Dec. 13, 1927. 1,652,419

H. M. SHIELDS

CONVEYER

Original Filed July 7, 1925 3 Sheets-Sheet 1

Fig. 1.

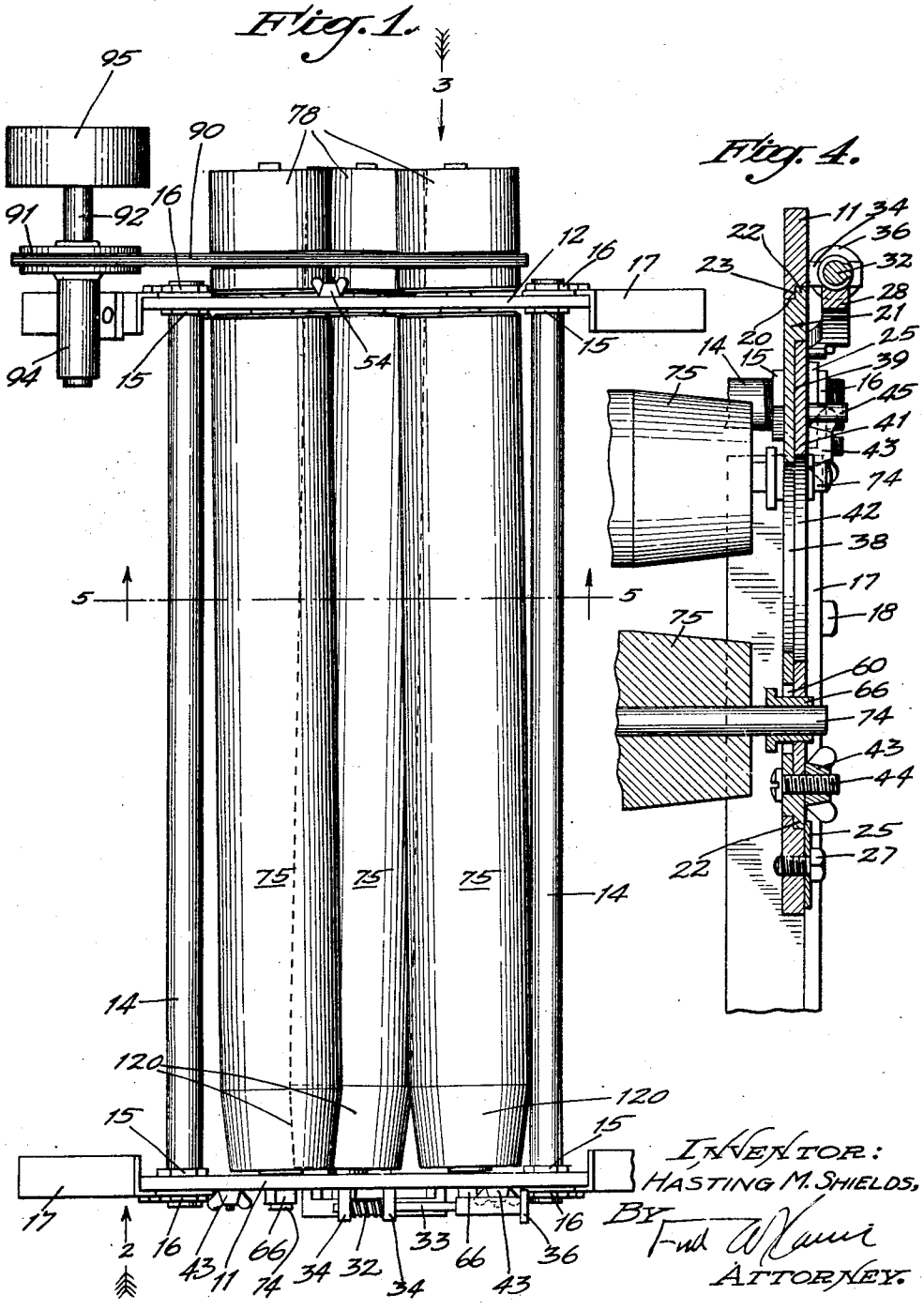


Fig. 4.

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Fig. 2.

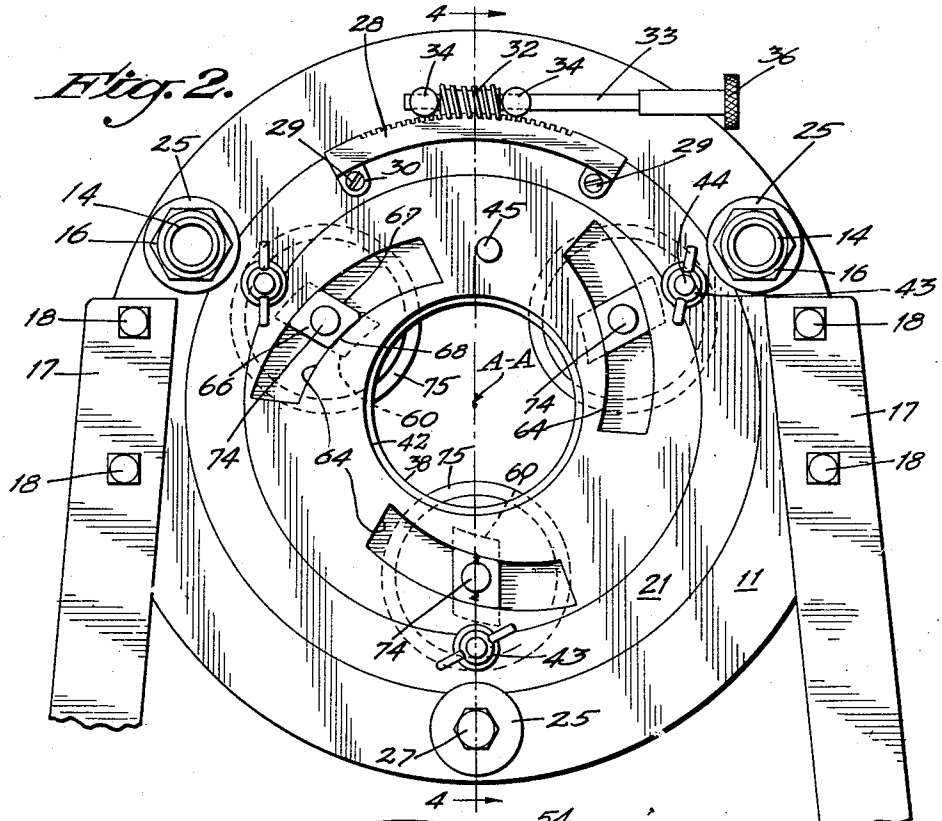
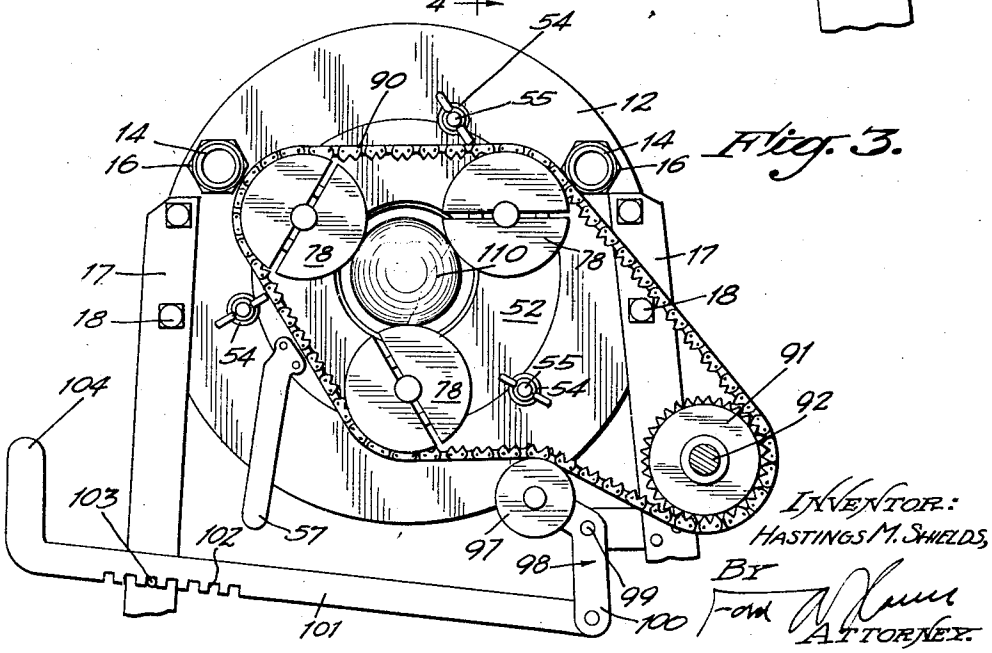


Fig. 3.



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Fig. 5.

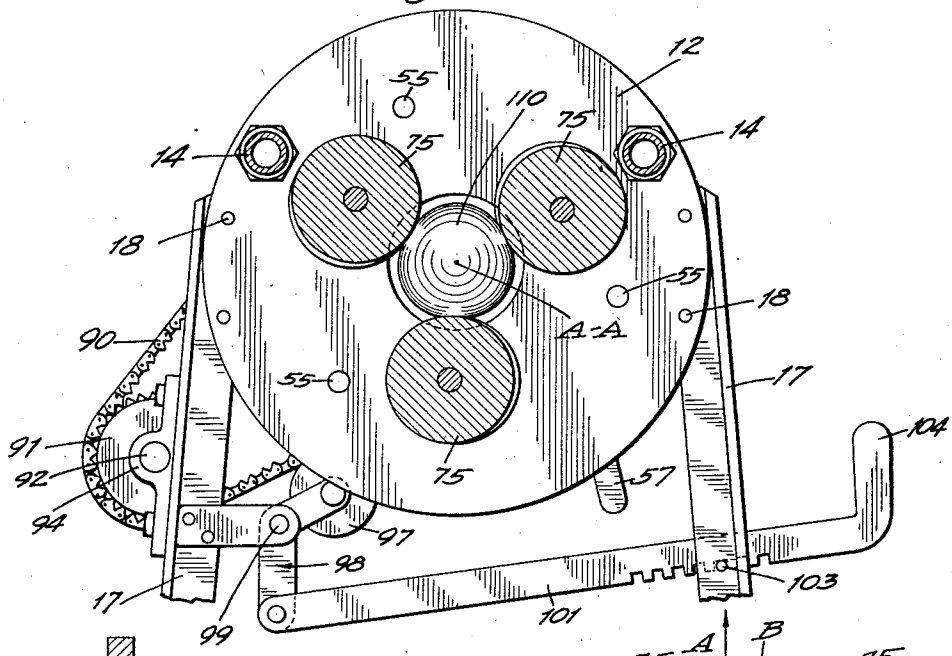


Fig. 6.

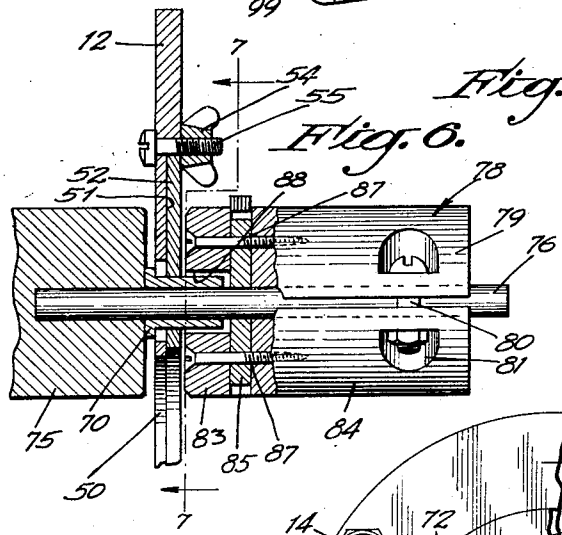


Fig. 8.

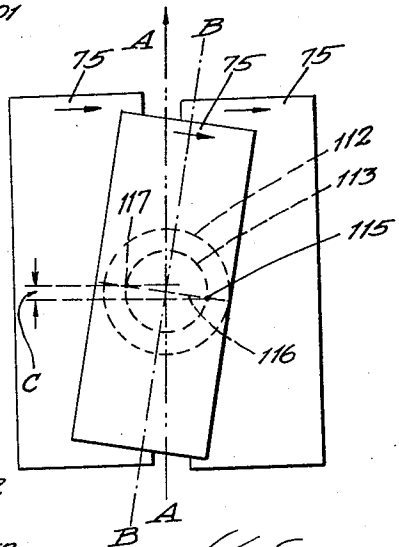
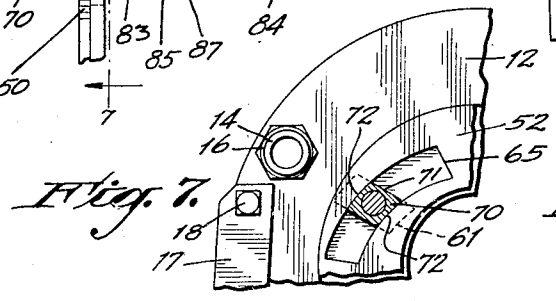


Fig. 7.



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Patented Dec. 13, 1927. 1,652,419

UNITED STATES PATENT OFFICE.

HASTINGS M. SHIELDS, OF LOS ANGELES, CALIFORNIA.

CONVEYER.

Original application filed July 7, 1925, Serial No. 42,026. Divided and this application filed November 9, 1925. Serial No. 67,799.

My invention has to do with conveyers, and is a true division of my application entitled Method of and apparatus for peeling fruit, Serial No. 42,026, filed July 7, 1925. Conveyers are of different types, some conveying objects from one place to another for the purpose of transportation, and others conveying objects while some operation is performed thereon. It is to this last mentioned type of conveyer that this invention relates.

It is an object of this invention to provide a conveyer which will rotate and feed an object.

It is another object of this invention to provide a conveyer of this character which rotates an feeds the object solely by engaging the surface of the object.

It is also an object of this invention to provide a conveyer having a plurality of rollers arranged to rotate and feed an object.

It is a further object of this invention to provide a conveyer of the character mentioned in which the rollers are adjustable so as to accommodate different sizes of objects.

It is a still further object of the invention to provide a conveyer of the character mentioned in which the rollers are adjustable so as to feed the objects at different speeds.

It is another object of this invention to provide a conveyer having a plurality of rollers which are adjustable in position so that they will feed an object between them in one direction or in a reverse direction.

Another object of this invention is to provide a conveyer having a plurality of rollers arranged to provide a path therebetween along which an object may be fed. The axes of the rollers are twisted into non-parallelism with respect to the axis of the path and, by virtue of this, rotate and feed the object along the path.

Other objects and advantages of the invention will be made evident hereinafter.

Referring to the three sheets of drawings in which I illustrate a preferred embodiment of my invention,

Fig. 1 is a plan view thereof.

Fig. 2 is and end view of Fig. 1 taken substantially as indicated by the arrow 2 of Fig. 1.

Fig. 3 is an end view taken as indicated by the arrow 3 of Fig. 1.

Fig. 4 is a fragmentary section taken on the line 4—4 of Fig. 2.

Fig. 5 is a section taken on the line 5—5 of Fig. 1.

Fig. 6 is an enlarged fragmentary section taken at the exhaust end of the invention.

Fig. 7 is an enlarged fragmentary section taken as indicated by the line 7—7 of Fig. 6.

Fig. 8 is a diagram illustrating the principle of operation of my invention.

In the drawings the numeral 11 denotes an end plate at the feed end of my apparatus, and the numeral 12 denotes an end plate at the exhaust end of my apparatus. The end plates 11 and 12 are secured together by tie-bars 14 which are attached to the end plates 11 and 12 by inner and outer nuts 15 and 16. The end plates 11 and 12 have legs 17 secured thereto by cap scews 18, or the like, whereby they are supported.

As shown best in Figs. 2 and 4 the feed end plate 11 is provided with a cylindrical opening 20. Placed in the cylindrical opening 20 is a cylindrical feed adjustment plate 21. The feed adjustment plate 21 has an annular flange 22 which rests in an annular recess 23 which surrounds the cylindrical opening 20 of the feed end plate 11. The feed adjustment plate 21 is retained in the cylindrical opening 20 and the flange 22 is retained in the recess 23 by discs 25. The upper two discs 25 are held in place by the nuts 16, whereas a lower disc 25 is secured in place by a cap screw 27 which threads into the feed end plate 11. The discs 25 merely prevent the feed adjustment plate 21 from being removed from place, but permit a rotation thereof.

An arcuated rack 28 is secured to the upper portion of the said adjustment plate 21 by screws 29 which extend through lugs 30 of the rack. This rack 28 is engaged by a worm 32 which is secured to a shaft 33, which shaft 33 is rotatably supported in bearings 34 carried by the said end plate 11. The extending end of the shaft 33 is provided with a knurled head 36 so that it may be conveniently manually operated. The feed adjustment plate 21 may be adjusted into the desired position, as will be described later, by rotating the worm 32 which engages the rack 28.

The feed adjustment plate 21 is provided with a central cylindrical opening 38 which is surrounded by an annular recess 39, this annular recess 39 being formed in the outward part of the feed adjustment plate 21.

Carried in the annular recess 39 is a size adjustment plate 41 which has a cylindrical opening 42 which is slightly larger than the opening 38. The size adjustment plate is of such a thickness that it fills the recess 39 and no more. As shown clearly in Fig. 4 the plate 41 is retained in place by a plurality of winged nuts 43 which are advanced onto screws 44 which extend through the feed adjustment plate 21. When these winged nuts 43 are tightened the size adjustment plate 41 is locked against movement relative to the feed adjustment plate 21. An operating bar 45 extends outward from the size adjustment plate 41 whereby the plate 41 may be rotated into the desired position, as will be described later, when the winged nuts 43 are loosened.

Referring to Figs. 3, 6 and 7 in particular, the exhaust end plate 12 has a central cylindrical opening 50 which is surrounded by an annular recess 51 formed in the outward part of the exhaust end plate 12. The cylindrical opening 50 and the annular recess 51 correspond to the opening 38 and the annular recess 39 of the feed adjustment plate 21.

Resting in the annular recess 51 is a size adjustment plate 52 which completely fills the annular recess 51 and no more. This size adjustment plate 52 corresponds to the size adjustment plate 41. This plate 52 is retained in the annular recess 51 by winged nuts 54 which are advanced on screws 55 which extend through the exhaust end plate 12. When the winged nuts 54 are tightened on the screws 55, the size adjustment plate 52 is locked against rotation in the same manner as is the size adjustment plate 51. An arm 57 extends from the size adjustment plate 52 (Fig. 3) for the purpose of rotating the plate 52 when the winged nuts 54 are loosened.

Referring to Figs. 2 and 4 in particular the feed adjustment plate 21 is provided with three radially extending slots 60, which are spaced equidistantly apart in concentric arrangement around the center of the plate 21, as shown in Fig. 2. The exhaust end of plate 12 is likewise provided with three equally spaced radial slots 61 having positions which correspond to the positions of the radial slots 60. The size adjustment plate 41 is provided with three spiral slots 64 which are spaced equidistantly and concentrically around the center of the plate 41 as illustrated in Fig. 2. These spiral slots 64 are formed on centers which are eccentric of the center of the plate 41 and therefore occupy the positions as shown in Fig. 2. The size adjustment plate 52 is likewise provided with three spiral slots 65 which are spaced equidistantly and concentrically around the center of the plate 52. These spiral slots 65 occupy positions which correspond to the positions of the slots 64 and are of corresponding shapes.

Extending through the slots 60 and 61 at the feed end of my invention are bearing blocks 66 which have parallel faces 67 engaging the sides of the slots 60 and curved faces 68 engaging the sides of the slots 64. In the slots 61 and 65 at the exhaust end of my invention are bearing blocks 70 having straight parallel faces 71 which engage the sides of the radial slot 61 and curved faces 72 which engage the sides of the spiral slots 65.

Extending through the bearing blocks 66 are trunnions 74 which extend from the feed end of rollers 75. Extending through the bearing blocks 70 are trunnions 76 which extend from the exhaust ends of the rollers 75. The bearing blocks 66 and 70, therefore, rotatably support the rollers 75, which are three in number.

As shown clearly in Figs. 1, 3 and particularly Fig. 6, the trunnions 76 are much longer than the trunnions 74 and extend outwardly through the bearing blocks 70 quite a distance. The extending ends of these trunnions 76 have extension rollers 78 secured thereto. The extension rollers 78 are split, consisting of halves 79 which are secured around the shaft by bolts 80. The heads and nuts of the bolts 80 rest in cavities 81 formed in the halves 79. The extension rollers 78 are also divided into inner and outer parts 83 and 84 between which sprockets 85 are secured by means of screws 87. The inner parts 83 of the extension rollers 78 have central cavities 88 into which the outer parts of the bearing blocks 70 may extend.

The three rollers 75 are driven by means of a chain belt 90 which extends around and engages the sprockets 85. This is clearly shown in Fig. 3. The chain belt 90 extends over a sprocket 91 which is secured on a shaft 92. This shaft 92, as shown in Fig. 1, is rotatably supported in a bearing 94 supported by one of the legs 17 and which may be driven by a pulley 95.

The tension in the chain belt 90 is controlled by a roller 97 which is rotatably carried on an arm of a bell crank 98, this bell crank 98 being pivoted at 99. Extending from the lower arm 100 of the bell crank 98 is a lever 101 having notches 102 provided therein. A pin 103 extends from one of the legs 17 and is adapted to rest in one of the notches 102. The lever 101 may be operated by a handle 104 so that the roller 97 is forced against the chain belt 90 to a proper pressure, the lever 101 being held in proper position by the engagement of the pin 103 in one of the notches 102.

In the operation of my invention the rollers 75 are first radially adjusted so that the innermost portions thereof define a circle

which is of proper size to accommodate the object which is to be fed therethrough. This adjustment is accomplished first by disengaging the roller 97 from the chain belt 90 so as to reduce the tension thereof, this being accomplished by disengaging the pin 103 from one of the slots 102; the winged nuts 43 and 54 are then loosened so that the size adjustment plates 41 and 52 may rotate relatively to the feed adjustment plate 21 and the exhaust end plate 12. The size adjustment plate 41 is then rotated by engaging the bar 45. When this plate is rotated, different portions of the spiral slots 64 are brought into adjacency with the blocks 66, and the blocks are therefore moved inwardly or outwardly according to the direction in which the size adjustment plate 41 is rotated. The size adjustment plate 41, however, is moved into such a position that the feed end of the rollers 75 will be properly spaced to receive an object, such object being indicated at 110 in Fig. 5. The winged nuts 43 are then tightened and the size adjustment plate 52 is rotated to proper position by means of the arm 57. Such a rotation will bring different portions of the spiral slot 65 into adjacency with the bearing blocks 70 and thus move them radially inwardly or outwardly as desired. The size adjustment plate 52 is moved into such a position that the exhaust ends of the rollers 75 are positioned to accommodate the object 110, after which the winged nuts 54 are tightened so as to lock the plate 52 against rotation. The roller 97 is then again brought into engagement with the chain belt 90 and a proper tension is applied thereto.

The next operation in setting the machine is to adjust the rollers into proper feeding position. The principle of feeding of the rollers 75 is clearly shown in Fig. 8. The rollers 75 are spaced in confining relationship around a space along which the objects are to be fed. In Fig. 8 the line A—A represents the center line of the space or the center line of the path along which the objects are fed. It should be noted that the rollers 75 are so placed as to form a confined path or, in other words, a definite path along which the object is moved. The rollers 75 are set so that the axes B—B thereof are at angles to the center line of the path A—A. It should be understood that in Fig. 8 the divergence of the lines B—B and A—A is exaggerated somewhat to clearly illustrate the principle of operation. The axes B—B of the rollers 75 may be considered as twisted from parallelism with the axis A—A of the path of the object 110. Dotted lines 112 represent the object 110, and dotted lines 113 represent the portion of the object which is in engagement with the top roller 75 at any time. A point on the object 110 therefore comes into contact with a point on the top roller 75 at 115 as indicated in Fig. 8. This point 115 travels along a path indicated by a dotted line 116, which line 116 is at right angles to the axis of rotation B—B of the roller in discussion. The point on the object, therefore, travels in contact with the point on the roller until it reaches a point 117 where it disengages the roller. In traveling from the point 115 to the point 117, the point on the object is carried forward with respect to the axis A—A a distance indicated at C. As the rollers rotate, an object is rotated with the rollers and gradually carried forward or fed from the feed end of the rollers to the exhaust ends thereof. The feeding action of the rollers 75 results entirely from the twisting of the axes B—B of the rollers from the center line A—A of the path of the objects.

The twisting of the rollers 75 from parallelism with the center line A—A is accomplished by rotating the feed adjustment plate 21. The feed adjustment plate 21 is rotated by operating the knurled head 36 of the shaft 33, which results in a rotation of the worm 32. The worm 32 by virtue of its engagement with the rack 28 rotates the feed adjustment plate 21. It is evident that the feed ends of the rollers 75 are moved circumferentially, whereas the exhaust ends of the rollers remain stationary. The feed adjustment plate 21 may be rotated in either direction so that, if desired, the objects may be fed in a reverse direction through the apparatus.

The objects, as indicated at 110 in Fig. 5, are then placed between the rollers 75, access being had thereto through the openings 38 and 42 in the plates 21 and 41. These objects may be fed by hand or they may be fed by suitable conveying means. It is desirable to taper the forward ends of the rollers 75 as indicated at 120 so that the objects 110 will be easily received by the rollers. The rollers 75, of course, have been set into rotation previously to the introduction of any objects therebetween. These objects are fed according to the principle described in connection with Fig. 8 and pass between the rollers 75 through to the exhaust end of the conveyer.

The extension rollers 78 are provided for carrying the objects to the exterior of the exhaust end plate 12 so that they may be conveniently taken directly from the conveyer or pass through another apparatus.

My invention may be utilized in various arts and the principal feature of it is that an object may be conveyed without penetrating it in any manner. Not only is the object conveyed but it is also rotated. My conveyer may be used in the washing and polishing of various fruits, such as oranges, lemons, apples, etc., or it may be used to

remove the oil or peel from oranges, lemons, etc. Some specific uses of my invention are shown in my application entitled Method and apparatus for peeling fruit, Serial No. 42,026, filed July 7, 1925, and in my application entitled Method of and apparatus for recovering the valuable constituents from fruit, Serial No. 64,602, filed October 24, 1925. In the first case the conveyer is used for conveying oranges while the peeling is being removed therefrom, and in the second case is employed for conveying oranges while the oil is being released from the peeling thereof.

In the drawings I have shown the rollers as solid and having smooth surfaces. It should be understood, however, that I may provide one of the rollers or all of them with various surfaces to accommodate the use to which they are to be put. For instance, in handling certain fruits such as apples, it may be desirable to provide the rollers with resilient faces so that the fruit will not be bruised. Also, it may be desirable to run one of the rollers slower than the others so that a friction and polishing action will be obtained. This could be readily accomplished by providing one of the sprockets 85 slightly larger than the others.

I claim as my invention:

1. A conveyer consisting of: A plurality of rollers supported in confining relationship so as to form a confined path, one of said rollers being positioned so that the axis thereof is non-parallel with the axis of said path; and means for operating said rollers.

2. A conveyer consisting of: A plurality of rollers supported in confining relationship so as to form a confined path and being positioned so that their axes are non-parallel with the axis of said path; and means for operating said rollers.

3. A conveyer for feeding objects along a given path comprising: A plurality of rollers disposed around said path and twisted in the same direction from parallelism with said path, said rollers being rotated in the same direction.

4. A conveyer for feeding objects comprising: Three rollers disposed around said path and twisted in the same direction from parallelism with said path, said rollers being rotated in the same direction.

5. In a conveyer of the class described: A frame having spaced end members; a plurality of rollers rotatably journaled between said end members and disposed in confining relation about a central space; and means for circumferentially shifting the roller journals in an end member to cause said rollers to assume positions twisted from parallelism with the axis of the aforesaid central space and means for rotating said rollers in the same direction.

6. In a conveyer of the class described: A plurality of rollers rotatably journaled and disposed in confining relation about a path in space, the axes of said rollers being deflected from parallelism with the axis of said path; and means for rotating said rollers.

7. A conveyer consisting of: A plurality of rollers circularly arranged to form a path; means for varying the radial positions of said rollers; and means for operating said rollers.

8. A combination as defined in claim 3 in which one end of each roller is tapered.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 3rd day of November, 1925.

HASTINGS M. SHIELDS.