R. C. SCHREIBER.

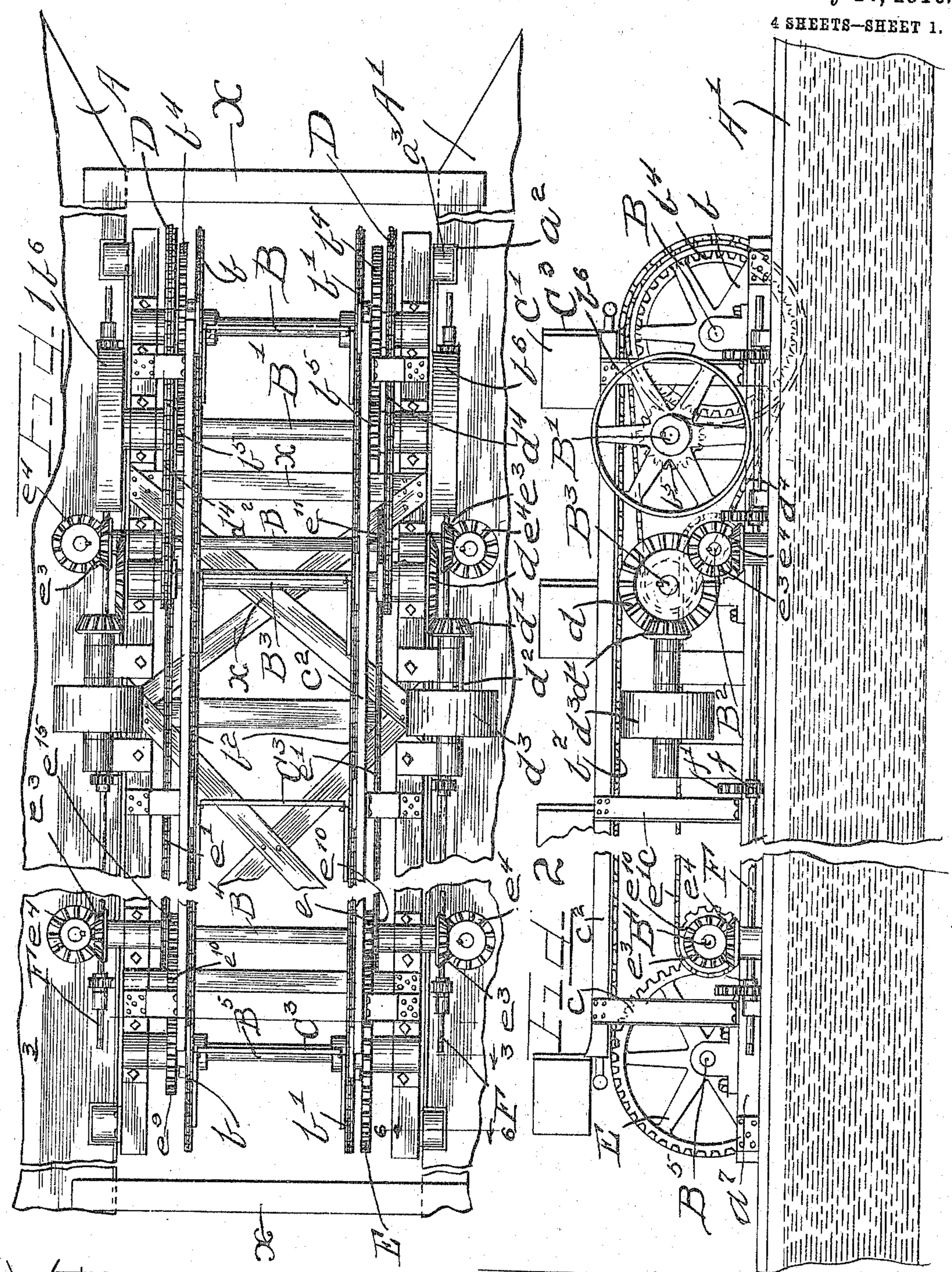
CURRENT MOTOR.

APPLICATION FILED OCT. 10, 1908.

958,014.

Patented May 17, 1910.

4 SHEETS—SHEET 1.



Witnesses

J. H. Angell.

E. E. Kennedy

Inventor

Rudolph C. Schreiber

by Charles Wiley Atty

ANDREW B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

R. C. SCHREIBER.

CURRENT MOTOR.

APPLICATION FILED OCT. 10, 1908.

958,014.

Patented May 17, 1910.

4 SHEETS—SHEET 2.

Fig. 3

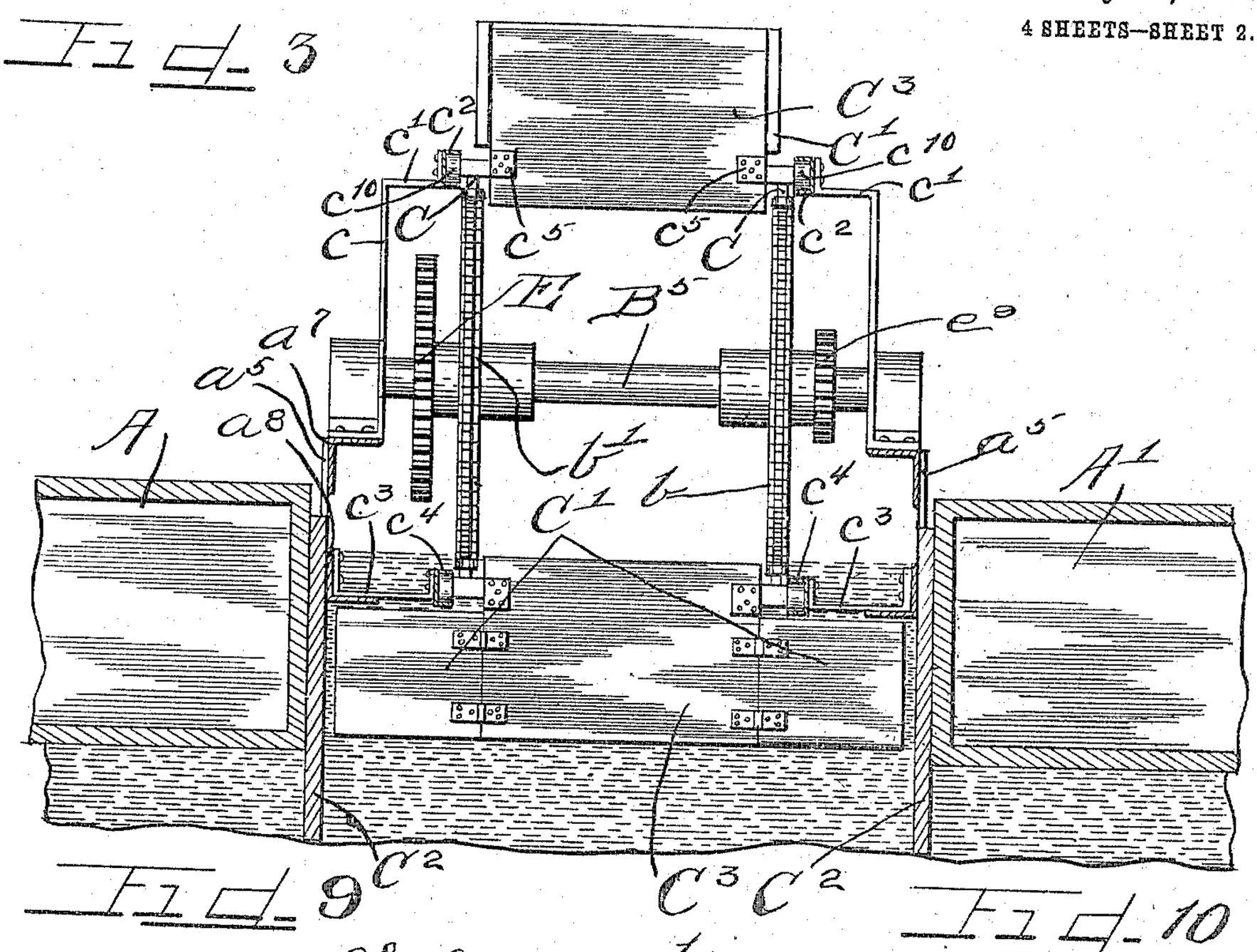


Fig. 9

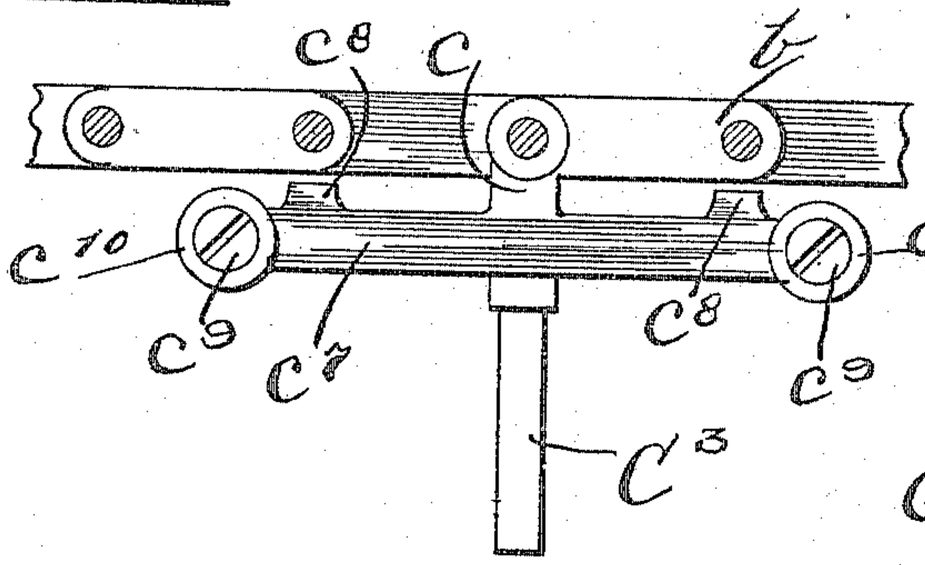
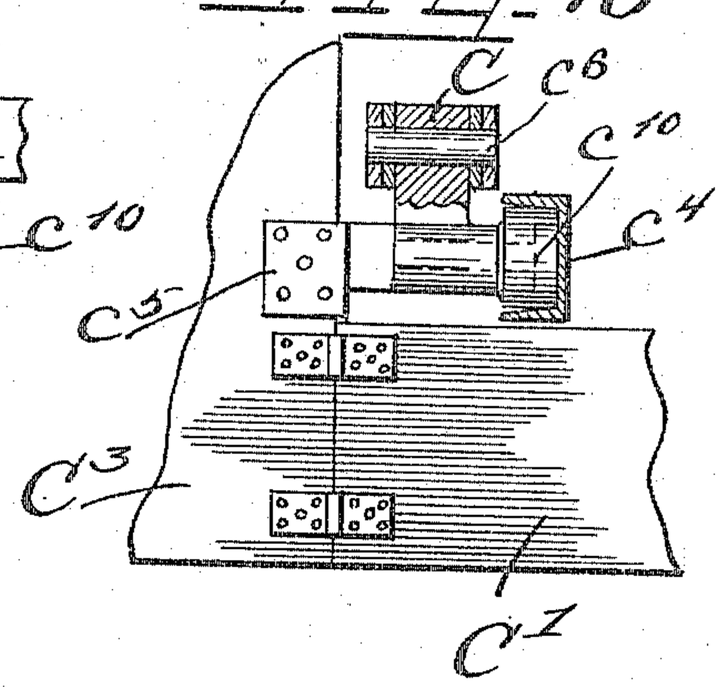


Fig. 10



Witnesses

J. V. Angell.

W. E. Hammack

by

Inventor

Rudolph C. Schreiber.

Charles W. Nichols Atty.

ANDREW B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

R. C. SCHREIBER.

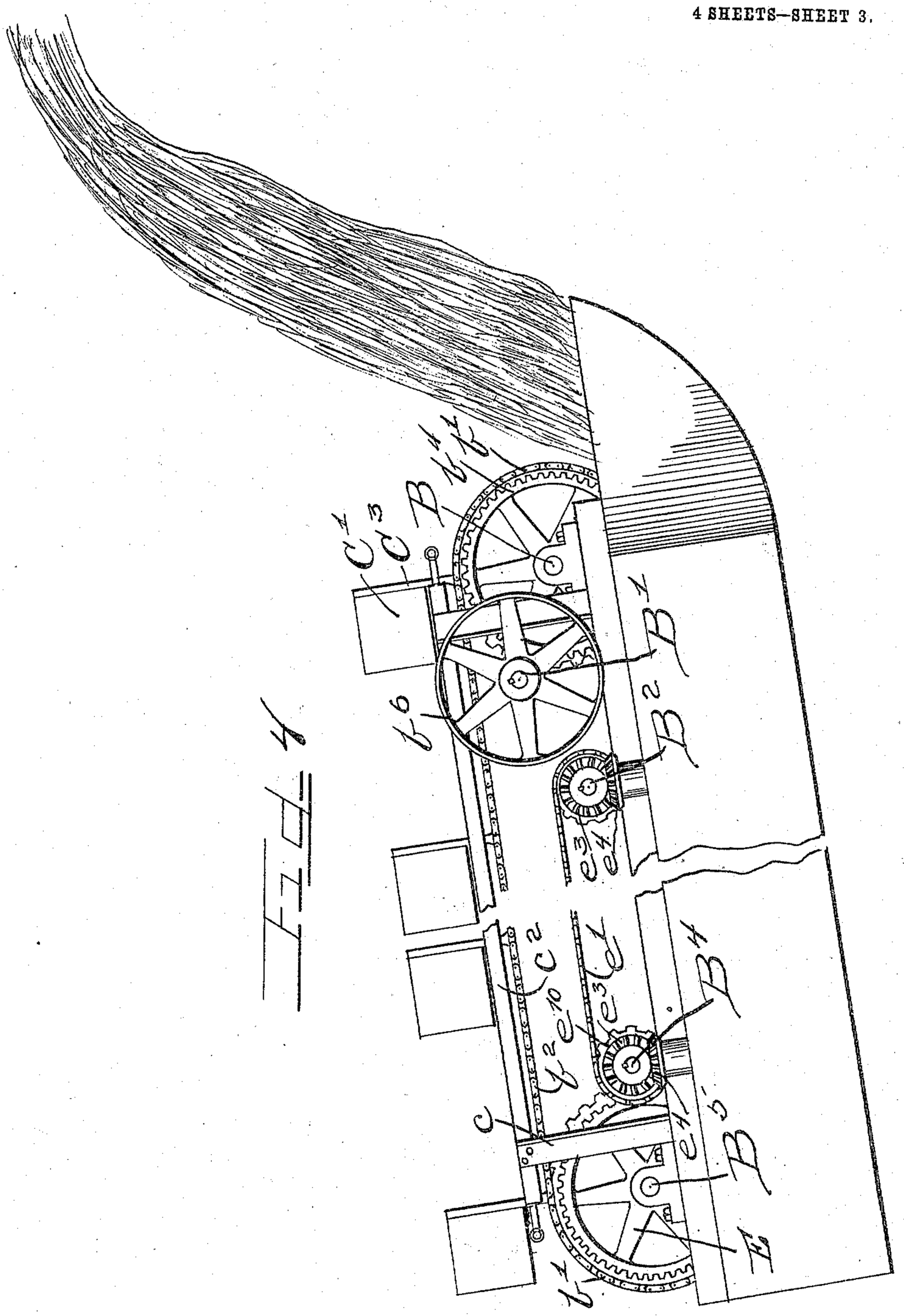
CURRENT MOTOR.

APPLICATION FILED OCT. 10, 1908.

958,014.

Patented May 17, 1910.

4 SHEETS—SHEET 3.



Witnesses

J. H. Angell.

E. E. Kennedy

Inventor

Rudolph C. Schreiber.

by Charles W. Tiers.

Atty.

ANDREW B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

R. C. SCHREIBER.

CURRENT MOTOR.

APPLICATION FILED OCT. 10, 1908.

958,014.

Patented May 17, 1910.

4 SHEETS—SHEET 4.

Fig. 5

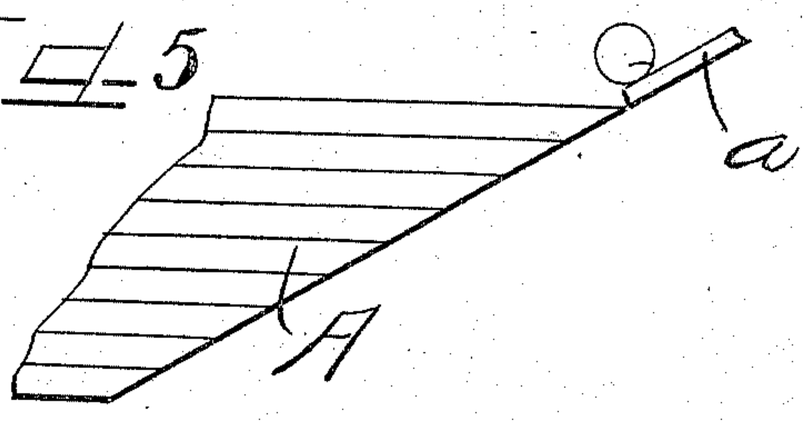
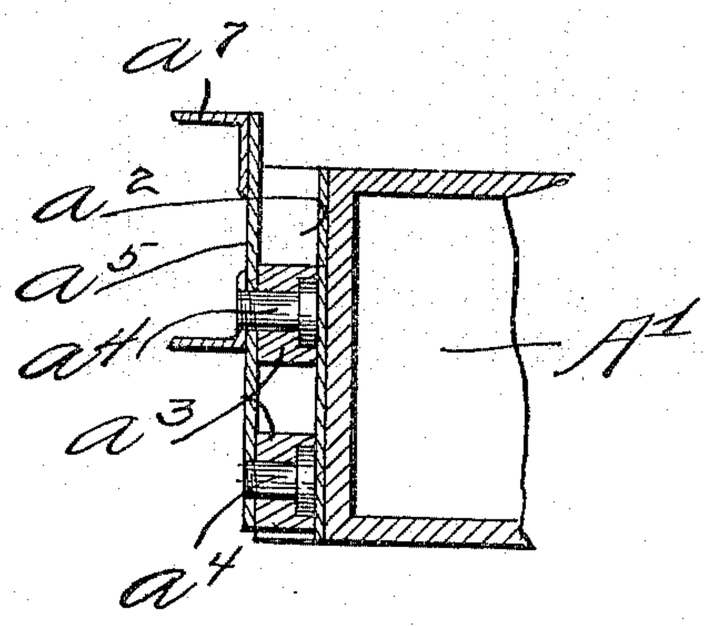


Fig. 6



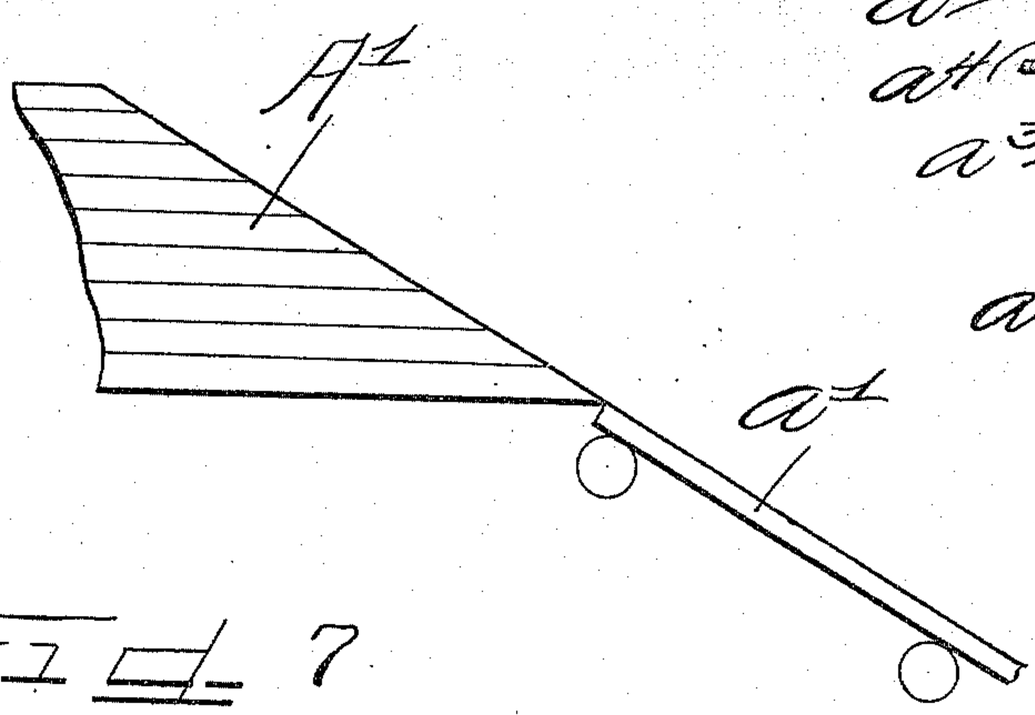


Fig. 7

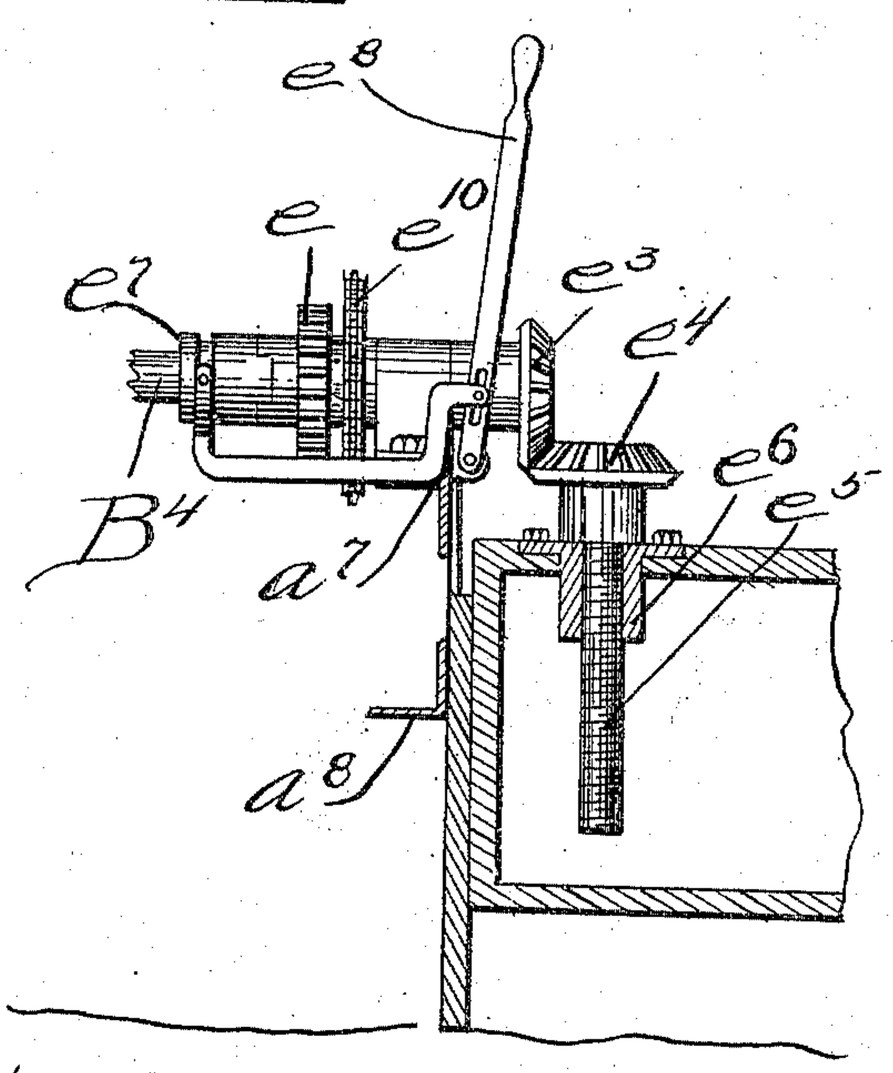
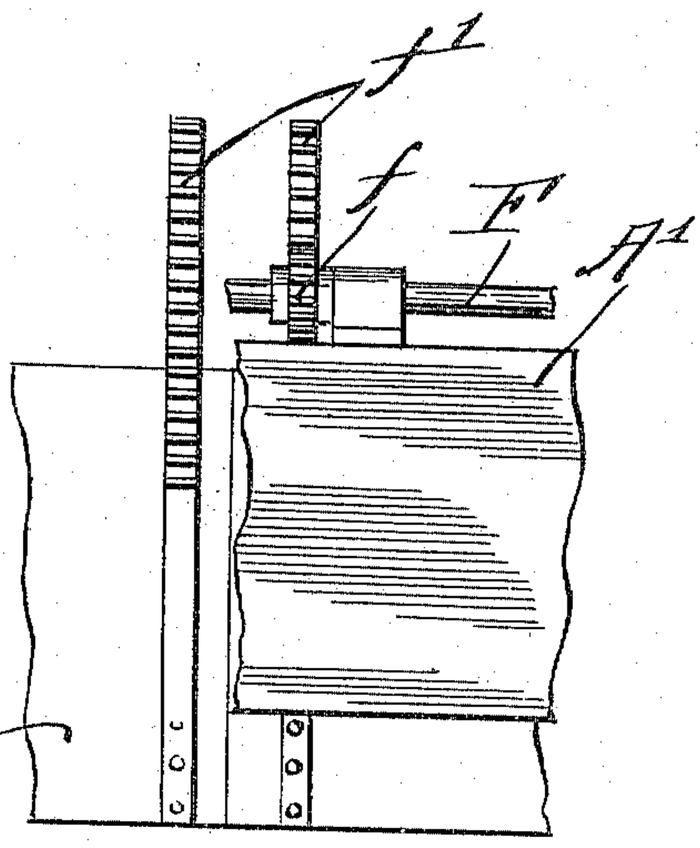


Fig. 8



Witnesses

J. H. Angell

D. E. Hamach

by

Inventor

Rydolph C. Schreiber.

Charles W. Nies.

Atty

ANDREW B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

RUDOLPH C. SCHREIBER, OF HARVEY, ILLINOIS.

CURRENT-MOTOR.

958,014. Specification of Letters Patent. Patented May 17, 1910.

Application filed October 10, 1908. Serial No. 457,058.

To all whom it may concern:

Be it known that I, RUDOLPH C. SCHREIBER, a citizen of the United States, and a resident of the city of Harvey, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Current-Motors; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The object of this invention is to provide a current motor adapted to operate by means of the current or flow in rivers and streams or in flumes or in any other location where the same may be subjected to the action of currents.

While numerous devices for the purpose have heretofore been constructed, these usually have been of such a nature and construction as to render the same expensive and frequently inefficient owing to the fact that the area exposed to the wind above the water on each of the buckets or blades was of the same size as the area exposed to the water pressure due to the flow and in consequence considerable resistance was thus effected against the operation of the device that in some instances, tended to seriously affect the operation. In many of such devices also, while means were provided (such, for instance, as a loose pulley) for discontinuing the drive of the machinery or mechanism to be operated by the current motor, nevertheless the motor frequently operated continuously, thus entailing considerable wear upon the mechanism unnecessarily. In other instances, attempts were made to elevate the mechanism by hand above the surface of the water. This entailed considerable labor, and as a result the driving belt was usually slipped onto the loose pulley and the motor continued to operate idly.

The object of this invention is to provide a device of the class described in which extensible buckets are employed to afford a greater effective surface to the action of the flow than exposed to the wind resistance.

It is also an object of the invention to afford a positively acting mechanism whereby the buckets or blades are supported in effective position when submerged to enable the same to receive the full force of the current or flow at right angles thereof.

It is also an object of the invention to afford a mechanism of the kind described adapted when desired to operate to elevate the same sufficiently out of the water as to throw the machine out of operation.

The invention embraces many novel features and consists in the matters hereinafter described and more fully pointed out and defined in the appended claims.

As shown in the drawings: Figure 1 is a fragmentary top plan view of a device embodying my invention, showing the same supported between pontoons. Fig. 2 is a fragmentary side elevation thereof. Fig. 3 is a somewhat enlarged transverse section thereof. Fig. 4 is a view in fragmentary side elevation and showing the device installed at the foot of a water-fall or cataract. Fig. 5 is a fragmentary detail illustrating the construction and arrangement of the mouth of the flume or sluiceway afforded by the pontoons and deflectors. Fig. 6 is a vertical section taken on line 6—6 of Fig. 1. Fig. 7 is an enlarged detail illustrating the mechanical means for hoisting the device. Fig. 8 is an enlarged fragmentary detail of means for adjusting the chute boards. Fig. 9 is an enlarged fragmentary detail in longitudinal section and partly in side elevation illustrating the roller bearings for the chain. Fig. 10 is an enlarged fragmentary detail of the bucket or blade and the means for journaling the same in the guide track.

As shown in the drawings: A—A′ indicate pontoons of any desired size and construction, preferably having the front end or that directed up-stream constructed as shown in Figs. 1 and 5, to afford outwardly inclined faces adapted to collect and direct the flowing water between the pontoons and as shown, wings *a*—*a*′, extend beyond the up-stream end of each pontoon in approximately the same plane with the inclined faces thereof to further collect and direct the flow thereof between the pontoons. These wings, of course, may be supported upon the piling or in any suitable manner.

As shown, near each end of each pontoon on the inner side thereof, is provided a vertical channel a^2, consisting, as shown, of a back web and lateral flanges adapted to receive between the same anti-friction rollers a^3, which, as shown, are journaled on the upper and lower steps a^4, and which are con-

nected by a rigid strap or bar of metal a^5, as shown in Fig. 6. Rigidly bolted on said upwardly directed strap a^5, as shown in Fig. 3, is an upper angle bar a^7, and a lower a^8, the flanges of which, as shown, are bolted on said strap or bar a^5, and extend upwardly and downwardly respectively and the webs of which are directed inwardly affording between the same a channel.

Rigidly bolted on the upper angle bar a^7, on each side the machine, are suitable journal boxes for transverse shafts B—B′—B²—B³—B⁴—B⁵, of which, as shown, the shafts B and B⁵, at opposite ends of the machine are each provided near their ends with sprocket wheels b—b', around which are trained sprocket chains b^2, on which are carried buckets C³, and as shown, rigidly bolted on the upper angle bar a^7, are upright straps or bars of metal c, which extend upwardly approximately to a height of the upper lead of the sprocket chain b^2, and are thence bent inwardly as shown in Fig. 3, said inwardly directed arms c', having rigidly secured thereon inwardly facing channel bars c^2, the lower flange of which lies approximately at, or slightly above, the upper run of the sprocket chain. In a similar manner inwardly directed brackets c^3, are rigidly secured on the lower angle bars a^8, and are of a length corresponding with the inwardly directed ends c', for the supports for the channels c^2, and rigidly secured thereon are inwardly facing channel bars c^4, which extend parallel with the upper channel bars c^2, and are directly beneath the same.

Each of the paddles or buckets C³, at its opposite end is fitted into, and rigidly riveted or bolted in a yoke c^5, comprising parallel flanges integrally connected with a stem C. Pivotally engaged on one of the pivot pins c^6, with which the links and chains are connected, and also integrally connected with said stem C, is a bar c^7, which extends longitudinally the chain in close proximity therewith, and on the outer side thereof is provided near its ends and adjacent the pivot pins c^6, with projections c^8, which are adapted to bear on the chain links for the pivot pins to hold the paddle C³, at right angles with the run of the chain. As shown also, journaled on laterally directed studs c^9, at each end of said bar c^7, are rollers c^{10}, adapted to run in the channels c^2—c^4, adjacent the upper and the lower run of the chains to afford a positive support at all times for the buckets. Each of the buckets or paddles C³, is provided at each end with an extension C′, hinged thereto to open down-stream or with the current when the bucket or paddle is submerged, as shown in Fig. 3. As shown, said extensions C′, are of a length to extend in close relation with the sides of the pontoon to obtain the maximum utilization of the flow passing between the same. For the purpose of still further confining the flow to the sluice afforded by the pontoons, adjustable chute boards C², are provided on each pontoon, and adapted to be adjusted downwardly to near the bottom of the stream whereby the force of the current instead of being diffused by passing beneath the pontoons, is confined therebetween and directed most effectively against the buckets or paddles.

Rigidly secured on the shaft B, is a gear wheel b^4, which meshes with a pinion b^5, on the shaft B′. As shown, such gears and pinions are provided on each end of said respective shafts and on the outer ends of the shafts B′, are provided belt pulleys b^6, adapted to deliver power from the machine to any mechanism to be driven thereby. As shown also, means are provided for delivering the power of the current motor transversely the machine. For this purpose, an additional sprocket wheel D, is provided on each end of the shaft B, and a sprocket chain d^4 driven thereby is passed around a smaller sprocket wheel on the shaft B³, at each end thereof and on each end of said shaft B³, are bevel gears d, which mesh with bevel pinions d', secured on a shaft d^2, journaled on each side of the machine and extending longitudinally thereof and on which is a driving belt pulley d^3.

Rigidly secured on the shaft B⁵, at one end thereof, is a gear E, which meshes with a pinion e, on the corresponding end of the shaft B⁴. Also secured on each end of said shaft is a sprocket wheel e^{10}, about which is trained a sprocket chain e', which also is trained about a corresponding sprocket wheel e^{11}, near each end of the shaft B². On the outer end of each of said shafts B², and B⁴, are bevel pinions e^3, which mesh with complemental bevel pinions e^4, rigidly secured on the upper end of a screw jack e^5, threaded in a suitable nut e^6, in the deck of the pontoon, as shown in Fig. 7. As shown, the pinion e, is rotatably secured on the shaft B⁴, and is adapted to be fixed thereon by means of a complemental sliding clutch member e^7, operated by a hand lever e^8, whereby said shaft may be rotated with the pinion thereby rotating the screw jack to elevate the mechanism by the force of the current, thus elevating the machine out of operative position, all four screw jacks, of course, operating simultaneously for this purpose.

For the purpose of lowering the machine into operative position, or in other words, reversing the direction of the screw jacks, a pinion e^9, is secured on the shaft B⁵, and meshes with an intermediate pinion e^{10}, journaled upon a stud shaft which meshes with a pinion e^{15}, rotatable on the shaft B⁴, in the same manner as before described with reference to the pinion e, on the same shaft

and likewise adapted to be thrown into or out of operation by means of a hand lever e^8, operating the clutch.

Of course, any suitable means may be employed for operating the chute boards C^2. Conveniently, however, a rack and pinion are employed. For this purpose, a shaft F, is extended along each side of the pontoon and supported upon suitable brackets and is provided with pinions f, as shown in Fig. 8, adapted to mesh with racks f', rigidly secured transversely the chute boards. Rotation of said shafts F, in one direction consequently serves to elevate the chute boards, while reverse rotation serves to lower the same.

The operation is as follows: Having secured the pontoons in proper relation in any suitable current the machine may be lowered into operative position by means of the clutch which fixes the pinion e^{15}, on the shaft B^4, thus rotating the shaft reversely the bevel pinions thereon rotating the screw jacks to thread the same downwardly, in this manner enabling the machine to be adjusted with the utmost nicety to exactly the required depth. Any desired number of buckets C^3, may be employed, and of course, they may be of other shapes than those herein shown. As the buckets enter the water with the current, the current filling into the same serves to swing the extension ends C′, outwardly should they not previously have been swung outwardly with the downward movement of the bucket before striking the water.

Inasmuch as practically the entire available width of the chute is filled with the bucket, which may, of course, extend to any desired depth, the force of the current against the same, drives the motor, and the buckets reaching the rear or down-stream end of the machine are carried upwardly over the sprocket wheels on the shaft B^5, the extension ends of the buckets or paddles then falling inwardly by gravity to approximately right angle relation with the central portion of the bucket, and in this manner the buckets are carried on the upper run of the chain forwardly to repeat the cycle.

The power generated by the force of the current is communicated to the driving shaft B′, by means of the gears and pinions on the shafts B and B′ respectively, and of course, the power may be delivered from the motor either by the utilization of one or both of the belt wheels b^6, as preferred. Should it be desired to drive transversely the machine, the drive is communicated to the shaft B^3, by means of the sprocket chains trained about the sprocket wheels thereon, and on the shaft B, and the drive is arranged at right angles with the shaft B^3, by means of the bevel gear and bevel pinion d—d'. Should it be desired at any time to elevate the machine out of operative position, the clutch for the elevating gears is thrown and in consequence, the gear E, driving the pinion e, which is rigidly engaged on the shaft B^4, by said clutch, rotates all four of the screw jacks simultaneously, and in equal degree to elevate the machine. Such elevation, of course, will continue so long as a sufficient area of the respective paddles is exposed to the action of the current to turn the mechanism at all. In practice, it is found that the machine may be elevated except for a very small portion of the paddles, entirely above the stream.

Inasmuch as the frame is rigidly secured together, by transverse bars X, which may be braced in any suitable manner on the pontoons, the machine is readily portable and may be moved from place to place at will, and may be quickly adjusted and arranged in the new location to deliver its maximum power as before.

Any suitable arrangement of the bracing members may be employed in the construction of the motor, and in the action of the supporting members or pontoons, and I have not attempted to go into the details fully in regard to these matters inasmuch as such details will of necessity vary with the size of the machine and the location of its use.

Of course, should it be desired, the machine is applicable for use in connection with timber flumes or otherwise, and when so used, of course, the pontoons will not be necessary, and instead, the machine will be supported upon the sides of the flume. They may be arranged to be self-elevating as before described, thus enabling the flume to be used for any of the purposes for which the flume is constructed when the machine is not in use, and at other times permitting the flumes to be used for the generation of power.

Of course, I am aware that many details of the construction may be varied, such, for instance, as the transverse drive and many others. I therefore, do not purpose limiting this application for patent otherwise than necessitated by the prior art.

I claim as my invention:

1. The combination with supporting means affording therebetween a sluiceway or flume of a current motor adjustably supported thereon, embracing parallel, transverse shafts, sprocket wheels thereon, sprocket chains trained about the same, extensible, flat buckets adapted to be extended by the action of the current, means pivotally connecting the buckets to the chains and lugs integral with said means on each side of the pivot point adapted to engage the under side of the chains for holding the buckets to receive the full force of the current.

2. The combination with supporting means

affording therebetween a sluiceway or flume of a current motor adjustably supported thereon, embracing parallel transverse shafts, sprocket wheels thereon, sprocket chains trained about the same, extensible flat buckets, adapted to be extended by the action of the current and to fall inwardly by gravity at the end of the power impulse, a member pivotally connecting the end of each bucket to the chain, means secured to said member for engaging the under side of the chain and preventing the buckets swinging out of the water by the force of the current, rollers journaled to said member and guides for receiving said rollers and holding the buckets a uniform height in the water.

3. In a machine of the class described the combination of the supporting elements, of a current motor adjustably secured thereon as to height with reference to the current, and embracing in part extensible paddles or buckets adapted to be opened by the current to increase the area subjected to the pressure, bars secured to the supporting elements, channel ways secured to said bars in vertical alinement and rollers connected with each bucket adapted to engage in each channel way to support the buckets in a horizontal plane.

4. In a water motor of the class described the combination with pontoons, parallel shafts journaled thereto, sprocket wheels secured on the shafts, chains trained around the sprocket wheels, buckets secured to the chains having foldable ends, a transmission shaft journaled to the pontoon between the aforesaid shafts, means driving said transmission shaft from one of the first named shafts, means on said transmission shaft for transmitting power longitudinally of the motor, a transmission shaft operated from one of the first named shafts, a shaft extending transversely thereof and operated thereby, means on said shaft for transmitting power transversely of the motor, a screw jack secured to the pontoon at each corner of the motor, parallel shafts, each shaft adapted to operate the screw jacks at the corresponding end of the motor, means connecting the shafts to rotate together and mechanisms operated from one of the first named parallel shafts for rotating one of the shafts to actuate the screw jacks in either direction.

5. In a machine of the class described the combination with parallel shafts, and sprocket wheels thereon, of sprocket chains trained about the same, one on each side of the machine, a plurality of transverse paddles attached to each chain, guides supporting said paddles perpendicularly with the flow of the current, mechanism operated by the current adapted for adjustment to elevate the machine from the current and by reversal to lower the machine into operative position in the current, a plurality of adjustable chute boards on each side of the machine and mechanism for simultaneously adjusting all of the chute boards on the same side of the machine.

6. In a machine of the class described the combination with pontoons rigidly secured in parallel relation and affording a sluiceway therebetween, screw jacks secured on the pontoons, one at each corner of the machine and acting vertically, a bevel pinion rigidly secured on each screw jack, a current motor, transverse shafts thereon, a bevel pinion on each end of each shaft meshing with the bevel pinion on the screw jacks and normally non-rotative, means connecting the shafts to rotate the screw jacks at each end of the machine simultaneously, paddles or buckets affording a part of the current motor and adapted to be driven by the current, and operative connections between one of said shafts and said paddles embracing in part, a clutch whereby said shafts may be driven by the movement of the paddles to adjust the motor vertically in the sluiceway by the rotation of the screw jacks.

7. In a machine of the class described the combination with pontoons rigidly connected and affording a sluiceway therebetween, of vertically acting screw jacks secured on the pontoons oppositely in pairs, a current motor embracing a frame, transverse shafts at each end thereof, sprocket wheels thereon, sprocket chains trained about the same, one on each side, upright paddles or buckets secured on said chains, transverse shafts journaled on the frame and operatively connected with the screw jacks to rotate the same, while supporting the motor thereon, a gear on each end of one of the driving shafts, a pinion near each end of one of the supporting shafts, and normally rotative thereon, and meshing with the gears on the driving shaft, one of the same meshing directly, the other thereof meshing therewith through the medium of an intermediate gear, a clutch for engaging either of said pinions to its shafts, operative connections between both said supporting shafts for rotating the same simultaneously and in the same direction, to rotate the screw jacks in either direction for elevating or lowering the motor, channeled guides, and means secured to the paddles adapted to engage in said guides to support the paddles at all time vertically when engaged in the current.

In testimony whereof I have hereunto subscribed my name in the presence of two subscribing witnesses.

RUDOLPH C. SCHREIBER.

Witnesses:
K. E. HANNAH,
J. W. ANGELL.