Feb. 9, 1932. H. M. JACKSON 1,844,765

DIRIGIBLE CONSTRUCTION

Filed Oct. 9, 1929 3 Sheets-Sheet 1

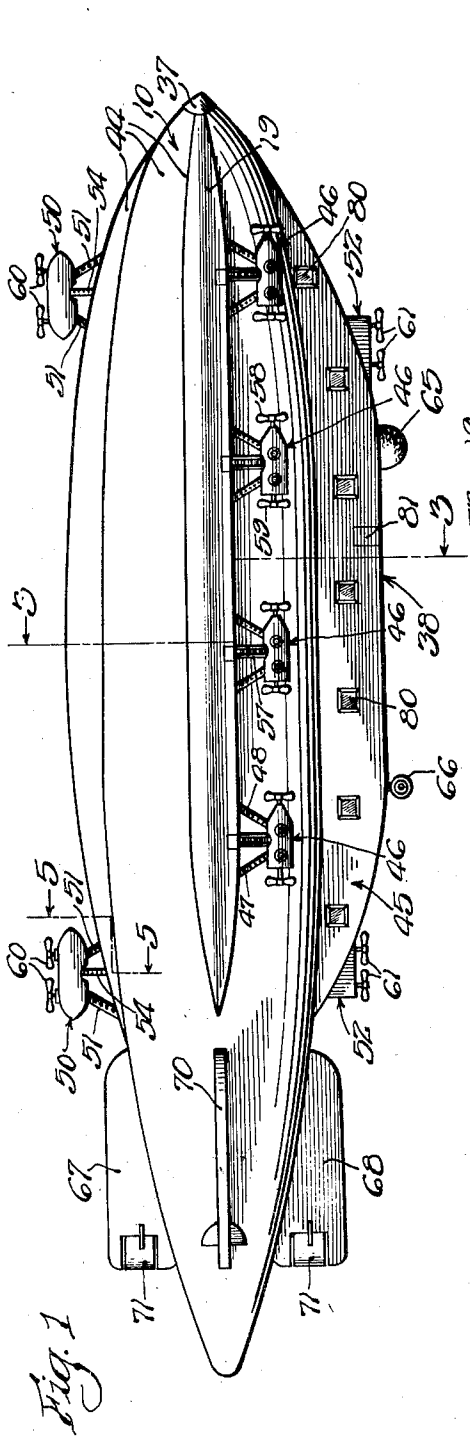


Fig. 1

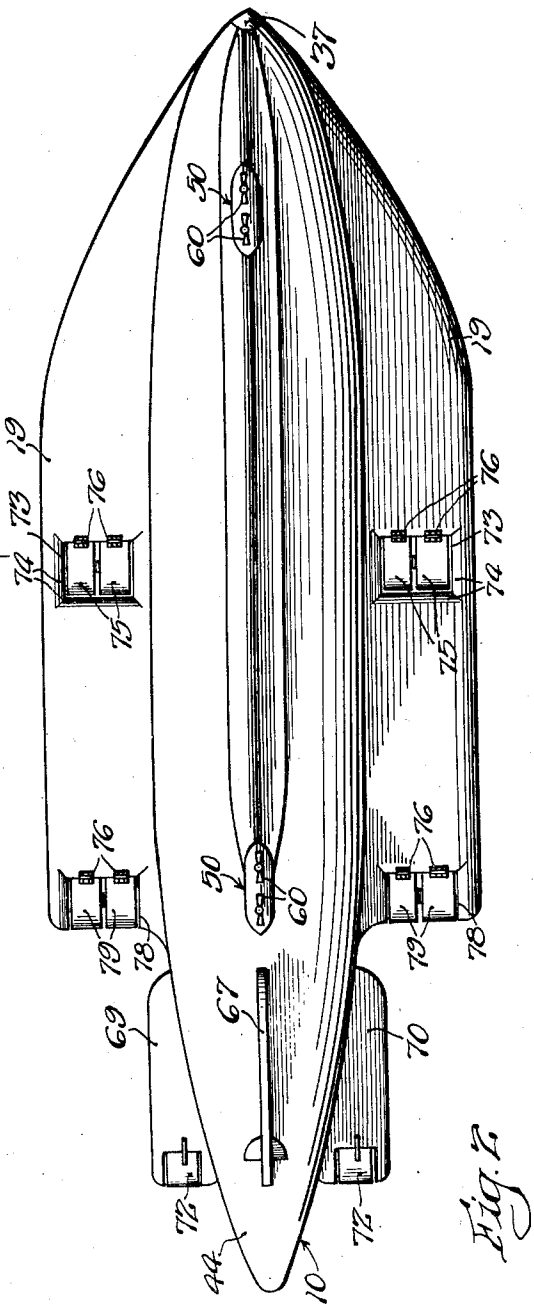


Fig. 2

WITNESS

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BY Victor J. Evans

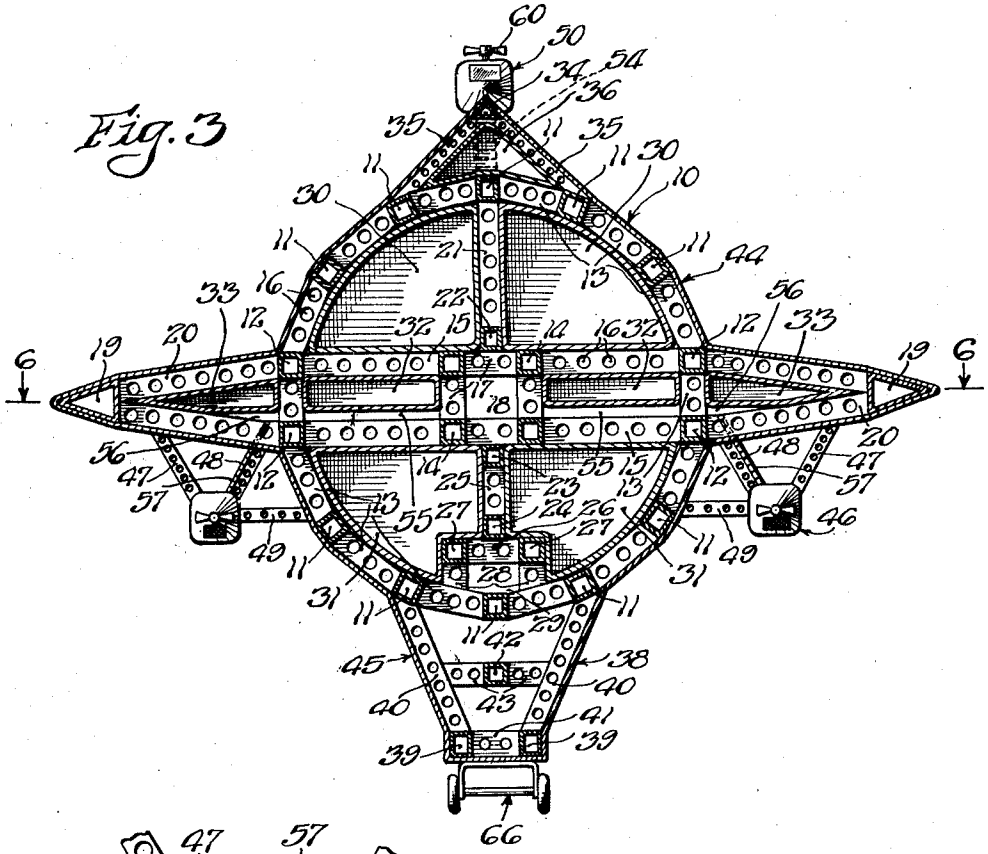
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DIRIGIBLE CONSTRUCTION

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Fig. 3



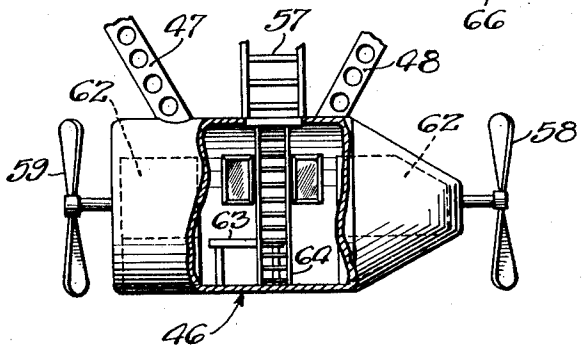


Fig. 4

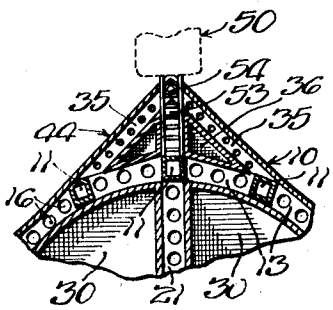


Fig. 5

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Feb. 9, 1932. H. M. JACKSON 1,844,765

DIRIGIBLE CONSTRUCTION

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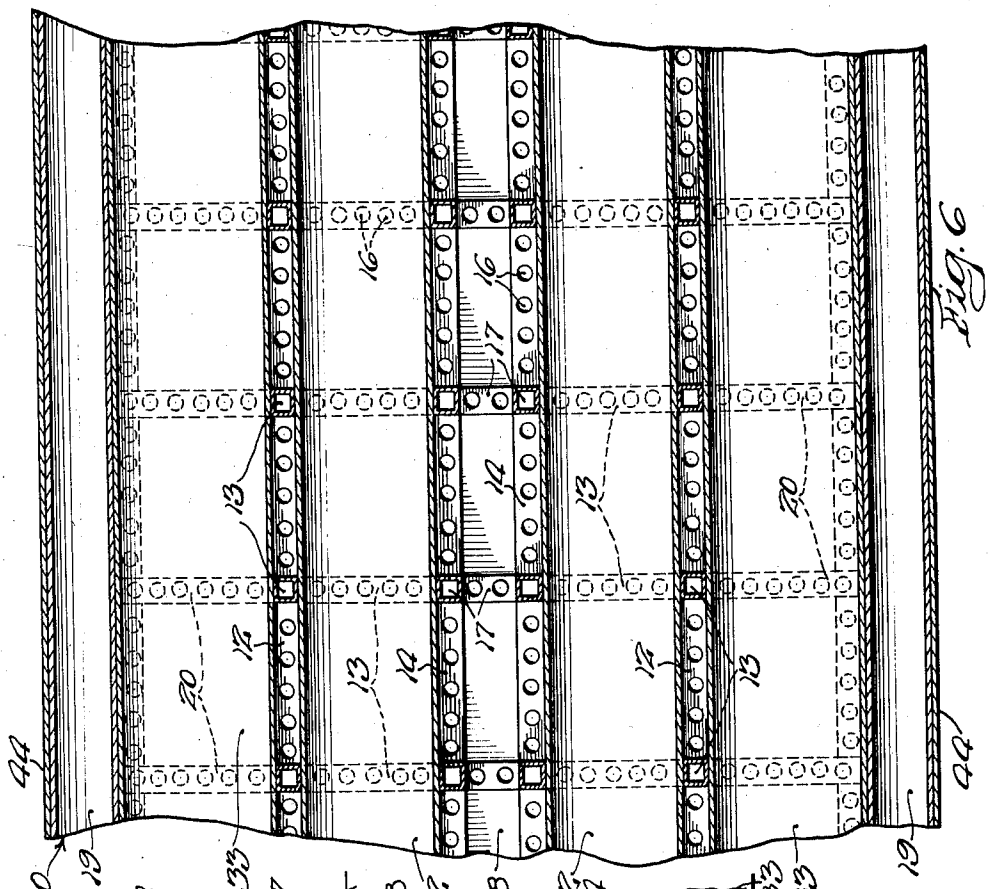


Fig. 6

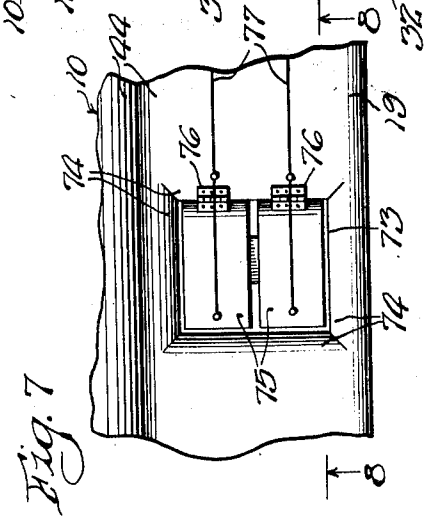


Fig. 7

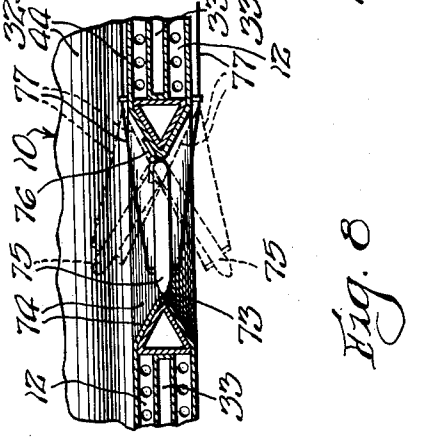


Fig. 8

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WITNESS

Patented Feb. 9, 1932

1,844,765

UNITED STATES PATENT OFFICE

HERBERT MARTIN JACKSON, OF OMAHA, NEBRASKA

DIRIGIBLE CONSTRUCTION

Application filed October 9, 1929. Serial No. 398,397.

This invention relates to certain novel improvements in dirigible constructions and has for its principal object the provision of an improved construction of this character which will be highly efficient in use and economical in manufacture.

It is among the objects of my invention to provide a dirigible construction which will embody in addition to the usual gas bag construction a horizontally extending wing construction in order to increase the stability of the craft and also to facilitate the handling thereof in the air.

Another object of the invention is to provide a construction of the above described character in which a plurality of gas containers may be arranged in order that a maximum amount of space may be utilized so as to increase the lifting power of the craft.

Another object of the invention is to provide a construction of the above described character which will be so arranged that a number of elevators and rudders may be associated therewith to facilitate the handling thereof.

A further object of the invention is to provide in a construction of the above described type, gas containers in the above mentioned wings and also gas containers in the upper portion of the structure.

A still further object of the invention is to provide a construction of the above described character in which a maximum amount of cabin space may be provided.

A still further object of the invention is to provide in a construction of the above described character an arrangement which will permit the employment of metal containers for the gas.

Other objects will appear hereinafter.

The invention consists in the novel combination and arrangement of parts to be hereinafter described and claimed.

The invention will be best understood by reference to the accompanying drawings, showing the preferred form of construction and in which:

Fig. 1 is a side elevational view of a preferred form of construction for my invention;

Fig. 2 is a top plan view of the device as illustrated in Fig. 1;

Fig. 3 is a sectional view taken substantially on the line 3—3 on Fig. 1;

Fig. 4 is a view partly in elevation and partly in section of the motor gondola construction;

Fig. 5 is a sectional detail view taken substantially on the line 5—5 on Fig. 1;

Fig. 6 is a sectional view taken substantially on the line 6—6 on Fig. 3;

Fig. 7 is a plan detail view of one of the elevator constructions provided in the wings; and

Fig. 8 is a sectional view taken substantially on the line 8—8 on Fig. 7.

In the accompanying drawings wherein I have illustrated a preferred form of construction for my invention 10 generically indicates the gas bag structure. This gas bag structure is formed so as to be substantially circular in cross section and is preferably stream line axially thereof. This gas bag structure includes a reenforcing structure comprised of suitably arranged girders which in turn support the gas containers. By referring to Fig. 3 it may be seen that the gas container structure 10 includes a plurality of longitudinally extending girders 11 which are arranged in spaced apart relation and which are disposed in substantially circular formation. On each side of the horizontal axis of the gas container construction 10 longitudinally extending girders 12 are provided which are arranged in alignment with the circular formation of the girders 11 and which girders 12 form a part of the wing structure to be set forth presently. In order to maintain the girders 11 in proper position and to reenforce the construction girders 13 are provided which extend between the various girders 11 and the girders 12 and 11. The girders 13 may be connected to the girders 11 and 12 in any approved manner as by welding or riveting. The girders thus far set forth are preferably substantially square or rectangular in cross section and are preferably made from a light strong material such as duralumin. As best illustrated in Fig. 6 the girders 13 are arranged in spaced

apart intervals in the extent of the girders 11 and 12 and it is, therefore, manifest that a very strong rigid and reenforced construction is provided to support the gas containers.

It has been set forth that it is among the objects of my invention to provide a horizontally disposed wing structure in association with the gas container 10. It has also been pointed out that the girders 12 comprise a part of this wing structure. In addition to the girders 12 longitudinally extending girders 14 are provided which are arranged on each side of the horizontal center line parallel to the girders 12 and the girders 14 are also arranged on each side of the vertically extending center line. Girders 15 are extended between the girders 14 and 12 and the girders 15 are secured to the girders 14 and 12 in the same manner as the girders 13 are secured. By referring to the drawings it may be seen that all of the girders thus far described are of substantially rectangular cross section and in the side walls thereof openings 16 are provided so as to reduce the weight of the girders without impairing the strength thereof. Extended between the girders 14 both horizontally and vertically are girders 17 and it is, therefore, manifest that a centrally located passage 18 is defined by the girders 14 and 17, the utility and purpose of which will be set forth presently. The portion of the wing structures which extend outwardly from the gas container 10 includes substantially triangularly shaped girders 19 which are disposed with the apices thereof extending outwardly from the gas container 10. Girders 20 extend between the girders 12 and the base of the girders 19 and it is, therefore, manifest that the girders are arranged so as to be substantially triangular in cross section by reason of the fact that the base of the triangular girders 19 to which the girders 20 are attached is of less width than the distance between the girders 12.

Extending between the upwardly disposed of the girders 11 and the upwardly disposed of the girders 17 are vertically extending girders 21 which are arranged in alignment with the girders 13. A girder 22 extends along the lower ends of the girders 21 above the named girders 17 and serves to reenforce the construction. A girder 23 extends parallel to the girder 22 on the lower side of the lowermost of the girders 17. Spaced below the girder 23 is a girder 24 which extends parallel thereto. Girders 25 extend between the girders 23 and 24 at spaced apart intervals preferably in alignment with the girders 13. Extended parallel to the girders 17 below the girder 24 are girders 26 which have arranged at the ends thereof girders 27 that extend parallel to the girder 24. Girders 28 extend between the girders 27 and the girders 13 arranged therebelow and it is, therefore, manifest that a passage 29 is defined by the girders 28, 27 and 26 above the lowermost of the girders 11.

Spaces are defined by the girder 21, the girder 22, the girder 17, the girder 14, the uppermost of the girders 12, and the girders 13 and 11, to the uppermost of the girders 11 on each side of the girder 21. In these spaces gas containers 30 are arranged and it is manifest that these gas containers are very effectively supported by the girder construction set forth. These gas containers 30 will be formed so as to embody a plurality of individual compartments or they may be continuous tanks as desired and preferably the tanks 30 are formed from a suitable light and rigid metal. Spaces are defined by the lowermost of the girders 12 and 15, the girders 14, lowermost of the girders 17, the girders 23, 25 and 24, and the girders 26, 27 and 28 as well as the girders 13 and 11 and in these spaces containers 31 are mounted which will be constructed substantially similar to the containers 30. In the areas enclosed by the girders 17, 14, 15, 12, 13, 12, 15 and 14 containers 32 are mounted. In the triangular areas defined by the girders 20 and 13 of the wing structures containers 33 are retained which will manifestly be substantially triangular in cross section. If desired the containers 30 and 31 may be arranged in series in order that when the air is extracted therefrom and a gas lighter than air such as hydrogen or helium is pumped into the gas the incoming light gas will successively flow through each of the containers. Similarly the containers 32 may be arranged in series with each other or if desired these containers may be conected in series with the containers 30 and 21 although it is to be understood that each of the containers might be arranged for individual charging with a gas lighter than air. The tanks 33 may also be connected in series or singularly so as to permit charging thereof.

A reenforcing rib construction is provided on the upper side of the gas container 10 which rib construction preferably extends from the front or nose of the gas container structure to a point adjacent the location of the tail controls and this rib construction is preferably stream line in configuration. This rib construction includes a substantially triangular girder 34 which is arranged in alignment with but spaced above the uppermost of the girders 11. Girders 35 extend from this girder 34 to the girders 11 arranged on each side of the uppermost girder 11 and these girders 35 are preferably substantially similar to the girders 13 and 11 although these girders may be of a somewhat smaller size. The girders 34 and 35 co-operate with the juxtaposed girders 11 and 13 to define another area in which a gas container 36 may be mounted, which gas con-

tainer 36 is substantially similar and performs a similar function to the gas containers 30, 31, 32, and 33.

From the foregoing description it is manifest that I have provided a construction which will provide a very rigid and ample support for the gas containers and it is also manifest that I have provided a construction in which a maximum amount of space may be utilized for the gas containers. Therefore, by reason of the relatively great gas area it is manifast that the lifting power of the craft will be greatly increased and, therefore, greater weight may be carried and inasmuch as the construction permits the use of metal containers it is manifest that a far better construction may be employed and that leakage will be reduced to a minimum.

It has been pointed out that it is desirable to form the gas container structure 10 substantially stream line and this manifestly entails providing a substantially rounded nose. At the forward end of this nose the usual connecting structure 37 is provided to permit the attaching of the craft to a mooring mast and this connecting structure 37 is made in the manner well understood in the art.

Arranged below the gas container structure 10 is the cabin structure generically indicated by 38. This cabin structure includes girders 39 which are intended to be arranged in spaced relation below the gas container structure 10 and which girders 39 preferably merge with the gas container structure 10 in the rounded nose thereof and which then extend downwardly and then parallel to the gas container 10 and which are then merged with the gas container 10 adjacent the tail controls and it is, therefore, manifest that the cabin structure 38 will also embody a stream line formation. Extending between the girders 11 and the girders 39 are girders 40 which are arranged at spaced apart intervals and which serve to support the girders 39. Girders 41 extend between the girders 39 and provide the support on which the lower wall of the cabin structure 38 may be mounted. I contemplate in my construction in arranging a number of decks in the cabin structure 38 and in the present instance I show a longitudinally extending girder 42 which is disposed substantially midway between the lower side of the gas container structure 10 and the girders 41 and girders 43 extend between this girder 42 and the girders 40 and this arrangement not only provides an effective reinforcing construction for the cabin structure 38 but also provides a support on which another deck may be mounted. If desired a somewhat different location for the girder 42 might be provided and additional girders might be arranged and in this manner additional decks may be provided.

The sides of the gas container structure 10 and the wing structures as well as the rib structure arranged above the gas container 10 may be covered with a suitable aluminum fabric generically indicated by 44 which will serve to cover the girder structures and thus eliminate pocket formations and, therefore, reduce air resistance although it is to be understood that this covering might be omitted. A similar covering indicated by 45 may be provided over the outer walls of the cabin structure 38 although a suitable metal or other covering may be associated therewith and it is to be understood that suitable wall structures may be provided around the cabin 38 to provide temperature insulation and the like.

In order to bring about propulsion of the craft the usual gondola constructions are provided in which internal combustion engines or other motive means are arranged and which internal combustion engines or the like are employed to operate propeller structures. Such gondola structures are indicated by 46 in the drawings and are intended to be supported from the wing structures by suitable girders 47 and 48. The gondolas 46 are also supported and reenforced by girders 49 which extend between said gondolas and the gas container structure 10. In addition to the gondolas 46 I provide gondola structures 50 adjacent the forward and rear ends of the gas container structure 10 on the upper side thereof, which gondola structures are supported by suitable girders 51 which are secured to the girder structures of the gas container structure 10. In addition to the above set forth gondolas, gondola structures 52 are provided adjacent the forward and rear ends of the cabin structure 38. Access to the various gondola structures is attained in the following manner. At a suitable point communication will be established between the passageway 29 and the interior of the cabin structure 38. At suitable intervals communication will be established between the passage 29 and the passage 18, this latter communication being established by suitable ladder constructions or the like. Below the gondolas 50 openings 53 are provided in the container 36 (see Fig. 5) through which a ladder structure 54 will be extended. Communication between the ladder structure 54 and the passage 18 will be established by means of a suitable ladder construction and it is, therefore, manifest that in the following manner access to the gondolas 50 may be readily attained. Similarly passages 55 and 56 will be provided in the containers 32 and 33 in order that passage may be had from the passage 18 to the ladder structures 57 which extend between the gondolas 46 and the passage way 56. Passages 55 and 56 will be provided in alignment with each of the gondolas 46 and the number of gondolas 46 will be varied in accordance with the length of the craft.

In the present instance I have depicted in association with each of the gondolas two propellers, which propellers in the case of the gondolas 46 are arranged at the forward and rear ends thereof and which propellers are indicated by 58 and 59. A pair of propellers 60 are arranged on the upper side of the gondolas 50 and a pair of propellers 61 are arranged on the under side of the gondolas 52. In Fig. 4 I have depicted a typical gondola construction and by referring to this view it may be seen that internal combustion engines 62 are arranged at the forward and rear ends of the gondolas 46 to the shafts of which motors the propellers 58 and 59 are respectively connected. A work bench 63 may be provided in the gondolas and a ladder 64 is provided therein which is associated with the ladder 57. While I have depicted two internal combustion engines in each of the gondolas it is to be understood that but one engine might be provided which would be arranged to be connected to both of the propeller structures. Engines are similarly arranged in the gondolas 50 and 52 to operate the propellers associated therewith. The propellers 58 and 59 are operated to bring about movement of the craft over the surface of the earth while the propellers 60 and 61 are employed to bring about movement of the craft in a vertical plane relative to the surface of the earth and are employed in the landing and taking off of the craft.

A suitable resilient bumper 65 is mounted on the under side of the cabin structure 38 and in spaced relation with the bumper structure 65 is a landing wheel structure 66, the utility and purpose of which is well understood in the art.

On the tail structure of the craft vertically extending fins 67 and 68 are provided. Horizontally extending fins 69 and 70 are also provided, which fins 69 and 70 are preferably aligned with the wing structures. In the fins 67 and 68 the rudders 71 are mounted. In the fins 69 and 70 the elevators 72 are provided and these rudders and elevators are employed to control the movement of the craft.

In addition to the above set forth rudders and elevators I have found it desirable to provide additional elevators which will facilitate the manipulation of the craft. These additional elevators are mounted in the wing structures in the location best depicted in Fig. 2. In order to permit the mounting of the elevators in the wing structures of the craft openings 73 are provided in the wing structures and the portions of the wing structure adjacent these openings are preferably stream line so as to more clearly define these openings. The openings 73 have substantially triangular girders 74 provided around the edges thereof for the purpose of reenforcing the wing structures at these openings. The elevators are indicated by 75 and are hingedly secured to the girders 74 as indicated at 76. Control lines 77 are secured to the elevators 75 for the purpose of manipulating the same and these control lines are directed to the control cabin which is located at the forward end of the cabin structure 38. A similar arrangement is provided at the rear ends of the wing structures, at which points recesses 78 are provided in which elevators 79 are suitably mounted. The elevators 79 as well as the elevators 75 and 72 and the rudders 71 are all arranged for control from the control cabin afore mentioned.

In addition to the controls for the elevators and rudders in the control cabin controls for the various engines will also be located in this control cabin. The particular arrangement for accomplishing this forms no particular part of my invention as several constructions may be employed without departing from the purview of my invention.

As has been stated above the number of gondolas 46 will vary in proportion to the length of the craft. This is also true of the elevator arrangement 75.

The cabin structure is intended to be arranged so as to contain quarters for the crew of the craft as well as the passengers. This compartment will also provide storage space for fuel and other equipment required and also for freight and baggage. Suitable window structures such as 80 will be provided therein and also a door 81.

While I have illustrated and described the preferred form of construction for carrying my invention into effect, this is capable of variation and modification, without departing from the spirit of the invention. I, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claims.

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

1. A dirigible including a reenforced gas container structure, a cabin structure below said gas container structure, wing structures extending outwardly from said gas container structure above said cabin structure, and rib structures opposite said cabin structure having gas container means therein.

2. A dirigible including a reenforced gas container structure, a cabin structure below said gas container structure, wing structures extending outwardly from said gas container structure above said cabin structure, said wing structures having gas containers therein, and rib structures opposite said cabin structure having gas container means therein.

3. A dirigible including a reenforced gas container structure comprising longitudinal-

ly extending girders having reenforcing girders extending therebetween at spaced apart intervals whereby a substantially circular cross sectional structure will be provided; and a wing structure comprising girders extended transversely and longitudinally of said gas container structure, and girders extending outwardly from said transversely extending girders at an angle to each other, and a girder at the outer end of said last named girders.

4. A dirigible including a reenforced gas container structure comprising longitudinally extending girders having reenforcing girders extending therebetween at spaced apart intervals whereby a substantially circular cross sectional structure will be provided; and a wing structure comprising girders extended transversely and longitudinally of said gas container structure, and girders extending outwardly from said transversely extending girders at an angle to each other, and a girder at the outer end of said last named girders; containers in said first named structure, and gas containers in said wing structure.

5. A dirigible including a reenforced gas container structure, a cabin structure below said gas container structure, wing structures extending outwardly from said gas container structure above said cabin structure, said wing structures having gas containers therein, power carrying gondolas supported below said structures, and means including passages through said containers for affording access to said gondolas.

6. A dirigible including a reenforced gas container structure, a cabin structure below said gas container structure, wing structures extending outwardly from said gas container structure above said cabin structure, rib structures extending longitudinally of said gas container structure on the top thereof and opposite said cabin structure, gas container means in said rib structures, and power carrying gondola structures below said wing structures and above said rib structures.

7. A dirigible including a reenforced gas container structure, a cabin structure below said gas container structure, wing structures extending outwardly from said gas container structure above said cabin structure, rib structures extending longitudinally of said gas container structure on the top thereof and opposite said cabin structure, gas container means in said rib structures, power carrying gondola structures below said wing structures and above said rib structures, and other power carrying gondolas below said gas container structure associated with said cabin structure.

8. A dirigible including a reenforced gas container structure, a cabin structure below said gas container structure, wing structures extending outwardly from said gas container structure above said cabin structure, rib structures extending longitudinally of said gas container structure on the top thereof and opposite said cabin structure, gas container means in said rib structures, power carrying gondola structures below said wing structures and above said rib structures, and means including passages through said containers for affording access to said gondolas.

9. A dirigible including a reenforced gas container structure comprising longitudinally extending girders having reenforcing girders extending therebetween at spaced apart intervals whereby a substantially circular cross sectional structure will be provided; and a wing structure comprising girders extended transversely and longitudinally of said gas container structure, and girders extending outwardly from said transversely extending girders at an angle to each other, a girder at the outer end of said last named girders; girders depending from said wing structures and extending outwardly from said first named structure, and power carrying gondolas carried by said last named girders.

In testimony whereof I affix my signature.

HERBERT MARTIN JACKSON.