

W. R. ELMENHORST.

Apparatus for Making Cube Sugar.

No. 157,594.

Patented Dec. 8, 1874.

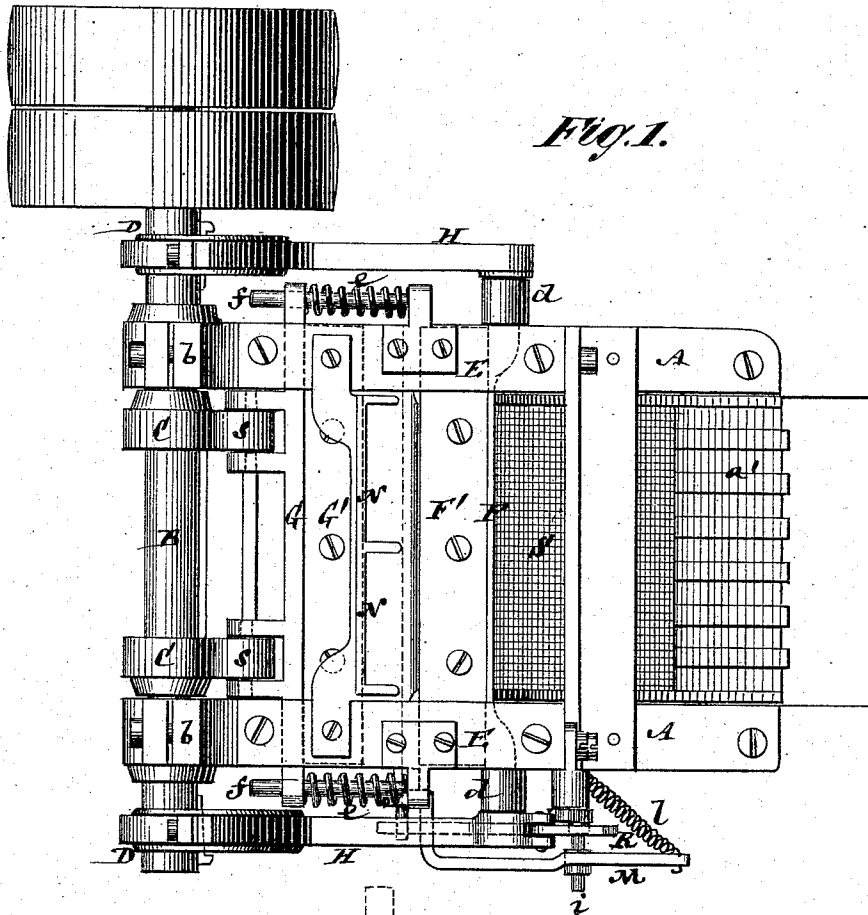


Fig. 1.

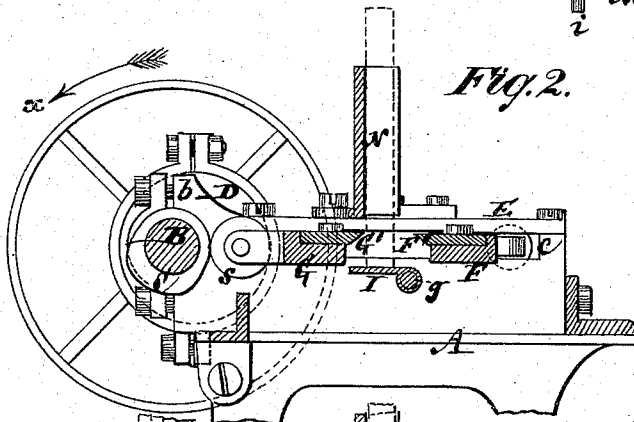


Fig. 2.

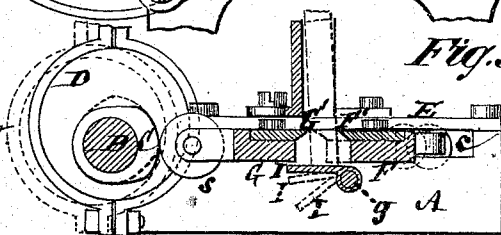


Fig. 3.

Witnesses
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Fig. 4.

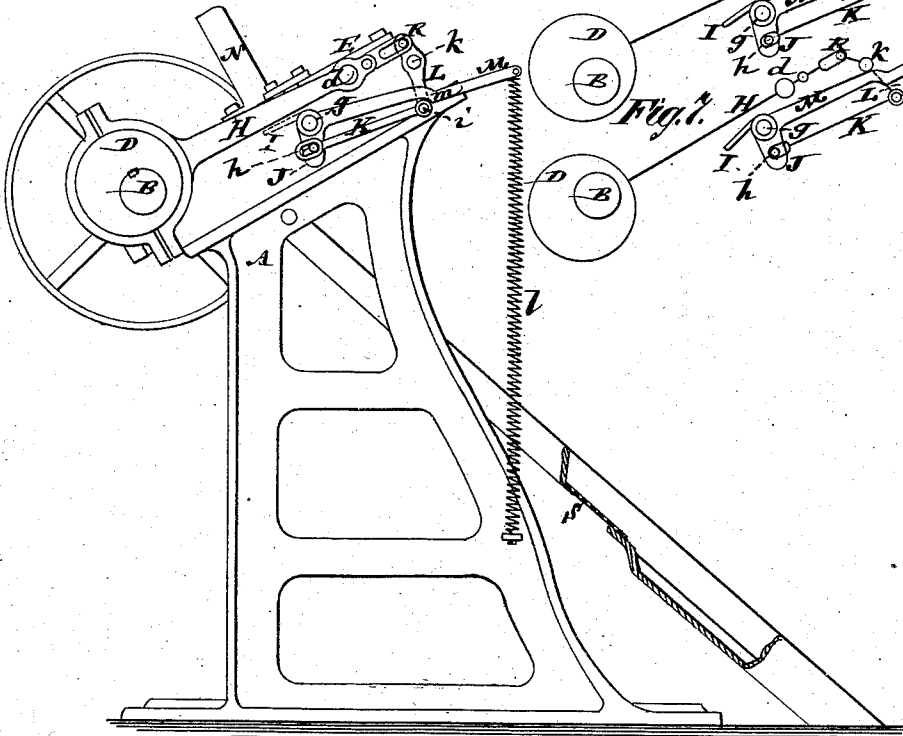


Fig. 6.

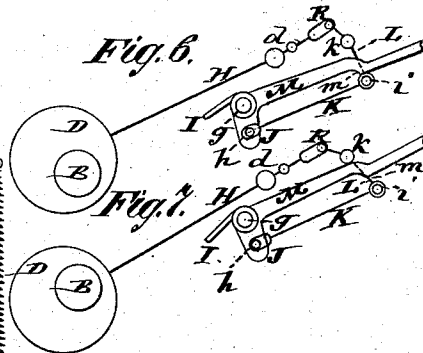


Fig. 7.

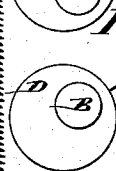
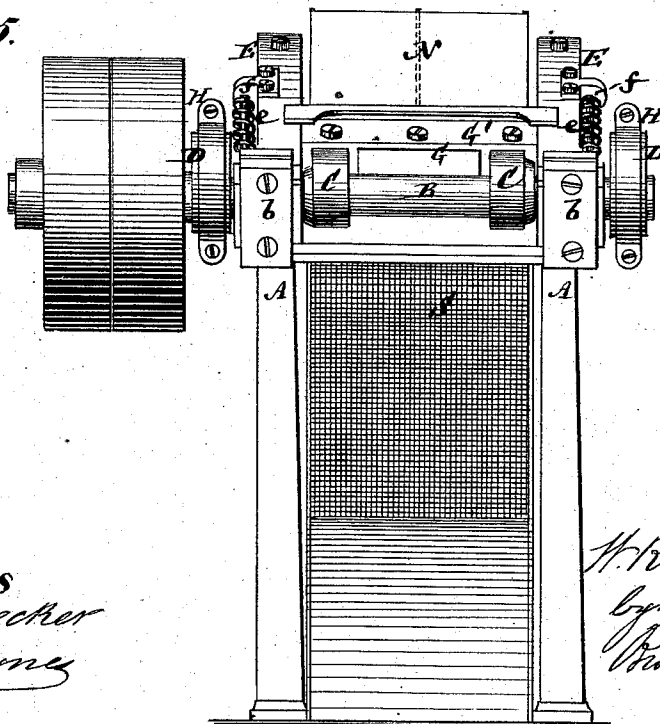


Fig. 5.



Witnesses

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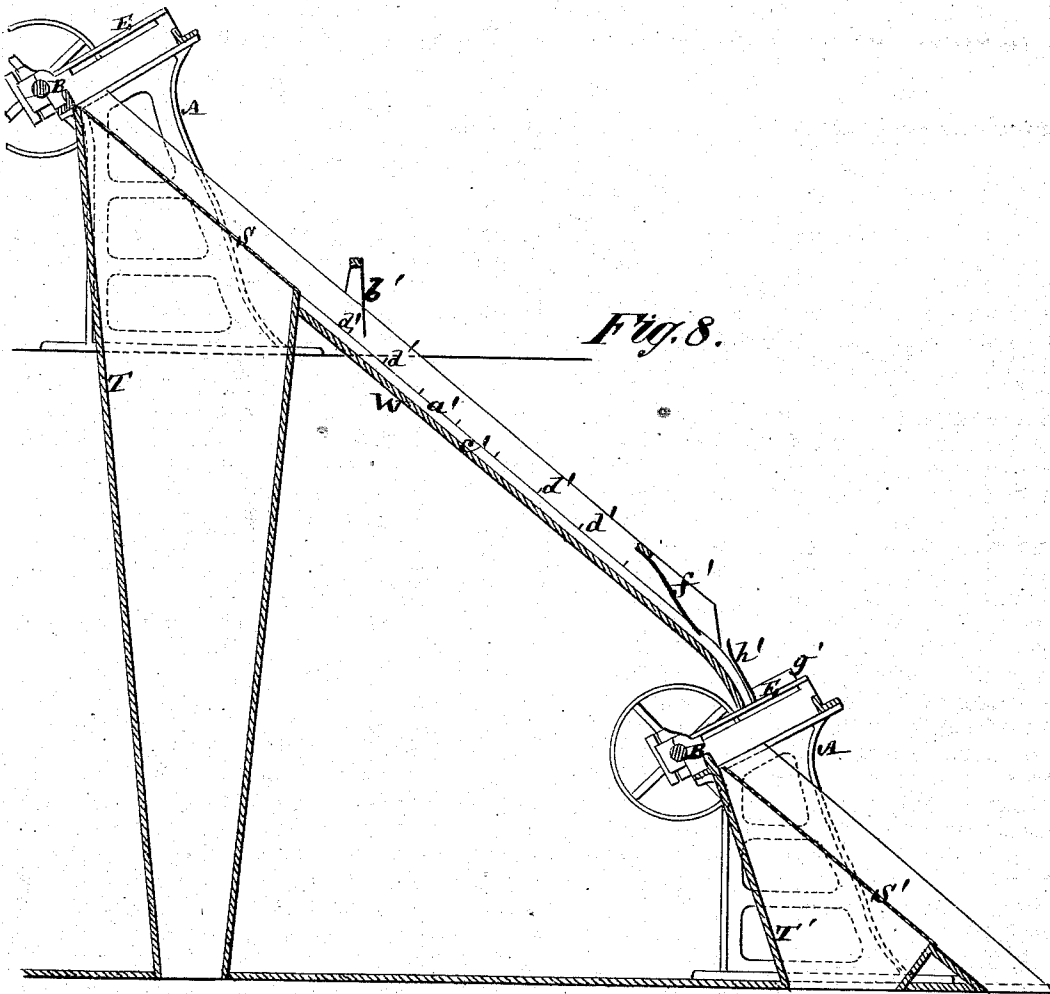


Fig. 8.

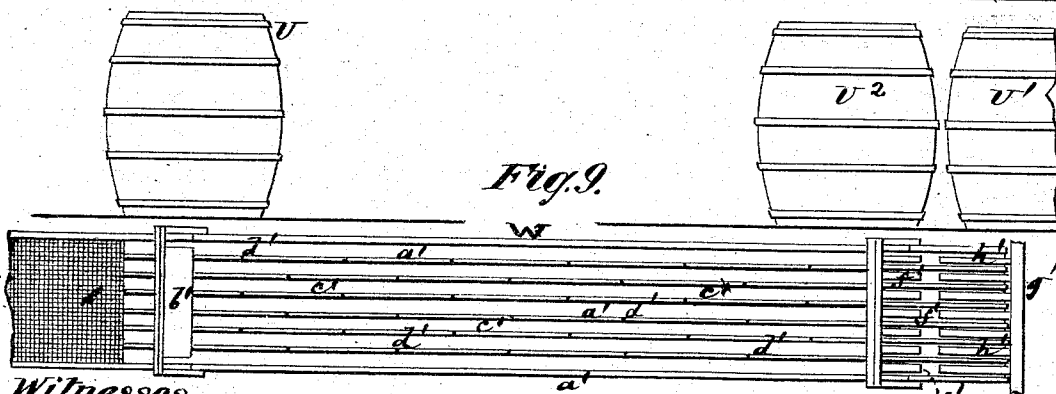


Fig. 9.

Witnesses
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UNITED STATES PATENT OFFICE.

WALTER R. ELMENHORST, OF JERSEY CITY, NEW JERSEY.

IMPROVEMENT IN APPARATUS FOR MAKING CUBE-SUGAR.

Specification forming part of Letters Patent No. **157,594**, dated December 8, 1874; application filed September 3, 1874.

To all whom it may concern:

Be it known that I, WALTER R. ELMENHORST, of Jersey City, in the county of Hudson and State of New Jersey, have invented certain Improvements in Apparatus for Cutting Hard Sugar, of which the following is a specification:

This invention more especially relates to apparatus for reducing hard sugar to cubes or blocks; and consists, generally, in a cutting apparatus employing knives for the purpose, which knives, so far as their meeting edges are concerned, are arranged to operate upon the same general principle as a pair of old-style hard-sugar nippers, but which, in other respects, are in nowise similar, and have certain relative motions given them—also, are associated with automatic feeding and other devices—whereby a machine is produced which not only effects the cutting of the sugar into pieces of equal size and in a regular manner, but, by combining two such machines, and connecting them by a suitable sugar turning and transferring duct, an apparatus of a compound character is produced, which serves, first, to cut the sugar, as it is taken from the molds in thin plates or slabs, into strips, and afterward into cubes or blocks of the required size. By thus combining and connecting two machines of similar construction, each of which involves similar peculiarities of construction and operation, the sugar is cut in an automatic manner, first into strips, and then the latter subdivided into cubes or blocks. If preferred, however, said machines may be used separately—that is, either for cutting the slab into strips, or the strips into cubes; but the invention will here be described as including the use, in combination, of two similar machines, as hereinbefore referred to.

The principal objects of the invention are, first, to diminish the amount of the sugar dust or waste which is necessarily produced during any mechanical process of reducing the sugar into cubes or blocks; and, secondly, to diminish the expense of such reduction of the sugar by the adoption of simple means, and by an automatic combination of devices, through which said reduction may be made without the aid of skilled labor.

Figure 1 is a top horizontal view of a sugar-cutting machine constructed in accordance with my invention, as adapted to cutting the slabs into strips. Fig. 2 is a central vertical section of the upper part of the same. Fig. 3 is a similar view, in part, showing certain of the working portions in different relative positions. Fig. 4 is a side elevation of the machine. Fig. 5 is a rear view of the same. Figs. 6 and 7 are diagrams, in illustration of the devices for working the knives and table used in cutting the sugar, in different relative positions. Fig. 8 is a central vertical section of two of said machines combined and connected by a transferring and turning duct or chute. Fig. 9 is a top horizontal view, mainly, of said chute.

Referring, in the first instance, to Figs. 1, 2, 3, 4, 5, 6, and 7, A is the frame of a sugar-cutting machine, having bearings *b b* on opposite sides of it for a cross-revolving shaft, B, which moves in direction of the arrow *x*. On this shaft B, toward opposite ends of the same, are two cams, C C, and two eccentrics, D D, the throw of the cams being at right angles, or thereabout, to the throw of the eccentrics. The frame A is also constructed or provided, in front of the bearings *b b*, with covers or straps E E, preferably arranged to incline upward in a forward direction, as shown in Fig. 4, and each serving, in connection with the opposite sides of the frame, to form a guiding-slot, *c*, for the two cutter-heads F G, carrying the knives F' G', said slots being parallel with each other, and in radial relation with the shaft B, or thereabout.

The ends of the cutter-head F are each provided with a pin, *d*, arranged to project outside of or beyond the slots *c*, and onto which rods H H are fitted to connect said cutter-head or its knife F' with the eccentrics D D, which latter cause the knife F' to reciprocate in a continuous manner toward and from the knife G' in a parallel manner as regards their cutting or meeting edges. The other cutter-head, G, which carries the knife G', is provided in its rear with rollers *s s*, against which the cams C C bear to give said cutter a slight forward movement as against springs *ee*, which give a return or back movement, and may be

spiral ones, arranged around fixed pins $f f$ lying parallel with the slots c , and passing freely through lugs at the opposite ends of said cutter-head G .

By this combination of parts the cutter-head G is always kept in close contact by its rollers $s s$ with the cams $C C$, and its knife G' receives a direct reciprocating motion toward and from the knife F' to the extent of the throw of the cams $C C$; but the stroke of the knife G' is intermittent, and less than that of the knife F' , and mainly serves as a sharp cutting-block to resist the action of the other knife, F' , and to ease the feed by lifting or pressing on the back of the sugar.

Beneath the cutter-heads $F G$, or the knives $F' G'$ thereof, at a suitable distance from the latter, according to the cut required, is a tilting strip or narrow table, I , hung, by a fulcrum or pivots, g , within the frame A . Fastened to this fulcrum-pin or pivot g , outside of the frame A , on its one side, is a crank, J , the pin h of which is connected, by a slotted rod, K , with a pin, i , of a double lever, L , that rocks on a fulcrum, k . The upper or opposite arm of the lever L , to the lower arm of which is attached the pin i , is connected, by a pin and slotted link, R , with one of the eccentric-rods H . Connected with the tilting table I is a lever or arm, M , formed with a jog or offset, m , and having an attached spring, l . This lever lies over an extension of the pin i on the lower arm of the double lever L , which pin may also form a stop to the lever M ; or a separate fixed stop may be used, the offset m fitting over the stop and the spring l , and the lever M then serving to keep the table I up or in its raised position, as shown by full lines in Figs. 2 and 3, and by dotted lines in Fig. 4. Arranged above the knives $F' G'$, and over the table I , is a guide-board, N , down which the sugar, either in slabs or in strips, is fed between the cutters $F' G'$.

The operation of such sugar-cutting machine is as follows: The sugar, fed into or down the guide-board N , rests, in the position in which it is fed, on the knives $F' G'$, when said knives, by the rotation of the shaft B , are brought together, or nearly so. The knives $F' G'$ then recede from each other, and the sugar falls onto the table I , which remains in its raised position, after which the knives gradually approach each other again and cut off the portion of the sugar lying between the knives $F' G'$ and the table I . As soon as the cutting-edges of the knives approach each other sufficiently close to effect the cut the slotted link R commences to pull on the double lever L , raising the lower arm of the latter, and, in so doing, lifting the lever M to the extent of the offset m . (See diagram, Fig. 6.) This action, which is only slight, causes the table I to be slightly tilted or dropped, as shown by dotted lines for its intermediate position in Fig. 3, and by full lines in Fig. 6. The object of this is to release the sugar already cut off

from any pressure during the after or concluding portion of the meeting action of the knives, and to prevent the sugar from being crumbled on its edges or surfaces.

The cutters $F' G'$ may ultimately approach each other within one-eighth of an inch, or thereabout. However, before approaching thus close, or when reaching within a quarter of an inch or thereabout, the slotted rod K is moved outward sufficiently to cause it to pull on the pin h of the crank J , as shown in the diagram, Fig. 7, and made to give a quick downward movement to the table I to the position shown for it by its lower dotted lines in Fig. 3, and by full lines in Fig. 7. This action, which is repeated for each revolution of the shaft B , causes the cut-off sugar to fall off the table and out of the machine, as it were, onto a sloping screen, S .

Supposing the guide-board N to be constructed to feed slabs of sugar to be cut into strips, then it is proposed, in order to cut said strips into cubes or blocks, to adopt the arrangement shown in Figs. 8 and 9 of the drawing, in which there are combined two sugar-cutting machines, constructed to operate substantially as hereinbefore described, the upper or first one of said machines cutting the sugar slabs into strips, and the lower or second one of said machines cutting said strips into cubes or blocks. To cut the slabs into strips, the guide-board N , described in the previous figures, and with which the upper machine is provided, is divided in direction of the feed, on its surface, by one or more narrow strips, to keep the two or more sugar slabs arranged abreast of one another separate. The screen S of this upper machine rests on a funnel, T , by which all sugar-dust or matter passing through said screen is carried separately into a receptacle, U , below. This screen is so fine that only dust or small particles pass through it, while the strips of sugar cut from the slabs by the knives $F' G'$ of the upper machine pass over said screen onto or into an inclined duct, W , which is grooved, by longitudinal strips or divisions a' , to correspond with the sizes of the sugar strips in direction of their length. A light elastic apron, b' , is hung across the entrance to the duct W , to prevent the sugar strips from jumping out of passages or grooves $c' c'$ formed in the bottom of the inclined duct W . The ribs or longitudinal divisions which form the grooves $c' c'$ in the inclined duct W are studded with pins $d' d'$, arranged so that as the sugar strips pass from the upper or first sugar-cutting machine, they, checked by the elastic apron b' , move or fall crosswise to strike the pins $d' d'$, and are turned into a right-angled position to their former position, and longitudinally within the grooves $c' c'$ of the duct W , so that said sugar strips glide lengthwise down the duct W . Toward the lower end of the duct W are light elastic strips $f' f'$, lying within the grooves $c' c'$. The object of these

elastic strips f' is to prevent the sugar-strips from jumping as they enter the lower cutting-machine, without choking the grooves c' , by reason of said elastic strips f' being too light to virtually stop the sugar in its movement down the inclined chute.

The lower sugar-cutting machine, which in all its leading features, as regards the action of the knives F' and G' and table I , is similar to those hereinbefore described, may be furnished with a frame, g' , capable of being forced outward or backward, and provided with springs h' , arranged opposite or over the grooves c' , to form positive guides for the sugar strips to enter square or in a right-angled direction to their first cut by the upper machine for action by the knives F' G' of the second or lower cutting-machine, which latter is similar in every essential respect to the upper one. The object of the backwardly-moving frame g' , with its springs h' , is to quickly free the passages formed by the grooves c' and springs h' in case any one or more of such passages should become choked, the necessary relief being given by simply drawing back the frame g' . After the necessary relief is given the frame g' is allowed to resume its former position.

The shafts B of both the upper and lower sugar-cutting machines have their motion communicated to them as required by means of fast and loose pulleys, so that either machine may be easily stopped, and the only radical difference between the two machines is that the lower one is made to run considerably faster than the upper one, so that it is sure to cut into cubes or blocks all the strips cut by the upper machine.

Directly underneath the lower machine is a screen, S' , similar to the screen S of the upper machine, and having its meshes of such a size that while the cut cubes or blocks pass off down the screen into a receptacle, U^1 , the dust and smaller cut particles are conducted by a funnel, T' , into a receptacle, U^2 .

I claim—

1. The combination, in a sugar-cutting machine or machines, of knives F' G' , arranged to reciprocate toward or from one another, and a lower tilting table, I , substantially as specified.

2. The combination, with a sugar-feeding or guide board, N , of the continuously-reciprocating knife F' and the intermittently-reciprocating knife G' , arranged to work toward and from each other, and a lower tilting table, I , essentially as described.

3. The combination, with the one knife-operating eccentric-rod H , of the slotted link R , the double lever L , the crank J , the tilting table I , the slotted rod K , and the lever M , controlled by a spring or weight for operation in connection with a fixed or movable stop, essentially as described.

4. The combination, with two sugar-cutting machines provided with knives F' G' and a tilting table, I , arranged for operation as described, of a connecting inclined sugar-duct or transferring-chute, W , having longitudinal grooves c' and pins d' on the intervening strips or ribs a' , for the purpose of turning the sugar in its passage from the upper to the lower machine, substantially as specified.

5. The elastic strip b' , in combination with the grooved inclined chute W , and upper and lower sugar-cutting machines, essentially as described.

6. The combination of the elastic strips f' with the grooves c' of the chute W , substantially as specified.

7. The adjustable frame G' , with its attached springs h' , in combination with the grooved chute W , connecting the two sugar-cutting machines, essentially as described.

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Witnesses:

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