June 5, 1951 J. H. NUTT 2,555,602

APPARATUS FOR STACKING ARTICLES ON EDGE

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Fig. 1

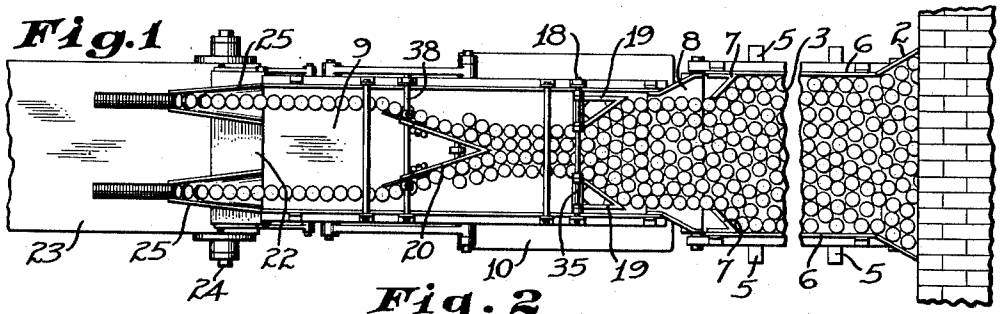



Fig. 2

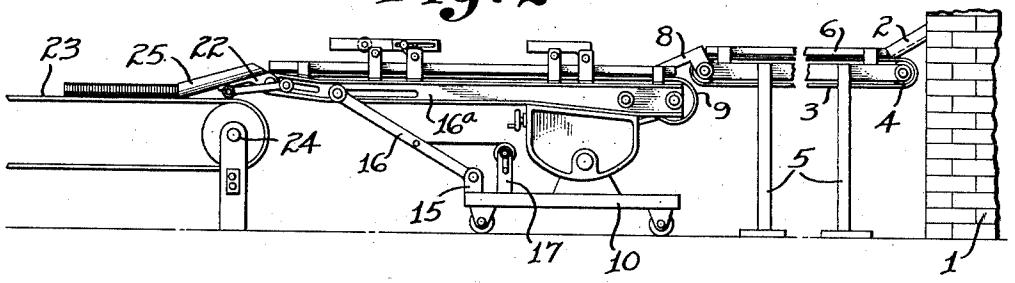



Fig. 3

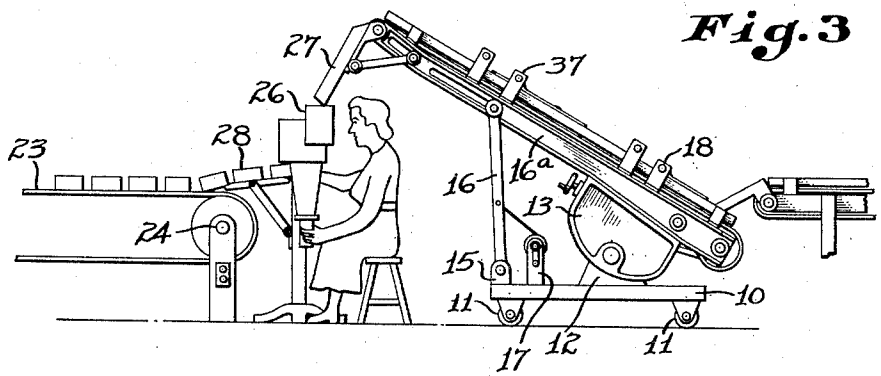
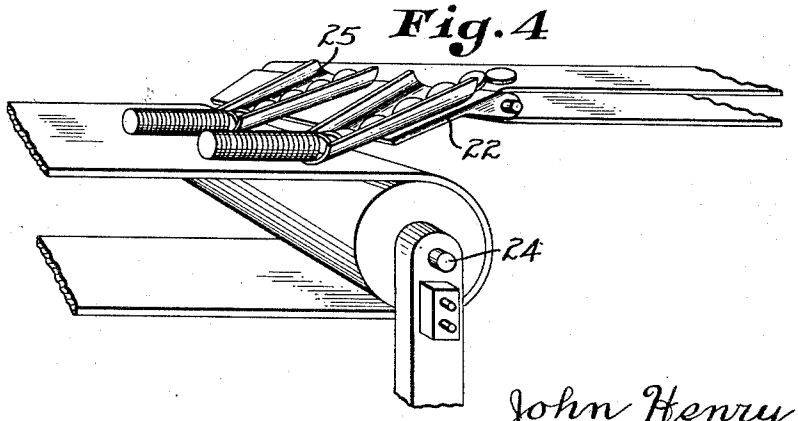



Fig. 4




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Fig. 5

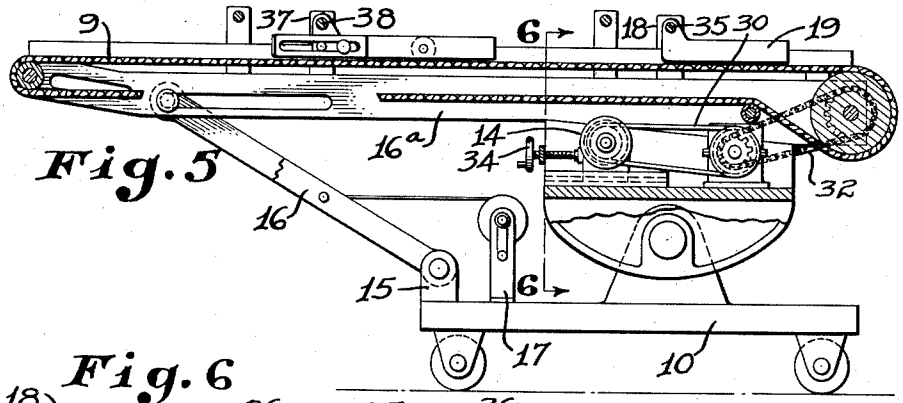



Fig. 6

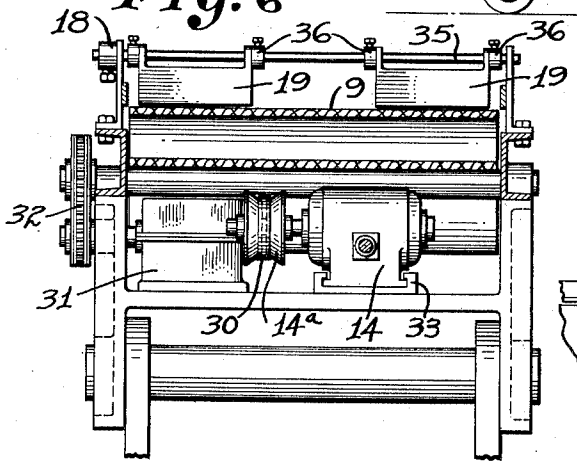



Fig. 7

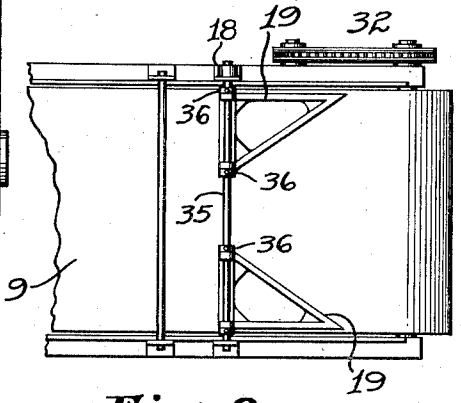



Fig. 8

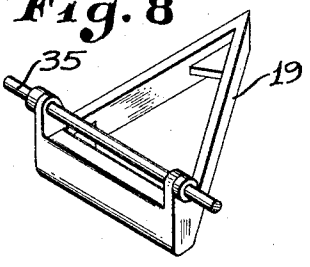
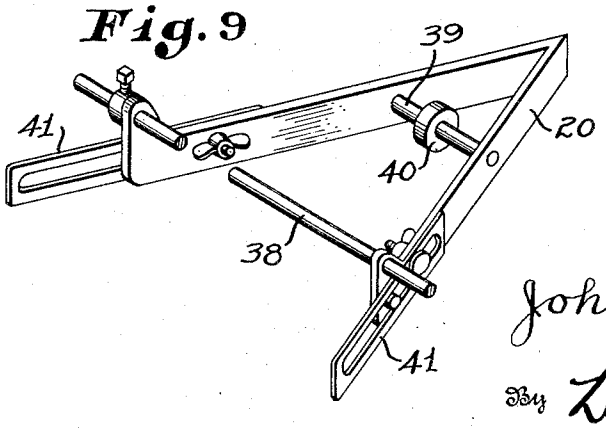



Fig. 9




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# UNITED STATES PATENT OFFICE

2,555,602

## APPARATUS FOR STACKING ARTICLES ON EDGE

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Application February 1, 1946, Serial No. 644,689

4 Claims. (Cl. 198—33)

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This invention relates to a method and apparatus for collecting articles scattered over a conveyer band and refers particularly to an apparatus for assembling the articles into a single file, and for stacking the articles on edge.

In the production of small articles susceptible to group packing or handling in multiple units, it has often been found necessary for the worker to pick up each unit individually from a scrambled disarrangement of the units in order that the same may be packaged or stacked. Thus, for example, in the manufacture of cookies, the cookies are often transmitted from the oven on a broad band conveyer, and previously it has been necessary for the cookies to be picked up individually from their different scattered positions on such conveyers in order that they may be stacked, packaged, etc. Accordingly, the packaging and stacking of small articles, such as cookies, has heretofore been a very slow and expensive process which has the further disadvantage that a large floor space must be employed to accommodate the workers and conveyers.

It is the general object of the present invention to provide a method and apparatus which will operate automatically to collect small articles from scattered positions and to assemble the same in a regimented condition to the end that the cost and labor of packaging, stacking, inspecting such articles may be materially reduced.

Another object of the present invention is to provide a method and apparatus for stacking the articles on edge so that they may be moved as a substantially continuous cylinder of articles towards a collecting or packaging zone.

In accordance with the method and apparatus of the present invention, small articles, such as cookies, which are distributed over a broad band conveyer, are first assembled into a single file. After positioning the cookies in single file on a conveyer, they are moved continuously to a zone wherein the articles are caused to stand on their edges in tightly packed position, and as such are transmitted as a continuously moving body toward the packaging zone.

The apparatus of the present invention is further designed so that it may be readily connected to or disconnected from a conveyer line, such as is used in modern plants, and set up for mass production. The apparatus of the present invention, therefore, constitutes a means by which the production line may be open to permit movement of persons or machinery from one side to the other of the conveyer line.

Another advantage of the apparatus of the

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present invention is that when it is moved into a position as part of the conveyer line system, it may be used for the purpose of varying the speed of transmission of the articles over such portion of the line for the purpose of increasing the cooling or aeration of the articles.

Another advantage of the apparatus of the present invention is that it permits a variation in the elevation of the articles moving along a production line.

The apparatus of the present invention permits the use of a packaging device which requires various elevations of the articles to be operated on.

Various other objects and advantages of the invention will be apparent from the following description of a preferred form or example of the method and apparatus embodying the present invention. For that purpose, I have hereafter described a preferred example of the invention in connection with the accompanying drawings, in which

Figure 1 is a plan view of the apparatus arranged to perform a stacking operation;

Figure 2 is a side elevation of the apparatus shown in Fig. 1;

Figure 3 is a side elevation of the apparatus arranged to function for packaging purposes;

Figure 4 is a fragmentary perspective view showing the final stacking portion of the apparatus indicated in Figs. 1 and 2;

Figure 5 is an enlarged elevation in vertical section of the center conveyer;

Figure 6 is a section on the line 6—6 of Fig. 5;

Figure 7 is an enlarged, fragmentary plan view of one of the guide members;

Figure 8 is a perspective of one of the guide members employed in connection with the apparatus of Fig. 7; and

Figure 9 is a perspective view of another of the guide members.

Referring to the drawings, I have illustrated the invention in the form in which it is particularly adapted for handling articles, such as cookies, although obviously the apparatus of the present invention may be used in connection with the handling of various other articles.

In the drawings, 1 indicates an oven from which the cookies are fed, after first being cooled, down an inclined chute 2 onto a conveyer 3. The conveyer 3 consists of a broad belt trained around rolls 4 and driven by any suitable means (not shown). The upper surface of the belt extends substantially horizontally. Uprights 5 are indicated for supporting the conveyer. There is pref-

erably provided at the sides of the conveyer upstanding sides 6 to prevent articles from falling off the sides of the conveyer.

The cookies are normally received on the conveyer 3 as indicated, scattered in more or less uniform manner over the area of the conveyer 3. Near the discharge end of the conveyer are guide members 7 attached to the sides 6 at their outer ends and extending at an angle inwardly so as to converge towards the discharge end of the conveyer. The guide members 7 serve the purpose of condensing the stream of articles or cookies on the conveyer 3 into a narrow stream. The inclined chute 8 is intended to feed the stream of cookies onto a conveyer 9.

The conveyer 9 is indicated as mounted on a truck 10 which is provided with casters 11 by which the truck 10, conveyer 9, and mechanism on the truck for operating the conveyer, may be moved as a unit either into various positions in the conveyer line system, or out of the system, as desired. On the truck 10 are provided brackets 12 which pivotally support a housing 13. Within the housing 13 there is provided a motor 14 which drives the variable drive 14*a*. From the variable drive 14*a* a belt 30 extends to a reduction gearing 31 which in turn drives, by means of chain 32, the end roller of the conveyer 9. The variable drive 14*a* may be any usual double tapered pulley, the separate halves of which are adapted to move together or apart to change the speed ratio as the tension on the belt 30 is varied by moving the motor 14 on the slide 33 by the adjustment handle 34.

There is also provided a bracket 15 on the truck 10 to which are pivoted the lower ends of the links 16, the other ends of the links being pivotally connected to slide movably on rails 16*a* at the sides of the conveyer 9 near the forward end thereof. By rotation of the links 16, as by means of a capstan 17, the conveyer may be adjusted from, for example, a horizontal position (as indicated in Figs. 1 and 2), to an inclined position, as indicated, for example, in Fig. 3.

The conveyer 9 is provided with brackets 18 mounting a transverse rod 35 on which are pivoted the guide members 19 which are shaped to condense the stream of articles on the conveyor 9 to a width of about four of the articles. The guide members 19 are generally triangular, as indicated, and their position on the rod 35 is adjustable by means of the collar 36. Depending upon the size of the articles to be handled by the apparatus, different adjustments of the separation between two of the guide members 19 may be found desirable.

Spaced along the conveyer 9 from the guide members 19 are provided brackets 37 mounting a cross-rod 38 and to the cross-rod 38 is pivoted the triangularly shaped guide member 20, the apex of which faces the receiving end of the conveyer 9 and is preferably disposed in substantially the center of the conveyer. Near the forward end of the guide member 20 is provided a rod 39 which mounts a roller 40 for supporting the guide member 20 on the conveyer 9. Supplemental guide members 41 are preferably provided for extending the length of the guide member 20. These supplemental guide members are provided with elongated slots guided by pins 41*a* carried by the members 20 and locked in adjusted position by wing bolts 41*b*. The guide member 20 divides the stream of advancing articles into two rows. The width of the guide is sufficient so that as the articles contact the guide member 20 they fall into two single files, one on each side of the guide 20, and are transmitted by the width of the member to near the sides of the conveyor.

It will be seen that in the method and apparatus of the present invention the articles which are originally distributed on the conveyer 3 over a wide area such, for example, as ten or more of the articles, may be aligned transversely of the conveyer, are then condensed into two single files of articles on the conveyer 9. It will ordinarily be necessary that the conveyer 9 travel at a speed in excess of the conveyer 3 in order that there be room on the conveyer 9 for the articles to pass in single file. This variation in speed between the conveyers 3 and 9 will be variable in operation, and under the conditions described there are ordinarily about ten articles spread over the width of the conveyer 3, requiring a speed ratio of about 5 to 1. This speed ratio is established by operation of the control 34.

At the end of the conveyer 9 is mounted a chute 22 which leads to a third conveyer 23. The conveyer 23 is driven by a drive which may be substantially similar to that described in connection with the conveyer 9 and which is generally indicated at 24. The speed of the conveyer 23, however, is generally considerably lower than the speed of the conveyer 9 since the articles upon the conveyer 23 are intended to be stacked tightly one against the other, on their edges. When the conveyer 23 is to be employed for stacking, there is provided two converging chute members 25 which are broader at their receiving ends than at their delivery ends, and at their delivery ends are slightly larger than the diameter of the articles to be stacked.

In operation of the apparatus, as the first articles pass down one of the chutes 25 it slides by gravity to the bottom thereof until its edge engages the surface of the conveyer 23. The conveyer 23 should be driven at a speed only approximately one-tenth of the speed of the conveyer 9. The result is that the first article is not taken away by the conveyer 23 before subsequent articles are crowded against the rear of said articles, which assists in tilting the same upwardly, and in subsequent operation the articles are withdrawn from the chute 25 by the conveyer 23 as a continuous stream of articles stacked in axial alignment on their edges. By correct adjustment of the speed of the conveyer 23 by the control 24 the articles can be positioned substantially in vertical planes. By a slight increase in the speed of the conveyer 23 the articles can be given a slight tilt towards the rear. A slight decrease in the speed of the conveyer 24 permits the articles to be received on the conveyer 23 with a slight tilt forward. The sole force which causes the successive articles coming down the chute 25 to stand on edge on the conveyer 23, is the energy of impact of succeeding articles. For this purpose, the elevation of the end of the conveyer 9 is indicated as above the conveyer 3. In certain cases, adjustment of the elevation of the end of the conveyer 9 by means of the capstan 17 may be found desirable in order to provide greater or less height to which articles pass down the chute 25 in order to vary the impact force of the articles against the preceding articles.

It will be readily seen that by means of the apparatus of the present invention an operator can, with one movement, pick up any desired number of the articles, for example 12, in an aligned stacked position for the purpose of pack-

aging such articles, and by means of the apparatus of the present invention the time for assembling the articles for packaging can be reduced by 50% to 90%.

Now referring more especially to Fig. 3 of the drawings, the figure illustrates how through the operation of the capstan 17 the conveyer 9 may be positioned at an angle so as to move the articles in an ascending direction. In this position the conveyer 9 may be used to elevate the articles sufficiently so that the two single files of articles discharged from the conveyer 9 may each be urged directly to a packaging machine, such as diagrammatically indicated at 26. The special chutes, such as indicated at 27, may be employed for directing the transfer of the articles from the conveyer 9 to the packaging machine 26. The packaging machine 26 may be any of the usual packaging machines which take articles and produce the packages, as indicated at 28, therefrom. The packages 28 may then be fed from the machine onto the conveyer 23 which now may operate at a sufficiently high rate of speed as to adequately carry the packages away from the machine. In this position, the apparatus of the present invention operates to greatly facilitate the packaging of articles. Packaging machines as ordinarily constructed can only function according to the number of units of a product which are in suspension in air between the chute 27 and the packaging device at the time that the weighing device in the packaging machine rotates. The single file prevents two or more articles from hitting the packaging device. The failure of most packaging machines is due to the inability of the machine to handle a product which is scrambled on the conveyer.

By the apparatus of the present invention there is produced a single file of products which allows the packaging machine to function to an accuracy of any weight plus a maximum of one additional unit, in place of a plus or minus of three or four additional units, such as would be the case if the packaging machines were supplied directly from the conveyer 3.

From the foregoing description of the apparatus of the present invention, it will be seen that the apparatus as described permits the manufacturing establishment producing small articles to materially reduce the cost of packaging, and labor in connection therewith, and at the same time the apparatus of the present invention serves as a flexible method of opening up the line of production, permitting the ingress and egress of persons or machinery from one side to the other, which would otherwise be impossible.

A further advantage of the apparatus resides in the fact that when employed to handle out-of-round articles it will operate to align such articles as they approach chutes 25 or 27, with their greatest dimension parallel with the direction of travel of the articles. When such an article is handled by the apparatus the frictional contact of the conveyors on the bottom of the article is greater than the frictional contact of the article with the sides of the members 19 and 20, so that when they contact these members they are aligned with their greatest dimension parallel to the line of movement. As they leave the members 19 and 29 they turn slightly so their greatest dimension is parallel of the alignment of movement of the conveyors. Therefore the apparatus of the present invention is valuable for the purpose of handling and packaging oblong articles, such as bars of soap, billfolds, packages of gum, candy bars, etc.

While the particular form of the method and apparatus herein described is well adapted for carrying out the objects of the present invention, it is to be understood that various modifications and changes may be made, and this invention is of the scope set forth in the appended claims.

I claim:

1. An apparatus for handling articles which comprises a conveyor, a chute positioned for feeding by gravity successive articles to said conveyor and arranged to jointly with said conveyor support the article until said article is carried away by said conveyor, a conveyor for feeding a supply of successive articles to said chute, and means for adjusting the speed of movement of said first mentioned conveyor relative to the supply of articles from said chute so that succeeding articles, by crowding against the article temporarily jointly supported by said first mentioned conveyor and chute, crowds said article on to its edge.

2. An apparatus for handling articles which comprises, a first conveyor, means for aligning articles on said first conveyor, a second conveyor at a lower level than the first conveyor, a chute for passing articles by gravity from the first conveyor to the second conveyor, said chute arranged jointly with said second conveyor to support the articles until said articles are carried away by said second conveyor, and means for adjusting the speed of movement of said second conveyor relative to the supply of articles from said chute so that succeeding articles by crowding against the article temporarily jointly supported by said second conveyor and chute, crowd said article on to its edge.

3. An apparatus for handling articles which comprises, a first conveyor, a second conveyor at a lower elevation than the first conveyor, a chute leading from the first conveyor to the second conveyor to pass succeeding articles from the first conveyor to the second conveyor by gravity, said chute and said second conveyor being arranged to jointly support said articles until said articles are carried away by said second conveyor, and means for adjusting the speed of movement of said second conveyor at a sufficiently slow speed as compared with the speed of the first conveyor so that succeeding articles, by crowding against the articles temporarily jointly supported by said second conveyor and chute, crowd said article on to its edge.

4. An apparatus for handling articles which comprises, a first conveyor on which said articles are to be scattered, a second conveyor movable at greater speed than the first conveyor and having means thereon for collecting the articles and arranging the same in single file on said second conveyor, a third conveyor moving at slower speed than the second conveyor and at a lower level than said second conveyor, a chute connecting the second conveyor and the third conveyor for passing, by gravity, the single filed articles from the second conveyor to the third conveyor, said chute and third conveyor being arranged to jointly support the articles until said articles are carried away by said third conveyor, and means for regulating the speed and movement of said third conveyor relative to the supply of articles from said chute so that succeeding articles, by crowding against the article temporarily jointly sup-

ported by said third conveyor and chute, crowd said article on to its edge.

JOHN HENRY NUTT.

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