

July 24, 1951

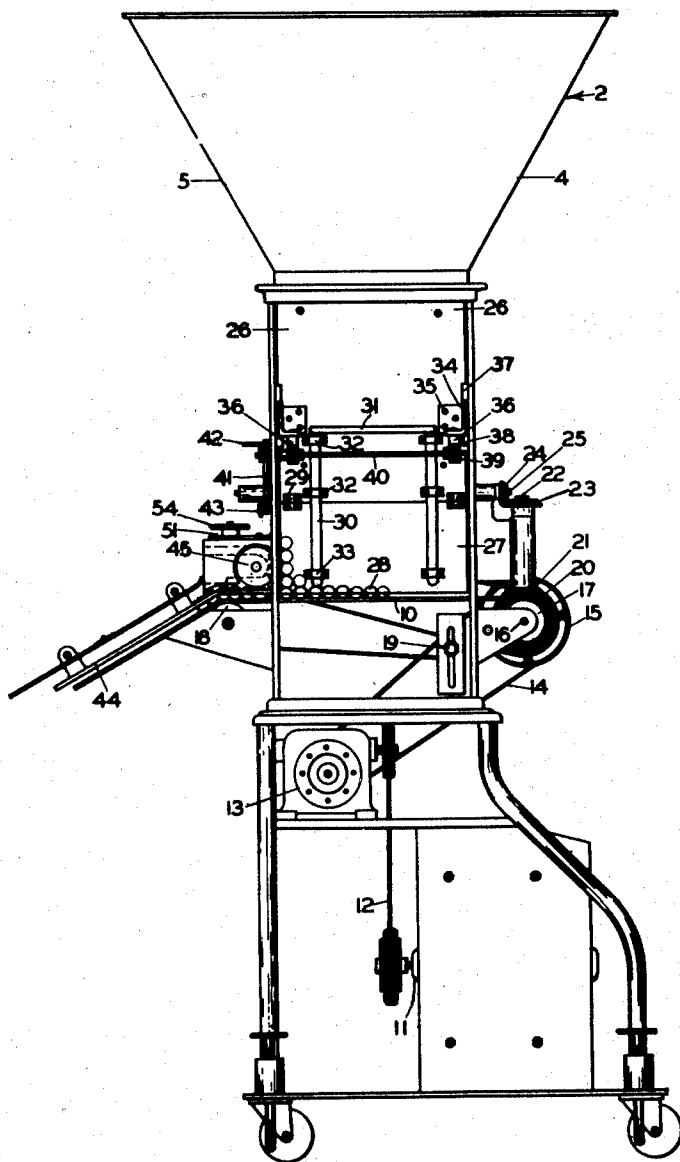
G. P. POTTER
ORIENTING HOPPER

2,561,412

Filed Jan. 28, 1947

4 Sheets-Sheet 1

FIG. 1



INVENTOR.

George Paul Potter
by
Walter J. Kaufmann

July 24, 1951

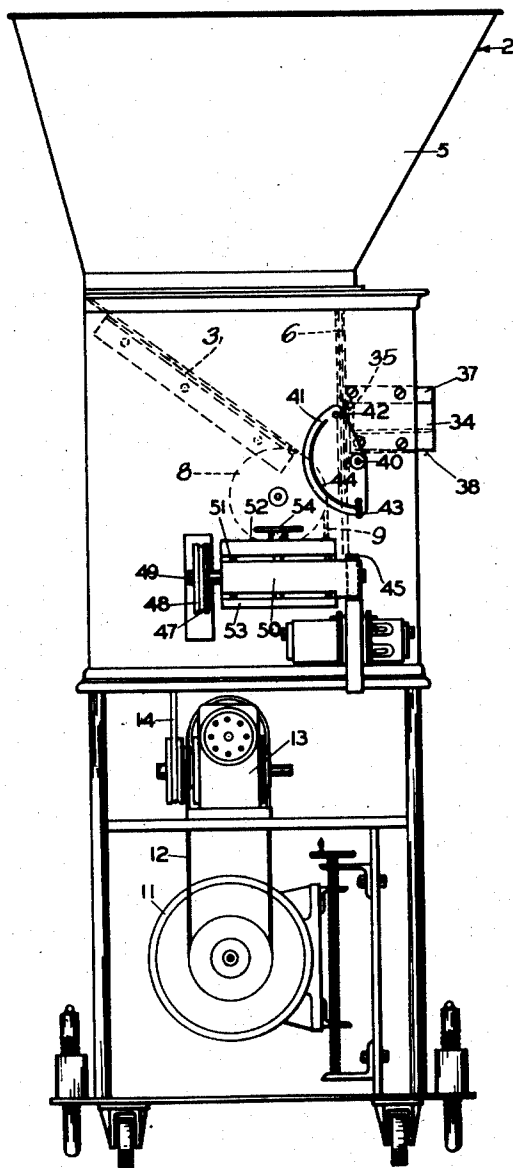
G. P. POTTER
ORIENTING HOPPER

2,561,412

Filed Jan. 28, 1947

4 Sheets-Sheet 2

FIG. 2



INVENTOR.

George Paul Potter
by
Walter H. Langman

July 24, 1951

G. P. POTTER
ORIENTING HOPPER

2,561,412

Filed Jan. 28, 1947

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FIG. 3

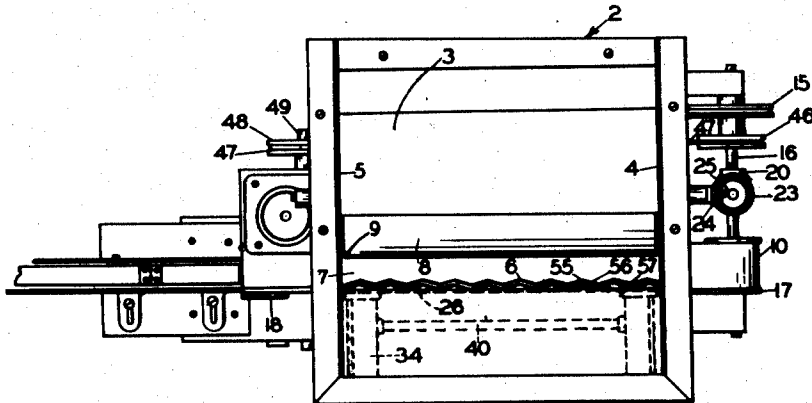


FIG. 4

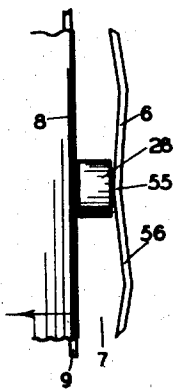


FIG. 5

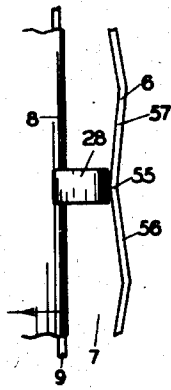


FIG. 6

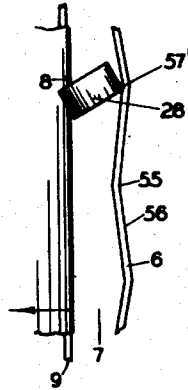


FIG. 7

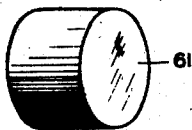
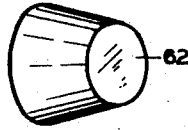


FIG. 8



INVENTOR.

Ginger Paul Potter
by
Walter H. Langman

July 24, 1951

G. P. POTTER
ORIENTING HOPPER

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Filed Jan. 28, 1947

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FIG. 9

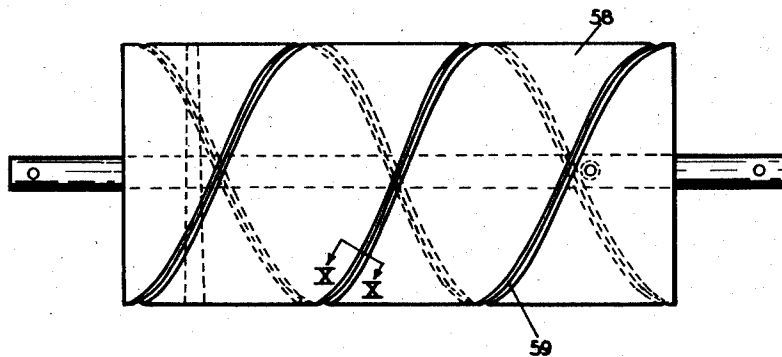


FIG. 10



FIG. 11

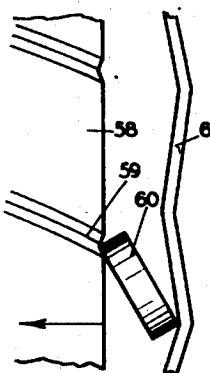
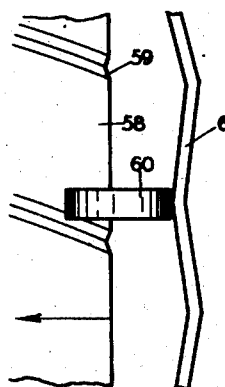


FIG. 12



INVENTOR.

George Paul Potter
by
Walter Kaufman
att'y

UNITED STATES PATENT OFFICE

2,561,412

ORIENTING HOPPER

George Paul Potter, Keyport, N. J., assignor to
Armstrong Cork Company, Lancaster, Pa., a
corporation of Pennsylvania

Application January 28, 1947, Serial No. 724,763

16 Claims. (Cl. 198—33)

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This invention relates to sorting machines effective for aligning substantially cylindrical articles with their axes in parallel relationship. The device has been found useful in sorting cork stopper blanks for delivery to a tapering machine which shaves the outer surface of the cork cylinders into tapered cork stoppers.

Sorting machines are now used in the cork stopper manufacturing industry, but none has been found satisfactory for sorting blanks where the axial length of the blank is less than the blank diameter. The same problem is involved in sorting wood tops for cork stoppers. The tops generally are many times greater in diameter than in axial length, and in feeding the tops to a decorating, assembly, or other fabricating machine, it is necessary to have the tops axially aligned. Thus, the sorting machine of the present invention may, for example, be positioned adjacent the aligning device disclosed and claimed in the application of James D. Auman, Serial No. 725,787, filed February 1, 1947, and assigned to my assignee.

The principal object of my invention is to provide a sorting machine for cylindrical objects having a diameter greater than the axial length which will position the articles with their axes parallel.

A further object is to provide a sorting machine of the type mentioned which will deliver the articles in single file at a rapid rate to feed high speed automatic machines which operate upon the articles in the further fabrication thereof.

Generally stated, my device includes the combination of a curved surface, such as a roller, and an actuating plate, the general plane of which is substantially parallel to the axis of the curved surface. The plate is spaced from the curved surface a minimum distance equal to or greater than the axial length of the articles to be aligned but less than the diameter of the articles. Means are provided for moving said curved surface in a direction opposed to the direction of movement of the articles in their travel between the curved surface and the plate to effect alignment of the articles with their axes normal to the axis of the curved surface, whereupon the articles pass between the curved surface and the plate in properly aligned position. With this mechanism, it is possible to heterogeneously feed cylindrical articles having a diameter greater than their axial length and effect alignment of the articles with their axes parallel at a high rate without damage to the articles.

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In order that my invention may be more readily understood, a specific embodiment will be described in conjunction with the attached drawings in which:

5 Figure 1 is a front elevation of a sorter illustrating my invention;

Figure 2 is a side elevation of the machine;

Figure 3 is a top plan view of the machine;

10 Figures 4, 5, and 6 are diagrammatic views illustrating the alignment of articles by the machine;

Figure 7 is a perspective view of a cork blank;

Figure 8 is a perspective view of a completed cork stopper;

15 Figure 9 is a front elevation of a modified feeder roll construction;

Figure 10 is a partial sectional view taken on the line of X—X of Figure 9; and

20 Figures 11 and 12 are views similar to those of Figures 4, 5, and 6, showing the alignment of articles, utilizing the feed roller of Figure 9.

In the preferred embodiment, the device comprises a hopper 2 formed with a slanting or sloping rear wall 3 defining one end of the hopper. Side wall members 4 and 5 are provided, and the front wall of the hopper is formed of a sloping front plate and a substantially vertically disposed actuator plate 6. The hopper 2 is provided with a chamber 7 at the bottom thereof between the rear wall 3 of the hopper and the actuator plate 6. A roller 8 is disposed below the wall 3 at the bottom of the hopper and extends into the chamber 7. The axis of the roller 8 is substantially parallel to the length of the open top of the chamber 7, and, as will be observed from Figure 3, a portion of the working surface of the roller is continuously disposed within the working area of the open top of chamber 7. A guide plate 9 disposed in a vertical plane substantially parallel to the plane of the actuator plate 6 is positioned below the roller 8. A conveyor belt 10 is provided below the plates 6 and 9 and constitutes the bottom of the chamber 7 which is defined by the plates 4, 5, 6, and 9.

45 A mechanism is provided for rotating the roller 8 and moving the conveyor 10. This mechanism includes a motor 11 connected by a belt 12 to a speed reducing unit 13. A belt 14 extends from the reduction unit 13 to a pulley 15 which is affixed to a common shaft 16 to which is also affixed a pulley 17 about which the conveyor belt 10 is trained. The conveyor belt 10 is disposed about an idle pulley 18 positioned at the forward end of the machine, and a belt tightener generally

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indicated at 19 is provided for maintaining the conveyor belt 10 under proper tension.

The roller 8 is driven from the motor 11 through the reduction unit 13 and the belt and pulley arrangement 14—15 and the common shaft 16 to which the pulley 15 is affixed. A bevel gear 20 is secured to the shaft 16 and intermeshes with a gear 21 which is affixed to a shaft 22 having attached to its upper end a bevel gear 23 which intermeshes with a gear 24 affixed to a shaft 25 upon which the roller 8 is mounted.

The actuator plate 6 is adjustable toward and away from the roller 8 and the plate 9 so as to accommodate articles of different sizes in the machine. The actuator plate 6 is secured to a backing support 26 which, in the embodiment illustrated, is provided with a transparent extension 27 which may be formed of clear plastic material, such "Plexiglas," so that the operator may inspect articles 28 disposed in the lower section of the chamber 7 below the roller 8. The extension 27 is preferably hinged to the backing plate 26 by hinges 29 and is held in place by a pair of locking bars 30 which are attached together at the top by a transverse member 31. Guides 32 on the support 26 and corresponding guides 33 on the extension 27 hold the locking bars in position. This arrangement permits the extension 27 to be opened for purposes of removing defective articles and for other purposes. This is accomplished by merely raising the bar 31 which will elevate the locking bars 30 to a position above the extension 27, whereupon the extension may be swung outwardly on the hinges 29.

The backing plate 26 is attached to angle supports 34 disposed at opposite sides thereof. Attaching plates 35 secure the angle supports 34 to the backing plate 26. Racks 36 are welded to the angle supports 34, and the supports 34 are guided in ways 37 and 38 which are affixed to the side members of the machine.

Pinions 39 are provided which mesh with the teeth on the racks 36. The pinions 39 are affixed to a shaft 40 which extends across the machine and to which is attached a quadrant plate 41. The plate 41 has an operating handle 42 by which rotation of the quadrant is effected. A locking winged nut arrangement 43 operates within a slot 44 provided in the quadrant and serves to lock the actuator plate in adjusted position.

Adjustment is effected by movement of the quadrant which imparts rotation to the pinions 39 moving the racks 36 and the associated angle supports 34 inwardly or outwardly, thus moving the backing plate 26 and its extension 27 and the actuator plate 6 to the desired location with respect to the roller 8. Thereupon, locking is effected by the winged nut lock arrangement 43 holding the mechanism in the desired adjusted position.

In order to insure that the articles 28 will be fed in single file from the machine by the conveyor 10 to a chute 44 which delivers the articles to a machine where further operations are performed and also to avoid any jamming at the exit from the chamber 7, a knurled roller 45 is positioned at that point. This roller 45 is driven from the motor 11 through the reduction 13 and belt and pulley arrangement 14—15 by a pulley 46 affixed to common shaft 16. A belt 47 encircles a pulley 48 affixed to shaft 49 to which roller 45 is also secured. The shaft 49 is received within an elevator block 50 guided on pins 51 which extend from a plate 52 affixed to the side of the machine into a similar plate 53, also affixed to

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the side of the machine. An adjusting hand wheel 54 passes freely through the plate 52, is threaded into the block 50, and is bearinged at the plate 53. Rotation of the wheel 54 is effective for raising and lowering the block 50 which adjusts the position of the knurled roller 45 with respect to the belt 10 to accommodate articles of different size.

The roller 45 is spaced from the conveyor belt 10 a distance slightly greater than the diameter of the blanks being fed but less than the diameter of a plurality of blanks so that only a single blank can pass beneath the roller, and superimposed blanks will be moved away from the entrance end of the chute by the controlling roller 45. The roller 45 is rotated in a direction opposite to the direction of movement of the blanks on the conveyor belt 10, and, preferably, the surface speed of the roller 45 is slightly greater than the surface speed of the belt 10 in order to provide for positive movement of articles coming in contact with the roller 45 at the entrance end of the chute 44. This prevents any "bridging" which might occur at that point which would stop the flow of blanks along the belt 10 and into the feed chute 44. The roller preferably has a surface speed between about 114 and 228 inches per minute with a belt speed between about 100 and 200 inches per minute. The roller 8 has a surface speed between about 550 and 1100 inches per minute. All of the rotating elements are driven from the same power source so that any change in the speed of rotation of the common shaft 16 will proportionately increase or decrease the speeds of movement of the roller 8, belt 10, and roller 45.

The actuator plate 6 is formed as indicated in Figures 3-6, for the purpose of facilitating the alignment of the articles with their axes normal to the axis of the roller 8. The spacing between the roller 8 and the actuator plate 6 is such that properly aligned articles 28 will pass freely between roller 8 and the projections 55 of the actuator plate 6. In other words, the minimum distance from the surface of the roller 8 at the point of closest approach to the actuator plate 6 is slightly greater than the axial length of the articles being fed. This is illustrated in Figure 4. As shown in Figure 5, however, the maximum distance between the roller and any article-engaging surface on the actuator plate 6 is less than the diameter of the articles 28, thus insuring that articles fed into the chamber 7 will in all instances be positioned with their axes normal to the roll axis, for the articles cannot pass between the roller and plate except in such direction.

Particularly where the diameter of the article being sorted is substantially the same as its axial length, there is a tendency for the blank to assume a position with its axis parallel to the axis of the roller 8 and to merely rotate on the roller 8 with its peripheral surface in engagement with the plate 6 and the roller 8, as illustrated in Figure 5. For this reason, the plate is provided with the corrugations shown so that substantially the entire surface of the plate is constituted of surfaces 56 and 57 which are inclined at obtuse angles. The line 55 of intersection where the inclined surfaces 56 and 57 join is relatively sharp, and it is substantially impossible for an article to rotate with its periphery disposed at such line, as indicated in Figure 5, for the article will move to the left or right and will travel along one of the inclined surfaces 56 or 57, thus assuming a position where its axis is normal to the

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roll axis, and it will pass into the chamber 7. The inclined surfaces are preferably of a width greater than the axial length of the articles being operated upon in order to insure that the article will in all instances assume an inclined position with respect to the roll axis without engagement with an oppositely inclined surface and will be free to move to a point of intersection 57' where movement along the surface of the actuator plate is momentarily arrested and the article is twirled by the roller 8 which is rotating in a direction opposed to the direction of movement of the article in its travel between the roller and the actuator plate into the chamber 7. This causes the article to assume a position where it will pass into the chamber in proper aligned position.

In Figures 9 and 10, there is disclosed a modified type of roller 58 which may be used in place of the roller 8 for certain types of articles. This type of roller has been found particularly useful in the feeding of embossed wood tops of the type used on cork stoppers where the diameter of the top is normally many times greater than the axial length. In the roller 58, helically disposed grooves 59 are provided which assist in the movement of the articles from the position shown in Figure 12 to the position shown in Figure 11. The movement of the roller 58 with an article 60 disposed in the groove 59 tends to convey the article 60 to a position where the article 60 is in proper alignment for feeding between the roller 58 and the plate 6. This is desirable with certain articles, such as the stopper tops mentioned, but in feeding other articles, such as small blanks for the manufacture of cork stoppers, a plain surfaced wooden roller is satisfactory.

In Figure 7, there is disclosed a cork blank 61 of the type which the present machine is designed to feed and Figure 8 shows the same blank after it has been tapered into a cork stopper 62.

In the operation of the device, the motor is started, and a quantity of corks are fed into the hopper 2. By reason of the converging of the hopper walls, the corks gravitate to a position between the roller 8 and the plate 6. Those corks which fall in the proper position immediately pass between the plate 6 and the roller 8. Rotation of the roller 8 continues to urge misaligned articles into proper position until proper alignment is effected, whereupon the articles drop into the chamber 7. The articles falling into the chamber 7 come into engagement with the conveyor belt 10 and are moved to the left, as shown in Figure 1. The properly aligned articles may partially or completely fill the chamber 7, only a few being shown in Figure 1 in order to more clearly illustrate the mechanism, and since it is desired to feed the articles in a single file, they are conveyed by the belt 10 past the exit end of the chamber 7 where the roller 45 is effective for limiting the exit of the articles except in single file. The articles then move down the chute 44 to a further operating station.

While the sorter is particularly useful in connection with cork stopper blanks and wood top blanks for use in stopper manufacturing, it is not limited to operation on such articles but may be used in the sorting of any article of a generally cylindrical nature having a diameter greater than its axial length, and the article may be of any material, not necessarily cork or wood.

While I have illustrated and described a preferred embodiment of my invention, it will be understood that the same is not limited therefo

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but may be otherwise embodied and practiced within the scope of the following claims.

I claim:

1. In a device for aligning substantially cylindrical articles having a diameter greater than their axial length with their axes substantially parallel, the combination of a hopper having a sloping bottom wall terminating in an opening for the passage of articles to be aligned, a roll having its working surface disposed partially within the opening in the hopper with the roll axis substantially parallel to the length of said opening, a plate spaced from the roll and defining with the roll a passageway for the passage of articles with their axes substantially normal to the roll axis but preventing passage of articles with their axes parallel to said roll axis, at least one of said roll and plate having surfaces thereon inclined at oblique angles with respect to the axis of the roll for engagement with the articles to be aligned, and means for rotating said roll in a direction opposed to the direction of movement of said articles in their travel between said roll and said plate.

2. In a device for aligning substantially cylindrical articles having a diameter greater than their axial length with their axes substantially parallel, the combination of a hopper having a sloping bottom wall terminating in an opening for the passage of articles to be aligned, a roll having its working surface disposed partially within the opening in the hopper with the roll axis substantially parallel to the length of said opening, a plate spaced from the roll and defining with the roll a passageway for the movement of articles with their axes substantially normal to the roll axis but preventing movement of articles with their axes parallel to said roll axis, at least one of said roll and plate having surfaces thereon inclined at oblique angles with respect to the axis of the roll for engagement with the articles to be aligned, means for rotating said roll in a direction opposed to the direction of movement of said articles in their travel between said roll and said plate, a chamber below said roll and plate to receive said articles disposed with their axes normal to the roll axis, and a conveyor constituting the bottom of said chamber for conveying properly aligned articles therefrom.

3. In a device for aligning substantially cylindrical articles having a diameter greater than their axial length with their axes substantially parallel, the combination of a member having a curved working surface, a second member disposed generally parallel to the axis of the curved surface and having substantially its entire working area formed of surfaces inclined at oblique angles with respect to the axis of said curved surface, said members being spaced from one another and defining a passageway for the passage of articles with their axes substantially normal to the axis of the curved surface but preventing passage of articles with their axes parallel to the axis of the curved surface, and means for imparting motion to said curved working surface along a direction opposed to the direction of movement of said articles through said passageway.

4. In a device for aligning substantially cylindrical articles having a diameter greater than their axial length with their axes substantially parallel, the combination of a member having a curved working surface, a second member disposed generally parallel to the axis of the curved surface and having substantially its entire working area formed of surfaces inclined in opposite

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directions at oblique angles with respect to the axis of the curved surface, said members being spaced from one another and defining a passageway for the passage of articles with their axes substantially normal to the axis of the curved surface but preventing passage of articles with their axes parallel to the axis of the curved surface, and means for moving said curved working surface in a direction opposed to the direction of movement of said articles in their travel between said members.

5. In a device for aligning substantially cylindrical articles having a diameter greater than their axial length with their axes substantially parallel, the combination of a hopper terminating in an opening for the passage of articles to be aligned, a roll having its working surface disposed partially within the opening in the hopper with the roll axis substantially parallel to the length of the opening, a vertically disposed plate disposed in said opening, said plate being provided with corrugations formed substantially entirely of flat surfaces extending in opposite directions obliquely to the axis of the roll and the width of the flat surfaces being equal to or greater than the axial length of the articles being sorted, the distance from the roll working surface along the line of closest approach to said plate being less than the diameter of the articles to be sorted at all points on the surface of said plate and being greater than the axial length of the articles to be sorted at the points of intersection of said flat surfaces, and means for rotating said roll in a direction opposed to the direction of movement of said articles in their travel between said roll and said plate.

6. In a device for aligning substantially cylindrical articles having a diameter greater than their axial length with their axes substantially parallel, the combination of a member having a curved working surface, a second member disposed generally parallel to the axis of the curved surface and having substantially its entire working area formed of surfaces inclined at oblique angles with respect to the axis of said curved surface, said members being spaced from one another and defining a passageway for the passage of articles with their axes substantially normal to the axis of the curved surface but preventing passage of articles with their axes parallel to the axis of the curved surface, means for imparting motion to said curved working surface along a direction opposed to the direction of movement of said articles through said passageway, and a chamber disposed below said members to receive a plurality of said articles in single-rank stacked condition with their axes parallel.

7. In a device for aligning substantially cylindrical articles having a diameter greater than their axial length with their axes substantially parallel, the combination of a member having a curved working surface, a second member disposed generally parallel to the axis of the curved surface and having substantially its entire working area formed of surfaces inclined at oblique angles with respect to the axis of said curved surface, said members being spaced from one another and defining a passageway for the passage of articles with their axes substantially normal to the axis of the curved surface but preventing passage of articles with their axes parallel to the axis of the curved surface, means for imparting motion to said curved working surface along a direction opposed to the direction of movement of said articles through said passageway, a cham-

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ber disposed below said members to receive a plurality of said articles in single-rank stacked condition with their axes parallel, and means for continuously conveying articles from said chamber in single file and in aligned position.

8. In a device for aligning substantially cylindrical articles having a diameter greater than their axial length with their axes substantially parallel, the combination of a hopper having a sloping bottom wall terminating in an opening for the passage of articles to be aligned, a roll having its working surface disposed partially within the opening in the hopper with the roll axis substantially parallel to the length of said hopper, a member disposed generally parallel to the axis of the roll and having substantially its entire working area formed of surfaces inclined in opposite directions at oblique angles with respect to the axis of the roll, said member and said roll being spaced from one another and defining a passageway for the passage of articles with their axes substantially normal to the axis of the roll but preventing passage of articles with their axes parallel to the axis of the roll, a confining plate disposed below said roll and with the said member constituting a chamber for the reception of aligned articles which have passed through said passageway, said chamber being of a width sufficient to accommodate articles aligned with their axes normal to the roll axis but insufficient to accommodate articles with their axes disposed parallel to the roll axis, a conveyor constituting the bottom of said chamber, and means for rotating said roll and for moving said conveyor in unison.

9. In a device for aligning substantially cylindrical articles having a diameter greater than their axial length with their axes substantially parallel, the combination of a hopper having an opening therein for the passage of articles to be aligned, a roll having its working surface disposed partially within the opening with the roll axis substantially parallel to the length of the opening, a corrugated plate spaced from the roll and defining with the roll a passageway for the passage of articles with their axes substantially normal to the roll axis but preventing passage of articles with their axes parallel to said roll axis, a chamber for the reception of a plurality of said articles in stacked order, said chamber opening into said hopper through said passageway, a conveyor constituting the bottom of said chamber for conveying said articles to an exit opening in said chamber, a controlling roller positioned at said opening and disposed above said conveyor a distance sufficient to pass articles in single file therebelow but not superimposed articles, means for rotating said controlling roller, said feed roll, and said conveyor belt at predetermined speeds, and means for simultaneously adjusting the speeds of said roll, roller, and conveyor while maintaining the surface speeds of said members in the same ratio.

10. In a device for aligning substantially cylindrical articles having a diameter greater than their axial length with their axes substantially parallel, the combination of claim 13 and means for adjusting the position of said member with respect to said roll to accommodate articles of different sizes and for simultaneously adjusting said member with respect to said plate to alter the width of said chamber for the reception of said aligned articles to accommodate articles passed through said passageway.

11. In a device for aligning substantially cylin-

drical articles having a diameter greater than their axial length with their axes substantially parallel, the combination of a member having a curved working surface, a second member having substantially its entire working area formed of surfaces inclined at oblique angles with respect to the axis of said curved surface, said members being spaced from one another and defining a passageway for the passage of articles into a reception chamber with their axes substantially normal to the roll axis, an extension of the said second member defining one wall of said chamber, a plate disposed below the member having a curved working surface and constituting another wall of said chamber, means for imparting motion to said curved working surface along a direction opposed to the direction of movement of said articles through said passageway into said chamber, and means for adjustably positioning said second member with respect to said surface and said plate for varying the width of said chamber for the reception of articles of different diameters.

12. In a device for aligning substantially cylindrical articles having a diameter greater than their axial length with their axes substantially parallel, the combination of a member having a curved working surface and provided with a helical groove for the reception of a portion at least of the periphery of articles to be aligned, a feeder plate disposed generally parallel to the axis of the curved surface having substantially its entire working area formed of surfaces inclined at oblique angles with respect to the axis of said curved surface, said members and plate being spaced from one another and defining a passageway for the passage of articles with their axes substantially normal to the axis of the curved surface but preventing passage of articles with their axes parallel to the axis of the curved surface, and means for imparting motion to said curved working surface to feed articles along said helical groove.

13. The combination of claim 3 in which the inclined working surfaces of the second member are greater in width than the axial length of the articles being aligned.

14. In a device for aligning substantially cylindrical articles having a diameter greater than their axial length with their axes substantially parallel, the combination of a corrugated feeder plate, a second plate spaced from said feeder plate and defining a chamber for the reception of ar-

ticles with their axes perpendicular to said plates, a roll disposed above said second plate and spaced from said feeder plate a distance to permit the passage of properly aligned articles, and means for imparting a rotary motion to said roll.

15. In a device for aligning substantially cylindrical articles having a diameter greater than their axial length with their axes substantially parallel, the combination of a roll provided with a helical groove for the reception of a portion at least of the periphery of the articles to be aligned, a plate disposed adjacent to the grooved surface of said roll but spaced therefrom a distance equal to or greater than the axial length of the articles to be aligned and less than the diameter of the articles to provide an elongated slot between said roll and said plate for the simultaneous passage of a plurality of aligned articles therebetween, and means for moving said roll in a direction opposed to the direction of movement of said articles in their travel through said slot.

16. In a device for aligning substantially cylindrical articles having a diameter greater than their axial length with their axes substantially parallel, the combination of a roll provided with a helical groove in the surface thereof for the reception of a portion at least of the periphery of the articles to be aligned, a member disposed generally parallel to the axis of said roll and having substantially its entire working area formed of surfaces inclined at oblique angles with respect to the axis of said roll, said roll and said member being spaced from one another and defining a passageway for the passage of articles with their axes substantially normal to the axis of the roll but preventing passage of articles with their axes parallel to the axis of the roll, and means for imparting motion to said roll along a direction opposed to the direction of movement of said articles through said passageway.

GEORGE PAUL POTTER.

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