Nov. 12, 1940. B. I. BUCK 2,221,699

BEAN SLICER

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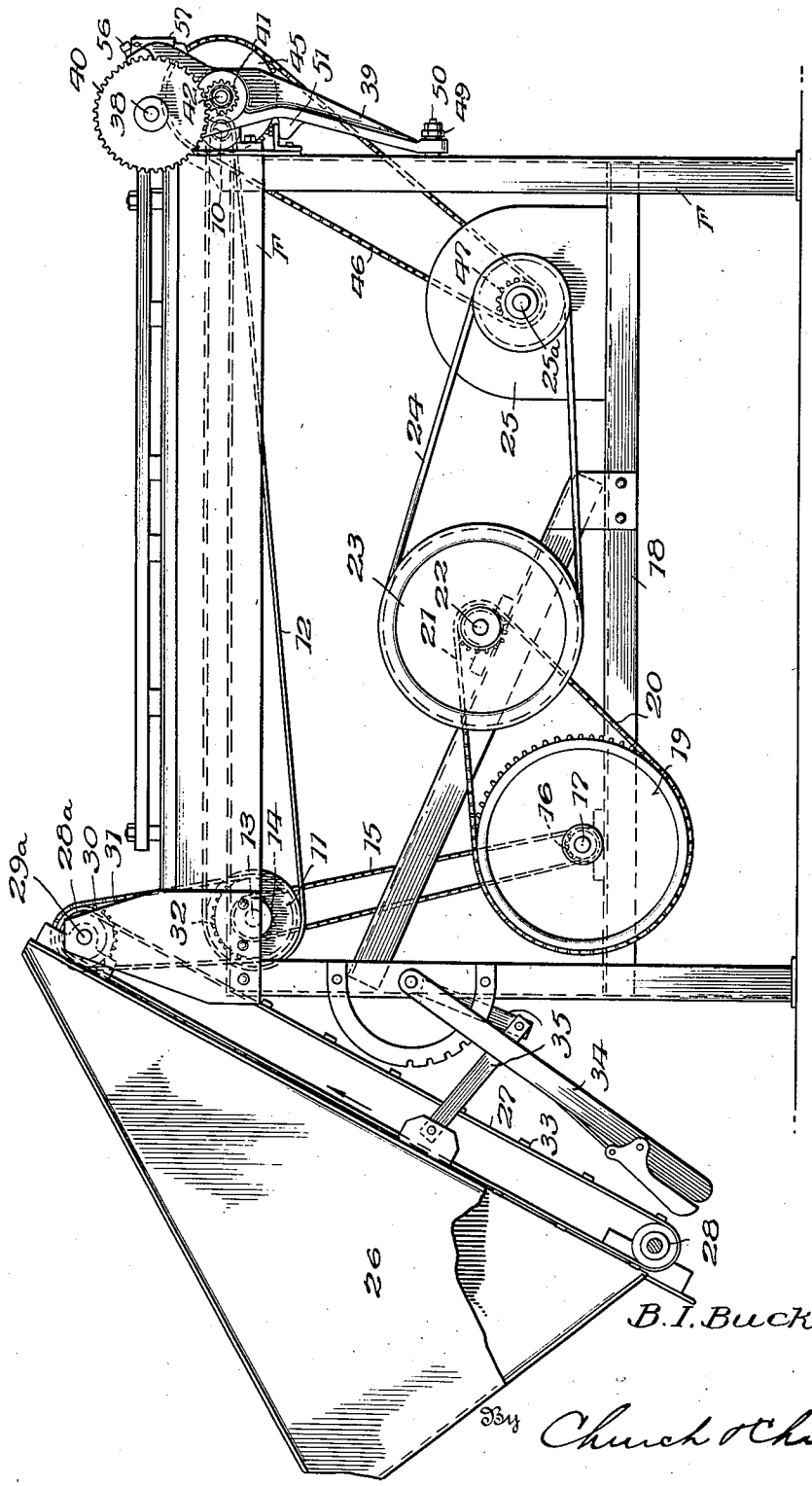


Fig. 1.

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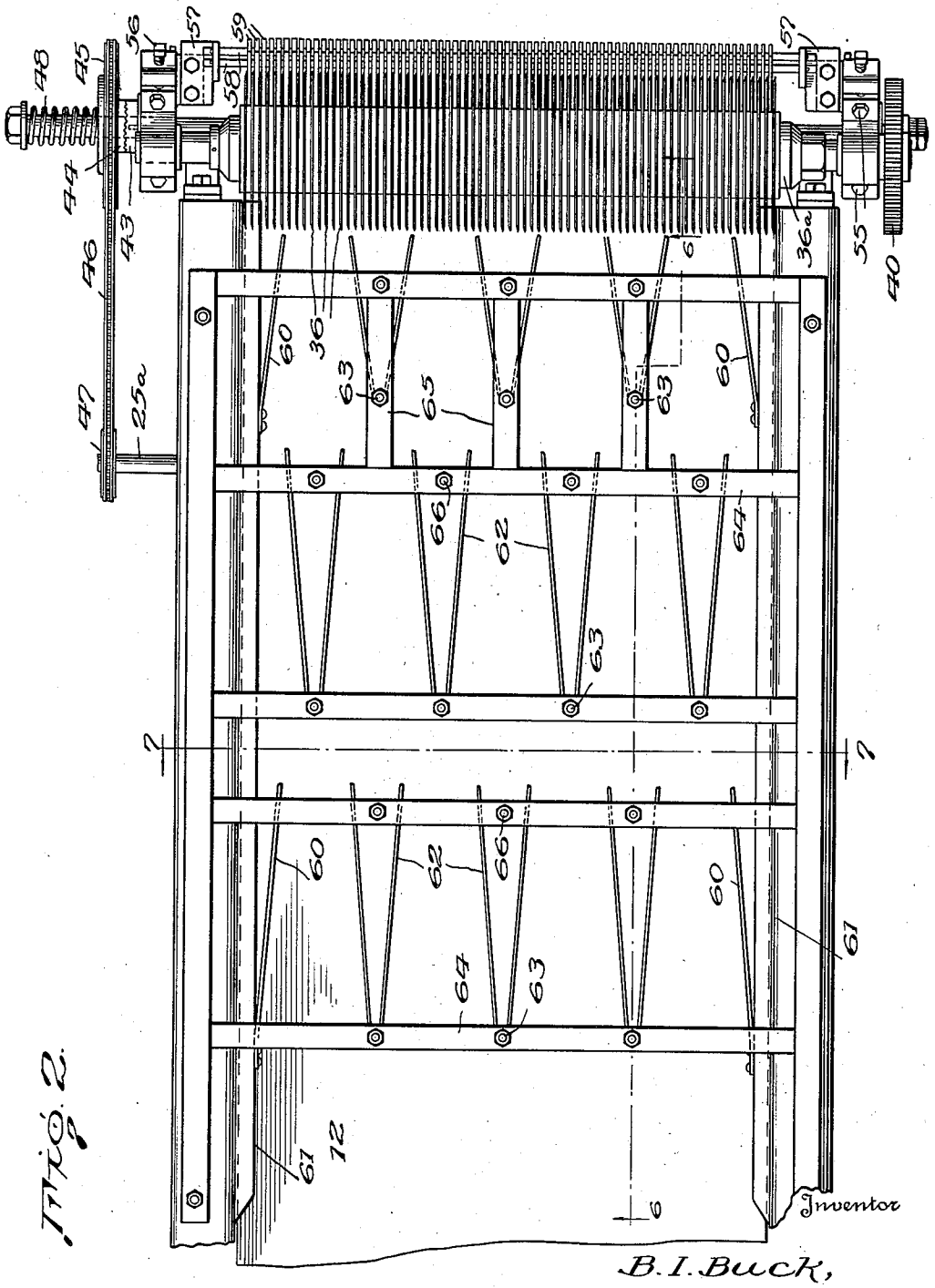


Fig. 2.

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BEAN SLICER

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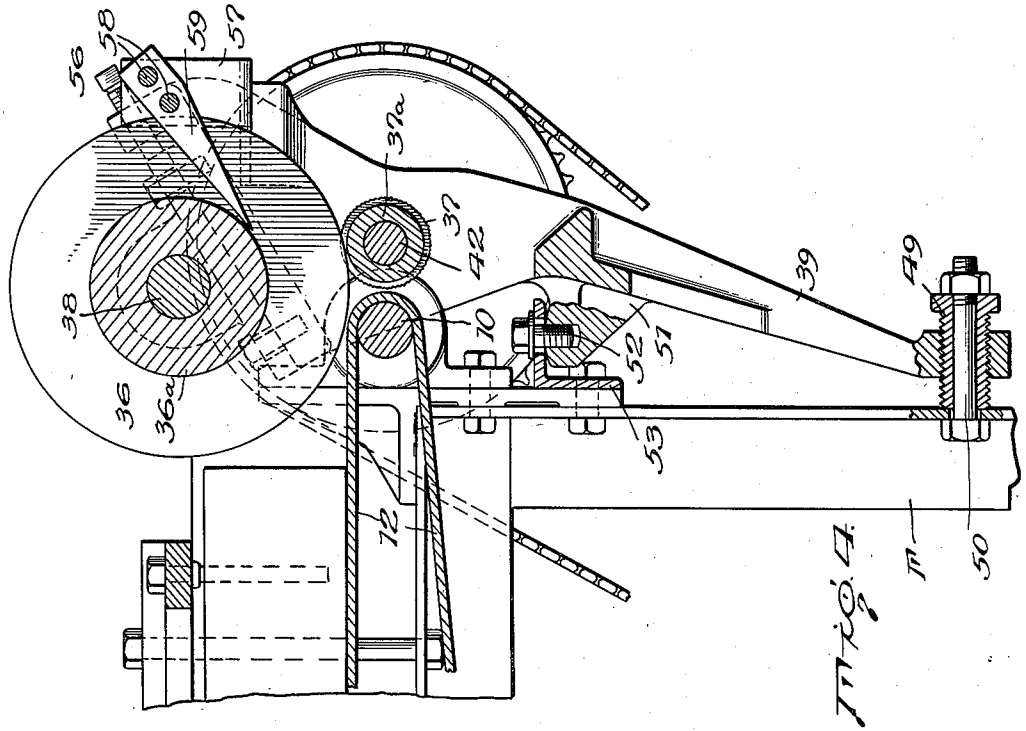


Fig. 4.

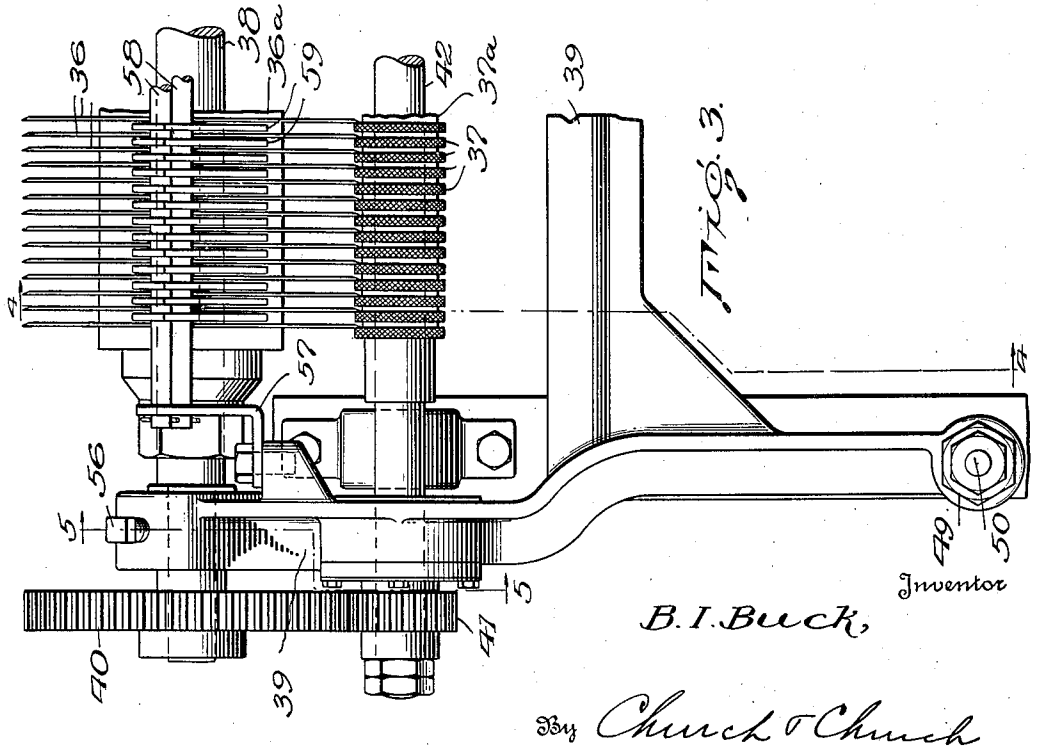


Fig. 3.

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BEAN SLICER

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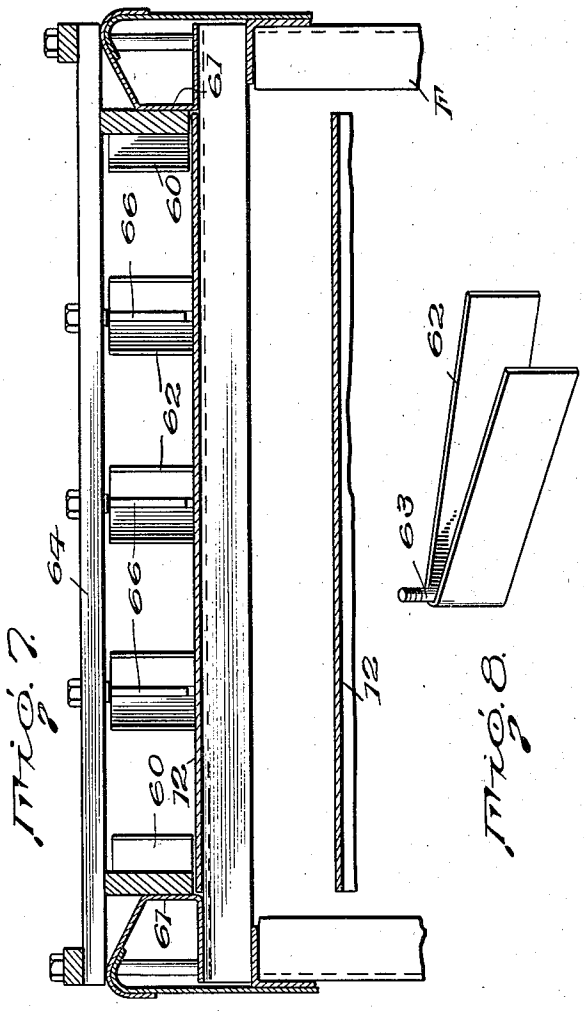


Fig. 7.

Fig. 8.

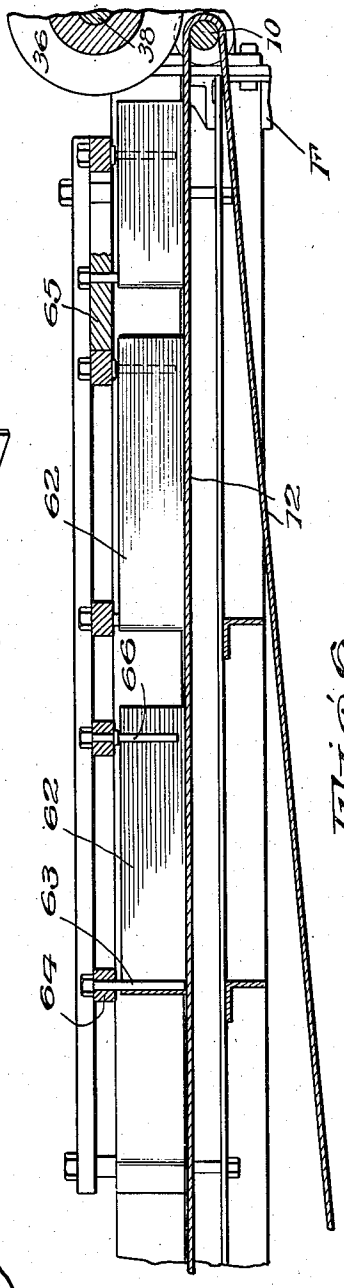


Fig. 6.

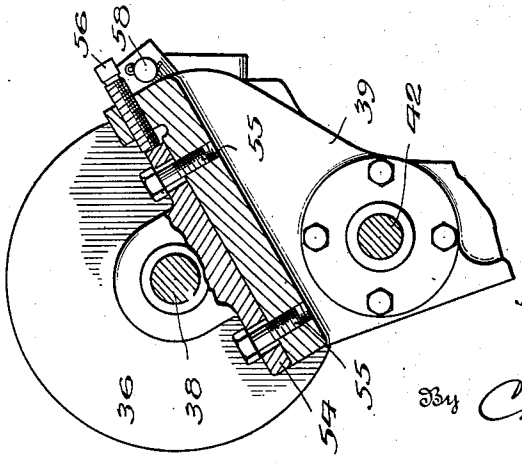


Fig. 5.

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Patented Nov. 12, 1940 2,221,699

UNITED STATES PATENT OFFICE

2,221,699

BEAN SLICER

Benjamin I. Buck, Baltimore, Md.

Application December 12, 1938, Serial No. 245,287

4 Claims. (Cl. 146—98)

This invention relates to improvements in bean-slicing machines.

The primary object of the invention is to provide a slicing mechanism which will operate upon the beans with maximum efficiency.

A further object of the invention is to provide a slicing mechanism which will prevent beans conveyed thereto accumulating and jamming at what might be termed the entrance to the slicing mechanism.

A still further object is to provide a machine in which the beans, which have been arranged lengthwise of the cutters as they are advanced toward the latter, will be maintained in that relationship so as to insure their being sliced lengthwise.

Another object is to provide a simplified form of slicing mechanism adjustably mounted with respect to the conveyor, by which the beans are transported to the slicing instrumentalities.

More specifically, the invention contemplates the provision of an endless traveling conveyor for delivering the beans endwise to a series of cutting discs which, together with the cooperating bean-supporting rollers, constitute the bean-slicing devices, these bean-supporting rollers and, preferably, the cutting discs, being rotatable and having a peripheral or surface speed in excess of the speed of the conveyor.

Another object of the invention is to provide a simple arrangement for arranging the beans lengthwise of the direction of travel of the conveyor, by which they are carried to the slicing mechanism, said means being readily removable for any desired purpose, and also being of a construction or arrangement such as will not interfere with the movement of the beans, in that there will be no tendency for the beans to clog or jam on the conveyor.

With these and other objects in view, the invention consists in certain details of construction and combinations and arrangements of parts, all as will hereinafter be more fully described, and the novel features thereof particularly pointed out in the appended claims.

In the accompanying drawings—

Figure 1 is a side elevation of a bean-slicing machine illustrating the preferred embodiment of the present invention;

Fig. 2 is a top plan view;

Fig. 3 is a rear end elevation, one side portion of the structure only being shown;

Fig. 4 is a longitudinal vertical section on the line 4—4 of Fig. 3;

Fig. 5 is a similar view on the line 5—5 of Fig. 3;

Fig. 6 is a longitudinal vertical section on the line 6—6 of Fig. 2;

Fig. 7 is a transverse vertical section on the line 7—7 of Fig. 2; and

Fig. 8 is a detail perspective view of one of the members provided for arranging the beans lengthwise of the conveyor.

In the embodiment of the machine illustrated, rollers 10, 11, journaled in a frame F, support an endless traveling belt or conveyor 12, and the shaft 13 of roller 11 carries a sprocket 14 connected by sprocket chain 15 to a gear 16 on a shaft 17 journaled in the longitudinal members 18 of the frame. Shaft 17 has mounted thereon a sprocket 19 connected by sprocket chain 20 to a sprocket 21 on a shaft 22, also journaled in the frame, and this shaft carries a driving pulley 23 which is driven by a belt 24 from the shaft 25a which, in turn, is actuated by a prime mover, such as a motor, enclosed within a housing 25 mounted on the frame members 18. Through this chain of connections the belt or conveyor 12 is driven from the prime mover.

The beans to be sliced are preferably deposited in a hopper 26, whose bottom may be formed by an endless belt 27 carried by a rollers 28, 28a, on shafts 29, 29a. Shaft 29a is provided with a sprocket 30 connected by a sprocket chain 31 to a sprocket 32 on shaft 13, so that the belt 27 is driven in the direction of the arrow in Fig. 1. This belt 27 is inclined and is provided with cross slats 33, whereby the beans deposited in the hopper 26 will be carried upwardly on the belt 27 and, as the latter travels around roller 28a, they will be deposited on the belt 12. The hopper is preferably adjustable with respect to the belt 12, a lever 34 connected by linkage 35 to the hopper being provided for this purpose.

The end of the upper reach of the belt 12, on which the beans are deposited from hopper 26, might be termed the receiving end of the belt, while the point at which the belt travels around the roller 10 might be termed its discharge end or discharge point. At this so-called discharge end of the belt, the beans are adapted to be transferred from the belt to the slicing mechanism, which consists essentially of slicing or cutting discs 36 and bean-supporting members, preferably in the form of knurled members 37, the peripheral portions of the discs lying closely to the side faces of the members 37, as more particularly illustrated in Fig. 3. The cutting discs 36 are mounted on a shaft 38 journaled in the

side arms of a supplemental frame 39 and said shaft is provided with gear 40 meshing with gear 41 on shaft 42, also journaled in supplemental frame 39. The knurled bean-supporting surfaces are mounted on this shaft 42. For the purpose of rotating the cutting discs 36 and members 37, one of the shafts on which the same are mounted is connected to the prime mover. Preferably, shaft 42 is provided with a clutch member in the form of a collar 43 fixed thereon adapted to cooperate with a clutch member 44 formed on a sprocket 45 which is connected by a sprocket chain 46 to a sprocket 47 on the shaft 25a driven by the prime mover. Sprocket 45, together with clutch member 44, is loose on the extended end of shaft 42, but the clutch members are held in engagement with one another by a spring 48 encircling the extension of said shaft 42. The contacting faces of the clutch members are formed with detents or ratchet teeth whereby motion will be transmitted from the sprocket 45 to the shaft 42 under normal conditions but if, by any chance, there should be a tendency of the machine to clog, the resistance to the rotary motion of shaft 42 willl overcome the tension of spring 48 and result in the clutch member 44 moving circumferentially relatively to the clutch member 43. In other words, under such conditions or if, for any other reason, sufficient resistance is offered to the turning of shaft 42, spring 48 is compressed sufficiently to permit the teeth on clutch member 44 to ride over the teeth on member 43.

The beans, which are arranged on the conveyor 12 endwise with respect to the cutting discs, as will be later described, are adapted to pass between the cutting discs 36 and the knurled supporting members 37, and to avoid the beans being displaced or their arrangement otherwise affected as they move from the conveyor to the knives and members 37, the latter are adapted to be driven at a peripheral speed in excess of the surface speed of the conveyor 12. It is for this reason that the several elements of the driving connections for the conveyor 12 and the shafts 38, 42, are formed of substantially the relative sizes illustrated in Fig. 1. No exact ratio of these various elements is required, but excellent results have been accomplished when the peripheral speed of the conveyor 12 is approximately one-half (½) that of the peripheral speed of the cutting discs 36 and the members 37. In this connection, it will be noted that the disposition of the discs 36 is such that they slightly overhang the conveyor 12 or, at least, to an extent where they will contact the beans before the latter pass sufficiently far beyond the roller 10 where they would tend to follow the curvature of the belt passing around said roll. In other words, due to the curvature of the knurled members 37 and of the belt passing around roll 10, there is a depression into which the beans might enter and their disposition lengthwise of the belt disturbed, if means are not provided for preventing such action on the part of the beans. In the present instance, this difficulty is overcome primarily by the increased peripheral speed of the slicing discs, by reason of the fact that, as soon as the beans come into contact with the discs, the higher speed of the latter causes the beans to be suddenly advanced into engagement with the knurled supporting members 37. This movement of the beans occurs very quickly and, by having the slicing discs positioned over the discharge end of the conveyor, as shown, the beans cannot become disarranged so far as their disposition lengthwise of the belt is concerned. Hence, there is no interruption in the operation of the machine from this source and, as a result, maximum output is constantly maintained.

In order to permit the slicing elements to be adjusted relatively to the discharge point of conveyor 12, the supplemental frame 39 has its side arms threaded on tubular screw members 49 bolted to the main frame F by bolts 50. The supplemental frame 39 is also provided with lugs 51 having threaded sockets therein for lag bolts 52 which project through brackets 53 on the main frame F. Thus, by relieving the bolts 50, 52, the lower ends of the side arms of the supplemental frame may be moved inwardly or outwardly to adjust the shafts 38, 42, toward and from roller 10 and the surface of the belt carried by that roller. The slicing discs 36 are also adjustable relatively to the belt and knurled supporting members 37 by having the bearings for shaft 38 formed in blocks 54 secured by lag bolts 55 to the supplemental frame. By relieving the pressure on these bolts 55, the slicing discs can be adjusted relatively to the members 37. Set screws 56 extending through the supplemental frame into engagement with the blocks 54 aid in determining the positions of said blocks. In order to keep the slicing discs clean or clear of particles of beans, brackets 57 are secured to the upper extremities of the supplemental frame, and mounted in said brackets is a rod 58 extending longitudinally of shaft 38, said rod 58 having mounted thereon a series of fingers 59, each one of which is positioned between two contiguous slicing discs, so as to clear the discs of particles of beans that tend to adhere to said discs.

While the cutting discs 36 and the bean-supporting members 37 may take any of various forms, in the present instance the discs are illustrated as being carried on a sleeve 36a fast on shaft 38, while the members 37 are in the form of annular shoulders on a sleeve 37a fast on shaft 42.

It is, of course, essential that the beans be presented endwise with respect to the cutting discs, in order that they will be slit or sliced lengthwise. For arranging the beans in this fashion on the belt 12, a plurality of resisting devices are positioned on the upper reach of the belt in such fashion that they are free to oscillate laterally of the belt, but without danger of the beans clogging between juxtaposed members. Specifically, these positioning means comprise a plurality of V-shaped strips of metal arranged in rows transversely of the belt and adapted to rest edgewise on the belt. The positioning members 60 at the sides of the belt are fastened to the side walls 61 between which the belt 12 travels. These side walls 61 are mounted on the frame F and, in conjunction with the belt 12, constitute substantially a trough along which the beans are conveyed by the belt. The intermediate positioning members 62 are held in place lengthwise of the belt by pins 63 that extend downwardly through cross-members 64 positioned above the belt. If desired, the cross-members 64 may be connected by longitudinal strips 65 in which the pins 63 may be placed. It will be observed that the members 62 of each row are staggered with respect to the members of the next succeeding row, so that a bean, engaging succeeding members in its travel toward the slicing discs, will gradually be arranged lengthwise of the belt so as to be presented endwise to said discs. Preferably, these positioning members possess a certain degree of resil-

iency, particularly the members 60 which are fast at the sides of the belt. However, the intermediate members 62 merely loosely encircle the pins 63 so that they are free to oscillate transversely of the belt. Thus, there is less likelihood of the beans jamming or clogging between two adjacent members. If desired, means may be provided for limiting this oscillatory motion of the members 62. For instance, where V-shaped members are used, as shown, additional pins 66 may be provided in certain of the cross-members 64, said pins being located between the free ends of the members 62 so as to engage one or the other side of the member, depending upon the direction in which it is oscillated. This particular form of positioning members is furthermore advantageous in that their removal for replacement or other purposes may be readily accomplished.

The construction of the machine is exceedingly simple, consisting of a comparatively small number of parts, all of which are of rather sturdy construction. Notwithstanding its simplicity, it operates very efficiently, particularly by reason of the fact that the beans are rapidly advanced at the moment they come into engagement with the slicing instrumentalities, as compared with their normal rate of movement while supported solely on the conveyor belt 12.

What I claim is:

1. In a bean-slicing machine having a traveling conveyor, a bean-slicing mechanism comprising a traveling bean-supporting surface spaced beyond one end of said conveyor onto which the beans are fed from said conveyor, and rotary slicing elements for slicing beans on said supporting surface, said slicing elements being positioned adjacent said end of the conveyor and overlying the same to engage beans on the latter, the peripheral speed of said elements being greater than the surface speed of said conveyor whereby the rotary slicing elements impinging against beans at the discharge end of the conveyor will accelerate the feeding movement thereof to the bean-supporting surface.

2. In a bean-slicing machine having a traveling conveyor, a bean-slicing mechanism comprising a traveling bean-supporting surface spaced beyond one end of said conveyor onto which the beans are fed from the conveyor, and rotary cutting discs disposed edgewise with respect to the end of said conveyor for slicing beans on said supporting surface, said discs being positioned to overlie said conveyor and engage beans on the conveyor adjacent said end of the conveyor and the peripheral speed of said discs being greater than the surface speed of said conveyor whereby the feeding movement of beans from the conveyor to said bean-supporting surface is accelerated by the cutting discs impinging against them.

3. In a bean-slicing machine having a traveling conveyor, a bean-slicing mechanism comprising a plurality of rotary circular bean-supporting members spaced from the discharge end of said conveyor and onto which the beans are fed from the conveyor, rotary cutting discs for slicing beans on said supporting members, said discs being positioned adjacent said end of the conveyor and overlying the same to engage beans on the latter, and means for rotating said discs and supporting members at a peripheral speed greater than the surface speed of said conveyor whereby the discs impinging against beans on the conveyor will accelerate the feeding thereof from the conveyor onto said supporting members.

4. In a bean-slicing machine having a conveyor belt, a pair of shafts disposed transversely of said belt at a point spaced from the discharge end of said belt, cutting discs fixed on one of said shafts and projecting over said belt in position for their peripheries to impinge against beans on the belt, bean-supporting surfaces fixed on the other shaft and to which the beans are fed from said belt, said supporting surfaces cooperating with said cutting discs in the slicing of the beans, a prime mover, and driving connections between said mover and said belt and shafts, respectively, said cutting discs and supporting surfaces having a peripheral speed greater than the surface speed of the belt whereby the cutting discs impinging against beans on the belt will accelerate the movement of the beans from the belt onto said supporting surfaces.

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