L. B. WILLOUGHBY.

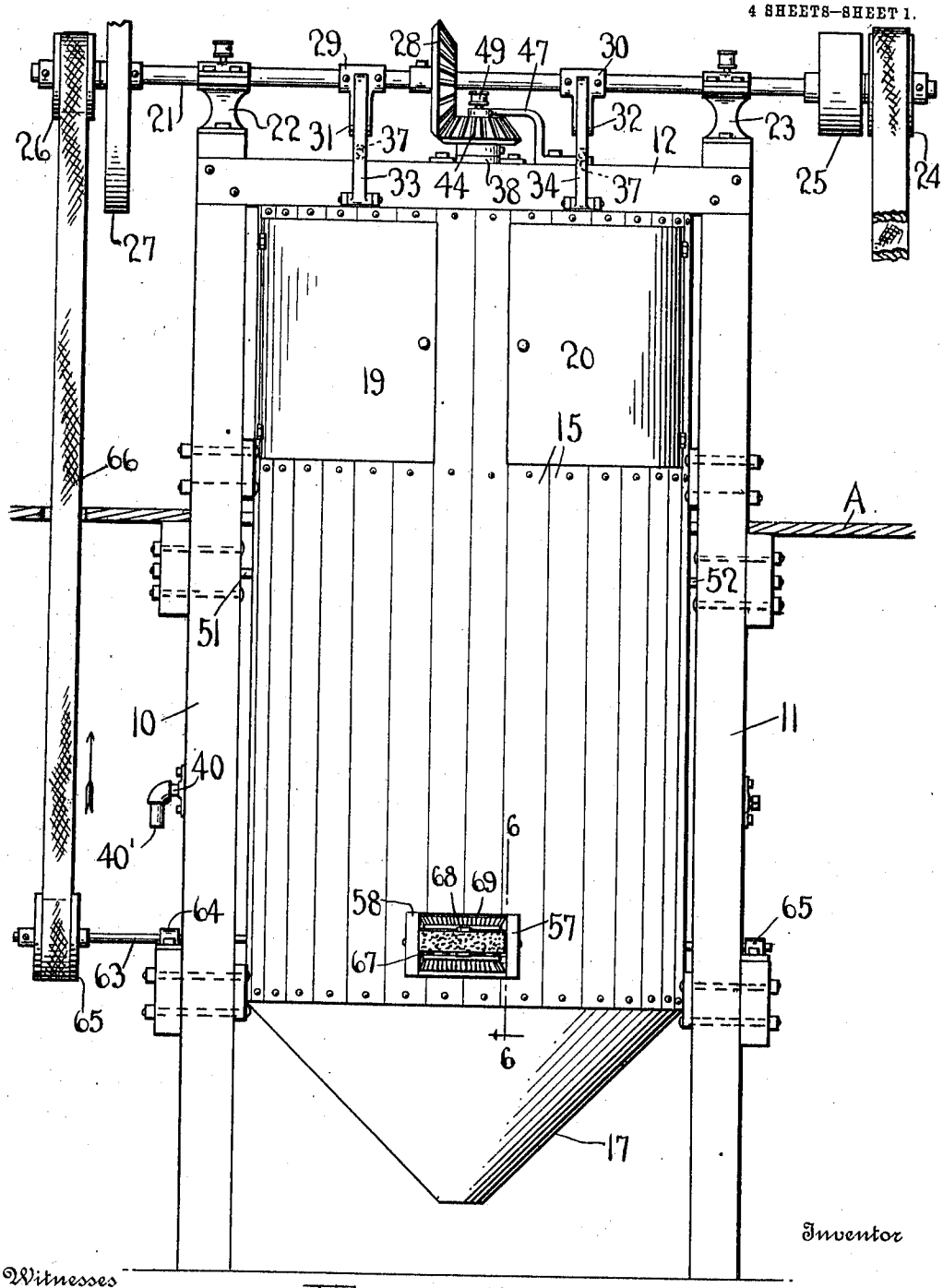
MILLING APPARATUS.

APPLICATION FILED DEC. 23, 1909.

982,454.

Patented Jan. 24, 1911.

4 SHEETS—SHEET 1.



Witnesses

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4 SHEETS—SHEET 2.

Fig. 2.

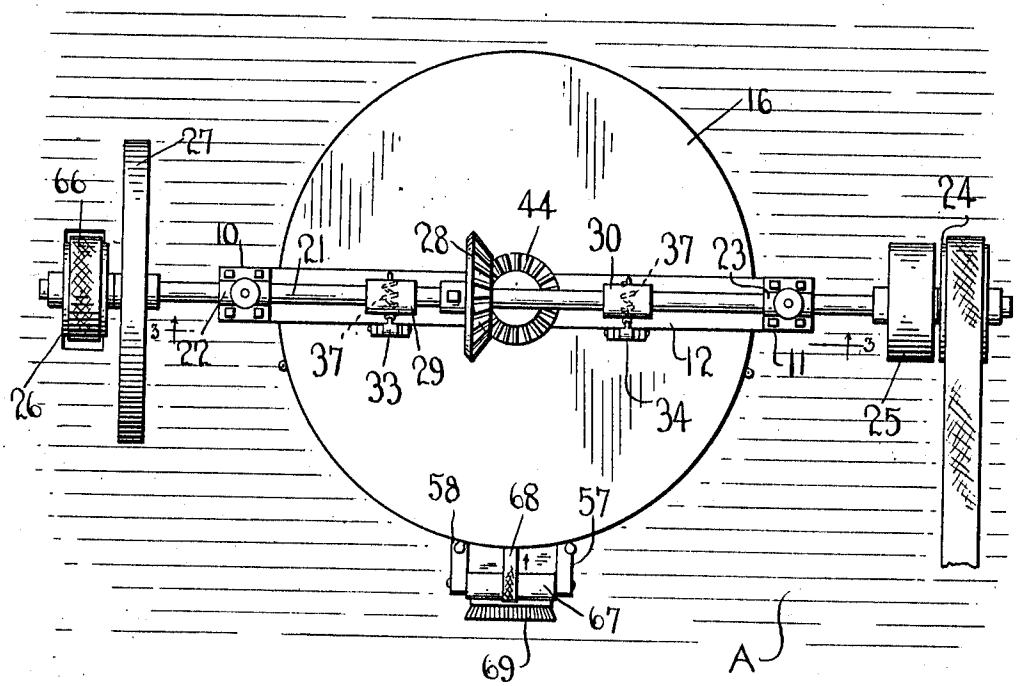
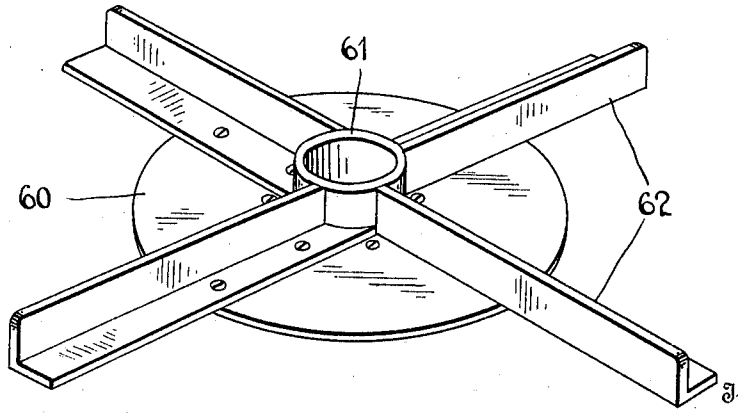


Fig. 4.



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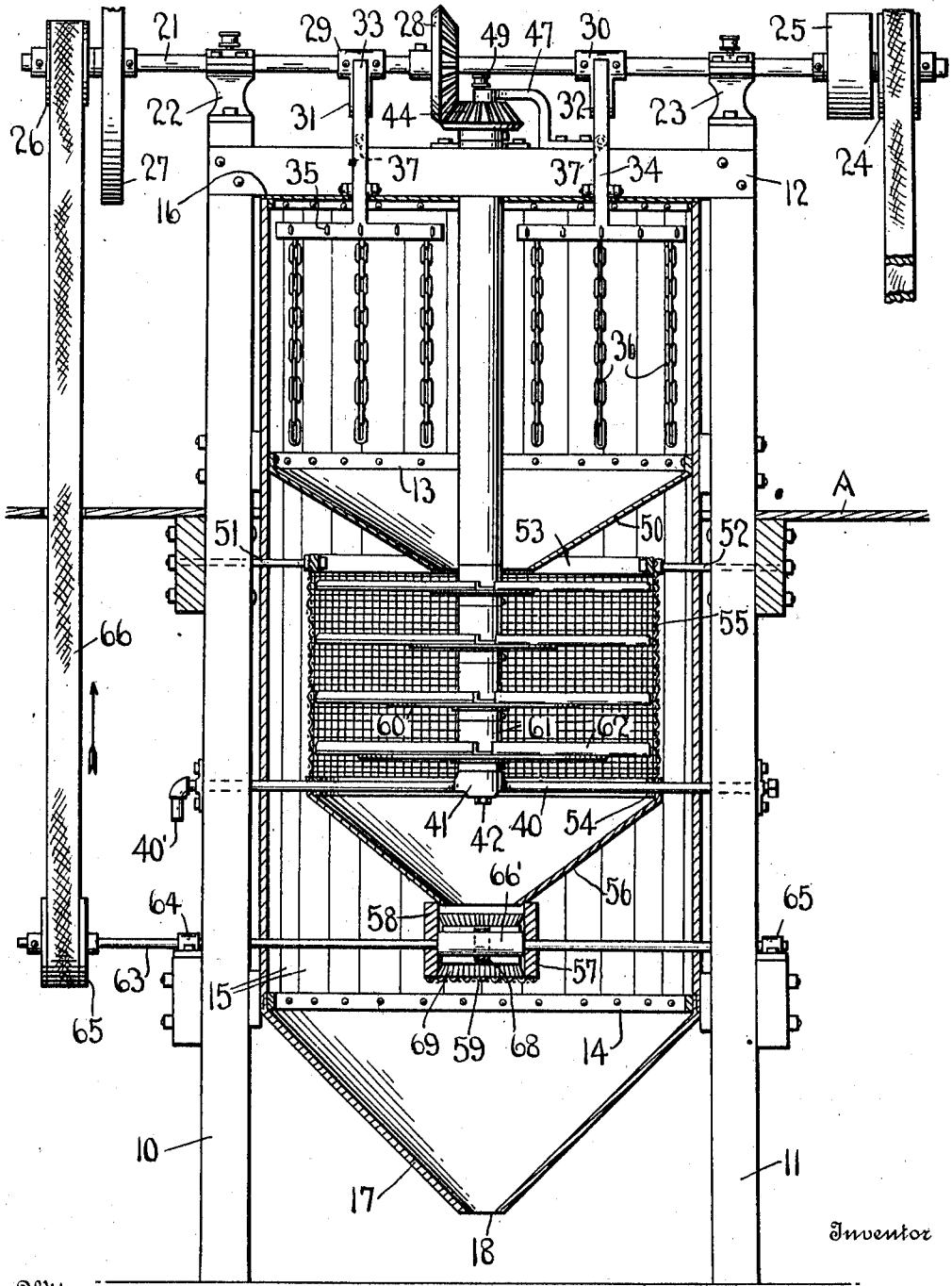

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FIG. 3.

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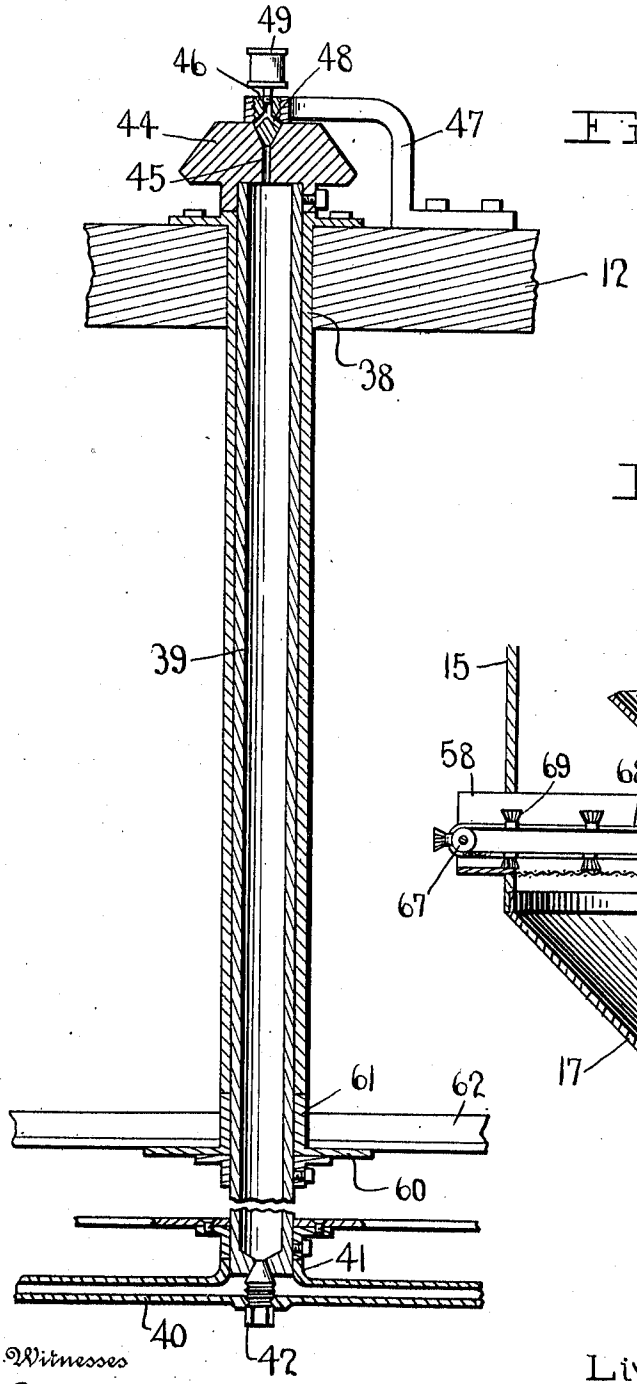
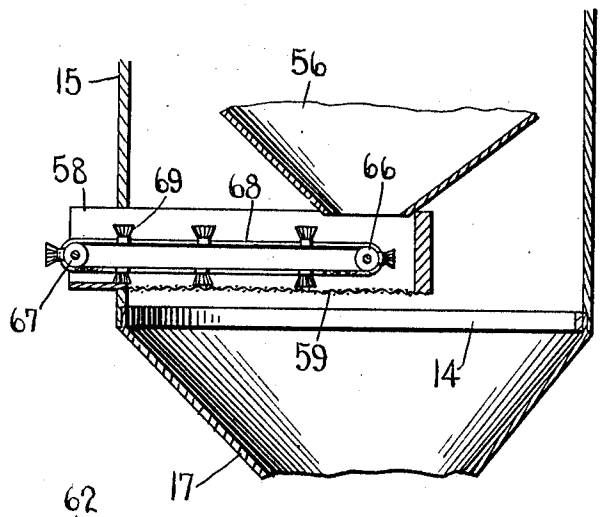


Fig. 5.

Fig. 6.



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UNITED STATES PATENT OFFICE.

LIVELY B. WILLOUGHBY, OF BOWLING GREEN, KENTUCKY.

MILLING APPARATUS.

982,454. Specification of Letters Patent. Patented Jan. 24, 1911.

Application filed December 22, 1909. Serial No. 534,478.

To all whom it may concern:

Be it known that I, LIVELY B. WILLOUGHBY, a citizen of the United States, residing at Bowling Green, in the county of Warren, State of Kentucky, have invented certain new and useful Improvements in Milling Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to milling apparatus.

The object of the invention is the production of an apparatus of the class described which combines in a unitary structure a sack shaking mechanism, a blending mechanism, and a sifting mechanism; said mechanisms being in successive relation and adapted to treat the product to efficiently blend and sift same as it passes from the sack shaking mechanism disposed at one end of the apparatus to a suitable outlet disposed at the other end.

With the above and other objects in view the invention consists in the details of construction and in the arrangement and combination of parts to be hereinafter more fully described and set forth in the claims.

In describing the invention in detail reference will be had to the accompanying drawings in which like characters of reference denote corresponding parts in the several views, and in which;

Figure 1, is a front elevation of the invention; Fig. 2, a top plan view; Fig. 3, a vertical section on the line 3—3 of Fig. 2, certain portions of the apparatus being shown in elevation; Fig. 4, a detail perspective view of one of the centrifugal compelling plates of the blending mechanism; Fig. 5, an enlarged vertical section of the operating shaft upon which the centrifugal compelling plates of the blending mechanism are mounted; and, Fig. 6, a partial section on the line 6—6 of Fig. 1.

Referring to the drawings, the apparatus is shown as comprising a vertically disposed frame formed of the uprights 10 and 11 which are connected together at their tops by the cross beam 12. Said uprights are of such height as to project above one floor of the mill indicated at A so that the upper portion of the frame will be located in the sack shaking compartment of the mill. Supported between the uprights 10 and 11 by suitable clips are corresponding horizontally disposed annular bands 13 and 14 on the exterior of which are attached a plurality of vertically disposed staves 15 to form the wall of the cylindrical casing which has its upper end closed by a top member 16, and its lower end provided with a funnel shaped bottom 17 provided centrally with an aperture 18 constituting a delivery mouth. The upper end of the cylindrical wall of the casing just described is provided with hinged doors 19 and 20, whereby access to the interior of said casing, and more particularly to the sack shaking, mechanism to be presently described, is had.

All the mechanisms of the apparatus previously mentioned are operated through the instrumentality of a common drive shaft 21 which is journaled in brackets 22 and 23, mounted upon the top of the frame in line with the longitudinal axis of the uprights 10 and 11 respectively. Said shaft 21 is provided at one end with a fixed pulley 24 and the idle pulley 24 whereby same may be connected and disconnected with a suitable source of power to effect the rotation thereof. On the opposite end of the shaft 21 there is mounted another pulley 26 for a purpose to be hereinafter described and a fly wheel 27, the latter serving to balance said shaft during its rotation. A bevel gear 28 is fixed to said shaft 21 slightly to one side of the center thereof, while collars 29 and 30, each of which are provided with laterally projecting fingers 31 and 32 respectively are mounted on the shaft on opposite sides of said bevel gear 28 and inward of the journal brackets 22 and 23.

Pivotally mounted at corresponding points on opposite sides of the center of the cross beam 12 are similar hanger members 33 and 34 of inverted T-shaped formation, the stems of which project through suitable apertures in the top 16 of the casing and extend upwardly a sufficient distance to be disposed in the path of travel of the fingers 31 and 32 respectively, when the shaft 21 is rotated. The horizontal arm of said hanger members which constitutes the lower portion thereof are disposed within the casing of the apparatus and have secured to each side thereof hooks 35 adapted to support the sacks containing product during the shaking operation. These horizontal arms of the hanger members 33 and 34 have also attached thereto a plurality of depending

chains 36 for a purpose to be presently described. In order to maintain the vertical stems of the hanger members 33 and 34 normally in a given position, or as in this case, disposed against the cross beam 12 each vertical support has secured thereto one end of a spring 37, the other end of each of said springs being secured in any suitable manner to the cross beam; the tendency of said springs being to constantly draw the vertical stems of the hanger members against the cross beam 12.

The cross beam 12 is provided centrally with a transverse aperture in which is fitted a bearing sleeve 38 which forms a journal for a hollow vertical shaft 39 the upper end of which projects through said sleeve and extends a slight distance above the upper end thereof.

A hollow rod 40 extends transversely through the casing intermediate the top and bottom thereof and is supported at its terminals by the uprights 10 and 11 through which it projects. This rod 40 is provided with an enlarged annular central portion 41 the upper face of which is provided with a cylindrical recess communicating with the bore of said rod, said cylindrical recess constituting a bearing for the lower end of the hollow shaft 39. The lower face of the enlarged portion of the rod 40 is provided with a threaded aperture in which is mounted a cone bearing 42 adapted to directly support the lower end of the shaft 39. The upper end of the shaft 39 which projects above the bearing of the sleeve 38 has mounted thereon a horizontally disposed bevel gear 44 which has formed therein a central transverse aperture 45, the upper end of the aperture 45 being flared outwardly to form a seat for a cone bearing 46 carried by a bracket 47 mounted upon the cross beam 12; said cone bearing being provided with apertures 48 to form an oil duct for the conveyance of oil from a suitable cup 49 mounted in the upper end of the aperture 48 of the cone bearing 46 to the sides of said bearing.

From the construction just described it will be apparent that the lubricant in cup 49 will not only dispose itself upon the cone bearing 46 but will travel downwardly through the shaft 39, overspread the cone bearing 42, pass into the bore of the rod 40 and expel through the end 40′ of said rod into any suitable receptacle, to be again utilized.

Supported upon the band 13 is a funnel-shaped partition 50 provided centrally with an aperture constituting a delivery mouth and disposed around the shaft 39. Supported by suitable clips 51 and 52 mounted in the uprights 10 and 11 respectively and extending through the cylindrical wall of the casing is an annular band 53 disposed in substantially the same horizontal plane as the lower end of the funnel-shaped partition 50. Another horizontally disposed annular band 54 having substantially the same diameter as the band 53 is supported by the rod 40. The bands 53 and 54 are connected by a vertically disposed cylindrical screen 55. The band 54 also carries a depending hopper 56, the mouth of which opens into a transversely disposed trough formed of the side members 57 and 58 and a bottom screen member 59 for a purpose to be presently described.

Mounted upon the shaft 39 between the bands 53 and 54, at spaced points thereon are a plurality of centrifugal deflector plates, each of which is formed of a cylindrical disk 60 provided centrally with an upwardly extending collar 61. Extending radially from the collar 61 are a plurality of angle irons 62 which project beyond the limits of the disk 61 and in proximity to the screen 55, the horizontally disposed portion of said angle irons being secured to the upper face of the disk. Said angle irons are so positioned upon the disks 60 that when same are rotated by the shaft 39 the horizontal portion of said angle irons will always precede the vertical portion thereof during their rotation. The circular disks 60 of said centrifugal deflector plates are of different diameters constantly increasing in downward succession. By thus increasing the diameters of the disks 60 in downward succession, it will be apparent that the effective area of the deflector plates as a whole is increased in downward succession.

Extending through the side members 57 and 58 of the trough disposed beneath the hopper 56 and also through the uprights 10 and 11 is a shaft 63 which is journaled in the bearings 64 and 65 mounted on the outer face of the uprights 10 and 11 respectively. One end of said shaft has mounted thereon a pulley 65 disposed in vertical alinement with the pulley 26 of the shaft 21 and adapted to be operatively connected therewith by a belt 66 whereby the rotation of the shaft 21 will produce a corresponding rotation of the shaft 63. That portion of said shaft 63 which is disposed between the side members 57 and 58 in the trough located beneath the hopper 56 has mounted thereon a roller 66 for simultaneous rotation with said shaft. Another roller 67 is journaled between the side members 57 and 58 and a belt 68 is mounted for travel on said rollers 66 and 67; said belt having mounted thereon a plurality of projecting brushes 69 of sufficient depth to brush the screen 59 as said belt is caused to travel by the rotation of the rollers 66 and 67.

The operation of the apparatus is as follows: The sacks containing the product are inserted into the casing through the doors 19 and 20 and suspended upon the hanger

members, after which the mouths of the sacks are opened and the doors 19 and 20 closed. The shaft 21 is then rotated by a suitable belt connection with a source of power as previously described which in turn will cause a corresponding rotation of the shaft 39 by reason of the meshing engagement between the gears 28 and 44. Said rotation of the shaft 21 will also cause a rotation of the collars 29 and 30 and the fingers 31 and 32 carried respectively by said collars, which fingers at one point in each revolution will engage the vertical stems of the hanger members 33 and 34 and move same away from the cross beam 12 against the influence of the springs 37. However, when said fingers reach a predetermined point in each revolution they will pass out of engagement with the vertical stems of said hanger members and said stems will be drawn sharply back by the springs 31 against the cross beam 12, thus producing a violent shaking effect upon the sacks carried by said hanger members which is further enhanced by the vibration of the chains 36. When the product leaves the sacks it passes upon the hopper like partition 50, and thence to the centrifugal deflector plates of the blending mechanism which are being rotated at a rapid rate by the shaft 39. The product disposed on the uppermost of the deflector plates will be thrown outwardly under the influence of centrifugal force through the screen 55 and will thence pass downwardly to the hopper 17 and out of the mouth 18 thereof into a suitable receptacle. The product which escaped the disk 60 of the uppermost deflector plate will fall upon the disk 60 of the deflector plate disposed next below and be thrown out through the sieve 55 in the manner heretofore described, the remaining deflector plates performing their function in precisely the same manner. Such product as is too coarse to pass through the screen 55 will be conveyed by the hopper 56 into the trough disposed beneath the mouth thereof and then acted upon by the traveling brushes 69; those portions which cannot pass through the screen 59 being swept out of the mouth of the trough as waste and those portions which pass through the screen 59 being also conveyed by the hopper 17 into a suitable receptacle.

What is claimed is:

1. In a milling apparatus, the combination of a frame, a cylindrical screen carried by the frame, a hopper discharging at the upper end of said screen, a shaft journaled in the frame and extending longitudinally through the screen and through the mouth of the hopper, and a plurality of deflector plates mounted on the shaft and disposed within the longitudinal limits of the screen, each of said deflector plates comprising a circular disk fixed to the shaft, and a plurality of arms having an angular cross section secured to said disks and disposed radially thereof, the disks of said deflector plates increasing in area in downward succession.

2. In a milling apparatus, the combination of a frame, a cylindrical screen carried by the frame, a hopper discharging at the upper end of said screen, a shaft journaled in the frame and extending longitudinally through the screen, and a plurality of deflector plates mounted on the shaft and disposed within the longitudinal limits of the screen, said deflector plates increasing in effective area in downward succession.

In testimony whereof, I affix my signature, in presence of two witnesses.

LIVELY B. WILLOUGHBY.

Witnesses:
HAROLD BOTTOMLEY,
CHAS. H. ROGERS.