

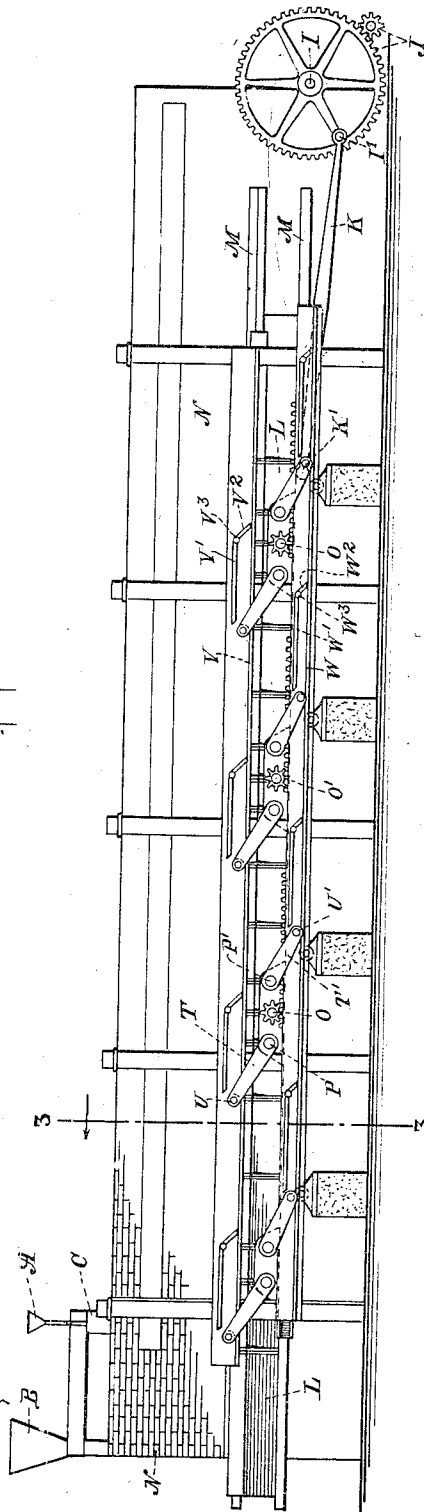
1,033,825.

J. H. NIELD.
SALT CAKE FURNACE.
APPLICATION FILED AUG. 6, 1909.

Patented July 30, 1912.

5 SHEETS-SHEET 1.

Fig. 1.



WITNESSES

G. V. Rasmussen
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Fig. 2.

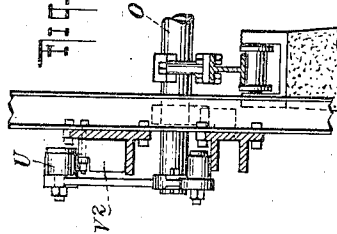
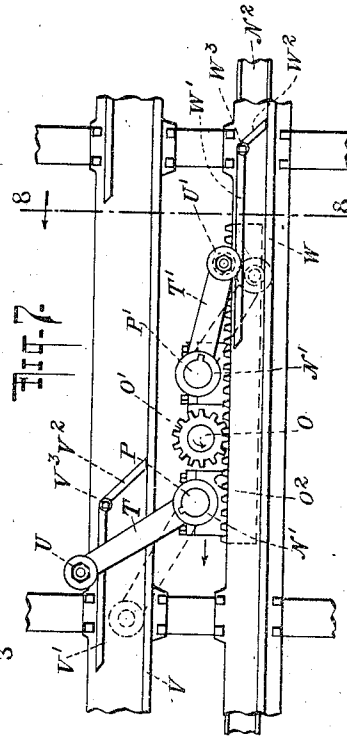


Fig. 7.



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5 SHEETS—SHEET 2.

Fig. 2.

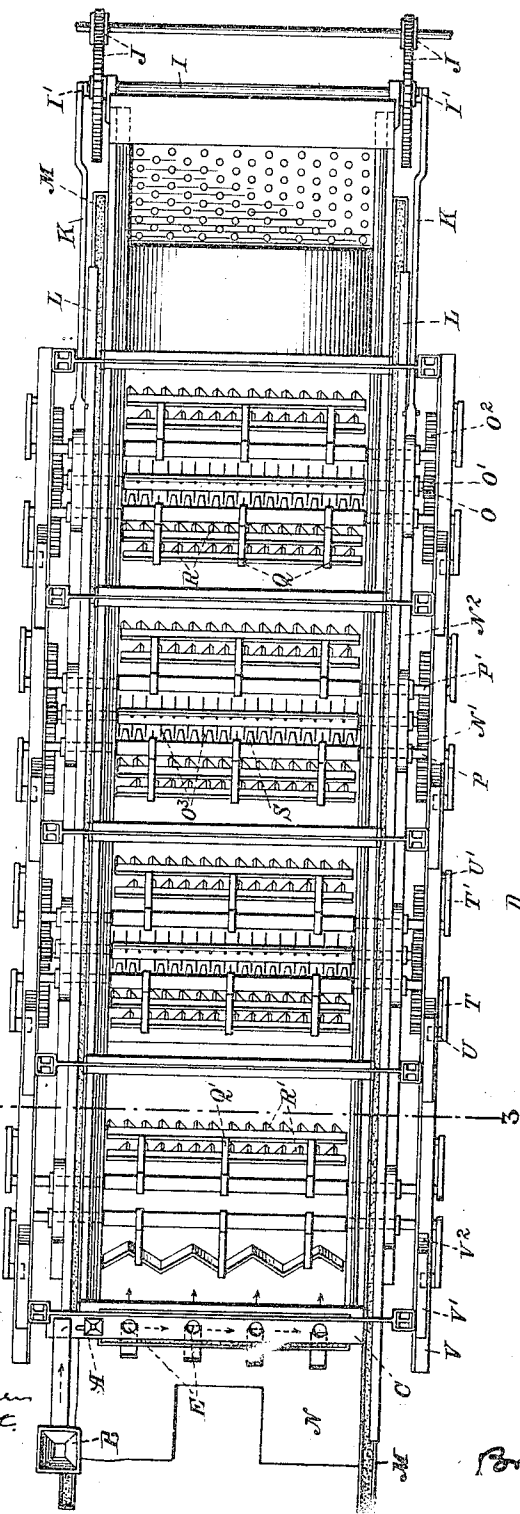
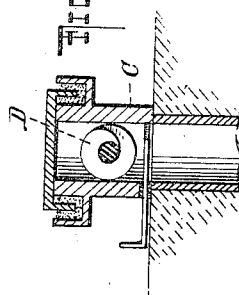


Fig. 1.



WITNESSES

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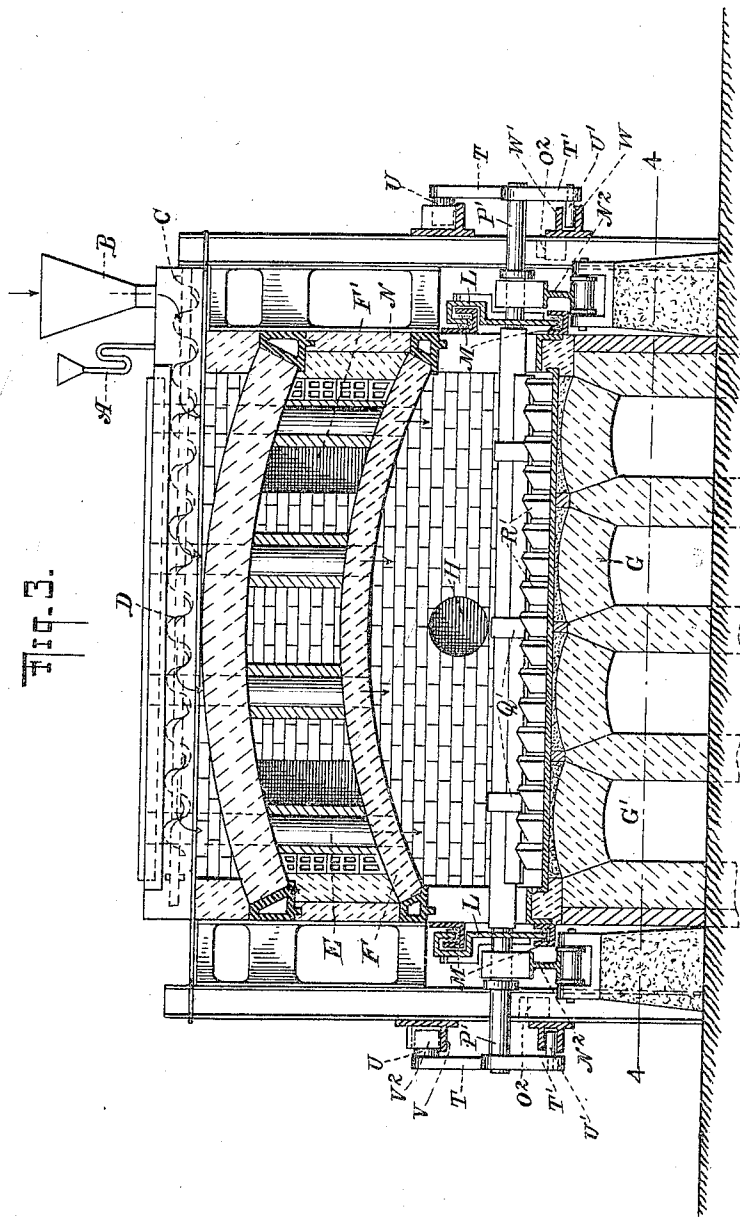
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5 SHEETS—SHEET 3.



WITNESSES

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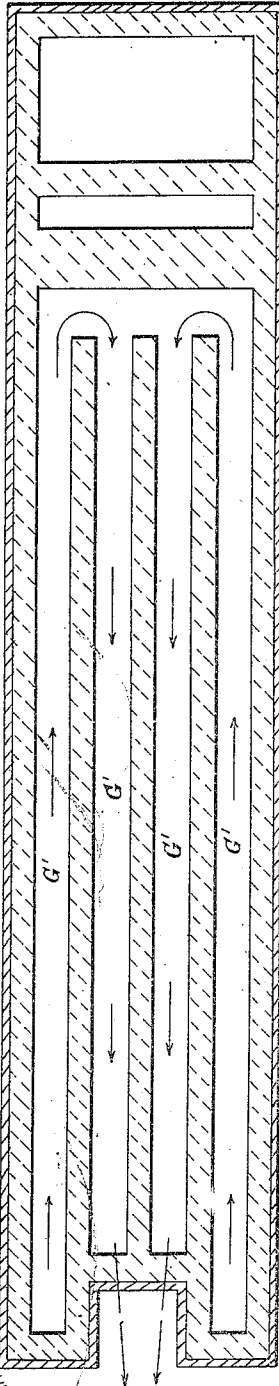
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5 SHEETS—SHEET 4.

Fig. 4.



WITNESSES

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Fig. 5.

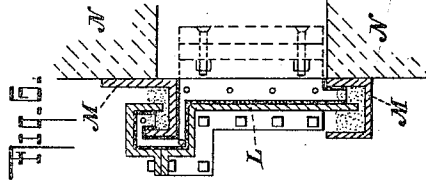
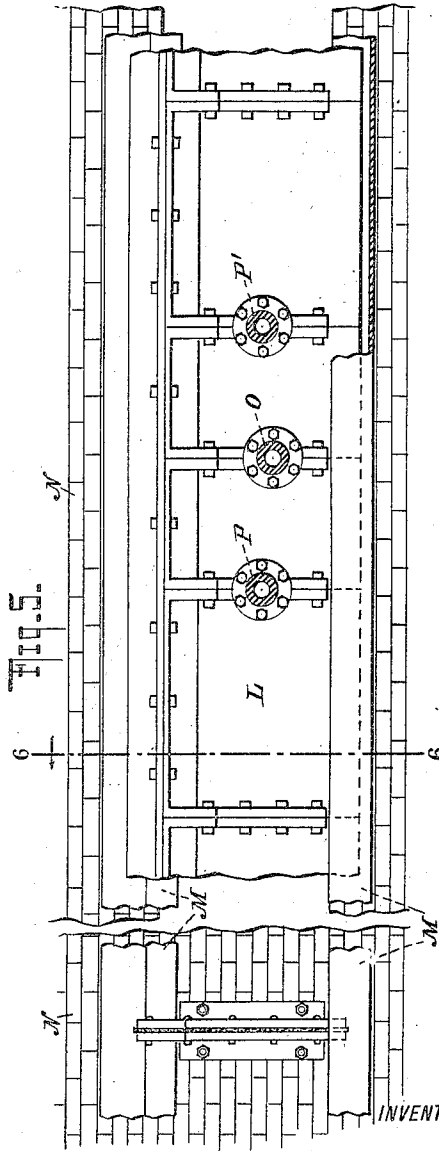


Fig. 6.



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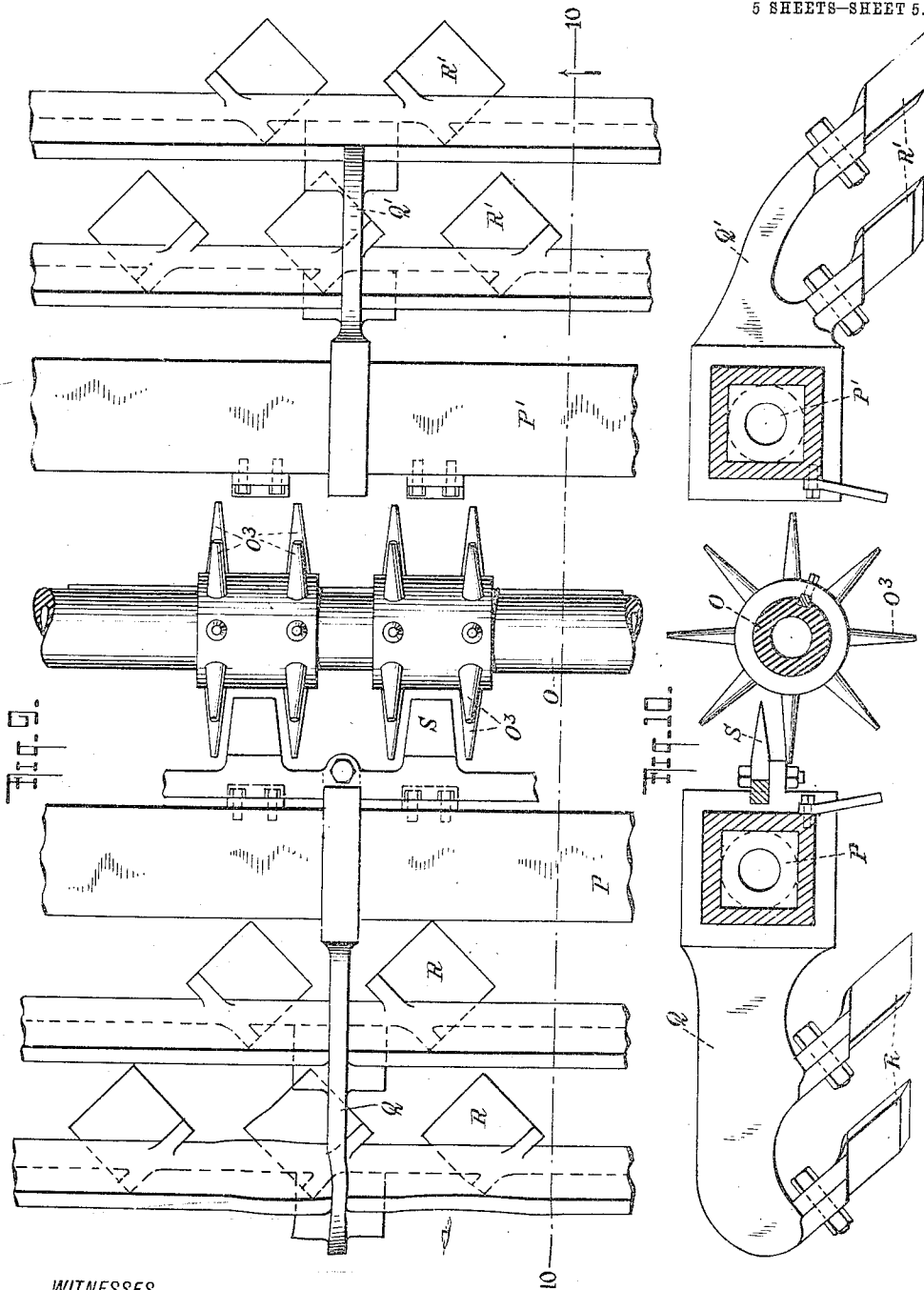
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APPLICATION FILED AUG. 6, 1909.

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Patented July 30, 1912.

5 SHEETS—SHEET 5.



WITNESSES

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UNITED STATES PATENT OFFICE.

JOHN H. NIELD, OF HACKENSACK, NEW JERSEY, ASSIGNOR TO GENERAL CHEMICAL COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

SALT-CAKE FURNACE.

1,033,825.

Specification of Letters Patent.

Patented July 30, 1912.

Application filed August 6, 1909. Serial No. 511,510.

To all whom it may concern:

Be it known that I, JOHN HERBERT NIELD, a citizen of the United States, and resident of Hackensack, Bergen county, New Jersey, have invented certain new and useful Improvements in Salt-Cake Furnaces, of which the following is a specification.

My invention relates to furnaces and particularly to such in which the material under treatment is propelled gradually from one end of the furnace to the other so that the residual material is removed.

I have designed the apparatus shown in the accompanying drawings with especial reference to the manufacture of hydrochloric acid from a mixture of sulfuric acid and sodium chlorid to which I have added, according to a process which forms the subject matter of another application for patent filed by me August 21, 1909, Serial No. 514,629, a suitable amount of an inert material which will keep the mixture in a firm condition so that the mechanical propelling devices employed by me may be available. The mere mixture of sulfuric acid with common salt produces a semi-fluid mass which could not be fed by propelling devices of the character herein disclosed. The inert material admixed to produce a more solid condition of the mixture may for instance be salt cake.

Some features of my apparatus are capable of a broad application wherever it is desired to feed or advance material before, during or after treatment.

In the accompanying drawings Figure 1 is a side elevation of a furnace embodying my invention; Fig. 2 is a plan view thereof with the upper wall of the furnace removed so as to disclose the propelling devices; Fig. 3 is a cross section on line 3—3 of Figs. 1 and 2; Fig. 4 is a horizontal section on line 4—4 of Fig. 3; Fig. 5 is a partial side elevation drawn upon an enlarged scale; Fig. 6 is a cross section on line 6—6 of Fig. 5; Fig. 7 is a detailed side elevation of another portion of the furnace; Fig. 8 is a vertical section on line 8—8 of Fig. 7; Fig. 9 is a partial plan view showing one of the feeding devices; Fig. 10 is a vertical section on line 10—10 of Fig. 9; and Fig. 11 is a sectional detail showing the feed worm, the feed chamber and the luted closure for the latter.

A indicates a suitable pipe for supplying

the requisite sulfuric acid while the solid material, say a mixture of common salt and salt cake is fed through a hopper B. Both substances are discharged into a chamber C arranged on top of the furnace proper containing a worm D or other device for feeding the mixture transversely so that it may reach the inlets E arranged in the upper wall F of the furnace proper. The mixture thus drops on the bottom G of the furnace at one end thereof. Any suitable construction is employed for heating channels F' in the top wall and also channels G' in the bottom wall. The hydrochloric acid gas evolved during the operation is withdrawn through an aperture H (see Fig. 3.)

The mechanism for feeding or propelling the material lengthwise on the bottom G from the inlet end to the outlet is operated from a shaft I which may be driven by means of gearing J, said shaft having a crank connection at I' with a connecting rod K attached at K' to a slide or I-beam N'. A closure slide L moves in lutes M secured to the side walls N' of the furnace proper. The slides L run free in lutes M; the openings are kept air-tight for example by means of sand or other suitable solid material of suitable fineness or any other material such as glycerin. The lutes are spaced and the openings are left in the side walls of the furnace adjacent to said lutes but such openings are closed by the closure slides L. The said slides and propelling devices are carried on the slides or I-beams N' which travel on rollers. The said slides carry one or more propelling devices. In the particular furnace shown there are four sets of propelling devices. Each set comprises three members, the central member is carried by a shaft O which also forms a connection between the opposite slides and said shaft is provided at each end with a pinion O' engaging a stationary rack O' so that, as the slide end reciprocates, the shaft O will be turned first in one direction and then in the other. The shaft O is provided with outwardly extending projections or pins O', which serve to stir or break up the material so as to keep it from forming lumps.

In advance and in the rear of each shaft O bearings N' are arranged on the slide N' and in these bearings are journaled rock shafts P, P' extending clear across the furnace and also forming connections between the

passage slides N². Within the furnace these rock shafts carry arms Q, Q' respectively, to which are secured shovels or feeding members R, R' the shape of which is shown best in Figs. 9 and 10. I may also secure to one of the shafts P, P' a series of teeth S arranged to project between the teeth O³ so as to keep them clean and stripped of any material adhering to them. On the outside of the furnace the shafts P are provided with arms T carrying rolls U adapted to work in conjunction with stationary guides. These comprise a lower guide V, a short upper guide V' and a guide V² hinged at V³ and of such a length that it will normally rest in an inclined position as shown in Figs. 1 and 7. Let us imagine that the rollers U first rest on the lower guide V and that the slide N² then travels toward the right in Fig. 7 the rake or propelling device carried by the corresponding arms Q will be in its lower operative position. As the roller U comes in contact with the hinged guide V² it will lift said guide and pass beyond it, the guide falling back by gravity into the position shown in Fig. 7. When thereupon the slide N² moves toward the left the roller U will ride up the inclined guide V², thus lifting the corresponding rake teeth R away from the material in the furnace so that the return movement will not affect the position of the material. When the roller U in traveling toward the left reaches the end of the upper guide V', it will drop off said guide, thus restoring the corresponding rake to its lower operative position. A similar action occurs at the same time in regard to the rakes carried by the arms Q'. For this purpose the shafts P' carry arms T' provided with rollers U'. These rollers work in conjunction with horizontal lower guides W, short horizontal upper guides W' and inclined guides W² hinged at W³ adjacent to one end of the upper guide W' and adapted to rest on the lower guide W. During movement of the slide N² toward the right the roller U' will rest on the lower guide W so that the corresponding rake teeth R' will be in their lower operative position. At the end of the movement toward the right the inclined guide W² will be lifted and when movement toward the left begins, this guide will cause the roller U' to travel up, thus lifting the rake teeth R' off the material in which inoperative position they are kept by the action of the upper guide W' until the roller U' drops off the left-hand end of said guide. It will therefore be seen that the material is only moved in one direction, that is toward the outlet, all the rakes being raised off the material when the slides move toward the inlet. The teeth O³ however, which do not act to feed the material but simply to keep it in a proper condition, are

operative both during the forward and the return movement of the slides. As shown in Fig. 10 the rake teeth R, R' should preferably be inclined downwardly toward the outlet portion of the apparatus.

It will be seen, especially with reference to Figs. 1 and 7, that the distance between the guides V, V' is greater than that between the guides W, W' and thus the up and down movement of the rear rakes R is greater than that of the front rakes R'.

I claim as my invention:

1. The combination of a support for the material to be fed, a slide arrangement to reciprocate lengthwise of said support, a feed member carried by the slide and movable relatively thereto toward and from said support, and means, governed by the reciprocation of the slide, for moving the feed member relatively to the slide.

2. The combination of a support for the material to be fed, a slide arranged to reciprocate lengthwise of said support, a feed member carried by the slide and pivoted thereto to swing toward and from said support, and means, governed by the reciprocation of the slide, for swinging the feed member on its pivot.

3. The combination of a support for the material to be fed, a slide arranged to reciprocate lengthwise of said support, a plurality of feed members carried by said slide tandemwise, and each movable relatively thereto toward and from said support, one of said members having a greater throw than its neighbor, and separate means for each feed member, governed by the reciprocation of the slide, for bringing the feed members toward the support into their operative position and then away from the support.

4. The combination of a support for the material to be fed, a slide arranged to reciprocate lengthwise of said support, two swinging feed members carried by the slide tandemwise and extending in opposite directions from their pivots, and means, governed by the reciprocation of the slide, for swinging the feed members alternately toward and from the support.

5. The combination of a support for the material to be fed, a slide arranged to reciprocate lengthwise of said support, a feed member connected with the slide pivotally and having an arm connected therewith, two guides extending lengthwise of the slide's movement at different distances from said support and a third guide hinged at one end of one of the first-named guides and extending to the other guide, the said three guides being adapted for engagement with said arm to throw the feed member alternately toward and from the support.

6. The combination of a support for the material to be fed, a slide arranged to re-

reciprocate lengthwise of the support, two feed members carried by the slide tandemwise and arranged to move alternately toward and from the support and a stirring device carried by the slide between said feed members.

7. The combination of a support for the material to be fed a slide arranged to reciprocate lengthwise of the support, two feed members carried by the slide tandemwise and movable toward and from the support, a rotary stirring member carried by the slide between said feed members and means governed by the reciprocation of the slide for rotating said stirring member and carrying the feed members alternately toward and from the support.

8. The combination of a support for the material to be fed, a slide arranged to reciprocate lengthwise of the support, two swinging feed members carried by the slide tandemwise and extending in opposite direction from their pivots, a rotary stirring member carried by the slide between the feed members and means governed by the reciprocation of the slide for rotating the stirring member and swinging the feed members alternately toward and from the support.

9. The combination of a support for the material to be fed, a slide arranged to reciprocate lengthwise of said support, two members carried by the slide tandemwise and movable relative thereto toward and from the support, said members being pro-

vided with rake teeth inclined in the direction toward which the material is to be fed and means governed by the reciprocation of the slide for carrying said feed members alternately toward and from the support.

10. The combination of a support for the material to be fed, a longitudinally apertured wall at the side of said support, a slide positioned externally of said wall and adapted to reciprocate lengthwise thereof, and a feed member and a closure member supported by said slide, said feed member extending through said aperture and said closure member having a luted connection with said wall whereby said aperture is sealed by said closure member.

11. The combination of a support for the material to be fed, longitudinally apertured walls at the sides of said support, slides positioned externally of said walls and adapted to reciprocate lengthwise thereof, and a feed member and closure members supported by said slides, said feed member extending through said apertures and said closure members having luted connections with said walls whereby said apertures are sealed by said closure members.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

J. H. NIELD.

Witnesses:

BERNHARD C. HESSE,
FRITZ V. BRIESEN.