Jan. 10, 1933. W. E. GHENT 1,893,938

GRADING MACHINE

Filed April 21, 1931

Fig. 1

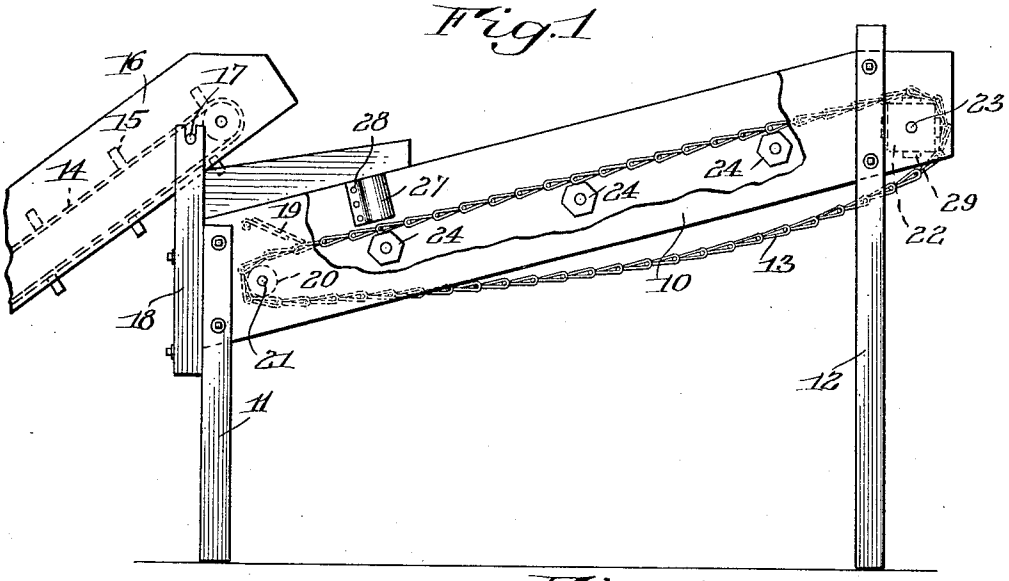


Fig. 2

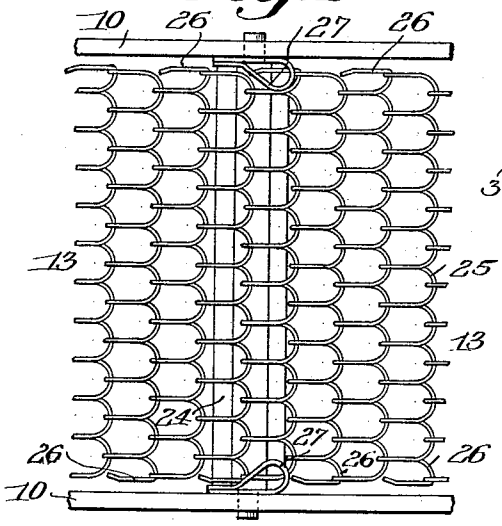


Fig. 4

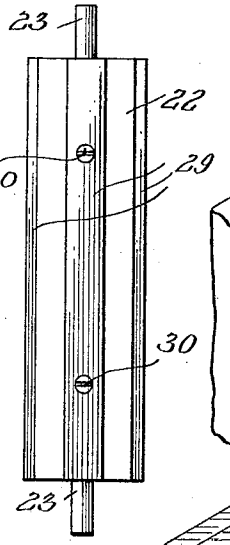


Fig. 3

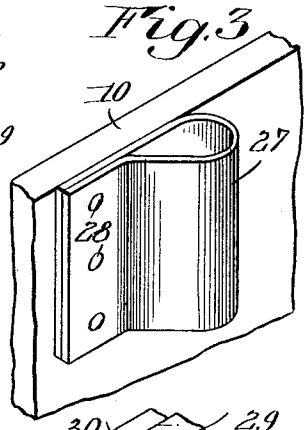


Fig. 5

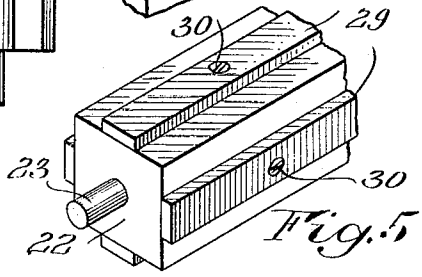
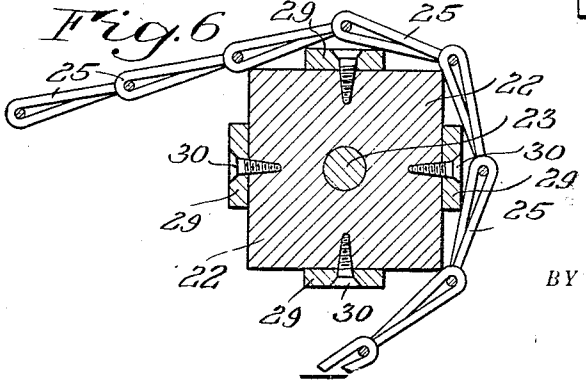


Fig. 6



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UNITED STATES PATENT OFFICE

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GRADING MACHINE

Application filed April 21, 1931. Serial No. 531,689.

The present invention relates to a grading machine and has for its object to provide an improved machine of this type for handling various articles and one which is particularly adapted for grading or sorting different kinds of fruits and vegetables.

A further object of the invention is to provide in a machine of this class, having a roller driven grading belt of the perforated or mesh type, means associated with the roller designed to prevent injury to the articles by being caught between said roller and belt during advancement of the latter.

A further object of the invention is to provide improved means for causing the articles to move inwardly from the edges of a mesh or perforated grading belt having adjacent its edges links or openings of a smaller size than those provided for grading the articles, whereby such articles as may lodge upon the smaller links or within the smaller openings are moved inwardly toward the center of the belt where they may pass through the larger openings instead of being carried forward and delivered with the articles discharging at the end of the belt.

A further object of the invention is to provide in a machine of the class described apparatus of a simple, practical, and efficient nature for effectively sorting or grading a variety of articles of different sizes.

To these and other ends the invention resides in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawing:

Fig. 1 is a side elevation of a machine embodying the invention;

Fig. 2 is a fragmentary plan view showing the position of the article displacing means with respect to the grading belt;

Fig. 3 is a perspective view drawn to an enlarged scale showing the application of one of the displacing members to a frame of the machine;

Fig. 4 is a plan view of the driving roller for the belt;

Fig. 5 is a view in perspective looking at one end of the roller, and

Fig. 6 is a sectional view taken transversely through the roller, drawn to an enlarged scale and showing the position assumed by the links of the belt in passing around the roller.

Similar reference numerals throughout the several views indicate the same parts.

The present invention embodies a sorting or grading machine of the link-belt type driven by a roller of angular construction and about which the successive rows of links travel. The belt shown is of the wire-mesh type and it has been found that the most effective type of roller for a belt of this kind is one which is rectangular in cross section with its faces each of a width equal substantially to the combined lengths of two links or link sections. With these proportions the link sections will hinge or pivot about the corners of the roller and approximately at the center of the upper side thereof in the somewhat arched manner shown in Fig. 6. In the operation of the belt in this manner a considerable space is left between the arched links and the roller at the top thereof and it has been found that the potatoes or other articles of relatively small proportions carried by the belt sometimes project through the links sufficiently to be crushed or injured through engagement with the roller. One of the objects of the invention is, therefore, to overcome this objectionable feature, and this has been done in a satisfactory manner by the use of suitable members, such for example as cleats or strips placed at the centers of the angularly disposed faces of the belt driving roller as described hereinafter.

It has also been found that with a belt of the kind employed, embodying a staggered arrangement of links, that one of the end links in each row or section is necessarily of less width than the main links and constitutes what may be termed a half-link. When the vegetables or other articles to be graded are delivered to the conveyor it is intended to have all of those below a certain size pass through the openings of the links before they have been advanced any considerable dis-

tance. However, it has been found that a certain percentage of the smaller articles find their way to the half-links and become wedged therein or lodged thereon so that they are carried forward and discharged with the larger articles at the end of the conveyor, which of course is objectionable. Means has also been provided as described hereinafter for overcoming this difficulty in the use of a belt of the type shown.

Referring to the drawing, 10 represents the side rails or members of a frame or base supported by legs or standards 11 and 12, as shown in Fig. 1. Disposed between the side members 10 is a suitable grading belt 13 preferably of the wire-mesh type and to which the articles to be graded are delivered, preferably by a feed belt 14 having cleats 15 for advancing the articles. The belt 14 is supported by and arranged to operate between a pair of suitably connected side frame members 16 having trunnions 17 thereon supported within the notched upper ends of a pair of arms 18 suitably connected with the standards 11. The feed belt 14 and its supporting frame comprises a unit which can be readily detached from the grading or sorting unit by lifting it to move the trunnions 17 out of the notches 18, said feed belt serving to deliver the articles to a downwardly inclined apron 19 overlying the grading belt 13.

The grading belt is carried at its receiving end by a roller 20 the journals 21 of which are rotatably mounted in the sides 10 of the supporting frame. The driving roller for the belt, designated by the reference character 22, has a shaft 23 extending therethrough, the ends of which are supported by the side rails 10 of the frame, preferably in advance of the standards 12 as shown in Fig. 1. Any suitable means, not shown, may be provided for driving the shaft 23 and roller thereon to advance the belt. Intermediate rollers 24 are supported by the side rails 10 to prevent sagging of the upper flight of the belt. The lower flight of the belt is allowed to sag as indicated in order to provide space between it and the upper flight for any suitable means, not shown, for receiving the articles, which by reason of their size pass through the openings in the upper flight. Such articles as remain on the belt are carried over the end of the latter and discharged for collection within a suitable receptacle not shown.

The belt, indicated generally at 13, is in the form of a light flexible chain comprising preferably a plurality of sections of wire each formed to provide longitudinally thereof a series of loops or links 25, each section having at one end a relatively narrow or half-link 26, made necessary by the staggered arrangement of the links of the different adjacently mounted sections. The openings formed by the links 25 are of a size and shape adapted to permit the passage therethrough of the articles which are of a smaller size than those to be selected for a particular use or purpose. The sections are hingedly connected and each may be considered as a perforated element of the link type having at one end a relatively small opening as compared to the main or standard size openings.

As stated above, difficulty has been experienced heretofore with the relatively small articles becoming wedged within or lodged upon the half-links 26 at the edges of the belt, which results in their being carried forward and delivered to a receptacle, not shown, for receiving the larger articles. This difficulty has, however, been overcome by providing at the edges of the belt deflecting means, preferably comprising flexible or yieldable loop-shaped members 27, formed of rubber or other suitable material and attached to the side rails 10, as by means of a plurality of nails 28. The members 27 are placed just in advance of the downwardly inclined apron 19 to which the articles are delivered by the conveyor belt 14. In this position, the deflecting members 27 serve to direct the articles at the opposite edges of the belt toward the center thereof during the initial advancing periods so that the comparatively small articles, which at these points may have lodged upon the half-links, are displaced or pushed therefrom by the members 27 and directed toward the center of the belt for discharge through the larger openings of the links. The members 27 therefore serve to prevent the carrying forward of the relatively small articles which accumulate upon the half-links at points between said members and the receiving apron 19 in the rear thereof. Injury to the articles, such as fruits or vegetables, which move into contact with the displacing members is prevented by reason of the flexibility or yielding qualities of said members, which are preferably formed of a comparatively soft grade of rubber.

The means for preventing injury to the articles by being caught between the faces of the driving roller 22 and the angularly disposed links 25 passing over the top of the roller is preferably in the form of a plurality of strips 29 extending longitudinally of the roller and secured thereto by any suitable means such as the screws 30 shown in Figs. 5 and 6. The strips 29 may be of any suitable shape and size best adapted to prevent the articles from projecting through the openings of the links into engagement with the angularly disposed faces of the roller and from being caught between said parts and crushed or injured by reason of the pressure exerted thereon by the links moving relative to the roller during advancement of the belt. The strips are preferably made detachable so that others of different proportions

may be applied in cases where it may be desired to use different belts from time to time having links of larger or smaller proportions than those shown to accommodate articles of different size.

While I have shown what may be termed a preferred embodiment of the invention, it will be understood that the inventive idea disclosed herein may be carried out in other ways and the invention therefore is not to be limited to the precise details described but is intended to cover all modifications falling within the scope of the appended claims.

I claim:

1. A machine for grading articles comprising a frame, an endless belt thereon for grading the articles comprising a series of transversely extending links, rolls carried by the frame for supporting the belt one of which comprises a driving roll for the belt having a plurality of angularly disposed faces forming corners on the roll each face corresponding in width substantially to the combined lengths of a plurality of the links so that the latter will swing one upon another substantially about the advancing corners of said roll, and strips secured to and extending longitudinally of the faces of said driving roll between the extremities of the faces and serving to guard the openings of the links whereby to hold the articles against passage through the openings to the roll to prevent them from being crushed between the links and the roll.

2. In a machine for grading articles, a frame, an endless link-belt thereon, rolls upon the frame for supporting the belt, one of which comprises a driving roll rectangular in cross section the sides of which are of equal width and the width of each corresponding approximately to the length of two of the links of the belt whereby to insure pivoting of the links about each advancing corner of the roll in sets of twos and at the same time effecting the outward movement of the connected ends of each set of links at a point substantially midway between the corners of the roll during rotation of the latter, and a relatively narrow strip secured to each side of the roll at the center thereof to underlie the connected ends of the links of each set during pivoting of the links about the advancing corners of the roll, said strips terminating short of the corners of said roll and extending substantially the full length of the roll.

3. A machine for grading articles, comprising a frame, an endless link-belt thereon for grading the articles, rolls upon the frame for supporting the belt, one of which comprises a four-sided driving roll for the belt of a length substantially equal to the width of the belt the faces of the driving roll each corresponding substantially in width to the overall length of a selected set of links, said sets at their points of connection pivoting about the corners of the roll during rotation thereof and the individual links of each set assuming different angular positions with respect to each face of the roll when in overlying relation with respect thereto, and a cleat secured on each face of the driving roll in position to underlie the openings of the links in registry therewith during rotation of said driving roll.

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