B. L. AND E. B. GIFFORD.

FRUIT GRADER.

APPLICATION FILED APR. 20, 1917.

1,310,394.

Patented July 15, 1919.

3 SHEETS—SHEET 1.

Fig. 1.

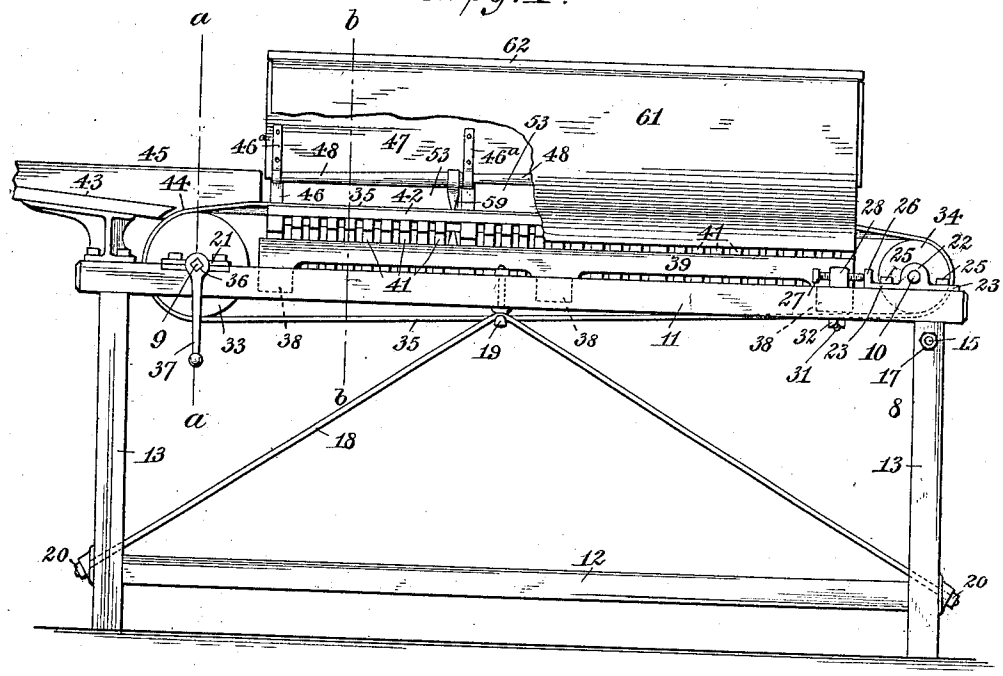
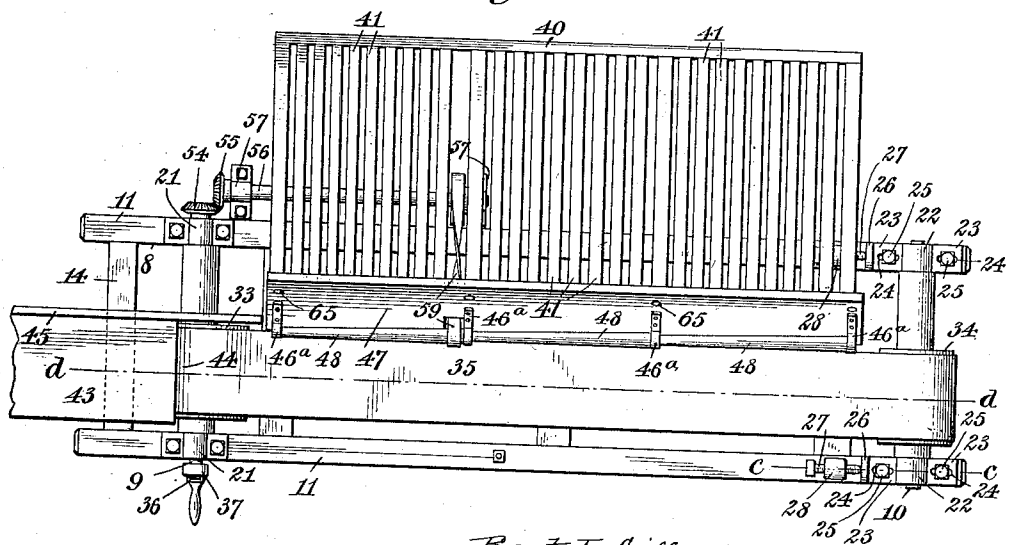


Fig. 2.



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3 SHEETS—SHEET 2.

Fig. 5.

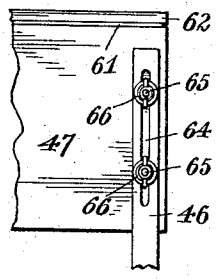


Fig. 3.

Fig. 6.

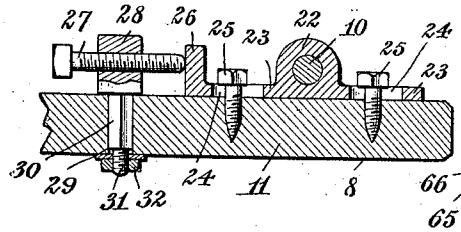


Fig. 4.

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3 SHEETS—SHEET 3.

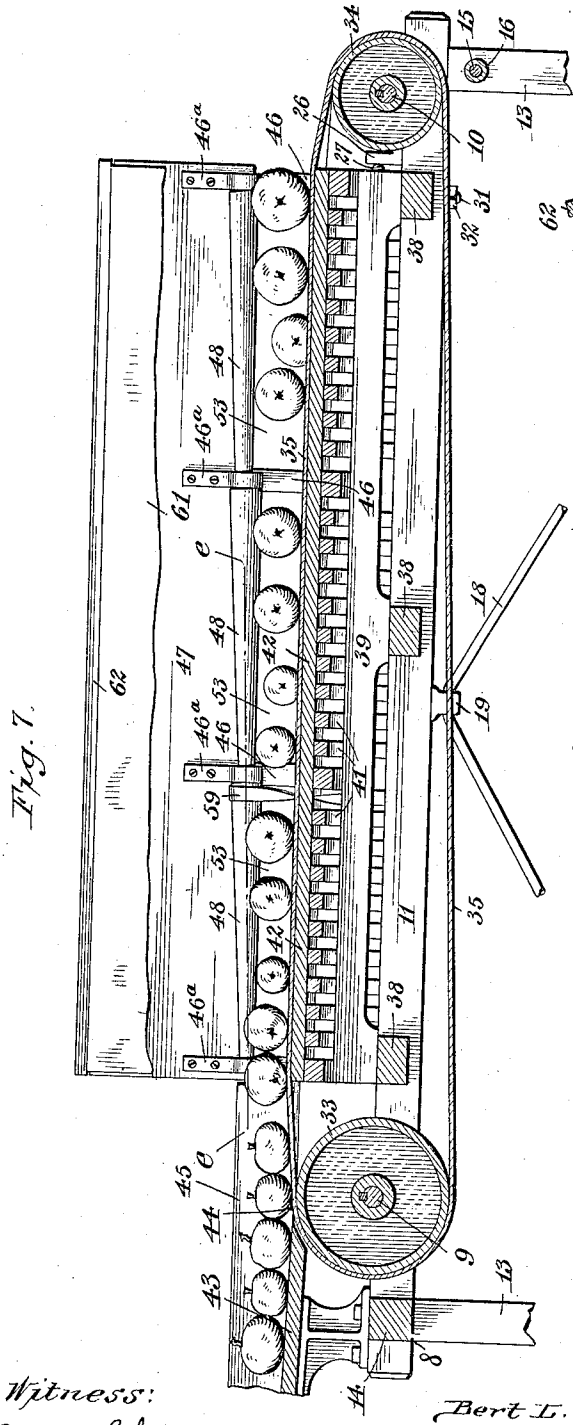


Fig. 7.

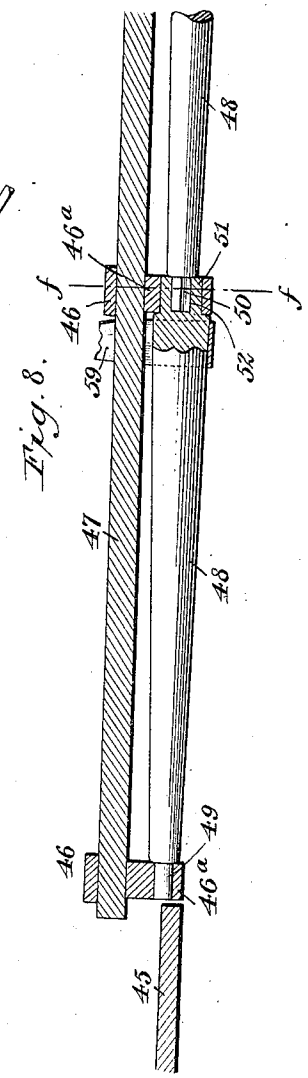


Fig. 8.

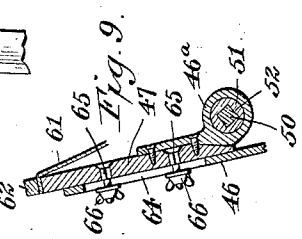


Fig. 9.

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UNITED STATES PATENT OFFICE.

BERT L. GIFFORD AND EDGAR B. GIFFORD, OF BARKER, NEW YORK, ASSIGNORS TO GIFFORD MANUFACTURING COMPANY, INCORPORATED, OF BARKER, NEW YORK, A CORPORATION OF NEW YORK.

FRUIT-GRADER.

1,310,394. Specification of Letters Patent. **Patented July 15, 1919.**

Application filed April 20, 1917. Serial No. 163,433.

To all whom it may concern:

Be it known that we, BERT L. GIFFORD and EDGAR B. GIFFORD, citizens of the United States, residing at Barker, in the county of Niagara and State of New York, have invented certain new and useful Improvements in Fruit-Graders, of which the following is a specification.

Our invention relates to improvements in fruit graders, and more particularly to a machine which is mainly designed for grading apples.

One of the objects of our invention is the provision of a machine of simple construction, which is thoroughly effective in grading apples, peaches, and other fruits, and which may be operated manually or by means of any suitable motor.

A further object is the provision of a machine of this kind which will automatically position apples passing through the machine so that the stem and blow are in a horizontal or substantially horizontal plane and so that the apples may be graded in accordance with their diameter taken at right angles to a plane passing through the stem and blow of each.

With these objects in view, the invention consists in the novel features of construction and in the arrangement and combination of parts to be hereinafter described and more particularly pointed out in the subjoined claims.

In the drawings,—

Figure 1 is a side elevation of a machine constructed in accordance with our invention, a part of the pressure blanket or cover being broken away to disclose parts behind.

Fig. 2 is a plan view of the machine with the pressure blanket or cover omitted.

Fig. 3 is an enlarged transverse section taken on line *a—a*, Fig. 1, the pulley or reel through which said section line is indicated being shown in elevation.

Fig. 4 is an enlarged transverse section taken on line *b—b*, Fig. 1.

Fig. 5 is a rear view of one end of the gaging or grading board.

Fig. 6 is an enlarged longitudinal section taken on line *c—c*, Fig. 2.

Fig. 7 is an enlarged longitudinal section taken on line *d—d*, Fig. 2, the major portion of the pressure blanket or cover being broken away.

Fig. 8 is an enlarged horizontal section taken on line *e—e*, Fig. 7.

Fig. 9 is a transverse section on a reduced scale, taken on line *f—f*, Fig. 8.

Reference being had to the drawings in detail, like numerals refer to like parts in the several figures.

The reference numeral 8 designates a frame which may be constructed in any suitable manner for supporting transversely thereon two shafts 9 and 10. This frame is preferably formed of a pair of longitudinally-disposed upper members 11, a pair of similar lower members 12, and legs 13 which are connected by cross pieces 14 in line with the upper and lower members 11, 12, except at one end of the frame where the upper cross piece is omitted, due to the fact that other parts of the machine occupy the space between the upper members 11; but in order to tie the upper members and the legs 13 together at this end, a tie rod 15 is provided which is passed through a spacing sleeve 16 and has nuts 17 applied to its outer end, the said spacing sleeve bearing with opposite ends against the inner faces of opposite legs 13. We have also provided truss rods 18 which are fitted into hangers 19 secured to the upper members 11, each of said rods extending in opposite directions from its hanger and having nuts 20 applied to opposite ends to securely tie the members constituting the frame together. This frame may, however, be otherwise constructed, if desired.

The transverse shaft 9 is journaled in suitable bearings 21 fitted into the upper members 11, while the shaft 10 is journaled in bearings 22 adjustable on said upper members, said bearings 22 having each a flat portion 23 extending from opposite sides, each of which is provided with an elongated slot 24 through which a bolt 25 is passed that takes into the upper member 11. One extension of each bearing 22 is provided with an upstanding portion 26 against which an adjusting screw 27 bears which is threaded through an enlarged head 28 of a bolt 29 having a square portion 30 which is passed through the upper member and a reduced cylindrical portion 31 which is threaded and onto which a nut 32 is secured, thus holding the bolt 29 securely to the frame. By loosening the bolts 25 the bear-

ings 22 may be adjusted and retained in adjusted position by the adjusting screws 27.

On the shaft 9 a belt pulley or reel 33 is secured, and passing around this pulley or reel and a pulley or reel 34 secured to the shaft 10 is an endless belt or carrier 35. The shaft 9 is provided at one end with a square portion 36 onto which is placed a crank handle 37 by means of which the pulley or reel 33 is rotated and consequently the endless belt or carrier driven. It is of course apparent that in lieu of the crank handle 37, any suitable power element, such as a sprocket wheel, pulley, or the like, may be secured to said shaft, and coöperating elements, such as a sprocket chain or belt utilized for rotating said pulley or reel 33 by driving the sprocket chain, belt, or the like, with suitable power means.

Arranged between the upper members 11 are transverse members 38, which support longitudinal supporting members 39 arranged in planes between the upper members 11, one of said members 39 being of greater depth than the other. Mounted on said members 39 is a receiving rack 40 formed of spaced strips 41 which extend laterally a distance beyond the frame, said strips being arranged in any suitable manner to form the rack, best shown in Fig. 2, onto which the fruit is delivered after being passed through the machine proper. This rack is inclined so that the fruit will roll toward the longitudinal edge of the same. Mounted on the rack 40 is a similarly inclined supporting board 42 over and in contact with which the upper stretch of the endless belt or carrier 35 travels, said upper stretch being therefore inclined laterally.

At one end of the frame a delivery table 43 is arranged, said table being inclined to deliver the fruit to be graded onto the belt or carrier at the point 44, and at one side said table is provided with an upstanding wall 45 which extends to a point in close proximity to the laterally inclined board 42.

Secured to the rack 40, or otherwise suitably secured, are brackets 46, which are spaced apart, as best shown in Figs. 1, 2 and 6, and to which a gaging or grading board 47 is adjustably secured, said board being arranged at an angle to the vertical. Each of the brackets 46 is provided with a longitudinal slot 64 through which bolts 65 extend that are passed through the gaging or grading board 47, the projecting ends of said bolts having thumb nuts 66 threaded thereon whereby the gaging or grading board may be vertically adjusted to any desired position within certain limits. Secured to the front face of said gaging or grading board 47 are brackets 46^a in which are journaled grade rollers 48 arranged in a plane at a slight angle to the horizontal, each roller being tapered toward the feeding end of the table. The first roller of the series is provided at its small end with a cylindrical journal 49 while the remaining rollers of the series have square reduced portions 50 at their small ends. Each roller also has at its large end a cylindrical journal 51 which is journaled in one of the brackets 46, and the journal at the large end of each roller is provided with a square socket 52 to receive the square projecting portion 50 at the small end of the next succeeding roller in the series. The rollers are therefore compelled to rotate together. It is of course understood that the journal at the large end of the last roller in the series need not be provided with a square socket as it is not intended to receive the square projecting portion of any other grading roller.

By arranging the series of rollers on a slight incline to the horizontal and also tapering them, fruit passages 53 are provided between the rollers and the upper stretch of the endless belt or carrier 35, as clearly shown in Figs. 3 and 4, these passages being successively enlarged so that through the passage beneath the first roller only the apples or other fruit of smallest size are permitted to pass, while through the passage beneath the next roller of the series, apples or other fruit of the next size may pass, all apples of a larger size being carried onward by the belt until they reach a space large enough to permit them to pass through.

If, for instance, there are any apples of a larger size than would be able to pass between the last roller of the series and the belt, they would be carried over the reel or pulley 34 and be discharged at the end of the machine. It is to be noted that the apples when placed upon the feed table 43 are arranged with their axis substantially vertical, this being the position which they would likely assume owing to the fact that they are naturally flattened at the stem and blow. However, as they are forced along and delivered onto the endless belt or carrier, they are caused to move laterally or to the left in Figs. 2 and 3, this being due to the inclination at which the upper stretch of the belt or carrier is arranged, and in order that the apples all move along with their stems and blows directed to the sides of the machine, we have arranged to keep the grading rollers in rotation. For this purpose the shaft 9 is provided with a bevel gear 54 which is in mesh with a bevel gear 55 secured to a shaft 56 journaled in bearings 57 secured to the frame 8. On this shaft is secured a pulley 58 around which a belt 59 passes, which belt also passes around the first roller 48 of the series of rollers, and in order that this roller and the remaining rollers of the series rotate in the direction of the arrow 60 in Fig. 4, said belt

is crossed, thus reversing the direction of movement of the rollers from the direction of movement of the shaft 56.

It is of course understood that all the grading rollers of the series are caused to rotate by reason of their having square reduced portions fitting the square sockets of the next preceding roller. The rotation of the grading rollers in the manner described acts to roll the apples to positions in which the stems and blows face laterally in opposite directions, and for this reason the grading is done most effectively, since in every instance the apple is graded according to its diameter taken at right angles to a plane passing through the stem and blow. Moreover, by rotating the rollers in the direction described, there is no tendency of the apples being crowded between the rollers and the carrier, as would be the case if the rolls were rotated in a reverse direction from that described, which would result in bruises and in some instances entire mashing of the fruit.

Secured to the gaging or grading board 47 is a blanket or cover 61 which is fastened to the upper edge of said board by a strip 62 through which and the blanket or cover, nails 63 are driven that take into the supporting board, as shown in Fig. 4. This blanket or cover may be of heavy canvas, or any other suitable material, and it is permitted to droop loosely over the carrier with the unfastened longitudinal marginal portion thereof extending over the outer edge of the supporting board 42, thus when the apples are directed onto the carrier and reach a point opposite the feeding end of the gaging or grading board 47 this blanket or cover assists in crowding the apples or other fruit against the grading rollers and overcomes the tendency of said rollers forcing the apples upwardly while moving with the inclined upper stretch of the carrier. Moreover, after the apples are properly positioned with their axis in the horizontal plane so as to expose the stems and blows in lateral directions, they are retained in such position by said blanket or cover while being carried forward by the belt or carrier 35.

As the grading of fruit is often done in the open, the blanket or cover 62 protects the grading rollers, and other parts of the machine from the elements of the weather, which is very desirable, as the warping of the parts would tend to cause an imperfect grading of the fruit. It is to be noted that when using the arrangement of grading rollers described the peripheral faces of the rollers at the bottom are parallel with the carrier, even though the rollers are tapered and therefore the fruit passing underneath any grading roller is limited in size regardless of the point along the roller that it may be delivered onto the receiving rack 40.

It is also to be noted that there is only a comparatively slight drop from the carrier to the receiving rack 40, and that in delivering the apples or other fruit from the carrier onto said rack, there is no possibility of the fruit becoming injured. If desired, the rack may be elevated so that its upper face is level with the inclined board supporting the upper stretch of the belt or carrier.

By providing adjusting means for the bearings 34 in which the shaft 10 is journaled, the endless belt or carrier may be held taut at all times.

By adjustably supporting the gaging or grading board 47 the fruit passages 53 may be changed in sizes to accommodate different kinds of apples or various kinds of fruits. For example, by loosening the thumb nut 66 the grading board may be raised or lowered on the brackets 46 so that the fruit passages are enlarged or diminished in height, which is a very desirable feature of our invention, since by this means crabapples or the largest grades of apples may be perfectly graded, and peaches, pears and other fruit as readily graded, as it is only necessary to adjust the gaging or grading board so that the intermediate fruit passage is adjusted to the size approximating the average size of the fruit to be graded.

It is apparent that under the principle involved, this improved fruit grading machine may be modified in various ways without departing from our invention or sacrificing any of the advantages thereof.

Having thus described our invention, what we claim is,—

1. A fruit grader comprising a traveling carrier inclined laterally, means arranged at one side of said carrier to which it is inclined providing passages of different sizes to permit fruit of different sizes to be delivered therethrough while caused to travel forwardly by said carrier, and means independent of said traveling carrier for keeping the fruit in contact with the means providing said passages.

2. A fruit grader comprising an endless traveling carrier arranged horizontally and having its upper stretch inclined laterally, a grading board arranged lengthwise at an angle to said carrier and spaced therefrom to provide different sized spaces through which different sized apples or other fruits may pass when moved forwardly by said carrier, and means attached to said grading board and hanging loosely therefrom to keep the fruit in contact with said board while traveling forwardly with the carrier.

3. In a fruit grader, means for moving the fruit along a straight course and for positioning the fruit with their axes transversely in horizontal position, or approximately so, passages for the fruit arranged successively to permit successive sizes of fruit to be de-

livered laterally from said carrier, and means for retaining the fruit in position with their axes horizontal, or approximately so.

4. A fruit grader comprising a lengthwise traveling carrier, a plurality of longitudinally-disposed grading rollers spaced from said carrier, said rollers being spaced different distances from said carrier, means for rotating said roller in a direction to prevent crushing of the fruit in passing between the same and said carrier, and means for keeping the fruit in contact with said rollers when moving forwardly on said carrier.

5. A fruit grader comprising a longitudinally-disposed traveling carrier, grading passages arranged at one side of said carrier, and means for directing the fruit toward said passages while traveling forwardly with the carrier.

6. A fruit grader comprising a longitudinally-disposed traveling carrier, grading passages arranged at one side of said carrier, means for directing the fruit toward said passages while traveling forward with the carrier, and means for retaining the fruit in close proximity to said passages so that when a passage is reached whose size equals the diameter of the fruit, such fruit may pass laterally through the passages.

7. A fruit grader comprising a frame, an endless traveling carrier supported by said frame, a grading member arranged at an angle to the carrying surface of said carrier, grading rollers journaled on said grading member and spaced different distances from said carrier, and a loosely hanging flexible cover secured to said grading member and adapted to retain the fruit in contact with said rollers as it is traveling with said carrier.

8. A fruit grader comprising a longitudinally-disposed traveling carrier inclined laterally in one direction, means providing passages of different sizes along the marginal portion of said carrier at the side to which it is inclined, and a loosely hanging flexible element covering said carrier and adapted to retain the fruit in close proximity to said passages when it is traveling forwardly with said carrier.

9. In a fruit grader, the combination of an endless traveling carrier arranged so as to direct the fruit to one side thereof, a plurality of grading rollers spaced from said carrier, means to rotate said rollers in a forward and upward direction to cause the fruit to assume a position with their axes disposed transversely, and means for retaining the fruit in contact with said rollers when so positioned and carried forwardly by said carrier.

10. In a fruit grader, a rectilinearly moving carrier, fruit passages of successively increasing sizes arranged along the side of said carrier, and means independent of said carrier for directing the fruit toward said passages when traveling with said carrier.

In testimony whereof we affix our signatures.

BERT L. GIFFORD.
EDGAR B. GIFFORD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."