

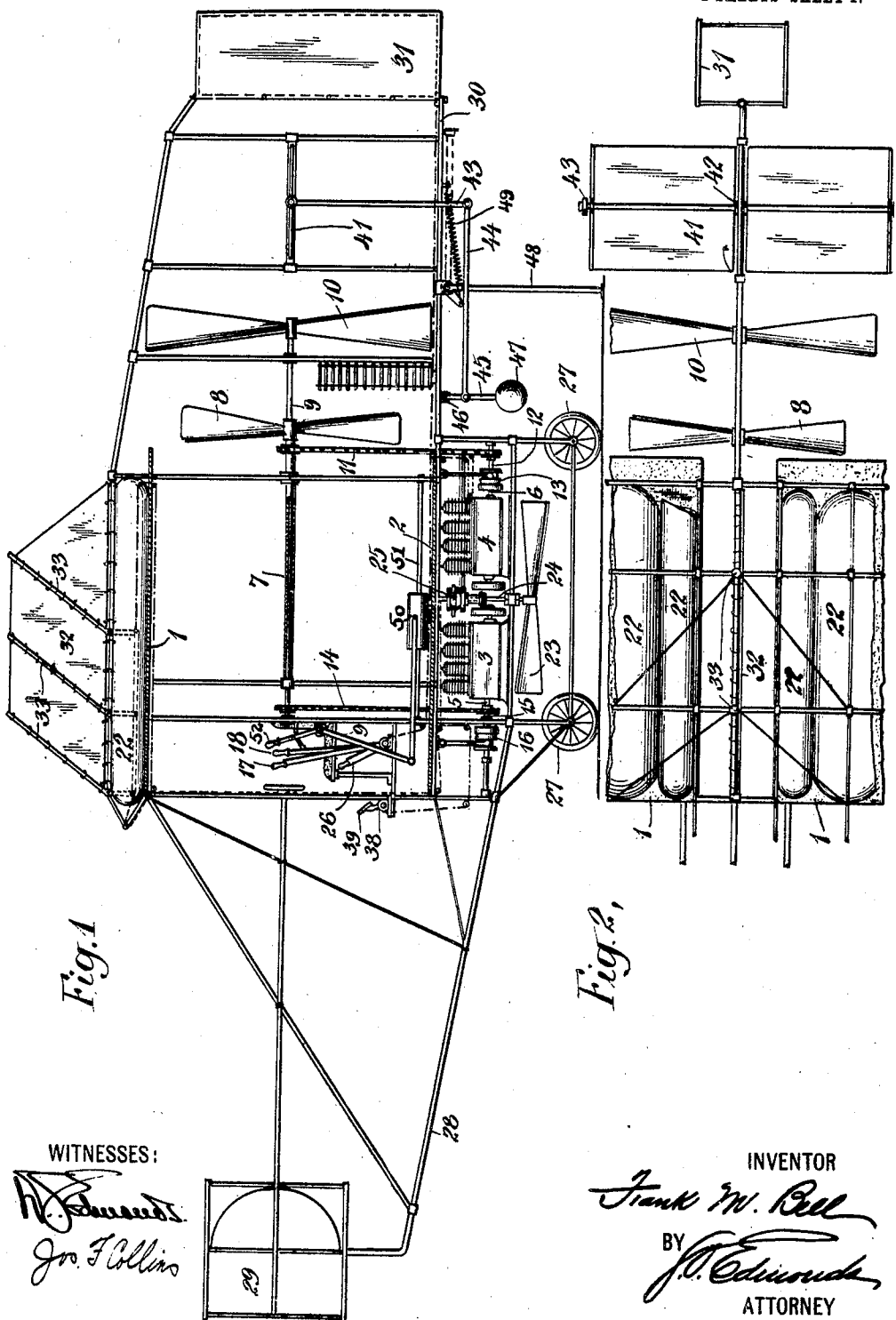
F. M. BELL.
FLYING MACHINE.

APPLICATION FILED JAN. 7, 1911.

1,056,772.

Patented Mar. 25, 1913.

2 SHEETS-SHEET 1.



WITNESSES:

H. Edwards
Geo. F. Collins

INVENTOR

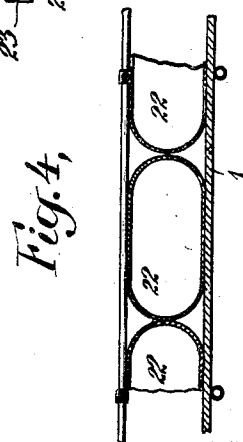
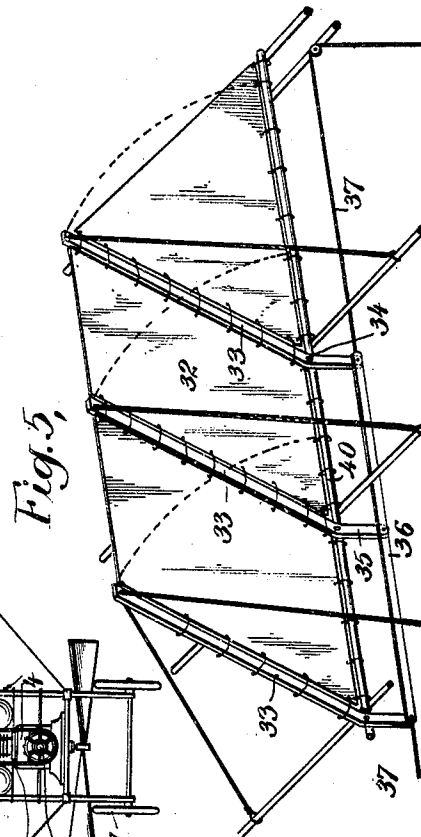
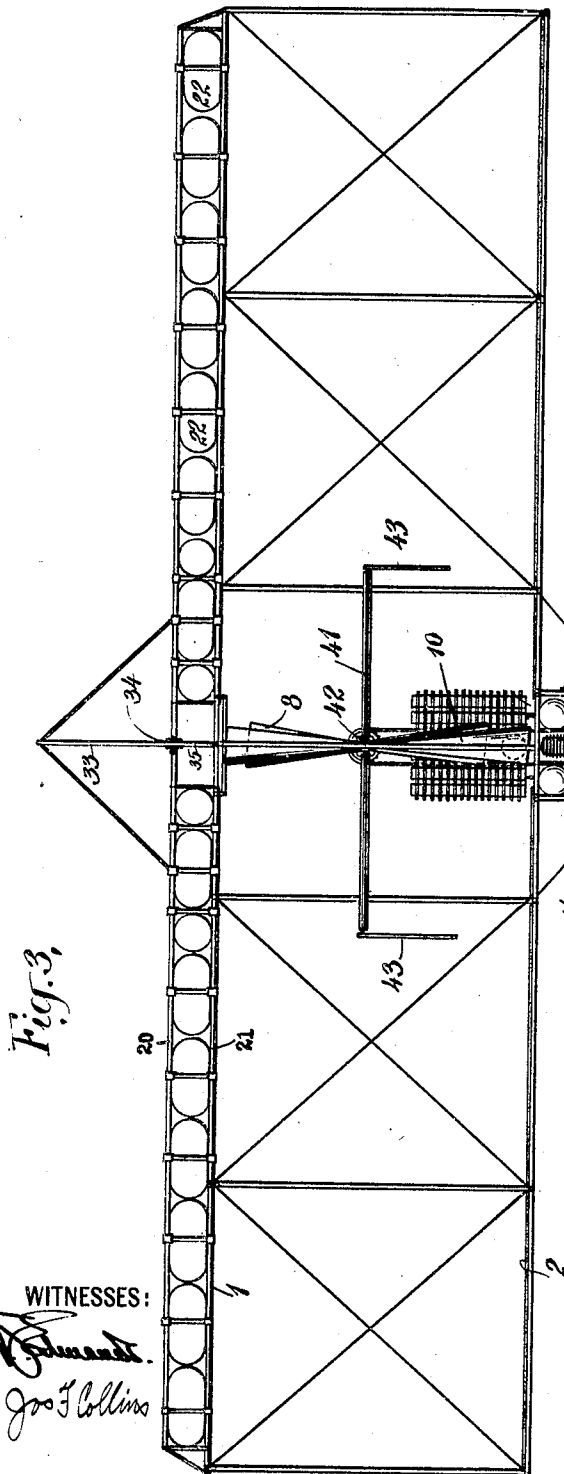
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BY *H. Edwards*
ATTORNEY

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UNITED STATES PATENT OFFICE.

FRANK M. BELL, OF EL PASO, TEXAS.

FLYING-MACHINE.

1,056,772.

Specification of Letters Patent.

Patented Mar. 25, 1913.

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To all whom it may concern:

Be it known that I, FRANK M. BELL, a citizen of the United States, residing at El Paso, in the county of El Paso and State of Texas, have invented certain new and useful Improvements in Flying-Machines, of which the following is a specification.

This invention relates to flying machines of the type known as "heavier than air" machines and is directed to the improvement of the construction of machines of this type to better adapt them for use and especially to decrease the danger attendant upon their use.

The invention involves numerous features of improvement in the construction and arrangement of the parts of machines of this type, which features may be used separately, or jointly in the same machine, and are susceptible of use in machines of various types, as for instance in mono-planes or bi-planes.

One of the features of improvement of my invention resides in the provision of a plurality of engines for propelling the machine and a plurality of propellers, one driven by each of the engines, these propellers being so arranged that in event of one of the engines becoming temporarily disabled, the operation of the other may be continued and the machine will be propelled under the guidance of the operator in the usual manner, but, of course, at a decreased speed. One of the great dangers incident to flights in aero-planes is that due to the danger of the engine becoming temporarily disabled. If one engine only be employed and the operation of this engine be discontinued, due to any cause, the propulsion of the machine is discontinued. If, on the other hand, two engines be employed, it is hardly possible under ordinary conditions that both of these would become disabled at the same time. I employ two engines and so arrange the propellers driven thereby that if the operation of one of the engines and its propeller is discontinued, the other propeller being driven by its engine will propel the machine without tending to make the machine swerve from the desired course. This is accomplished by arranging both propellers on the same axis, both at the rear or both at the front or one

at the rear and one at the front of the machine so that if either propeller is stopped the other will drive the machine without tending to turn it to one side. For this purpose two propellers are employed, one a hollow shaft through which the other extends and each engine is geared in driving relation to one of the shafts. In order to increase the stability of the machine while in the air, the engines are arranged in the bottom part of the machine, below the seat of the operator and gearing extends upwardly from these engines to the propeller shafts. In a biplane, which is the type of machine which I prefer to use, the operator's seat is arranged between the upper and lower planes while the engines are located below the lower plane. In this way the comparatively great weight of the engines is disposed in the bottom of the machine so that the latter will be more stable when in the air. And furthermore, the engines are located below the operator so that there would be less danger of injury to the operator in case of a fall.

The invention also includes the provision of a multiplicity of containers for gas preferably disposed along the wings and so arranged that they are individually removable for re-filling. Such gas containers increase the stability of the machine in the air, have the effect of decreasing its weight and assist materially in ascending. The gas containers are also of material assistance in starting. To facilitate this operation, I preferably provide a horizontally disposed propeller which under the control of the operator may be connected to and disconnected from one of the engines.

These and other features of the invention will be more particularly described in connection with the accompanying drawings which illustrate the preferred embodiment of the invention and in which—

Figure 1 is a side view of the machine, Fig. 2 is a top view of a portion of the same, Fig. 3 is a front view and Figs. 4 and 5 are detail views hereinafter described.

Referring to these drawings, the features of my invention are illustrated as applied to a biplane, though it will be understood that they may be employed in machines of

other types. In these drawings 1 indicates the upper plane and 2 the lower plane. The two engines 3 and 4 are gas engines of the usual or any suitable type, and are mounted upon the frame of the machine below the lower plane 2 so that their weight is disposed in the lower portion of the machine and below the seat of the operator.

The shaft of the engine 3 is indicated at 5 and that of the engine 4 at 6. Above the engines and between the two planes at the center of the machine is a hollow shaft 7 journaled in suitable bearings carried by the frame of the machine, and on the rear end of this hollow shaft is a propeller 8. A second shaft 9 extends through this hollow shaft 7 and at its rear end carries a propeller 10. On the hollow shaft 7 is a sprocket wheel which receives a chain 11, this chain also running on a sprocket wheel secured to a shaft 12 which is in axial alignment with the shaft 6 of the engine 4 and is adapted to be coupled to that shaft by a clutch 13. The shaft 9 is similarly connected by a chain 14 to a sleeve 15 adapted to be coupled to the shaft 5 of the engine 3 by a clutch 16. The clutches 13 and 16 are adapted to be operated by levers 17 and 18 which are located adjacent to the seat 19 for the operator, this seat being located between the upper and lower planes 1 and 2. With this construction it will be seen that stability is obtained by disposing the weight of the engines at a point near the bottom of the machine, and furthermore, that the engines are below the operator so that danger to the operator, in case of a fall, is reduced. It will also be seen that the two propellers are independently driven each by its own engine so that if either engine becomes disabled the other engine continuing to run will drive its propeller and propel the machine in a forward direction without tending to turn it to one side of the other as would be the case if the two propellers were arranged on shafts displaced laterally one from the other upon the framing of the machine.

A multiplicity of containers for gas are incorporated in the plane or planes of the machine so as to sustain more or less of the weight and thereby decrease the danger of falling. In the present instance the upper plane is shown as having two walls 20 and 21 separated a short distance and in the space between these walls are a plurality of containers 22 for a suitable gas. These containers are preferably in the form of long bags of oval cross-section, and are individually removable for repair or refilling. The gas bags 22 assist materially in ascending and in order to further facilitate starting, a horizontally disposed propeller 23 is provided, this being mounted upon a vertical shaft 24, and suitable gears are provided

whereby this vertical shaft may be driven from the shaft of one of the engines. The shaft 24 may be connected to or disconnected from its driving engine by means of a clutch 25 which is adapted to be operated by a handle 26 projecting upwardly close beside the seat of the operator. The upper plane which carries the gas-containers is a rigid plane; that is, its form is fixed and permanent irrespective of the number, size and shape of the containers. The plane therefore presents a rigid surface for co-action with the air and serves its usual function in addition to sustaining the containers.

The frame of the machine is extended downwardly below the propeller 23 and carries the wheels 27. The front outrigger 28 extends forwardly from the main portion of the frame and carries the front control 29. The frame is also extended rearwardly to provide the rear outrigger 30 on which the rudder 31 is mounted.

In order to increase the stability of the machine when in flight I provide an upwardly extending fin or plane so that if the machine tends to tip to one side or the other this fin will resist such turning movement. This fin, however, is so arranged that it may be collapsed more or less as desired under the control of the operator so that its effective area will be increased or diminished.

This fin is shown at 32. Referring to Fig. 5 it will be seen that supports 33 are provided pivotally mounted at 34 on a longitudinally extending member of the frame of the machine. To these supports is secured flexible fabric which constitutes the fin 32. The supports 33 are extended below their pivots 34, as shown at 35, and their lower ends are pivotally connected to a bar 36. To the ends of this bar are secured the ends of a cable 37 which extends around suitable guiding pulleys, journaled on the frame of the machine, to a drum 38 adapted to be operated by a foot-pedal 39 extending upwardly in front of the seat 19 for operation. By depressing this pedal 39 the bar 36 may be moved to the position in which it is shown in Fig. 5 or it may be moved forwardly from this position and in the latter case supports 33 will be turned on their pivots 34 to positions approaching parallelism with the rod 40 of the frame on which the supports are mounted, thereby collapsing the fin 32 by folding it down upon the top of the machine. In combination with this vertical fin disposed in the direction of the length of the machine, I provide an opening or openings in one or both of the planes, adjacent to the fin, through which the air may freely pass. In the drawings, the fin is shown as extending upwardly from the upper surface of the upper plane, and this upper plane is provided with an opening therethrough extending a substantial distance on either side of

the fin. When the machine is moving in a vertical direction, the air may pass freely through this opening and coast with the vertical fin. In so doing, it aids materially in maintaining the equilibrium of the machine. This fin and the cooperating containers in the planes are of special utility when descending. When in horizontal flight, the fin may be collapsed so as to fold it down upon the upper plane more or less, as desired. I also provide a horizontally disposed fin or plane at the rear of the machine to check downward movement. This plane is pivotally mounted and so arranged that it is automatically rocked on its pivots to maintain it in substantial horizontality. This rear plane is shown at 41 and is provided with trunnions at its lateral edges which are received in bearings formed in the frame, as shown at 42. To the end of one of these trunnions is secured a lever 43 extending downwardly and having its lower end pivotally connected to a link 44. This link at its opposite end is pivotally connected to the lever 45 which is pivotally suspended at 46 from the frame of the machine. At its lower end lever 45 carries a weight 47. It will thus be seen that as the angular inclination of the machine is changed the lever 45 will be turned about its pivot 47 thereby operating through the link 44 and rod 43 to rock the plane 41 on its pivots and maintain that plane substantially horizontal.

At 48 is shown a support which is of particular utility in preventing damage to the rear portion of the machine when starting. This support is pivotally mounted upon the frame of the machine in rear of the wheels 27 for supporting the machine upon the ground. On the pivot of the support 48 is a crank-arm to which is attached one end of a spring 49, the other end of which is secured to the frame so that after the support 48 has performed its function it will be folded up against the frame of the machine by spring 49.

Having described my invention what I claim as new therein and desire to secure by Letters Patent of the United States is:

50 1. An airship having a frame, a plane mounted thereon and formed in two parts which are separated so as to provide an opening through the plane at the center of the ship, two concentric shafts mounted on said frame at the center of the ship and in line with said opening, a propeller on each of said shafts, two motors mounted on said frame, gearing connecting each motor to one of said shafts and a fin mounted on the frame, disposed vertically and extending fore and aft of the ship in line with the center of said opening, substantially as set forth.

2. An airship having a frame, a plane

mounted thereon and formed in two parts 65 which are separated so as to provide an opening through the plane at the center of the ship, said parts of the plane being rigidly mounted on the frame, a shaft mounted on the frame at the center of the ship and in line with said opening, a motor mounted on the frame and driving said shaft, a propeller mounted on the shaft, and a fin mounted on the frame, disposed in a vertical plane fore and aft of the ship at the center of said opening and incapable of movement out of a vertical plane fore and aft of the ship, substantially as set forth.

3. An airship comprising a plane, an engine, a shaft driven by the engine, a propeller on said shaft, a vertical fin extending upwardly from said plane and disposed in the direction of the length of the ship, and means under control of the operator for increasing and decreasing the effective area of said fin, said plane having openings, there-through adjacent to said fin through which air may freely pass on both sides of the fin when the ship is moving vertically, substantially as set forth.

4. A biplane comprising upper and lower planes, two engines located below the lower plane, two concentric propeller shafts located between said planes, a propeller on each of said shafts, gearing from each of said engines up to one of said shafts, each of said engines being operable to drive the corresponding shaft and propeller independently of the other engine and propeller, a vertical shaft, a propeller mounted thereon and a clutch for connecting one of the engines in driving relation to said vertical shaft, said planes having openings therethrough in line with said last-named propeller through which air may freely pass when the machine is moving vertically, substantially as set forth.

5. An air ship comprising a frame, a plane thereon having an opening therethrough, an engine, a shaft driven thereby, a propeller on the shaft, a seat on the frame, supporting devices, pivots mounted on the frame in said opening in the plane, a fin carried by said devices, and means operated from said seat for rocking said devices on their pivots to vary the effective area of said fin, substantially as set forth.

6. An airship comprising a frame, a rigid plane of fixed and permanent form mounted thereon and having a plurality of receptacles formed therein, a plurality of individually removable gas-containers mounted in said receptacles, a vertical fin mounted on the frame and disposed lengthwise of the machine, said plane having openings therethrough on opposite sides of said fin through which air may freely pass when the machine is moving vertically, an engine mounted on

said frame, a shaft driven by the engine, and a propeller on said shaft, substantially as set forth.

5 7. A biplane comprising an upper plane of fixed and permanent form, a plurality of containers for gas mounted thereon, a lower plane, an engine, a propeller driven thereby, and a vertical fin disposed lengthwise of the machine, said planes having openings there-

through on opposite sides of said fin through 10 which air may pass when the machine is moving vertically, substantially as set forth.

This specification signed and witnessed this 14th day of Dec., 1910.

FRANK M. BELL.

Witnesses:

JEROME L. HITE,

JULIUS B. LOVING.