

No. 712,689.

Patented Nov. 4, 1902.

E. R. KROCKER.
AIR SHIP OR VESSEL
(Application filed Jan. 4, 1900.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

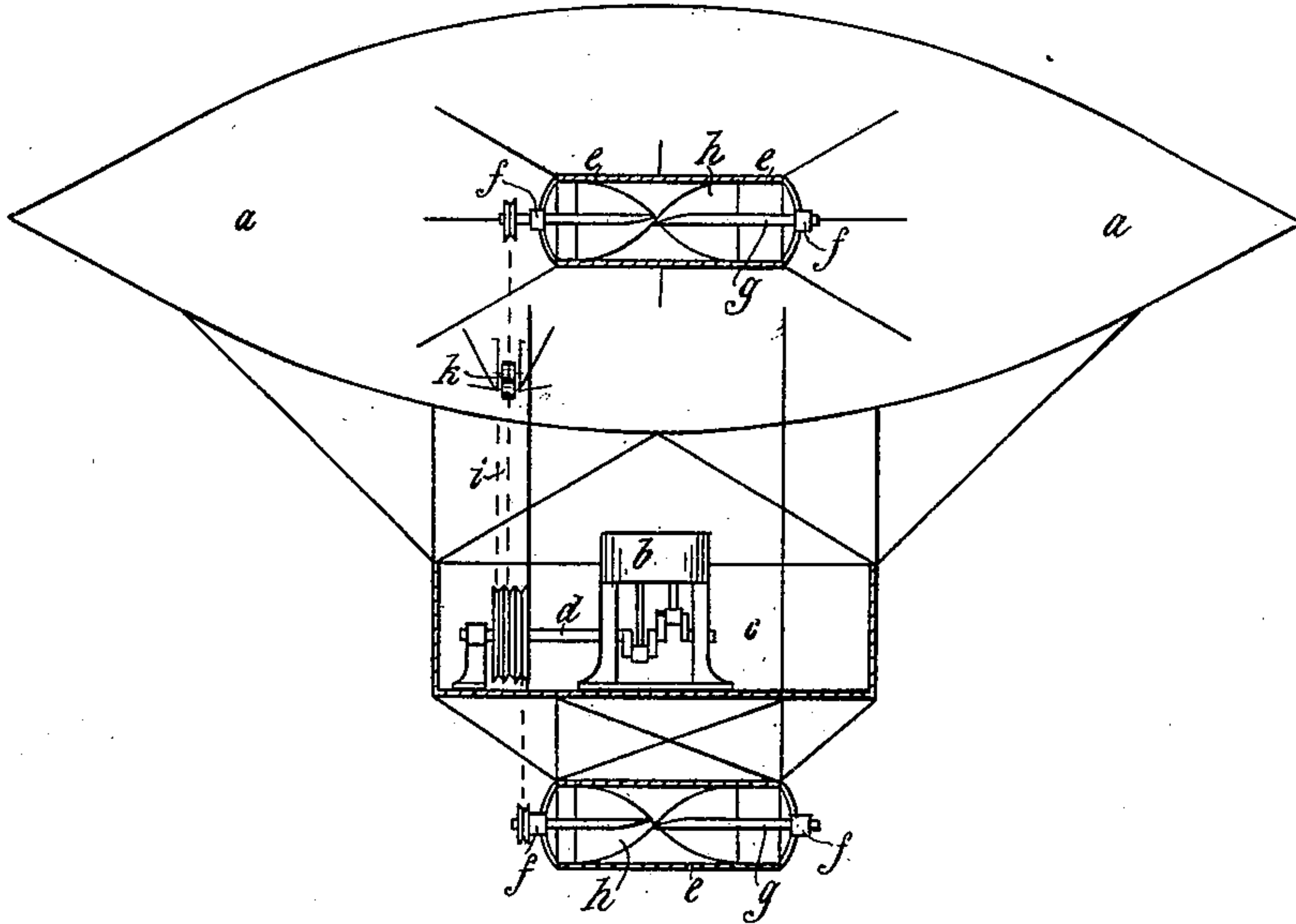


Fig. 2.

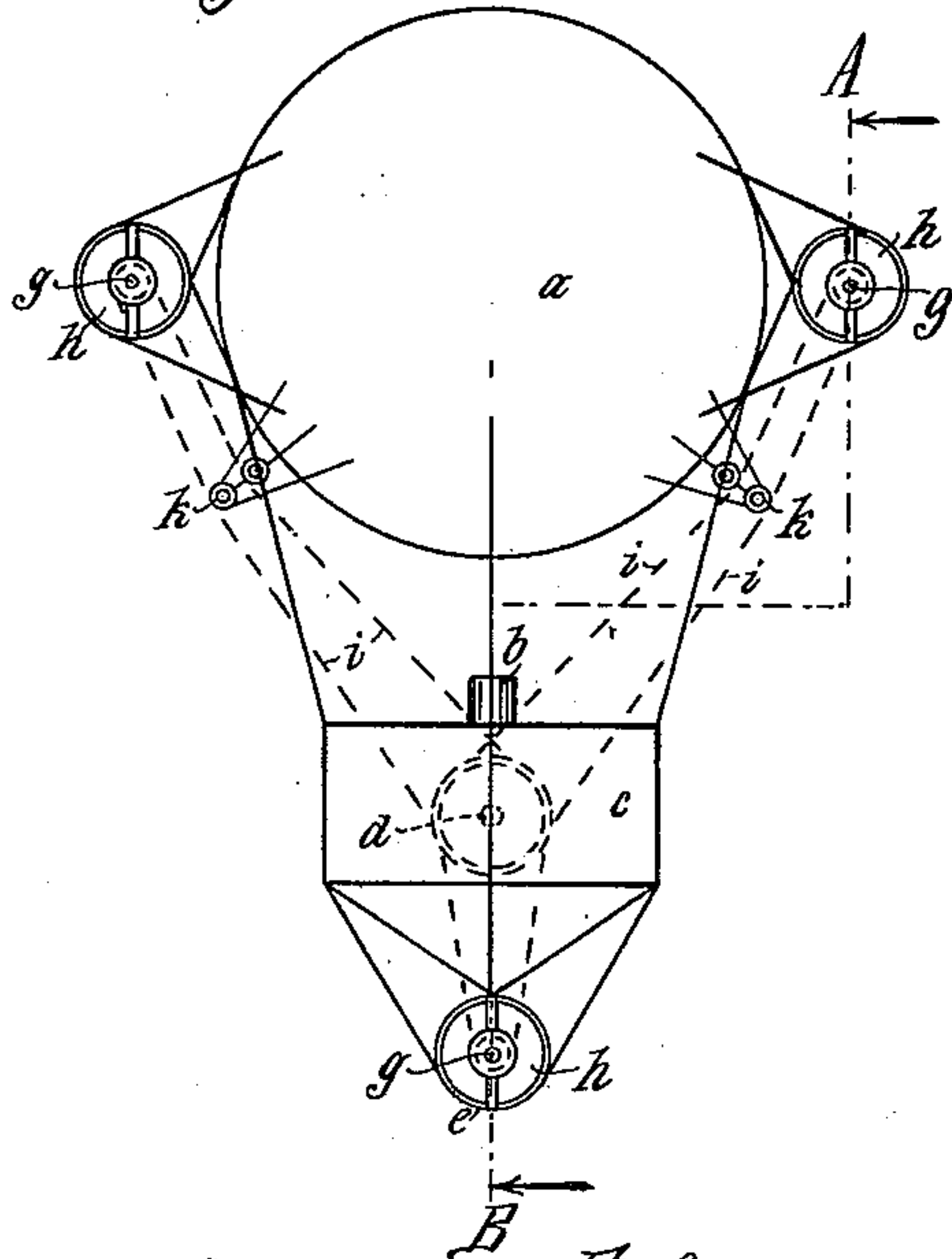
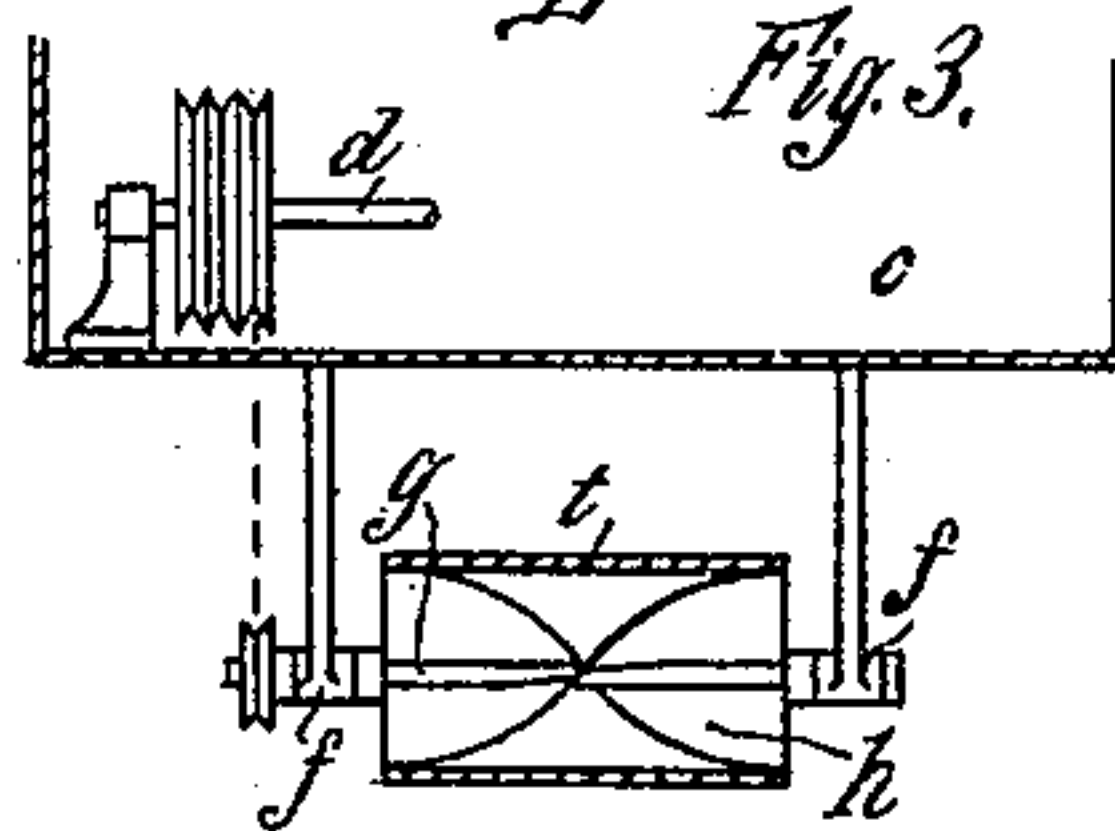


Fig. 3.



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No. 712,689.

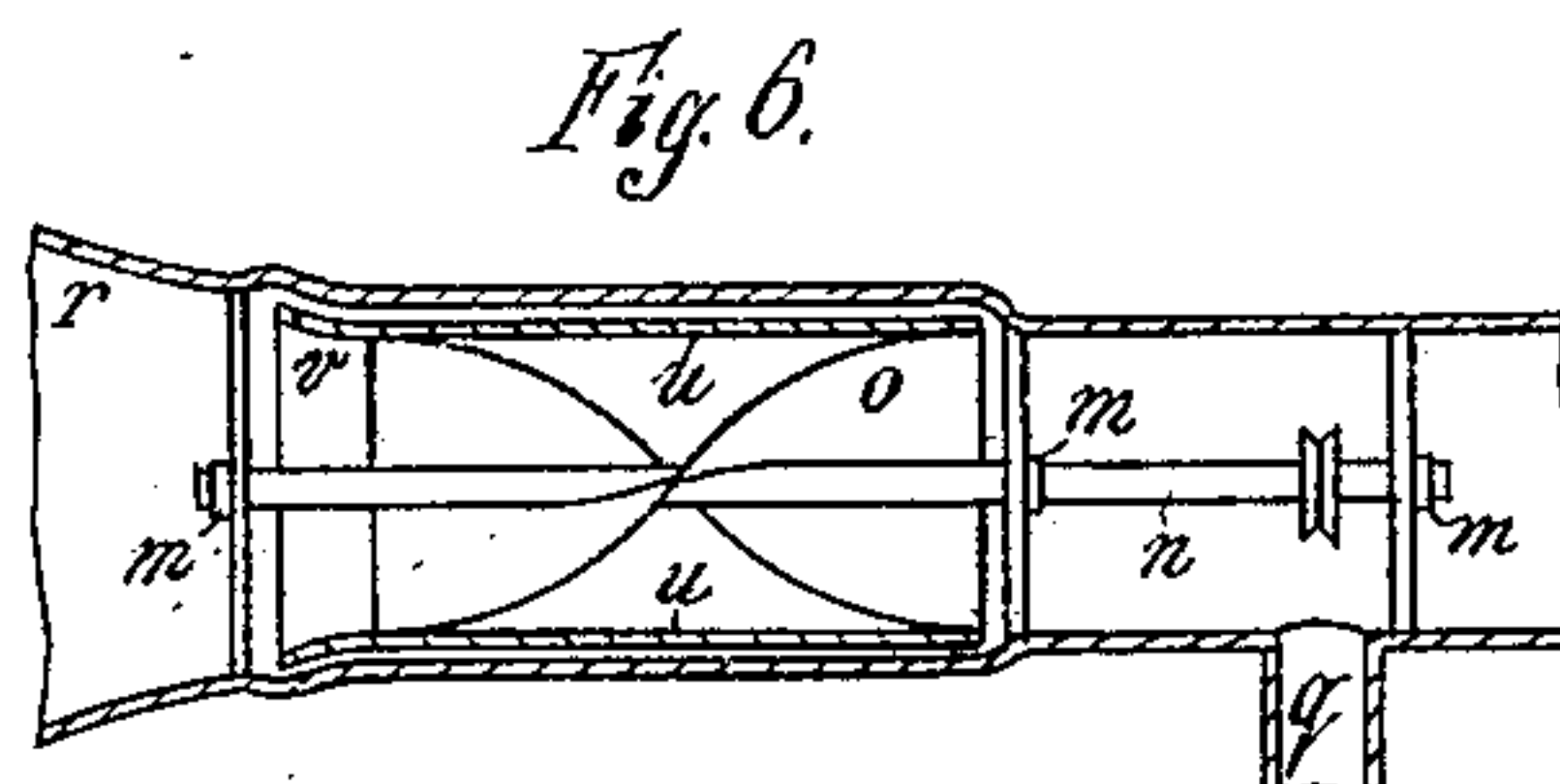
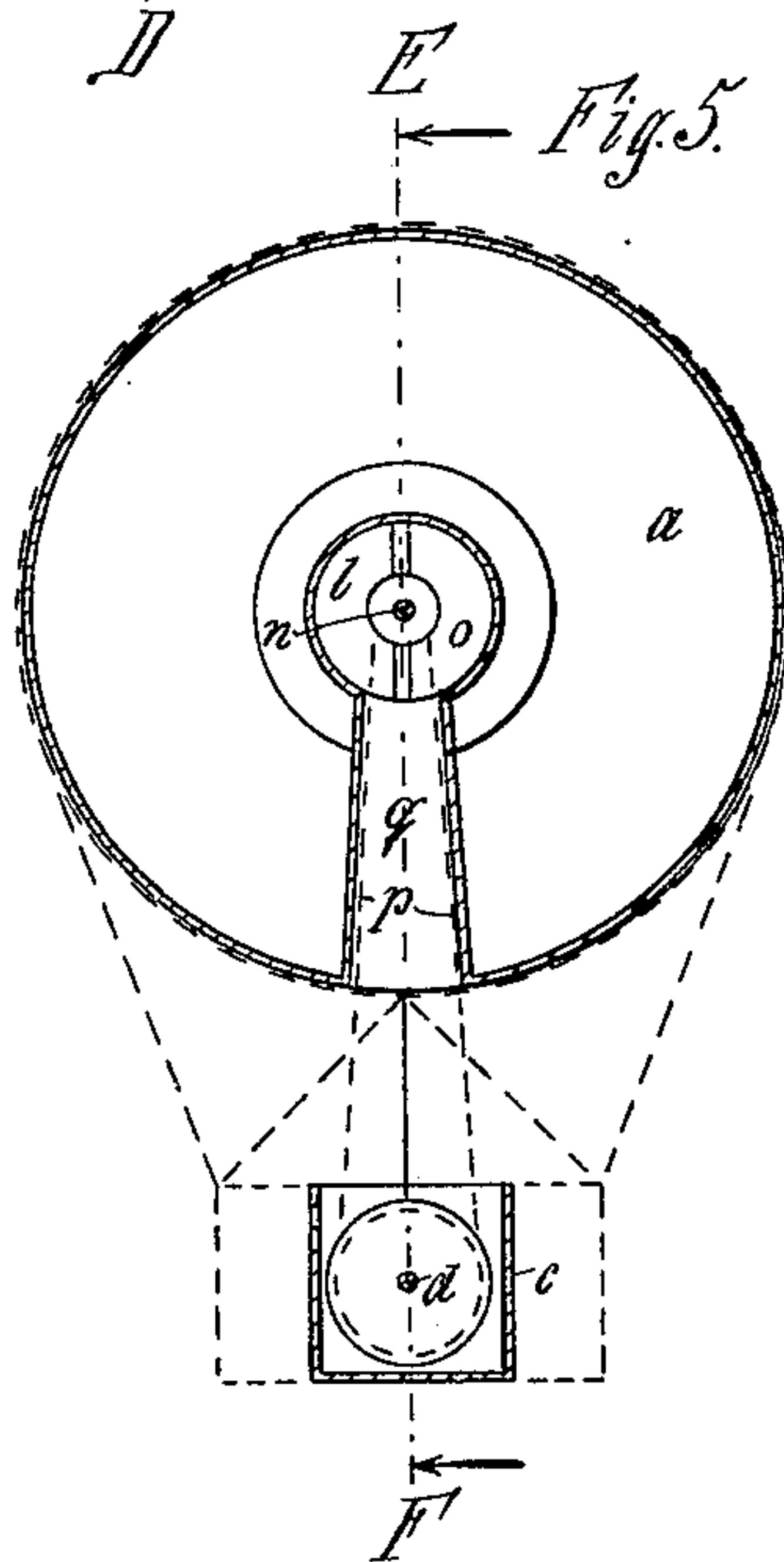
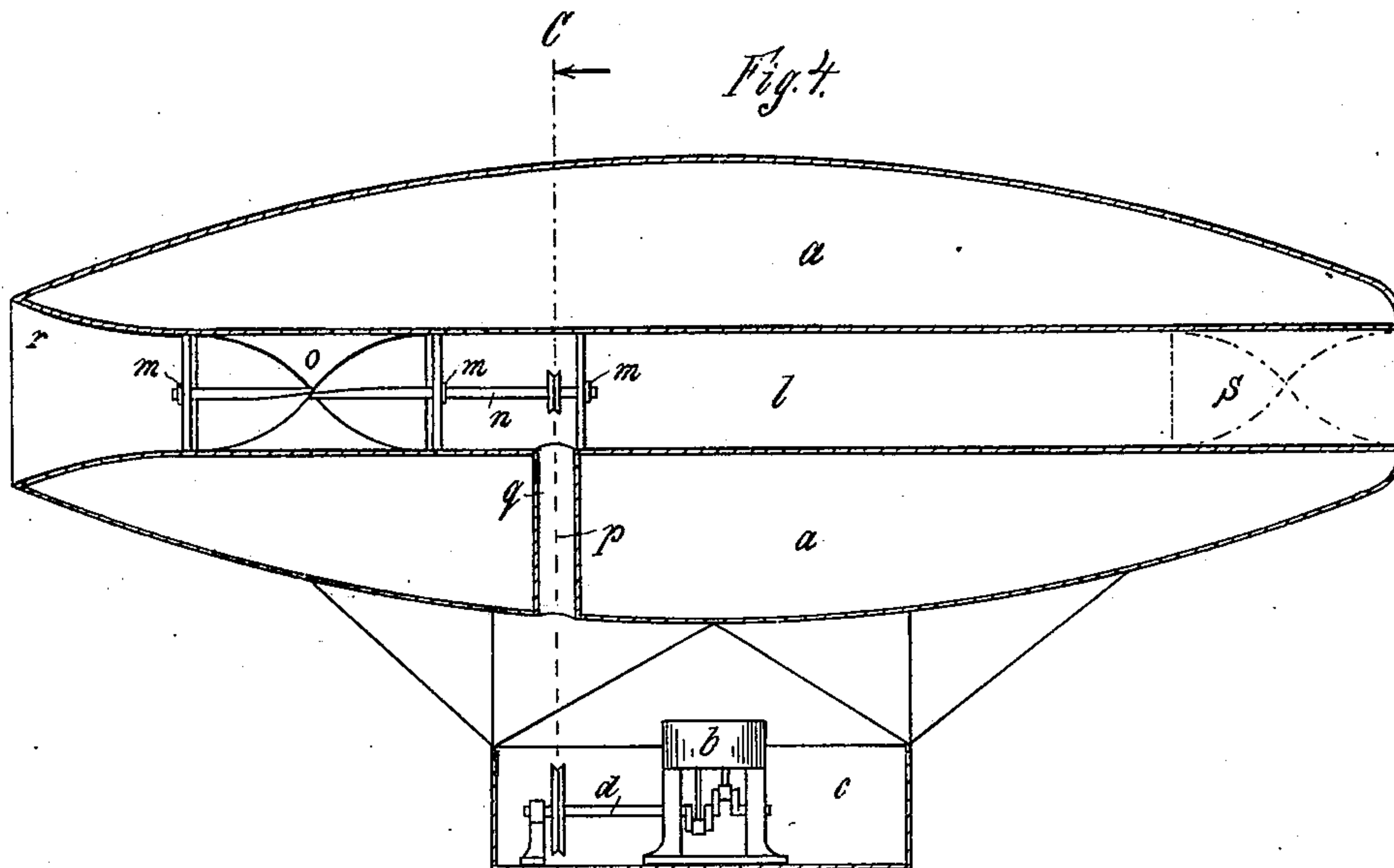
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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

ERNST RUDOLF KROCKER, OF TEPLITZ, AUSTRIA-HUNGARY.

AIR SHIP OR VESSEL.

SPECIFICATION forming part of Letters Patent No. 712,689, dated November 4, 1902.

Application filed January 4, 1900. Serial No. 390. (No model.)

To all whom it may concern:

Be it known that I, ERNST RUDOLF KROCKER, a subject of the King of Prussia, German Emperor, residing at Teplitz, Bohemia, Austria-Hungary, have invented certain new and useful Improvements in or Relating to Air Ships or Vessels, (for which I have applied for Letters Patent in Germany, K. 18,860 III/77b, dated November 27, 1899; in Great Britain, No. 24,047, dated December 2, 1899; in France, dated December 2, 1899; in Denmark, dated December 2, 1899; in Austria, dated December 4, 1899; in Sweden, dated December 4, 1899; in Switzerland, dated December 4, 1899, and in Belgium, dated December 9, 1899,) of which the following is a specification.

The present invention relates to air ships or vessels, and particularly to means of propulsion of such vessels.

A ship or marine propeller even in a modified form and greatly enlarged form will never be found suitable to act as a propelling agent for aerostatic purposes, since air is an elastic compressible body and is infinitely more mobile than water and therefore is not sufficiently resistant to the action of the blades of the propeller, and a great part of the power employed is consumed in useless movement of the air in the formation of air-whirls and like useless effects. A drawback of great importance is the effect of centrifugal force. Instead of steadily working through the air and driving back the air the propeller forces great quantities of air laterally, uselessly compressing the air around the vessel, while rarefying the medium, otherwise already too unsteady and unresisting, on which the propeller-blades are intended to act.

The object of the present invention is to increase the useful effect of the propeller by placing it in a casing or cylinder open at both ends and with its axis parallel to the direction the vessel is intended to travel, whereby the air instead of escaping laterally is forced to move in a line parallel to the line of movement of the aerostat. Owing to the arrangement of the cylinder surrounding the propeller screw or blades it is possible to replace the ordinary form of marine screw-propeller by a kind of Archimedean screw similar to a screw conveyer, in which the blades extend close up

to the inner surface of the cylinder, the latter thus coöperating with the former in such a manner as to fully utilize the propelling effect.

The invention can also be carried out in a modified construction, in which the cylinder inclosing the propelling-screw passes through the buoyant part filled with gas of the aerostat—i. e., through the body of the apparatus instead of below or at the sides. The central driving effect obtained by this arrangement will be found of great advantage, especially in connection with ellipsoidal or similarly-shaped balloons, as it is most suitable for keeping the desired direction of movement and because projections from and additions to the outer surface or contour of the vessel should be limited as far as possible to the car carrying the motor. In such an arrangement the fore part of the cylinder passing through the buoyant part or balloon may be conically enlarged outwardly, whereby the air drawn in by the action of the propeller becomes compressed on entering the reduced space of the cylinder, thus rendering more effective the work of the screw.

In the accompanying drawings the invention is represented in several forms of construction.

Figure 1 is a vertical section on the line A B of Fig. 2. Fig. 2 is an end view. Figs. 3 and 6 are detail views; and Fig. 4 is a vertical section on line E F of Fig. 5 of a modified construction, and Fig. 5 is a similar section on line C D of Fig. 4.

In the form of construction represented in Figs. 1 and 2, which will be described first, the propeller-screws are arranged outside the buoyant part of the balloon. From the ellipsoid-shaped balloon *a* is suspended the customary car *c*, in which is placed the motor *b*. The aerostat is provided with three screw-propellers actuated from the motor-shaft *d* by means of band, cord, or chain gearing. One cylinder *e* is immovably suspended underneath the car *c* and is provided at *f f* with bearings for the screw-shaft *g*. The screw *h* resembles as regards shape the well-known form of conveyer-screw. The screw may be considered as being generated by a rectangular metal sheet bent around its longitudinal central line. The edges of the blades or

wings are so formed that the screw *h* fits in the cylinder *e* as closely as possible without touching it. The propellers provided at the sides of the vessel are in every respect similar to the one described above. The transmission bands or chains pass upward over guide-rollers *k*. This form of construction is intended to serve as an example only of an aerial vessel according to the present invention, the arrangement of which may vary to any extent as regards number and the relative position in which the propellers may conveniently be fixed.

In the second form of construction the cylinder *l*, Figs. 4 and 5, lies in the axis and extends through the whole length of the buoyant part *a* of the aerostat, which here also is ellipsoidal in shape. In the fore part of the cylinder is arranged the screw *o*, carried on a shaft *n*, turning in bearings *m*. The screw is worked in this case also by a motor *b*, placed in the car *c*, by means of a band or other transmission device *p*, which passes from the motor-shaft to a pulley on the propeller-shaft through a tube *q*, provided for that purpose in the lower part of the vessel. The end *r* of the cylinder *l* in front of the screw is conically enlarged outwardly, the outward edge of this part *r* forming with the surface of the body *a* meeting it a kind of annular bow which cuts through the air. The air entering this funnel-shaped space *r* is compressed on passing into the narrower cylinder, and in this condition is attacked by the screw *o* and driven backward through the cylinder *l*. In the case of exceptionally long cylinders it will perhaps be found expedient to provide at the other end of the cylinder a second propeller *s*, as indicated in dotted lines in Fig. 4.

The screws *h*, Fig. 1, and *o*, Fig. 4, are revolvably arranged in the fixed cylinders in the two forms of construction described above.

In another modification the screws are rigidly connected with the cylinders and both revolve. In this case a perfectly-close connection between the two can easily be obtained, and the wings or blades of the screw may also be made thinner and lighter, since they are strengthened through being connected at their outer edges with the cylinder. This modification can be easily effected where the screws are placed outside the buoyant vessel. As shown in Fig. 3, on the shaft *g*, revolvably arranged in bearings *f*, are fixed the screw-blades *h* and on them the cylinder or casing *t*.

In the case where the screw *o* is surrounded by the buoyant part *a*, as shown in Fig. 6, the part of the fixed cylinder passing through the aerostat where the screw is located is enlarged and the screw *o*, with the cylinder *u* connected to it, is concentrically and revolvably arranged within this enlarged space. The widened mouth *v* of the cylinder *u* is intended to act as a continuation of the widened part *r* of the cylinder *l*.

Steering devices are not represented in the accompanying drawings, since the problem of steering an aerostat is contained in and solved with the problem of propelling an aerostat in a required direction.

What I claim as my invention, and desire to secure by Letters Patent, is—

In an air-ship, the combination with a conduit extending through the length of the air-ship, open at each end, the forward end of said conduit being larger than its rear end, and a propeller located within said conduit.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ERNST RUDOLF KROCKER.

Witnesses:

OTTO WOLFF,
C. THAYER GUMMER.