April 16, 1940. A. A. NORMAN 2,197,192

ADJUSTING APPARATUS

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Fig. 1

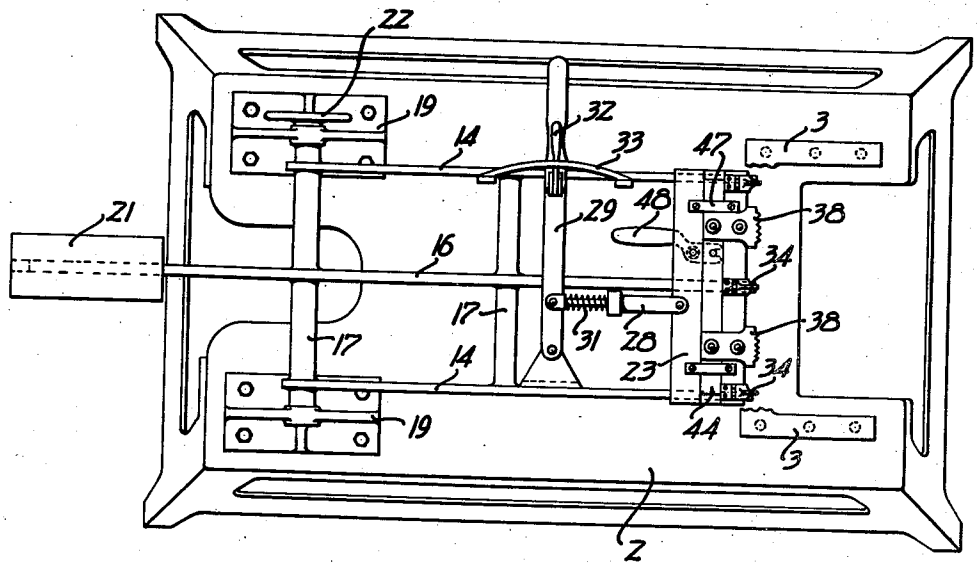


Fig. 2

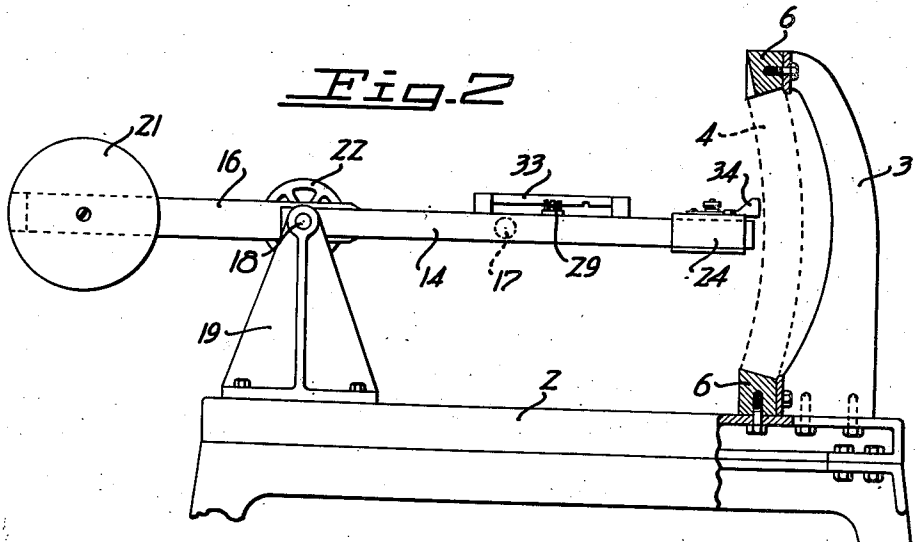
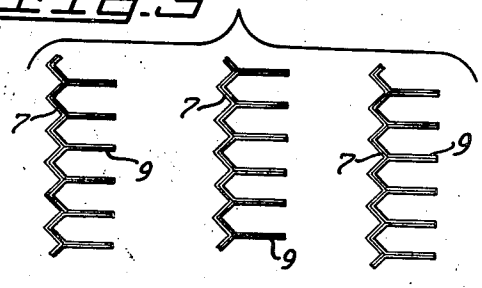


Fig. 3



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Fig. 4

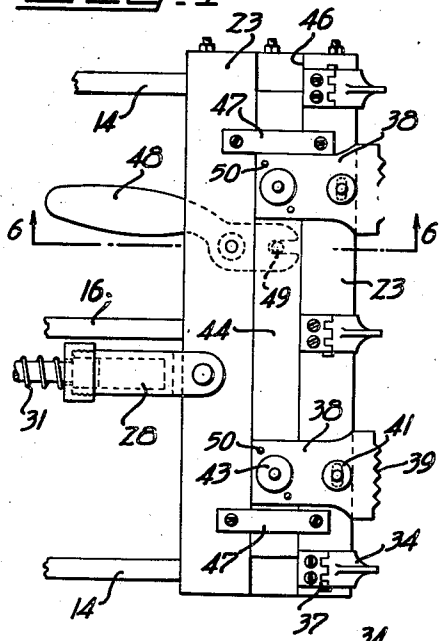
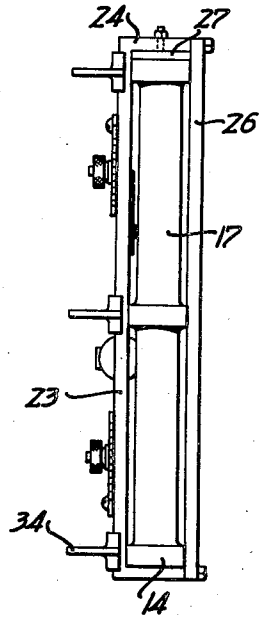


Fig. 5



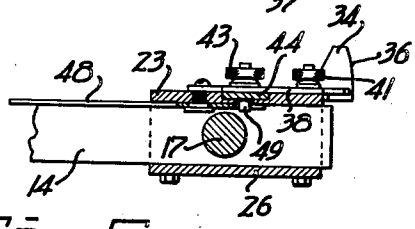


Fig. 6

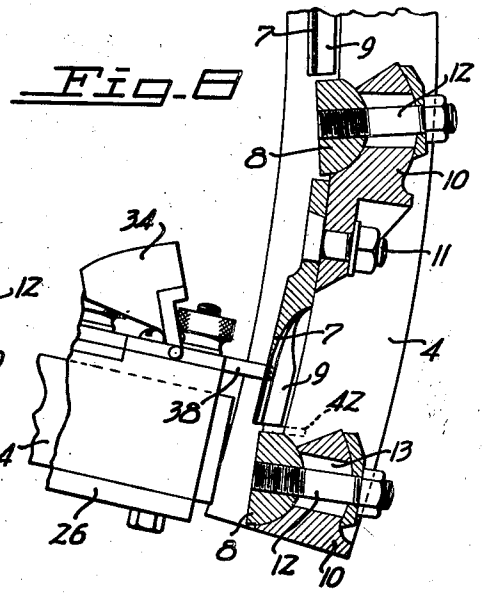
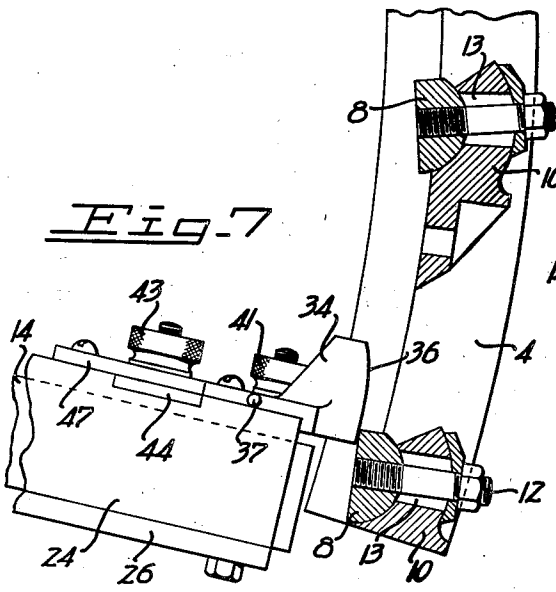


Fig. 7



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Patented Apr. 16, 1940 2,197,192

UNITED STATES PATENT OFFICE

2,197,192

ADJUSTING APPARATUS

Arvil A. Norman, Manteca, Calif., assignor to Spreckels Sugar Company, San Francisco, Calif., a corporation of California

Application May 29, 1939, Serial No. 276,333

8 Claims. (Cl. 33—185)

My invention relates to apparatus for adjusting the guide bars and knives of rotary slicers such as used for cutting cossettes from sugar beets in the process of manufacturing beet sugar.

It is among the objects of my invention to provide means for accurately setting the guide bars and knives in a rotary slicer whereby cossettes of uniform cross section are cut from the beet.

Another object is to provide adjusting means of the character described by which precision setting of the slicer parts may be accomplished quickly and easily.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of my invention. It is to be understood that I do not limit myself to this disclosure of species of my invention, as I may adopt variant embodiments thereof within the scope of the claims.

Referring to the drawings:

Figure 1 is a plan view of the adjusting apparatus embodying my invention; and

Figure 2 is a side view of the same, partly in section and partly in elevation.

Figure 3 is a view looking at the ends of a series of knives, showing the offset arrangement of knife corrugations in one type of setting.

Figure 4 is a fragmentary plan view of the adjusting head on larger scale than Figure 1; and

Figure 5 is an end view of the same.

Figure 6 is a vertical sectional view of the head, taken in a plane indicated by line 6—6 of Figure 4.

Figure 7 is a vertical sectional view through a knife block showing the adjusting head in position for setting a guide bar; and

Figure 8 is a similar view showing the adjusting head in position for setting a knife.

In the manufacture of beet sugar the beets are sliced into filaments called cossettes from which the sugar is extracted by osmosis in a diffusion cell. For maximum efficiency in the diffusion step it is important that the cossettes be of exact predetermined thickness and all of uniform cross-section. A common type of slicer for cutting these cossettes is the Maguin rotary slicer, comprising a series of corrugated knives arranged on the inner surface of a drum with interposed guide or rocker bars for regulating the thickness of slice. The knives and guide bars are mounted on a series of arcuate sections called knife blocks, which in turn are assembled on a spider to form the drum of the slicer.

It has been the practice to set the guide bars and knives by gauging the spacing of the latter from the knife block. However, the blocks are usually rough castings and are subjected to considerable wear so that there is no reliable reference point on the block from which a precision setting of the parts can be made. Furthermore, there are variations between the blocks in the assembled drum due to inequalities in the blocks themselves and to their separate mounting, so that a setting of the guide bars and knives with reference to one block does not necessarily coincide with those set with reference to another block. It is the practice to make guide bar and knife settings by gauging from the blocks in millimeters and fractions thereof, but it is apparent that this careful work is nullified by the variations inherent in the blocks.

With my improved apparatus the setting of the guide bars and knives is gauged independently of the blocks and adjustment is effected solely with reference to the axis of the drum so that the guide bars and knives are set on predetermined equal radii, whereby the parts travel in exact circles about the axis of rotation when the assembled drum is in operation.

In terms of broad inclusion, my apparatus for adjusting an element on an arcuate drum section comprises gauge means movable about an axis coincident with the section center (drum axis) for positioning the element. The drum section or knife block is preferably held in a suitable frame, and the gauge means is preferably mounted on an arm pivoted on the frame about an axis located relative to the drum section to coincide with the axes of the final drum. A retractable head is preferably provided on the pivoted arm, and the gauge means for the guide bars preferably comprises a finger mounted on the head. The gauge means for the corrugated knives preferably comprises a plate mounted on the head for adjusting movement transversely of the arm and having a serrated edge registerable with the corrugations of a knife.

In greater detail, and referring to the drawings, the apparatus embodying my invention comprises a frame 2 having a bracket 3 for holding the knife block 4 of a slicing drum. The drum of a rotary beet cutter, such as a Maguin slicer, is divided into a series of arcuate sections demountably assembled on a spider in the final drum. These sections or knife blocks are usually castings machined to fit accurately along abutting edges, and complementary holding bars 6 are provided in my machine for fixing block 4 in a position simulating that which it has in the final drum. The block is slidable endwise into hold-

ing position and may readily be replaced with another block to be adjusted.

As shown in Figures 7 and 8 the knife blocks 4 provide a mounting for a series of corrugated knives 7 and interposed guide bars 8. Knives 7 are usually arranged in pairs extending across the width of the drum and are disposed one above the other about the circumference of the drum, each block carrying say three sets of knives. Figure 3 shows the forward cutting edges of the knives with slitters 9 projecting from the backs of the corrugations. This is common knife construction. These knives are fastened to cross pieces 10 of a block by suitable bolts 11. Guide bars 8 are usually in the nature of half-round rocker bars seated in grooves in cross pieces 10 and held in adjusted position by studs 12 extending through slots 13. Thus by turning these bars in their seats the upper edges are adjusted relative to the knife edges to control the thickness of slice. When a block is set in my machine it is positioned to point the knives downwardly as shown in Figure 8.

There are two common ways of setting knives on a block. One is to offset the corrugations of adjacent sets of knives by one-half division so that the ridge of one knife is followed by a valley of the next knife, as shown in Figure 3. This full view of the knife edges is only for the purpose of showing the lateral displacement of the knives in such a setting, it being understood that the knives are actually disposed one behind the other as shown in Figure 8. This offset knife arrangement cuts cossettes of rectangular cross-section. In another type of knife setting the corrugations are aligned to cut V-shaped cossettes.

Referring again to my apparatus as shown in Figures 1 and 2, I provide a gauge arm having side pieces 14 and a center piece 16 secured together by cross-rods 17. The rear cross-rod extends outwardly to provide pivots 18 journaled in bearing brackets 19 on the frame. A counterweight 21 on the rearwardly projecting end of arm piece 16 serves to balance the arm; and a hand wheel 22 threaded on one end of the pivot rod serves to lock the arm in selected position.

An important feature of the machine is that the axis of arm pivots 18 is located to coincide with the axis of the final drum. Thus, the forward end of the gauge arm swings across the face of block 4 in an arc concentric with that of the block. Elements on block 4 in the machine may therefore be adjusted by the gauge arm, independently of the block and solely with reference to the axis of the drum so that the guide bars and knives may be set on predetermined equal radii, whereby the adjusted parts on all the blocks travel in exact circles about the axis of rotation when the assembled drum is in operation.

A retractable head is preferably mounted on the forward end of the arm, and comprises a top plate 23 having side flanges 24 connected by a bottom plate 26. The box-like head is slidable on the arm pieces and a gib 27 is preferably interposed between a side of the arm and one of the head flanges. Retraction of the head is controlled through a link 28 by a lever 29 pivoted to the arm. Link 28 is preferably made with telescoping sections held extended by a spring 31. A latch 32 on lever 29 is adapted to engage suitable notches in a rail 33 to hold the head in either extended or retracted position.

The gauge means for guide bars 8 on the knife block comprises a plurality of say three gauge fingers 34 mounted to project forwardly from head plate 23. These fingers have a curved profile 36 for contacting the upper forward edge of the rocker bar being adjusted. See Figure 7. After a guide bar has been tilted to register with the gauge fingers it is fixed in adjusted position by studs 12, and the gauge arm is then shifted opposite another guide bar. During this phase of the adjustment the knives are absent and the gauge fingers have a free path across the face of the block.

Gauge fingers 34 are preferably mounted for movement out of their projecting positions to clear the forward edge of the head for further gauging operations. For this purpose the fingers may merely be demountably fastened to the head by screws, but I prefer to mount them on hinges 37 so that they may be simply tipped back out of the way. See Figure 8. The length of these gauge fingers is designed to set the upper edges of the guide bars a predetermined distance back from the lower inside edges of the knives. Usually this back set or height is of the order of two millimeters, and may be altered by replacing the gauge fingers 34 with others of different length.

The gauge means for the knives preferably comprises a pair of gauge plates 38 having serrated forward edges 39 for registering with the corrugations of the knives. These gauge plates are locked in selected position on head plate 23 by nuts 41 threaded on studs projecting through slots in the gauges. In making the knife adjustment they are mounted loosely on the block and the gauge arm is brought down to a point opposite a set of the knives. The head is then extended and the knives shifted into perfect registration with the serrated edges of the gauges. During this adjustment a thin gauge plate 42 (Figure 8) is interposed between the top of guide bar 8 and the lower edge of the knife to space these parts a predetermined amount, say two millimeters.

Following these adjustments the knives are fixed by tightening up bolts 11; and the head is then retracted and the arm turned to a position opposite another set of knives. If the positions of gauges 38 are not changed on the head the corrugations of knives will be set in perfect alignment for cutting the V-shaped type of cossette.

Means are also provided for shifting the knife gauges laterally to offset the knives, as shown in Figure 3, for cutting the rectangular cossettes. For this purpose gauge plates 38 are fastened by studs and nuts 43 to a bar 44 slidably confined in a groove 46 in head plate 23 by straps 47. Aligning pins 50 are also preferably provided between the slide bar and gauge plates. A lever 48 pivoted to the head and engaging a pin 49 on the slide bar serves to shift the latter between the limits permitted by straps 47 which also function as stops. These stops are so spaced that the knife gauges may be shifted laterally one-half the width of a corrugation. In setting the knives in the arrangement shown in Figure 3, alternate sets of knives are adjusted with gauges 38 in one position, and the remaining sets of knives are then adjusted with the gauges in the other position, so that the corrugations of adjacent sets of knives are offset.

A separate gauge piece, similar to the gauge 42, is preferably employed to check the radial

height of the knives from the guide bars before removing the block from the machine.

I claim:

1. Apparatus for adjusting a corrugated knife and guide bar on a section of a slicer drum, comprising a frame for holding said section, an arm pivoted on the frame about an axis coincident with the drum axis, a head on the arm, a gauge finger on the head for positioning said guide bar, and a gauge plate on the head and having a serrated edge registerable with the corrugations of the knife for positioning the latter.

2. Apparatus for adjusting a corrugated knife and guide bar on a section of a slicer drum, comprising a frame for holding said section, an arm pivoted on the frame about an axis coincident with the drum axis, a head on the arm, a gauge finger hingeably mounted on the head for positioning said guide bar, and a gauge plate on the head and having a serrated edge registerable with the corrugations of the knife for positioning the latter.

3. Apparatus for adjusting a corrugated knife and guide bar on a section of a slicer drum, comprising a frame for holding said section, an arm pivoted on the frame about an axis coincident with the drum axis, a head on the arm, a gauge finger on the head for positioning said guide bar, and a gauge plate mounted on the head for adjustable movement transversely of the arm and having a serrated edge registerable with the corrugations of the knife for positioning the latter.

4. Apparatus for adjusting elements on an arcuate section to insure equal radial spacing of said elements from an axis coincident with the section center, comprising a frame, means on the frame for holding said section, a gauge member for positioning said elements on the section, and means on the frame for pivotally mounting the gauge member about said axis.

5. Apparatus for adjusting elements on an arcuate section to insure equal radial spacing of said elements from an axis coincident with the section center, comprising a frame, means on the frame for holding said section, a gauge member for positioning said elements on the section, means on the frame for pivotally mounting the gauge member about said axis, and means on said mounting means for retracting the gauge member toward said center.

6. Apparatus for adjusting elements on an arcuate section to insure equal radial spacing of said elements from an axis coincident with the section center, comprising a frame, means on the frame for holding said section, a gauge member for positioning said elements on the section, an arm for supporting the gauge member, means on the frame for pivotally mounting the arm about said axis, and counterbalance means on said arm.

7. Apparatus for adjusting a corrugated knife on a section of a slicer drum, comprising a frame, means on the frame for holding said section, a gauge plate registrable with the corrugations of the knife, and means on the frame for pivotally mounting the gauge plate about an axis coincident with the axis of the drum to adjust the distance of the knife from said axis.

8. Apparatus for adjusting a corrugated knife on a section of a slicer drum, comprising a frame, means on the frame for holding said section, a gauge plate registrable with the corrugations of the knife, means on the frame for pivotally mounting the gauge plate about an axis coincident with the axis of the drum to adjust the distance of the knife from said axis, and means for shifting the gauge plate parallel to said axis for registration with a knife offset relative to the first knife.

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