June 10, 1941. L. B. SAMMIS ET AL 2,244,729

GRADER

Filed Nov. 21, 1938 3 Sheets-Sheet 1

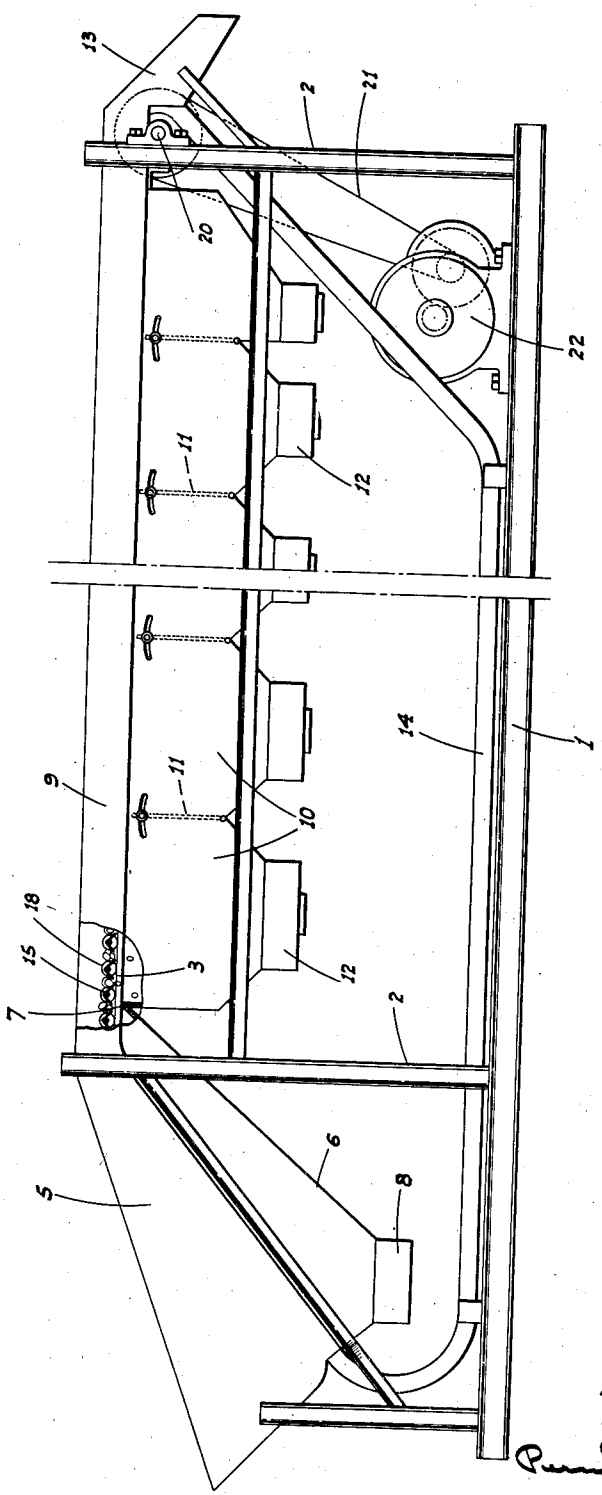


Fig. 1

INVENTORS
L. B. Sammis
F. R. Hood

ATTORNEY

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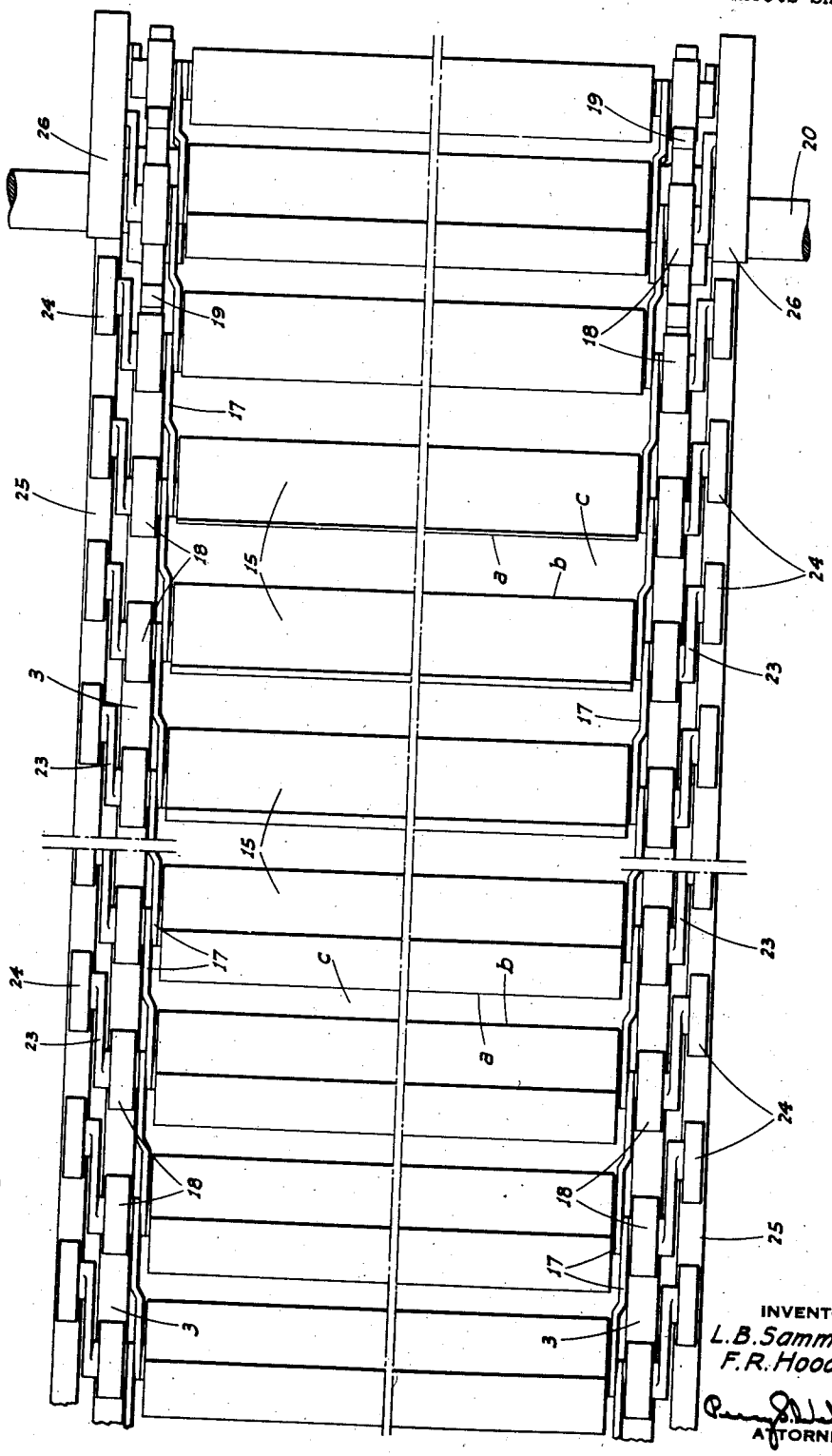


Fig. 2

INVENTORS
L.B.Sammis
F.R.Hood

ATTORNEY

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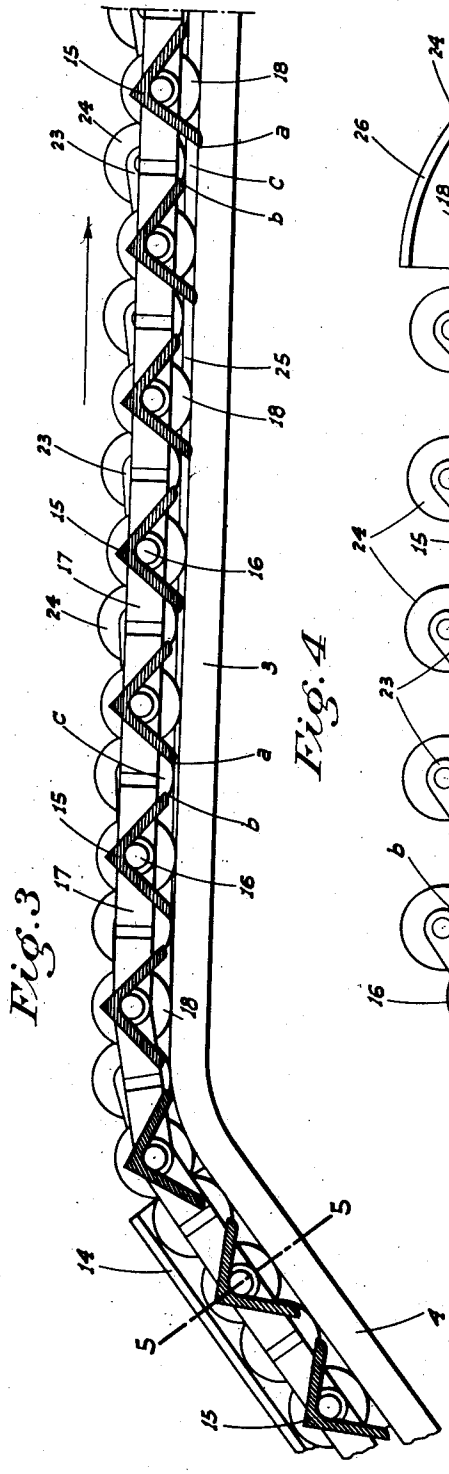


Fig. 3

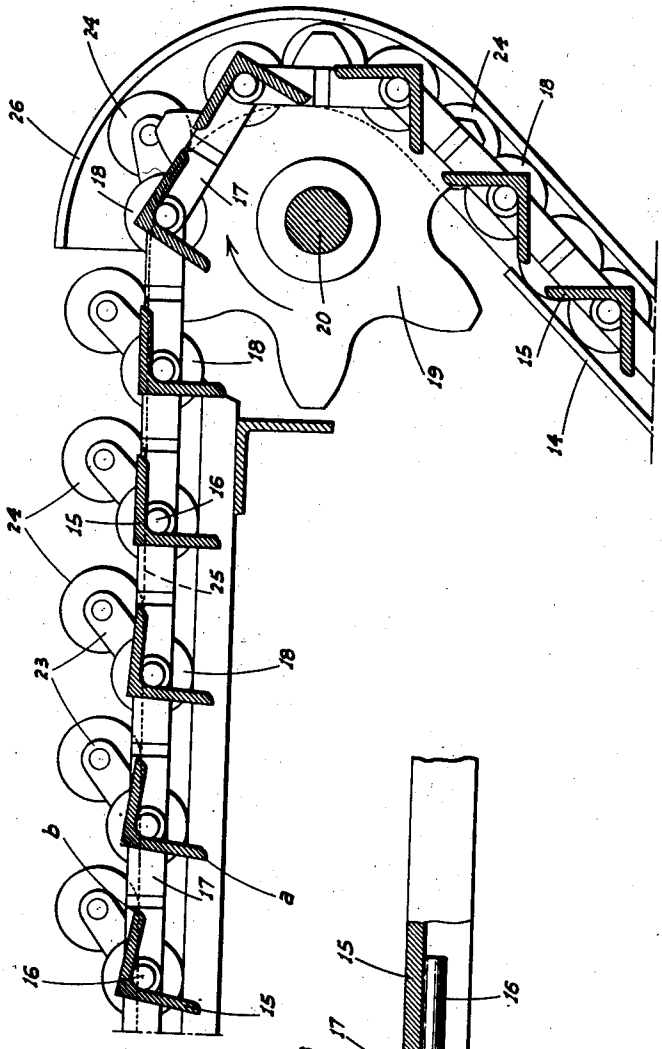


Fig. 4

Fig. 5

INVENTORS
L. B. Sammis
F. R. Hood

BY

ATTORNEY

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UNITED STATES PATENT OFFICE

2,244,729

GRADER

Louis B. Sammis and Frank R. Hood, Wallace, Calif.

Application November 21, 1938, Serial No. 241,562

3 Claims. (Cl. 209—98)

This invention relates in general to a mechanical grader for the segregation of objects according to size; the invention being directed specifically to a size grader having a moving grading conveyor arranged to grade fruits and vegetables, and particularly olives.

In the olive packing industry at the present time, the olives are graded according to size by apparatus of varying types but preferably by means of the endless cable type of grader shown in our United States Letters Patent No. 1,534,663.

While the grader shown in the above mentioned patent has proven quite successful and has been accorded wide commercial acceptance, its capacity is inherently somewhat limited, and it is therefore our principal object to provide an improved grader of relatively great capacity which will operate to assort objects, such as olives, which are oblong, and thus difficult to grade mechanically, with greater speed and accuracy than was previously accomplished.

It is also on object of our invention to provide, in a grader, an improved form of endless grading conveyor; the same being shown and described in three embodiments.

Another object of the invention is the provision of a grader which is constructed so that when in operation, the objects being graded are not chafed, bruised, cut or otherwise injured.

A further object of the invention is to produce a simple and inexpensive device and yet one which will be exceedingly effective for the purpose for which it is designed.

These objects we accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings similar characters of reference indicate corresponding parts in the several views:

Figure 1 is a foreshortened side elevation of the apparatus; the rear side of the same being partially broken away to illustrate the grading conveyor.

Figure 2 is a fragmentary top plan view illustrating the transverse grader bars as disposed in the successively changed positions.

Figure 3 is a fragmentary side view of the grading conveyor adjacent the receiving end thereof.

Figure 4 is a similar view of the grading conveyor adjacent its other or discharge end.

Figure 5 is a fragmentary cross section on line 5—5 of Fig. 3.

Referring now more particularly to the characters of reference on the drawings, the grader comprises a frame including transversely spaced base beams 1 suitably secured together and each provided with vertical frame members 2. These members 2 support a pair of transversely spaced tracks 3 which are of substantial length as shown. These tracks are horizontal for a major portion of their length but at one end slope downward as at 4. The downwardly sloping portions 4 of the tracks are surrounded by an open topped hopper 5 whose bottom 6 extends, at its upper edge, to a termination beneath the horizontal portions of the tracks a short distance inward from their ends and as shown at 7. As is obvious, the hopper extends beneath the sloping portion of the tracks and at the bottom is provided with a lateral discharge trough 8.

Side plates 9 extend the full length of horizontal tracks 3, and are included below said tracks as part of a number of receiving bins 10 arranged in a row and disposed beneath said tracks. The partitions 11 between adjacent bins 10 are adjustably mounted so as to provide means to selectively control the size or grade of the objects being discharged into any particular bin. A lateral discharge trough 12 leads from the bottom of each bin. Also, at the end of the apparatus which comprises the discharge end of the grading conveyor as will hereinafter appear, there is a longitudinally extending chute 13 arranged to receive objects hitherto remaining on and now falling from the adjacent end of the grading conveyor.

The grading conveyor is an endless unit which is supported in its travel by means of track portions 3 and 4, and intermediate the ends of the tracks 3 it is carried in inwardly opening channels 14 which are transversely spaced at least the same distance as the tracks and follow the contour shown in Fig. 1. At one end portion, the channel, as shown at Fig. 5, may be formed in connection with tracks 4 and extends to the top thereof.

This endless grading conveyor is constructed as follows:

A plurality of transversely extending grading bars 15, of right angle triangular shape in cross section, and preferably of skeleton or angle-bar form, are disposed in predetermined longitudinally spaced relation, and when in operative position on the tracks, the apex of each of said bars is disposed generally in an upward position. These bars are provided at each end under and near the apices with stub shafts 16; the shafts each being connected with the adjacent shafts by

means of offset links 17 which are freely turnable on the shafts with which they cooperate. The shafts 16, outwardly of the links, carry supporting rollers 18 which are likewise free on the shafts and ride on the supporting tracks 3 and 4 as well as in channels 14. The assembly described above provides the endless grading conveyor which is driven at one end by means of spaced sprockets 19 supported on a cross shaft 20; the sprocket teeth engaging between the rollers 18 as they leave the ends of the horizontal tracks. Shaft 20 is driven by any suitable means such as a belt drive shown generally at 21 and including a motor unit 22.

Stub shafts 16 project a short distance beyond the supporting rollers 18, and at their outer ends are rigid with relatively short radial arms 23 which extend at right angles to the central apical plane of the angle bars and project in the same direction as the direction of movement of the conveyor. These arms carry rollers 24 on their outer ends and such rollers are mounted for rotation on an axis parallel to the axis of shafts 16. Other tracks 25 are disposed parallel in a transverse plane with but outwardly of tracks 3, and said tracks 25 slope upward from the receiving end of the conveyor to the discharge end; the rollers 24 riding on tracks 25.

Operation

As the endless grading conveyor is driven, the grading bars enter the feed hopper 5 in such relative position that their adjacent lower edges, indicated at A and B, are disposed as close together as possible; the bars being held in such position by reason of the fact that rollers 24 are retained within the confines of channels 14. The space or slot C between the bars when so disposed is predetermined and of sufficient width to permit the culls, small debris such as stones, etc., to pass therebetween; the remainder of the objects—such as marketable olives—being held in the trough formed by the inwardly converging faces of the bars. As the grading conveyor passes from sloping tracks 4 onto horizontal tracks 3, the rollers 24 escape from the adjacent open end of channel 14 and immediately ride onto the low end of tracks 25. With continued movement of the conveyor, rollers 24 gradually ride up tracks 25 and with such movement, arms 23 rotate shafts 16 in a direction which causes the adjacent bar edges in the bottom of each trough to separate and thus increase the width of the slot C therebetween. As the width of the slot increases, the objects being conveyed will drop therethrough when the slot is of a width to permit their escape. Those objects which are too large to escape at any time are discharged into chute 13.

In the manner above described, the objects are effectively and rapidly graded; the several grades being received in the bins 10, except the large grade discharged onto the chute as above described. As the relative movement between the grading bars is relatively slow and easy, the objects being graded are not chafed or bruised; yet such relative movement is effective to roll oblong objects such as olives, and to thus assure their escape at the proper time.

The rolling about of the olives, which causes them to assume proper positions in the troughs for discharge according to the correct size, is caused by the fact that as adjacent bars alter their relative setting due to the control rollers 24 moving up the sloping tracks, one side of the trough included between said bars moves down while the opposite side moves up.

As the conveyor reaches the discharge end, the rollers 24 have reached their highest point and thereafter must be returned to the initial neutral or starting position, so as to return the grading bars to a similar position. This is accomplished by means of an eccentric flange 26 which is formed as an extension of the adjacent end of channel 14, and against which rollers 24 ride as they leave the tracks 3; the eccentricity of said flange moving the rollers inward until in proper position to enter the parallel sided channels 14.

The use of channels to guide the conveyor between the ends of the operative portion thereof not only enables the control rollers to be returned to and maintained in the desired neutral position, but avoids the need of using various direction changing pulleys in the length of the conveyor.

By reason of the grading bar arrangement shown and described, a more compact grader having a greater capacity than one of the cable type may be provided, since there is no relative restriction at the feed-in end as is necessary with the cable grader.

From the foregoing description it will be readily seen that we have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described our invention, what we claim as new and useful and desire to secure by Letters Patent is:

1. In a grader, an endless grading conveyor including grading elements formed of a plurality of cooperating sections of rigid angle form disposed transversely in spaced relation, the apex of the sections extending upwardly; a stub shaft rigid with and projecting from each end of the sections under and adjacent its apex, a roller mounted on each shaft, the grader including transversely spaced tracks upon which said rollers ride, a drive for the conveyor, and means operative when the conveyor is driven and acting on said shafts whereby to effect relative rotation of said sections.

2. A grader comprising an endless driven conveyor having a feed end and a produce receiving run, and which includes a plurality of transversely extending evenly spaced and unitary grading elements each having a pair of upper faces rigid with each other and diverging downwardly from an axis and disposed symmetrical to a line at right angles to the length of the conveyor when said elements are at the feed end of said conveyor whereby the spaces between the lower edges of adjacent faces of arjacent elements will then all be the same width, means mounting the elements for rotation, a track extending lengthwise of said run of the conveyor and means connected to the grading elements and engaging the track; the latter being disposed so that with the movement of the conveyor, the elements will be rotated through a predetermined arc whereby one of the upper faces of the elements will move up toward a horizontal position while the other face will move down toward a vertical position and the

spacing between the adjacent faces of adjacent elements will be increased.

3. A structure as in claim 1, in which the conveyor includes side supporting chains in which the stub shafts are turnable and in which said means comprises arms fixed on and projecting from the shafts laterally out from the chains in a direction lengthwise thereof, rollers on the arms at their outer end and tracks on which said rollers ride extending lengthwise of the grading run of the conveyor chains at an angle thereto.

LOUIS B. SAMMIS.
FRANK R. HOOD.