

(No Model.)

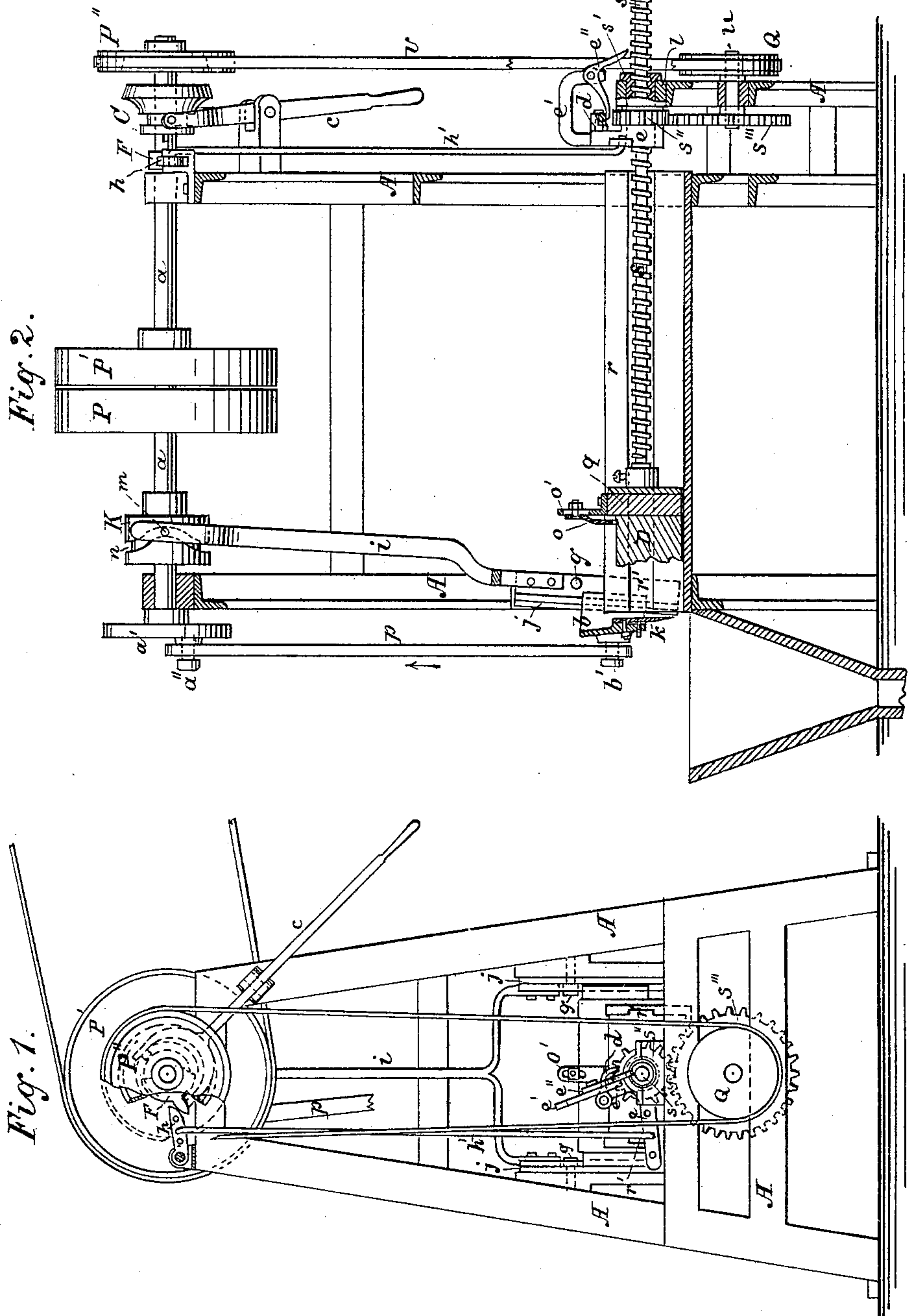
2 Sheets—Sheet 1.

C. C. MILLER.

MACHINE FOR CUTTING, GRANULATING, AND DISINTEGRATING
BLOCKS OR CAKES OF SUGAR.

No. 273,875.

Patented Mar. 13, 1883.



Witnesses:

Geo. C. Coffin

Wm H Blair.

Inventor:

Charles C. Miller

(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

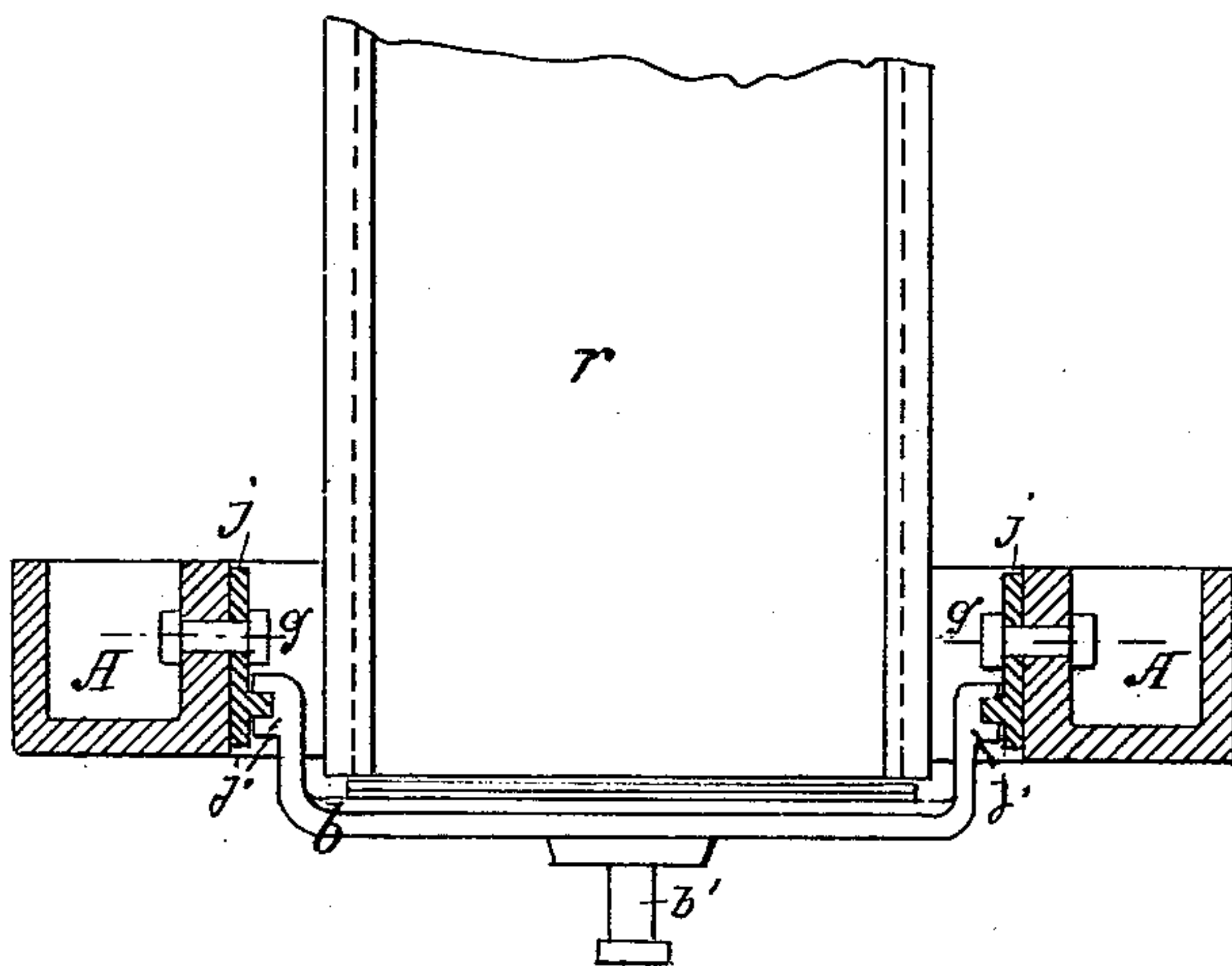


Fig. 4.

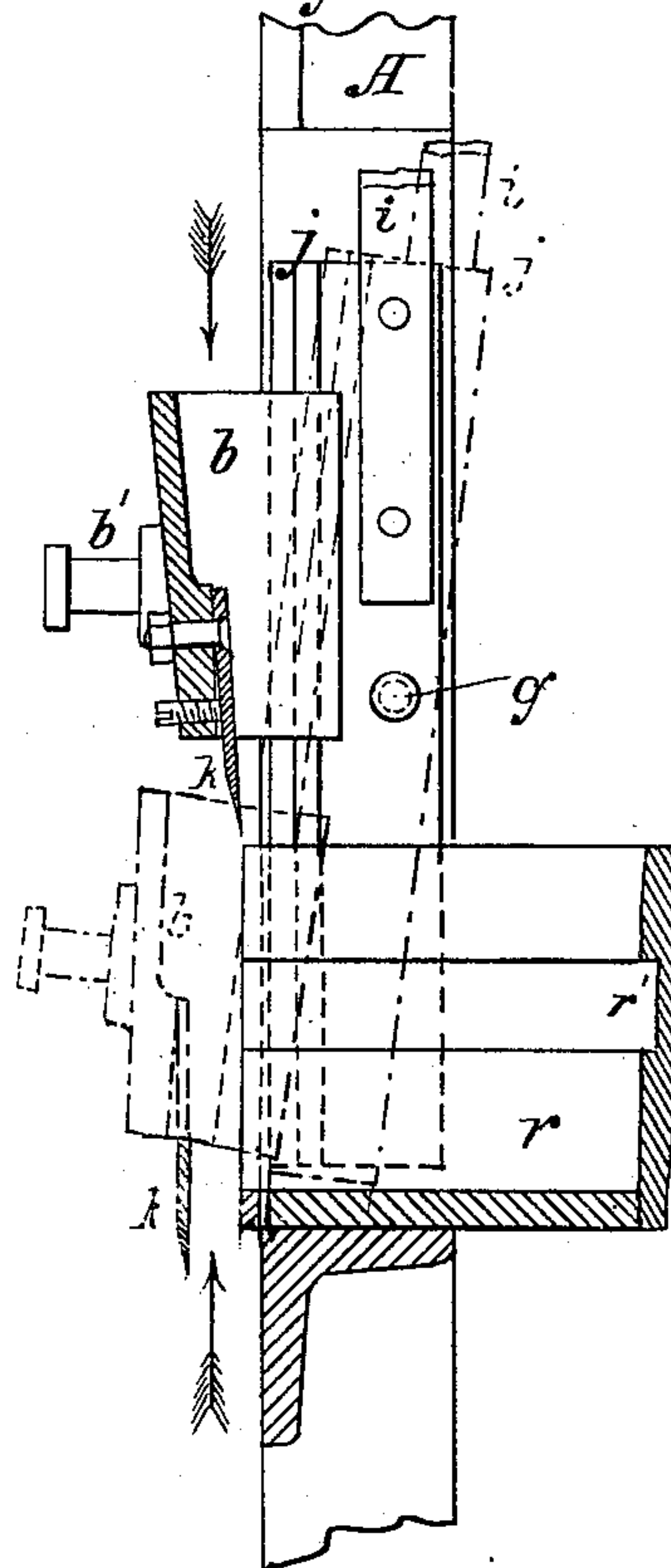
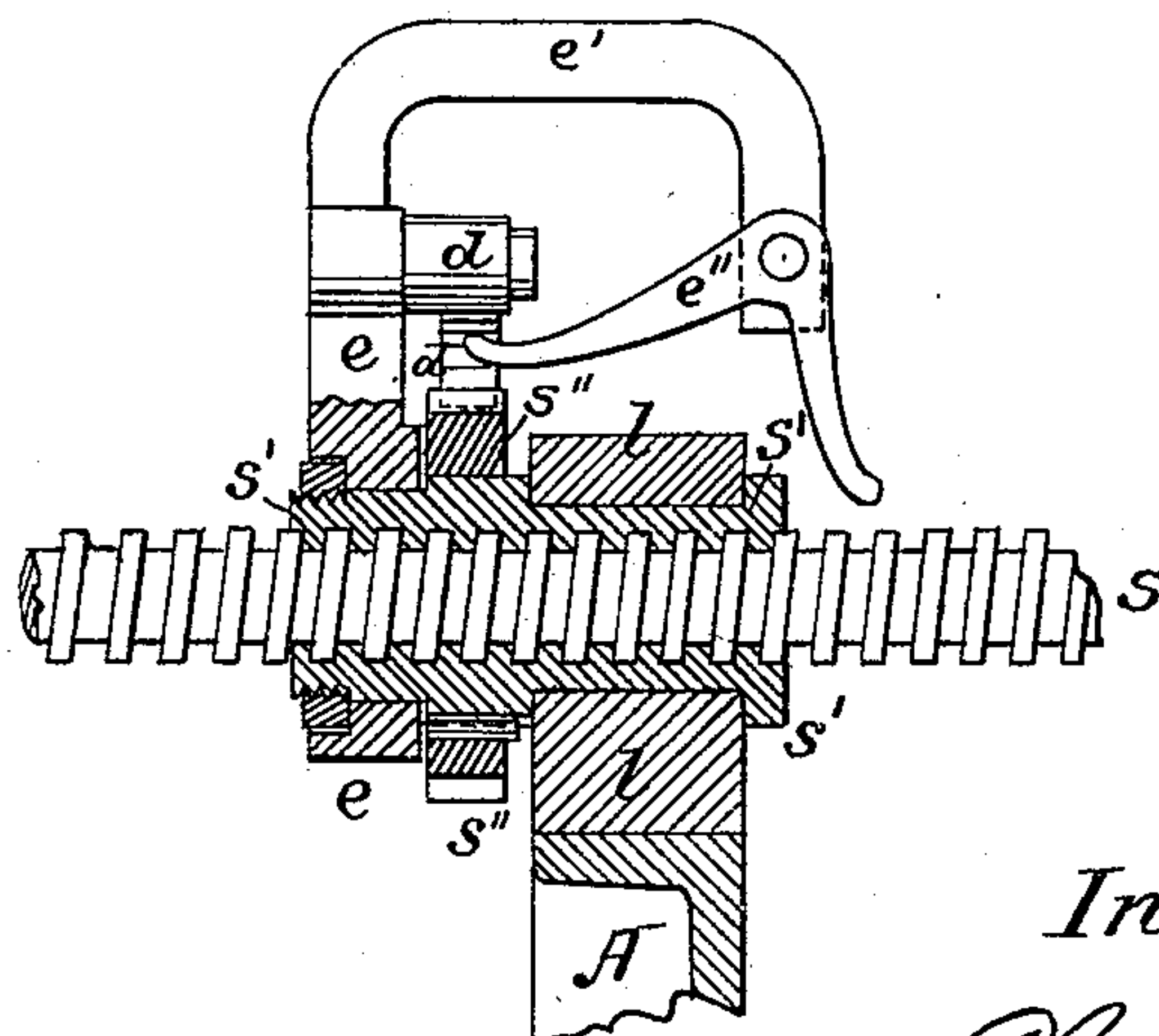


Fig. 5.



Witnesses:

Geo. C. Coffin

Am H. Blum

Inventor:

Charles C. Miller

UNITED STATES PATENT OFFICE.

CHARLES C. MILLER, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO
GEORGE HENCKEN, OF SAME PLACE.

MACHINE FOR CUTTING, GRANULATING, AND DISINTEGRATING BLOCKS OR CAKES OF SUGAR.

SPECIFICATION forming part of Letters Patent No. 273,875, dated March 13, 1883.

Application filed November 3, 1882. (No model.)

To all whom it may concern:

Be it known that I, CHARLES C. MILLER, a citizen of the United States, residing in the city and county of New York, State of New York, have invented a new and useful Machine for Cutting, Granulating, and Disintegrating Blocks or Cakes of Sugar, of which the following is a specification.

It has been the practice heretofore to shave from blocks of grape-sugar thin shavings by means of rotary knives, and to reduce these shavings to a granulated state by subjecting them to the action of a powerful current of air; but in this operation the cutters or knives are apt to become clogged with the sugar adhering to them, and, owing to the rapid circular motion of the knives, the cut material is scattered and thrown a great distance, the rotary motion acting as a fan to blow the particles all over the machinery. In rotary-cutting machines the drum or frame upon which the knives are set must work on bearings and centers, and as these wear rapidly there is a lost motion, which prevents the knives from cutting uniformly and regularly.

The object of my invention is to remove these objections, and to cut the cake of sugar by a reciprocating knife, which cannot be clogged, and also to cut the block of sugar from one end to the other, and reduce it to a granulated, disintegrated, or pulverized condition without leaving any portion of it uncut, or so very thin a portion as to be of no account; and the nature of my invention consists in the construction and arrangement of a knife which, by a reciprocating movement, shall shave off or cut the cake of sugar by a straight stroke and cut across the cake, the knife being set at a very slight angle to the face of the cake to be cut and touching it only at its edge, and upon the backward or upward movement the knife is carried entirely clear of the cake, so as not to have the sugar adhere to it, the cut being so rapid and firm as to disintegrate and pulverize the part cut off; also, in the construction and arrangement of a feed-box to hold and conduct the cake of sugar steadily and firmly to the knife; and, also, in the construction and arrangement of a suitable feeding device capable of adjustment, so as to regulate the amount of shaving which the knife is to cut at each stroke.

In the accompanying drawings, Figure 1 represents an end elevation; Fig. 2, a side elevation. Fig. 3 is a plan view in detail, showing in cross-section the knife cross-head *b*, the ribs *j*, and relative position of the feed-box *r* when the knife is on the down-stroke. Fig. 4 is a section showing the knife in the upper position, when ready to cut, before moving down, in full lines, and in the lowest position, when ready to move upward, in dotted lines, also the slides and ribs *j* in both extreme positions. Fig. 5 is in detail, showing a section through the nut *s'*, with the parts attached and operating thereon.

Similar letters represent similar parts of the machine in all the figures.

The operating parts of the machine are supported upon the frame-work *A A*. A revolving shaft, *a*, by which the machine is operated, is placed across the frame *A* at the top, and is secured in suitable journals and bearings at the top of the frame. Upon this driving-shaft are placed the disk *a'*, which is also a balance-wheel, the cam *K*, the pulleys *P P' P''*, the friction-coupling *C*, and feed-cam *F*. The knife *k* is attached and made adjustable on the knife cross-head *b*, and this knife is operated in a vertical reciprocating movement, and also in a slight horizontal reciprocating movement, in the manner and by the devices hereinafter described. The cross-head *b*, upon each of its sides, is provided with a vertical recess or groove in the solid body of the knife-head. On each side of the knife-head *b* is constructed and arranged a solid vertical plate, upon which is a vertical projecting rib or slide, *j j*, and which is fitted to slide into the aforesaid recess or groove on the sides of the knife-head. These plates are hung and arranged and operated so as to give them, and also the knife-head and knife, a slight oscillatory motion in the manner hereinafter described. These plates oscillate upon a pivot bolt or axis, *g*. They are firmly bolted at the top to the forks of a vertical forked lever, *i*, the upper end of which lever is bent around the cam *K*, and there carries a pin or roller, *m*, which engages in a guiding-groove, *n*, upon the cam *K*. When the driving-shaft is put in rotation the pin *m* will follow the groove *n*, which is so formed that it causes the lever *i*, together with the plates and slides or guides *j j*, to oscillate

slightly upon the pivot-bolts *g* as an axis, thereby causing, by means of the grooves *j' j'*, Fig. 3, the knife cross-head and knife to make a slight movement toward and from the cake of sugar which is being cut. The groove and cam are so arranged and the cam *K* must be so set that the movement of the knife from and to the cake of sugar will always occur just as the knife reaches its lowest point and again after when it has just reached its highest point. The cutting-stroke and return movement of the knife are effected by the crank-disk *a'* (upon shaft *a*), the pin *a''*, the pitman *p*, and the center-pin *b'*, attached to the knife cross-head *b*.

The feeding of the cake of sugar is effected through a follower, *q*, which, having projections on its sides, is guided in the grooves *r' r'* in the side walls of the feed-box *r r*, and is thereby kept squarely to the back end of the cake and moves in a direct and undeviating motion. Attached to the follower *q*, on its reverse side, is the feed-screw *s*, which is made to move forward toward the knife by the operation of the revolving nut *s'*, Figs. 2 and 5, carrying the cog or ratchet wheel *s''*. Around the nut *s'*, guided laterally, but made to turn freely, is the angle-lever *e*, carrying the feed-pawl *d*, also the bent arm or bracket *e'*, which carries the stop-lever *e''*, (*e'* being placed at a right angle to the line of motion of the lever *e*, but parallel to the axis of *s*.) The nut *s'* is made to turn freely in the journal *l*, fastened to the main frame *A*, but is held from moving in a lateral direction by flanges projecting on each side of the journal. The screw *s* carries on its outer end the stop-disk *t*. Upon the top of the follower *q* is a bracket, *o'*, which forms a support and guide for the pressure-arm *o*. This latter is adjustable vertically by a fastening-bolt sliding in a slot in *o'*, so as to suit different thicknesses of cake. The pressure-arm *o* is designed to press the cake against the bottom of the feeding-box *r*. This feeding-box is shown at *r r'* in Figs. 2 and 4, and is of rectangular shape, adapted to the size and shape of the cake, and open at the top and at the ends, and should be adapted to closely fit the cake of sugar.

The feeding is effected as follows: The follower *q* and screw *s* having been drawn back to their primary position, the cake or block of glucose sugar, *D*, is placed in the feed-box *r*, the cake being of sufficient length to fill the space between the knife and the follower *q*.

The driving-bolt is thrown from the loose pulley *P'* to the driving-pulley *P*, fast to shaft *a*. By the revolving of the shaft *a* the feed-cam *F*, upon the shaft, is revolved, and thereby the lever *h*, mounted on the top of main frame *A*, is raised, and by means of the connecting-rod *h'* the lever *e*, at the lower end of rod *h'*, will be raised, and thereby cause the pawl *d* to push and turn the ratchet-wheel *s''*, and thereby with the nut or washer *s'*, which, operating upon the screw *s*, propels it forward, and with it the cake, toward the knife. The lever *e* is provided with a series of holes for admitting

adjustment thereon of the rod *h'* for regulating the motion of the nut, and consequently the amount of the feed.

At the end of the feed operation just described, when the cake has been entirely reduced to shavings by the knife, the flanged disk or stop *t*, at the end of screw *s*, will have arrived at the angle-lever *e''*, and will act upon it immediately and throw the pawl *d* out of gear with the wheel *s''*, and thus stop the feed.

To effect a speedy return of the follower the friction-coupling *C*, having its lever-fulcrum in a bearing, *c'*, fast to frame *A*, is engaged by the movement of *C* with the loose pulley *P''* upon the projecting end of shaft *a*, and by means of the belt *v*, Figs. 1, 2, pulley *Q*, shaft *u*, and spur-wheel *s'''* the wheel *s''* is turned, and therewith the nut or washer *s'*, in a reverse direction to the feed motion, thereby returning the screw *s* and follower *q* to their place of starting, ready to begin the feed anew.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a machine for cutting cakes of sugar, the reciprocating knife *k* and knife cross-head, constructed and arranged to cut straight across the cake, touching the cake only at its cutting-edge, and on the return movement to recede, so as to entirely clear the cake of sugar, by means of the grooves *j' j'* and slides or guides *j j*, the oscillating forked lever *i*, operated by the groove *n* upon cam *K*, the vertical action of the knife being operated by the crank-disk *a'* through the pin *a''*, the pitman *p*, and the center-pin *b'*, attached to the knife cross-head *b*, the mechanism arranged and operating together substantially in the manner and for the purposes as set forth.

2. The construction and combination of the feed-screw *s*, the washer *s'*, revolving on the journal, the pawl *d* on the angle-lever *e*, and the ratchet *s''* upon the nut and connected with main shaft *a*, whereby the feed-screw is pushed forward without revolving, and the exact amount of feed at each stroke of the knife is adjusted and firmly secured and regulated, so as to produce uniform granulation and pulverization of the sugar all through the cutting of the cake.

3. The disk *t* upon the end of screw *s* and the angle-lever *e''* upon the bent arm *e'*, in combination with the pawl *d*, whereby at the end of the cutting the cake the pawl *d* is thrown out of gear with the wheel *s''* and the feed movement is arrested.

4. The reversing device consisting of coupling *C*, loose pulley *P''*, belt *v*, pulley *Q*, shaft *u*, and ratchet-wheel *s''*, combined with nut or washer *s'*, whereby a reverse motion to that of the feed is produced, and the screw and follower are rapidly carried back to the place of starting, constructed, arranged, and operating substantially as set forth.

CHARLES C. MILLER.

Witnesses:

GEO. C. COFFIN,
WM. H. BLAIN.