(No Model.) 3 Sheets—Sheet 1.

R. M. FRYER.

Buoyant Propeller Ship.

No. 233,086. Patented Oct. 12, 1880.

Fig. 1

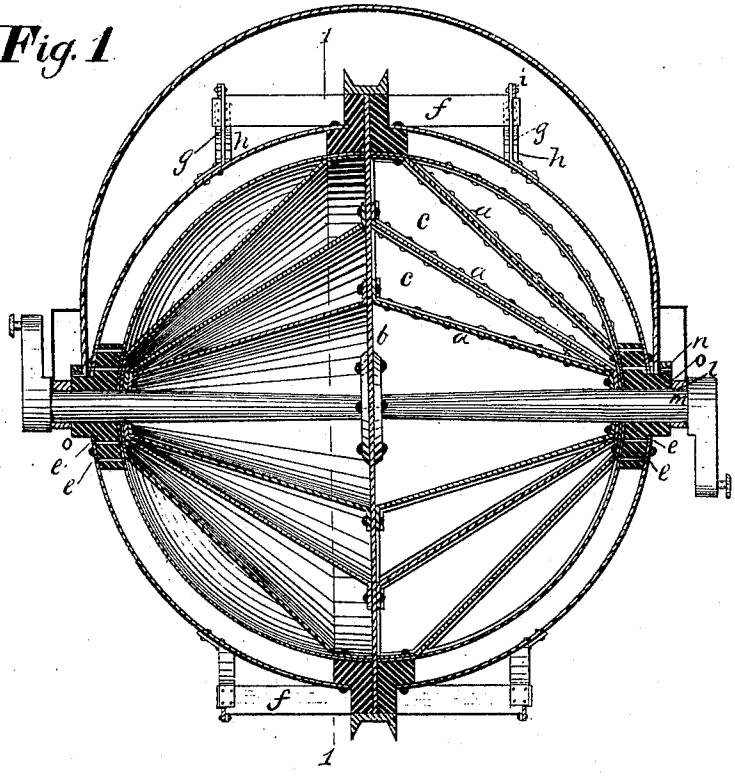
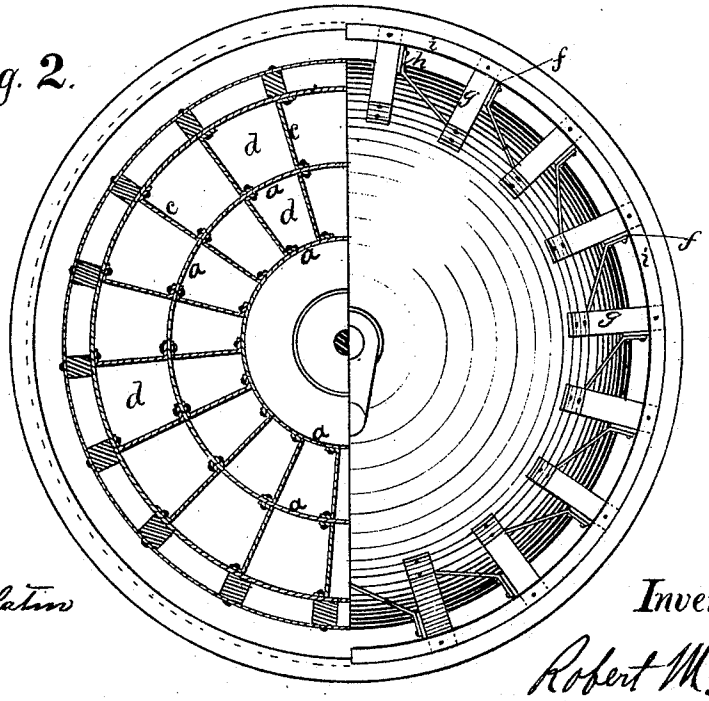


Fig. 2.



Witnesses.

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(No Model.) 3 Sheets--Sheet 2.

R. M. FRYER.

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Fig. 3.

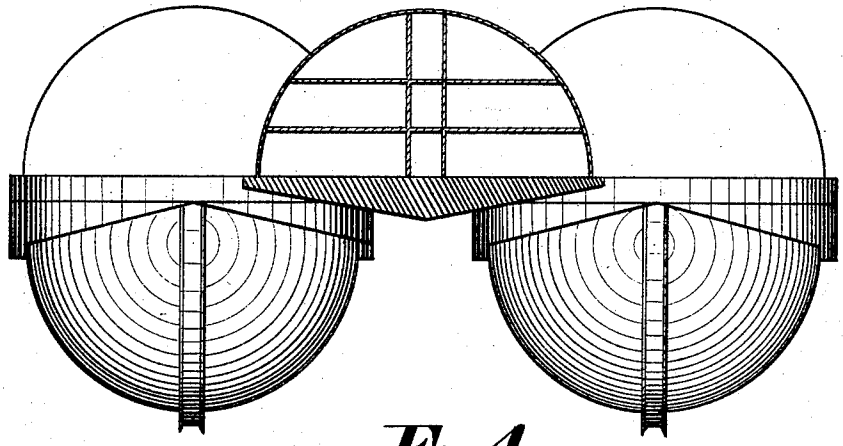
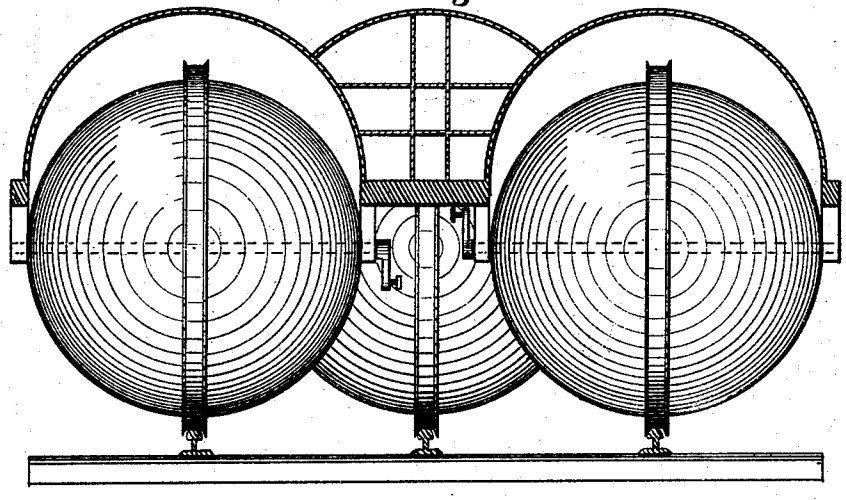


Fig. 4.



WITNESSES

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(No Model.)

3 Sheets—Sheet 3.

R. M. FRYER.

Buoyant Propeller Ship.

No. 233,086. Patented Oct. 12, 1880.

Fig. 5.

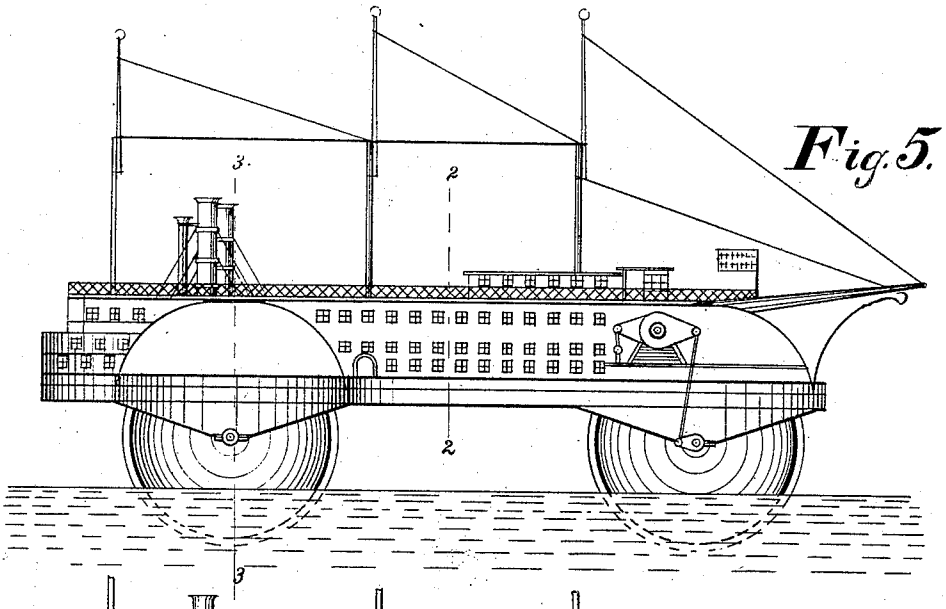


Fig. 6.

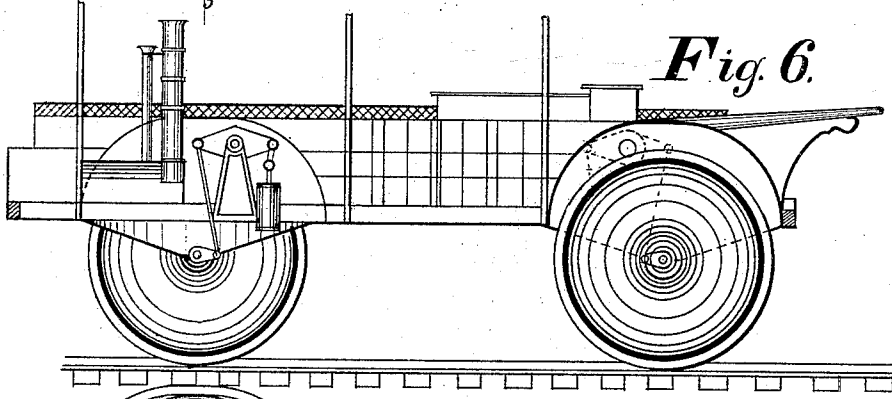
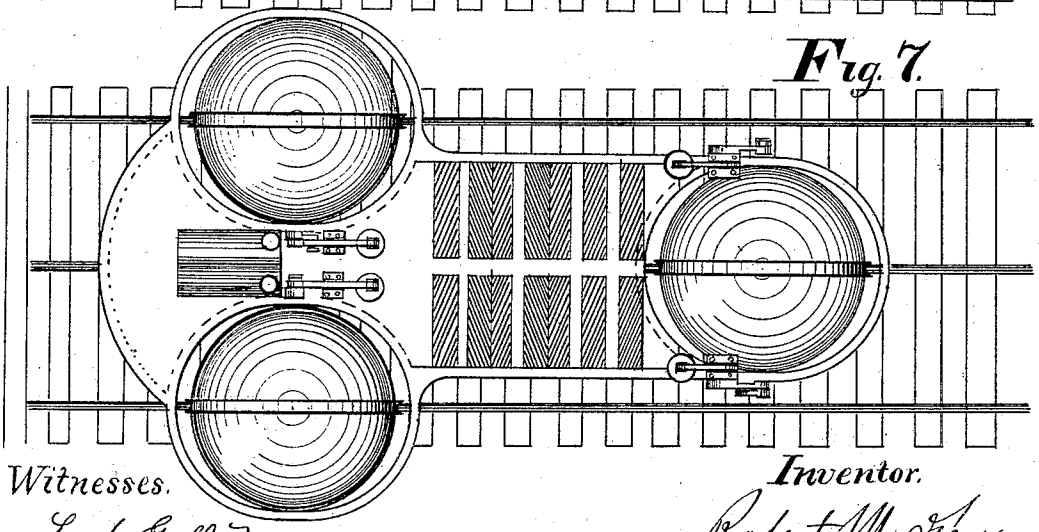


Fig. 7.



Witnesses.

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Inventor.

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UNITED STATES PATENT OFFICE.

ROBERT M. FRYER, OF SAN FRANCISCO, CALIFORNIA.

BUOYANT PROPELLER-SHIP.

SPECIFICATION forming part of Letters Patent No. 233,086, dated October 12, 1880.

Application filed April 6, 1880. (No model.)

To all whom it may concern:

Be it known that I, ROBERT M. FRYER, of the city and county of San Francisco, and State of California, have invented certain new and useful Improvements in Buoyant Propeller-Ships, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a sectional elevation of one of the propelling drums or spheres, taken at right angles to its plane of rotation; Fig. 2, a partly sectional view, the section being taken on the line 1 1 of Fig. 1. Fig. 3 represents a sectional elevation on line 2 2 of Fig. 5, looking toward the stern; Fig. 4, a sectional view on line 3 3, looking toward the bow, and showing the spheres in elevation; Fig. 5, a side elevation of the vessel complete; Fig. 6, a longitudinal section of the same; Fig. 7, a plan view of the drums or spheres, and the frame-work by which they are united, the top of the body being removed to show the relative arrangement of parts and the locality of the engines by which the propelling drums or spheres are driven.

The vessel consists of a frame-work or body, preferably of iron, in which are arranged buoyant spheres or drums provided with paddles or floats upon their outsides, and their interiors divided into compartments, for the purpose of increasing their strength and decreasing their liability of sinking in case of accident.

As shown more clearly in Fig. 7, I arrange three of these spherical floats in a frame-work, this number being preferable, for the reason that in rough water the vessel is enabled to adjust itself upon the surface without strain of the frame-work; and this adjustment is the more readily permitted by the spherical form of the floats shown, which enables them to turn in the water after the manner of ball-and-socket joints, while at the same time the pressure is always toward the center and the degree of immersion remains the same.

These spheres or floats are to be so proportioned relatively to the weight of the entire vessel that about one-sixth of their buoyant power shall be sufficient to support the whole structure upon the water, or, in other words, that only about one-sixth of the spheres shall be immersed in the water when supporting the entire weight of the vessel. Each sphere or float is capable of independent rotation, and is provided with independent means for driving it, so that in the absence of a rudder the vessel may be guided and controlled by the relative speed, or the direction of rotation of the floats.

The spheres or floats are composed of inner and outer shells of plate-iron, the space between being subdivided, and each subdivision provided with an outlet near the journal for water which may leak through the outer shell. These shells are secured together and supported by intermediate rings or bars, to which the plates are riveted; and the interiors are also subdivided into compartments, so that in case of injury to the shells and admission of water their entire buoyancy shall not be destroyed.

I have shown in Figs. 1 and 2 one manner of forming these compartments, which consists in arranging a series of cones, *a*, around the shaft of the wheels, one within the other, their bases separated by and connected to a central division-plate, *b*, arranged in the plane of rotation. These cones are divided into compartments *d d* by plates *c*, arranged between them and riveted, as shown. In order to guard against accidents and leakage each compartment is provided with an outlet, *e*, at its outer end near the bearing of the shaft, through which any water that may collect therein will be discharged as the wheel rotates.

In the drawings I have not shown the inner cone divided into compartments, though it is clear that it may be so divided. In the absence of such compartments the outlet or opening through which to discharge the water is to be made at or near the plate *b*. On their outsides the wheels or spheres are provided with paddles *f*, supported at their ends by standards *g* and braces *h*, attached to the outer shell or case.

The standards *g* and braces *h* are made of flat pieces of iron, and the former have their flat sides in the plane of rotation, while the braces have their flat sides at right angles thereto.

The paddles are arranged between the standards and braces, and the whole bolted together

by U-bolts passing around the standards and through the paddles and braces, and having screw-nuts on their ends.

The standards and braces are all connected by a ring or band, *i*, passing around the ends of the paddles and bolted to the ends of the standards, which project beyond the edges of the paddles a sufficient distance for that purpose. By this means the united strength of all the standards and braces is given to the support of each paddle. This also allows of the ready removal of any of the paddles in case it should be desired, for any reason, to take them out. This arrangement may be multiplied to any extent necessary for properly securing the paddles.

In order to adapt the vessel to run on land in case it should be desired to use it as a land conveyance while crossing an isthmus, &c., I provide the wheels or spheres with a flanged keel arranged in the plane of rotation, and so shaped as to adapt them for use as a keel, when in water, to prevent great lateral movement through it, and when upon land to run on rails, as shown in Figs. 1, 3, 4, 6, and 7 of the drawings.

These flanges or keels may be attached to the wheel in any suitable manner; but I have shown them made and attached to the extremity of the division-plate *b* and united to the shells forming the outer spheres. The flanges for keeping the keel to a track project from the face of the keel a sufficient distance for the purpose, as shown.

The body or hull of the vessel is composed of a frame-work or water-tight bottom, which is supported by the journals of the wheels a sufficient distance above the level of the sea to prevent said frame-work from being brought into violent contact with the waves in the roughest weather.

Three water-tight domes or wheel-houses are arranged upon this frame-work or bottom, which domes are connected by an arch subdivided into compartments, which serve as state-rooms, cabins, &c. The whole is made water-tight, so that in the event of the wheels (or spheres) being broken or disabled, or the vessel capsized, it will still possess sufficient buoyancy to prevent it from sinking.

The arch by which the domes or wheel-covers are connected affords the greatest strength, in proportion to its weight, of any other form, and for this reason I consider it preferable, though it is evident that this structure may be built in other forms.

In Fig. 1, *o* represents a projection of the flange of the wheel, which forms a secondary bearing, in connection with box *n*, located a short distance above. This provision is made so that in case the main journal, *m*, should be broken or injured the weight calculated to rest upon it through the box *l* would then be sustained by the said secondary bearing, permitting the wheel (or sphere) to revolve as before, except for the greater friction caused by its ill proportion.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. A buoyant propeller-wheel of substantially spherical form, composed of two shells, one within the other, joined together by intermediate girders or ties radiating from the axes, the spaces so formed being provided with outlets through the outer shell near the axes of the wheel, for the purpose of discharging any water which may accumulate between these shells from leakage or any other causes.

2. In a buoyant propeller-vessel, the combination of three revolving spheres arranged in triangular form relatively to each other, and operated by separate engines, said spheres being provided on their outsides with paddles or floats, and with central keels, as shown, in their plane of rotation, the said keels being grooved on their faces to follow a track, whereby the vessel is adapted to be used either upon water or a land railway, as set forth.

3. A buoyant propeller-wheel internally divided or subdivided into compartments, and each compartment provided with an opening or outlet through the side of the wheel for the purpose of discharging, during the rotation of the same, any water that may accumulate therein from leakage or other causes.

4. A buoyant propeller-wheel of substantially spherical form provided with a series of internal hollow cones, one within the other, their bases joined together in a plane at right angles to the axis of rotation, and the spaces between said cones subdivided by partitions arranged in the plane of their axes, substantially as and for the purpose set forth.

5. The hull or body of the vessel herein described, consisting of three water-tight domes or wheel-covers, connected by an arch located between the two rear wheel covers or houses, and forming stays or supports for the same, and extending longitudinally forward to the forward dome or wheel-house, to support the same, such arch being subdivided into water-tight compartments, the whole supported upon a bottom or frame-work provided with suitable bearings for the journals of the wheels, and made water-tight, as and for the purpose set forth.

ROBERT M. FRYER.

Witnesses:
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I. J. FRYER.