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PATENTED JUNE 21, 1904.

A. JOHNSON & G. B. WILLCOX.

SALT RAKER.

APPLICATION FILED MAR. 6, 1903.

NO MODEL.

3 SHEETS—SHEET 1.

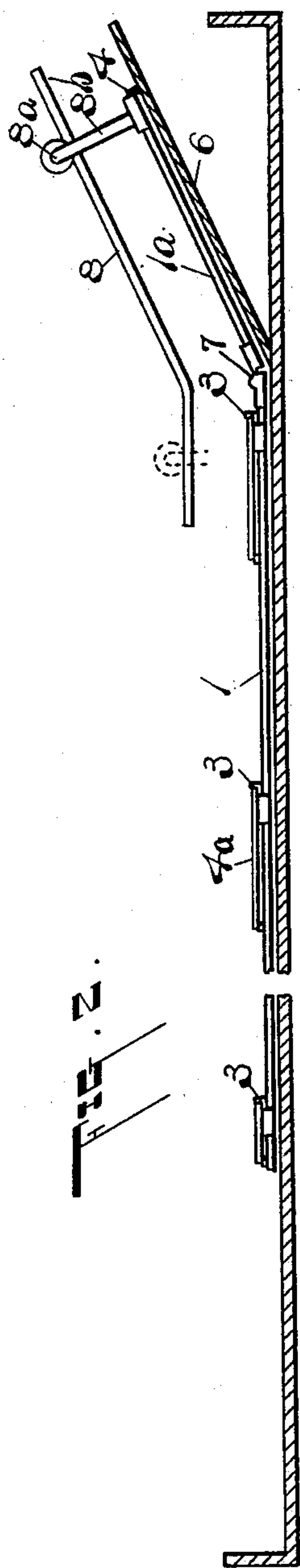
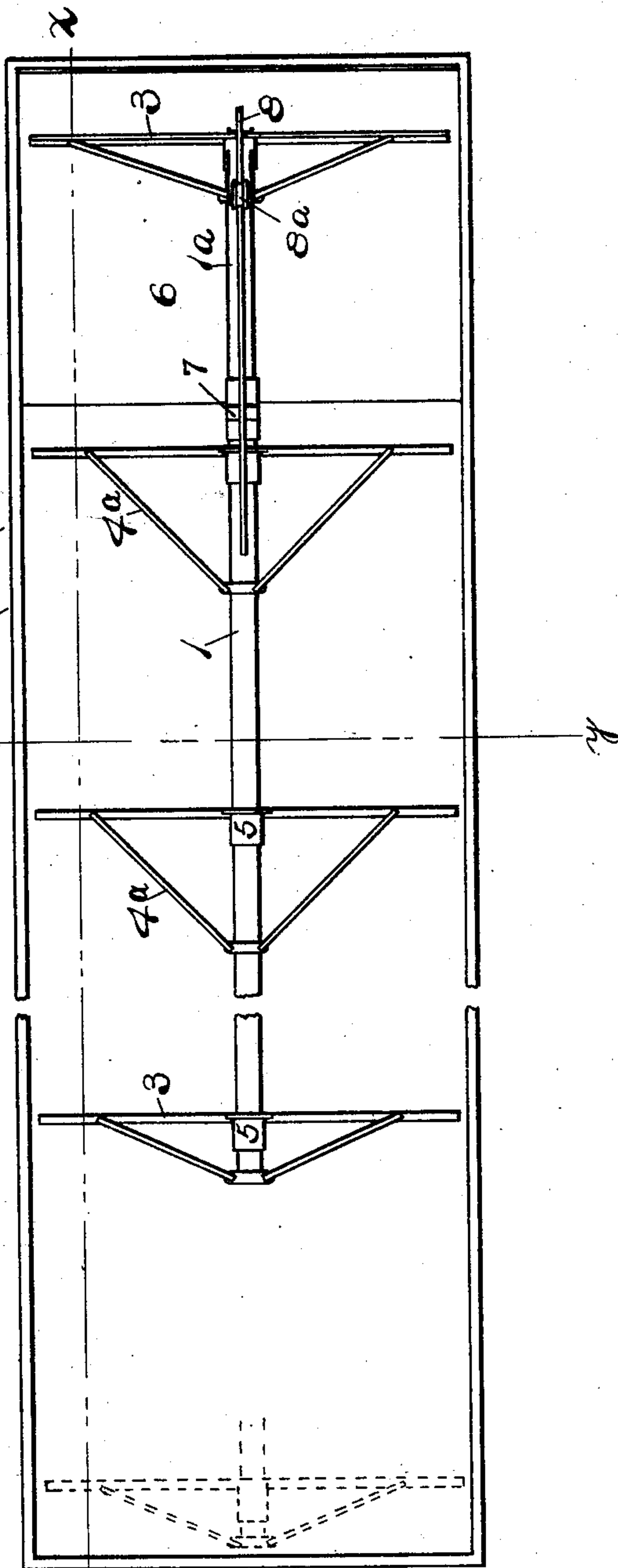


FIG. 2.



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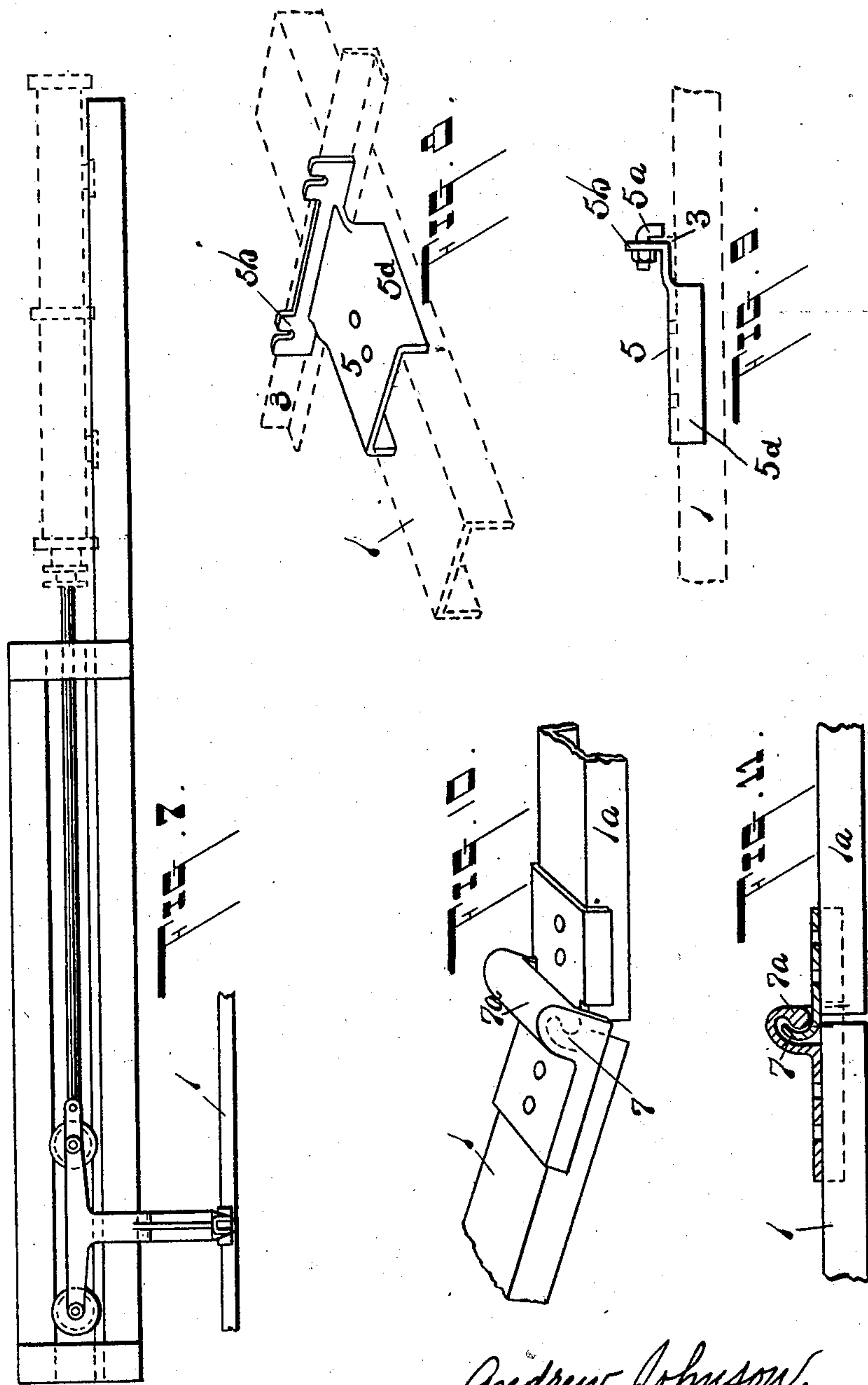
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James C. Hanson.
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UNITED STATES PATENT OFFICE.

ANDREW JOHNSON, OF SAGINAW, AND GEORGE B. WILLCOX, OF BAY CITY, MICHIGAN.

SALT-RAKER.

SPECIFICATION forming part of Letters Patent No. 762,908, dated June 21, 1904.

Application filed March 6, 1903. Serial No. 146,514. (No model.)

To all whom it may concern:

Be it known that we, ANDREW JOHNSON, residing at Saginaw, in the county of Saginaw, and GEORGE B. WILLCOX, residing at Bay City, in the county of Bay, State of Michigan, citizens of the United States, have invented certain new and useful Improvements in Salt-Rakers; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This is a salt-raker for automatically removing the salt from the bottom of a steam-grainer as fast as the salt is formed, and pertains more particularly to that class of rakers comprising a framework having a forward-and-back reciprocating motion and carrying scraper-blades that operate along the grainer-bottom to push the salt toward the end of the grainer on the forward stroke and feather on the back stroke, so that the salt is intermittently moved along the bottom of the grainer and delivered up the incline at its front end with a step-by-step movement.

The particular object of this invention is to so construct a salt-raker of the reciprocating type just described that it shall operate entirely beneath the grainer-pipes, its working parts being submerged in the brine, so that the rapid corrosion of metal alternately dipped in brine and exposed to the air is entirely avoided. By keeping all the working parts beneath the grainer-pipes the space above the pipes is left unobstructed, so that workmen can easily rap the scape and accumulated gypsum from the pipes without the inconvenience of crawling through the framework above the pipes, as has heretofore been necessary.

Our invention is illustrated in the accompanying drawings, in which—

Figure 1 is a top plan view of a grainer embodying our invention. Fig. 2 is a vertical section on the line *xx* of Fig. 1. Fig. 3 is an enlarged section on the line *yy* of Fig. 1. Fig. 4 is a plan view of two sets of scrapers. Fig. 5 is a detail of the bearing-blocks on which the longitudinal framework rests. Fig. 6 is a side elevation of the scraper-blade and a short

section of the backbone. Fig. 7 is a side elevation of a cylinder and cross-head for driving the raker. Fig. 8 is a perspective detail of a bracket for securing the transverse blade-supporting angles to the backbone. Fig. 9 is a side elevation of the same. Figs. 10 and 11 are details of the hinge for securing the front or incline section to the backbone, Fig. 10 being a perspective view, and Fig. 11 a vertical longitudinal section, through the hinge.

As is clearly shown in the drawings, the device consists of a central rib or backbone 1, preferably of channel-section, that extends lengthwise the grainer along its bottom and is moved back and forth by any suitable means, such as the cylinder and cross-head shown in Fig. 7. The backbone is preferably supported by cast-iron blocks 2, as shown in Figs. 3, 5, and 6. These blocks are located at intervals in a straight line along the grainer-bottom, each block being kept from sliding by a pin 2^a in the grainer-bottom. The blocks 2 are thus pivotally mounted, so that they are capable of a transverse swinging motion, as is indicated by dotted lines in Fig. 5, to prevent the backbone from binding laterally as it slides back and forth. At intervals along the length of the backbone are transverse angle or other suitable bars 3, from which are suspended swinging scraping-blades 4. These blades are preferably hinged to the upper edge of the angle and are arranged to feather on the back stroke, being held vertical by the upright flange of the angle to push the salt on the forward stroke. Suitable braces 4^a keep the bars 3 from springing or bending.

It is essential in a device of this kind, which is subject to the corrosive action of the brine, that there should be as few bolts or other small parts as possible to hold the working parts together. Therefore we prefer to secure the transverse bars 3 to the backbone 1 by clamping each bar by means of the clamping-brackets 5. (Shown in Figs. 8 and 9.) This bracket fits the top of the backbone 1, and the bar 3 is slid under and held fast by the forward end of the bracket and is secured in place by hook-bolts 5^a on the laterally-extending wings 5^b. The bracket 5 is secured to

the backbone by central bolts 5^c, the heads of which are on the under side of the backbone 1 and slide freely through the longitudinal groove 2^b of the block 2. The backward thrust of the blades 4 against the bars 3 is thus resisted by the face of the bracket 5 instead of being taken by bolts or rivets passing through the bar 3. The full strength of the bar 3 is thus preserved, and the bolts 5^c, that secure the bar 3 to the backbone, have only to resist the direct backward thrust of the bar 3, all twisting effort being taken up by the wings 5^b and the flanged edges 5^d of the bracket 5. The rear ends of the diagonal braces 4^a are similarly secured to the backbone 1. A bracket 9, having side flanges 9^a to engage the sides of the backbone 1, is secured by a central bolt or rivet 9^b to the backbone. The head of the bolt 9^b passes through the clearance-slot 2^b of the blocks 2 as the raker moves back and forth. Wings 9^c on the bracket 9 are secured to the ends of the braces 4^a by bolts 9^d, both ends of which are easily accessible. The salt is pushed up the incline 6 and discharged over the edge of the grainer by the forwardly-extending hinged section 1^a of the backbone 1. This section is secured to the backbone by the interlocking hinge shown in Figs. 10 and 11. This hinge is made up of an upwardly-hooked member 7 on the incline section 1^a, that interlocks with a downwardly-looped member 7^a on the backbone 1. No pivot-pin is required, and such a pin if used would be apt after a short time to corrode and bind. We prefer to guide the front scraper, which goes up the incline, by a trolley-track 8 over the incline, the trolley-wheels 8^a being connected to the front end of the scraper by a trolley-arm 8^b.

The practical advantages derived from this form of construction, in which the operating framework or backbone is entirely submerged in brine and operates beneath the pipes instead of projecting above them, are of the greatest importance in salt-making. A most important advantage of this construction is evident from inspection of Fig. 3, where it is seen that the area above the pipes is as free and unobstructed as if there were no raking device in the grainer. This arrangement gives the salt-maker unobstructed access to the pipes for removing the scale and gypsum from them and for inspecting and repairing them. Corrosion of the metal framework is reduced to the minimum, for the reason that the parts are not exposed alternately to the action of the hot brine and the corrosive effect of the air.

The reciprocating movement of the raker has been found by experience to be especially well adapted for removing salt from grainers, and the objection heretofore found in reciprocating scrapers of this class has been that a wooden framework extending over the top

of the grainer and moving back and forth on wheels at the sides of the grainer has been necessary to support the scraping-blades beneath the pipes. Our present invention does away with all mechanism above the pipes and embodies all of the advantages of the reciprocating type of raker as heretofore used without any of the disadvantages above mentioned.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In a reciprocating raker for grainers, a central non-flexible backbone extending lengthwise the grainer in proximity to its bottom and adapted to move lengthwise back and forth; guides for said backbone located at intervals along the bottom; transverse bars carried by the backbone, extending from side to side of the grainer; scraping-blades pivotally suspended from said bars; a forwardly-extending member hinged to one end of the backbone; scrapers carried by said forwardly-extending member and means for actuating said backbone and forwardly-extending member back and forth.

2. In a raker of the class described, the combination of the central backbone of inverted-channel section; guides pivoted to the grainer-bottom and having slotted tops adapted to carry said backbone; series of transverse angle-bars with one flange upright, secured to the backbone; clamping-brackets carried by the backbone adapted to fit over it and each adapted to clamp the flange of an angle-bar; said clamping-brackets having laterally-extending wings; hooked bolts carried by said wings; scraper-blades pivotally suspended from said angle by hinges secured to the tops of the angles and adapted to bear against the face of the angle and hold the blades upright on the forward stroke of the raker; diagonal braces each secured at one end to the transverse angle; brackets carried by the backbone and having wings to receive the other ends of the diagonal braces; a front section of said backbone, said section comprising a thrust member carrying scraper-blades; a hinge connecting the backbone with the front section and comprising an upwardly-hooked bar and a downwardly-looped bar interlocked; an upwardly-inclined trolley-track over the front section; a trolley-wheel thereon and a depending arm connecting said trolley-wheel to the front section; together with means for moving the backbone back and forth.

3. In a raker of the class described a non-flexible backbone extending lengthwise the grainer below the liquid-level, said backbone comprising a channel of U section, the flanges of said channel extending downward.

4. In a raker of the class described a non-flexible backbone extending lengthwise the grainer below the liquid-level, said backbone comprising a channel of U section, the flanges

of said channel extending downward; guides secured to the grainer-bottom and adapted to support the inverted channel.

5 In a raker of the class described a non-flexible backbone extending lengthwise the grainer below the liquid-level, said backbone comprising a channel of U section, the flanges of said channel extending downward; guides
10 support the inverted channel; said blocks being pivotally mounted on the grainer-bottom and having slotted tops.

6. In a raker of the class described having a longitudinal backbone adapted to move back
15 and forth, transverse angle-irons, having one flange upright, secured to the backbone; feathering scraping-blades; hinges carried by the upper edges of the angle-irons, adapted to support said blades and to hold them vertical
20 during their forward movement together with means for actuating the backbone back and forth.

7. In a raker of the class described having

a longitudinal backbone and transverse bars; a clamping-bracket, comprising a flat mem- 25 ber adapted to fit the top of said backbone; a front portion adapted to receive and hold the transverse bar to the backbone; laterally-extending wings on said front portion, and bolts for clamping the transverse bars to said wings. 30

8. In a raker of the class described having a longitudinal backbone and transverse bars carried thereby; means for clamping said bars to the backbone, comprising a bracket rigidly
35 secured to the backbone; the front part of said bracket being formed to fit over said bar and provided with laterally-extending flanges and means for clamping said bar to said flanges.

In testimony whereof we affix our signatures in presence of two witnesses.

ANDREW JOHNSON.
GEORGE B. WILLCOX.

Witnesses:

P. M. HOLDSWORTH,
JAMES C. HANSON.