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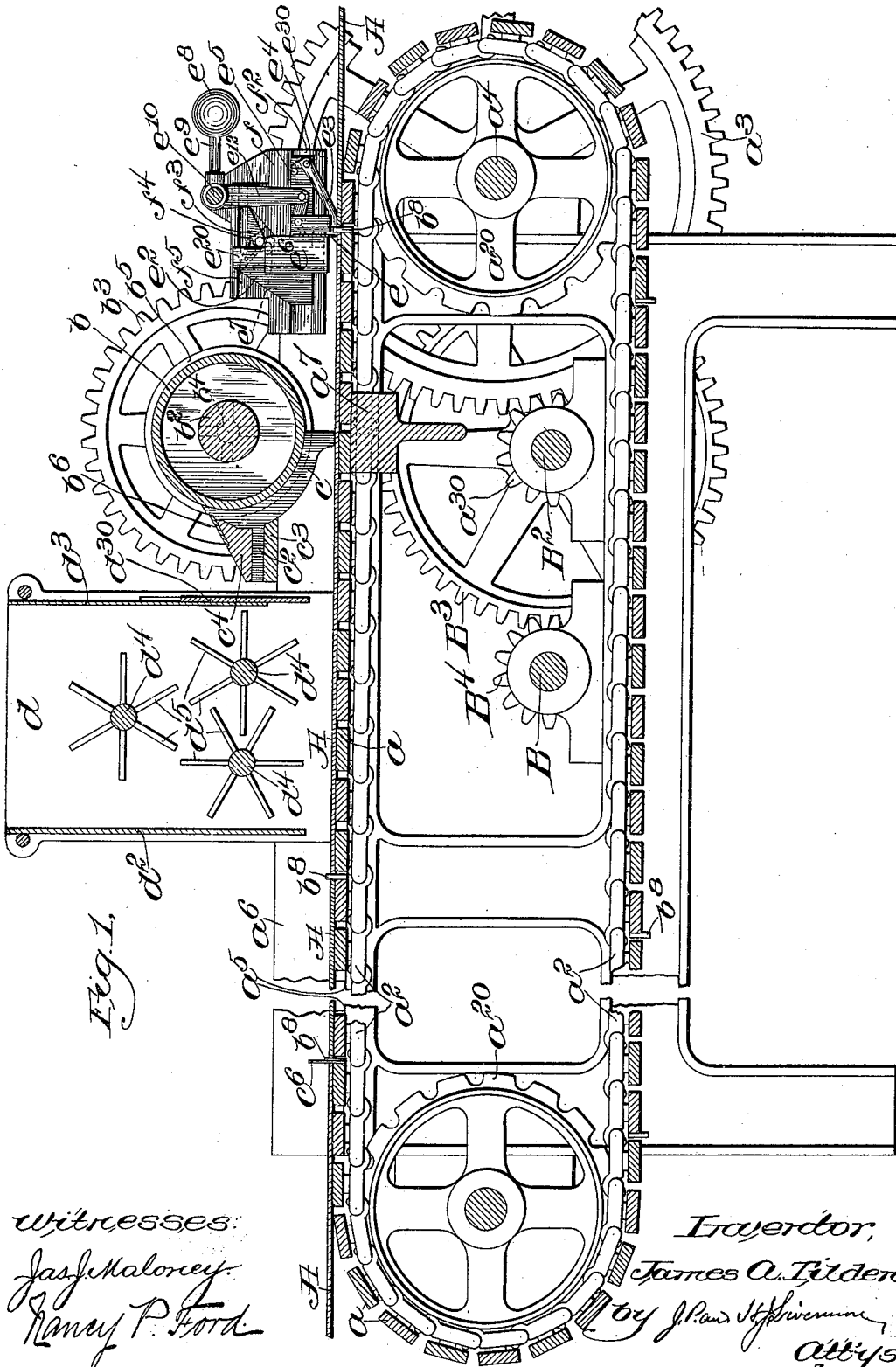
Patented June 12, 1900.

J. A. TILDEN.
SUGAR FORMING MACHINE.

(Application filed Aug. 22, 1898.)

(No Model.)

3 Sheets—Sheet 1.



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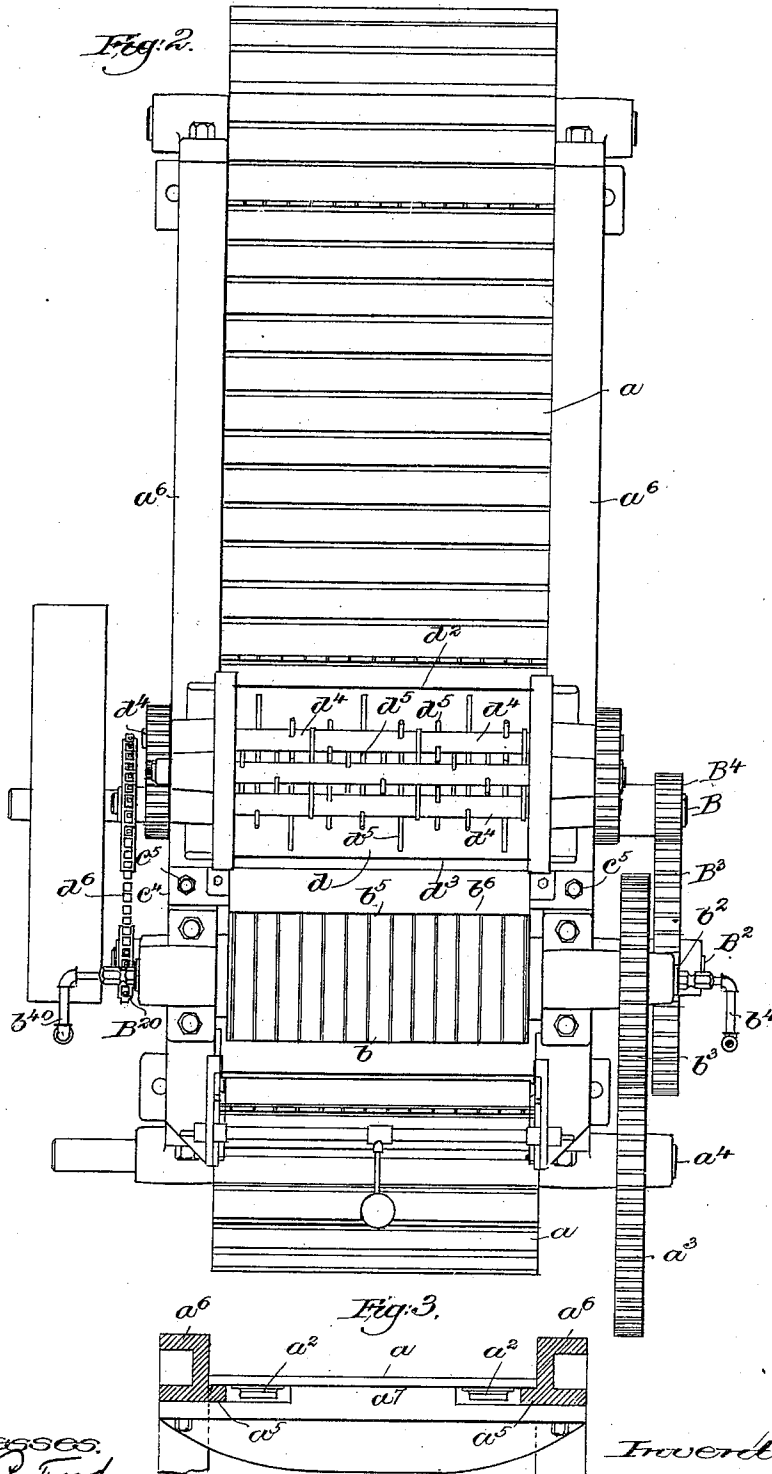
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3 Sheets—Sheet 2.



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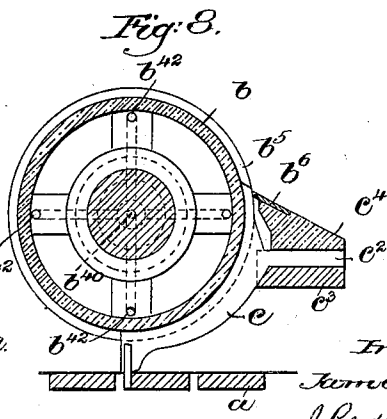
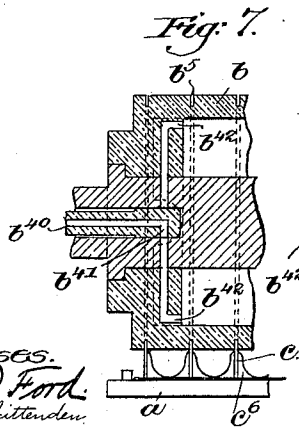
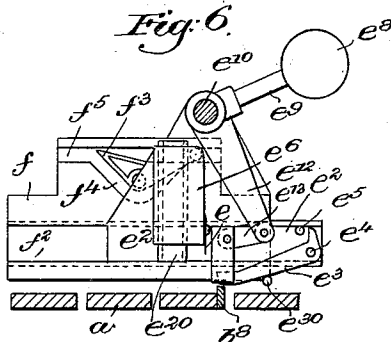
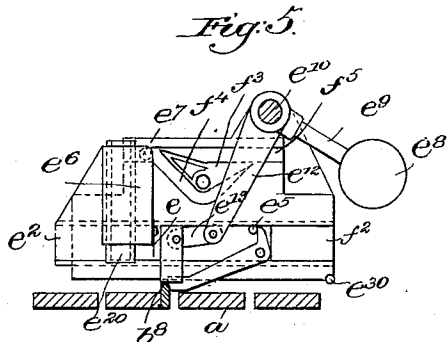
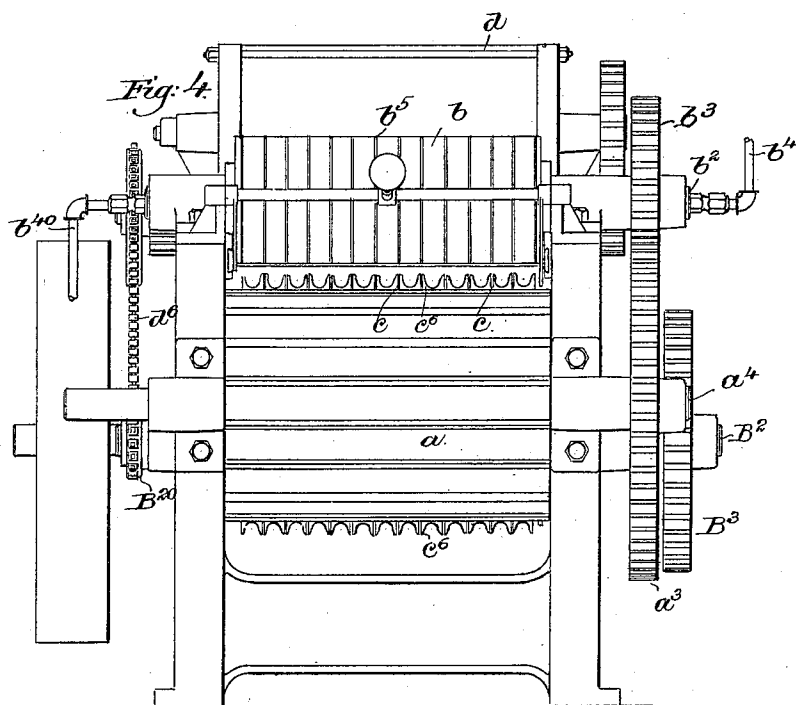
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

JAMES A. TILDEN, OF HYDE PARK, MASSACHUSETTS, ASSIGNOR TO THE
HERSEY MANUFACTURING COMPANY, OF BOSTON, MASSACHUSETTS.

SUGAR-FORMING MACHINE.

SPECIFICATION forming part of Letters Patent No. 651,618, dated June 12, 1900.

Application filed August 22, 1898. Serial No. 689,233. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. TILDEN, of Hyde Park, county of Norfolk, and State of Massachusetts, have invented an Improvement in Sugar-Forming Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

10 The present invention relates to a sugar-forming machine, and is embodied in a machine for forming sugar in sheets or bars to be subsequently cut up into lumps.

15 The object of the invention is to obtain a machine which will operate continuously and with comparative rapidity and which will continue to operate without becoming fouled or clogged up by the sugar which comes in contact with the operating parts.

20 In accordance with the invention the sugar is pressed flat between a plane presser member, which will be hereinafter referred to as the "platen," and a rotary presser member, which will be hereinafter referred to as the
25 "presser-roll," one of said members being arranged to travel bodily past the other, and the presser-roll being rotated during the pressing operation.

30 It is to be understood that the terms "platen" and "presser-roll" are used for convenience and are intended to include, respectively, any form of plane and rotary presser members.

35 A further feature of the invention consists in providing the machine with means for dividing the sugar into bars or strips, and for this purpose the said machine is shown as provided with dividing-blades extending from the surface of one presser member to
40 the surface of the other, the said blades being transverse to the axis of the presser-roll, so as to divide the sugar longitudinally, or, in other words, in a direction parallel to the direction of movement of the traveling member.

45 To obviate, so far as possible, the tendency of the sugar to stick to the presser-roll, the said roll is provided with heating means and is herein shown as hollow and arranged to be heated by circulation of steam.

50 The dividing-blades are shown as stationary and interposed between the surface of

the presser-roll and that of the platen, and in order to keep the blades from becoming fouled the machine is provided with means for scraping the said blades at intervals during the operation. The presser-roll may also
55 be provided with a scraper to remove any sugar which is carried up thereby and prevent the sugar from gradually collecting on and fouling the surface thereof.

60 For convenience in removing the formed sugar from the machine the sugar is preferably formed upon supporting-plates adapted to rest upon the platen and to be carried thereby past the roll, and as a matter of convenience the knife-scrapers, which are shown
65 as consisting of slotted projections from the surface of the platen, also serve to engage and carry forward the plates, which are adapted to be supplied with sugar before reaching the
70 roll, as from a suitable hopper mounted above the platen, the said knife-scrapers, however, being so formed that the sugar is practically unconfined with relation to the platen, so that
75 it will not heap up in front of the roll while the sugar behind is under pressure. The machine is further provided with means for regulating the pressure to which the sugar is subjected, this being conveniently accomplished
80 by regulating the amount of sugar delivered to the plates in the operation of the machine.

To cut or trim the sugar at the point where the sugar upon one plate is separated from that which is upon the next-following plate, the machine may further be provided with a
85 cutting-blade of any suitable or usual kind, a cutting device of novel construction and arrangement being herein shown and forming a part of the invention.

Figure 1 is a vertical longitudinal section
90 of a machine embodying the invention with part broken out to save space. Fig. 2 is a top plan view of the same. Fig. 3 is a sectional detail on line x^3 of Fig. 2, on a smaller scale and complete. Fig. 4 is an end elevation
95 Fig. 5 is a detail, on a somewhat-larger scale, showing the cutting mechanism. Fig. 6 is a similar detail showing the same mechanism in a different position; and Figs. 7 and
8, sectional details, on an enlarged scale, of
100 the presser-roll and dividing-blades.

The sugar is acted upon in the operation

of the machine by a plane presser member or platen a and a rotary presser member or presser-roll b , one of said members being arranged to travel with relation to the other
 5 so that the sugar is pressed between them, and in addition to the pressing operation the sugar may be acted upon by the dividing-blades c , which extend from the surface of the presser-roll toward that of the platen.
 10 The said platen a is herein shown as consisting of a series of cross-bars supported at their ends upon chains a^2 , which are adapted to run over sprockets a^{20} , one of which is adapted to be rotated by means of a gear a^3 upon
 15 a shaft a^4 , the said gear being driven by means of a gear-wheel a^{30} upon a counter-shaft B^2 , provided with a gear-wheel B^3 , meshing with a gear B^4 on the main shaft B . The said platen is herein shown as the traveling member
 20 and is so arranged that its velocity of travel will be the same as the surface velocity of the presser-roll b , said presser-roll being mounted on a shaft b^2 and driven by a gear b^3 , meshing with the gear a^3 , the said gears
 25 bearing the same relation to each other in size as do the sprocket a^{20} and the roll b .

The cross members which form the supporting-surface of the traveling platen are sufficiently rigid to afford a firm support for
 30 the sugar and are supported at their ends upon shoulders a^5 , which are formed in the side members a^6 of the machine-frame, the arrangement of said shoulders being best shown in Fig. 3. At the point where the
 35 pressure is exerted, moreover—that is to say, where the platen travels past the presser-roll—the said bars are arranged to travel across a supplemental stationary support a^7 , Figs. 1 and 3, so that the pressure cannot be
 40 affected by any possible yielding of the platen.

For convenience in handling the sugar after it has been formed and is being delivered from the machine the platen is arranged to carry plates A to receive the sugar, and the
 45 sugar may be automatically fed to the said plates as they are carried along by the platen from a hopper d , adapted to contain a mass of sugar, which is supported by the walls of the hopper and by the plates which travel
 50 along beneath the same. The sugar is thus received upon the plates and formed thereon, the plates passing through the machine and being bodily removed with the formed sugar supported thereon. The walls d^2 and d^3 of
 55 the hopper are shown as terminating at a point somewhat above the surface of the traveling platen, so that the sugar which falls upon the plates A is spread out and carried forward thereon to be acted upon by the roll
 60 b and dividing-blades c . The hopper d is also shown as provided with stirring devices, which may consist of shafts d^4 , having radially-projecting fingers d^5 , the said shafts being geared together and arranged to be driven by a chain
 65 d^6 , running over a sprocket B^{20} on the counter-shaft B^2 .

It is desirable to regulate the pressure to

which the sugar is subjected in the operation of the machine, and, as herein shown, this regulation is effected by controlling the amount
 70 of sugar which leaves the hopper, so that a thicker or thinner layer of sugar is advanced between the rotary and plane presser members, which are fixed in the relative position of one to the other and at a definite predetermined distance apart. To accomplish this,
 75 the wall d^3 of the hopper is provided with a vertically-movable slide d^{30} , arranged to be moved toward and from the surface of the traveling platen, it being obvious that the
 80 thickness of the sheet of sugar dragged out from the hopper by the said platen will be equal to the distance between the lower edge of said slide and the surface of said platen. It is to be noted, therefore, that while all
 85 sheets of sugar formed by the machine are of uniform thickness the sugar in the forming process may be subjected to more or less pressure, as is found necessary to obtain the proper density.
 90

To prevent, so far as possible, the sugar from sticking to the surface of the roll b and to the dividing-blades c , the said members are arranged to be heated, the roll b being shown
 95 as hollow (see Figs. 7 and 8) and provided with inlet and outlet pipes b^4 and b^{40} in order that steam may be circulated through the roll. The roll may also be provided with any suitable means for discharging the water of condensation, the pipe b^{40} , as shown in Figs. 7 and
 100 8, having a downwardly-extended inlet b^{41} , arranged to come into alinement with radial ducts or passages b^{42} , having their inlets near the internal periphery of the roll.

The dividing-blades c are herein shown as
 105 stationary and arranged to extend for some distance in grooves b^5 , formed in the surface of the roller b , the said grooves not only serving to keep the blades in position, but also affording a large amount of surface in contact with the heated roll, so as to thoroughly
 110 heat the blades where they extend from the said roll toward the platen. The shape and arrangement are best shown in Fig. 8, the said blades having projections c^2 , supported upon a transverse member c^3 , suitably connected with the frame of the machine, the
 115 said projections being held in position by means of a bar c^4 , secured to the cross member c^3 , as by bolts c^5 , Fig. 2. By removing the said bar c^4 it is obvious that one or all of the blades may be removed to be cleaned or sharpened or for any other purpose desired.

While the heating of the presser-roll and dividing-blades has been found to obviate to
 125 a large extent the tendency of the sugar to stick during the pressing and dividing operations, the machine is further provided with means for removing such sugar as may stick, so as to prevent the same from collecting in
 130 any material quantities and thereby rendering the machine inefficient, in which case the machine would have to be shut down periodically and cleaned.

As herein shown, the roll *b* is provided with a scraper *b*⁶, the said scraper being secured to the cross-bar *c*⁴ and inclined so as to deflect the sugar which is scraped from the roll toward the mass which is being forwarded from the hopper. Thus as the roll rotates any sugar which sticks thereto is scraped off, so that when said roll comes in contact with the sheet of sugar to be pressed it will be perfectly clean and smooth, so as to properly act upon the surface of the sugar. The dividing-blades *c*, moreover, are also provided with cleaning devices or scrapers *c*⁶, the said scrapers being shown as comprising slotted projections from the surface of the platen *a*, the slots therein being in line with the blades *c*, as best shown in Fig. 7, so that as they travel past the said blades they will scrape the same and remove any sugar which may stick thereto. By arranging the blade-scrapers in this way, moreover, they also serve to engage and forward the plates *A*, each plate being of such length as to extend from one set of scrapers to the next.

It is obvious that the platen might be provided with other means for causing the plates to travel therewith, it being essential, however, that the sugar should be free to move or flow along the surface of the plates to the rear of the presser-roll in order to prevent the compressed sugar from heaping up in front of the roll, as would be the case if the mass of sugar were confined at the rear and pushed forward by a feeding member engaging directly with the sugar itself. For this reason the blade-scrapers are shown as separated from each other as far as possible, so as not to engage any material part of the mass of sugar, which is carried forward solely by its natural tendency to remain on the plate. The mass of sugar, therefore, after it leaves the hopper and passes by the blades is divided into substantially-continuous bars which, although separated by the blade-scrapers to such an extent as to come apart easily, are preferably cut or trimmed at the end of each plate. This transverse cutting or trimming is herein shown as accomplished by means of a reciprocating cutter *e*, the construction and operation of which are best illustrated in Figs. 5 and 6.

To obtain a clean cut through the sugar while the same is traveling continuously, it is desirable that the cutter *e* should follow the movement of the sugar, as well as have a vertical downward movement to cut the same. This is accomplished, as herein shown, by mounting the cutter on a slide or traveling support *e*², arranged to travel in an undercut guide-groove *f*², formed in a stationary supporting-frame *f*, secured to the main frame of the machine. The said slide is arranged to be acted upon at the proper time by the platen *a*, which is shown as provided for this purpose with a projection *b*⁸, arranged to engage a portion of the slide *e*², herein shown as a finger *e*³, pivoted at *e*⁴ to the said slide and adapted to

stand in the position shown in Fig. 5, where it is held by means of a stop *e*⁵. The cutter *e* itself is mounted on a vertically-movable support *e*⁶, arranged to move up and down on a guide *e*²⁰ on the slide member *e*² and to produce the upward and downward movement of the cutter. The said support is shown as provided with a projection *e*⁷, arranged to be acted upon in the forward movement of the slide by a guide member *f*³, pivotally secured to the support *f*. The said guide member normally stands in the position shown in Figs. 5 and 6, being supported in a lateral recess in the part *f*, the said recess being so shaped as to form a cam-surface *f*⁴, which is inclined first downward and then upward from a groove *f*⁵, in which the projection *e*⁷ normally stands. In the position shown in Fig. 5 the platen *a* is in such position that the projection *b*⁸ is in engagement with the finger *e*³, so that the continued movement of the said platen will produce a corresponding movement of the slide *e*². In such movement it is obvious that the projection *e*⁷ will engage the under side of the guide *f*³ and be forced downward thereby along the inclined surface *f*⁴, so that the cutting-blade will pass down into the sugar and cut or trim the ends of the strips which extend across from one plate to the next. In the continued movement of the slide *e*² the projection *e*⁷ will ride up the farther side of the surface *f*⁴ until it reaches the position shown in Fig. 6, the guide *f*³ moving on its pivot out of the way of the projection. The said guide will then drop back to its normal position, as shown, (being overweighted at one end for this purpose,) so that in the return movement of the slide *e*² the projection *e*⁷ will ride along the top of the guide, holding the cutter up. The said guide thus acts as a switch to direct the projection downward along the surface *f*⁴ as it moves forward and in line with the groove *f*⁵ as it moves back. The slide *e*² is arranged to return automatically to its normal position as soon as it is released by the platen *a*, and is herein shown as provided with a weight *e*⁸ at the end of the arm *e*⁹, projecting from a rock-shaft *e*¹⁰, mounted on a fixed portion of the frame and connected by means of an arm *e*¹² and link *e*¹³ with a portion of the said slide *e*². To release the slide from the platen *a*, the finger *e*³ is shown as arranged to be acted upon by a projection *e*³⁰, which engages the under side thereof, as shown in Fig. 6, lifting the end of the finger out of engagement with the projection *b*⁸, so that the slide returns through the action of the weight *e*⁸. The finger *e*³ is shown as held in its normal position by force of gravity, the weight of the said finger tending to cause the same to drop until the finger is engaged by the stop *e*⁵, as shown in Fig. 5, the finger then being in the proper position to be engaged by the projection *b*⁸.

For convenience the platen *a* is of sufficient length to receive two or more plates *A* at the same time, and there is a projection *b*⁸ corre-

sponding to each plate, so that in the operation of the machine the cutter will descend each time a plate has reached the proper position, thus trimming the sugar at the point of separation, so that the strips or sheets on the various plates will be of uniform length. The sugar thus formed is then dried, being preferably retained on the plates during the drying operation.

From the foregoing description it will be seen that the sugar is forwarded, divided, and pressed with a continuous feed movement and that the parts of the machine are protected from being clogged or fouled. The machine therefore operates smoothly and rapidly and is comparatively simple in construction and inexpensive.

It is not intended to limit the invention to the specific construction and arrangement herein shown and described, since modifications may obviously be made without departing from the invention.

I claim—

1. A sugar-forming machine comprising a presser-roll; a platen adjacent thereto, said roll and platen constituting cooperating presser members; means for feeding the sugar to the said presser members to be operated upon thereby; and a series of dividing-blades located intermediate the ends of said roll and between the surface thereof and that of the platen, whereby the operations of compression and division are nearly simultaneous and the sugar is prevented from reuniting during compression, as set forth.

2. A sugar-forming machine comprising a presser-roll; a platen adjacent to the said presser-roll; means for heating said presser-roll, to prevent the sugar from sticking thereto; and dividing-blades extending from one of said members toward the other, substantially as described.

3. A sugar-forming machine comprising a presser-roll; a cooperating platen adjacent to the surface of said presser-roll; dividing-blades extending from the presser-roll toward the said platen; and means for heating said presser-roll and dividing-blades, substantially as described.

4. A sugar-forming machine comprising a presser-roll; a cooperating platen adjacent to the surface of said presser-roll; dividing-blades extending from the presser-roll toward the said platen; and means for heating and scraping said blades, substantially as described.

5. A sugar-forming machine comprising a presser-roll; a cooperating platen adjacent to the surface of said presser-roll; a scraper for the surface of said presser-roll; means for heating said presser-roll, and dividing-blades between said presser-roll and said platen, substantially as described.

6. A sugar-forming machine comprising a presser-roll; a scraper for the surface thereof; a platen to cooperate with said presser-roll; dividing-blades extending from said roll to-

ward the said platen; means for heating said roll and said blades; and means for scraping or cleaning said blades, substantially as described.

7. A sugar-forming machine comprising a presser-roll; a traveling platen arranged to travel past the surface of said roll; and stationary dividing-blades extending from said roll toward said platen, substantially as described.

8. A sugar-forming machine comprising a presser-roll; a traveling platen arranged to travel past the surface of said roll; stationary dividing-blades extending from said roll toward said platen; and scrapers for said blades comprising slotted projections from the surface of said platen, substantially as described.

9. In a sugar-forming machine, the combination with means for continuously feeding and forwarding the sugar; of a series of dividing-blades for dividing the sugar into strips; means for pressing the said sugar; and a cutter for cutting or trimming the strips transversely, the said cutter being arranged to travel with the sugar during the cutting operation, substantially as described.

10. In a sugar-forming machine, the combination with means for continuously feeding and forwarding the sugar; of a series of dividing-blades for dividing the sugar into strips; means for pressing the said sugar; a cutter for cutting or trimming the strips transversely, the said cutter being arranged to travel with the sugar during the cutting operation; and means for restoring said cutter to its normal position after the cutting operation, substantially as described.

11. In a sugar-forming machine, the combination with a continuously-traveling platen adapted to receive sugar-supporting plates; of a hopper to contain sugar and deliver the same to said plates; a presser-roll adjacent to said platen; and a series of dividing-blades to act upon the sugar on said plates as said plates are carried along by the platen, said dividing-blades being substantially parallel to the line of movement of the sugar during the pressing operation, substantially as described.

12. In a sugar-forming machine, the combination with a traveling feed member comprising a traveling platen adapted to receive and forward sugar-supporting plates; of a hopper to deliver sugar to said plates; a presser-roll mounted adjacent to said platen to act upon the sugar on the plates; a series of parallel grooves extending around the surface of said presser-roll; and a dividing-blade supported in each groove and extending from the surface of the presser-roll toward the said platen to act upon the sugar carried thereby, substantially as described.

13. In a sugar-forming machine, the combination with the presser-roll provided with parallel annular grooves in its surface; of means for heating the said roll; and a series of dividing-blades each having an extension

fitting into one of said grooves, substantially as and for the purpose described.

14. In a sugar-forming machine, the combination with a continuously-traveling platen; of means for dividing and compressing sugar supported on said platen; a cutter for cutting or trimming the divided sugar transversely; and means for causing said cutter to travel with the platen during the cutting operation, substantially as described.

15. The combination with means for dividing and pressing the sugar; of a continuously-traveling platen to support the sugar; and a cutting device for cutting or trimming the sugar transversely; said cutting device comprising a cutter mounted on a sliding support; an engaging portion of said support arranged to be engaged by a portion of the feeding device to produce a movement of the slide with said feeding device; means for producing a vertical movement of said cutter in response to such movement of the slide; and means for restoring the said slide to its normal position after the cutting operation is completed, substantially as described.

16. In a sugar-forming machine, the combination with a continuously-movable feed member for the sugar; of a cutter mounted

on a slide adapted to be engaged by and to move with said feed member; a cutter-actuating device arranged to engage an inclined surface in the movement of the slide to cause a vertical reciprocation of said cutter; means for disengaging said slide from the feed member and for restoring the same to its normal position; and a movable guide or switch member to direct the knife-actuating device away from the inclined surface and prevent a vertical movement thereof during the return movement of the slide, substantially as described.

17. The combination with the slide e^2 provided with the vertical guide e^{20} ; of the cutter-carrier e^6 supported in the said vertical guide; the cutter-actuator e^7 ; the groove f^5 and inclined surface f^4 ; the movable switch member f^3 ; and means for moving the said slide first in one direction and then in the other, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES A. TILDEN.

Witnesses:

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NANCY P. FORD.