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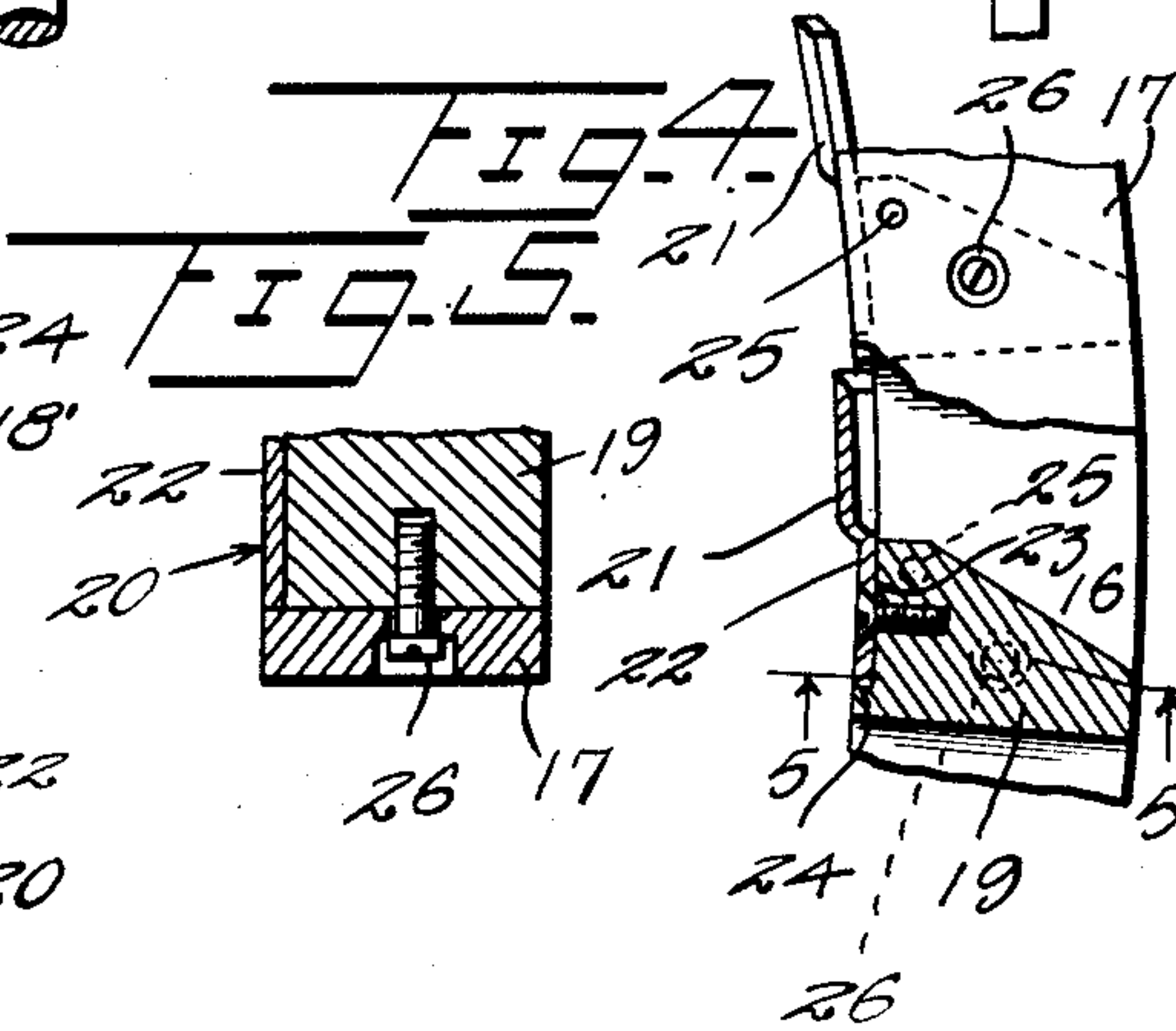
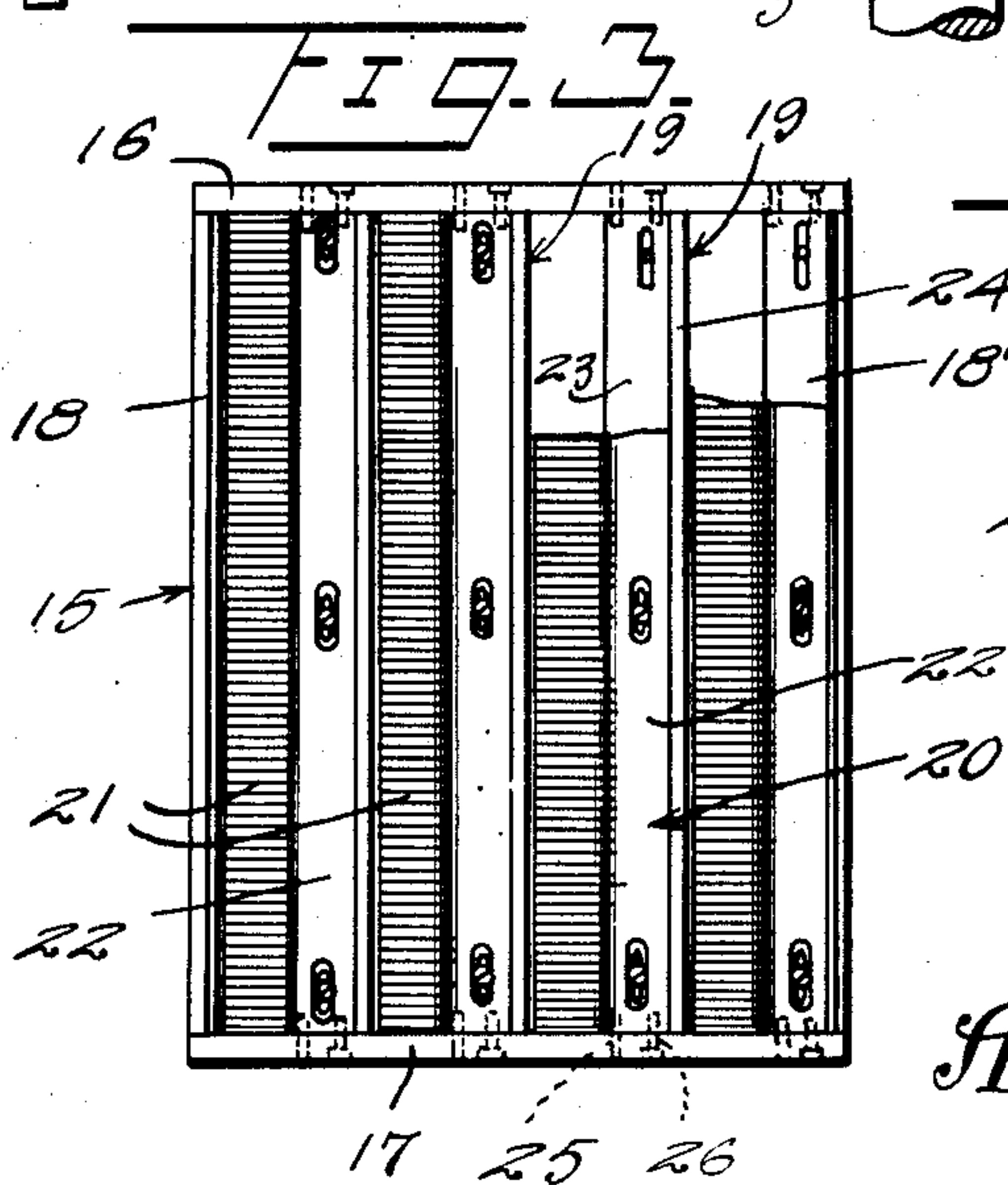
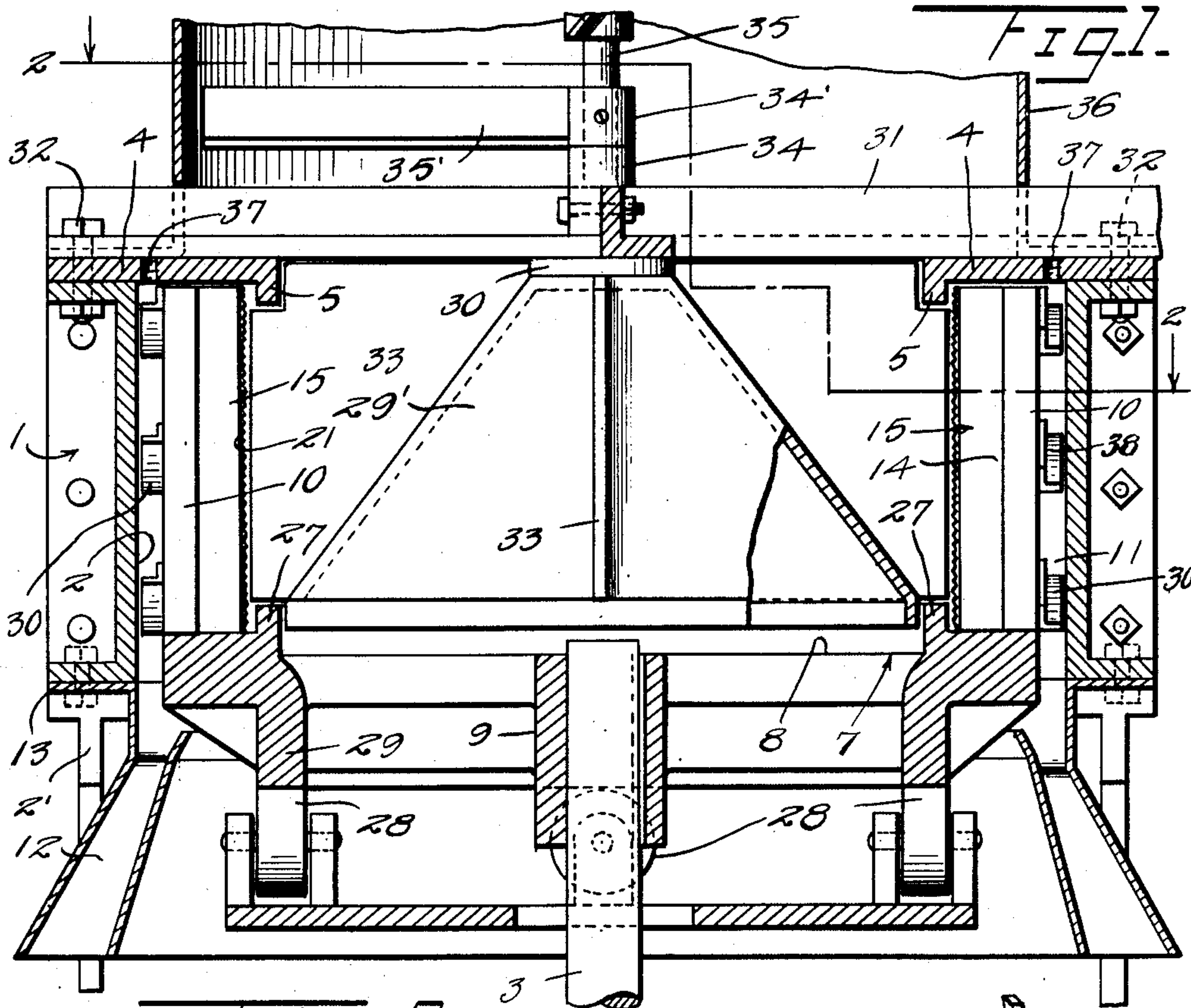
A. BACHOFNER

2,148,922

BEET-CUTTING MACHINE

Filed Dec. 18, 1937

2 Sheets-Sheet 1



Inventor  
*Albert Bachofner*  
 By *Watson E. Coleman*  
 Attorney

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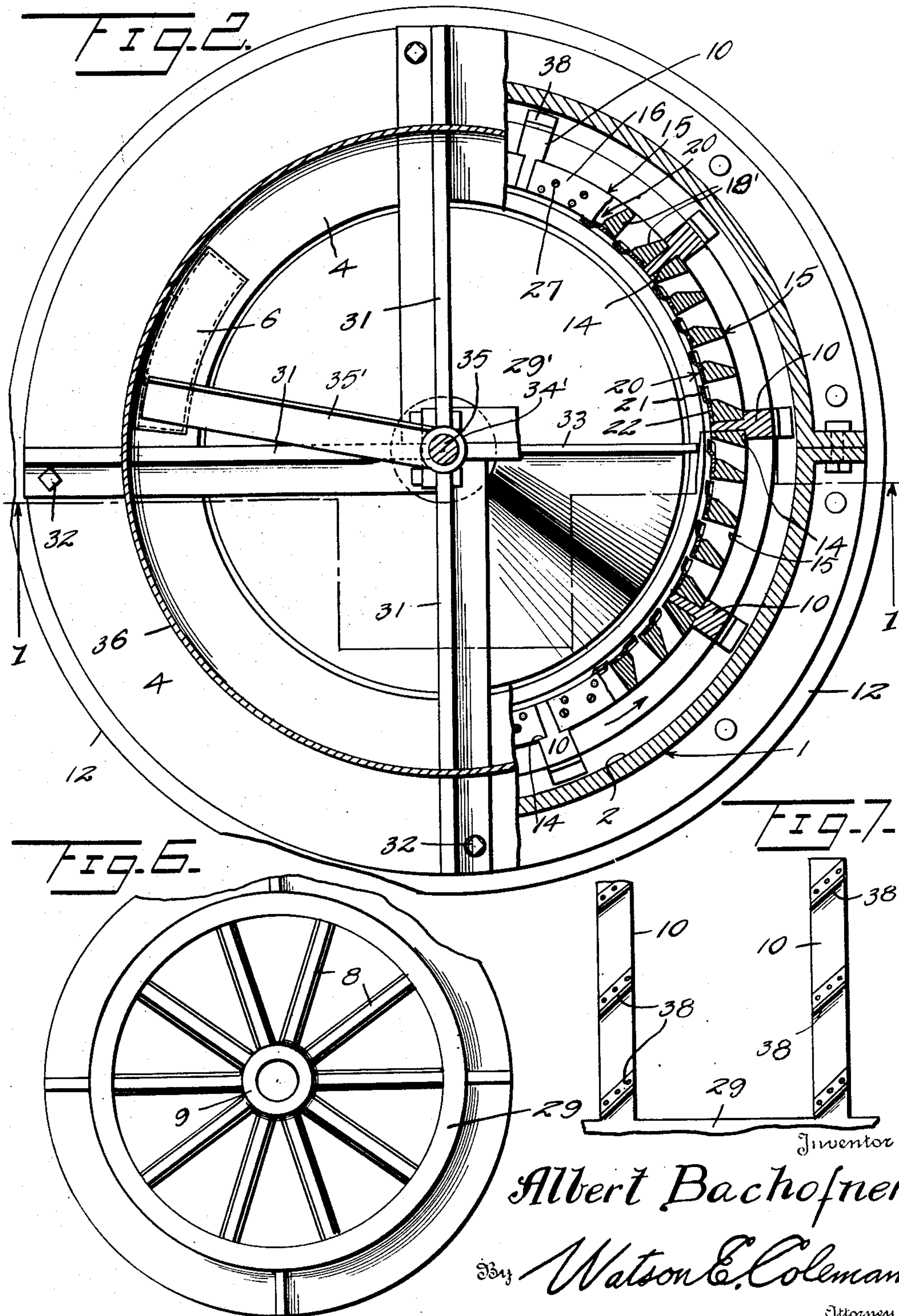
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## UNITED STATES PATENT OFFICE

2,148,922

## BEET-CUTTING MACHINE

Albert Bachofner, Spreckels, Calif.

Application December 18, 1937, Serial No. 180,642

4 Claims. (Cl. 146—93)

This invention relates to improvements in beet-root cutting machines in which such roots are sliced or cut for the purpose of extracting the sugar from the juices thereof.

5 In beet-root cutting machines of the type at present in use, the cutting units are so mounted that they may be adjusted to control the thickness of the slice cut from a beet-root, and the mounting of the cutter is made upon a fixed support against which the beet-root bears in passing across a cutter blade. Such supports have the effect of tearing and mashing the body of the beet-root particularly where the support for the cutter has become worn and a considerable amount of fibre is thus freed from the beet-root and gets into the juice, which is later extracted from the slices of the root, and interferes to a certain extent with the proper filtration of the juice.

20 The present invention has for a primary object to provide an improved beet-cutting machine in which a novel cutter construction and feeding means is employed whereby the beet roots will be sliced cleanly and a minimum of mashing or pulping occurs, thereby making it possible to improve upon and speed up the production of the beet sugar by eliminating from the juice the pulp which interferes with the proper purification of the same.

30 Another object of the invention is to provide an improved beet-cutting machine having in association with the improved cutter construction a novel means of feeding the beets to the cutters whereby all of the cutters of the machine will be in operation during the running of the machine so that a balanced condition of the cutter carrying rotary drum of the machine will exist thereby making it possible to operate the machine at a higher speed than is at present possible and thus greatly increasing the capacity of the machine.

45 Still another object of the invention is to provide in a machine of the character described an improved cutter construction whereby the available cutting surface of the machine is increased approximately thirty-three and one-third percent over that of the machines at present in use.

50 Still another object of the invention is to provide an improved means for feeding beets to the cutter blocks which consists of a vertical hopper discharging onto a vertically arranged cone about which the cutters rotate, thus making use of the weight of the beets in the hopper and

the force of gravity for constantly urging the beets toward the cutters.

A still further object of the invention is to provide a novel feeding means whereby a positive downward pressure is exerted upon the body of beets being fed to the rotating cutters over the feeding cone, thereby holding the beets firmly against the cutters so as to prevent their moving or rotating, and thus insuring the production of clean-cut slices without mashing.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings forming part of this specification, with the understanding, however, that the invention is not confined to any strict conformity with the showing of the drawings but may be changed or modified so long as such changes or modifications mark no material departure from the salient features of the invention as expressed in the appended claims.

In the drawings:

Figure 1 is a view in vertical section thru the beet cutter embodying the present invention.

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1.

Fig. 3 is a view in elevation of a cutter block showing improved mounting for the cutter blades.

Fig. 4 is a view partly in horizontal section and partly in top plan of a cutter block showing the method of mounting and adjusting the cutters.

Fig. 5 is a section taken on the line 5—5 of Fig. 4.

Fig. 6 is a view in bottom plan of the rotating drum portion of the machine.

Fig. 7 is a view in elevation of a pair of drum posts showing steam deflectors thereon.

Referring now more particularly to the drawings, the numeral 1 generally designates the housing of the beet cutting machine embodying the present invention, which housing is of circular form as shown and is so designed as to have the inner wall face 2 smooth throughout. Any suitable means may be provided for supporting the housing 1 in position, such as the standards 2'. Co-axial with the housing is a vertically disposed shaft 3 upon which the hereinafter described rotary portion of the machine is mounted, and this shaft is driven from any suitable source of power, not shown.

Secured to the top of the housing 1 is the relatively broad annular plate 4 which extends inwardly and terminates in the downturned flange 5. This plate or ring is provided, thru



a portion of its circular extent, with a removable panel 6, which panel extends from the inner edge of the plate thru substantially one-half the width thereof, and is provided to facilitate the ready removal of cutter blocks, hereinafter described, when it is necessary to remove and replace the same. The numeral 7 generally designates a spider structure which consists of the series of arms 8 radiating from a hub 9 and each terminates in a vertically extending post 10, the outer face of which is in spaced relation with the wall 2 of the housing providing the area 11 in which the slices are received to be carried off thru the lower part of the machine. Any suitable means may be provided for carrying off the slices of beets, and there is here shown a conduit 12 which is secured at its outer side to the bottom of the housing 1, as indicated at 13, while the inner side terminates short of and in closely spaced relation with the outer ends of the spider arms 8. This conduit is of circular formation so that the inlet thereof will conform to the area 11 into which the cut beet slices are discharged.

Each of the posts 10 has a portion of its side face cut away from the inner face to provide the recesses 14, and there are mounted between the posts 10 the cutter blocks which are indicated as a whole by the numeral 15 and which position in these recesses, being held in place by the shoulders as shown in Fig. 1.

Each of these cutter blocks 15 consists of a frame having the top and bottom rails 16 and 17 respectively and the upright side rails 18. Within each frame is a series of vertically disposed bars 19, to the inner face of each of which a cutter or knife 20 is secured. These knives are of the usual or standard construction, each having a blade portion 21 and a back or rear portion 22, and in the present mounting therefor each of the bars 19 has its inner face recessed, as indicated at 23, to receive the back of the knife, there being a flange 24 extending lengthwise of each bar at the rear edge of the knife back which constitutes a size bar which coacts with the cutting edge of an adjacent knife.

Secured in each end of each of the knife supporting bars 19 is a pivot pin 25, which extends into a suitable aperture in the adjacent rail of the frame and each frame rail also has extended therethrough and into the ends of the bars which are in opposed relation therewith a screw 26. The apertures in the rails thru which the cap screw 26 passes, are of slightly greater diameter than the shanks of the screws, see Fig. 5, so that when the screws are loosened each bar can be oscillated slightly on the pivot pins 25 so as to swing the cutting edges of the knives relative to the adjacent bars, and in this manner the cutting opening between each knife blade and an adjacent bar can be regulated as desired, the usual size of opening being between two and three millimeters so that it will be readily seen that only a very slight amount of play is necessary for the cap screws in order to make these adjustments.

The rail 18' which forms one vertical side of the frame is constructed in the same form as the bars 19 and as shown has its inner face recessed to receive the rear or back portion of a blade and is pivotally mounted and adapted to be secured in adjusted position in the same manner as the bars 19 so that the blade carried thereby may have its cutting edge adjusted relative to the adjacent bar 19 to vary the size of the cutting opening or throat as desired. It is also to be pointed out that while all knife carrying bars are

oscillatable, it is only necessary to adjust every other knife, as such adjustment will automatically take care of the knives in between or in other words, the knives which are not moved, therefore alternate bars may be set or fixed. It will thus be seen also that by mounting the cutting knives in the manner herein described the space which is at present taken up by the knife supporting throat bars in cutting machines of the type at present in use, is utilized by putting in additional knives, thus making it possible to increase the effective cutting capacity of the machine to a great extent. It is also to be pointed out that with the knife mounting illustrated, there is eliminated from the structure those elements which in machines of the type at present in use, are responsible for the mashing of the beets so that the extracted juice contains an undesirable amount of pulp.

When the cutter blocks are in position between the uprights or posts 10 of the spider structure, they form with the spider a rotary drum unit, and they are retained in position by the ring or annular plate 4 and the flange 5 of the same. The outer ends or arms 8 of the spider may be provided with the upstanding flange 27 behind which the lower rails of the cutter bar frames position, thus maintaining the bottoms of the same against movement.

As is illustrated the hub portion 9 of the spider of the rotary drum has the shaft 3 extended there-thru and keyed thereto so that the rotation of the shaft will impart rotary movement to the drum and in order that this rotary movement may be maintained smooth and that the drum will not sag at any point, there are provided the rollers 28 which engage an annular flange or trackway 29 which projects downwardly from the undersides of the arms 8. Any suitable supporting means for the rollers 28 may be employed.

Disposed within the rotary drum is an inverted cone 29' which is preferably made of a suitable sheet metal such as boiler plate or the like, and is disposed coaxially with the drum. The top of the cone has the circular plate 30 secured thereto and secured to this plate are the four radially extending beams 31 which project across the top of the plate 4 and are secured thereto by means of bolts 32 or in any other suitable manner. These beams support the cone 29' in spaced relation with the tops of the arms 8 and they also support, together with the cone, the four webs 33 which are secured to the face of the cone and extend radially thereof, each beneath a beam 31, toward the cutter blocks 15. The outer edges of the webs 33 are vertical, as shown, and the clearance between these edges and the cutters is very slight, being only sufficient to insure passage of the cutters past the webs without striking the latter.

Secured to the beams 31 at the axial center of the cone 33 is a step bearing 34 in which is mounted for rotation the lower end of a vertically disposed shaft 35. This shaft has secured thereto several collars 34' each of which carries a blade 35' which extends radially therefrom and is disposed obliquely to the axis of the shaft 35. This shaft is designed to be driven from a suitable source of power applied in any suitable manner to the upper end thereof.

Mounted vertically upon the plate 4 in surrounding relation with the plates 35' is a cylindrical hopper 36, which opens downwardly into the drum so that beets discharged into this cylinder will be fed directly to the cutters and due to the force of gravity and the pressure exerted



thereon by the blades 35', they will assume a horizontal position in the drum and be forced against the cutters in such a manner as to be cut lengthwise, which is the desirable method of cutting beets when preparing the same for the extraction of sugar.

The plate 4 is provided at suitable points with threaded apertures 37 in which steam pipes (not shown) may be coupled for the discharge of steam into the area 11 in accordance with the practice of beet sugar extraction.

It will be noted that the steam inlet apertures 37 are directed downwardly across the outer faces of the posts 10, and each of these outer faces has secured thereto a series of obliquely directed flanges 38. These flanges incline downwardly or are directed oppositely to the direction of rotation of the drum and they serve the double purpose of forcing the beet pulp down thru the area 11 toward the outlet 12, and forcing the steam toward the knife blades to effect cleaning of the latter.

From the foregoing it will be readily apparent that the method herein described of mounting cutters or knives in the cutter blocks eliminates to a great extent the possibility of bruising and pulping the beets while they are being sliced, due to the fact that there has been eliminated from the cutter structure the throat bars which form a part of cutters of the type at present in use and which are the chief cause of the beets being mashed and pulped up. In the present case, the knife supporting bar is placed behind the back of the knife so that only a narrow portion of the bar is exposed to be engaged by the beet. This narrow portion of the bar which is indicated by the numeral 24 acts as a throat bar for the cutting edge of the adjacent knife. Thus the amount of surface against which the beets have to rub in the passage of the knives over them is reduced to a minimum and consequently the possibility of mashing and pulping the beet is also reduced and the number of clean-cut slices is increased.

In addition to the improved features of the present beet cutter as regards the knife construction, the provision of the feeding or guiding cone over which the beets are fed downwardly and outwardly toward the cutters, together with the webs which divide the cone into a series of compartments, insures the clean slicing of the beets as they are forced firmly against the cutters and held there until completely cut up and are not free to roll or shift, as they are in cutters of the type at present in use. When such rolling or shifting occurs the body of the beet becomes mashed and in this way also adds to the amount of undesirable pulp which passes off thru the conduits 12 from the machine.

By the provision of the removable door section 6 in the inner part of the annular plate 4, any one of the cutter blocks 15 may be taken out for repair or replacement without disturbing or disassembling any other part of the machine. The cutter blocks are firmly held in place against the shoulders 14 of the posts 10 between which they are mounted, by the pressure exerted thereagainst by the mass of beets in the hopper and on the cone 29. Thus while the cutter blocks are free to be readily removed thru the door 6 of the plate 4, they are prevented from shifting by the beets and also by the flanges 5 and 27 which form a part of the plate and frame structure respectively.

I claim:

75 1. In a sugar beet slicer, a cylindrical casing, a

drum mounted for rotation on a vertical axis within and concentric with the cylinder, the drum comprising a series of vertical spaced posts and cutter units between the posts, the said units discharging cut beets outwardly into the casing, means for feeding beets downward and radially of the drum toward the units, means facilitating the discharge of steam downwardly between the cylinder and drum, and means carried by the drum for effecting simultaneous deflection of the steam to clean said units and the positive movement of the cut beets downwardly thru the casing.

2. In a beet slicing machine, a cutter unit comprising a frame having top and bottom rails and vertical side bars coupling said rails, a plurality of knife bars in spaced parallel relation one with the other and with said side bars between said rails, said knife bars and side bars having aligned working faces across which is moved material to be cut, a knife carried by each knife bar and by one of said side bars, each knife being in two longitudinal portions forming a back which is set into the said face of its supporting bar and a blade extending in substantially parallel relation with said face, one of said knives having the blade cutting edge adjusted relative to an edge of the said face of the said one of the side bars and each of the other knives having the blade cutting edge adjusted relative to that edge of the said face of the adjacent knife supporting bar which is remote from the blade supported thereby, and means for effecting the adjustment of each knife blade edge relative to the said face of the bar adjacent thereto by oscillating the supporting bar of the knife on its longitudinal axis.

3. In a beet slicing machine, a cutter unit comprising a frame having top and bottom rails and vertical side bars coupling said rails, a plurality of knife bars in spaced parallel relation one with the other and with said side bars between said rails, said knife bars and side bars having aligned working faces across which is moved material to be cut, a knife carried by each knife bar and by one of said side bars, each knife being in two longitudinal portions forming a back which is set into the said face of its supporting bar and a blade extending in substantially parallel relation with said face, one of said knives having the blade cutting edge adjusted relative to an edge of the said face of the said one of the side bars and each of the other knives having the blade cutting edge adjusted relative to that edge of the said face of the adjacent knife supporting bar which is remote from the blade supported thereby, and means for effecting the adjustment of each knife blade edge relative to the said face of the bar adjacent thereto, comprising a pivot between each end of each knife carrying bar and the adjacent frame rail and means carried by a rail and engaging a knife carrying bar for holding it against pivotal movement.

4. A beet slicing machine of the character described, comprising a housing having a vertical cylindrical wall and open at its top and bottom, an annular plate secured to the top of said wall and concentric therewith and extending inwardly, a rotary unit within the housing comprising a circular spider concentric with the housing and including a plurality of posts extending vertically from its periphery to and terminating short of the under side of said annular plate, a vertical drive shaft secured at its upper end with the center of said spider, a plurality of arcuate cutter units each adapted to be inserted downwardly between a pair of posts, each cutter unit comprising a



series of vertical slicing blades, there being sliced material passing passages between said blades, the outer sides of said posts and units being spaced from said housing wall to permit the downward escape of sliced material, a supporting frame 5 mounted upon said annular plate and extending across said spider, an inverted cone secured at its apex to said supporting frame and having its base terminating within the circular area of said

spider, partition plates extending radially from the surface of said cone to close proximity with said cutting units, said annular plate having a door opening therein through which said cutting units may be passed, and annular supporting structure for and beneath said spider and concentric with said shaft. 6

ALBERT BACHOFNER.