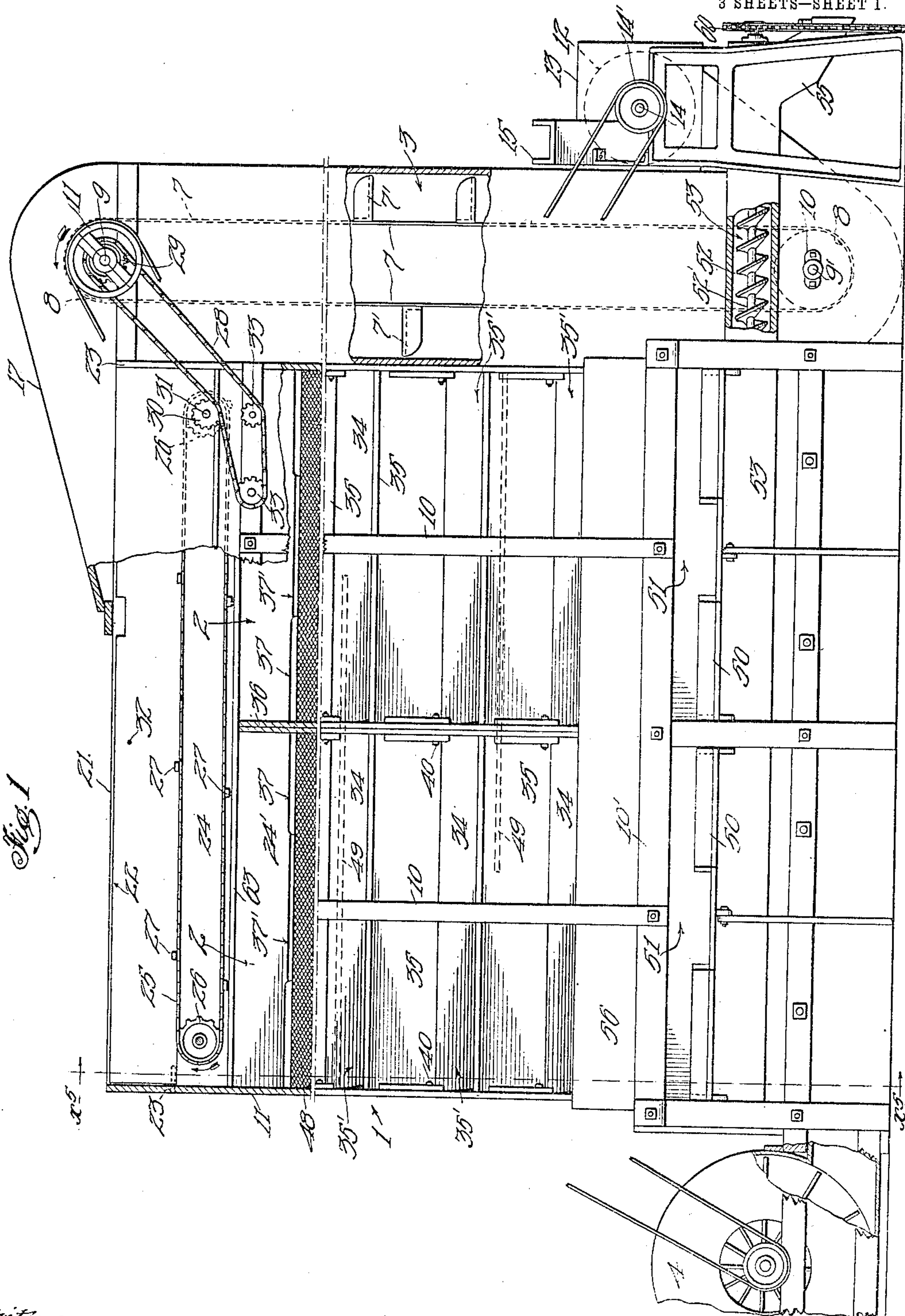


No. 831,884.

PATENTED SEPT. 25, 1906.

F. H. MERRILL.  
SOAP DRYING MACHINE.  
APPLICATION FILED JULY 31, 1905.

3 SHEETS—SHEET 1.



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Frank L. Graham

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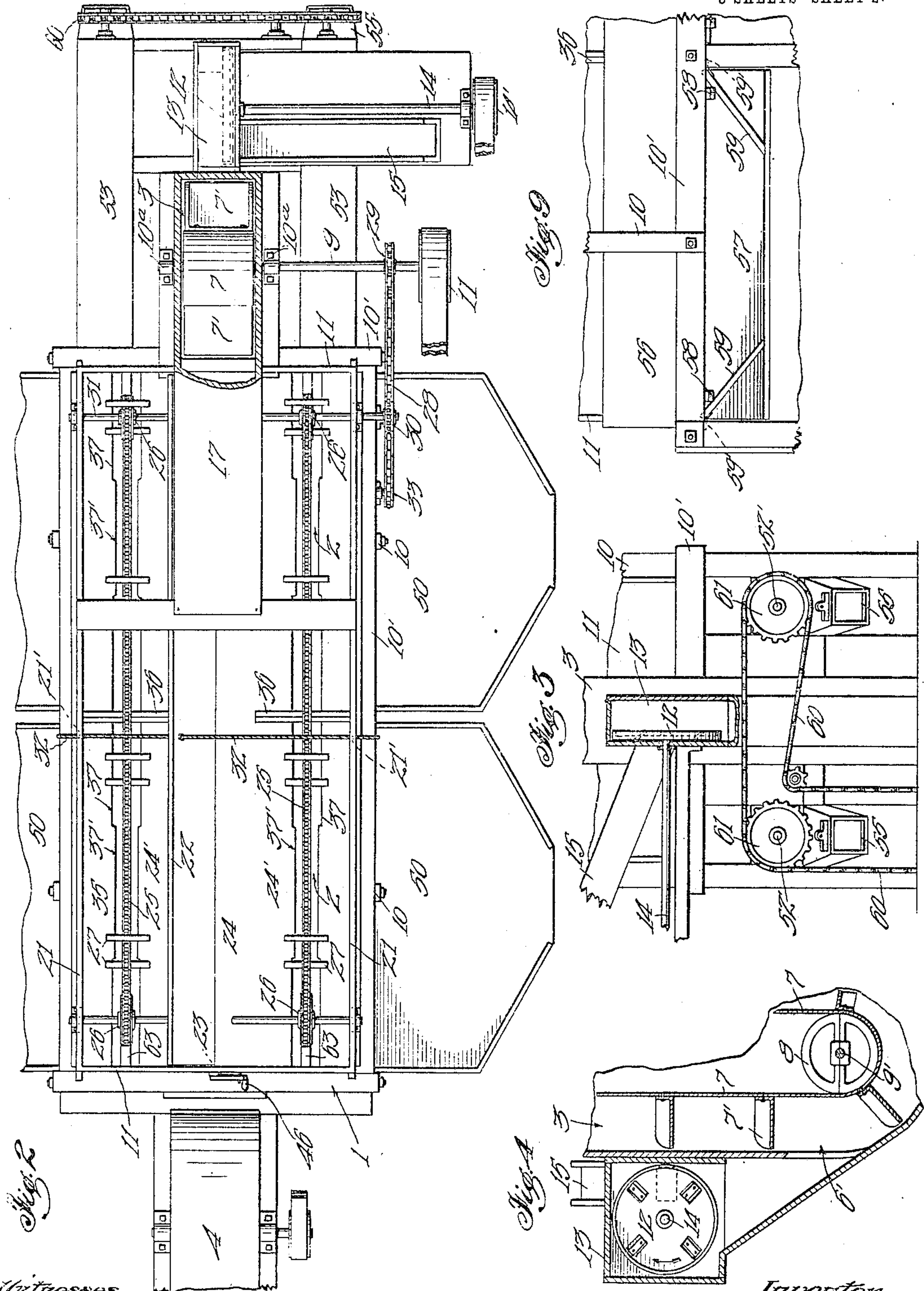
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3 SHEETS—SHEET 2.



Witnesses  
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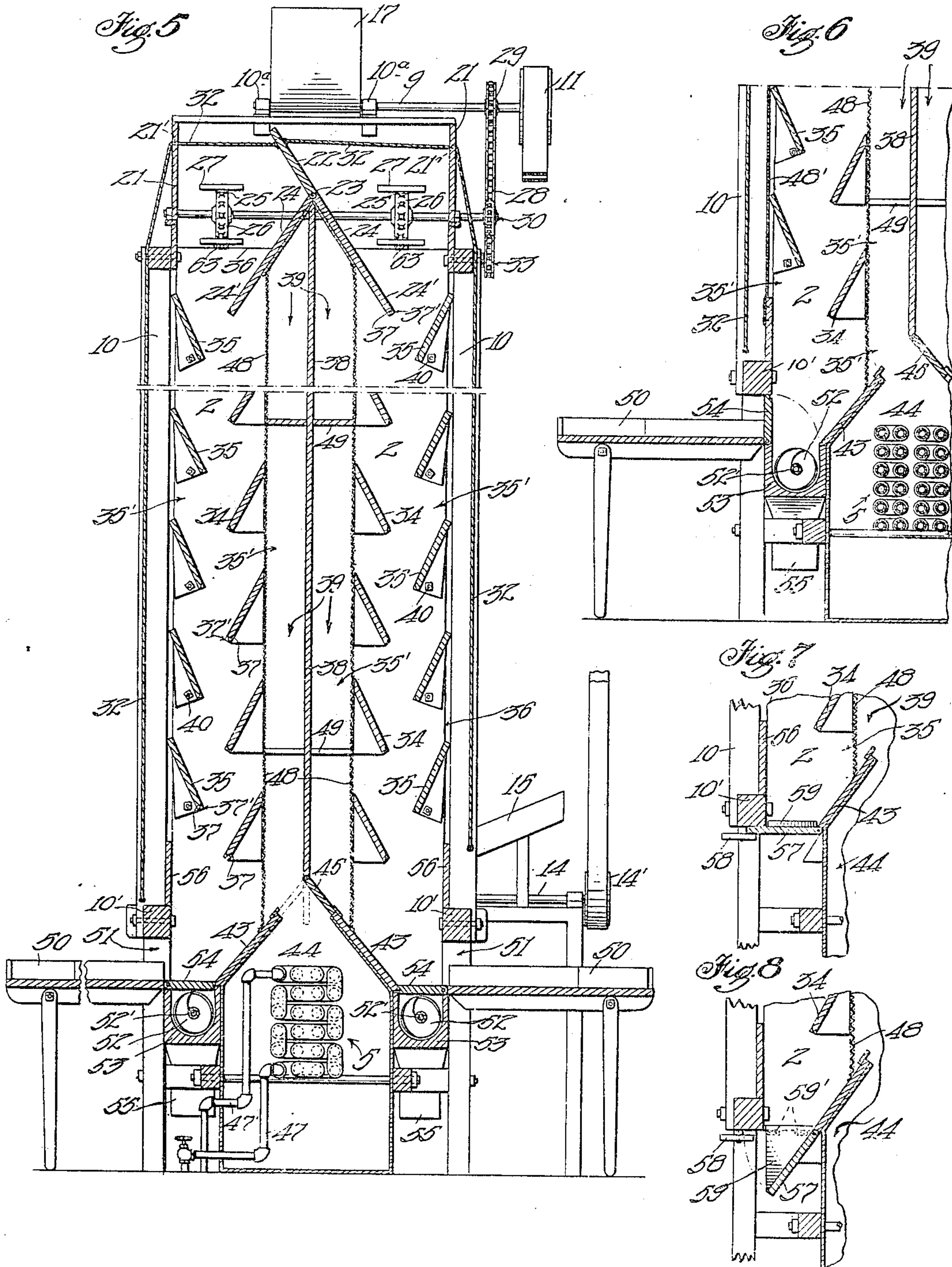


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3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

FRANK H. MERRILL, OF LOS ANGELES, CALIFORNIA.

## SOAP-DRYING MACHINE.

No. 831,884.

Specification of Letters Patent.

Patented Sept. 25, 1906.

Application filed July 31, 1905. Serial No. 271,900.

*To all whom it may concern:*

Be it known that I, FRANK H. MERRILL, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Soap-Drying Machine, of which the following is a specification.

The main object of this invention is to provide a machine for drying soap economically and expeditiously.

The invention is particularly applicable for drying soap in a more or less divided condition—for example, in the form of flakes or in the form of powder; and one object of the invention is to provide a machine which can be used interchangeably for the drying of flaked soap or of washing-powder.

The accompanying drawings illustrate the invention.

Figure 1 is a side elevation of the machine with parts broken away. Fig. 2 is a plan. Fig. 3 is an end view of the lower part of the machine at the delivery end. Fig. 4 is a detail vertical section of the soap dividing and charging means. Fig. 5 is a vertical section on line  $x^5 x^5$  in Fig. 1, showing the machine in condition for use in drying flaked soap. Fig. 6 is a similar view of part of the machine in condition for use in drying soap-powder. Fig. 7 is a detailed vertical section of the delivery portion of the machine, showing a modified construction, the delivery-outlet being closed. Fig. 8 is a similar view showing the outlet open. Fig. 9 is a side elevation of Fig. 8.

The machine comprises a frame 1, containing one or more bins 2, suitable means, such as an elevator 3, for supplying to the bins the soap or material to be dried, an air-supply means, such as a blower 4, a heater 5 for heating the air-supply, means for conducting the heated air through the bins, and means for discharging or delivering the dried material from the bins.

The frame 1 may comprise uprights 10, longitudinal bars 10', and end walls 11. Bins 2 are closed at the ends by said end walls and are open at the top. The side walls of the bins are sufficiently open to permit passage of air therethrough from side to side. The elevator 3 is arranged at one end of the frame 1 and is of any usual or suitable construction, comprising a trunk or casing attached to the end wall of frame 1 and inclosing the conveyor 7, consisting of an endless apron or

chain mounted on drums 8 at the top and bottom of the elevator-casing, said drums being carried by shafts 9 9', mounted in bearings 10<sup>a</sup>. 11 designates a pulley on one of said shafts to receive a suitable driving connection, such as a belt. Conveyor 7 is provided with flights or buckets 7', and the elevator-casing is provided with an opening 6, through which soap or material is delivered to said flights or buckets.

12 designates means for supplying soap or material in a state of division suitable for drying, the same being, for example, a slicing device or wheel mounted in a box or head 13 and driven by a pulley 14' on its shaft 14, a chute 15 being provided, whereby the bars of soap are delivered into the slicing device, and a trough or chute 16, leading down from the end of the box 13 to deliver the sliced material through the opening 6 to the elevator. This head or box may be removed when desired and any other suitable device substituted for supplying soap in a powdered form or any other desired state of division.

The elevator 3 is provided at its top with a hood or extension 17, extending over the top of the bins 2, so that the soap or material carried up by the elevator will be carried through this hood into the open top of the bins. In the present instance two bins 2 are provided, located at the respective sides of the machine. The frame or casing 1 has an upward extension at the top of the bins, formed of the end walls 11 and side walls 21, and a deflector or flap 22 extends longitudinally and centrally therein, said deflector being mounted on a pivotal support 23 and swinging to one side or the other, so as to direct the material issuing from the elevator to the bin at one or the other side. This deflector is pivoted at the top of two fixed oppositely and outwardly sloping deflectors or strips 24, which direct the material from the deflector downwardly into the appropriate bin. Deflector is operated by a rope or flexible connection 32, extending through holes 21' in side walls 21 and hanging down in convenient position at the side of the machine. The space between these fixed strips and side walls 21 of the trunk or extension at the top of the bins form troughs extending along the top of each bin, and means are provided in each of said troughs for distributing or feeding the soap along the same, said means consisting, for example, of an endless chain 25 in each trough,



mounted on sprocket-wheels 26 and carrying flights 27 for engaging with the soap or material to push or drag the same forward away from the elevator end of the trough. Said feeding means may be driven by a chain 28, running on a sprocket 29 on the shaft 9 aforesaid and running under a sprocket-wheel 30 on shaft 31 of one of the sprockets 26 and over idlers 33. A rail or parallel-sided strip 63 is provided to support the chain 25, which runs thereon.

The construction of the dragging means 25 and of the supporting-rail 63 is such as to give an open construction which will not interfere with the downward movement of the soap except at the center portion of the flights. For this purpose the said rail and the means 25 are relatively narrow compared with the bin and trough, and the flights 27 are spaced apart so as to occupy a relatively small portion of the area, so that the soap can pass freely down on either side of the rail; but its movement at the center is obstructed by this rail, so that the soap cannot pack at the center, but falls to either side and on the deflectors. Moreover, this rail serves to support the dragging devices or flights by direct contact with the under side of same and thereby prevents any tendency of the conveyor to be pushed up by the soap underneath the same or to press on and pack the soap or to become clogged.

The bins are open at the top and with their inner and outer walls formed with openings 35' for the passage of air through the bin and through the material therein. For this purpose said inner and outer walls are formed of slats or strips 34 35, which slope inwardly or toward the inside of the bin on both the inner and outer walls thereof. These strips are staggered or alternated from top to bottom of the bin on the respective sides, each strip facing an interstrip opening on the other side of the bin, so that said strips will act to retard the descent of the soap and prevent packing thereof. A partition 36 extends across each bin, dividing it into vertical compartments.

In soap-driers of this class there is a tendency of the soap or material being dried to descend more slowly at each end than in the middle, due to the resisting effect or friction on the soap of the end walls of the bins, holding up the soap near said end walls and maintaining it in comparatively open condition, while the material near the center of the bin not being so supported becomes packed and less open to the passage of air, with the result that the air passes mostly through the end portions and the latter are fully dried or overdried before the central portions become dried. To overcome this difficulty, the deflectors or wall-strips 34 35 are cut away or recessed, as shown at 37, at the lower edges or lips, adjacent to the end walls and to the partition 36,

so as to facilitate the passage of soap therebetween at such points and compensate for the retarding effect of the bin ends. The projecting parts 37' of such strips or deflectors at the central parts of the bins serve to retard the soap thereat in correspondence with the retardation of the soap at the end portions of the bin by the bin ends.

The deflectors on opposite sides or walls of each bin are separated sufficiently to leave an intervening clear space in which the soap descends from the top to the bottom of the bin, the inwardly-projecting deflectors at each side not preventing such direct passage, but only retarding same by the frictional resistance at each side.

The air is applied and distributed to the bins through the space between the inner bin-walls, said space being divided by a longitudinally-extending partition 38 to form two vertical chambers 39, which are closed at the top by the inclined top strips 24, which are extended at their lower ends, as indicated at 24', to form the top deflectors or inner wall-slats. Said top strips 24 are attached at their ends to the end walls 11 of the case or frame 1, and the other strips or slats 34 are also attached to said walls. The other slats 35 are attached to said walls by bolts 40, so as to be detachable and movable, said slats resting against the uprights 10 of frame 1.

At the bottom of the bins inclined bottom pieces 43 are arranged, extending down from the line of the inner walls and forming the top of an air trunk or chamber 44.

A deflector or valve-plate 45, hinged to the bottom of partition 38, is adapted to swing over to one or the other of these bottom pieces, thereby shutting off communication from the air-trunk 44 to one of the chambers 39 and opening communication to the other chamber, or vice versa. Said deflector is operated by a handle 46.

An air-chamber 39 may contain the heater or heating-coil 5 for heating the air-supply. 47 47' designate the pipes through which steam or heating agent passes to the heating-coil 5. A fan, blower, or other air-supply means 4 is connected to said air-trunk 44 to force a current of air past the heater therein and up through one or the other of the chambers 39 and thence between slats 34 into and through bins 2. A perforate wall means 48, such as a wire gauze or netting, is placed at the inner sides of bins 2 to permit passage of air while retaining the material in the bins. In drying finely-divided material, such as soap-powder, it is also necessary to provide a similar screen-wall at the outer side of the bins, the same consisting, for example, of cloth, as indicated at 48' in Fig. 6, for retaining the powder in the bins; but with flaked or sliced soap such retaining means is not necessary and is dispensed with. Baffle-plates or strips 49 extend longitudinally of



the spaces between partition 38 and the inner walls of the bins to deflect the air equally to all parts of the bins, said strips extending alternately from opposite ends of said spaces.

5 The delivery or discharge means at the bottom of the respective bins is shown as adapted for use alternatively with flaked or sliced soap and with powder, the soap being delivered directly onto the trays or tables 10 (indicated at 50) through an outlet or discharge-opening 51, while with powder it is advisable to convey or lead the same away by positive conveying devices. Said devices (indicated at 52) may consist of screws 15 mounted on shafts 52' and extending longitudinally below the bottom of the respective bins in troughs 53, said screws being driven by chain 60, engaging sprockets 61 on shafts 52'. Flaps, leaves, or deflectors 54 are 20 hinged at the outer side of each trough and can be extended over the top of the trough, as shown in Fig. 5, in which position it will cut off the delivery communication to said conveyer or can be thrown to upright position, as shown in Fig. 6, when it will open 25 communication to the conveyer. A delivery-chute 55 leads from one end of each trough 53. The bin is closed at its outer side near the bottom by a wall, (indicated at 56,) the 30 bottom of said wall being formed of one of the longitudinal frame members 10', sufficient space being left between said bottom and top of the tray or table 50 to form an outlet or discharge-opening 51 for the flaked 35 soap, said outlet being closed by the flap or leaf 54 aforesaid when the latter is raised, as shown in Fig. 6. When said leaf is depressed, as shown in Fig. 5, the flaked or sliced soap from the bin is guided by the inclined bottom pieces 43 on to said leaf 54 and 40 passes over said leaf to the tray or table 50.

An alternative construction of the discharge or delivery means is shown in Figs. 7, 8, and 9, a flap or leaf 57 being provided at 45 the bottom of each bin, hinged at the inner wall thereof and adapted to be held up by a button 58 while the bin is being filled. When released from said bottom, said leaf will fall to the inclined position shown in Fig. 50 9, forming a downwardly-sloping deflector or guide for delivering the material downwardly and outwardly from the bin. To concentrate the material so delivered at the middle portion of the bin, it is desirable to provide 55 the leaf 57 with additional leaves 59, hinged to the frame 1 at 59' and extending obliquely inward over the leaf 57, so that as said leaf 57 falls to the aforesaid inclined position the leaves 59 will fall therewith, so as to continually rest thereon, and will assume the inclined position shown in Figs. 8 and 9. 60 When flap or closure member 57 is raised, the leaves 59 rest flat thereon, as shown in Fig. 7.

The operation is as follows: Assuming that 65 dried flake soap is desired, the soap in the

form of bars is supplied to chute 15 and is divided into flakes by slicer 12, the flaked soap falling through openings 6 into the elevator, which carries it up and dumps or 70 throws it into the top of the bin-case, where the deflector 22 directs it to one or the other of the bins. The tendency of the soap will be to first fill up the elevator end of the bin, and the conveyer or carrier 25 serves to feed 75 and distribute the soap along toward the other end of the bin. In this operation the rail 63 serves to scrape the adhering soap from the flights 27 and also prevents sagging of the flexible carrier 25. Air is blown in 80 through the heating-chamber or air-trunk 44, and the valve or deflector 45 is turned to divert the hot air from said chamber into the bin that contains the soap. The air passes up through the spaces 39 in a tortuous path, 85 so that it is distributed equally to all parts of the bin, and passes through the bin from side to side. The deflector wall-pieces 34 35 serve to support the soap loosely and uniformly, particularly on account of the central projections 37' allowing even distribu- 90 tion and access of air to all parts of the soap, the soap being supported by the intrusion therinto of these deflectors from each side, so that the whole weight thereof does not 95 come on the lower parts. When the soap has been sufficiently dried in this manner, it is withdrawn through the outlet 51 onto table 50 and thence into suitable receptacles. When one bin has been filled, as above 100 described, the deflector 22 may be reversed and the supply of soap directed to the other bin. The air-deflector 45 may then be turned to central position (indicated by dotted lines in Fig. 5) to allow air to pass to 105 both bins simultaneously, or when the soap in the first bin has fully dried said deflector may be reversed to direct the air to the other bin.

It will be noted that the leaves 54 in Fig. 5 furnish a bottom support for the soap to re- 110 tain it in the bin until it is drawn out through outlet 51. In the form shown in Figs. 7 to 9 the leaf 57 forms a bottom closure while the bin is being filled, and when the soap is to be withdrawn this leaf is dropped to position 115 shown in Figs. 8 and 9, forming an inclined chute for delivery of the soap, the supplementary leaves 59 serving to concentrate the stream of soap toward the center.

In using the machine for drying soap-pow- 120 der the outer screen 48' is applied at each side and the flaps 54 are turned up, as shown in Fig. 6, to close the outlet 51 and open the top of the conveyer-troughs 53, enabling the conveyers to feed the soap to the discharge-out- 125 let. In this case also the slicer-box 13 is removed and a suitable connection to a powder-supply or a suitable powdering device is substituted in obvious manner.

While the apparatus has been described as 130



a soap-drying apparatus, it may also be used for drying other flaked or granular material—such, for instance, as glue or salt.

The machine may be variously modified to adapt it to different conditions.

I claim—

1. In a soap-drying machine, a bin having vertical walls and inwardly-sloping deflectors extending between said walls and forming two sides of the bin, said deflectors having their lower edges projecting farther toward the middle of the bin at the parts away from said vertical walls.

2. In a soap-drying machine, a bin having two closed walls and inwardly-sloping deflectors extending between said closed walls and forming the other walls of the bin, said deflectors having their lower edges recessed near said end walls.

3. In a soap-drying machine, a drying-bin and feed-trough at top of said bin, said trough being open at the bottom to communicate with the bin, means for delivering the soap into the said trough, and a spreading device in the trough for distributing and feeding the soap longitudinally of the trough over the opening into the bin, the same comprising an endless dragging-carrier, provided with spreading-flights, wheels on which the said carrier is mounted and driving means for the carrier, said spreading device being of open construction for the free downward passage of the soap and a rail extending longitudinally of the carrier and beneath the flights thereon for supporting the flights.

4. In a soap-drying machine, two bins each having inwardly-sloping deflectors forming its outer and inner walls, and having air-passages between the deflectors, the inner walls of the two bins being separated, a partition dividing the spaces between said inner walls into two chambers closed at the top, an air-supply chamber below said partition and a pivoted deflector to direct the air-supply from said air-supply chamber into one or the other of said chambers on opposite sides of said partition and through the inner wall of one or the other of the bins.

5. In a soap-drying machine, a bin having a discharge-outlet extending laterally at the bottom of one wall, a delivery-trough at the bottom of the bin and a deflector pivoted at one side of the trough and swinging down to close the top of the trough, or up to close the lateral outlet.

6. In a soap-drying machine, a bin, an elevator at one end thereof, discharging into the top of the bin, a soap-dividing machine discharging into said elevator, a dragging-spreader extending along the top of the bin, receiving the soap from the elevator and distributing it along the bin, said spreader being of open construction to permit of free downward passage of the soap, means for passing heated air through the bin, and delivery means at the bottom of the bin.

7. The combination of two bins each having inner and outer walls formed with downwardly-sloping deflectors and intervening spaces, an elevator at one end thereof discharging into the top of the respective bins, a deflector at the top of the bins deflecting the discharge into either of the bins, a soap-dividing machine discharging into said elevator, spreaders at the top of each bin, means for operating said spreaders to spread the soap away from the elevator end of the bin, a longitudinally-extending partition between the inner walls of the bins, an air-chamber below said partition, and a deflector at the lower end of the partition for directing air from said chamber to either side of the partition, and into and through the bin at that side.

8. In a soap-drying machine, two bins having their inner and outer walls formed of separated inwardly-sloping deflectors, a partition dividing the spaces between said inner walls into two chambers adjacent to the respective bins, closure means for said chamber at the top of said partition, an air-supply chamber below the partition communicating with said chambers and baffle-plates extending longitudinally in said chambers.

9. In a soap-drying machine, a bin, a distributor at the top of the bin consisting of a flexible carrier provided with flights, rotary supports for said carrier, and a rail extending longitudinally of said carrier and under the flights thereon, in contact with said flights, said carrier and rail being narrow relatively to the bin and the flights being separated to allow free downward passage of the soap but to drag the soap longitudinally of the bin.

In testimony whereof I have hereunto set my hand, at Los Angeles, California, this 25th day of July, 1905.

FRANK H. MERRILL.

In presence of—

ARTHUR P. KNIGHT,  
FRED A. MANSFIELD.