by a rudder 47. The rudder 47 is mounted on the frame 23, and is controlled by a cable 48, the ends whereof are connected by means of eyelets 49 at opposite
40 sides of the rudder. The cable 48 is reeved over sheaves 50 to guide the said cable to a drum 51 upon which the said cable is wound. (See Fig. 4 of the drawings.) The drum 51 is fixedly mounted on the tiller
45 post 18, as is also a hand wheel 52. The tiller posts 18 and 19 are suitably mounted on the platform 14 convenient to the hand of the aviator. In the preferred construction the tiller post 18 is a hollow tube
50 through which is extended the tiller post 19, a drum 53 being fixedly mounted on the said post 19 below the post 18, while the hand wheel 54, which is fixedly mounted on the post 19 is extended above the hand
55 wheel 52 but adjacent thereto. The two wheels being thus stationed facilitate the handling of the machine by the aviator.

The manipulation of the wheel 52 effects the rudder 47; the manipulation of the wheel
60 54 effects the levitating plane 55. The levitating plane 55 is pivotally mounted at 56 on a standing frame 57. In the normal position the levitating plane is horizontal, or parallel with the carrying frame, as shown
65 in Fig. 1 of the drawings. To each side

of the pivot are connected the ends of a controlling cable 58, the said cable being wound upon the drum 53, as shown in Fig. 4 of the drawings. It will be seen that by manipulating the wheels 52 and 54 the rudder
70 47 and the plane 55 may be changed to right or left, and vertically, respectively, to alter the course of flight of the machine.

It is to assist the bag 30 that I have provided the carrying planes 59. The planes
75 59 are extended laterally from the machine and the carrying frame thereof. The planes are mounted on a shaft 60 which is pivotally mounted in bearings 61 provided in the carrying frame. The planes are raised and low-
80 ered at the rear, and at the edge removed from the shaft 60, by rocking the shaft 62. The shaft 62 is mounted in suitable bearings in the truss frame 12, and has fixedly connected therewith the lever arms 63. The
85 lever arms 63 are connected by means of pitmen 64 with the planes 59.

The shaft 62 is rocked by manipulating the lever 17. The lever 17 is connected by means of a reach bar 65 with a lever arm
90 66, which is fixedly mounted and centrally disposed upon the shaft 62. As seen best in Fig. 1 of the drawings, the lever 17 is provided with a hand grip detent 67 of usual construction, the bolt whereof engages a
95 quadrant, shown in said Fig. 1 concentric with the bearing 16.

When and as the lever 17 is shifted to the front or rear of the machine the planes 59 will be depressed or raised. When depressed
100 below the horizontal the incline of the planes, as in the ordinary aeroplane, will lift the machine vertically. When, however, the planes 59 are raised above the horizontal, the operation of the planes upon the
105 air through which the machine is moving is to depress the machine. The operation, lifting or depressing the machine, performed by the planes 59 is in a direct vertical path, producing the effect on the bag of lightening
110 or increasing the weight carried thereby.

When the plane 55 is manipulated, as, for instance, to lift the forward end of the frame, it will be seen that the angle of operation of the entire machine is vertically
115 changed. When the rudder 47 is operated it will be seen that the angle of flight of the machine is horizontally changed.

It will be observed that by the construction and arrangement herein described, and
120 as shown in the accompanying drawings, there is produced an airship having the qualities of safety of a balloon and the qualities of facility in operation together with speed of an aeroplane.
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Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In a combined aeroplane and dirigible balloon, an aeroplane carrying frame com- 130

prising a skeleton frame; a motor fixedly mounted therein, said motor being provided with pivot pins; and a supporting mast pivotally connected with said pins and extended above the said motor and carrying frame to be pivotally connected with said balloon.

2. In a combined aeroplane and dirigible balloon, an aeroplane carrying frame comprising a skeleton frame; a motor fixedly mounted therein, said motor being provided with pivot pins disposed at near the balancing center thereof; and a supporting mast pivotally connected with said pins and extended above the said motor and carrying frame to be pivotally connected with said balloon.

3. In a combined aeroplane and dirigible balloon, an aeroplane carrying frame comprising a skeleton frame; a motor fixedly mounted therein, said motor being provided with pivot pins; a supporting mast pivotally connected with said pins and extended above the said motor and carrying frame to be pivotally connected with said balloon; a plurality of elongated cylindrical pointed fuel containing tanks, said tanks being disposed in parallel arrangement to said carrying frame; and a plurality of outrigger arms for supporting in laterally extended position from said mast the said tanks.

4. In a combined aeroplane and dirigible balloon, an aeroplane carrying frame comprising a skeleton frame; a motor fixedly mounted therein, said motor being provided with pivot pins; a supporting mast pivotally connected with said pins and extended above the said motor and carrying frame to be pivotally connected with said balloon; and a plurality of fuel carrying tanks mounted on said mast above said motor.

5. In a combined aeroplane and dirigible balloon, an aeroplane carrying frame comprising a skeleton frame; a motor fixedly mounted therein, said motor being provided with pivot pins; a supporting mast pivotally connected with said pins and extended above the said motor and carrying frame to be pivotally connected with said balloon; a plurality of fuel carrying elongated tanks; and a plurality of outrigger supports for said tanks suitably mounted on said mast to balance said tanks.

6. In a machine of the character described, in combination, an aeroplane; a balloon supportingly attached to said aeroplane normally to float the same and the load carried thereby; levitating planes pivotally mounted on said aeroplane and extended laterally therefrom; a manually operated mechanism for varying the angle of incidence of said planes to decrease and augment the pulling weight on said balloon; a levitating rudder pivotally mounted in transverse bearings in the forward part of said aeroplane; a diverging rudder mounted in vertical bearings at the rear of said aeroplane; a tubular tiller post having a hand wheel and a winding drum; a tiller post rod extended from said tubular post and provided with a hand wheel adjacent the hand wheel on said tubular post; and a winding drum adjacent the winding drum on said tubular post, said post being mounted convenient to the aviator's operating station.

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

WALTER EDWARD ZELLS.

Witnesses:

CHAS. L. MILLER,
MOSES SEABOLT.