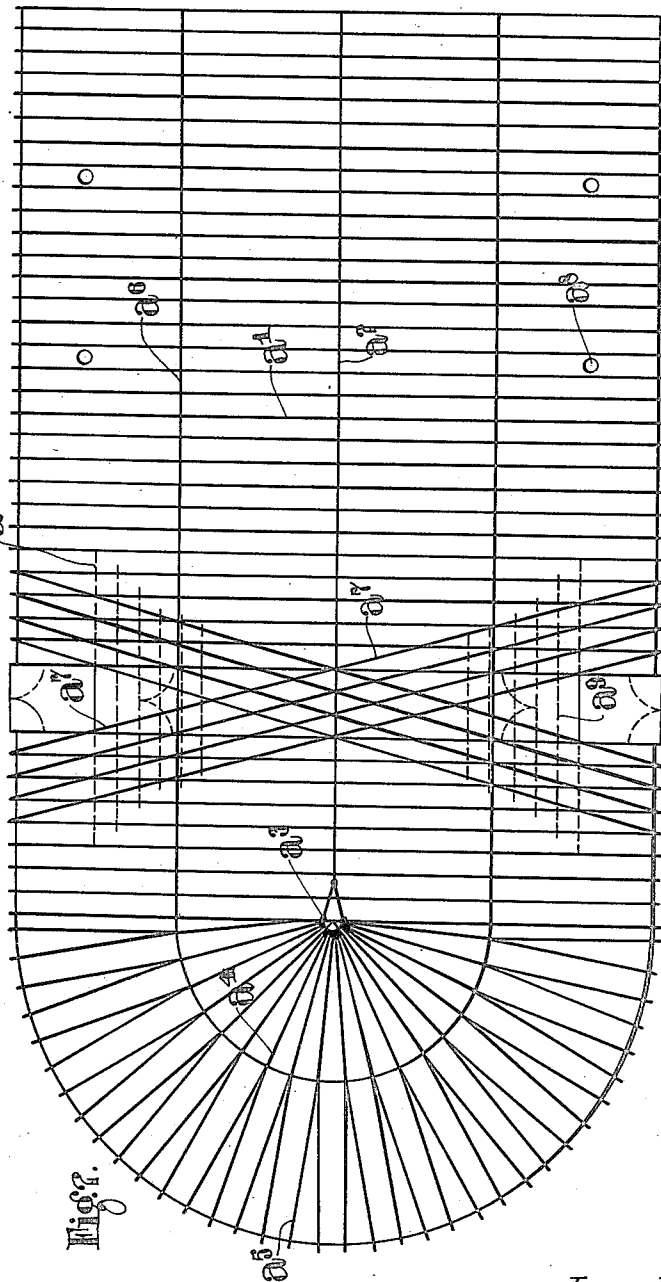
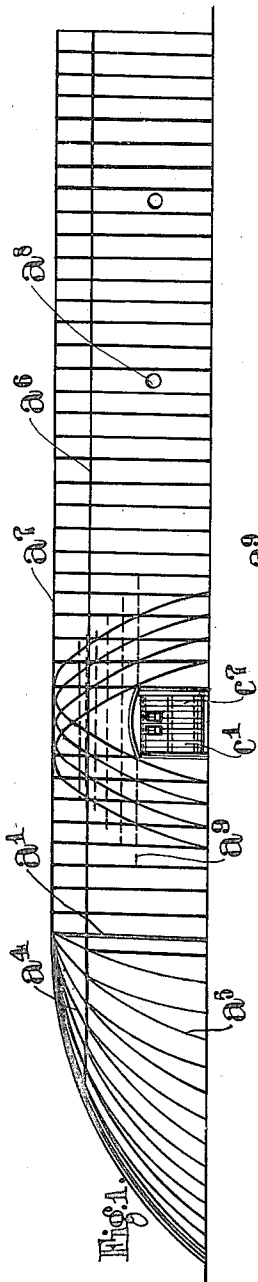


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APPLICATION FILED FEB. 11, 1919.

1,302,182.

Patented Apr. 29, 1919.

3 SHEETS—SHEET 1.



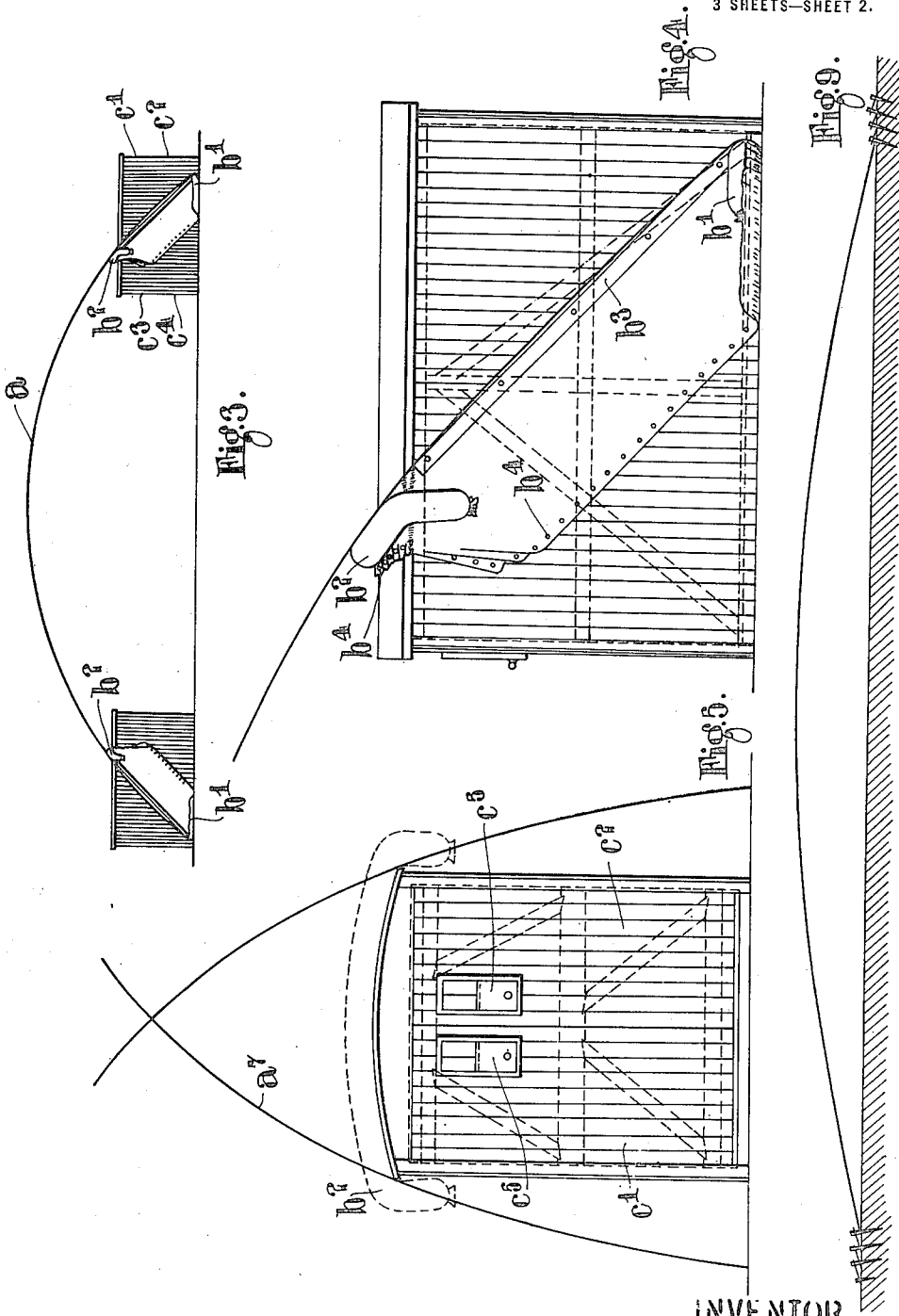
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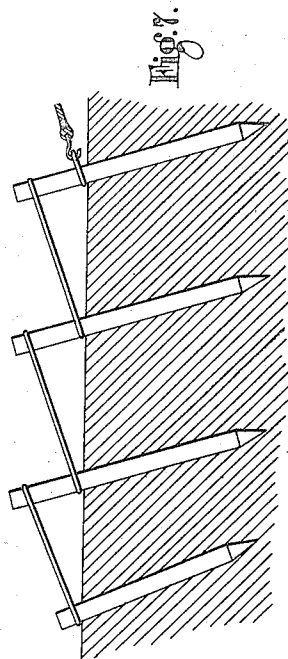
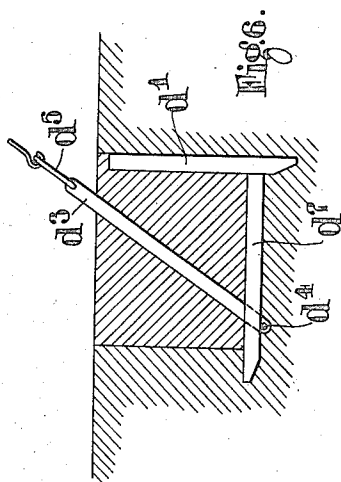
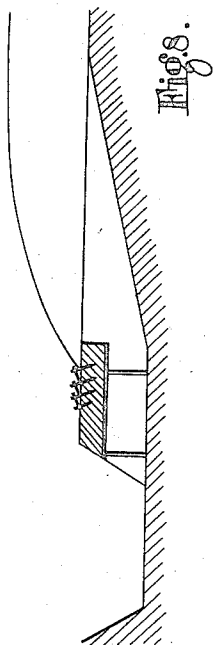
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CONSTRUCTION OF TENTS FOR FIELD-HOSPITALS, DEPOTS, AND LIKE PURPOSES.

1,302,182.

Specification of Letters Patent.

Patented Apr. 29, 1919.

Application filed February 11, 1919. Serial No. 276,379.

To all whom it may concern:

Be it known that I, FREDERICK WILLIAM LANCHESTER, a subject of the King of Great Britain and Ireland, and residing at 41 Bedford Square, London, W. C. 1., England, have invented a certain new and useful Improved Construction of Tents for Field-Hospitals, Depots, and like Purposes, of which the following is a specification.

10 The present invention relates to an improved construction of tent for field hospitals, depots, and like purposes.

The present invention has for its object to provide a means of constructing and 15 erecting a tent of large size without the use of poles or supports of any kind. The present invention consists in brief in a construction of tent in which balloon fabric or other material of low air permeability is 20 employed and maintained in the erected state by air pressure and in which ingress and egress is provided for by one or more air locks.

The present invention further consists in 25 a tent maintained in the erected state by air pressure, in the provisions for ingress and egress, for rendering pressure tight, and for lighting hereinafter described.

A tent constructed according to the present invention may be conveniently designed 30 either as a segment of a sphere or as a segment of a cylinder.

In one mode of carrying the present invention into effect, a rectangular sheet of 35 balloon fabric suitably reinforced by bands, ropes or nets, is pegged to the ground along two of its parallel edges, a flap being left beyond the point of attachment which is turned under. The ends of the said rectangular sheet have stitched or laced to them 40 extensions cut after the manner of a spherical balloon to form quadrant segments of spherical or approximately spherical form. These extensions likewise have a marginal 45 flap which is turned under.

The whole of the above having been securely staked and if necessary loaded by ballast the interior is inflated by moderate air pressure by a centrifugal fan, and the 50 whole so inflated forms a tent of segmental form terminated by dome-like ends. The

marginal flap initially turned under in laying out the envelop now forms an air seal in contact with the ground, and where necessary is loaded by sandbags in order to 55 maintain it in close contact and minimize air leakage. One or more doors in the form of an air lock, constructed as hereinafter described, are arranged at suitable points according to the use to which the tent is 60 required to be put. For the purposes of lighting either the fabric employed for the envelop may be made of some transparent or translucent material or panels or portions of it may be of transparent or trans- 65 lucent material, oiled silk may be used for this purpose. Alternatively artificial lighting may be relied upon.

Assuming balloon fabric of fair quality to be employed and the sealing in contact 70 with the earth to be good the supply of air required to maintain inflation against leakage is small in comparison with that required to inflate initially and a comparatively small power installation is required 75 for permanent running. It is desirable to have a certain moderate amount of leakage in order to provide for adequate ventilation. Disused balloon fabric may therefore be used for constructing tents in accordance 80 with this invention.

The pressure required is of the same order of magnitude as that needed in balloons of the non-rigid type and is less than $\frac{1}{4}$ lb. per square inch. The pressure necessary is related to the velocity of wind and may be 85 increased in bad weather or in order to maintain the envelop against a weight of snow the anchorage requires to be calculated and provision made according to the maximum 90 pressure which it is contemplated will be employed. Where the soil provides an insufficient anchorage the latter may require to be assisted by ballast.

The present invention is more particularly 95 applicable to tents of large size, and permits of a very great span being employed. There is no engineering difficulty in constructing a tent for example of 100 feet span and any length required. The technique of construction in such matters as 100 roping, netting, reinforcing, etc., may

closely follow similar well known methods at present practised in connection with dirigible balloons.

Referring to the accompanying sheets of diagrammatic drawings:—

Figure 1 is an elevation, and

Fig. 2 is a plan, of part of a tent constructed in accordance with the present invention.

Fig. 3 is a transverse section showing two air locks in elevation.

Fig. 4 is a side elevation of an air lock in greater detail.

Fig. 5 is an end elevation of same.

Fig. 6 represents an appropriate anchorage.

Fig. 7 is a section showing an alternative anchorage where the maximum angle of slope is small, as for example where it is important that the tent shall cast no shadow.

Fig. 8 illustrates a method of air lock construction giving access to the structure where the general ground level is above the level of the service road.

Fig. 9 is an example of the employment of anchorage given in Fig. 7.

With reference to Figs. 1, 2 and 3 a number of ropes a^1 are secured to appropriate means of anchorage at their extremities; a central ridge rope is provided a^2 terminating in a "banjo" member a^3 from which radial ropes a^4 and a^5 are arranged, similarly connected to a land anchorage, to form the retaining members for the end of the tent or structure. One or more longitudinal rope members n^6 are provided and, at the points where provision is made for an air lock or entrance, diagonal ropes a^7 are provided to reinforce the structure locally and take the place of the transverse ropes that are omitted; as shown more particularly in Figs. 1 and 2, and in Fig. 5.

The air lock Figs. 3, 4 and 5 conveniently takes the form of a van body in which two sets of doors are provided opening inward, as indicated in the plan view Fig. 2.

The van body is adapted to be utilized as a means of packing the whole outfit when transporting the tent from place to place. The diagonal rope members a^7 adjacent to the air lock or entrance, Fig. 5, form, together with the roof of the air lock aforesaid, the figure of the capital letter A and where it is not desired to make the outfit portable the air lock may comprise structural panels filling in the triangular spaces included between the sides and roof of the air lock Fig. 5 and the adjacent rope members aforesaid.

Beneath the rope network constructed and arranged as hereinbefore described a canvas or fabric envelop is provided of low air permeability, the said envelop being cut and sewn or jointed to fit the rope network just as in the case of a balloon of the non-rigid

type. The edges of the envelop do not terminate on the ground line, but allow of a flap extending inward, as shown more particularly in Figs. 3 and 4, the said flap either being pressed to the ground by internal air pressure or, where necessary, being loaded by sand bags as shown at b^1 , Figs. 3 and 4. Where the envelop is cut to permit of the insertion of the air locks or entrances a flap is likewise provided and this may be sealed by a sandbag, as shown at b^2 or by strips and bolts as shown at b^3 , or both methods may be utilized and the flap may be additionally nailed, as indicated at b^4 . Reinforcement ropes or bands may be provided as at a^8 , a^9 . The van bodies serving as air locks are arranged with doors, one pair at each end, c^1 , c^2 , and c^3 , c^4 , opening in like direction, and apertures may be provided c^5 , c^6 fitted with sliding doors, both to equalize the pressure when it is desired to open the doors, acting thus in the manner of the sluice gates of a lock, and to allow of observation if required to ascertain that the lock is not otherwise engaged.

For the purpose of lighting the fabric or canvas employed may be translucent or other means may be provided. For example port holes may be fitted in the canvas in the interspace between the adjacent transverse ropes, at a suitable level for lighting purposes and to allow of observation from the interior of the tent, as shown by way of example at a^3 ; for this latter purpose the height of the port holes from the ground level requires to be regulated at about five feet. Alternatively, and as is frequently desirable from a military stand point, the material of the envelop should be opaque and artificial means of lighting exclusively relied upon.

The means of anchorage for the transverse ropes depicted in Fig. 6 comprises wooden planks or barks d^1 , d^2 with an iron tension bar d^3 cottered at d^4 and with a coupling at link d^5 , the said link being connected to its corresponding transverse rope member by a rigging screw or lanyard. The method of constructing the anchorage is to dig a trench of the necessary width and depth, drive the timber in place, and, with the tension bar d^3 in position, fill in and tamp. The vertical component of the load on the tension bar is taken mainly by the filled in and tamped earth, but in part by the driving of the horizontal timber member d^2 under the virgin soil as indicated, the timber member d^2 inserted in an inclined position, being driven down by its butt end while the chamfered end forces its way into the undisturbed soil.

In cases where camouflage is important, as in a military zone, where liable to aerial observation, the tent or structure is made of considerable span and minimum altitude, so

that the maximum roof angle is insufficient to cast a shadow. In such cases the transverse tension members or ropes a' , a' , a' may be held by double, triple or multiple picketing, as indicated in Fig. 7.

In erecting a tent or structure in accordance with the present invention it is desirable to employ a centrifugal fan of considerable delivery capacity, the outlet of the fan being coupled up by a flexible conduit to any convenient point in the envelop and the inflation volume being sufficient to take charge of considerable leakage. While inflated by this means the tent may be entered by passing beneath the sealing flap, and sand bags, etc., may be loaded on to the sealing flap at points of leakage in order to make good; also the air locks may be inserted and the sealing around them be made secure. When this is done the permanent air pressure plant, consisting of a comparatively small motor and fan, may be set to work and will be sufficient to maintain the inflation pressure. An appropriate inflation pressure under ordinary weather conditions is about one inch water gage, but in stormy weather as much as two or three inches water gage may become necessary.

In place of the definite distribution of transverse and longitudinal ropes hereinbefore described the ropework may take the form of a net in which the whole of the members are diagonally knotted or cross fastened in any well known manner.

In the case of a tent of circular form the method hereinbefore described as concerns the ends of the structure may be adhered to, the tent taking the form of two ends with no cylindrical portion as figured on the left of Figs. 1 and 2.

If air locks in the form described are insufficient in size, as in the case of stowage for aeroplanes, special locks may be employed of larger dimensions or the whole end of a building may be occupied by an air lock. In such structures it is necessary, however, that the air lock should be of semi-permanent character and either steel or ferro concrete may be conveniently employed to form end buildings containing the lock adapted to be connected by a cylindrical inflated roof constructed as hereinbefore described.

In other cases and on sites where the conditions indicate the method as suitable, access to the structure may be obtained by a tunnel or "cut and cover" with a ramp leading upward to the floor level and such construction is indicated where the site chosen

is adjacent to a sunken road; a diagrammatic example of this is given in Fig. 8.

In order to provide for the excess inflation pressure required when there is a high wind a cowl raised on a stand pipe, or suitably mounted on the top of the tent structure, may be employed, the cowl consisting of a wind catcher pivotally mounted and directed by a weather vane. The wind catcher may consist merely of a right angle bend or hood with the vane so attached that the aperture of the bend is always facing the wind and the said aperture may be flared or made funnel shaped in order to obtain the maximum effect. This device is similar to the ordinary chimney cowl except that the vane is arranged to act in the diametrically opposite sense.

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

1. The combination with a tent supported by air pressure in the interior of the same, of means provided at the lower edge of the tent and rendering the lower edge substantially air tight, and a substantially air tight body arranged in the wall of said tent and having doors provided at each end of the same.

2. The combination with a flexible tent supported by air pressure in the interior of the same and having its edges secured by substantially air tight means, of a hollow body passing through the wall of said tent, and doors provided at each end of said body.

3. The combination with a tent supported by air pressure in the interior of the same, of a flap provided at the lower edge of said tent and rendering the lower edge substantially air tight.

4. In a combination as defined in claim 1, a series of transverse ropes extending across the tent, and a plurality of longitudinal ropes extending lengthwise of said tent.

5. A tent comprising a body portion having its lower edge secured by means of a substantially air tight joint, a series of ropes extending across said body portion and reinforcing the same, a passageway extending through the wall of said body portion and having one of its ends located in the interior of the body portion and its other end located outside of the body portion, and doors provided at the ends of said passageway and operative independent of each other.

In testimony whereof I have signed my name to this specification.

FREDERICK WILLIAM LANCHESTER.