(No Model.)

3 Sheets—Sheet 1.

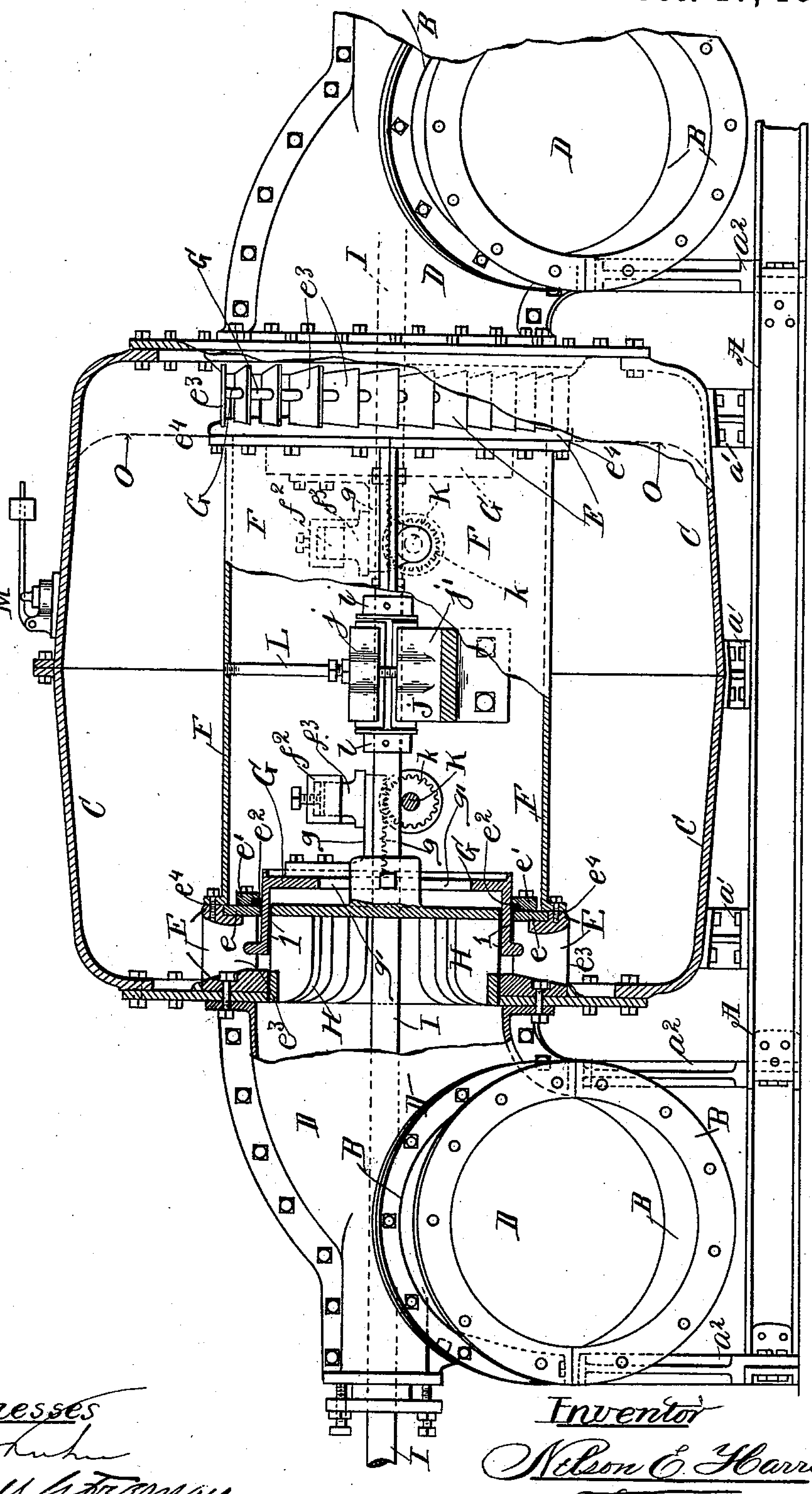
N. E. HARRIS.

HYDRAULIC MOTOR.

No. 506,876.

Patented Oct. 17, 1893.

Fig. 1.



Witnesses

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James G. Froman.

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(No Model.)

3 Sheets—Sheet 2.

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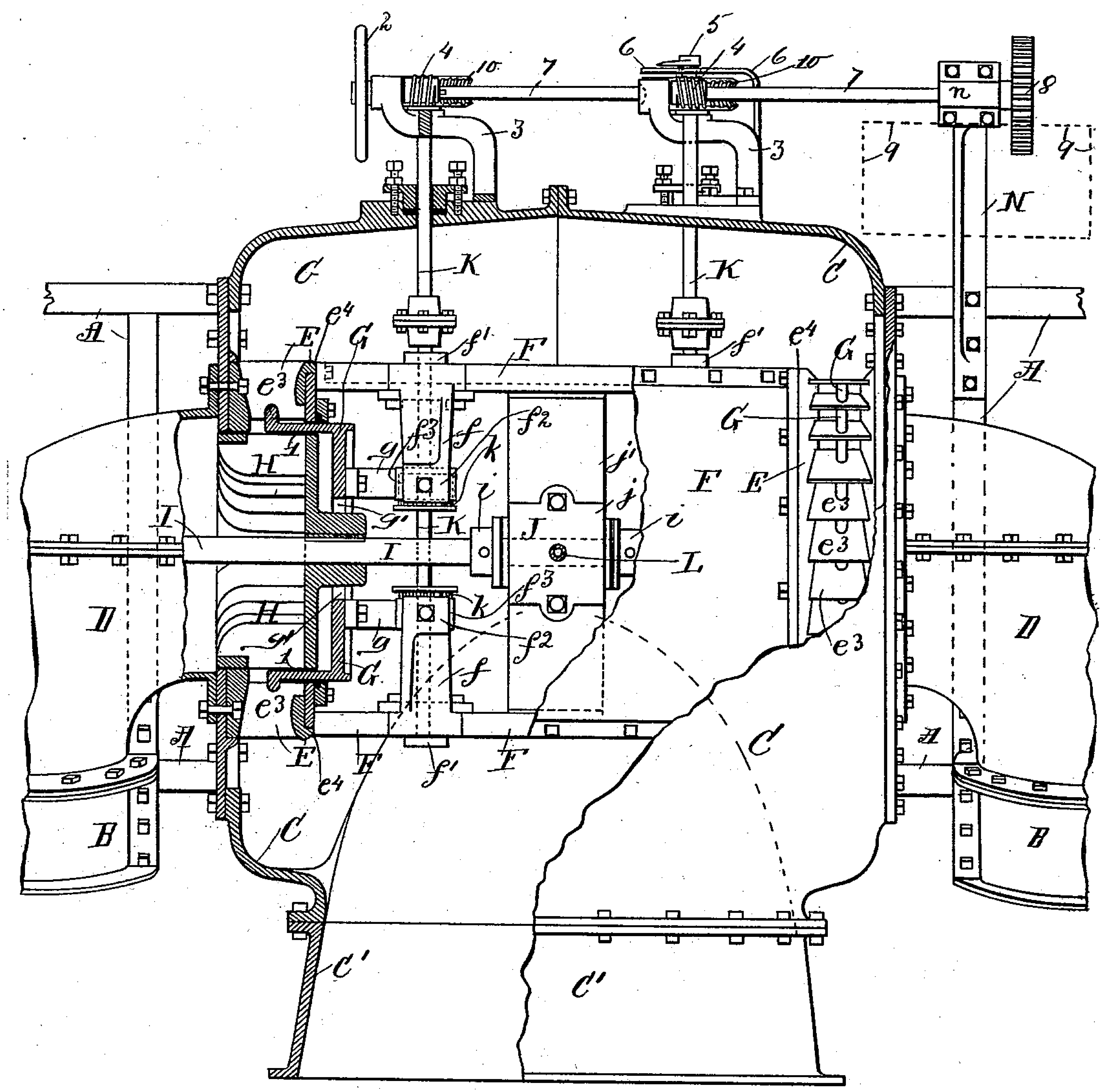

Fig 2.

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(No Model.)

3 Sheets—Sheet 3.

N. E. HARRIS.

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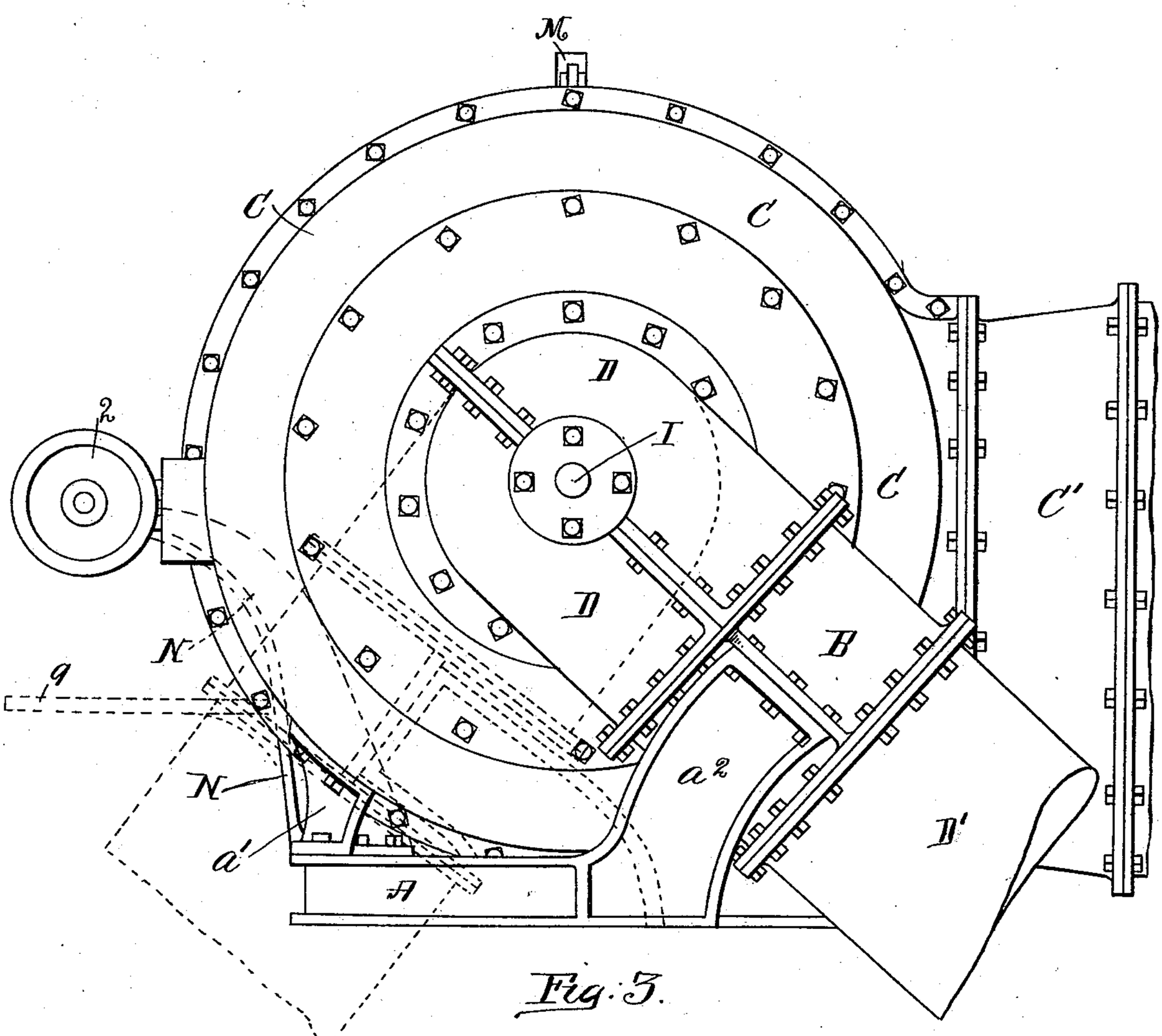

Fig. 3.

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UNITED STATES PATENT OFFICE.

NELSON E. HARRIS, OF ORANGE, MASSACHUSETTS.

HYDRAULIC MOTOR.

SPECIFICATION forming part of Letters Patent No. 506,876, dated October 17, 1893.

Application filed May 13, 1892. Serial No. 432,885. (No model.)

To all whom it may concern:

Be it known that I, NELSON E. HARRIS, of Orange, in the county of Franklin, State of Massachusetts, have invented certain new and useful Improvements in Hydraulic Motors, of which the following is a specification.

The objects of this invention, are, to so construct a hydraulic motor comprising the essential features of my prior inventions, as to attain a complete, compound portable motor, and to so construct a bed framework, that the educts or quarter-turns, and the draft-tubes can be rigidly supported at any angle, and permit of the quarter-turns or the draft tubes being readily disconnected without disturbing the other, and to so construct the interior of the flume-drum, that the inflowing water can not strike against the within machinery. These are the essential features of this invention. I attain these objects, by the construction illustrated in the accompanying drawings in which—

Figure 1 is a side elevation, showing the motor broken away in several places as with Fig. 2 which is a plan view of Fig. 1. To clearly illustrate the general construction of my invention Fig. 3 is an end view.

Referring to parts (A) denotes the bed framework that has stanchions (a^2) protruding vertically therefrom, on each side of the educts or quarter-turns (D) to rigidly support and hold the quarter-turns and the draft-tubes (D′) at any desired angle. The stanchions are rigidly bolted to the section, or as I might term it the union (B) as it connects the respective quarter-turns in a line with the draft-tube, yet permitting either to be disconnected from the motor without disconnection of the other, which is one of the essential features of this invention. To the same framework (A) are secured the supports (a') that rigidly connect the flume-drum (C) to the framework; and the vertical upright (N) which gives a bearing (n) to the shaft (7) that is engaged with the gate machinery. The gear (8) is meshed or engaged with the usual gate operating mechanism that can be either secured to the said upright, or to the flume-drum shell for regulating the motor, but which is not shown in the drawings, only the location as represented by the dotted lines (9) in Figs. 2, and 3, as it is fully known to those skilled in hydraulic motors. The flume-drum (C), and the two quarter-turns or educts (D) and the respective wheel casings (E), are rigidly bolted to each other in their order. The wheel casings are essentially the same as illustrated in my prior inventions, with their chutes (e^3); together with the general gate operating machinery within the flume-drum. The driving shaft (I) passes in a straight line horizontally through the center of the entire motor and receives its bearings on the educts (D) which are provided with suitable bearings for the shaft. To the shaft are secured the water-wheels (H) within their chuted casings (E); and between the casing and water-wheel slides my ordinary water-gate (G) that has its periphery smoothed off to admit of the circular packing (e^2) between the rings (e) and (e') preventing water passing from the wheel casings into the drum or chamber (F) which will be fully described hereinafter.

To the back of the gate are secured my ordinary racks (g) that engage with their pinions (k) upon the gate rods (K) that pass through the flume-drum to the arms (3) that support their ends which have secured thereto the worm-wheels (10) that engage with the worms (4) secured to the shaft which is actuated through the hand wheel (2) or by the regulating mechanism that can be attached either to the upright (N), or to the case of the flume-drum, which was before mentioned.

To the respective sides (e^4) of the wheel casings, is rigidly secured a cylindrical drum or chamber (F), which is divided in two equal sections horizontally, each being provided with flanges to make perfect their fit; the lower section of the cylindrical chamber is provided with suitable stuffed bearings (f') for the gate-rods (K) that have secured thereon pinions (k) that engage with the horizontal gate-racks (g) which are secured to, or a part of the gates (G) that have suitable openings (g') through their vertical backs; and this same section of the cylindrical drum is provided with a suitable bearing (J) that has at each side thereof, secured to the driving shaft (I), suitable collars (i) that prevent longitudinal movement of the shaft, and with

suitable arms (f) that are provided in their heads (f^2) with suitable blocks of wood, or any other material (f^3) which are used to bear against the upper parts of the gate-racks, to steady the movement of the gates, and to keep the said racks in mesh with their pinions, and this cylindrical chamber is provided with a vertical pipe (L) that is screwed in the upper section of the drum, and into the cap (j) of the bearing (J) to admit water from the flume-drum to the periphery of the driving shaft within said bearing which is provided with suitable blocks or seats of wood or any other material for the shaft to rotate on, which said shaft-blocks are inserted in the cap (j) and in the lower part (j') of the bearing (J) with their faces coated with oil or grease that works in conjunction with the water passing through the vertical supply pipe, as a lubricant which has proved to be quite efficient. The essential feature of this cylindrical drum, or chamber is that it prevents the inflowing water, which flows through the mouth of the induct (C'), striking the before mentioned machinery within the motor, thus dispensing with a large amount of resistance, that the water would receive within the flume-drum, if it were not for this cylindrical drum (F), consequently attaining a more efficient motor. Before I proceed further with this descriptive matter, I wish to remark that my inner chamber can be designed to shield and support machinery applicable for operating one or more gates, for a corresponding number of water wheels, without departing from the essential feature of said inner chamber, as above described. Thus I do not wish to confine myself to the application of the inner chamber, to two oppositely located chuted wheel casings as illustrated in the accompanying drawings. When my inner chamber is applied to a single wheel motor, the opposite ends are respectively connected to the chuted wheel casing, and to a corresponding wall of the flume-drum, in like manner when connected to two oppositely located chuted wheel casing as above described.

In the drawings, Fig. 1, represents this connection of my inner chamber with one chuted wheel casing and a corresponding vertical wall of the flume-drum, by the dotted line (O) at the right of said view which denotes that this end of the flume-drum can end as with said dotted line so as to effect the above connection of said inner chamber just described.

The water that enters the drum (F) is drawn therefrom by the suction element caused by the action of the water, and water-wheels within the educts, for the water in the drum is admitted to the backs of the respective water-wheels, by the openings (g') in the backs of the gates, which can be made to any desirable length. Thus the water is drawn through the space (1) between the periphery of the water-wheel and its respective gate (G) which said space is sufficient for perfect clearance of the two parts. When the motor is set in action, the swift flow of the water passing down the draft tube, and the rotary movement of the water wheel, both produce this suction element which is felt within the drum (F) by its drawing the air therefrom through the slight space between the water wheel and gate, that in time generates a vacuum which lifts or draws the water from the interior of the drum (F) through the opening (g') and the space (1); thus protecting the within gate machinery from the effects of the water, and from the terrific force of the inflowing water that passes in or through the induct (C'). By securing the packing rings (e) and (e') to the sides of the wheel casings as illustrated in Figs. 1, and 2, with suitable packing between them it prevents the water working that way into the drum. Thus the water is only admitted into the drum through the bearing supply pipe (L).

(M) represents an ordinary escapement valve, which is fitted on the top of the flume-drum, and (5) denotes an ordinary finger that is secured to one of the gate rods (K) to indicate upon the dial (6) secured to the bracket (3) how far the gate or gates are opened, but which is not new in hydraulic motor construction.

Having described my invention, I claim—

1. In a hydraulic motor mechanism the combination of a section or union draft tube, and of a flume-drum bed or frame suitably connected together, a quarter turn and the draft tube proper sustainably united by said union draft tube, and suitable gate actuating and motor regulating machinery sustained by aforesaid flume-drum bed or frame, substantially as, and for the purpose described.

2. In a hydraulic motor mechanism, the combination of a section or union draft tube, and of a flume-drum bed or frame connected together, the quarter turn separably connected to and sustained by a flume-drum and said union draft tube, the draft tube proper sustained by the union draft tube and in a separable manner opposite to aforesaid quarter-turn connection, and said flume-drum sustained by aforesaid frame-work substantially as set forth.

3. In a hydraulic motor mechanism, the combination of a suitable chamber and of a chuted wheel casing connected together, such chamber shielding and supporting machinery within the flume drum or motor casing, and having gate rod bearings, a water wheel shaft support, such support having a suitable lubricating device, and said chamber having means to engage the gate mechanism to steady the movement of said gate substantially as set forth, and for the purpose described.

4. In a hydraulic motor mechanism, the combination with the flume-drum, the chuted wheel casing, such sealing the periphery of the gate, the gate, such having a suitable opening through its back and racks, the gate

actuating and motor regulating machinery, such having gate rods entering the motor casing and an inner chamber, and said rods having pinions secured thereto in mesh with aforesaid racks whereby the gate is reciprocally moved within said inner chamber, the water wheel and shaft all substantially as specified, of an inner chamber connected to the aforesaid chuted wheel casing, and combining a similar oppositely located casing, and having suitable gate rod bearings, gate steadying means engaging the inclosed gate mechanism, and a water-wheel shaft support or bearing, and such bearing provided with a suitable lubricating device, substantially as and for the purpose described.

NELSON E. HARRIS.

Witnesses:
THOMAS W. HOBDAY,
JOHN A. GODFREY.