(No Model.) 2 Sheets—Sheet 1.

W. CLAYPOOL & C. E. DOOLEY.

WATER ELEVATOR.

No. 572,596. Patented Dec. 8, 1896.

FIG. 4.

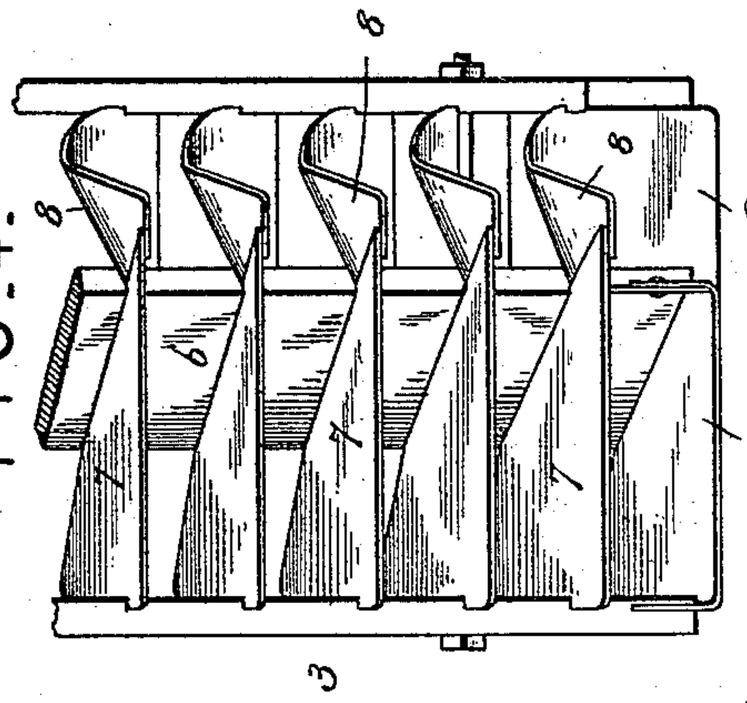

FIG. 1.

Witnesses
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C. E. Doyle

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William Claypool
and
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By their Attorneys,
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(No Model.) 2 Sheets—Sheet 2.

W. CLAYPOOL & C. E. DOOLEY.

WATER ELEVATOR.

No. 572,596. Patented Dec. 8, 1896.

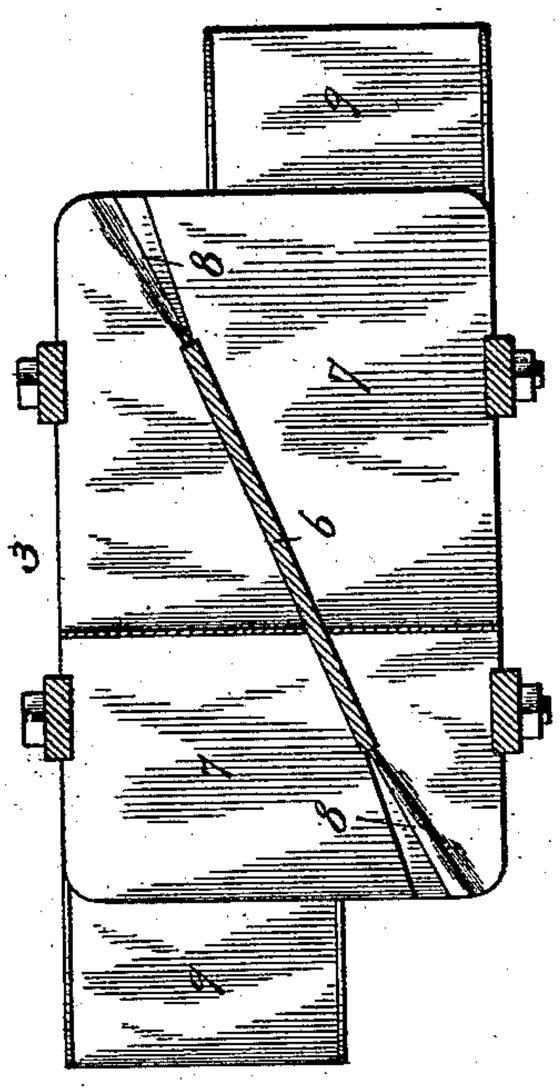

FIG. 3.

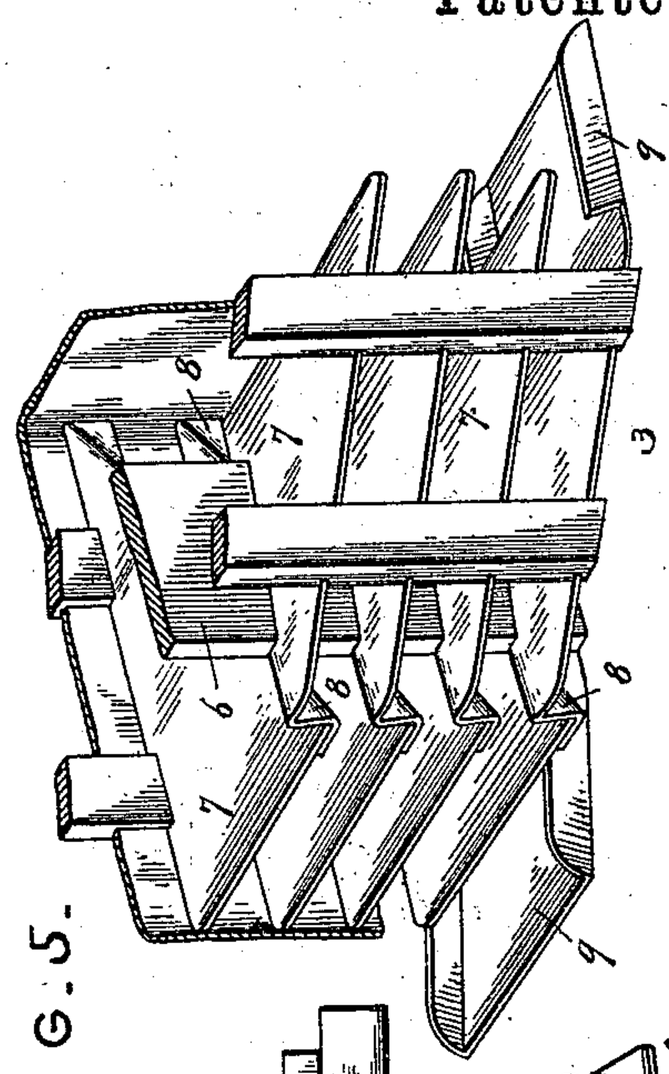

FIG. 5.

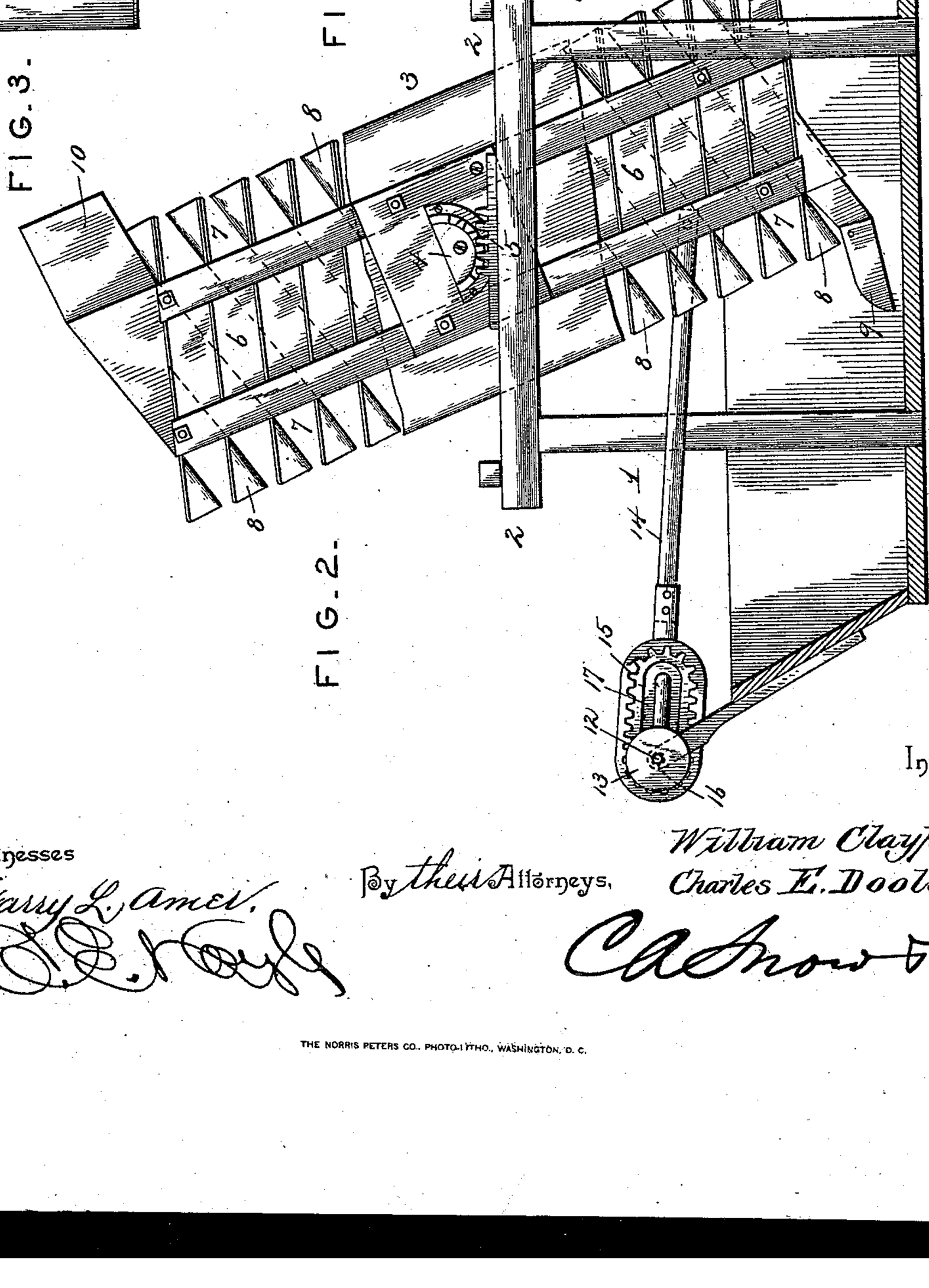

FIG. 2.

Witnesses
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By their Attorneys,
William Claypool and
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UNITED STATES PATENT OFFICE.

WILLIAM CLAYPOOL AND CHARLES E. DOOLEY, OF GERING, NEBRASKA.

WATER-ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 572,596, dated December 8, 1896.

Application filed May 25, 1895. Serial No. 550,667. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM CLAYPOOL and CHARLES E. DOOLEY, citizens of the United States, residing at Gering, in the county of Scott's Bluff and State of Nebraska, have invented a new and useful Water-Elevator, of which the following is a specification.

Our invention relates to water-elevators designed especially for use in connection with the irrigation of land; and the objects in view are to provide a simple and efficient apparatus adapted to lift water from a depressed pool or stream and deposit it with an approximately continuous flow upon a higher level, from which it may be conducted by suitable means, forming no part of our invention, to the points needing irrigation, and, furthermore, to provide mechanism whereby gravity is employed as an agent in the elevation of the water.

Further objects and advantages of this invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings, Figure 1 is a perspective view of an apparatus constructed in accordance with our invention. Fig. 2 is a side view showing one side of the casing of the oscillating plunger partly removed, the plunger being shown in the inclined position which it assumes in order to cause the water to descend the inclined blades upon the near side of the device. Fig. 3 is a horizontal section of the plunger. Fig. 4 is a side view of a portion of the plunger. Fig. 5 is a detail view in perspective of the lower end of the plunger.

Similar numerals of reference indicate corresponding parts in all the figures of the drawings.

1 designates a supporting-framework, which may be of any suitable construction, having horizontal front and rear beams 2, and 3 represents the oscillatory plunger, which swings between said horizontal beams and is provided approximately at the center of its length with segmental rockers 4, mounted upon bearing-plates 5 on said beams. These segmental rockers are preferably toothed, as shown, and the teeth thereof mesh with corresponding teeth upon the bearing-plates, whereby displacement of the plunger during operation is prevented. It will be seen that the use of a rocker on the plunger causes the point of support of the plunger to vary as the inclination of the plunger varies, said point of support approaching the lower side of the plunger or that from which the lower end of the plunger is swinging, the object of this construction being explained hereinafter.

The plunger consists of an exterior casing within which is arranged a web or partition 6, which, in horizontal section, is arranged upon a diagonal of the casing, said partition being of less width than the diagonal of the casing, whereby it is separated at its side edges from the side walls and opposite angles of the casing to form passages through which the material to be elevated may pass. Arranged between each side of the diagonally-disposed web or partition and the opposite side of the casing is a series of parallel inclined blades or chutes 7, the blades or chutes upon opposite sides of the web or partition being inclined in opposite directions. The blades or chutes upon opposite sides of the web or partition are connected in series by means of guards 8, disposed approximately in vertical positions and arranged approximately in the plane of the diagonal web or partition.

By reason of the parallel-sided casing and the diagonally-disposed dividing web or partition it is obvious that the blades or chutes are tapered in length, and the reduced ends of the blades or chutes upon one side of the web or partition connect with and are adapted to discharge upon the broad or enlarged ends of the blades or chutes upon the other side of the web or partition, and in order to cause the blades or chutes upon one side of the web or partition to discharge upon the blades or chutes upon the opposite side the plunger must be arranged in such a position, as indicated in Fig. 2, as to cause the first-named blades or chutes to assume an inclined position downward toward their reduced ends. When the plunger assumes this position, the water or other material upon all of the blades or chutes seeks the depressed points of connection of the blades or chutes, and as in this position of the apparatus the reduced extremi-

ties of the blades or chutes upon one side of the web or partition are above the planes of the enlarged ends of the blades or chutes upon the other side of the web or partition it is obvious that the material will flow from the reduced ends of the first-named blades to the enlarged ends of the connected blades or chutes; hence the construction of the plunger with longitudinally-tapered blades or chutes inclined and tapered in opposite directions upon opposite sides of the dividing web or partition, the reduced ends of the blades upon one side connecting with the enlarged ends of the blades upon the other side, and the former being elevated above the planes of the enlarged ends of the latter and being connected thereto by guards depending from the reduced ends of the former. The water or other material flows from the reduced ends of one set of blades to the enlarged ends of the connecting-blades for the reason that the latter offer increased space and are depressed in lower planes. When the plunger is reversed in position or inclined in the opposite direction, the water or other material which has been deposited upon the enlarged ends of the blades or chutes will flow down said blades and pass to the other side of the web or partition around the opposite edge thereof, said water or other material being prevented from flowing back to the reduced ends of the blades or chutes from which it has previously flowed by the approximately vertical guards 8.

Communicating with the enlarged ends of the lowermost blades or chutes are dippers 9, which are adapted to dip the water, grain, or other material from the reservoir, pool, stream, or other source and carry it to the blades or chutes with which they communicate, and when the material has reached the uppermost blades or chutes it is discharged through the outlet-spout 10.

In the construction illustrated in the drawings the blades or chutes are arranged in duplicate series communicating, respectively, with the oppositely-disposed dippers 9, and hence two distinct streams of material flow from the dippers, respectively, until they reach the outlet-spout, where they escape simultaneously. The connection of a blade or chute upon one side of the partition with the opposite ends of alternate blades or chutes upon the opposite side is shown clearly in Fig. 2.

It is obvious that when the plunger is inclined to cause the material to flow toward the reduced ends of the blades or chutes the weight of the material is concentrated at the lower side of the plunger, and it is in order to arrange the point of support or fulcrum of the plunger in the plane approximately of the center of gravity in all positions of the apparatus that we employ the rocker-bearings. The rockers cause the point of support to approach the lower side of the plunger, and hence advance in the direction that the center of gravity advances as the material carried by the elevator approaches the lower or reduced extremities of the blades or chutes, preparatory to reversing the plunger to cause the material to flow in the opposite direction upon the blades or chutes at the opposite side of the web or partition. When the plunger is in an upright position, the point of support is at the center, and as the plunger swings to the opposite side the point of support again advances toward the lower side and hence remains constantly in the vertical plane of the center of gravity. The advantage of this arrangement is that it minimizes the necessary power for operating the plunger and avoids the excessive strain upon the operating parts in starting the plunger from its inclined position in either direction. In other words, it equalizes the weight in all positions of the plunger and causes the strokes to be uniform throughout. Instead of having a fixed point of support with a moving center of gravity controlled by a moving load, we employ a shifting point of support which is controlled by the position of the plunger, and hence indirectly by the position of the load, inasmuch as the position of the load is controlled by the position of the plunger.

Any suitable means for communicating an oscillatory movement to the plunger may be employed, the means which we have illustrated in the drawings being effective, and consisting, essentially, of a pinion 11, carried by a shaft 12, upon which is fixed a belt-pulley 13, (any other equivalent means for operating said shaft may be employed,) a pitman 14, connected at one end to the plunger, and a rack 15, secured to the pitman and engaged by the pinion. The rack is approximately elliptical in construction, having opposite parallel sides and rounded extremities, the teeth being internal to engage with the pinion when the latter is located between the parallel sides of the rack, and the extremity of the shaft being extended beyond the plane of the pinion to form a guide-stud 16, which operates in a guide-groove 17 parallel with the teeth of the rack.

The driving-shaft is adapted to receive a continuous rotary movement, whereby it imparts a swinging movement to the plunger when the pinion is in engagement with either of the parallel sides of the rack, said plunger remaining substantially in a state of rest during the time that the pinion is in engagement with the teeth at either of the rounded ends of the rack, this period of rest being sufficient to allow the contents of the plunger to pass from the reduced ends of one set of blades or chutes to the enlarged or broad ends of the other set.

It will be seen that no lateral movement of the liquid at the ends of the strokes is necessary in order to pass from a blade of one set to the communicating blade of the other set,

such lateral or transverse movement being avoided by the use of a thin partition or web 6 and by the arrangement thereof in a diagonal position, as described. When the water or other liquid reaches the reduced discharge end of one blade and passes into the enlarged receiving end of the connected blade, it is allowed to spread over a greater area than that formerly occupied, and hence is effectually prevented from returning upon the same blade as that over which it has just passed by a comparatively slight obstruction in the way of the guard 8.

A further advantage of the construction above described resides in the fact that by arranging the fulcrum of the elevator at an intermediate point the lower end thereof serves to counterbalance the upper end, and hence it is only necessary for the shifting fulcrum to compensate for the movement alternately in opposite directions of the liquid. Even a portion of this movement of the liquid is compensated for by the intermediate fulcruming of the elevator, inasmuch as that liquid which is upon the blades below the fulcrum-point serves to partially counterbalance that portion which is above, and hence by means of this fulcruming of the elevator at an intermediate point the upper and lower ends of the elevator, even when loaded, may be approximately counterbalanced. We prefer, however, to balance the upper and lower ends of the elevator, when emptied, by arranging the fulcrum approximately at the center of its height or length and accomplish the counterbalancing of the contents thereof by the employment of a shifting fulcrum which advances in the direction of the load and thus remains permanently in the plane of the center of gravity of the loaded elevator.

Various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of this invention.

Having described our invention, what we claim is—

1. In an elevator, an oscillatory plunger having inclined blades tapered continuously toward their discharge ends and connected in series the reduced discharge end of each blade being arranged slightly above the plane of the broad receiving end of the connected blade whereby backflow is prevented, guards 8 interposed vertically between the connected ends of the blades, and means for depositing the material to be elevated upon the lowermost blade or chute, substantially as specified.

2. In an elevator, an oscillatory plunger provided with inclined blades connected in series and arranged in sets, the blades in each set being parallel and the blades in one set being inclined oppositely to those in the other, a diagonally-disposed web or partition separating the sets except at their connected extremities, and means for depositing the material to be elevated upon the lowermost blade, substantially as specified.

3. In an elevator, an oscillatory plunger provided with inclined blades connected in series and arranged in vertical sets, an interposed partition separating the sets except at their connected extremities, the blades being reduced or tapered continuously in width toward their discharge ends, and means for depositing the material to be elevated upon the lowermost blade, substantially as specified.

4. In an elevator, an oscillatory plunger having twin sets of communicating oppositely-inclined blades, said blades being inclined upward toward their discharge ends whereby the plunger must be inclined at a greater angle than the blades in order to cause the material to be elevated to advance toward the discharge ends of the blades by gravity, and a shifting fulcrum for the plunger arranged at an intermediate point of its height whereby the bearing-point is advanced in the same direction as the load to occupy a position in the vertical plane of the center of gravity, substantially as specified.

5. In an elevator, an oscillatory plunger provided with a series of inclined blades arranged in vertical sets, each blade in one set being in communication at its opposite ends with higher and lower blades in the other set, said plunger being fulcrumed at an intermediate point whereby the portion below the fulcrum approximately counterbalances the portion above the same, and the fulcrum being of shifting construction and consisting of interlocking toothed bearing-plates and rockers carried respectively by a frame and the casing, whereby as the plunger is inclined to move the contents of the blades alternately toward the opposite ends thereof the bearing-point is moved in the same direction, or toward the weighted ends of the blades, to maintain the bearing-point in the vertical plane of the center of gravity, substantially as specified.

6. In an elevator, an oscillatory plunger having a cross-sectionally rectangular elongated casing or shell, a longitudinal partition arranged in the plane of one of the diagonals of the casing and terminating at its lateral edges short of the angles of the casing to form intervals by which the spaces upon opposite sides of the partition communicate, twin sets of inclined blades arranged, respectively, upon opposite sides of the plane of said partition with the reduced end of each blade communicating with the broad end of a blade upon the opposite side of the partition, means for depositing material to be elevated upon the lowermost blade, and a shifting fulcrum arranged upon the casing at a point between its extremities and consisting of stationary toothed bearing-plates and segmental toothed rockers secured to the casing and meshing with the teeth of the bearing-plates, whereby as the plunger is inclined to move the con-

tents of the blades alternately toward the opposite ends thereof the bearing-point is moved in the same direction or toward the weighted ends of the blades to maintain the bearing-point in the vertical plane of the center of gravity, substantially as specified.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in the presence of two witnesses.

WILLIAM CLAYPOOL.
CHARLES E. DOOLEY.

Witnesses:
A. B. WOOD,
E. F. MOON.