

(No Model.)

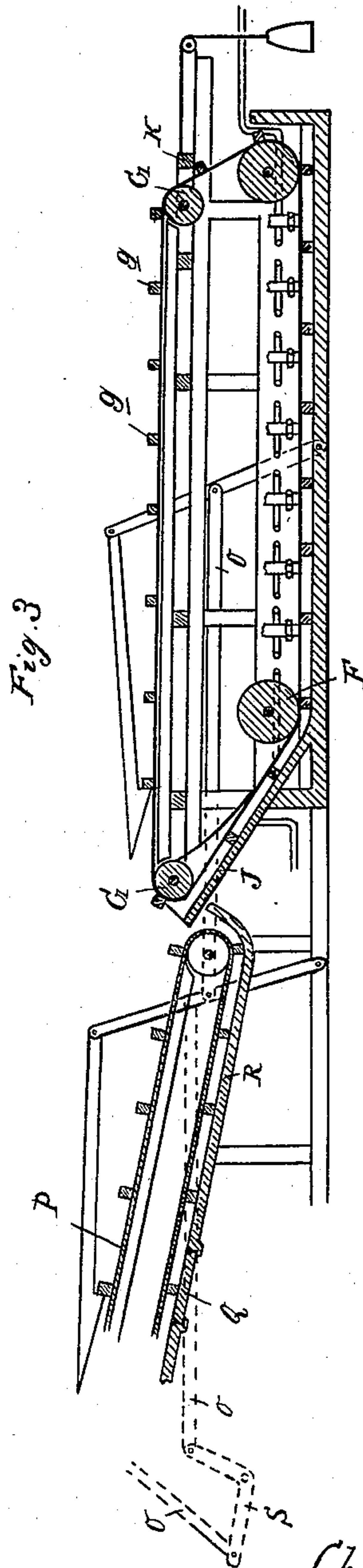
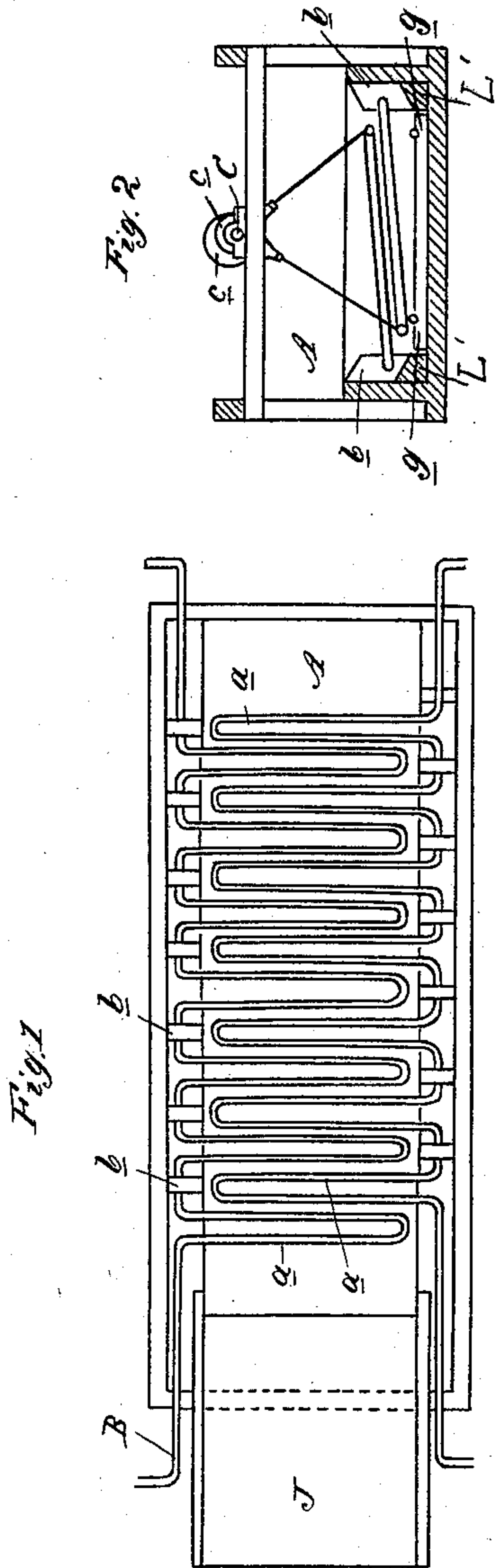
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C. A. MERRILL.

SALT GRAINER.

No. 324,142.

Patented Aug. 11, 1885.



Attest:

John Schuman.  
Charles J. Hunt

Inventor:  
Charles A. Merrill  
by his Atty  
Thos. L. Sprague

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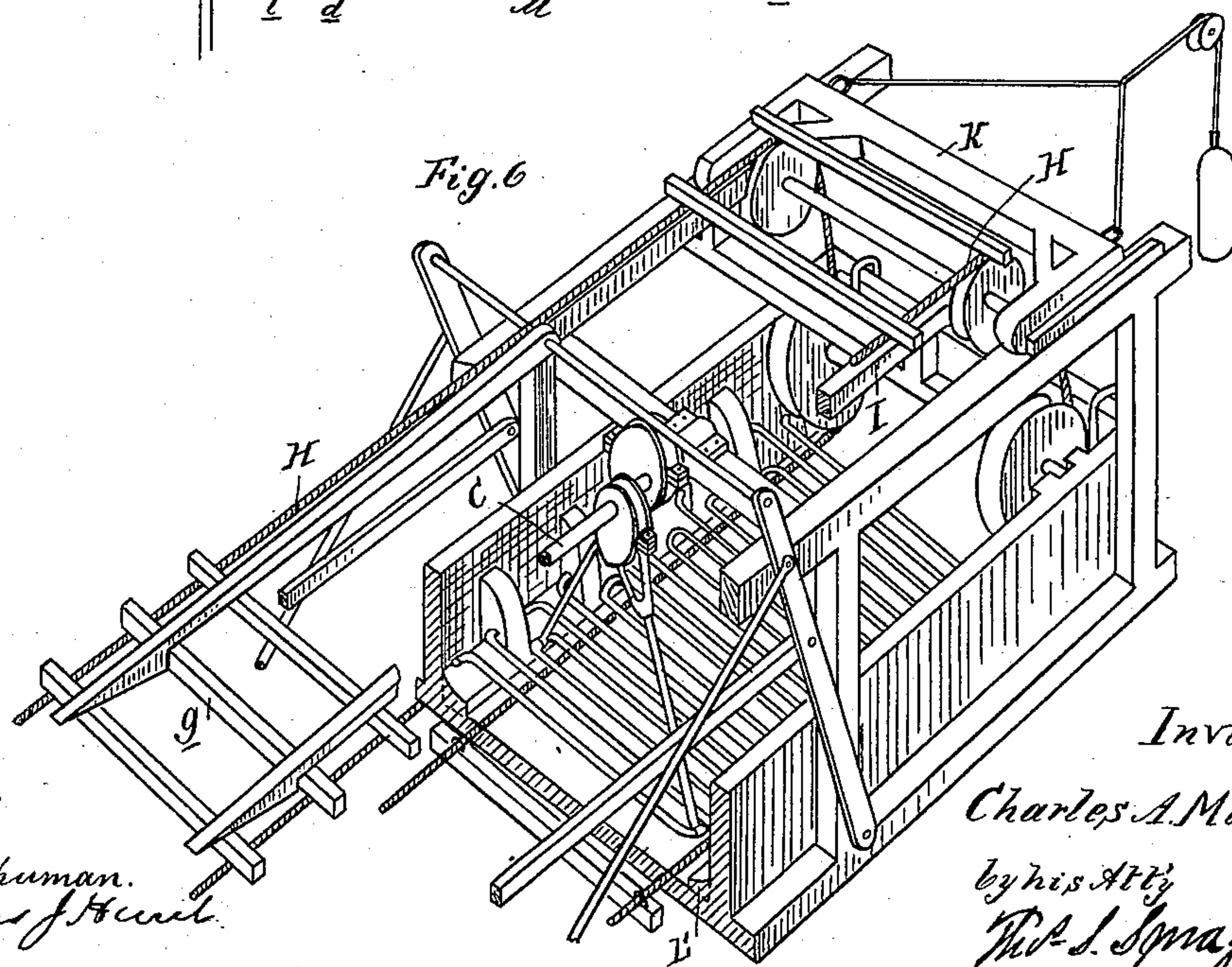
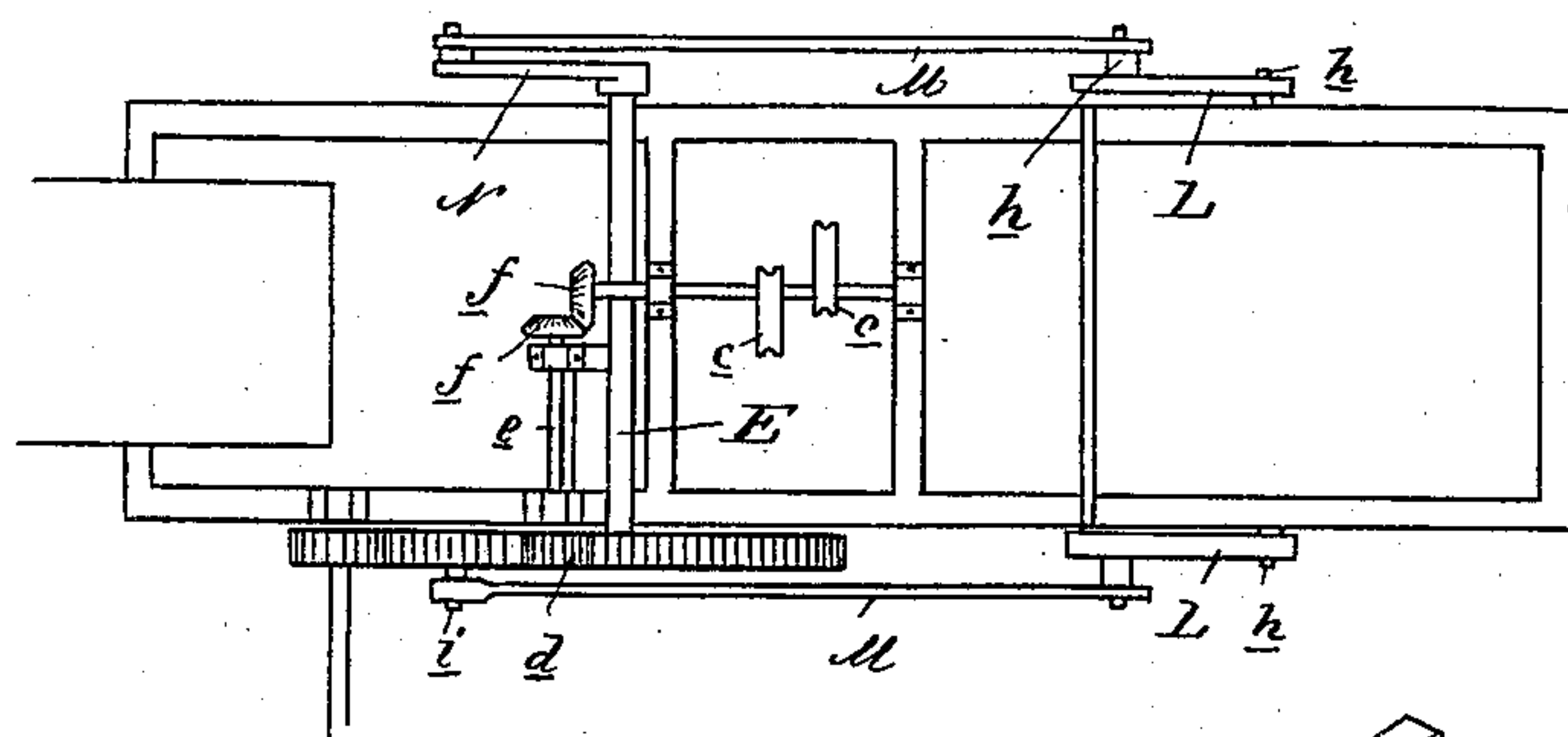
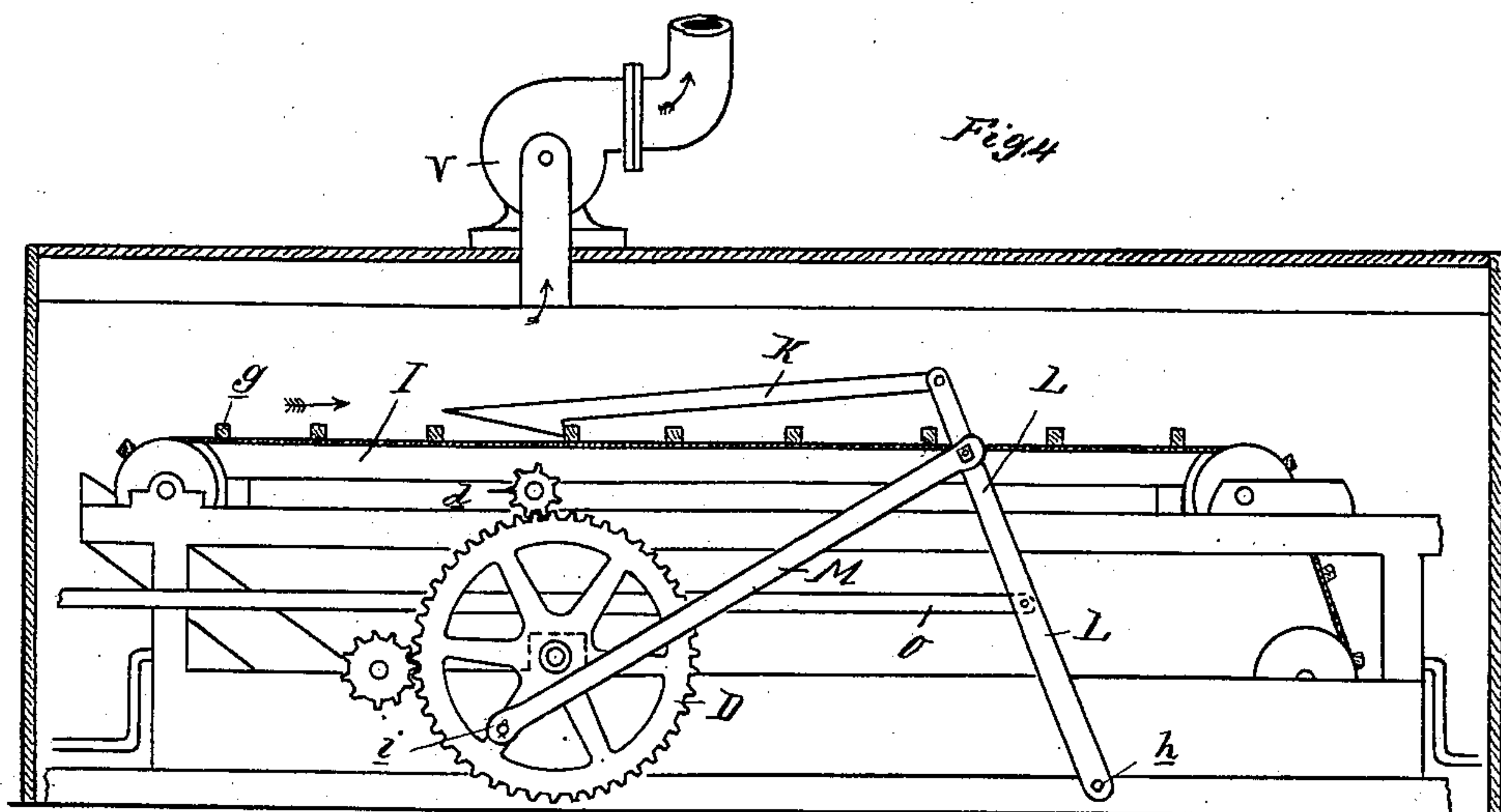
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# UNITED STATES PATENT OFFICE.

CHARLES A. MERRILL, OF BAY CITY, MICHIGAN.

## SALT-GRAINER.

SPECIFICATION forming part of Letters Patent No. 324,142, dated August 11, 1885.

Application filed May 13, 1885. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES A. MERRILL, of Bay City, in the county of Bay and State of Michigan, have invented new and useful Improvements in Salt Grainers; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to a new and useful improvement in salt-grainers; and the invention consists in the construction, arrangement, and combination of the various parts, whereby not only the evaporating capacity of the salt-grainer is largely increased, but which also simplifies the process of evaporating salt by producing a superior article without the use of grease.

In the drawings which accompany this specification, Figure 1 is a diagram plan showing the disposition of the steam-pipes in the grainer. Fig. 2 is a vertical central section of Fig. 1, showing, in addition, the pipes connected with a device for moving them in the brine. Fig. 3 is a vertical central section of the salt-grainer as it is in operation. Fig. 4 is a side elevation of the salt-grainer, and showing it as arranged for evaporating under a partial vacuum. Fig. 5 is a diagram plan of the grainer, showing the connection of its operating mechanism. Fig. 6 is a perspective view of the grainer, with the parts partly broken away.

A is the grainer, in which the brine is subjected to evaporation. B are steam-pipes arranged near the bottom of the grainer, and by means of which heat is applied to the brine. These steam-pipes, instead of being arranged stationarily, as in the grainers in present use, are movably secured and connected to operating mechanism, by means of which they are given a reciprocating movement in the brine. The object of this arrangement is to prevent the salt-crystals from settling upon and adhering to the steam-pipes, and thereby reduce their heating capacity. Another advantage is that the motion of the pipes produces the desired agitation of the brine and renders the arrangement of devices specially arranged for this purpose unnecessary.

There are different ways in which the steam-

pipes may be made movable, one of which is shown in the drawings and will be understood from the following description: There are two lines of steam-pipe, B B, each of which forms, between the ends of the grainer, a series of transverse loops, *a*, the loops of one pipe occupying the intervals between the loops of the other pipe. Between each loop the pipes are journaled in little blocks *b*, which are secured to the inside of the grainer. Above the grainer, and lengthwise of the same, is journaled a shaft, C, which is provided with two eccentrics, *c c*, to which the steam-pipes are connected, so that the motion of the eccentrics oscillates each system of pipe, one raising up while the other drops down. Motion is given to the eccentrics by means of power applied in any suitable manner to the gear-wheel D upon the shaft E, and transmitted from it through a pinion, *d*, on a counter-shaft, *e*, and from which it is further transmitted to the shaft C and the eccentrics by intermediate bevel-pinions *f f*.

Instead of oscillating the pipes, as shown, they may be arranged to move sidewise, or up and down, or any other way which will obtain the main object in view—that is, keep the pipes clean.

It will be evident that by making the pipes thus self-cleaning the salt cannot accumulate upon them, but will readily fall to the bottom, and a much larger quantity of pipe for a given grainer can now be used, thereby greatly enlarging its capacity for evaporating. The salt collecting upon the bottom of the grainer is removed by an endless-scraper device, which is constructed and operated as follows: F are grooved rollers, suitably journaled at the ends of the grainers, and G are corresponding rollers journaled above the grainer. Around these rollers pass two endless ropes, H, to which are secured a series of cross-slats, *g*. Between the upper rolls the scraper is supported upon a horizontal track, I, and one set of upper rolls is provided with a suitable device for tightening the ropes.

The grainer is provided on one end with an incline, J, and the scraper is so arranged that in its travel it will scrape the salt from the bottom of the grainer, underneath the steam-pipes, and carry it up said incline and deposit



it on a platform, or drop it into a conveyer, which carries it to the packing-bins.

To prevent salt from accumulating between the blocks *b* where the scrapers could not reach it, I place the deflectors *L'* along the sides of the bottom of the grainer. These throw the salt into the path of the scrapers. The motion of the scraper is intermittent, and is produced in the following manner: *L* is a vibrating frame, pivotally secured at the lower end at *h* to the sides of the grainer. *M M* are crank-rods, one connecting one side of the vibrating frame with a crank-pin, *i*, on the gear-wheel *D*, and the other one connecting the other side of the vibrating frame with a crank, *N*. These parts are so arranged that the power which is applied to the gear-wheel *D* oscillates the frame *L*, and thereby reciprocatingly draws back and forth a pair of hooked arms, *K*, which are pivotally secured to the upper part of the frame *L*, and, resting upon the top of the scraper, engage with the cross-slats *g* and intermittently draw the scraper in one direction. This intermittency of motion in the travel of the scraper gives the salt drawn upon the incline *J* the necessary time to drain into the grainer before it is carried farther on.

Fig. 3 shows how this motion of the scraper may be communicated by means of connecting-rods *O* to similarly-operating scrapers *P*, which travel in suitable troughs, *R*, and carry the salt to the packing-bins, into which it is discharged through slides *Q* in the bottom of the troughs. Several scrapers may be thus arranged to act as conveyers in any desired direction, any change in the direction of the connecting-rods *O* being easily effected by means of suitable bell-cranks, *S*. A chamber, *T*, is built around the grainer and made as air-tight as possible, so that by means of a suitable exhaust-fan, *V*, connected with the chamber a partial vacuum may be maintained inside the chamber while the grainer is in operation. By thus inclosing the grainer, all circulation of cold air over the surface of the brine is prevented, and under the influence of the reduced atmospheric pressure the brine is kept boiling. The result is that a rapid evaporation takes place, which prevents the salt-crystals on the surface from adhering to each other and forming scales, as in the open grainer, where grease or fat has to be used to counteract their formation.

What I claim as my invention is—

1. In a salt-grainer, a system of steam-heating pipes movably secured in the brine and connected with operating mechanism, substantially as described.

2. In a salt-grainer, one or more systems of steam-pipes forming a series of lateral loops in the brine and journaled at the base of the loops, in combination with suitable operating mechanism connected to the top of one or more loops and arranged to give the steam-pipes a vertically-oscillating movement in the brine, substantially as described.

3. In a salt-grainer, two systems of steam-pipes forming a series of lateral loops alternating with each other and journaled near the base of the loops upon opposite sides of the grainer, in combination with operating mechanism for alternately oscillating the pipes up and down in the brine, substantially as described.

4. The combination of the grainer *A*, steam-pipes *B*, forming loops *a*, journal-blocks *b*, countershaft *C*, and eccentrics *c c*, all arranged and combined substantially as described.

5. In a salt-grainer, the combination of an endless-scraper device consisting substantially of the grooved rolls *F G*, ropes *H*, and cross-slats *g*, with the vibrating frame *L*, having hooked arms *K*, all arranged substantially as described.

6. In a salt-grainer, the combination of two or more scraper devices consisting substantially of endless belts or ropes and cross-slats with two or more vibrating frames, *L*, having hooked arms *K*, and connecting-rods *M*, all arranged substantially as described.

7. In a salt-grainer, a closed chamber inclosing the grainer and its operating mechanism, and having an exhaust-fan, substantially as and for the purposes specified.

8. A salt-grainer comprising the following devices: a grainer having steam-pipes movably secured therein and connected with the operating mechanism, an endless-scraper device moving intermittently through the brine to scrape out the salt collecting at the bottom of the grainer, a chamber inclosing the grainer, and an exhaust-fan for reducing the atmospheric pressure within the chamber, all arranged substantially as described.

CHARLES A. MERRILL.

Witnesses:

HENRY LINDNER,  
GEORGE FISH.