(No Model.)

2 Sheets—Sheet 1.

D. W. LORD.

BUOYANT PROPELLER.

No. 438,815. Patented Oct. 21, 1890.

Fig. 1.

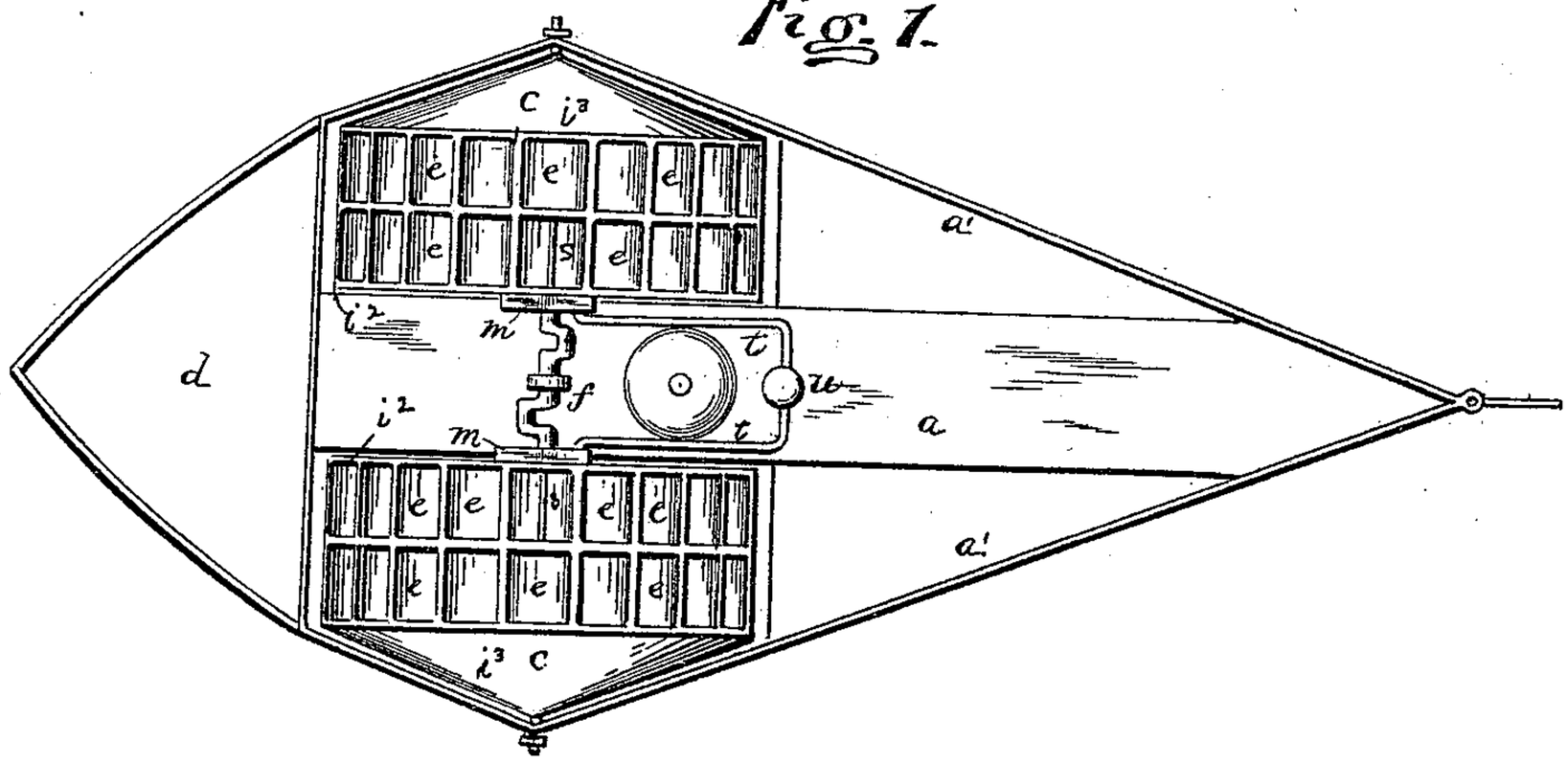
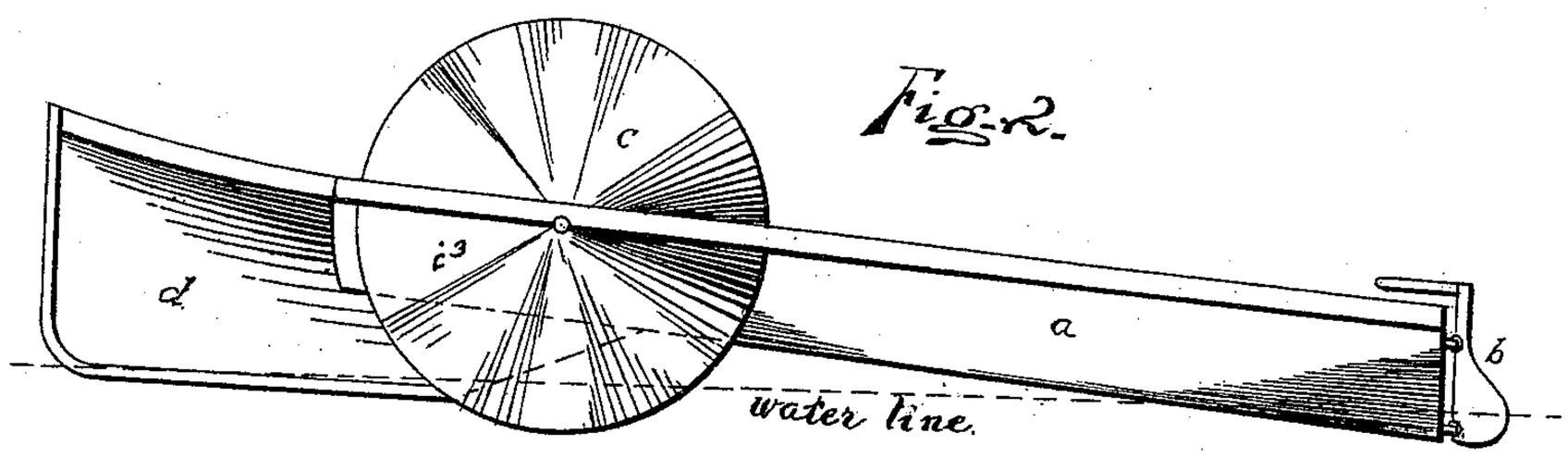


Fig. 2.



Witnesses:
T. W. Johnson.
L. Br. Bartlett.

Inventor:
Daniel W. Lord
By Wm A Bartlett
Atty.

(No Model.) 2 Sheets—Sheet 2.

D. W. LORD.

BUOYANT PROPELLER.

No. 438,815. Patented Oct. 21, 1890.

Fig. 3.

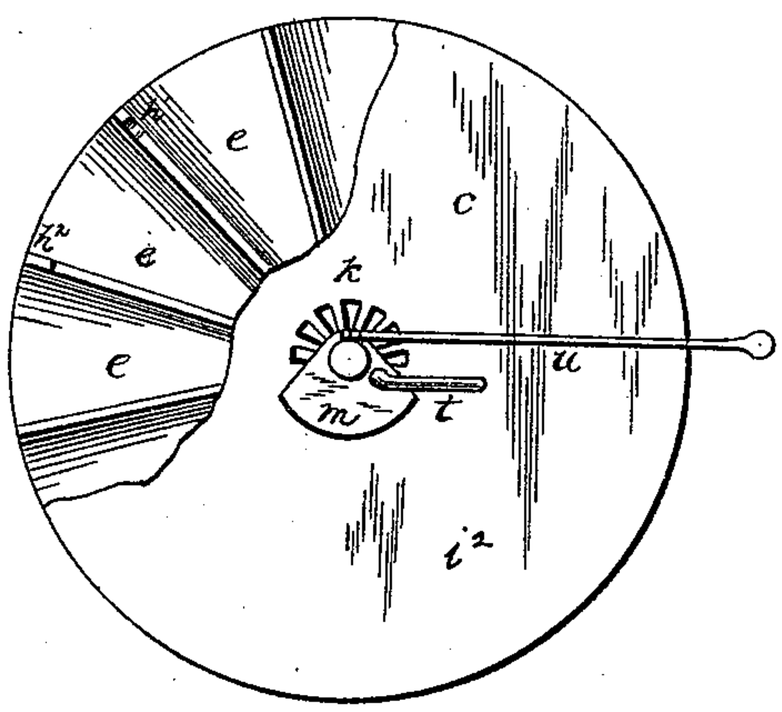


Fig. 4.

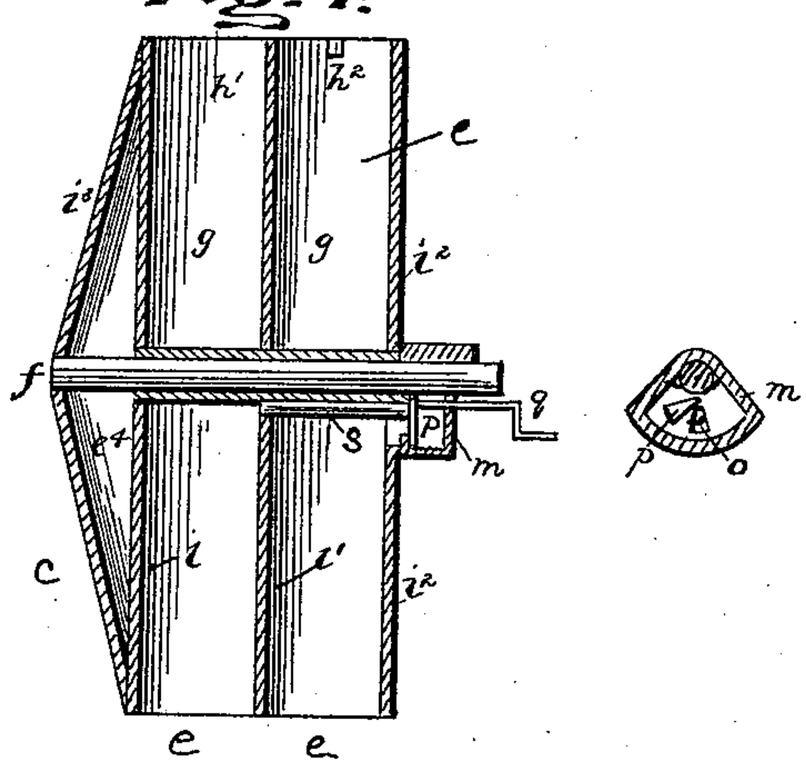
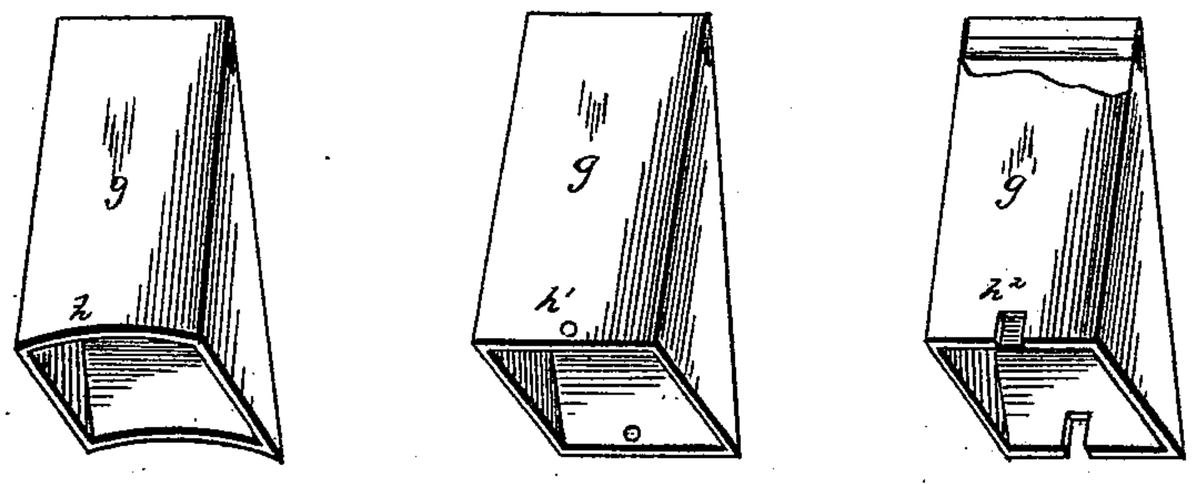


Fig. 5.



Witnesses:

T. W. Johnson.

L. M. Bartlett.

Inventor:

Daniel W. Lord.

By W. A. Bartlett

Atty.

UNITED STATES PATENT OFFICE.

DANIEL W. LORD, OF MALDEN, MASSACHUSETTS.

BUOYANT PROPELLER.

SPECIFICATION forming part of Letters Patent No. 438,815, dated October 21, 1890.

Application filed August 3, 1889. Serial No. 319,641. (No model.)

To all whom it may concern:

Be it known that I, DANIEL W. LORD, residing at Malden, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Buoyant Propellers, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to propellers for vessels and the method of operating the same, and is especially intended as an improvement in what are known as "buoyant propellers."

The object of the invention is to produce a buoyant propeller with open buckets or receptacles, from which the water is excluded wholly or in part by air-pressure, and to utilize the air-pressure as well as the movement of the propeller, so far as may be, in the propulsion of the boat.

Figure 1 is a plan of a boat, showing generally the arrangement of buoyant wheel-propellers with relation to other parts. Fig. 2 is a side elevation of boat. Fig. 3 is a side elevation of a wheel-propeller, partly broken away and showing air-trunk and connections. Fig. 4 is a section through wheel and air-trunk. Fig. 5 are details of buckets or compartments in the wheel.

The letter *a* indicates the hull of the boat, which by preference lies between the propeller-wheels at its forward portion, the stern of the hull only being intended to rest on the water, and the bottom of this stern portion being formed to pass easily through the water. Any form of rudder or steering-gear *b* may be used.

The buoyant propellers *c* are connected by a driving-shaft *f*, to which shaft the forward end of the hull is attached, so as to be supported above the water.

The hull may have a stem portion *d* in front of the propellers, or this may be omitted, and guards or stays *a' a'* will be used when needed. When the stem portion *d* is used, it will serve as a guard to break the crest of the waves and will afford flotation when the air is permitted to escape from the buckets in the wheels. When the stem *d* is omitted, the body of the hull will rest in the water whenever the air is permitted to escape from the buckets.

The buoyant propellers *c* are represented as wheels having open buckets or compartments *e*, extending from near the central shaft *f* to the periphery of the wheel. The buckets or compartments are thus of wedge form, open at the outer end. The partitions *g*, which separate these compartments, preferably have small apertures, notches, or cut-away portions, as $h\ h'\ h^2$, near the periphery of the wheel. The ends of the wheel proper are composed of disks $i\ i^2$, and by preference a disk i' separates the chambers *e* from each other in the direction of the length of the wheel-shaft to prevent side oscillation. One of the end disks i^2 of the wheel is perforated at *k* near the shaft, there being one opening for each bucket *e*. The buckets *e* do not communicate with each other, save as above described, by passages *h*. An air-trunk *m* near the shaft covers the apertures in disk i^2 of such buckets as are in the water at any one time. This air-trunk has a single opening *o*, which communicates with the adjacent bucket *e*, and by a pipe *s* communicates also with the compartment or bucket *e* toward the outside of the wheel. This opening *o* may be closed by a valve *p*, operated by handle *q* or by a cock or valve in the supply-pipe. The outer end of each wheel is preferably strengthened by a conical plate i^3, which forms a water-tight chamber e^4 at the end of the wheel.

The air-truck *m* is preferably segment-shaped, and is supported about the shaft *f*, so that it may be rocked on said shaft, as by handle *w*, thus varying the position of the opening *o*. Air is conveyed to the trunk by a flexible or jointed pipe *t* from any suitable compressor or source of air-supply, as at *u*. The air-trunk serves as a convenient means of connecting the air-supply pipe with the buckets of the moving wheel and can be rocked to any position to feed the air to the buckets at any point between their entering and leaving the water. The air-trunk makes a close joint against the wheel, and the rotation of the wheel serves as a cut-off to prevent the backflow of air. The valve may act as a cut-off when the wheel is at rest. Air may be fed to one or more buckets at the same time, according to the position and size of the air-passages.

The weight of the structure tends to sink the wheels in the water. As the mouths of the buckets are open, the water would enter such buckets as present their mouths to the water were it not for the air confined in the buckets. By compression this confined air loses some portion of its volume, which loss I make good from outside the wheel through the supply-pipe. As the wheel rotates and the buckets rise from the water, the air under pressure in the buckets prevents suction and the lifting of water by the wheel, and by its pressure aids in the propulsion of the boat in some degree.

The wheels *c* may be rotated by suitable power applied to shaft *f*, or the boat may be driven directly by a wheel, screw, or other propelling device acting independently, leaving the wheels *c* free to rotate and support the boat by their buoyancy.

I have described the wheels *c* as forming the buoyant supports or propellers; but these are merely a form of propeller which may be used. Buoyant propellers have been made on the principle of the screw and as endless belts, and perhaps other forms. Where the action of such can be improved by feeding compressed air between the propelling-surface and the water I consider my invention applicable to them and do not desire to limit myself strictly to the wheel. The openings *h* or *h'* near the outer ends of the buckets permit the escape of air until the bucket has been submerged to the depth of this opening in the partition. The object of this is to permit the escape of air, which might otherwise bubble out and cause commotion in the water in its effort to escape compression. The openings *h* are not indispensable, but are believed to conserve economy in the use of power.

The bearings by which the hull is attached to shaft *f* will be of such character as to permit the rotation of this shaft with little friction. The wheels may be covered with suitable boxes.

The compressed air will be supplied from a suitable reservoir or directly from a compressor, and suitable valves will be arranged to control the air supply and pressure. Other gaseous fluids may be used instead of compressed air.

It will be understood that I do not confine myself to the number of wheels or propellers to be used, nor to the number or shape of the buckets in the propeller. The wedge shape is a desirable form for the buckets; but other forms may be used.

What I claim is—

1. A buoyant propeller having a bucket opening into the water and means for supplying a gas under pressure to said bucket, in combination, substantially as described.

2. A buoyant propeller having open-mouthed buckets, means for supplying gas under pressure to said buckets, and a cut-off acting to retain the air in said buckets.

3. The method of maintaining the buoyancy of an open bucket in a propeller, which consists in conveying gas under pressure to said bucket and retaining the gas in said bucket until released by the movement of the propeller.

4. The combination, with the hull of a boat, of a buoyant propeller having open-mouthed buckets, a reservoir for compressed gas in the boat, and connections, substantially as described, for conveying the gas under pressure to the propeller.

5. The buoyant wheel described, having open-mouthed buckets, mechanism for supplying compressed air, and a pipe connecting the air-reservoir with the buckets in the wheel, in combination, substantially as described.

6. The wheel having wedge-shaped buckets arranged radially, with open mouths and side openings near the shaft, and an air-supply pipe near the shaft communicating with the openings at the side of one or more of the buckets.

7. The wheel having open-mouthed buckets arranged radially and having apertures *h* or *h'* extending through the partitions near the mouth of the buckets.

8. The buoyant wheel described, having open-mouthed buckets, the air-supply pipe, and means for shifting the supply-pipe so that it will communicate to the buckets at varying points in the rotation of the wheel, combined substantially as described.

9. The buoyant wheel described, having open-mouthed buckets and having a chamber for confined air at the side of the buckets, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

DANIEL W. LORD.

Witnesses:
W. A. BARTLETT,
T. W. JOHNSON.