No. 744,288. PATENTED NOV. 17, 1903.

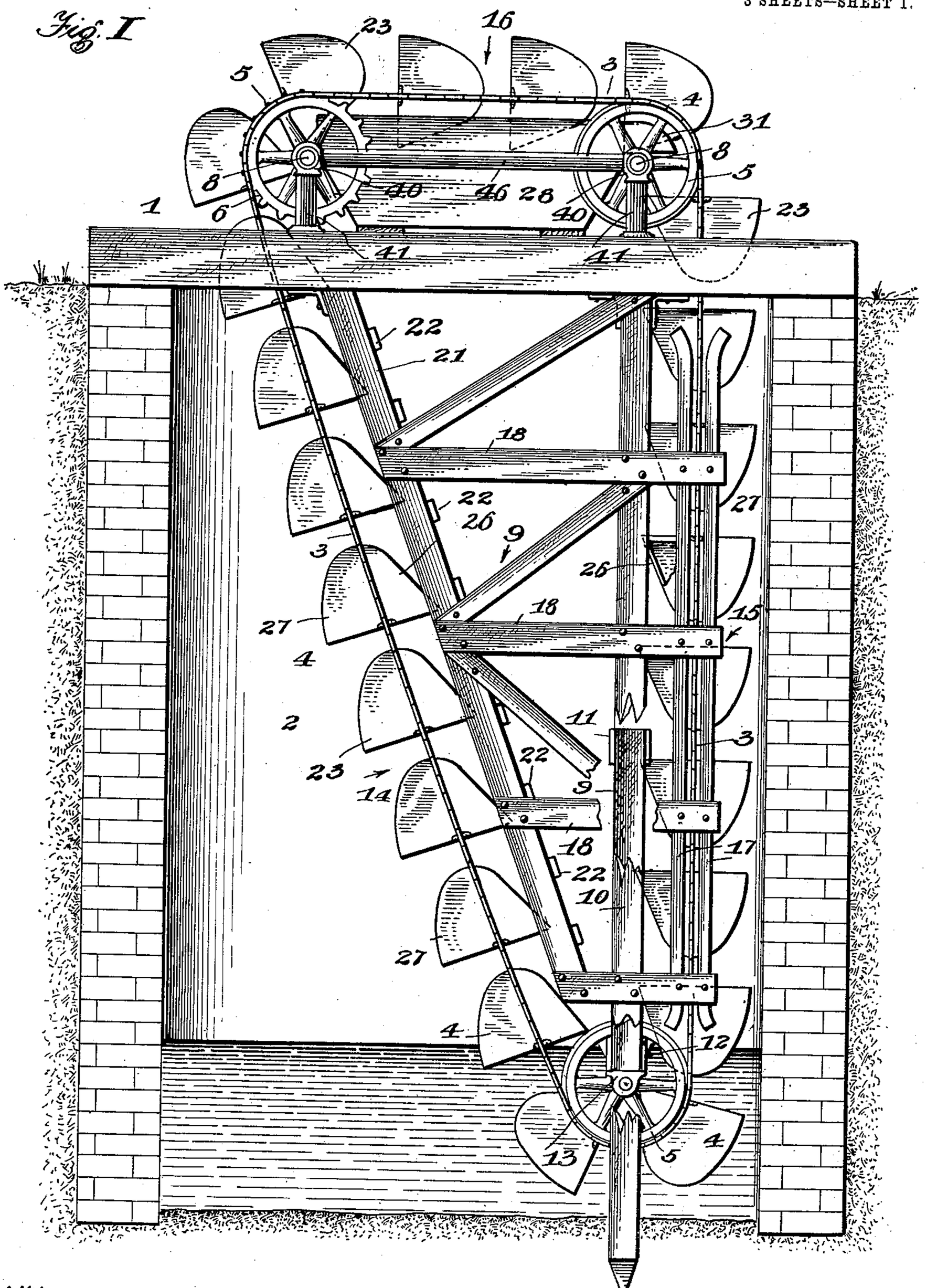
J. L. BROWN.

WATER ELEVATOR.

APPLICATION FILED MAY 13, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. I



Witnesses
Edmund A. Strauss.
W. S. Boyd,

Inventor
James Lloyd Brown
by Townsend Bros
his attys

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NO MODEL. 3 SHEETS—SHEET 2.

Fig. II

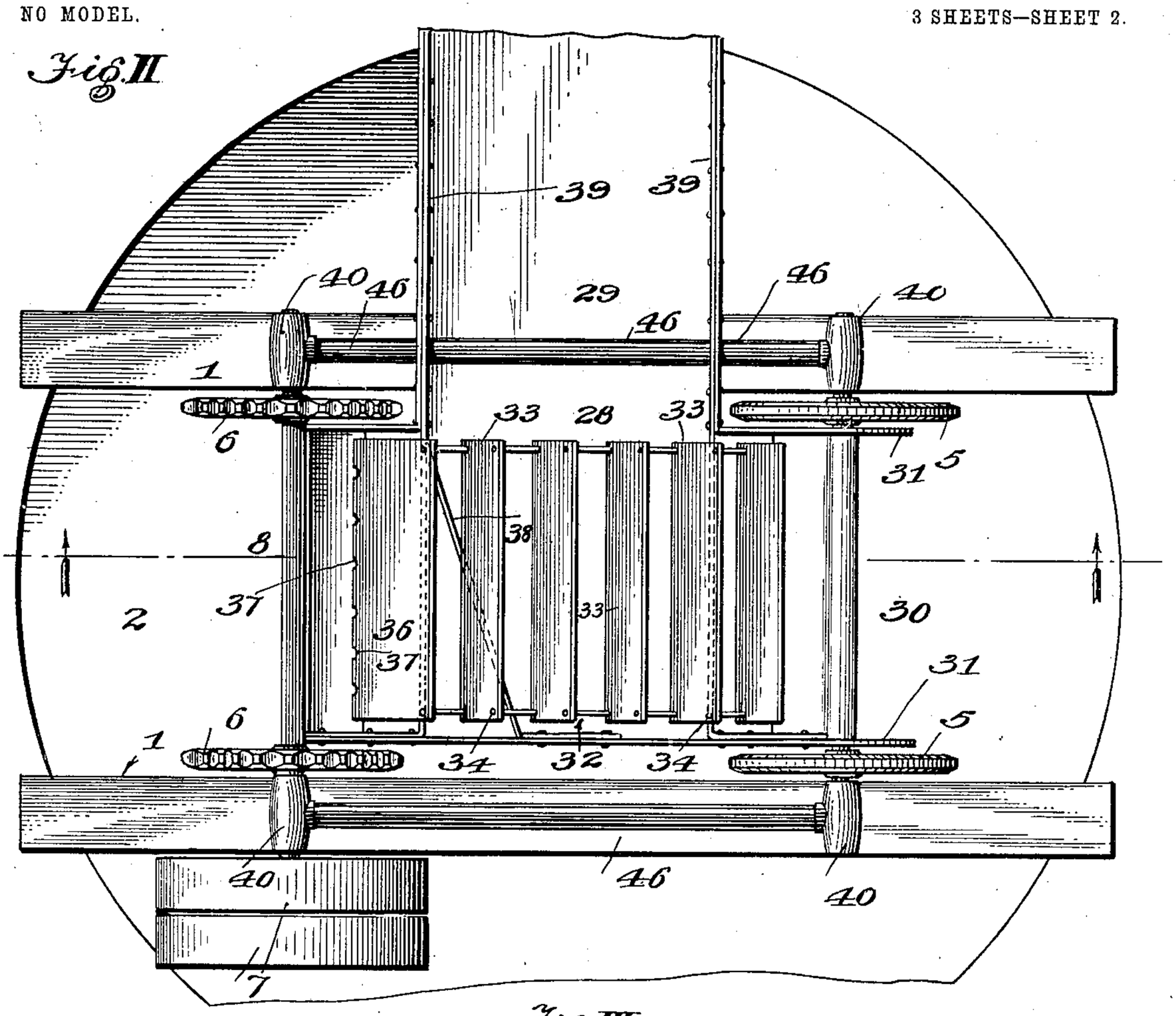
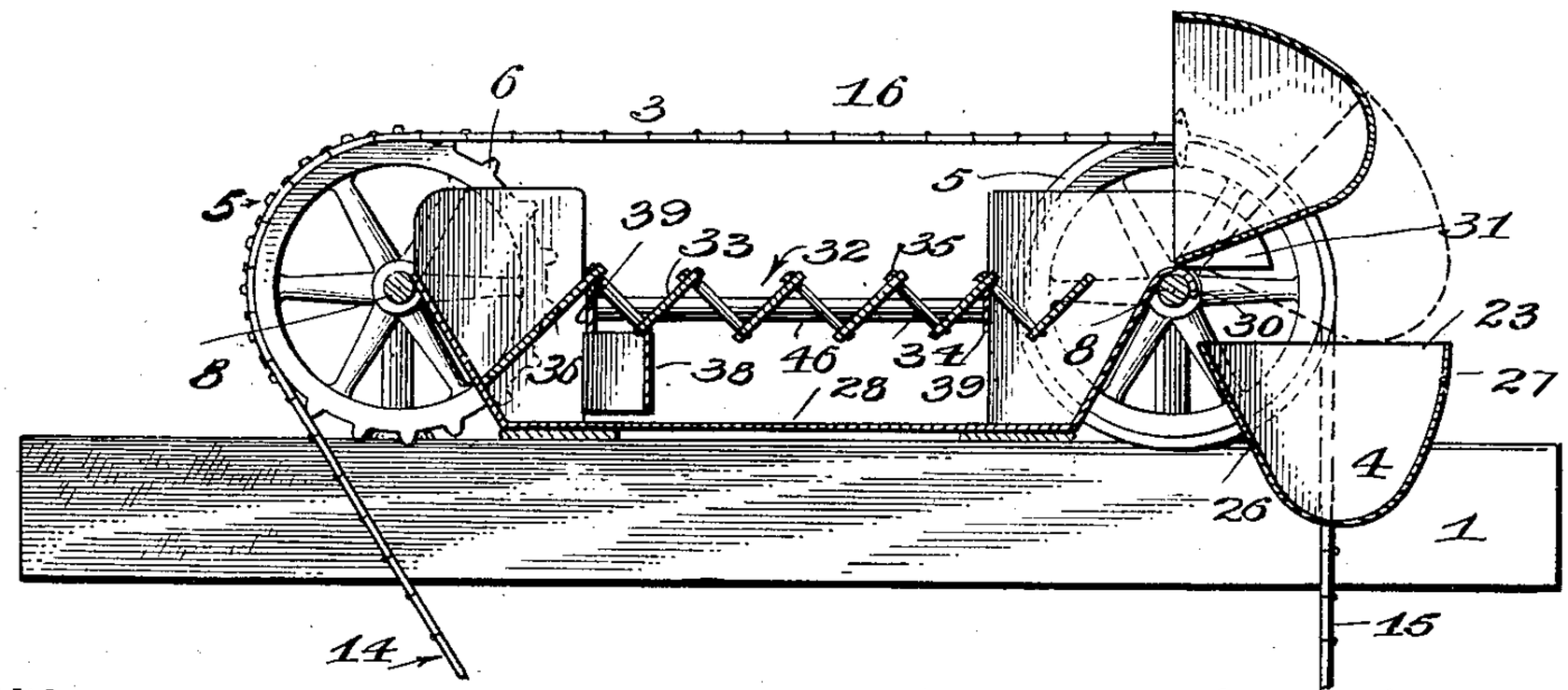


Fig. III



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NO MODEL. 3 SHEETS—SHEET 3.

Fig. IV

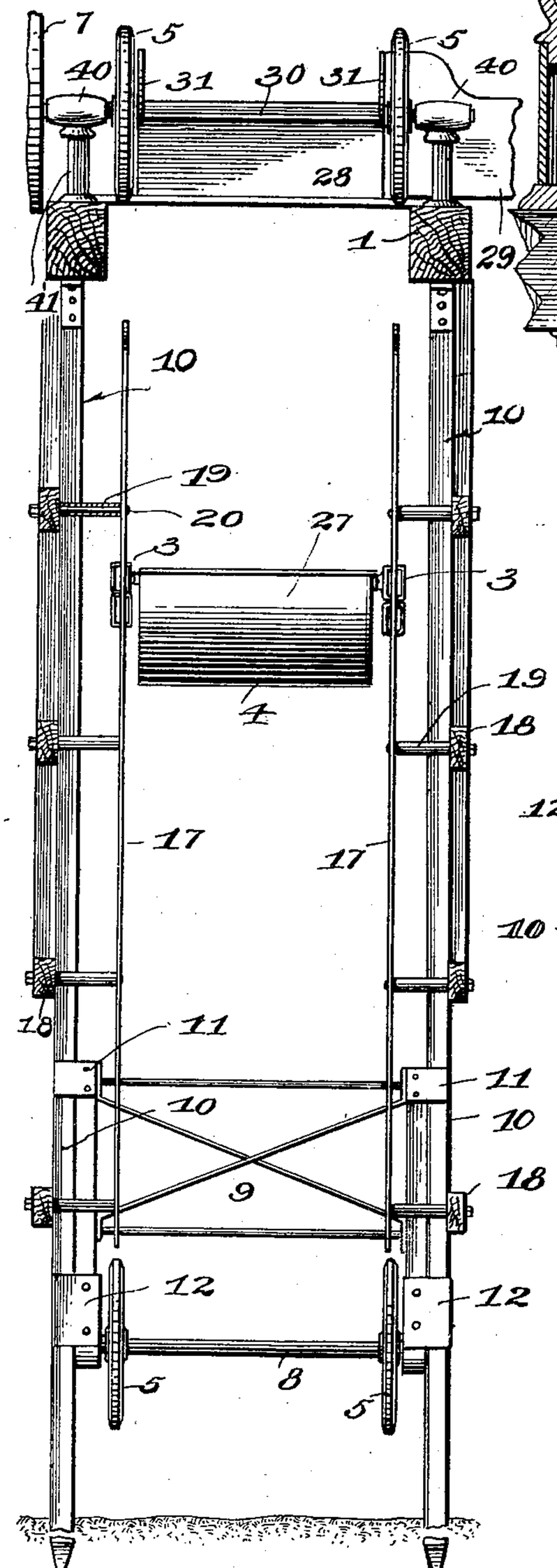


Fig. V

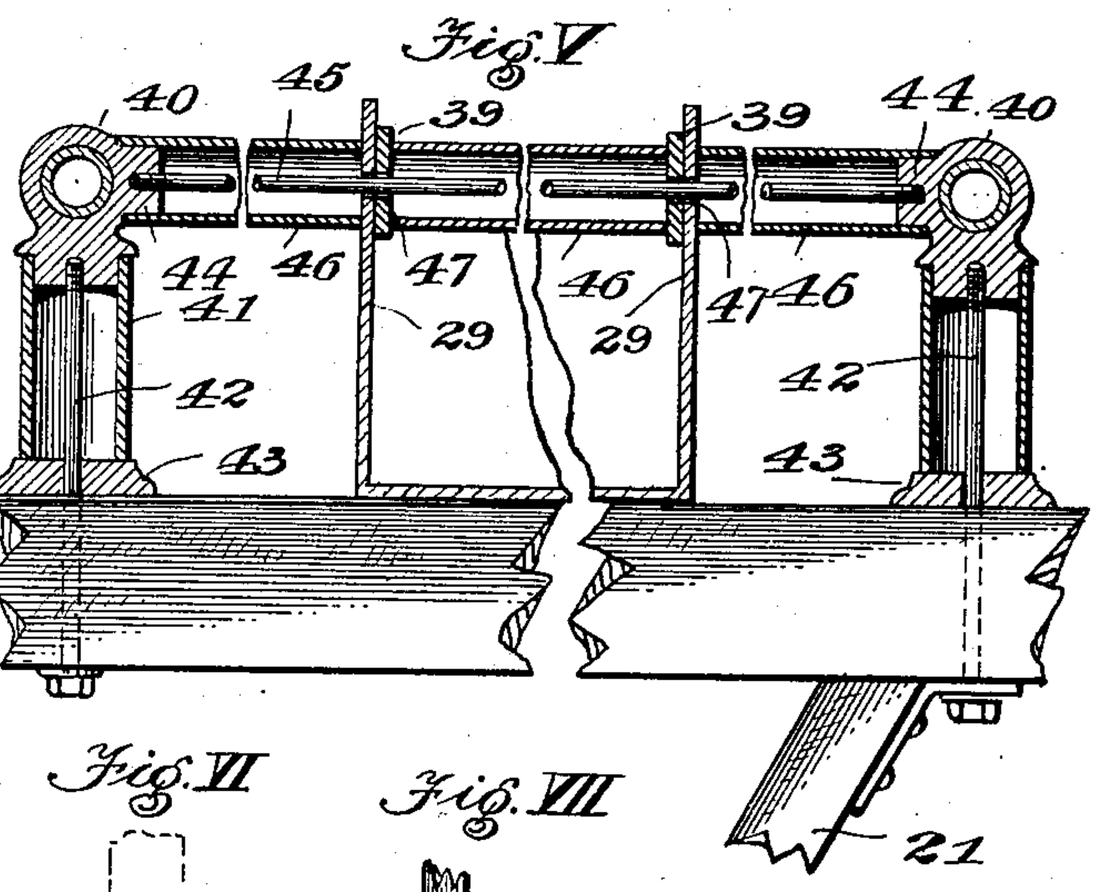


Fig. VI

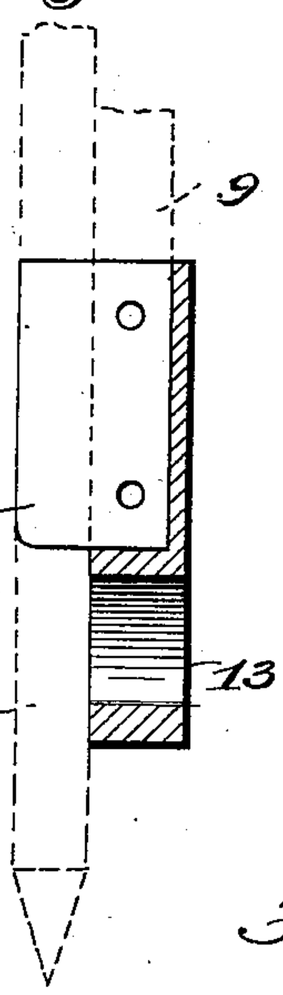


Fig. VII

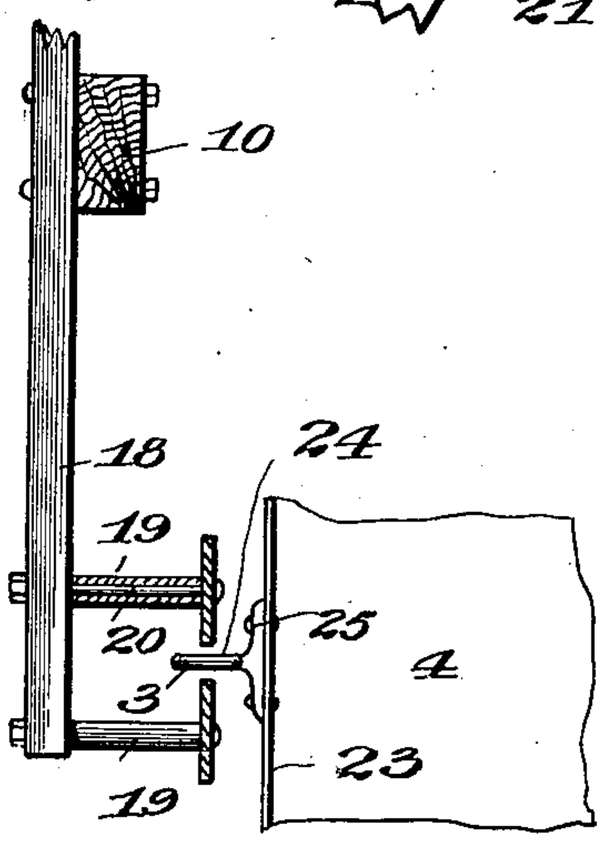


Fig. VIII

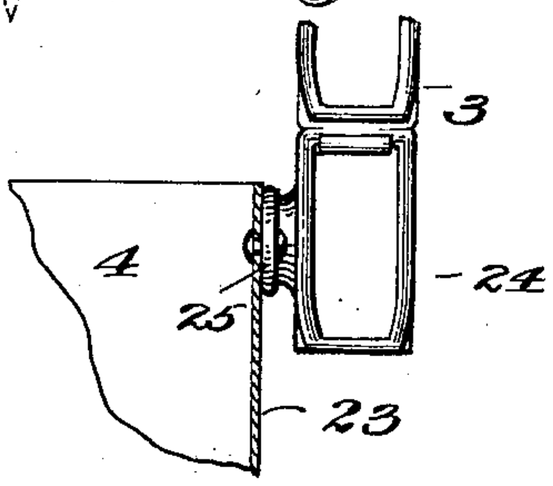
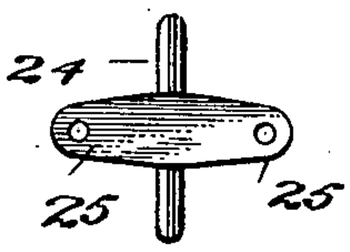


Fig. IX



Witnesses
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Inventor
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by Townsend Bros.
Their Attys

No. 744,288. Patented November 17, 1903.

UNITED STATES PATENT OFFICE.

JAMES LLOYD BROWN, OF LOS ANGELES, CALIFORNIA, ASSIGNOR OF ONE-HALF TO JOHN GEORGE YOUNG, OF LOS ANGELES, CALIFORNIA.

WATER-ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 744,288, dated November 17, 1903.

Application filed May 13, 1902. Serial No. 107,182. (No model.)

To all whom it may concern:

Be it known that I, JAMES LLOYD BROWN, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a certain new and useful Improvement in Water-Elevators, of which the following is a specification.

My invention relates to water-elevators, and more particularly to that class of such devices in which a series of buckets or carriers are mounted upon an endless conveyer and the carriers are adapted to be filled by being immersed in the water and are emptied by being wholly or partially inverted above a discharge trough or spout.

In constructing conveyers or elevators for water, earth, and other materials from a shaft, well, or other reservoir it is necessary that the carriers or receptacles be placed close together upon the conveyer, so as to elevate the greatest amount of material with the least forward movement of the chain and also to secure the carriers in such a manner that the contents will not be spilled while being elevated and emptied, especially where water is being elevated as for the purpose of irrigation, &c. It is also desirable to move the conveyer in such a manner that the carriers will be held as nearly level as possible while being elevated and that they will be turned over sufficiently to completely discharge their contents at the top. This I accomplish by causing the conveyer to travel substantially on the lines of a right-angle triangle, with the descending portion moving along the hypotenuse and the ascending and emptying portions moving along the lines of the other two sides, suitable guides being provided when desired to keep the ascending carriers level and to prevent oscillatory movements. It is also desirable to afford sufficient play or movement of the parts at the bottom to prevent catching or binding and possible breaking of the conveyer. I accomplish this by passing the conveyer over a vertically-movable support.

A still further desirable feature in elevators in which the conveyer is formed from sprocket-chains is to prevent the possibility of the links of the chain creeping or climbing up onto the teeth of the sprocket, whereby the chain is broken either by direct strain or by the jar caused by the dropping of the loaded portion of the conveyer when the links slip over the top of the sprockets. I accomplish this feature by passing the chains over smooth-surfaced pulleys except the pulleys to which the power is applied.

My invention has for one of its objects to produce a device of this kind which shall be peculiarly adapted for use in irrigation where the water is to be raised or elevated from a suitable source of supply, as from a well or reservoir, and be discharged at the top, from whence it is distributed to the point where needed.

Another object is to produce a device which can be readily and firmly secured in position and have power applied thereto in such manner that no special attention need be given to keep it in operation.

Another object is to construct a device in which the parts will be light in weight, yet strong and durable and that can be put up or assembled by the ordinary workman without the need of a skilled mechanic.

With these and other objects in view my invention consists in the improved construction and novel arrangement of parts of a water-elevator, as will be hereinafter more fully set forth.

The accompanying drawings illustrate the invention.

Figure I is a side elevation of one form of water-elevator embodying my invention. Fig. II is a top plan view of the same. Fig. III is a central sectional view of the upper portion of the elevator. Fig. IV is a side view of the elevator looking from the right-hand side of Fig. I. Fig. V is a detail view, partly in section, of the bearings at the top of the elevator. Fig. VI is a side view, partly in section, of the lower end of one of the posts of the elevator. Fig. VII is a transverse sectional view taken through one of the elevator-chains and the adjacent parts. Fig. VIII is a detail elevation, partly in section, of a portion of the chain and one of the buckets. Fig. IX is an edge view of one of the links of the chain.

In practicing my invention I preferably

mount the conveyer upon a frame or support 1 at the top of the well 2 or other place where it is to be used. The conveyer is preferably formed from two sprocket-chains 3, between which are suspended a series of buckets or scoops 4. The conveyer is mounted upon suitable pulleys 5, arranged in pairs or sets, two of the sets being arranged at a distance from each other upon the frame 1, and the other set is mounted at or near the bottom of the well 2. Two sets of the pulleys are smooth, while the third or motor set is provided with sprocket-wheels 6, which engage with the links of the chain and carry the conveyer forward when the power is applied to the sprocket-wheels, as by means of pulleys 7. The pulleys 5 may be secured to shafts 8; but I prefer mounting one pulley of each set loosely, except on the motor-shaft, so as to provide for any inequality that may occur in the respective chains, and thereby prevent binding or twisting of the parts. The lower pulleys are preferably mounted in a lower pulley-frame 9, which fits loosely between guides 10 and which may be raised or lowered to accommodate the apparatus to the depth of the well or shaft or to the level of the water therein. Said guides may be secured in position in any manner, as by having their upper ends secured to the frame 1 and their lower ends driven into the ground or connected with suitable framework. (Not shown.) The frame 9 is provided with flanges 11 and 12 at the top and the bottom, respectively, the bottom flanges forming parts of bearings 13, within which the lower shaft 8 is journaled. The frame 9 may slip on the guard from top to bottom, and vice versa, so that by putting in or taking out sections of the conveyer the same may be adjusted so that the lower end of the conveyer may be made to work at any desired depth in the well or shaft.

By arranging the lower pulleys substantially in a direct line below the smooth set of pulleys at the top the conveyer in passing over the pulleys will move upon the lines of a right-angle triangle, in which the descending leg 14 of the conveyer will move upon the hypotenuse, while the vertical or ascending leg 15 and the horizontal leg 16 will move, respectively, upon the other two sides. By applying power at the upper acute angle of the triangle the weight of the material in the ascending leg will cause the conveyer in the ascending and horizontal portions to be stretched taut at all times, thereby causing any slack that may occur to be in the descending leg of the conveyer. This will cause the ascending portion to run smoothly; but to prevent any swing or lateral movement that might occur I prefer to arrange two parallel guides 17 upon opposite sides of each chain or supporting portion of the conveyer. These guides may be secured at a distance from brackets 18 by means of hollow sleeves or spacers 19 and bolts 20. The brackets 18 are secured to the vertical guides 10, and they may be extended so as to support inclined braces 21, which extend from the frame 1 down nearly to the bottom of the posts or guides 10. Cleats 22 may be secured upon the braces 21 to form a ladder for going into or out of the well.

The buckets are preferably formed from sheet-iron, with or without a strengthening-strip at the top, and are each preferably semicircular in cross-section with straight or parallel ends 23. Each end is rigidly secured at its upper edge to the conveyer, as to one of the links 24, in any suitable manner, as by means of ordinary cross-arms 25. The point of attachment between each bucket and the chain is at substantially the mid-width of the bucket and is so made that the top of the bucket will stand at right angles to the chain at all times, being at such a distance from the inner edge on wall 26 that when the bucket is being discharged said wall forms a straight discharge-lip, which will just pass over the shaft 8 between the set of pulleys at the right angle of the triangle at the top of the well.

The outer edge on wall 27 of the bucket is formed on a curve equal to the arc of a circle whose center is at the center of the shaft at the bottom of the well, and the radius extends to the outer edge of the bucket when it is passing over the pulleys on said shaft. This form of the outer line or edge of the bucket will cause it to enter the water as a knife-edge, and thereby offer the least resistance and also prevent jarring or movement of the elevator, which would be caused by a flat portion of the bucket striking the water. The inner edge on wall of the bucket is substantially straight or flat and has a sufficient inclination to permit of the complete discharge of the contents while the bucket is traveling along the horizontal portion of its journey. Said elevator-bucket is formed in the segment of a cylinder, and the outer wall 27 thereof is substantially conformed to the curved portion of the perimeter of said segment, and the inner wall 26 of said bucket is a chord to the extended curve of said curved portion, and the radius of said curved portion is such that when the bucket is passing around a pulley said curved outer wall lies substantially in an arc inscribed from the axis of the pulley. This will be understood from Figs. I and III, in the latter of which views it will be observed that the inner wall of the discharging-bucket is aslant and directed above the shaft 30 at the moment of discharge, so that the contents of the bucket will be poured over the shaft into the receptacle while the outer curved wall of said bucket resists any tendency of any water to fly up from centrifugal force, whereby the elevator is adapted to empty more readily and to run at a higher speed without throwing or dragging the water or other material. This form of bucket will also permit of the escape of the air at the earliest possible moment as it is carried

around the lower pulleys, thereby permitting of the buckets being completely filled with water as soon as they start on their upward journey. By rigidly securing the buckets to the chain with the top at right angles thereto and moving the ascending leg in a vertical direction the buckets can be filled to their top without danger of the water being spilled or splashed out. It will also cause the outer edge of the bucket to swing in a much greater arc than the inner edge when the bucket is being emptied or passed over the shaft of the bucket-emptying set of pulleys, thereby preventing the bucket from being jerked out from under a portion of the water at the outer edge when the turn is being made, as would happen if the buckets were pivotally secured to their supports or were not secured rigidly at their upper edges. Since the distance between the inner edge of the bucket and the links which suspend said bucket is approximately equal to the radius of the bucket-emptying set of pulleys, the inner edge of the bucket remains substantially still by moving through such a small arc of a circle while it is being emptied, and it is evident that the discharge takes place virtually similar to what would occur in emptying an ordinary pail by hand, as by resting one edge upon a support and swinging the entire bucket and its contents thereon in the arc of a circle. This desirable end is attained by so constructing and mounting the trough and buckets that the outwardly-inclined discharge-lip of the bucket passes in close proximity to the bucket-emptying set of pulleys.

Although any desired form of trough or receptacle may be used at the top of the well, I prefer and have shown a trough 28, preferably formed from galvanized sheet-iron, with its bottom resting upon or supported by the frame 1 and one side of it provided with a lateral discharge 29. The ends of the trough are preferably inclined, and one of them, as at the emptying end, may have an end lip 30, which extends to and over the axle 8, so as to partially or wholly encircle the axle, as shown. This will prevent the escape of any water at that point, as the contents of the buckets do not begin to escape until after the inner edge of the bucket has passed above the center of said shaft and the direction of movement of the buckets begins to change from vertical to horizontal.

The sides of the trough are extended a sufficient distance above the shafts 8 to prevent the escape of the water except through the discharge, and at the emptying end of the trough the sides are extended beyond the shaft 8, so as to form guards 31, between which the ends of the buckets pass as they are being swung over in emptying, thus preventing the escape of the water from the buckets laterally beyond the sides of the trough. In this connection I have provided means, which I will now describe, arranged in the trough to retard and quiet the rush of water and prevent the splashing thereof. Arranged horizontally within the trough at a suitable distance above the bottom to prevent its interfering with the escape of the water through the discharge-outlet is a lattice-work 32, the slats 33 of which are inclined and arranged substantially on a line with the oblique rush of water from the buckets. When the lattice-work is constructed and mounted in the trough in this manner, the thin slat 33 not only tend to guide the water into the trough, but on account of their inclination they prevent the inrushing water from being thrown out of the trough by splashing up from the bottom thereof when emptied from moving buckets. The slats may be held together and retained in their inclined position in any suitable manner, as by means of spacers 34 and bolts 35, the bolts being passed through the upper and lower edges, respectively, of the adjacent slats and through the spacers. The end slat 36 may be extended so as to be adjacent to or bear against the inclined end of the trough and provided with perforations 37 or openings through which any water, as the drippings from the buckets, can find its way down into the trough and out through the discharge. An inclined glance-board 38 is secured at its end to the opposite sides of the trough and extends diagonally underneath the lattice-work to assist in forcing the water out at the discharge. The bottom of the glance-board is arranged at a short distance above the bottom of the trough, so as to permit of the escape of any water thereunder which may be carried or forced over onto the outside of said board. The ends of the board are preferably bent at an angle and secured to the sides of the trough, whereby greater rigidity is secured for the parts.

Although the lattice-work may be supported in any desirable manner, I have shown it resting upon two brace-bars 39, the inner ends of said bars being preferably bent and secured to the sides of the wall or trough opposite the discharge-outlet and extended across the trough and out into and secured to the sides of the discharge-outlet. These bars will thus give sufficient rigidity to the sides of the trough and outlet to prevent their being damaged or bent by the weight of the water being discharged. By properly spacing the slats apart the angles formed by two of the slats and their bolts will rest upon the bars, and the lattice-work will thereby be prevented from being moved out of position. By arranging the lattice-work in this manner it can be held at a sufficient distance above the bottom of the trough to prevent its interfering with the escape of the water, and at the same time its upper surface will be out of the way of the inner edges of the buckets as they are being carried horizontally across it, the strain upon the conveyer being sufficient to prevent any sagging of the buckets at that point. By causing the conveyer to travel in a horizontal direction

across the top of the trough, with the buckets rigidly held with their tops in a vertical direction and the inner edge on an incline, a sufficient opportunity is given for the entire contents of the buckets to be discharged into the trough before the buckets are started on their journey into the well for another load.

To permit of supporting the trough directly on top of the frame 1, it is necessary that the shafts 8 be supported at a suitable distance above the frame, which can be done by mounting their bearings 40 on top of suitable sleeves 41 and holding them rigidly in place by means of machine-bolts 42. If desired, a shouldered washer 43 may be placed under each sleeve and each bearing may be provided with a shoulder 44 to fit into the top of the sleeve. Additional rigidity is given to the bearings by connecting those upon the same side of the trough by means of a screw-threaded rod 45, which is screwed at its ends into shouldered projections therefrom. Suitable sleeves 46 are mounted on the rods, with their ends in engagement with the projections, whereby a very strong and rigid construction is formed. The sleeves upon the discharge side of the trough are preferably formed in sections, the end ones of which fit between the bearings and the sides of the outlet, and the middle one fits between said sides. In this manner the sleeves act as supports or braces for the sides of the outlet, and the shaft passes through suitable openings 47 in the sides of the outlet and through the bars 39.

In operating my invention the conveyer is mounted upon the pulleys and power applied to the pulleys provided with the sprockets or teeth. This will cause the buckets of the conveyer to be carried down into the water and up out of the same and over the trough, from whence the water can be delivered where needed, as over the land to be irrigated. Owing to the peculiar formation of the buckets they will be carried into and through the water with the least possible resistance and will be carried to the top with comparatively no loss of contents and discharged without excessive waste or leakage. The buckets can be formed without spouts or projections at the top and can thereby be arranged very close to each other upon the chains, thereby increasing the capacity of the conveyer in proportion to its length, which will permit of an almost constant stream being poured into the trough. As the separate buckets are carried up over one set of the upper pulleys and discharged the water will pass down between the slats of the lattice into the trough, and as it will be impossible for it to pass up between the slats in the opposite direction to escape it will be forced out through the lateral discharge, the weight of the oncoming stream of water as the bucket is emptied adding to the movement of the water below it in passing out through the sides of the trough into the discharge.

When it is desired to vary the position of the lower end of the conveyer, it can readily be done by putting in or taking out additional links in the chain, preferably upon the inclined or descending portion, thereby regulating the length of the conveyer to the height of the water in the well or reservoir and also permitting the conveyer to be used for the purpose of sinking shafts or excavations in the ground, whereby the empty buckets may be always carried down to a convenient point to be filled by the workmen in the shaft. The utility of the elevator for this purpose is increased by reason of the peculiar formation through which it is caused to pass—that is, by arranging one leg or portion of it adjacent to one side of the shaft and inclining the other leg or portion, which will give plenty of room in the main portion of the shaft for the workmen in removing the earth and filling it into the buckets.

Although I have shown what I consider the most desirable form of constructing my invention, yet it is evident that changes and alterations can be made therein, and I reserve the right to make such variations in any or all of the parts as will come within the scope of my invention.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. In a water-elevator, a support, sets of pulleys mounted thereon, vertical guides below one of said sets, a lower set of pulleys mounted between said guides, a pair of parallel guides for the connection and extending longitudinally in line with one of the top sets of pulleys and the lower set of pulleys, a trough having an end lip extending to and over the axle of the bucket-emptying set of pulleys, a conveyer comprising two parallel connections adapted to engage with the respective pulleys and pass between the parallel guides, and buckets mounted between the connections and having discharge-lips adapted to pass in close proximity to the axle of the bucket-emptying set of pulleys.

2. In a water-elevator, in combination, a trough, means for emptying moving buckets into said trough, and a series of slats in the trough having their lower sides inclined to prevent the water splashing out of the trough.

3. In a water-elevator, in combination, a trough, means for emptying moving buckets into said trough, and a series of slats therein having their upper edges inclined toward the incoming water and their lower sides adapted to prevent splashing.

4. In a water-elevator, in combination, a trough, a series of buckets adapted to be emptied into said trough while moving longitudinally thereof, and a series of transverse slats in said trough having their upper edges inclined toward the incoming water and their lower edges raised slightly above the bottom of the trough, the lower sides of said slats being adapted to prevent the water splashing out of the trough.

5. In a water-elevator, in combination, an

elongated trough adapted to receive water from buckets moving longitudinally thereover, a moving connection, a series of buckets mounted thereon, pulleys for carrying said connection, there being a pulley at the end of the trough adjacent to the ascending buckets whereby the direction of movement of the buckets is changed from vertical to horizontal as said buckets begin to empty, and a series of transverse slats inclined toward the incoming water and arranged in the trough to prevent water splashing therefrom.

6. In a water-elevator, a frame, sets of pulleys mounted therein, one of said sets near the bottom of the well, an endless conveyer carried by said sets of pulleys and including two parallel connections, a bucket attached to the connections at substantially its mid-width, the outer wall of said bucket forming a curve which lies substantially in an arc inscribed from the axis of the bottom set of pulleys when the bucket passes therearound, the inner wall of said bucket being substantially straight and forming a lip which moves in close proximity to the axis of one of the upper sets of pulleys when emptying, and a trough extending to and over the axle of the bucket-emptying set of pulleys.

7. In a water-elevator, a support, sets of pulleys mounted thereon at a distance from each other, vertical guides below one of said sets, a set of pulleys loosely mounted between said guides, a pair of parallel guides adjacent to each vertical guide, and an endless conveyer mounted upon said pulleys, said conveyer comprising two chains and a series of buckets secured thereto, said chains being adapted to engage with the respective pulleys and to pass between the parallel guides.

8. In a water-elevator, a support, sets of pulleys mounted thereon at a distance from each other, vertical guides below one of said sets, a set of pulleys loosely mounted between said guides, brackets secured to said guides, parallel guides for each vertical guide, bolts and spacers for securing said parallel guides to the brackets, and an endless conveyer provided with chains which engage with the respective pulleys and pass between said parallel guides.

9. In a water-elevator, a support, sets of pulleys mounted thereon at a distance from each other, guides below one of said sets, a set of pulleys loosely mounted between said guides, brackets secured to each of said guides, parallel guides secured to the projecting ends of said brackets at one side of each guide, and an inclined brace secured to the other, said inclined brace being provided with cleats to form a ladder, and an endless conveyer provided with chains which engage with the respective pulleys and pass between said parallel guides.

10. In a water-elevator, a support, sets of pulleys mounted thereon at a distance from each other, a set of pulleys below said support, a trough between the pulleys at the top and provided with a lateral discharge, a lattice mounted in said trough above the bottom and comprising inclined slats and means for spacing them apart, an endless conveyer upon said pulleys provided with buckets, and means for discharging the contents of said buckets substantially in a line with the inclination of said slats.

11. In a water-elevator, a support, sets of pulleys mounted thereon at a distance from each other, a set of pulleys below said support, a trough between the pulleys at the top and provided with a lateral discharge, a lattice mounted in the trough at a distance from the bottom, an inclined glance-board below said lattice, and an endless conveyer mounted upon said pulleys.

12. In a water-elevator, a support, sets of pulleys mounted thereon at a distance from each other, a set of pulleys below the support, a trough between said pulleys and provided with a lateral discharge, a lattice mounted in the trough at a distance from the bottom, one of the slats of which has its lower edge adjacent to one end of the trough, an inclined glance-board below the lattice, the lower edge of which is at a distance from the bottom of the trough, and an endless conveyer on said pulleys.

13. In a water-elevator, a support, sets of pulleys mounted thereon at a distance from each other, a set of pulleys below the support, a trough between the pulleys at the top and provided with a lateral discharge, braces secured to the sides of the trough opposite the discharge at one end and secured to the sides of the discharge beyond the trough at the other end, a lattice mounted on said braces within the trough, and an endless conveyer mounted on said pulleys.

14. In a water-elevator, a support, sets of pulleys mounted thereon at a distance from each other, a shaft for each set of pulleys, the bearings for which are each provided with shoulders, a sleeve and a bolt for supporting each bearing upon the support, screw-threaded rods for connecting the bearings of the respective ends of said shafts, a trough between said pulleys, and an endless conveyer over said pulleys.

15. In a water-elevator, a support, sets of pulleys mounted thereon at a distance from each other, each set being provided with a shaft, a trough between said sets and provided with a lateral discharge, the sides of said discharge being perforated, means for supporting the journal-bearings of said shafts above the support, screw-threaded rods and sleeves for connecting the journal-bearings upon the same side of the trough with each other, the sleeve upon the discharge side of the trough being formed in sections, the end sections fitting between the journal-bearings and the sides of the discharge and the middle section fitting between said sides, the

shaft upon said side passing through said sections and through perforations in the sides of the discharge.

16. In a water-elevator, an endless conveyer and pulleys of definite radius therefor, a trough adjacent to the axle of the bucket-emptying set of pulleys, the elevator being provided with a bucket which is attached at substantially its mid-width to the conveyer, said bucket being formed in the segment of a cylinder and the outer wall thereof substantially conformed to the curved portion of the perimeter of said segment and the inner wall forming a straight outwardly-inclined pouring-lip which passes in close proximity to the axle of the bucket-emptying set of pulleys, the curved portion being such that when the bucket is passing around the lower set of pulleys said outer wall lies substantially in an arc inscribed from the axis of the pulley.

17. In a water-elevator, a frame, sets of pulleys mounted therein, one of said sets near the bottom of the well, an endless conveyer carried by said sets of pulleys and including two parallel connections, a bucket attached to the connections at substantially its mid-width and having a pouring-lip which passes in close proximity to the axle of the bucket-emptying set of pulleys, and a trough having a lip adjacent to the axle of the bucket-emptying set of pulleys, said lip being adapted to receive the water as soon as the buckets begin to empty.

18. The combination of a conveyer comprising chains and having an ascending limb, pulleys carrying said chains, two pulleys being bucket-emptying pulleys arranged at the top of the ascending limb of said conveyer to change the direction of the conveyer, and a bucket suspended from and rigidly connected with opposite links of the conveyer and furnished with a pouring-lip, the edge of which is located inwardly from said links a distance therefrom approximately equal to the radius of said supporting-pulleys.

19. In a water-elevator, a support, sets of pulleys mounted thereon at a distance from each other, a trough extending between said sets of pulleys, a shaft for each set of pulleys, bearings for said shafts and above the support, and a rod connecting the bearings of the respective pulleys.

20. In a water-elevator, a support, sets of pulleys mounted thereon at a distance from each other, a trough extending between said sets of pulleys, a shaft for each set of pulleys, bearings for said shafts and above the support, and a rod on each side of the trough connecting the bearings of the respective pulleys.

In testimony whereof I have signed my name, in the presence of two subscribing witnesses, at Los Angeles, in the county of Los Angeles and State of California, this 2d day of May, 1902.

JAMES LLOYD BROWN.

Witnesses:
W. S. BOYD,
F. M. TOWNSEND.