No. 805,446. PATENTED NOV. 28, 1905.

H. G. BROWN.

CURRENT MOTOR.

APPLICATION FILED AUG. 1, 1904.

3 SHEETS—SHEET 1.

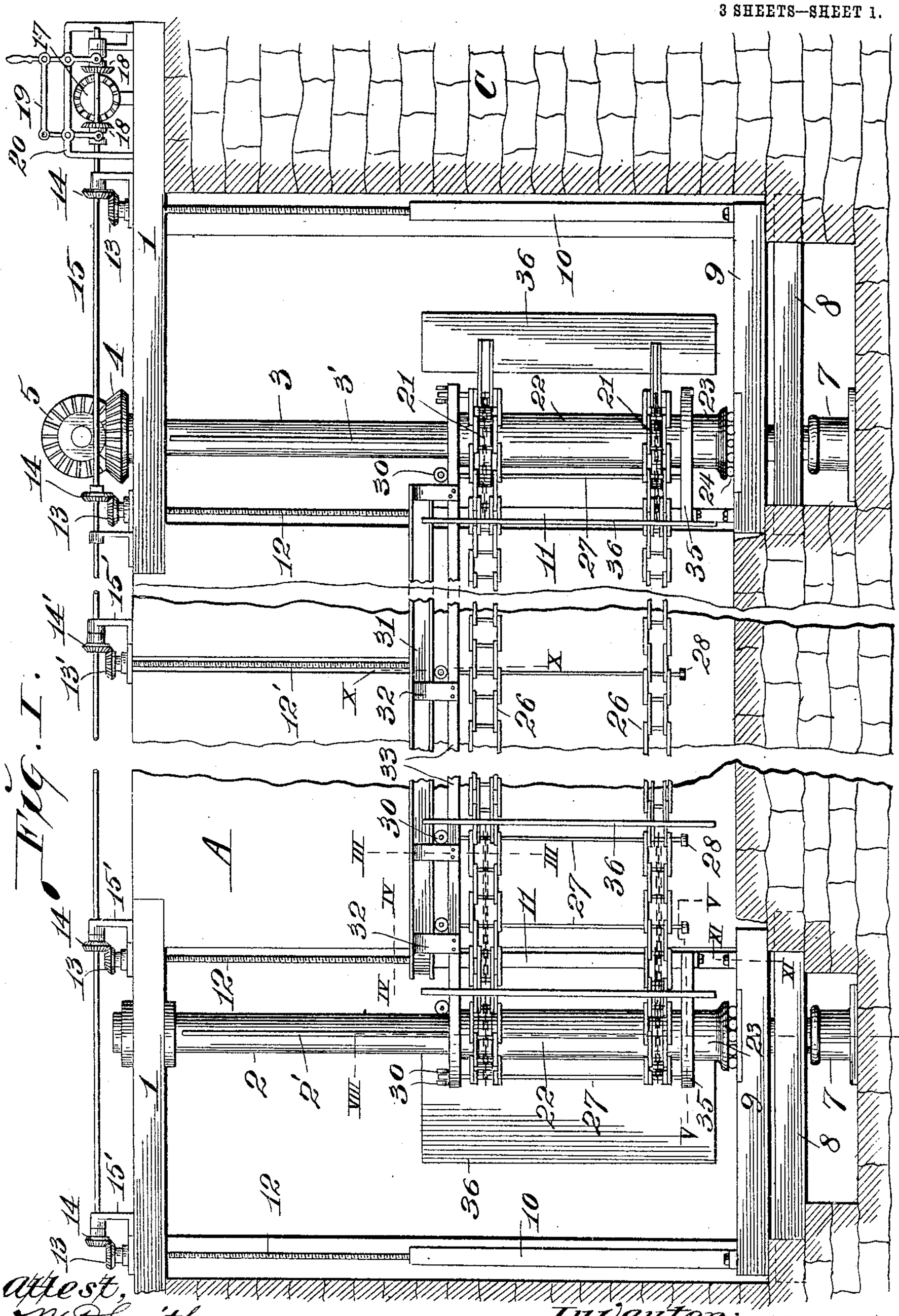

Fig. 1.

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3 SHEETS—SHEET 2.

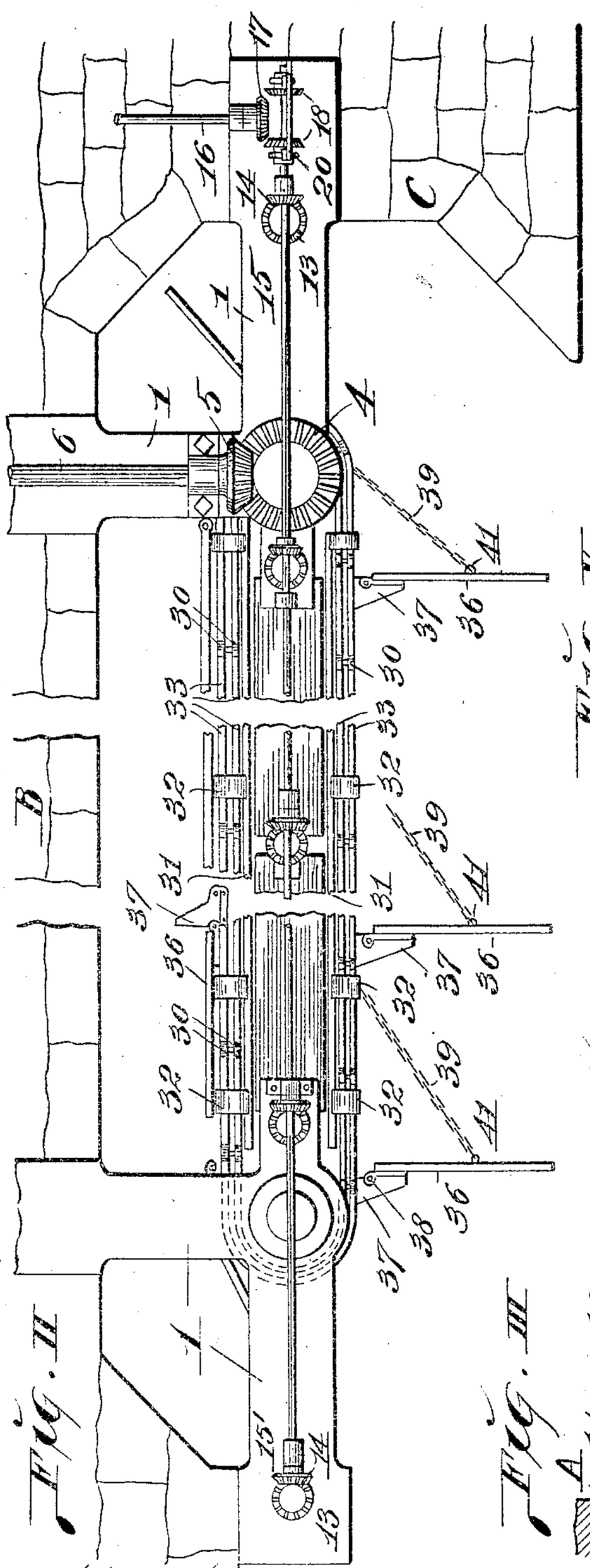

FIG. II.

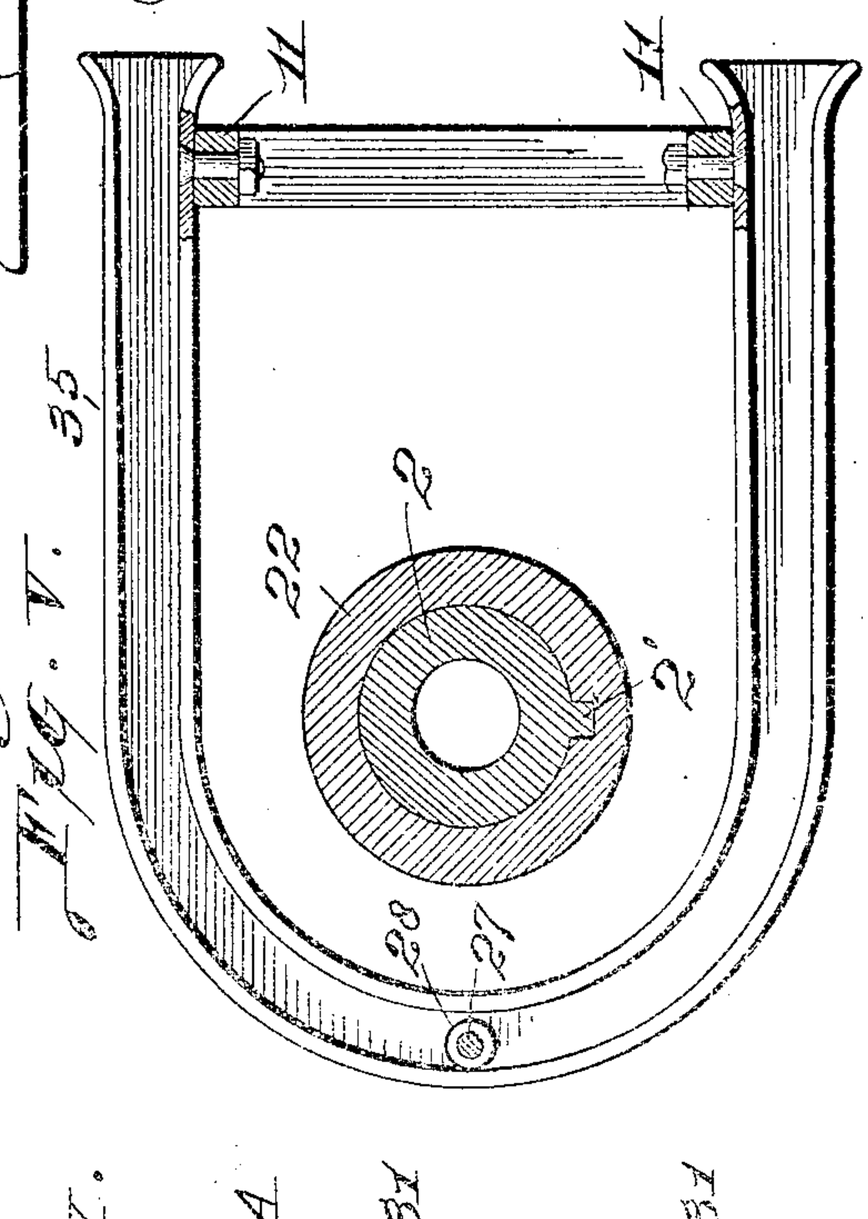

FIG. V.

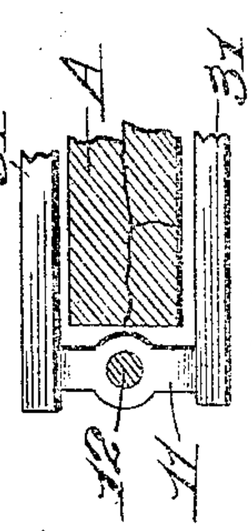

FIG. IV.

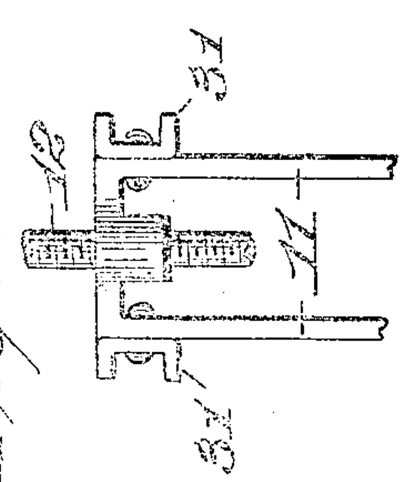

FIG. VI.

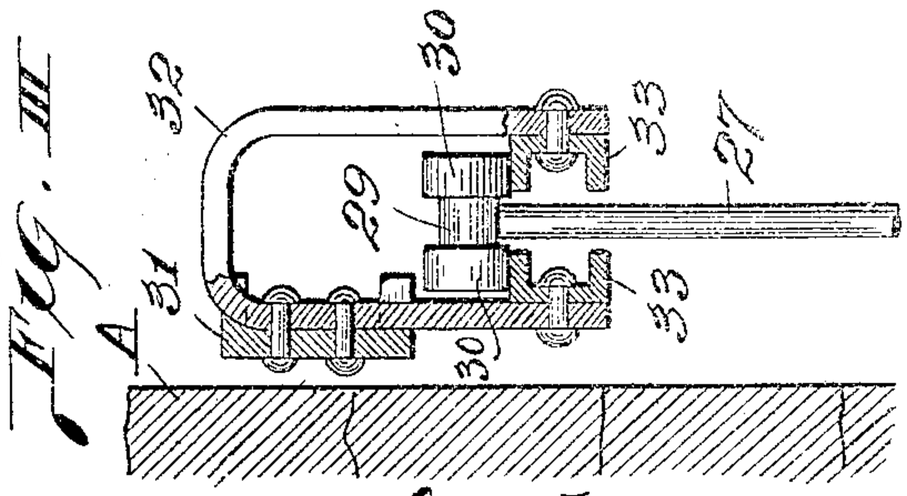

FIG. III.

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3 SHEETS—SHEET 3.

Fig. VII.

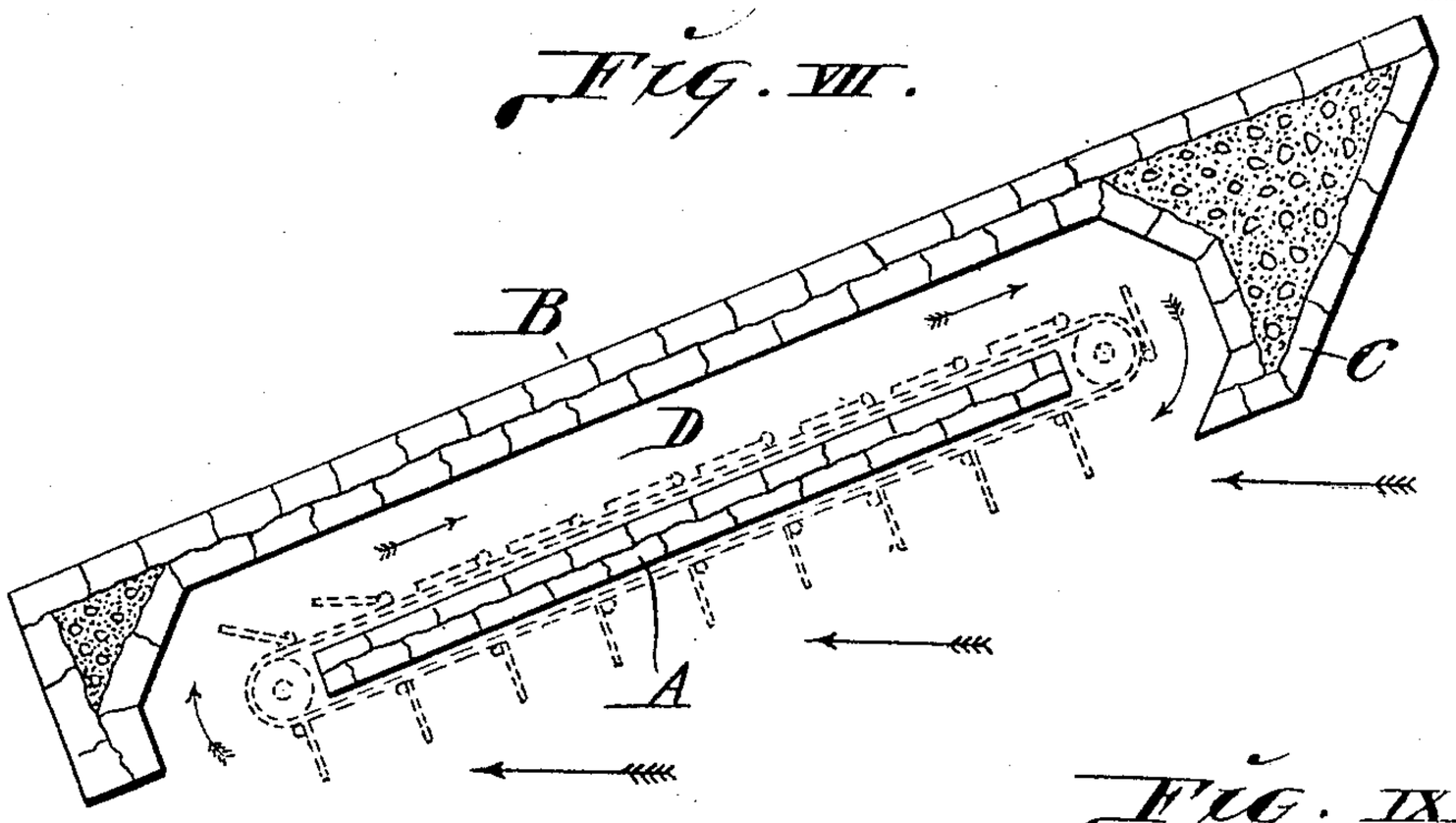


Fig. VIII.

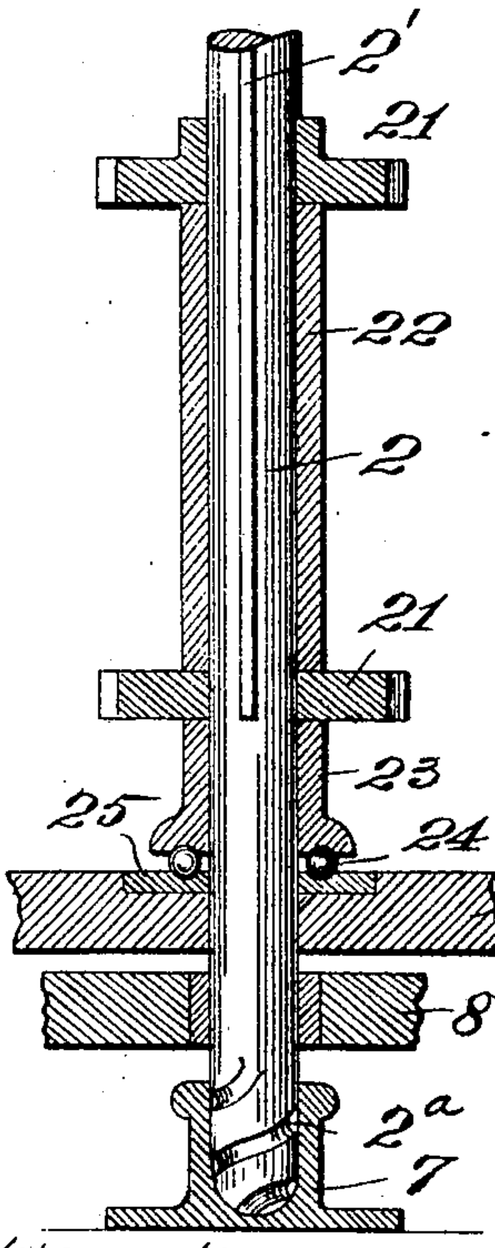


Fig. IX.

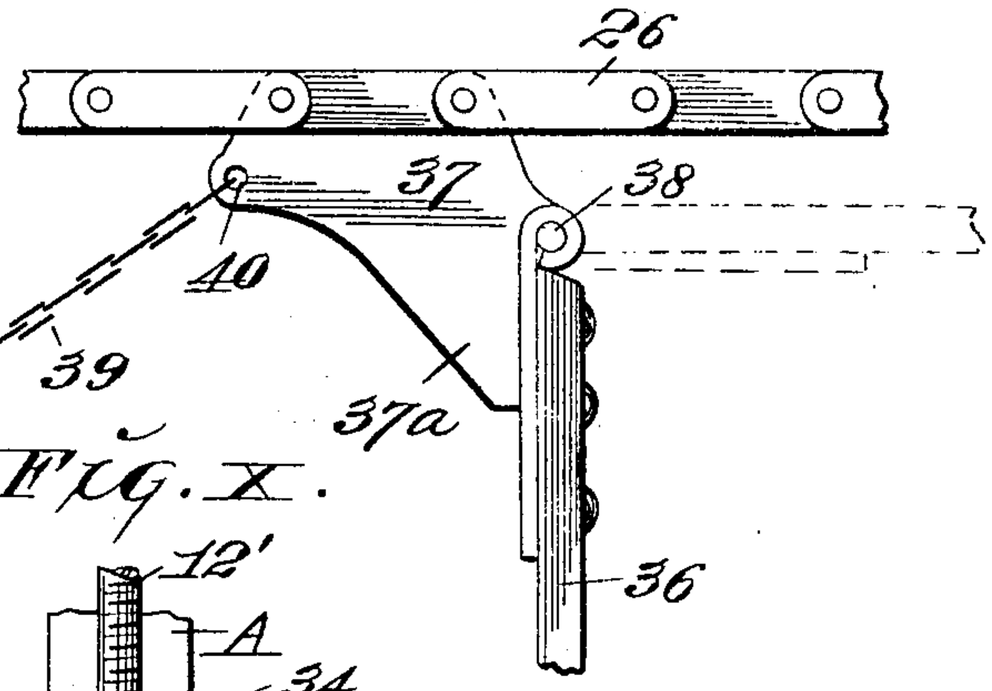


Fig. X.

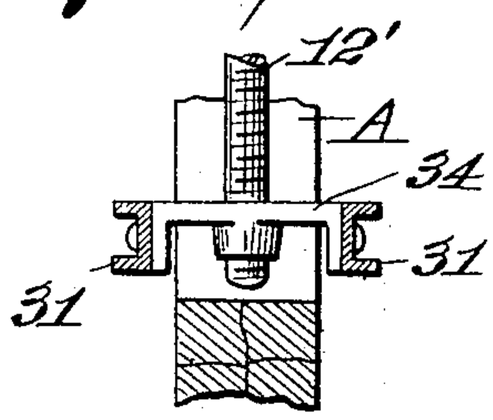
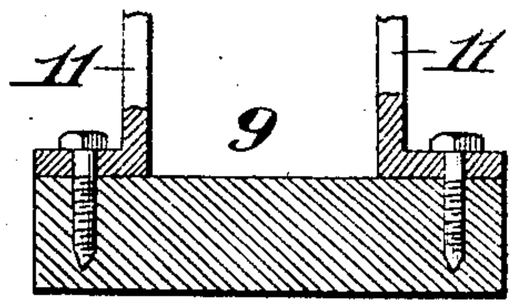


Fig. XI.



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UNITED STATES PATENT OFFICE.

HAVILAH G. BROWN, OF TUXEDO PARK, MISSOURI, ASSIGNOR OF TWO-THIRDS TO DAVID C. EDWARDS AND FRANK CLARK, OF ST. LOUIS, MISSOURI.

CURRENT-MOTOR.

No. 805,446. Specification of Letters Patent. Patented Nov. 28, 1905.

Application filed August 1, 1904. Serial No. 218,964.

To all whom it may concern:

Be it known that I, HAVILAH G. BROWN, a citizen of the United States, residing at Tuxedo Park, in the county of St. Louis and State of Missouri, have invented certain new and useful Improvements in Current-Motors, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to a motor for use in streams of water to derive power from the flow of current therein, the construction being such that the members that receive the impact of water may be lowered into the water and raised therefrom and provision being made whereby an eddy may be formed in which the blades of the motor may move during the course of their inoperative travel.

Figure I is an elevation of my motor. Fig. II is a top or plan view of the motor. Fig. III is an enlarged vertical section taken on line III III, Fig. I. Fig. IV is an enlarged horizontal section taken on line IV IV, Fig. I. Fig. V is an enlarged horizontal section taken on line V V, Fig. I, with parts beneath said line shown in plan. Fig. VI is an end view of the upper portion of one of the lift-yokes of the motor and one of the hoist-screws seated in said yoke. Fig. VII is a top or plan view of the piers in connection with which my motor operates, the traveling blades of the motor being shown in dotted lines. Fig. VIII is a vertical section taken on line VIII VIII, Fig. I. Fig. IX is an enlarged top view of fragments of one of the endless chains of the motor and one of the blades connected thereto. Fig. X is an enlarged vertical section taken on line X X, Fig. I. Fig. XI is an enlarged vertical section taken on line XI XI, Fig. I.

A designates a pier around which the driven members of my motor operate.

B designates a pier that is set in the stream in such position as to be in a vertical plane at an angle to the course of flow of the current in said stream, the said pier being formed at its upstream end with an L C, that extends transversely of the pier A at its upstream end. By virtue of this formation of the pier B, I produce an eddy within the boundary of the pier B throughout the space D, (see Fig. VII,) in which the water either remains stationary or partakes of a flow directly the opposite of that in which it moves in the body of the stream. The blades against which the water impacts in the downward flow of the current past the motor travel through the space D in the eddy when they are returning upstream, and therefore there is no resistance to their upstream movement, such as would exist if they traveled through the downwardly-flowing current of the stream.

1 designates supporting-frames seated upon the piers A and B.

2 and 3 are vertical shafts having their upper ends journaled in the supporting-frames 1, the shaft 2 being provided with a feather 2′ and the shaft 3 being provided with a feather 3′. Fixed to the upper end of the shaft 3 is a transmission-gear wheel 4, that meshes with a transmission-gear wheel 5, carried by a transmission-shaft 6. Power may be conveyed from the transmission-shaft 6 to any point at which it may be desired to utilize it.

The lower end of each of the vertical shafts 2 and 3 is stepped into a bearing-box 7, (see Figs. I and VIII,) mounted upon masonry alongside of the pier A. These boxes 7 being located beneath the water in the stream in which the motor is placed are liable to receive mud or sediment, and for the purpose of constantly removing such sediment from the boxes I form a spiral groove in each of the shafts 2 and 3 at their lower ends, as indicated at 2^a, Fig. VIII, by which the sediment is constantly worked out of the boxes. The lower portions of the vertical shafts 2 and 3 are journaled in bearing-slabs 8, located above the boxes 7. (See Figs. I and VIII.)

9 designates bed-slabs that are loosely seated on the masonry at the bottom of the pier A and through which the vertical shafts 2 and 3 pass, the bores in said slabs occupied by the shafts being of sufficient diameter to permit of the slabs being raised and lowered without disturbing the shafts.

10 and 11 designate lift-yokes that are secured at their lower ends to the bed-slabs 9, the yokes 10 being located at the outer ends of the slabs and the yokes 11 being located at the inner ends of the slabs.

12 designates hoist-screws that are tapped into the upper ends of the yokes 10 and 11 and extend vertically from said yokes to and through the supporting-frames 1, as seen in Fig. I. These hoist-screws have fixed to their upper ends beveled pinions 13, that are arranged in mesh with coexisting bevel-pinions

14, fixed to a rotatable shaft 15, which is journaled in bearing-brackets 15′. The office of the hoist-screws 12 and the rotatable shaft 15 geared thereto is that of providing for the lifting of the bed-slabs 9 and the traveling motor-driven members of the motor, to be hereinafter described. The rotatable shaft 15 is designed to be rotated in either direction to rotate the hoist-screws for elevating or lowering action, and this shaft is driven through the means of a suitably-operated shaft 16, equipped with a beveled pinion 17, that is arranged to mesh with either one of a pair of beveled pinions 18, feathered to the shaft 15. The pinions 18 are shifted to and fro to move them into or out of engagement with the beveled wheel 17 through the medium of a shifter 19, pivoted to a supporting-frame 20.

21 designates sprocket-wheels slidably fitted to the vertical shafts 2 and 3 and held from turning on said shafts due to the presence of the feathers 2′ and 3′. These sprocket-wheels (shown most clearly in Fig. VIII) are spaced apart by sleeves 22, also slidably fitted to the vertical shafts. Beneath the lower sprocket-wheels and surrounding the vertical shafts are end-thrust bearing-collars 23, that rest upon antifriction-balls 24, which are seated on bearing-plates 25, set into the bed-slabs 9.

26 designates a pair of endless chains that operate on the pairs of sprocket-wheels 21, carried by the vertical shafts 2 and 3.

27 designates carrier-rods that pass through certain links of the endless chains 26 and constitute the pivot members of said links at their locations. These carrier-rods are provided at their lower ends with antifriction-rollers 28, (see Figs. I and V,) and at the upper end of each rod is a head 29, (see Fig. III,) to which is journaled a pair of rollers 30. (See Figs. I, II, and III.)

31 designates longitudinal beams supported by the lift-yokes 11 and located at the sides of the pier A. These beams 31 have secured to them inverted-**U**-shaped brackets 32, and secured to the legs of said brackets at their inner sides are track-rails 33, preferably of channel shape, on which the rollers 30 of the carrier-rods 27 travel. The track-rails 33 are continuous and encircle the pier A and also the vertical shafts 2 and 3, as seen most clearly in Fig. II. The beams 31 are supported by the yokes 11, and they are adapted to be raised and lowered with the other vertically-movable parts of the motor through the medium of the hoist-screws 12 entering into said yokes. As additional means of raising and lowering said beams I provide a hoist-screw 12′, that seats in a cross-piece 34, seated between the beams. (See Fig. X.) This last-named hoist-screw is geared to the rotatable shaft 15 through the medium of beveled pinions 13′ and 14′.

35 designates curved channel-shaped guides for the antifriction-rollers 28 of the carrier-rods 27, these guides being secured at their ends to the lift-yokes 11 and extending around the lower ends of the vertical shafts 2 and 3 and the bearing-collars fitted thereto, as seen in Figs. I and V. During the travel of the endless chains 26 the antifriction-rollers 28 ride in part against the surfaces of the pier A at its sides while traversing the pier, and when they reach the guides 35 they pass thereinto to be directed in their course around the vertical shafts and emerge therefrom at the opposite side of the pier. The ends of the guides 35 have bell-shaped mouths to provide for the ready passage of the rollers.

36 designates a series of blades that are carried by the endless chains 26. Each of these blades is secured to links of the upper and lower chains through the medium of carrier-plates 37, to which the blades are hinged at 38. (See Figs. II and IX.) The point of hinge connection of the blades to said carrier-plates is beyond the outer ends of the plates, whereby an arm 37ª of each plate is caused to exist, against which the blades bear to prevent their folding in a forward direction under the force of water directed thereagainst when the blades are propelled in the current of a stream.

39 designates chains that also resist the forward folding of the blades, these chains being connected at 40 to the carrier-plates 37 (see Fig. IX) and connected at 41 to the next blades in advance of their connection to the various carrier-plates, as seen in Fig. II.

In the practical use of my current-motor the force of the water in a stream in which the motor is situated is exerted against the rear sides of the plates 36, and the blades are thereby propelled forwardly as long as they remain unfolded in the course of current of the water. As the blades reach the downstream end of the course traveled by the endless chains, they fold rearwardly, as indicated in Fig. VII, and travel with the chain in an upstream direction through the eddy-space D, so that no resistance is offered to their travel to counteract the movement of the blades being forced downstream.

I claim as my invention—

1. In a current-motor, the combination of traveling water-impact-receiving members, means by which said members are carried, and means whereby said members and carrying means are raised; said raising means consisting of bed-slabs by which said carrying means are supported, and means for lifting said slabs, substantially as set forth.

2. In a current-motor, the combination of traveling water-impact-receiving members, means by which said members are carried, and means whereby said members and carrying means are raised; said raising means consisting of bed-slabs by which said carrying means are supported, yokes connected to said slabs,

and means for lifting said yokes, substantially as set forth.

3. In a current-motor, the combination of traveling water-impact-receiving members, means by which said members are carried, and means whereby said members and carrying means are raised; said raising means consisting of bed-slabs by which said carrying means are supported, yokes connected to said slabs, lift-screws fitted to said yokes and means for operating said lift-screws, substantially as set forth.

4. In a current-motor, the combination of a pair of vertical shafts, sleeves slidably fitted to said shafts, endless blade-carrying members operating on said sleeves, and means for lifting said sleeves and the endless blade-carriers operating thereon, substantially as set forth.

5. In a current-motor, the combination of endless chains, blades carried by said chains, shafts to which said chains are geared, boxes in which the lower ends of said shafts are stepped; said shafts being provided at their lower ends within said boxes with spiral grooves, substantially as set forth.

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In presence of—
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BLANCHE HOGAN.