P. L. DAY.
BEAN SORTING MACHINE.
APPLICATION FILED APR. 20, 1914.

1,105,890.

Patented Aug. 4, 1914.

Fig. 4.

Fig. 6.

Witnesses
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To all whom it may concern:

Be it known that I, Park L. Day, citizen of the United States, residing at Frazee, in the county of Becker and State of Minnesota, have invented certain new and useful Improvements in Bean-Sorting Machines; 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.

My invention has for its object to provide a highly efficient machine for sorting beans or similar articles, which, when in perfect form, have smooth surfaces, and which, when imperfectly formed, have shriveled or rough surfaces, and to such ends, generally stated, the invention consists of the novel devices and combinations of devices hereinafter described and defined in the claims.

In the accompanying drawings, which illustrate the invention, like characters indicate like parts throughout the several views.

Referring to the drawings, Figure 1 is a front elevation of the improved machine, some parts being broken away, showing some of the exposed parts in section; Fig. 2 is a right side elevation of the improved machine, with some parts removed, some parts broken away, showing some of the exposed parts in section; Fig. 3 is a longitudinal vertical section taken on the irregular line $a^*a^*$ of Fig. 1, with some parts broken away, showing some of the exposed parts in section; Fig. 4 is a horizontal section taken on the irregular line $a^*a^*$ of Fig. 1, with some of the underlying parts broken away, showing some of the exposed parts in section; Fig. 5 is a detail view, partly in side elevation, and partly in vertical section, taken on the line $a^*a^*$ of Fig. 4, on an enlarged scale; Fig. 6 is a detail view, principally in vertical section, taken on the oblique line $a^*a^*$ of Fig. 4, on an enlarged scale; Fig. 7 is a detail view, partly in elevation and partly in vertical section, taken on the line $a^*a^*$ of Fig. 4, on an enlarged scale; and Fig. 8 is a detail view in horizontal section, taken on the irregular line $a^*a^*$ of Fig. 7.

The general 1 indicates a rectangular skeleton framework from which the parts of the machine are supported, either directly or indirectly. To the front of this framework 1 is secured a vertically extended leg or spout 2 which leads from an overhead storage bin, not shown, or some other suitable source of supply. The lower end of this spout 2 is closed and terminates considerably above the floor line. Mounted in the spout 2, at a point substantially in the plane of the top of the framework 1, is a horizontal slide or gate 3 provided for cutting off the supply of beans from the storage bin when the machine is not running. Normally this gate 3 is open and the spout 2 completely filled with beans.

To the front end of the framework 1 is rigidly secured a pair of upright laterally spaced posts 4 and 5 which extend from the top to the bottom of the machine immediately between the sides thereof. The post 4 is in close contact with the adjacent side of the spout 2 to form a solid wall, the purpose of which will presently appear. To the inner faces of the front and rear end sections of the framework 1 is rigidly secured, respectively, a plurality, as shown, five, rails 6 and 7. These rails are set oblique and the members of each set vertically spaced, one above the other. Opposite pairs of these rails 6 and 7 extend in the same plane.

Working between each pair of rails 6 and 7, and over the uppermost of said pairs, is a plurality (as shown, five) of endless belts 8. These belts extend longitudinally between the posts 4 and 5, substantially the full length of the framework 1, and run over all their receiving ends, relatively large rollers 9, and at their delivery ends, over relatively small trunnion-equipped rollers 10. The rollers 9 are keyed or otherwise rigidly secured to shafts 11 journalled in horizontally aligned bearings 12, removably secured to the front faces of the posts 4 and 5. The trunnions of the rollers 10 are journalled in bearings 13 mounted for horizontal sliding movement in longitudinally extended yoke-like brackets 14. The ends of each pair of these brackets 14 are rigidly secured to the inner end of a horizontally extended deck 15 over which runs the upper portion of the respective belt 8. As best shown in Fig. 5, the brackets 14 form longitudinal extensions of the deck 15, rest directly on the upper edges of the rails 7 and thereby support the inner ends of the deck 15. The outer ends of the decks 15 rest on the rails 6. Belt tighteners of extremely simple construction are provided for placing the belts 112...
8 under different tensions. Each of these belt tighteners comprises a nut-equipped bolt 16 passed through aligned perforations in the transverse portions of the brackets 14 and the outer end portions of the bearings 15. The heads of these bolts impinge against the brackets 14 and the nuts thereof are anchored in the bearings 12 and are held thereby against rotation.

10 Hereafter the belts 8 will be referred to as bean-distributing belts and beans are delivered onto the receiving ends thereof from the spout 2 through oblique ports 17 formed in the post 4 and adjacent side of said spout.

15 Vertically extended laterally spaced side plates 18 are extended between the posts 4 and 5 with their lower edges overlying and closely engaging the upper portions of the bean-distributing belts 8. These plates 18, together with the inner faces of the posts 4 and 5, afford bottomless pockets 19, under which travel the upper portions of the bean-distributing belts 8, and into which the beans flow from the ports 17. In the lower longitudinal edge of the inner plates 18 is cut a port 20, through which pass the beans from the pockets 18. Cooperating with each of these ports 20 is a gate 21 provided for regulating the amount of beans passing through said ports. These gates 21 are mounted for vertical sliding movement in guides 22 secured to the inner faces of the inner plates 18, and are held in different vertical adjustments by bell-crank levers 23 and cooperating segments 24. The levers 23 are journaled in bearings 25 on the post 5 and are connected to the gates 21 by links 26. The segments 24 are secured to the post 5. It is important to note that the delivery ends of the ports 17 are located below the tops of the pockets 19 and thereby prevent the beans from overflowing said pockets.

Underlying each bean-distributing belt 8 is an endless bean-sorting belt or apron 27 arranged to run at right angles to said bean-distributing belt. Each of these aprons 27 runs over a pair of horizontally extended rollers 28 and 29, the former being vertically spaced above the latter, so that said aprons are inclined with their upper portions arranged to travel upward. The rollers 28 are provided with trunnions 30, journaled in bearings 31 on the framework 1. The trunnions 32 of the rollers 29 are journaled in bearing boxes 33, slidably mounted in longitudinally extended seats 34 formed in the lowermost ends of the rails 6 and 7. The bearing boxes 33 are yieldingly pressed toward the lower outer ends of the seats 34 by adjustable coiled springs 35 compressed between said boxes and the upper inner ends of said seats. Obviously, these springs afford belt tighteners for the apron 27.

The aprons 27 are held transversely stretched by guides 36, on the inner faces of the rails 6 and 7, and having formed therein longitudinally extended channels 37 with contracted entrance passages. The longitudinal edges of the sorting aprons 27 run in these channels 37 and are held against removal therefrom by cords or small ropes 38, sewed, or otherwise secured, in the rolled longitudinal edges of said aprons. To permit the rolled edges of the sorting aprons 27 to be removed or placed within the channels 37, the guides 36 are provided with removable sections 39 held in position by screws 40. The guides 36 also prevent the beans on the sorting aprons 27 from rolling off the edges thereof.

All of the aprons 27 are driven in a direction so that their upper portions travel upward and all of the bean-distributing belts 8 are driven so that their upper portions travel transversely outward over said aprons by the following connections, to wit: The trunnion of the lowermost of the rollers 28 at the front of the machine is relatively long and has keyed, or otherwise secured thereto, a pulley 41, over which runs a driving belt, not shown. The lowermost of the rollers 28 is driven direct from the pulley 41. The remaining rollers 28 are driven from an upright countershaft 42 through intermeshing bevel gears 43. This countershaft 42 is journaled in bearings 44 on the framework 1 and receives motion from the directly driven roller 28, through intermeshing bevel gears 45. The shafts 11 are all driven in the same direction by a countershaft 46 and intermeshing bevel gears 47. The countershaft 46 extends parallel to the countershaft 42 and is journaled in bearings 48 on the post 5. The countershaft 46 is driven from the countershaft 42 by a sprocket chain 49 which runs over horizontally aligned sprocket wheels 50 and 51 on the upper ends of the countershafts 42 and 46, respectively. The sprocket wheel 50 is relatively small and is secured for rotation with the countershaft 42 and the sprocket wheel 51 is relatively large and is loosely journaled on the countershaft 46. A clutch 52 provided for locking the sprocket wheel 51 for rotation with the countershaft 46 is slidably mounted on said countershaft but is held for rotation therewith. The clutch 52 is moved into and out of interlocking engagement with the sprocket wheel 51 by a bell-crank shipper 120 lever 53 fulcrumed at 54 to the framework 1. Cooperating with the free arm of the lever 53 is a notched segment 55 provided for holding said lever in different positions. The outer end portion of the trunnion 30 to which the pulley 41 is secured is journaled in a bearing 56, on a floor-supported pedestal 57.

Beans are scraped from the distributing belts 8 at predetermined intervals by a ph-
rality of deflectors in the form of vertically extended blades 58, which overlie the upper portions of the distributing belts 8. The outer ends of the blades 58 are integrally formed with the upturned ends of horizontally extended slides 59 mounted for endwise sliding movement in oblique seats 60, cut transversely through the decks 15. The blades 59 also extend oblique with respect to the direction of travel of the belts 8 and by adjusting the slides 59 in the seats 60 may be made to project more or less over said belts. The ends of the blades 59 are set in staggered arrangement longitudinally of the belts 8, so that the deflectors nearest the receiving ends of the belts 8 will scrape off a few of the beans deposited thereon. The next set of deflectors will scrape off a few more of said beans and so on until only a few beans on the belts 8 will pass the last set of deflectors. These remaining beans will be delivered over the inner ends of the belts 8, which terminate short of the adjacent longitudinal edges of the aprons 27. By this arrangement the beans are evenly distributed transversely over the inclined upwardly moving surfaces of the aprons 27. To prevent the beans from falling off from the longitudinal edges of the belts 8 on the opposite sides from the deflectors, the decks 15 are provided with vertical extensions 61.

The good beans delivered onto the inclined upwardly moving surfaces of the aprons 27, owing to their shape and smoothness, will roll downward on said aprons and over the lowermost ends thereof. All bad beans, having shriveled surfaces, and all broken beans will be carried upward on said aprons and delivered over the same. All good beans drop onto a downwardly and inwardly inclined deflector 62 which extends parallel with and below the lowermost of the rollers 29, which delivers the same into a horizontally extended trough 63 extended longitudinally of the framework 1. The bad beans also drop onto a downwardly and inwardly inclined deflector 64 arranged similar to the deflector 62 and are delivered thereby into a trough 65 which extends parallel with the trough 63. Mounted in each trough 63 and 65 is a horizontally extended endless belt conveyor 66 arranged to run over idle rollers, 66, journaled in the inner ends of the troughs 63 and 65, and over driven rollers 67 keyed to a common shaft 68, journaled in bearings 69 on the front of the framework 1. The shaft 68 is driven from the lowermost of the shafts 11 by a pair of intermeshing spur-gears 70, one of which is secured to said shaft 11, and the other of which is secured to a short shaft 71, journaled in bearings 72 on the post 4. A sprocket chain 73 runs over a pair of vertically alined sprockets 74 and 75, respectively, on the shafts 71 and 68. The driving connections just described are such as to cause the distributing belts 66 to travel in the direction of the arrows marked on Figs. 1 and 2. The good and bad beans delivered onto their respective conveyors 66 are delivered into the lower ends of elevator legs 76, at the front of the machine. Mounted in each of these elevator legs 76 is a bucket-equipped elevator belt 77 provided for carrying the sorted beans to a distant point. The lower rollers 78 over which the elevator 77 runs are driven from the shaft 63 by sprocket chains, not shown, which run over sprocket wheels 79 on the shaft 68 and sprocket wheels, not shown, on the shafts of the rollers 78.

The good beans delivered from the sorting aprons 27 are directed onto the deflector 62 by a curtain 80 of canvas or other suitable material. This curtain is suspended at its upper edge from a horizontally extended rod 81 anchored at its ends to the framework 1. The curtain is spaced outward from the rollers 29 a distance sufficient to permit free passage of the beans therethrough, and its lower end hangs loosely within the deflector 62. To hold the curtain 80 pulled straight down, a metal rod 82 is secured within its lower longitudinal edge portion. The purpose of making this curtain 80 of a pliable material is to prevent the beans from bouncing when they strike the same.

The bad beans delivered over the rollers 29 are directed to the deflector 64 by a frame 83, hinged at its lower longitudinal edge to the deflector 64, for movements toward and from the framework 1. A curtain or facing 84 is secured to the inner surface of the frame 83 and serves the same purpose as the curtain 80. This curtain or facing 84 will also be constructed from the same material as that from which the curtain 80 is made. When the machine is in operation the frame 83 is held in an upright position by a long hook and cooperating eye 85, at each end thereof. A second set of eyes, located inward from the first set is provided for receiving the hooks to hold the frame 83 drawn inward in close engagement with the uppermost of the rollers 28 when the machine is not in use.

Cooperating with each port 17 is a gate 86 mounted for horizontal sliding movement in guides 87 within the spout 2. By the use of these gates 86 the supply of beans to any one pocket may be cut off, thereby throwing out of action the cooperating belts 8 and 27, and thus reducing the capacity of the machine. In the drawings five cooperating belts 8 and 27 are shown but it is, of course, understood that any number may be provided depending on the capacity of the machine required. The belts 8 and 27 are preferably constructed from heavy
canvas but it is, of course, understood that any other suitable material may be used.

The above described bean sorting machine has been put in successful commercial use.

What I claim is:

1. A sorting machine of the kind described, including a traveling endless apron, having an upwardly moving inclined surface, a traveling endless bean-distributing belt working transversely over said apron, and means causing the beans to roll from said distributing belt onto said upwardly moving inclined surface, whereby the bad beans will be carried on said surface over the highest point of travel thereof, and the good beans will roll therefrom over the lowest point of travel thereof.

2. A sorting machine of the kind described, including a traveling endless apron, having an upwardly moving inclined surface, a traveling endless bean-distributing belt working transversely over said apron, a gate-equipped open bottom pocket overlying the receiving end of said belt, a feed spout arranged to deliver beans into said pocket, and means causing the beans to roll from said distributing belt onto said upwardly moving inclined surface, whereby the bad beans will be carried on said surface over the highest point of travel thereof, and the good beans will roll therefrom over the lowest point of travel thereof.

3. A sorting machine of the kind described, including a plurality of traveling endless aprons, each having an upwardly moving inclined surface, a traveling endless bean-distributing belt working transversely over each of said aprons, means causing the beans to roll from said distributing belt onto said upwardly moving inclined surfaces, whereby the bad beans will be carried on said surfaces over the highest point of travel thereof and the good beans will roll therefrom over the lowest point of travel thereof, a gate-equipped open bottom pocket overlying the receiving end of each of said distributing belts, a feed spout, and gate-equipped ports connecting said feed spout with said pockets.

4. A sorting machine of the kind described, including a traveling endless apron having an upwardly moving inclined surface, a traveling endless bean-distributing belt working transversely over said apron, and a plurality of deflectors for scraping the beans from said distributing belt onto said upwardly moving inclined surface, whereby the bad beans will be carried on said surface over the highest point of travel thereof, and the good beans will roll therefrom over the lowest point of travel thereof.

5. A sorting machine of the kind described, including a traveling endless apron having an upwardly moving inclined surface, a traveling endless bean-distributing belt working transversely over said apron, and a plurality of deflectors for scraping the beans from said distributing belt onto said upwardly moving inclined surface, whereby the bad beans will be carried on said surface over the highest point of travel thereof, and the good beans will roll therefrom over the lowest point of travel thereof.

6. A sorting machine of the kind described, including a traveling endless apron having an upwardly moving inclined surface, a traveling endless bean-distributing belt working transversely over said apron, a plurality of deflectors for scraping the beans from said distributing belt onto said upwardly moving inclined surface, whereby the bad beans will be carried on said surface over the highest point of travel thereof, and the good beans will roll therefrom over the lowest point of travel thereof.

7. A sorting machine of the kind described, including a traveling endless apron having an upwardly moving inclined surface, a traveling endless bean-distributing belt working transversely over said apron, a gate-equipped open bottom pocket overlying the receiving end of said belt, a feed spout arranged to deliver beans into said pocket, and a plurality of deflectors for scraping the beans from said distributing belt onto said upwardly moving inclined surface, whereby the bad beans will be carried on said surface over the highest point of travel thereof, and the good beans will roll therefrom over the lowest point of travel thereof.

8. A sorting machine of the kind described, including a plurality of traveling endless aprons, each having an upwardly moving inclined surface, a traveling endless bean-distributing belt working transversely over each of said aprons, a plurality of deflectors for scraping the beans from said distributing belts onto said upwardly moving inclined surfaces, whereby the bad beans will be carried on said surfaces over the highest points of travel thereof, and the good beans will roll therefrom over the lowest points of travel thereof, a feed spout, and gate equipped ports in said spout, arranged to deliver onto the receiving ends of said bean-distributing belts.

9. A sorting machine of the kind described, including a plurality of traveling endless aprons, each having an upwardly moving inclined surface, a traveling endless bean-distributing belt working transversely over each of said aprons, a plurality of de-
flectors for scraping the beans from said distributing belts onto said upwardly moving inclined surfaces, whereby the bad beans will be carried on said surfaces over the highest points of travel thereof, and the good beans will roll therefrom over the lowest points of travel thereof, a gate-equipped open bottom pocket overlying the receiving end of each of said distributing belts, a feed spout, and ports connecting said feed spout with said pockets.

10. A sorting machine of the kind described, including a plurality of traveling endless aprons, each having an upwardly moving inclined surface, a traveling endless bean-distributing belt working transversely over each of said aprons, a plurality of de-

flectors for scraping the beans from said distributing belts onto said upwardly moving inclined surfaces, whereby the bad beans will be carried on said surfaces over the highest points of travel thereof, and the good beans will roll therefrom over the lowest points of travel thereof, a gate-equipped open bottom pocket overlying the receiving end of each of said distributing belts, a feed spout, and ports connecting said feed spout with said pockets.

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

PARK L. DAY.

Witnesses:

Wm. Espenson,
Herman Lehman.