

(No Model.)

2 Sheets—Sheet 1.

B. F. COOPER.
HYDRAULIC MOTOR.

No. 341,732.

Patented May 11, 1886.

Fig. 1.

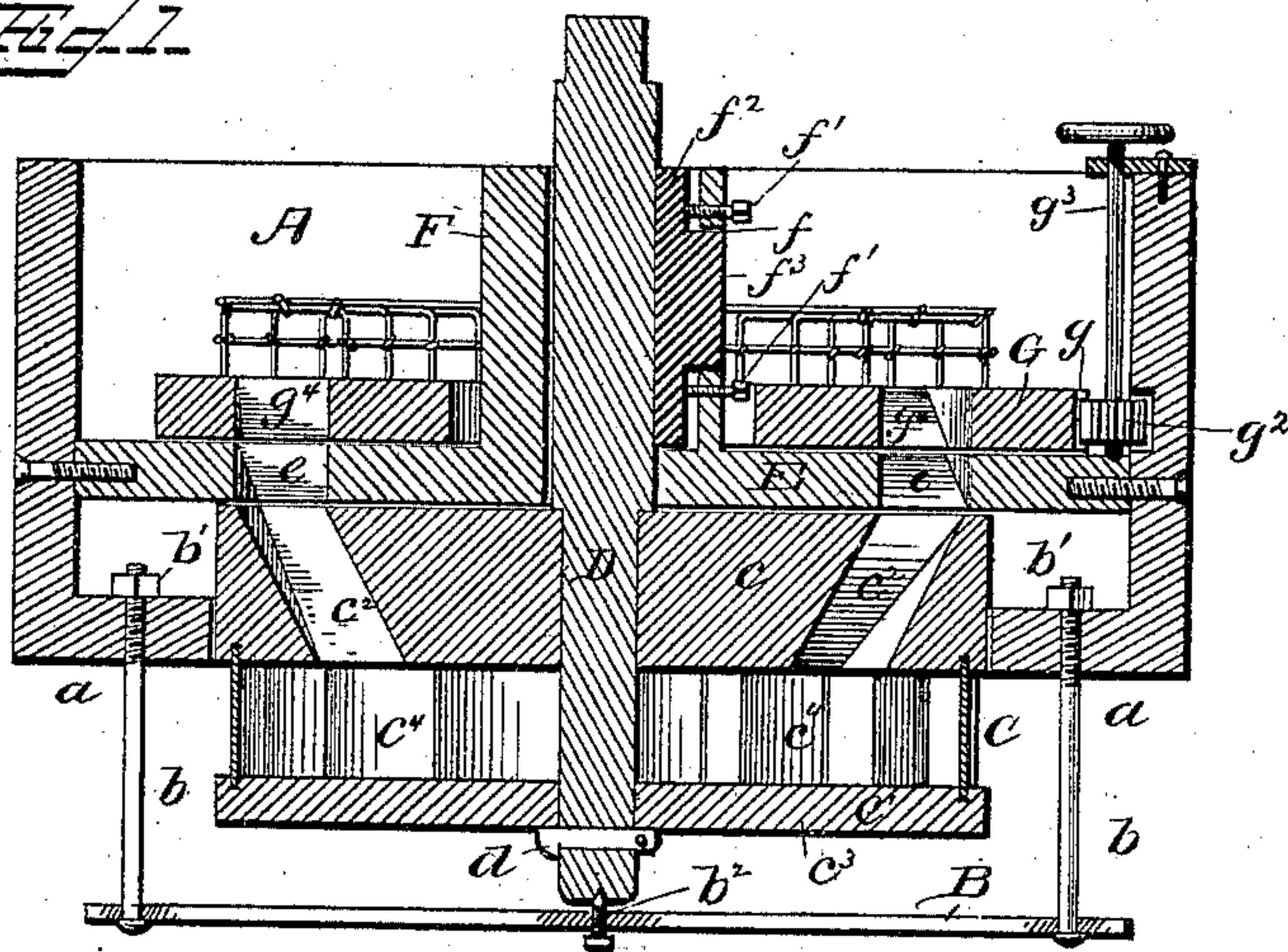


Fig. 2.

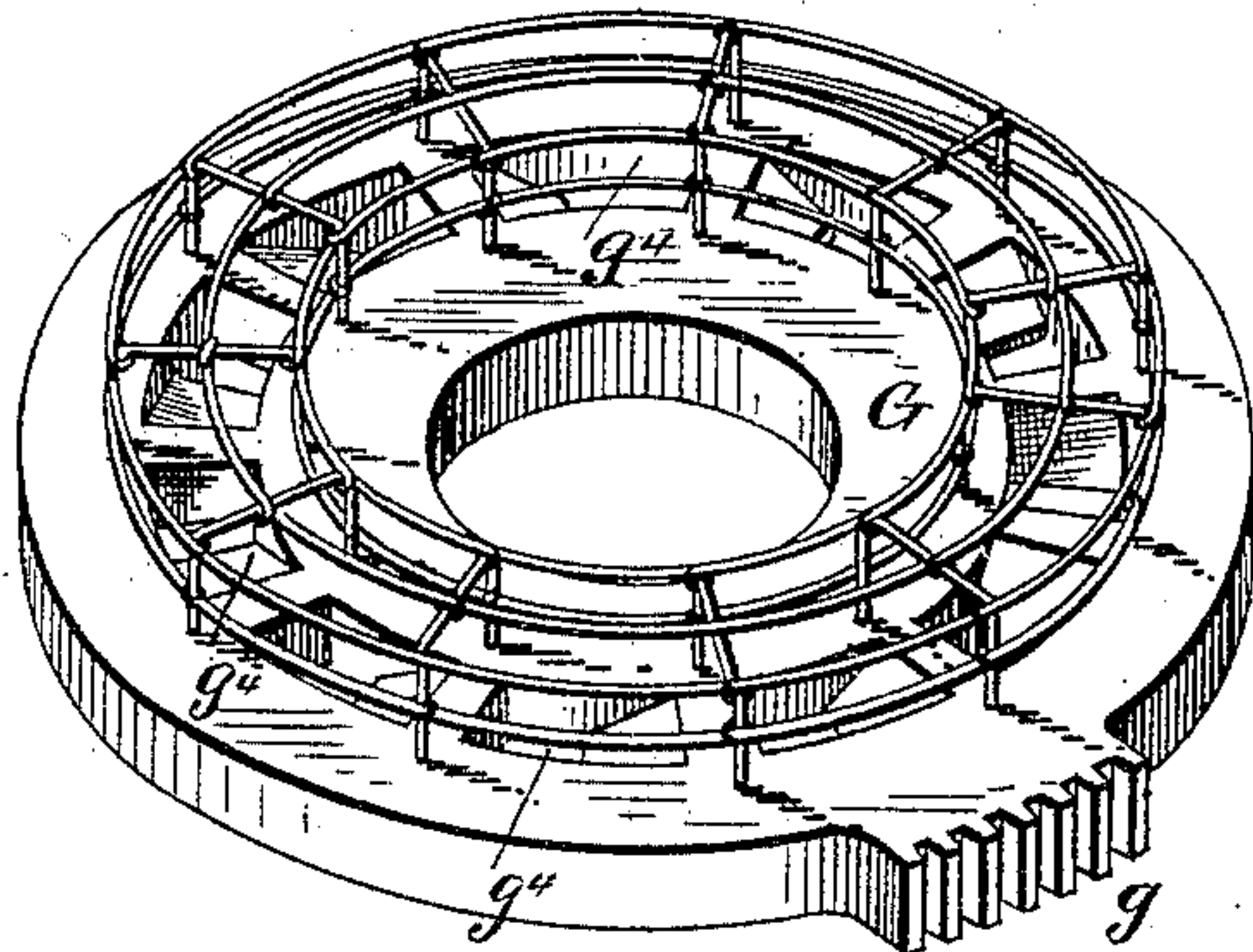
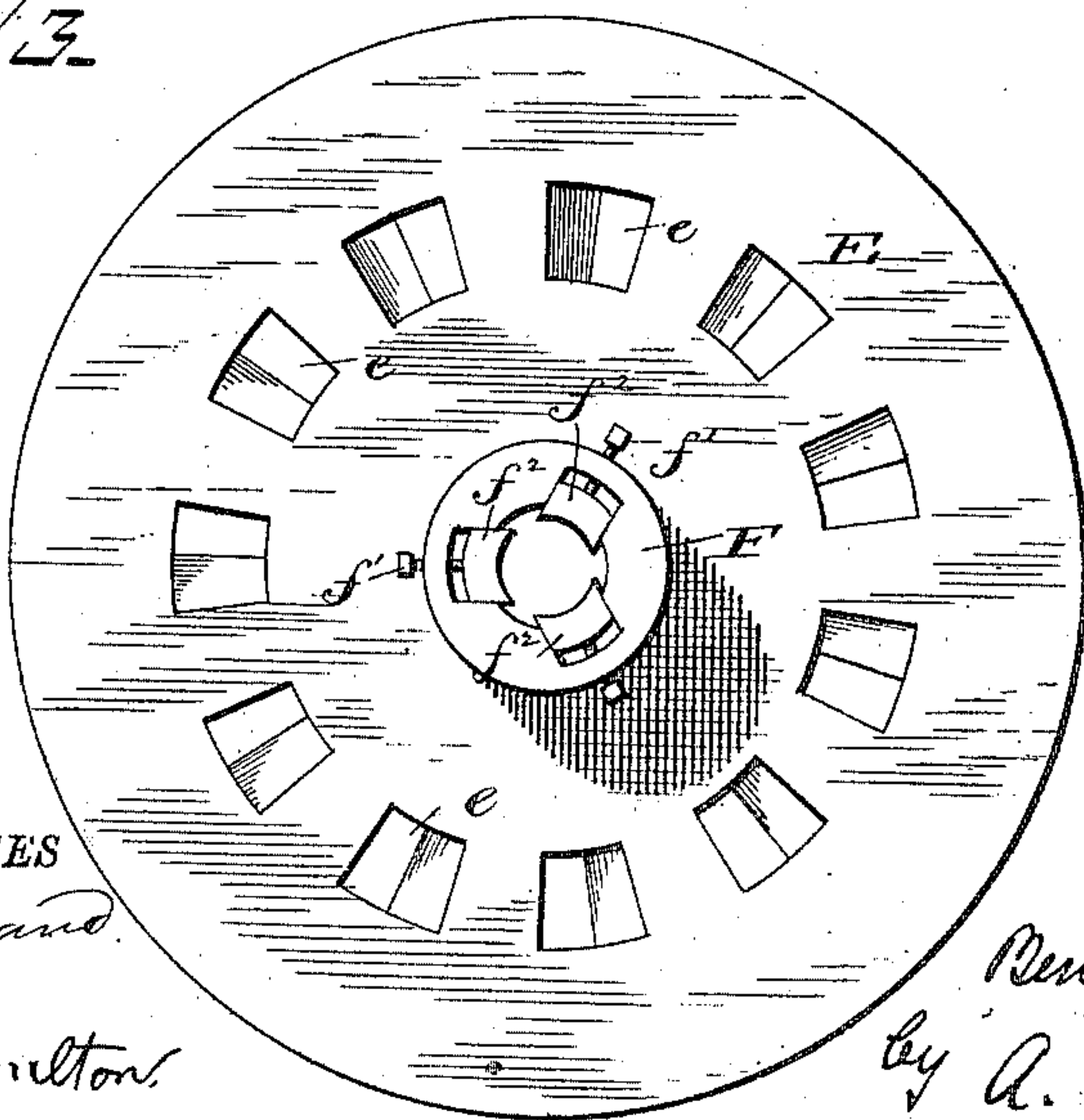


Fig. 3.



WITNESSES
F. L. Curand.
C. A. Moulton.

INVENTOR
Benj. F. Cooper.
by *A. G. Heyman.*
Attorney

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Fig. 4.

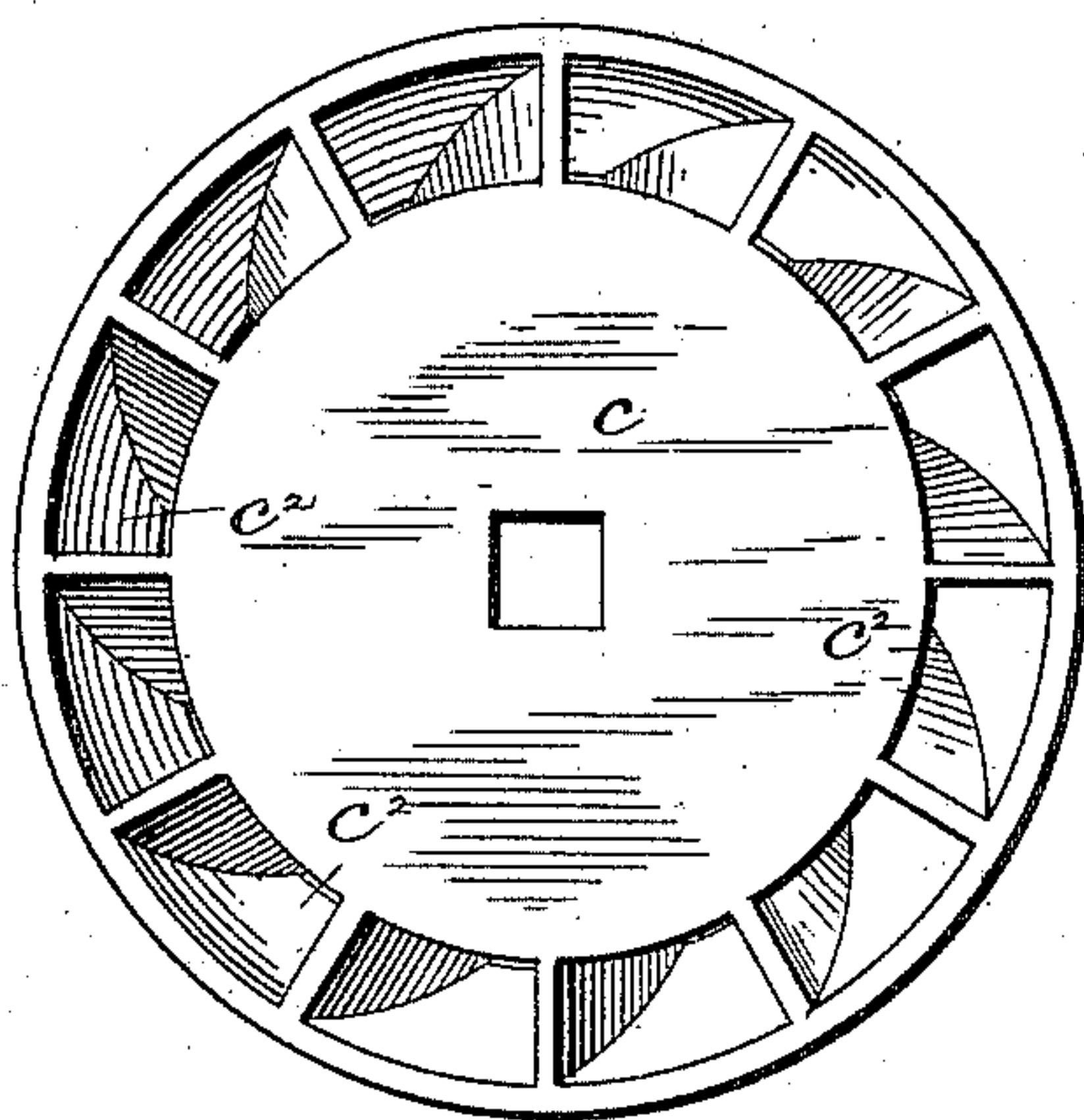


Fig. 5.

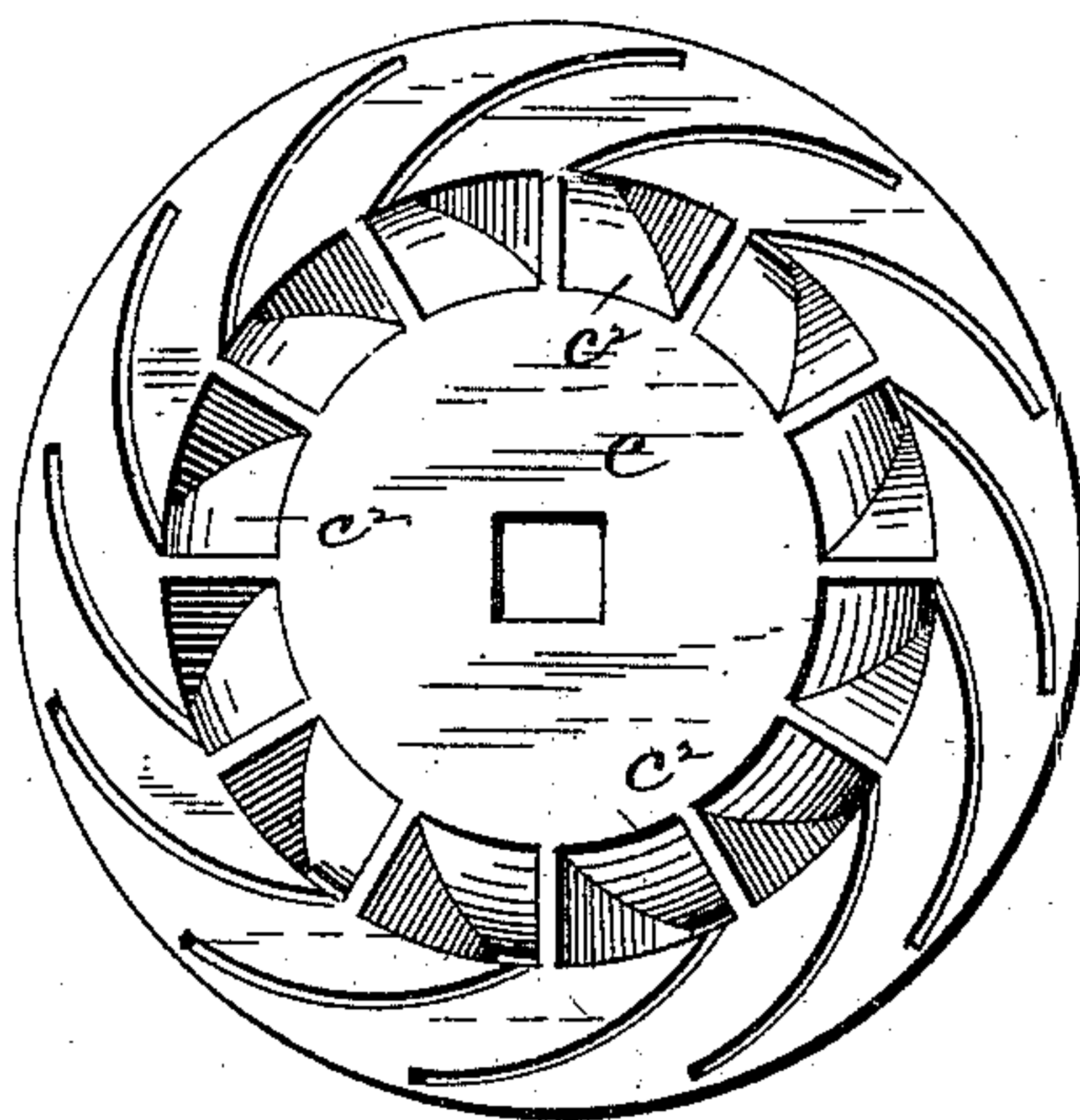


Fig. 6.

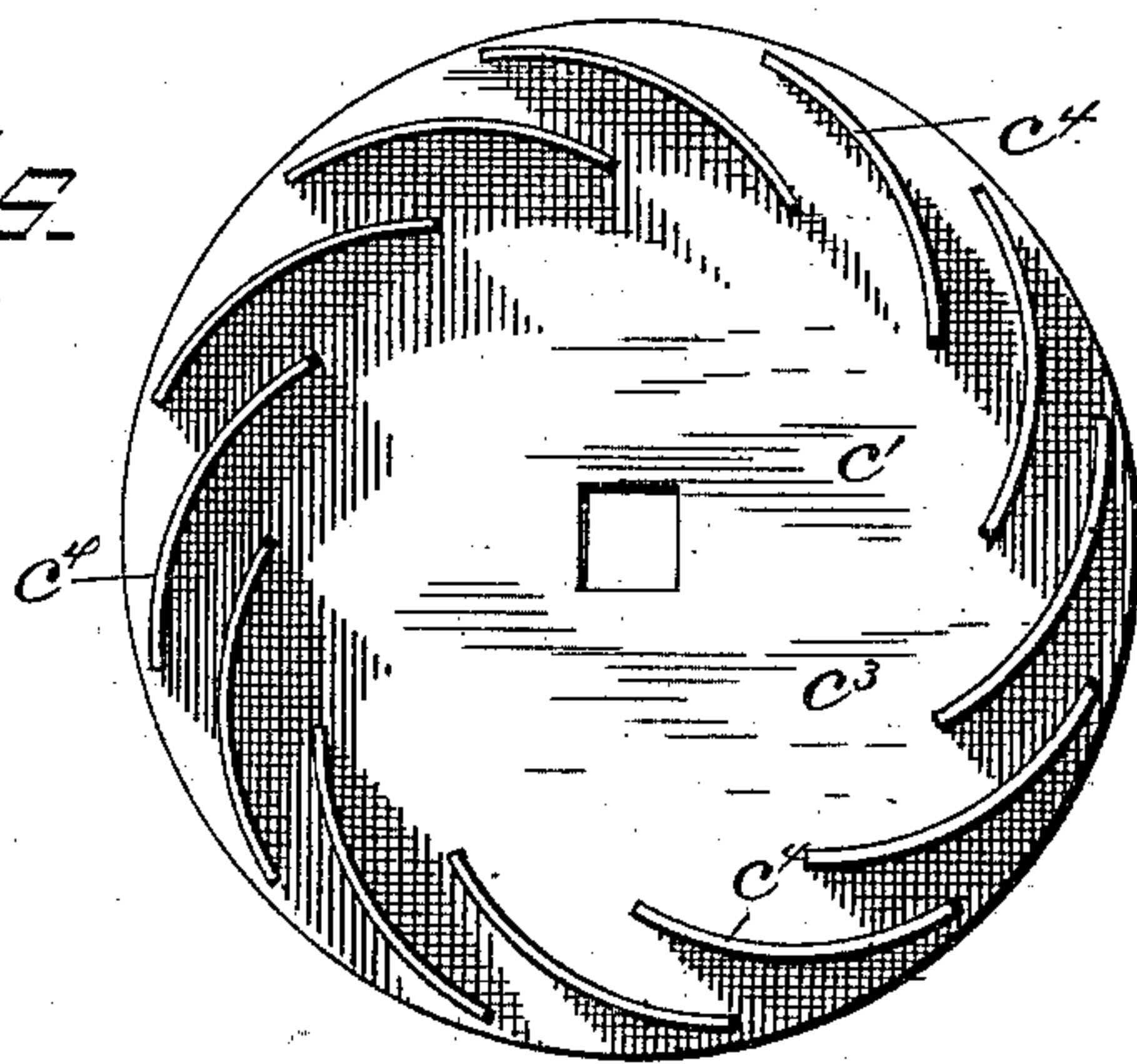
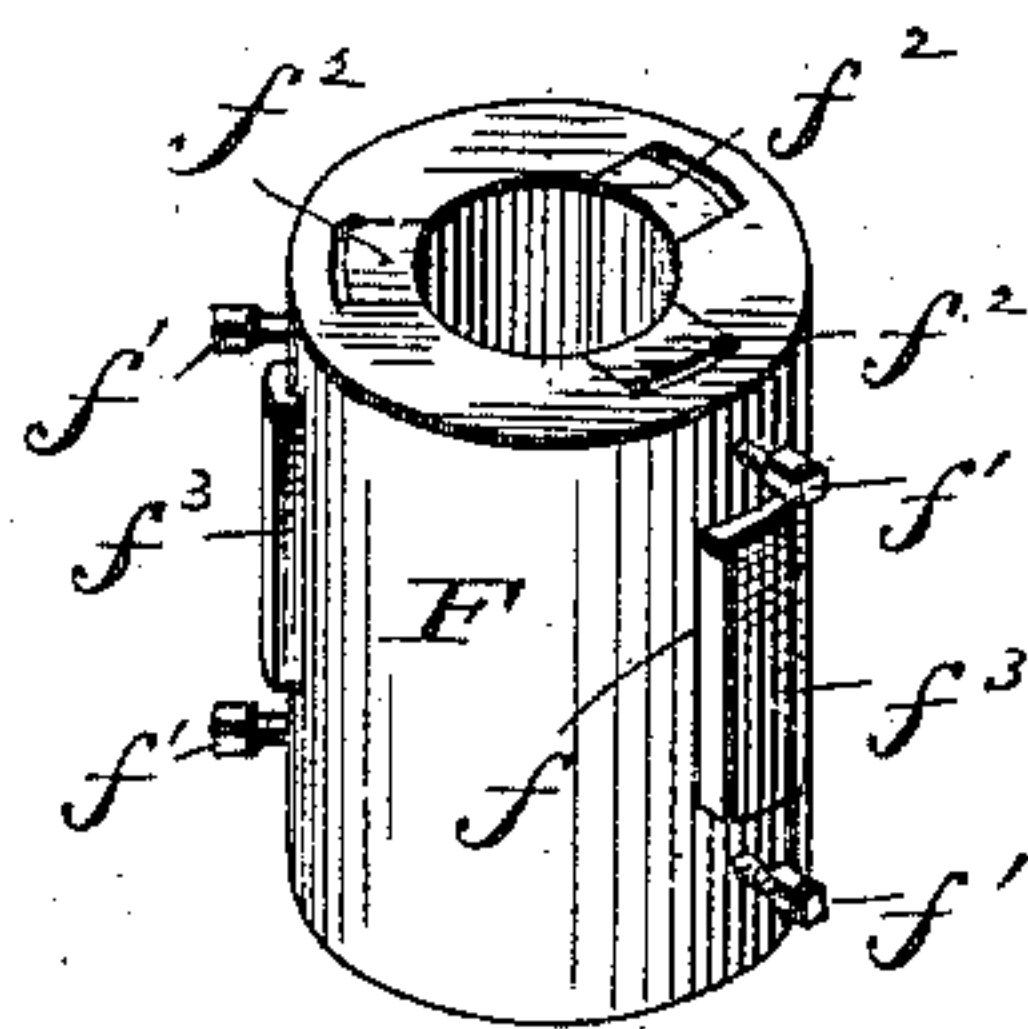


Fig. 7.



WITNESSES
F. L. Curand.
C. A. Moulton

INVENTOR
B. F. Cooper.
by A. G. Keyman
Attorney

UNITED STATES PATENT OFFICE.

BENJAMIN F. COOPER, OF CENTER, TEXAS.

HYDRAULIC MOTOR.

SPECIFICATION forming part of Letters Patent No. 341,732, dated May 11, 1886.

Application filed September 29, 1885. Serial No. 178,573. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN F. COOPER, a citizen of the United States of America, residing at Center, in the county of Shelly, in the State of Texas, have invented a new and useful Hydraulic Motor, of which the following is a specification.

My invention has relation to improvements in hydraulic motors of that class known as "turbine water-wheels," of the kind adapted to take the water through the top ring.

The object of my invention is to simplify and improve existing motors of the kind named; and my invention consists in the novel construction, arrangement, and combination of parts, as will be hereinafter fully described, and to be particularly pointed out and distinctly claimed, as directed by the statute.

I attain the objects of my invention by means of the mechanism illustrated in the accompanying drawings, forming a part of this specification, and wherein Figure 1 is a vertical central sectional view of the wheel disposed in the water-tub. Fig. 2 is a perspective of the gate. Fig. 3 is a plan view of the guide-plate with its guide-channels. Fig. 4 is a plan view of the top of the wheel. Fig. 5 is a bottom view of the upper part or section of the wheel. Fig. 6 is a view of the lower part or section of the wheel, the top section being removed; and Fig. 7 is a detail view of the journal-box formed on or secured to the guide-plate.

The letter A designates the water box or tub, provided with the bottom flanges, *a*, which project inwardly, their inward edge forming the boundary of a circular hole through which the wheel is projected and arranged.

The letter B designates a bridge-tree, on which the shaft or spindle of the wheel rests. This bridge-tree is adjustably connected to the bottom flanges of the water-box by means of screw-threaded bolts *b*, passed through each end of the bridge-tree, and having their upper ends projected through the bottom flange of the water-box and adjustably secured by threaded nuts *b'*. In the center of the bridge-tree is secured a step, *b²*, to receive the toe of the wheel shaft or spindle. By means of the nuts on the bolts *b* the wheel can be set in any desired position of elevation. The re-

versal of these bolts may be made and the adjustment attained from the nuts at the ends of the bridge-tree.

The letter C designates the turbine water-wheel consisting of an upper section, *c*, and a lower section, *c'*, the two parts or sections comprising a single wheel. The upper section or part, *c*, is made in a single piece, and formed with a series of buckets or chutes, *c²*, arranged concentric to the spindle about the outer parts of the section, and having a spiral direction in their downward course with a convergence toward the axis of the wheel, so that the water discharged through them is delivered into the chamber of the lower section, which chamber is formed by the shells of the buckets or blades arranged in that part of the wheel. The lower section, *c'*, is comprised of a bottom plate, *c³*, provided with a series of tangentially-curved grooves in its upper face, into which are seated the lower edges of the curved buckets *c⁴*, the upper edges of said buckets being seated in grooves formed in the bottom face of the upper section. The buckets *c⁴* consist of metallic plates curved substantially as seen in the drawings, and set vertically on their side edges in the grooves or seats formed in the bottom plate in the under side of the top section. A hole is formed in the center of the bottom plate and another through the top section, and through these is projected the spindle D, the sections of the wheel being rigidly fixed on the spindle of the wheel and clamped against vertical displacement or separation by bolts with taps and screws through the edge of wheel at the mouth of each bucket.

I have shown a key-bolt, *d*, projected through the end of the spindle and bearing against the face of the bottom plate. A suitable toe is fitted in the lower end of the spindle and sets in a seat on the step on the bridge-tree, as heretofore stated.

The letter E designates the guideway-plate, which is snugly fitted and secured to the interior of the water-box immediately over the top of the wheel, and is provided with a series of water-guides, *e*, arranged concentric to the axle of the wheel, and to register with the openings to the buckets or chutes in the top of the wheel. The direction of these water-

guides is reverse to the direction of the buckets of the wheel into which they direct the water. This for the purpose of throwing the water against the reverse wall of the chute and thus start the wheel.

The letter F designates a metallic hub, formed on or secured to the upper face of the guideway-plate and extending up the spindle of the wheel for some distance to serve as a brace or steadier, as well as a bearing for the spindle. This hub F is formed with three or more slots, f , arranged in the direction of its length, and above and below the ends of each slot is fitted an adjusting-screw, f' . Bearings f^2 , formed with projections f^3 , fitting the slots in the hub of the guideway-plate, and having their ends extended above and below the slots for the length of the hub, are arranged in seats f^4 , formed in the interior of the hub. These bearings are preferably made of Babbitt metal or similar non-corrosive material. They are adjusted to the spindle by means of the adjusting-screw projected through the hub.

The letter G designates the gate, formed with a central hole adapted to fit over the hub of the guideway-plate, and provided with a segment-rack, g , on its face or side, which meshes with a pinion, g^2 , on the end of a bar, g^3 , suitably secured to the water-box, and adapted to be turned from its upper end. The gates g^4 register with the guides in the plate below, and by means of the bar carrying the pinion which engages with the segment-rack of the gate-plate the guideways may be closed by turning the closed spaces between the gates over the mouth of the guides.

The requisite gear is fitted to the upper end of the spindle and the connections made therewith.

It will be observed that the water is admitted to the guideways from the ways in the gate without deflection from the gateways to the guideways, which arrangement does not interfere with the impetus of the flow in the direction of the wheel's motion; that the water where discharged by the guides is intercepted by the face of the bucket, the incline of which

reverses the water's direction and the converging spirality of the buckets directs the water toward the axis, in which direction it is thrown into the lower section of the wheel and in turn against the buckets of that section, being discharged with a very low velocity.

The opening in the water-box is of such size as to permit the wheel to revolve therein without undue friction, and the wheel is disposed in the opening so that the lower section or part is below the bottom of the water-box and the upper section within the water-box.

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

1. The turbine water-wheel herein described, comprised of a shaft or spindle, D, the wheel C, consisting of the upper section, c , formed with a series of buckets or chutes arranged concentric to the axis of the wheel and curved inwardly and spirally, and the lower section, c' , comprised of the bottom plate, c^3 , secured on the lower end of the spindle, and curved buckets c^4 , arranged in seats formed in the upper face of the bottom plate and the bottom face of the upper section, substantially as described.

2. The combination of the water-box with the gate-plate having a central hole to set about the hub of the guideway-plate and provided with water-ducts, the guideway-plate rigidly fixed in the casing and formed with a vertical hub, F, having adjustable bearings arranged therein, and the water-wheel consisting of the upper and lower sections rigidly secured together and arranged with the spindle in the hub of the guideway-plate and supported in position with the upper section in the water-tub and the lower section extended below the bottom of the water-tub, substantially as described.

In witness whereof I have hereunto signed my name in the presence of two attesting witnesses.

BENJAMIN F. COOPER.

Attest:

JESSE PADON,
J. H. PADON.