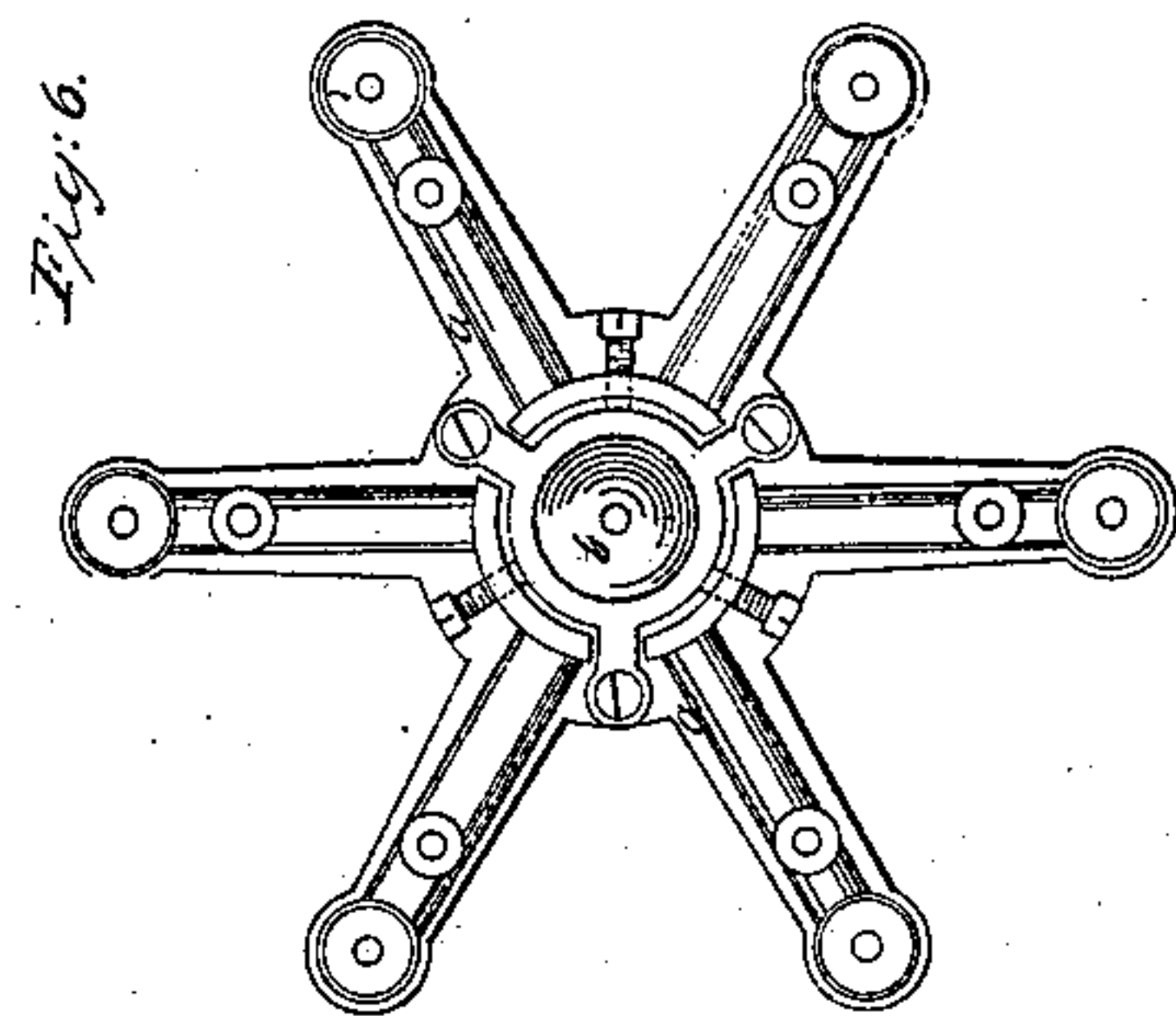
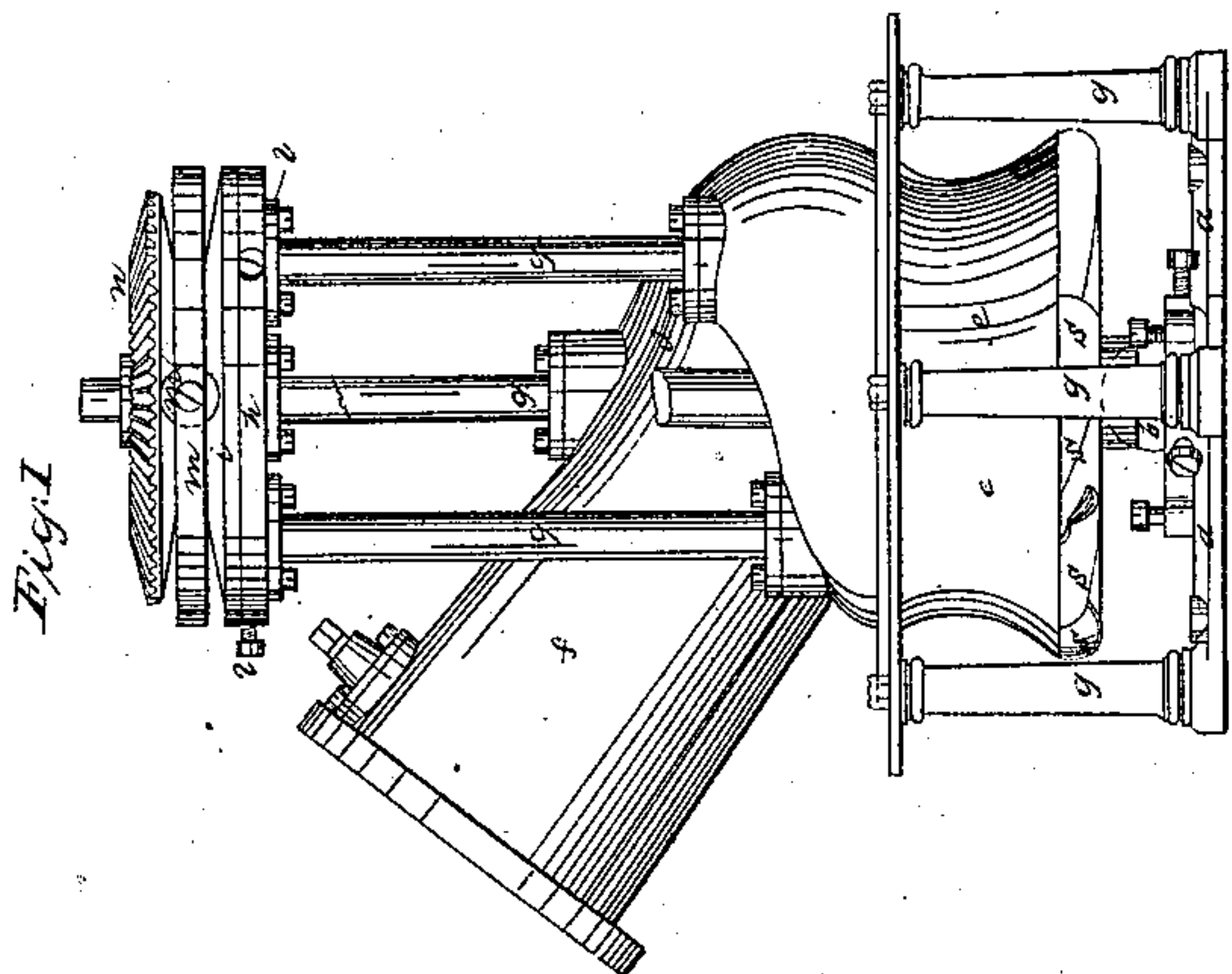
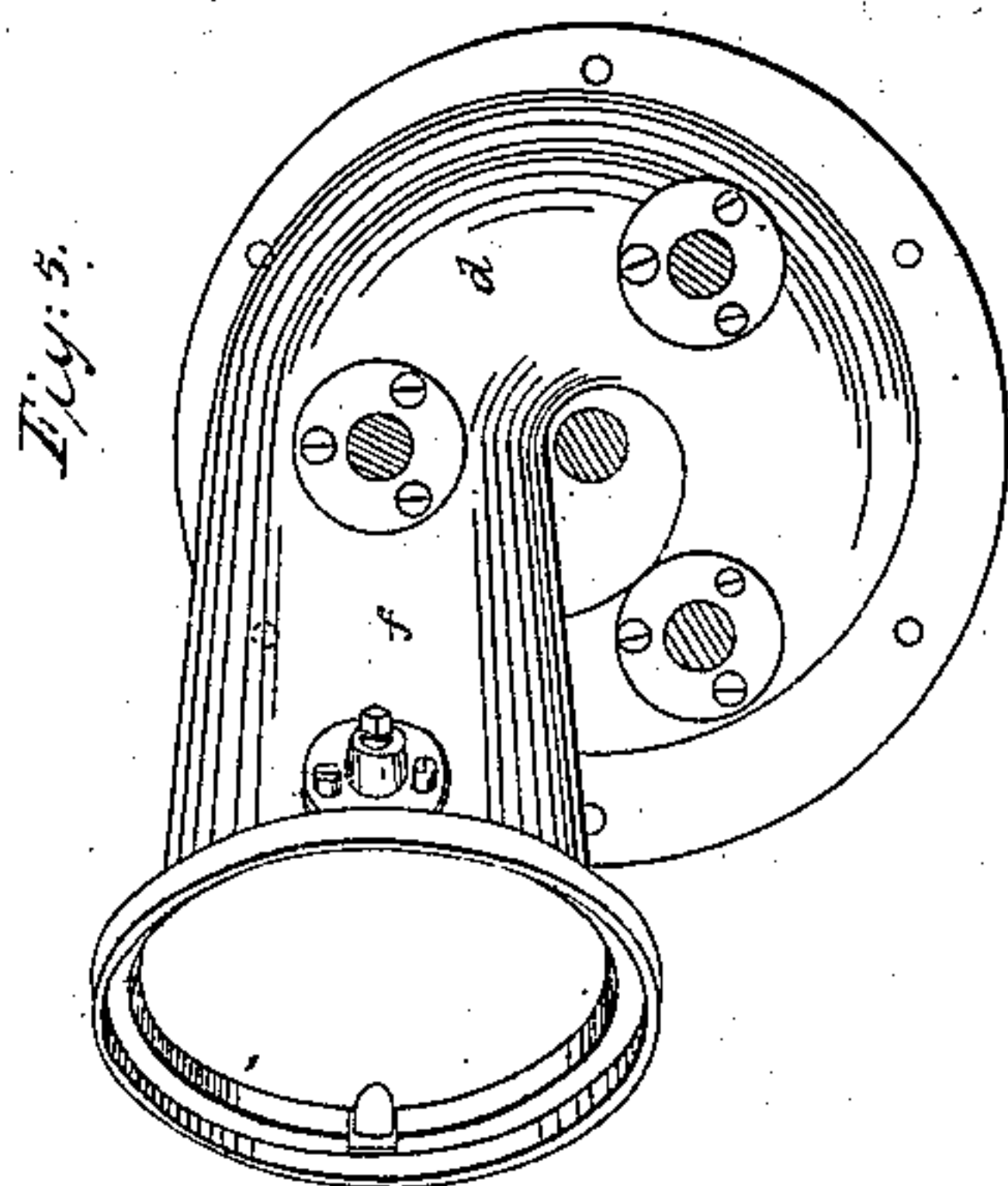
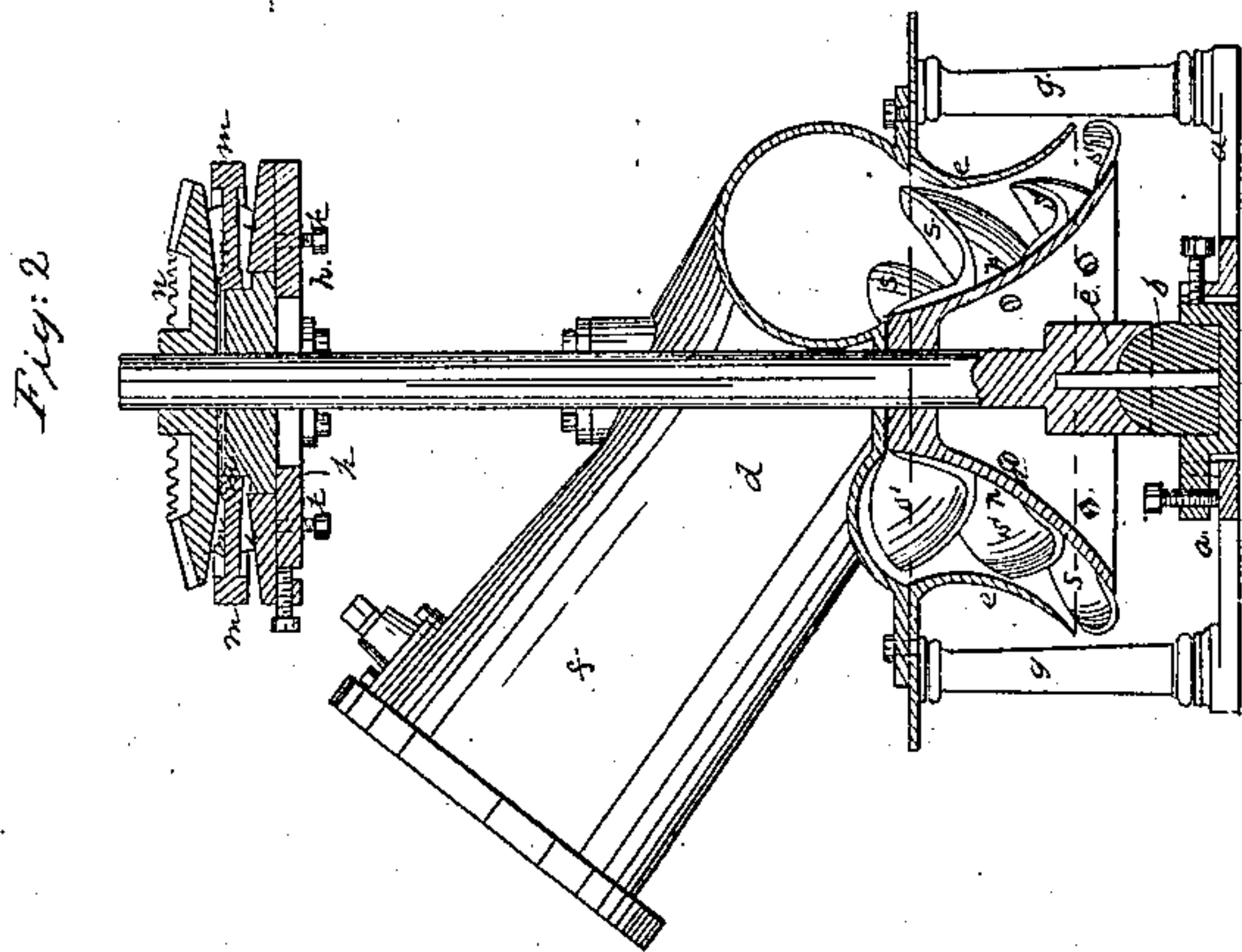
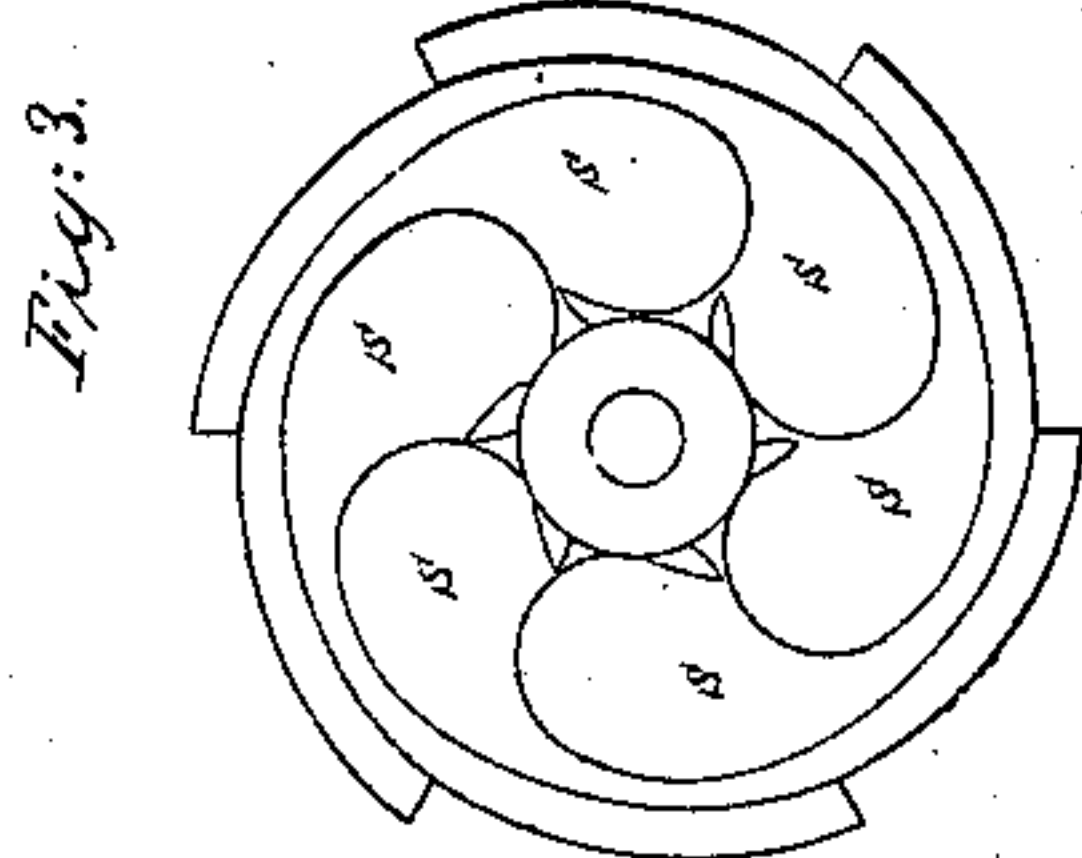
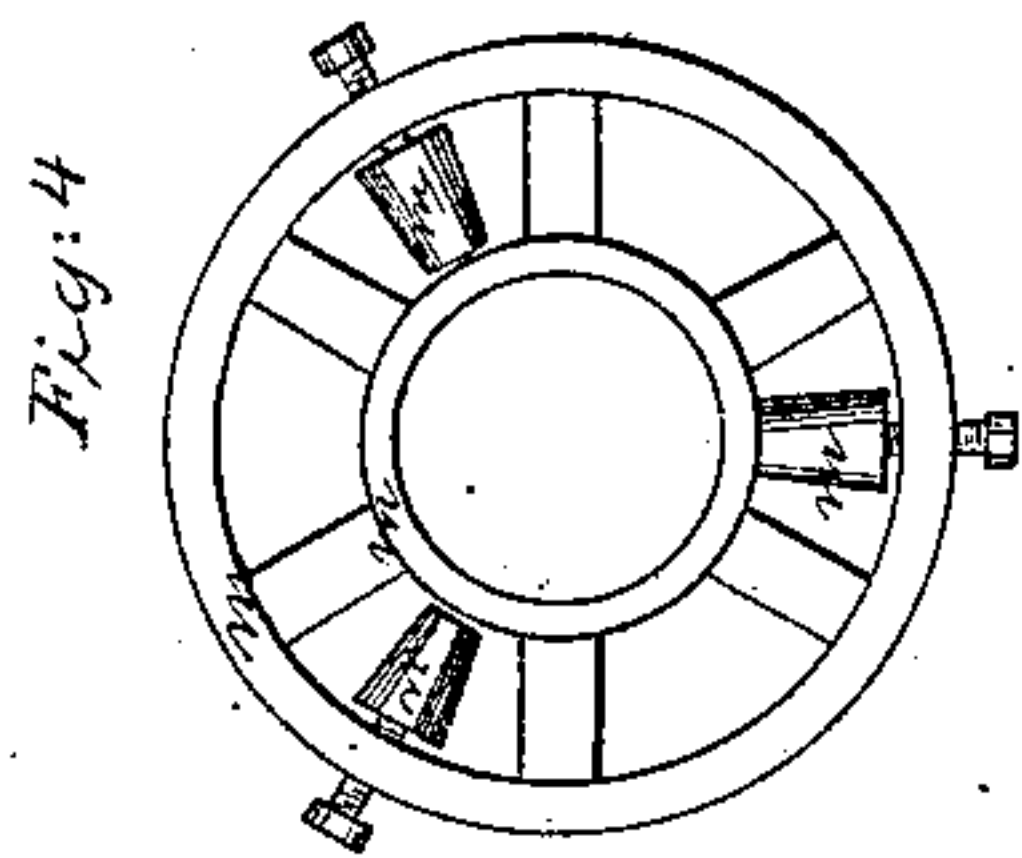
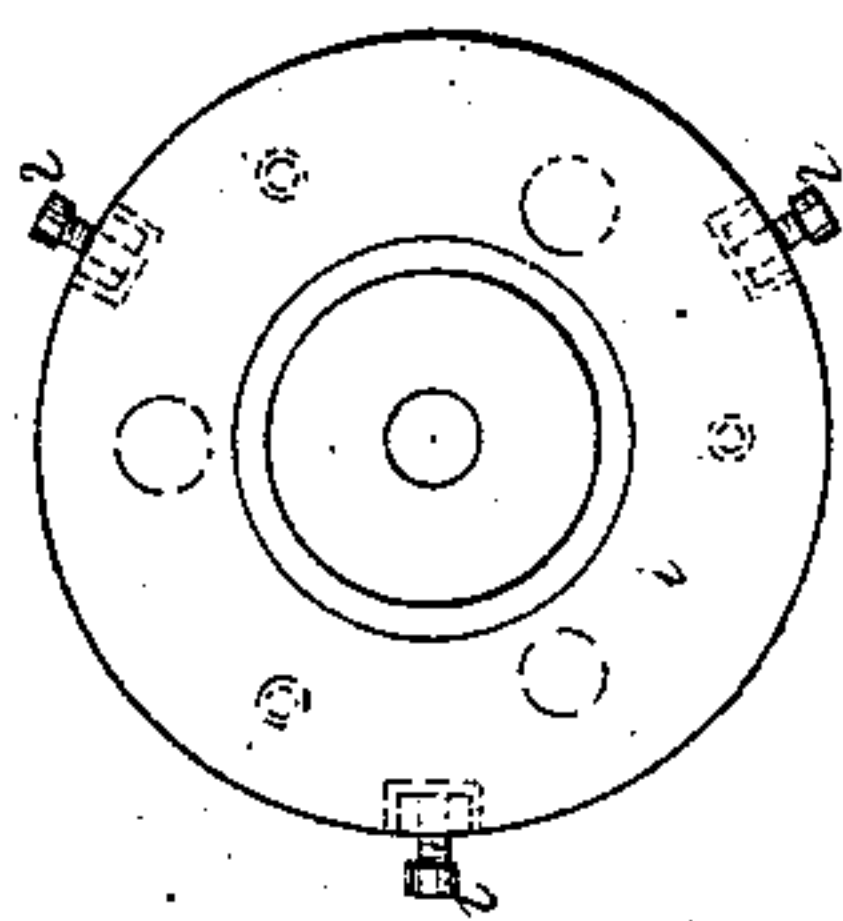


*S. Hadley Jr.*

*Water Wheel,*

*N<sup>o</sup> 12,097.*

*Patented Dec. 19 1854.*



*Inventors*

*Stephen Hadley Jr.*



# UNITED STATES PATENT OFFICE.

STEPHEN HADLEY, JR., OF LYMAN, NEW HAMPSHIRE.

## DIRECT-ACTION WATER-WHEEL.

Specification forming part of Letters Patent No. 12,097, dated December 19, 1854.

*To all whom it may concern:*

Be it known that I, STEPHEN HADLEY, Jr., of Lyman, in the county of Grafton and State of New Hampshire, have invented certain new and useful Improvements in Water-Wheels; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 is an elevation; Fig. 2, a vertical section; Fig. 3, a plan of the buckets; Fig. 4, the suspension-plates; Fig. 5, a plan of chute; Fig. 6, a plan of lower frame.

My wheel is divided for the purpose of using the water by impact or percussion alone without any aid from reaction or centrifugal force.

The course of the water through my wheel is in a straight line, which I conceive to be important to obtain its full force, and as the water passes onward with accelerated velocity I adapt my curves and increase the diameter so as to effect this object, causing the flow to be natural and with the least disturbance.

The construction is as follows: I form a suitable frame-work *a* as a base, at the center of which there is a spherical projection *b* upward, so constructed as to be adjusted by set-screws. Upon this pivot *b* the lower end of the spindle or shaft rests. This part of the shaft is enlarged, and on its lower end there is a concavity *c*, just fitting the pivot and forming the bearing of the shaft. Six pillars *g* (more or less) project up from the base-plate *a* and sustain the chute *d*, which is cast with a flange for the purpose of attachment to said pillars. Below this plate there is attached a bell-shaped cap *e*, that just covers the buckets of the wheel, to be presently described, said buckets running close underneath it. Above the flange the chute ascends in a true spiral scroll for a single turn and then projects upward in a straight line *f* to the forebay or other place of supply, gradually enlarging in diameter to the top, in which I generally place a revolving or other sufficient gate. Above the scroll *d* three (more or less) pillars *g'* rise to a sufficient height to support a stationary collar *h*, which is a flat annular plate. Upon this rests another metal disk *i*, made level by set-screws *l*, inserted beneath and passing up through stationary plate *h*. Lugs that project downward from this disk *i*

fit recesses in plate *h*, and by horizontal set-screws *l*, that pass through them, the disk *i* is adjusted. This disk forms or surrounds the collar or upper bearing of the shaft that passes up through it. The upper side or face of this disk is an obtuse cone in form, as clearly seen in Fig. 2. There is above the disk a double ring *m*, (shown in plan in Fig. 4,) the two rings being concentric and connected by radial arms. Between these two rings there are three or more conical rollers *m'*, placed radially and having set-screws through the outer ring to set them up for adjustment. The inner ring just fits and surrounds the collar of the upper bearing. Above these attachments there is a stout bevel or other gear-wheel *n*, made conical on the under side corresponding with the disk below and resting upon the conical rollers. This gear-wheel *n* is firmly keyed to the shaft, which is thus principally sustained as the wheel revolves. The wheel is of a bell-shaped form, an outline of which is shown at *p p*, Fig. 2. The outer surface is concaved in its elevation. This forms the hub or base upon which the buckets *s* are affixed. These buckets run spirally around the hub, gradually diminishing in cross-section as they approach the periphery. They are in shape a semicircle in their cross-section, or nearly so, being twisted to the curve, so that the water passing straight through the wheel shall have its course at all times perpendicular to the bucket, the straight line being maintained by the bell or concave form of the base upon which said buckets are fixed. The form and proportions of this part of the device are very important, as upon them depend the full effect of my invention. They must be so formed and arranged as that the water shall pass through the wheel in a straight line without deflection, the face of the wheel assuming the proper concave for that purpose. The bucket must be so curved as to have the water acting perpendicularly upon it, and, lastly, as the wheel increases in diameter from the commencement of the bucket to its termination the bucket shall diminish in capacity as the water becomes diffused, and thus the velocity of the two becomes more equal. The stationary cap over the buckets confines the water to its proper course, and thus aids the effect.

Having thus clearly described my improvements, what I claim as my invention, and desire to secure by Letters Patent, is—

1. The form and construction of my wheel, as follows: making the surface upon which the buckets are affixed concaved or bell-shaped, in combination with spiral-formed buckets so curved as to meet the water on their face perpendicular to its course and gradually diminishing their capacity from the center to the periphery. I do not claim either the cap or concave separately, whether it be my original invention or not, as the

whole are required to produce the best effect, which I attain.

2. The adjustable collar, bevel-wheels, and gear-wheel combined to tram and sustain the wheel and adjust it perfectly to the stationary parts, as herein set forth.

3. In combination with the above-described wheel, the stationary cap inclosing the moving buckets, as above specified.

STEPHEN HADLEY, JR.

Witnesses:

WM. GREENOUGH,  
JACOB HATZELL, Jr.