

I. KITSEE.  
EVAPORATING PAN.

(Application filed Feb. 28, 1900.)

(No Model.)

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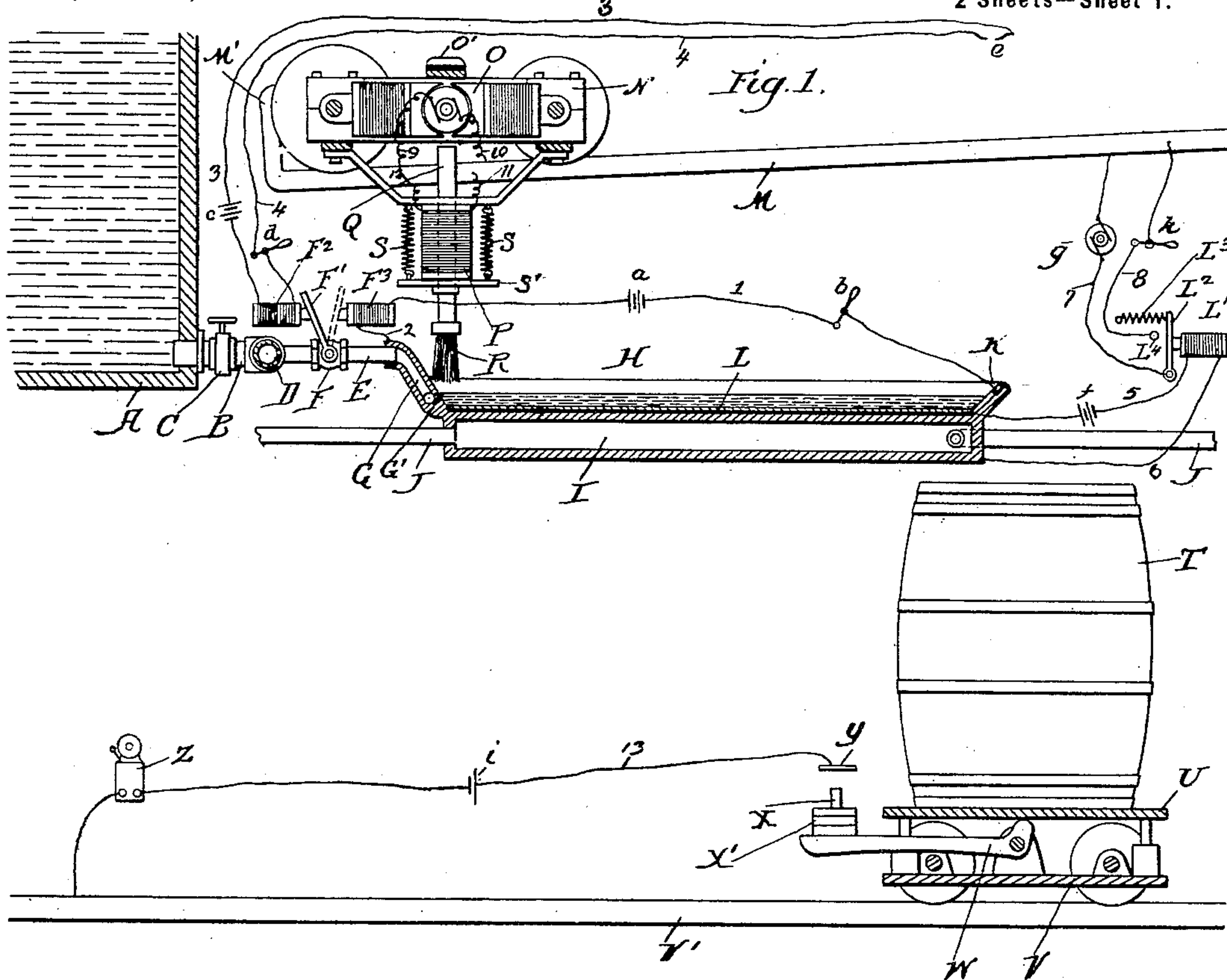
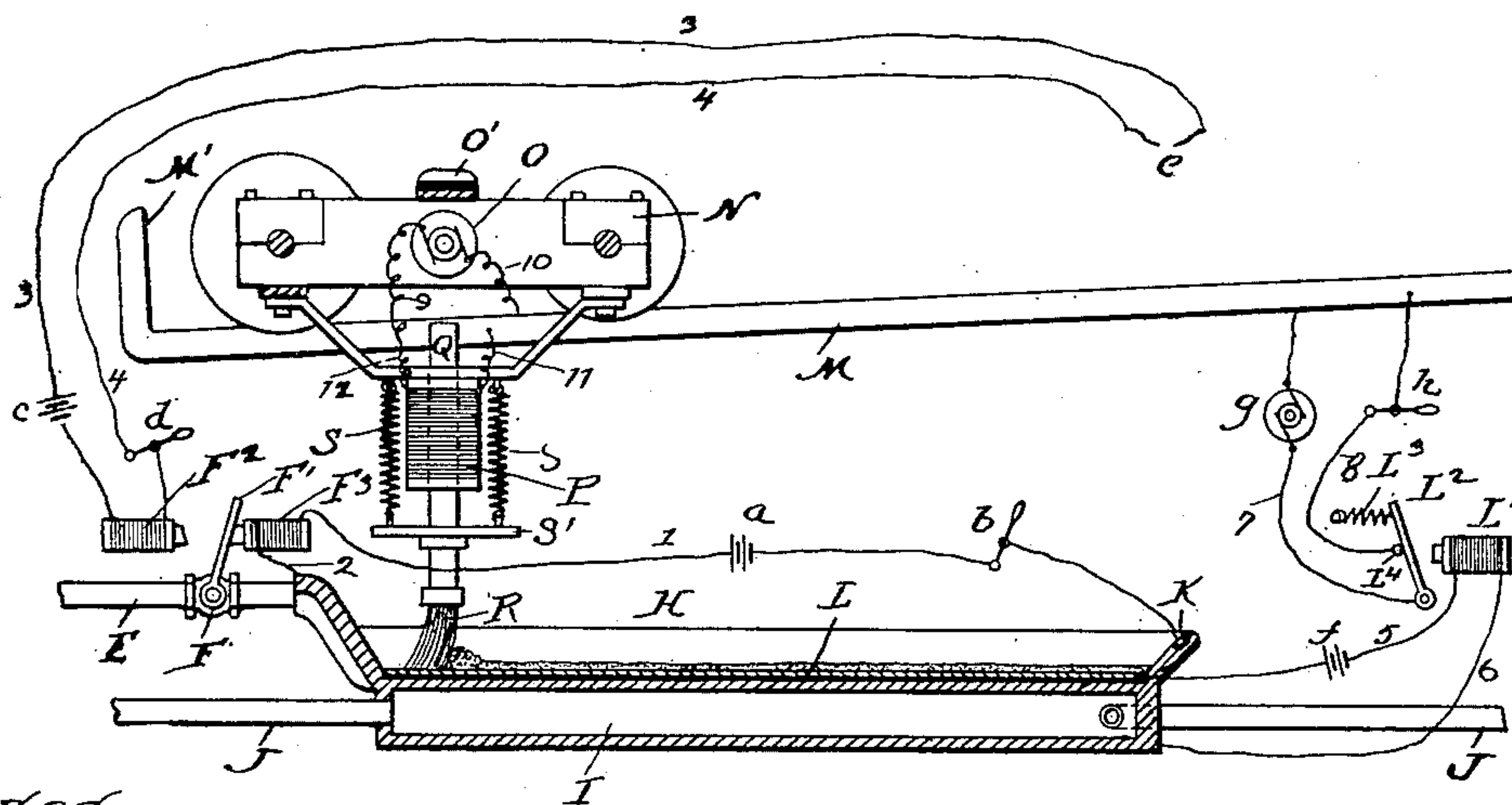


Fig. 2.



Witnesses:  
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2 Sheets—Sheet 2.

Fig. 3.

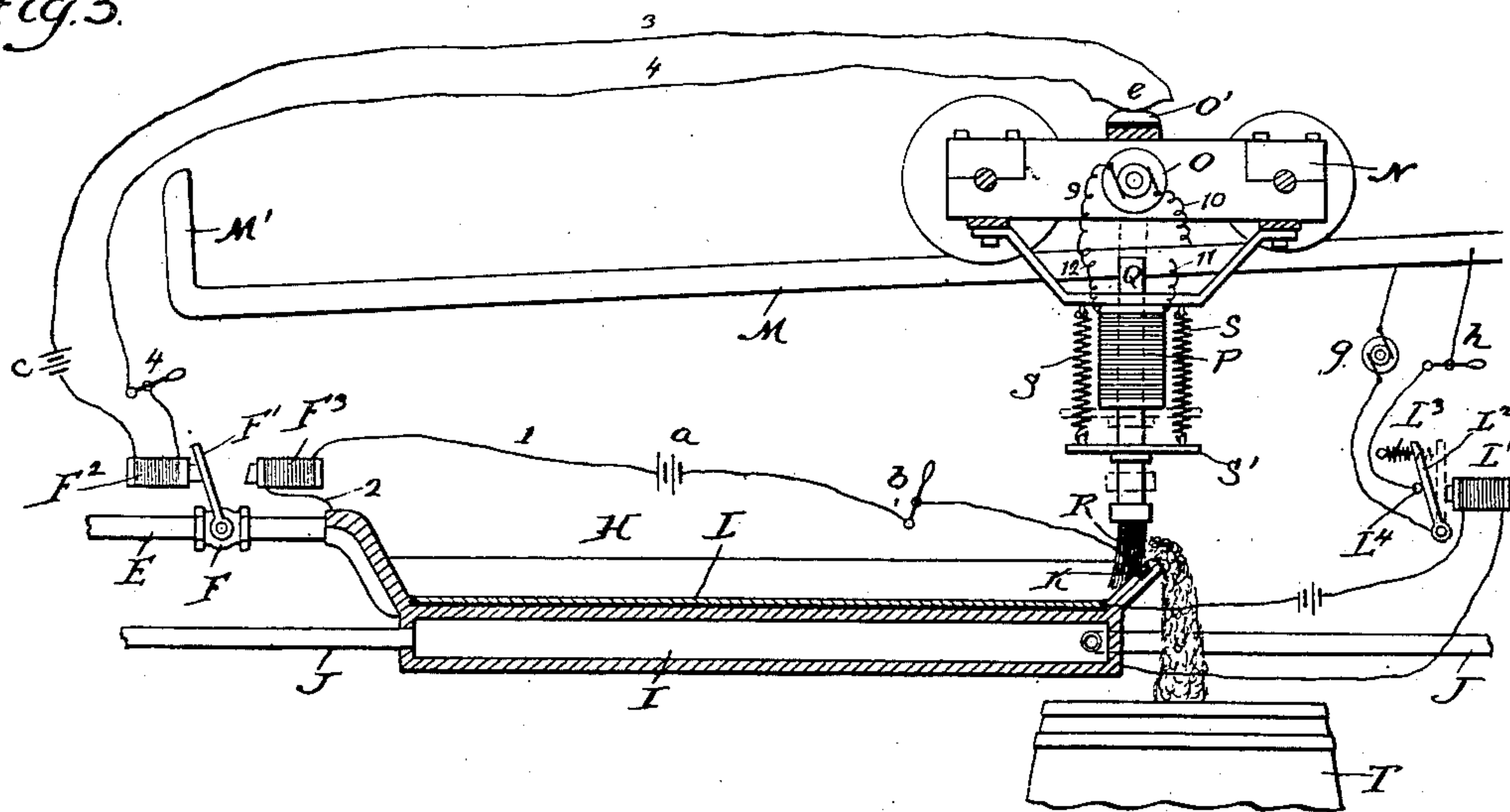
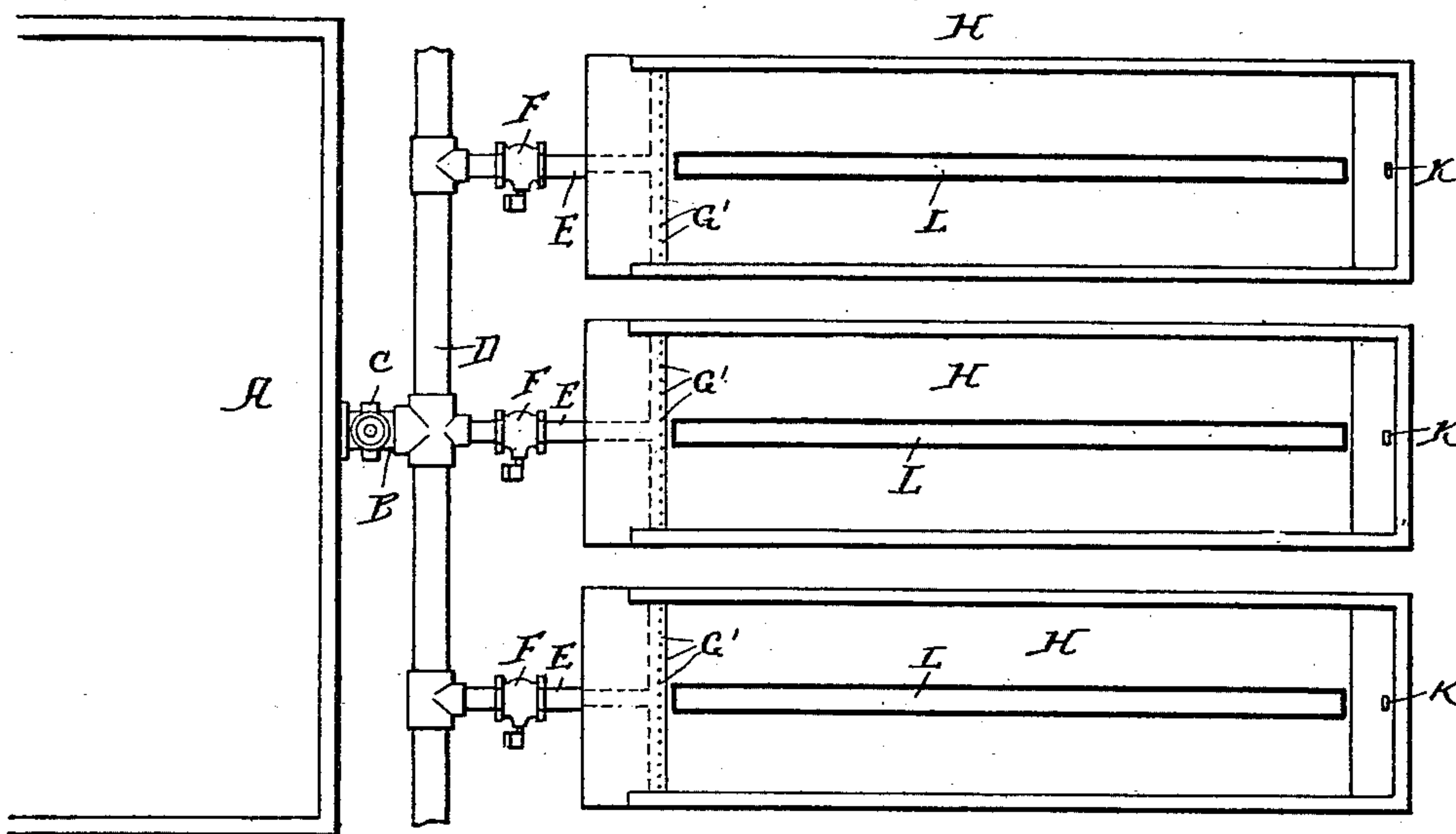


Fig. 4.



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# UNITED STATES PATENT OFFICE.

ISIDOR KITSEE, OF PHILADELPHIA, PENNSYLVANIA.

## EVAPORATING-PAN.

SPECIFICATION forming part of Letters Patent No. 677,416, dated July 2, 1901.

Application filed February 26, 1900. Serial No. 6,599. (No model.)

*To all whom it may concern:*

Be it known that I, ISIDOR KITSEE, of the city and county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Evaporating-Pans, of which the following is a specification.

Generally speaking, my invention relates to an improvement in the production of solids out of the liquids containing said solids, and has more special reference to an improvement in the manufacture of caustic soda or sodium hydrate.

The production of caustic soda is now generally carried on by the action of electricity on common salt, (chlorid or sodium,) through which process a solution more or less saturated with alkaline hydrate is produced in the negative compartment of the electrolytic cell. This solution has to be evaporated for the purpose of producing the alkaline in a solid state. The main disadvantages of the evaporating process as practiced to-day are the great amount of labor required and inconvenience experienced in the handling of the bulky mass of liquid, emptying and cleaning of the evaporating-kettles, and the handling of the solid compound before ready for shipment. Another disadvantage is that the employment of kettles as practiced to-day results in a great loss of heat, for the reason that the first thin layer of the solid caustic greatly retards the heating of the liquid in the center of the evaporating vessel, and the thicker the solid crust the greater the loss.

The object of my invention is to obviate these difficulties and to produce the solid caustic out of its solution with the least possible labor and the least possible loss of heat.

Referring to the drawings, in which similar characters indicate similar parts, Figure 1 is a sectional view illustrating my invention, the caustic liquid just entering the evaporating-pan. Fig. 2 is a sectional view illustrating my invention at the stage when the brush commences to sweep the solid contents of the evaporating-pan. Fig. 3 is a similar view illustrating my invention at the stage when through the action of the brush the solid contents are swept in one of the hogsheads in proximity to the evaporating-pan. Fig. 4 is a plan view showing the arrangement of the evaporating-pan.

A is the reservoir containing the caustic liquid; B, the main outlet of said reservoir; C, the main valve in said outlet; D, the feeding-pipe; E, the branch pipes leading from said feeding-pipe D each to one of the evaporating-pans H. F represents valves in the branch pipes, the levers of said valves being made of soft iron, and in proximity to same are placed the electromagnets  $F^2$  and  $F^3$ , adapted to open or close said valve. The electromagnet  $F^2$  is connected to the circuit consisting of the battery  $c$ , wire 3, contact-point  $e$ , wire 4, and switch  $d$ . The electromagnet  $F^3$  is connected to the circuit consisting of the battery  $a$ , wire 1, switch  $b$ , contact-point K, metallic pan H, and wire 2. The contact-point K is secured to but insulated from the metallic pan.

G is the duct as part of the evaporating-pan. G' represents small holes or openings extending from this duct to the inner space of the pan, the lower part of which consists of the hollow box I, connected to the steam-pipes J.

Secured to the bottom of the pan, but insulated from it, is the conducting-strip L, connected to the battery  $f$ , wire 5, electromagnet  $L'$ , wire 6, and the pan itself. The armature  $L^2$  of this electromagnet is provided with the spring  $L^3$  and has in juxtaposition the contact-point  $L^4$ , connected through wire 8 and switch  $h$  to one of the rails M. The armature  $L^2$  is connected through wire 7, dynamo, or other source of electric current  $g$  with the second rail M. (Not shown in the drawings.)

On the rails is placed the truck N, the wheels of which are insulated from each other. This truck is provided with the motor O, one terminal of which is connected through wire 10 with one of the rails M (not shown in the drawings) and the other terminal of which is connected through wire 9 with wire 12, which wire is one of the terminals of the solenoid P, the other terminal of which is connected through wire 11 with the second rail M. (Illustrated in the drawings.) These rails are provided with the buffer M'.

On the truck is placed the conducting block or brush O'. To the lower part of the truck is secured the solenoid P. In this solenoid is placed the soft-iron core Q, provided as to its lower end with the brush or scraper R.



The springs S, secured on their lower part to the cross-piece S', are designed to keep the brush or scraper R normally in an upward position and away from the bottom of the pan H. The terminals of the solenoid are connected through wires 11 and 12 to the circuit containing the dynamo or other generator of electricity *g* and in series with the motor, as above stated.

T is a barrel or hogshead placed on the truck U, provided with the weighted lever W. X and Y are two contact-points, the first one secured to the lever and the second one in proximity to the first contact-point. This truck is placed on the rails V'. The contact-points X and Y are connected to the circuit consisting of wire 13, battery *i*, alarm Z, rail V', wheels of the truck U, and lever W.

The *modus operandi* is as follows: When the apparatus is out of action, the hand-valve C is closed; but the lever of the valve F should preferably be near the electromagnet F<sup>2</sup>. The switch *h* of the circuit containing the dynamo *g* is open. If it is desired to bring the device into action, it is only necessary to open the hand-valve C, and as the valve F is already open the liquid will flow into the pan till it has reached the contact-point K. As soon as this contact-point is reached the circuit containing the electromagnet F<sup>3</sup> will be closed and the lever F' of the valve F will be drawn toward this magnet and the valve will be closed, thereby stopping the flow of the liquid. As soon as the liquid has covered the bottom of the pan the circuit including the electromagnet L' will be closed, energizing the core of the electromagnet and drawing the lever L<sup>2</sup> toward it and away from the contact-point L<sup>4</sup>. At this period the switch *h* should be closed. The steam or other source of heat is now allowed to pass through the pipes J and the hollow part I of the pan H. Through the action of this heat the liquid in the pan will evaporate and will leave the solid contents at the bottom of the pan. As long as moisture remains at the bottom of the pan the circuit consisting of the insulated conducting-strip L, battery *f*, wire 5, electromagnet L', wire 6, conducting part of the pan, and the moisture will be closed and the circuit including the dynamo *g* will be opened, because the armature L<sup>2</sup> will be drawn away from the contact-point L<sup>4</sup>; but as soon as the liquid in the pan has evaporated and the solid contents are dried enough to offer a higher resistance to the passage of the current the circuit of the electromagnet L' will be broken and the lever L<sup>2</sup> will be drawn by its spring L<sup>3</sup> toward and in contact with the point L<sup>4</sup>, closing the circuit including the generator *g*. The closing of this circuit will have a twofold result—first, the current will flow through the solenoid and draw the soft-iron part of the core Q downward, thereby pulling down the brush or scraper R till the same is in contact with the bottom of the pan H, and, second, the current will also

flow through the motor O, actuating this motor, thereby moving the truck from its resting-point near M' toward the opposite end of the rail. This moving of the truck and pressing downward of the brush will result in the sweeping of the bottom of the pan and in carrying the contents of this bottom toward that part of the pan which is in proximity to the barrel T, and from this point through the sweeping action of the brush or scraper R the solid contents of the pan will be thrown out of the pan and into the barrel T. As soon as the truck N has reached that point of the line of travel where the contact-points *e* are stationed the contact block or brush O', secured to the truck N, will bring these contact-points in electrical contact with each other, thereby closing the electric circuit containing the electromagnet F<sup>2</sup>. The closing of this circuit will result in drawing the lever F' of the valve F away from the electromagnet F<sup>3</sup> and toward the electromagnet F<sup>2</sup>, thereby opening said valve and allowing the liquid to flow into the pan. As soon as any part of the bottom of this pan is even in the slightest degree covered by the liquid the circuit including the electromagnet L' will be closed, the lever L<sup>2</sup> will be drawn toward it and away from the contact-point L<sup>4</sup>, and the circuit including the dynamo *g* will be broken. The breaking of this circuit will also result in a twofold action—first, the ceasing of the flow of the current in the helix or solenoid P will allow the springs S to come into play, thereby drawing upward the cross-piece S' with the appended brush or scraper R, and, second, the ceasing of the flow of the current through the motor O will not only stop the truck N, but as the rails of travel are somewhat inclined toward the buffer M' the truck will by its own gravity run backward till it comes to a stop at the point where the buffer is placed. The liquid in the meantime will continue to flow into the pan till again the contact-point K is reached, when the closing of the circuit including this point will again draw the lever F' toward the magnet F<sup>3</sup>, thereby closing the valve F' and stopping the inflow of the liquid. The heat will again evaporate the liquid, the core of the electromagnet L' will again be demagnetized, allowing its armature to close the circuit containing the dynamo, the brush will again sweep the dry contents of the pan into the hogshead T, and the circuit containing the electromagnet F<sup>2</sup> will again be closed when the truck has reached the point where the contact-points *e* are stationed, opening again the valve and allowing again the liquid to flow into the pan. This action is repeated over and over again till the contents of the barrel or hogshead T overbalance the weight X', placed on the lever W, thereby bringing in contact the contact-points X and Y, closing the circuit, and actuating the alarm Z, notifying the attendants that the required amount of solid caustic has been placed into the hogshead or barrel. It



will then be only necessary to move the truck out of the evaporating-room and into the store-room or other place wherein the barrel can be closed and made ready for shipment. It is therefore apparent that the whole process of producing the solid out of the liquid is an automatic one, not requiring any of the manual labor required to-day in the usual process of producing solids out of caustic liquid.

I have illustrated and described my invention in a manner so that persons versed in the art may readily understand and practice the same; but in so doing I entirely ignored the mechanical details in the description or illustration of this process, because these details may vary according to requirements, and a description of same would only tend to make less clear the different steps necessary in the broad application of my invention.

As I considered myself the first applying an entirely automatic action to the process of producing solid out of liquid alkaline, I deemed it unnecessary to more than illustrate in diagrammatic views the electric circuits to illustrate in broad principle the different mechanical devices necessary to produce the required result, stating at the same time that other mechanical means may be employed producing the same result without departing from the scope of my invention. I have illustrated and described the electric circuit containing the dynamo as being opened and closed not directly through the liquid contents in the pan, but with interposition of a second circuit containing an electromagnet, for the reason that I deemed it impractical to allow a heavy current to flow through said liquid. To illustrate the upward and downward movements of the broom or scraper R, I made use of the solenoid action; but different electromagnetic means may be employed, and it may even be more advantageous to use an electromagnet wherein the armature consists of a semicircle and wherein levers are connected to the armature. As said above, it is my purpose to illustrate and describe the broad idea and application and the means for same, leaving the execution of the different devices to the person in charge of making and assembling the same. I do not intend to allow the liquid to reach in the evaporating-pans a depth of more than about one-half of an inch, for the reason that the solid crust formed should not interfere with the evaporating process; but the adjustment may be such as to allow different heights, and the person in charge of the plant will readily ascertain what height is advisable in his special case. So, also, have the sizes of the pans to be decided according to requirements; so, also, the size of the barrel or hogshead and the amount of weight to be placed on the lever. I have illustrated the device designed to sweep the solid contents of the pan into the hogshead as consisting of a broom; but other devices may be employed, or the broom may be followed by a scraper,

or vice versa, or two or more brooms may be employed, and the person in charge of the plant has to learn by experience what is necessary in his special case. The pan I have illustrated and described as being provided with the hollow part designed to act as a conveyer for the steam or hot air or other medium of heat. This is done for the purpose of economizing. Should the pan only be placed on top of pipes conveying heat, a great loss would result from the radiation of said pipes. This loss is mostly obviated by the arrangement as illustrated. The whole arrangement I call an "evaporating plant." I have illustrated the helix or solenoid P as being electrically connected to the rail M. It is obvious that in practice this connection is best accomplished through one of the wheels with which the truck is provided; but I have rather illustrated a direct connection for the same purpose, as I have illustrated direct connections in other places, for the reason that the flow of the current should be more easily traced by persons desiring to establish plants according to this my invention, leaving to the judgment of these persons the details and different adjustments of same.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an evaporating-pan, the combination with the pan proper, of a movable carrier arranged adjacent to said pan, and electromagnetically-controlled means arranged upon said carrier for removing the residual products after evaporation.

2. In an evaporating-pan, the combination with the pan proper, of electromagnetic means for controlling the inflow of the liquid to said pan, and electromagnetically-controlled means for removing the residual products of the pan after evaporation.

3. In an evaporating-pan, the combination with the pan proper, of electromagnetic means for controlling the inflow of the liquid to said pan, a movable carrier arranged adjacent to said pan, and means arranged upon said carrier for removing the residual products after evaporation.

4. In an evaporating-pan, the combination with the pan proper, of an inlet-pipe for feeding said pan with the liquid to be evaporated, a valve arranged in said pipe, electromagnetic means for actuating said valve, a movable carrier arranged adjacent to said pan, and means arranged upon said carrier for removing the residual products after evaporation.

5. In an evaporating-pan, the combination with the pan proper, of electromagnetic means for controlling the flow of the liquid to said pan, an electric circuit comprehending the pan as a part thereof, said circuit controlling said electromagnetic means, a movable carrier arranged adjacent to said pan, and means arranged upon said carrier for removing the residual products after evaporation.

6. In an evaporating-pan, the combination



with the pan proper, of a valve for controlling the flow of the liquid thereto, an electric circuit controlling said valve for closing the same when the liquid contents of the pan have reached a predetermined height, a second electric circuit controlling said valve for opening the same when the liquid contents have been evaporated, and electromagnetic means for removing the residual products after evaporation.

7. In an evaporating-pan, the combination with the pan proper, of a valve for controlling the flow of the liquid thereto, an electric circuit in which is included electromagnetic means for closing said valve when the liquid contents of the pan have reached a predetermined height, a second electric circuit including electromagnetic means for opening said valve when the liquid contents have been evaporated, a movable carrier arranged adjacent to the pan, and means arranged upon said carrier for removing the residual products after evaporation.

8. In an evaporating-pan, the combination with the pan proper, of a valve for controlling the flow of the liquid thereto, electromagnetic means for opening and closing said valve, an electrically-operated carrier arranged adjacent to the pan, means arranged upon said carrier for removing the residual products after evaporation, and an electric circuit in which the pan is included, said circuit controlling the movements of the carrier.

9. In an evaporating-pan, the combination with the pan proper, of a valve for controlling the flow of the liquid to said pan, electromagnetic means for opening and closing said valve, an electrically-operated carrier arranged in proximity to the pan, a sweepers arranged upon said carrier for removing the residual products after evaporation, and an

electric circuit including the pan as part thereof, said circuit controlling the movements of said carrier.

10. In an evaporating-pan, the combination with the pan proper, of a valve for controlling the flow of the liquid thereto, electromagnetic means for opening and closing said valve, a movable carrier arranged adjacent to said pan, a sweepers arranged upon said carrier for removing the residual products after evaporation, electromagnetic means for operating said sweepers to position the same in operative relation to the pan, and an electric circuit for controlling the movements of said carrier.

11. In an evaporating-pan, the combination with the pan proper, of a valve for controlling the flow of the liquid thereto, electromagnetic means for opening and closing said valve, an electrically-operated carrier arranged in proximity to the pan, a sweepers arranged upon said carrier, electromagnetic means for operating said sweepers to position the same in operative relation to the pan, means for removing the sweepers from such relation, and an electric circuit controlling the movements of said carrier.

12. In an evaporating-pan, the combination with the pan proper, of electromagnetic means for controlling the flow of the liquid thereto, electromagnetic means for removing the residual products after evaporation, a receptacle for receiving the residual products, and means operatively related to said receptacle for indicating the filling thereof.

In testimony whereof I hereby sign my name, in the presence of two subscribing witnesses, this 23d day of February, 1900.

ISIDOR KITSEE.

Witnesses:

EDITH R. STILLEY,  
WALLACE B. ELDRIDGE.