Nov. 12, 1935. N. J. WIGGINTON 2,021,094

GRADING MACHINE

Filed Feb. 3, 1933 3 Sheets-Sheet 1

FIG. 1.

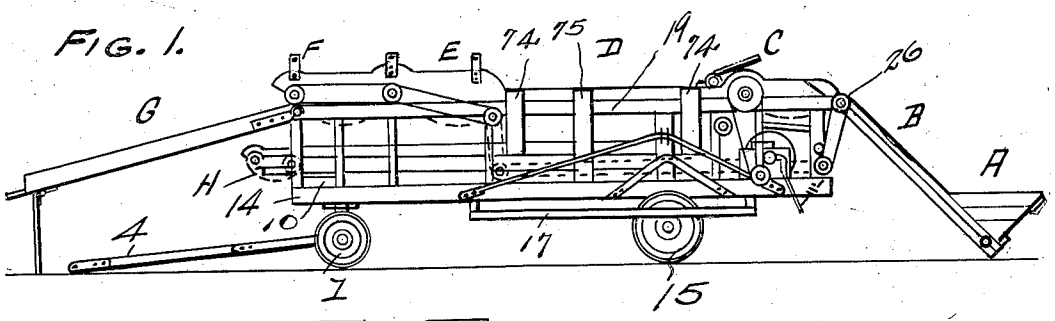


FIG. 2.

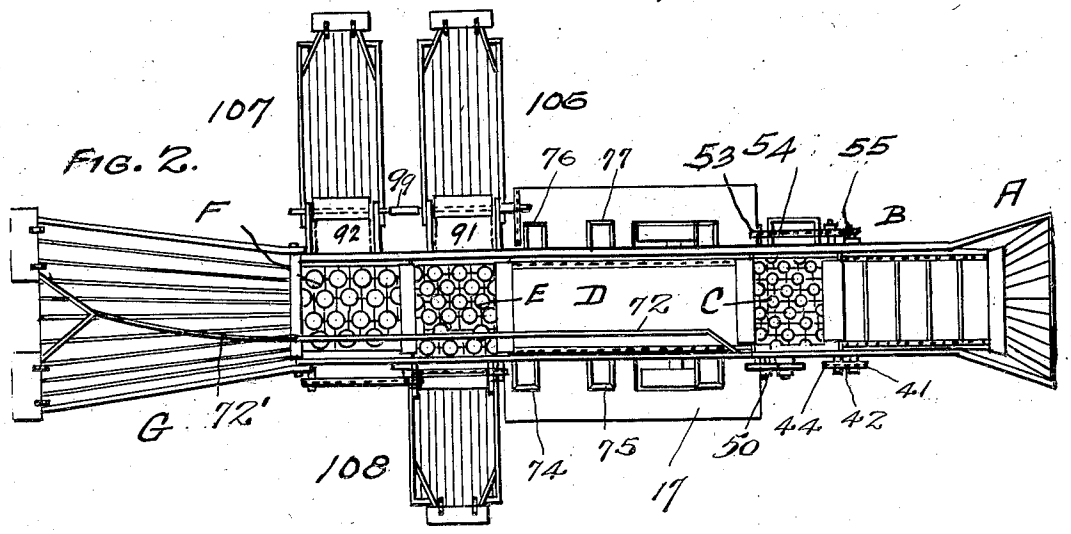
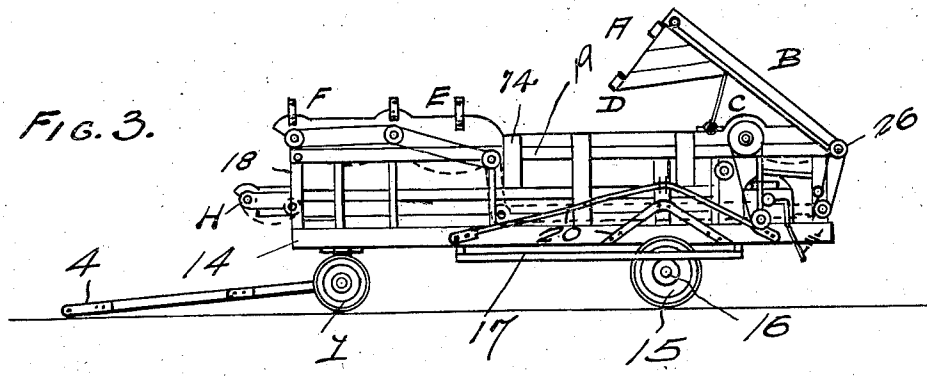


FIG. 3.



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GRADING MACHINE

Filed Feb. 3, 1933 3 Sheets-Sheet 2

FIG. 7.

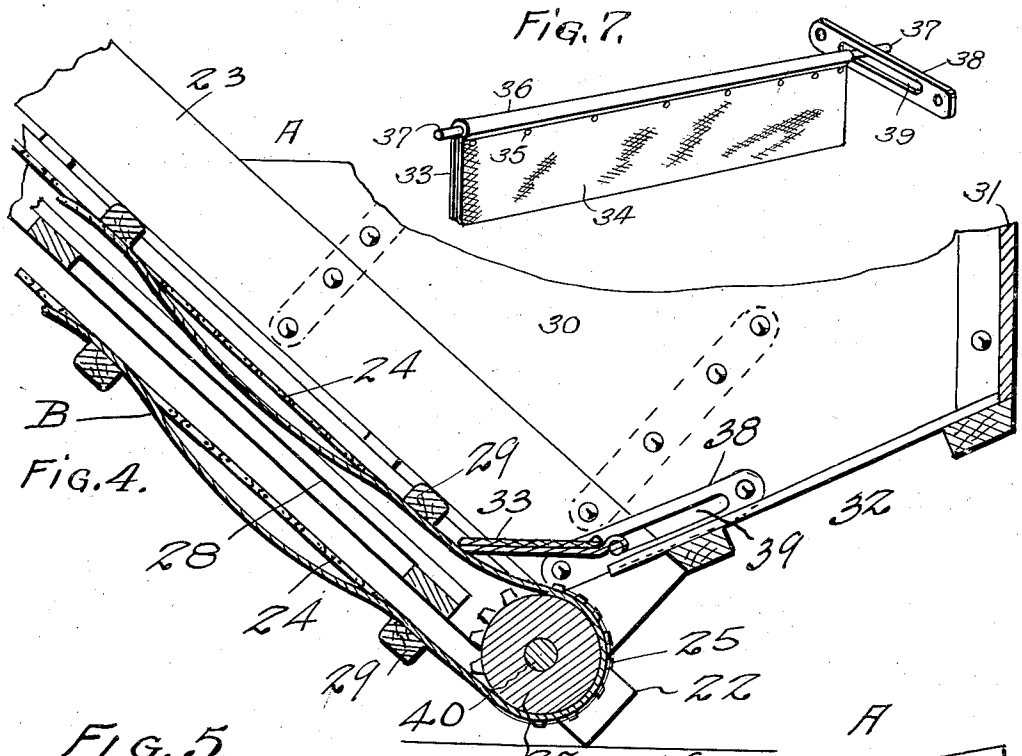
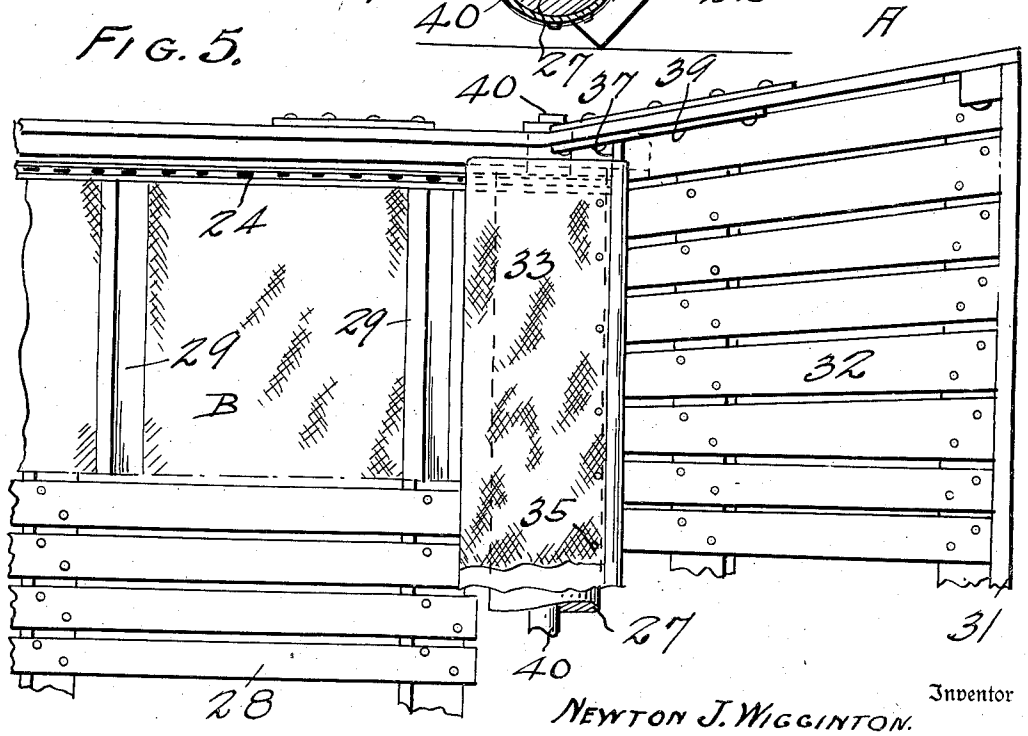


FIG. 4.

FIG. 5.



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Filed Feb. 3, 1933 3 Sheets-Sheet 3

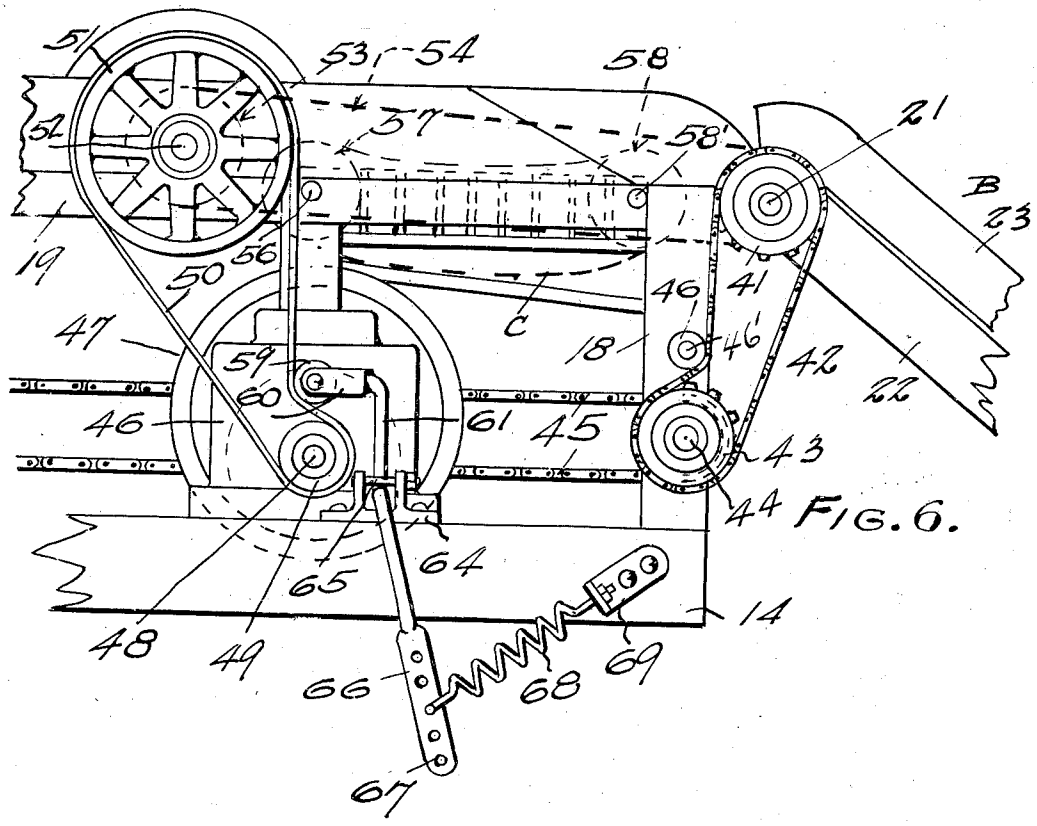


FIG. 6.

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UNITED STATES PATENT OFFICE

2,021,094

GRADING MACHINE

Newton J. Wigginton, Winchester, Va.

Application February 3, 1933, Serial No. 655,115

6 Claims. (Cl. 198—53)

My present invention relates to improvements in grading machines which, while adapted for grading, sorting, and sizing various fruits, vegetables, and other similar commodities, is especially designed for grading apples. The invention is directed particularly to a combined elevator and feed hopper forming part of the implement, and to a gravity-actuated bridge member or gate that is combined with the elevator and hopper, together with accessories for these parts. In the actual reduction to practice and commercial use of my improved machine I have embodied my invention in a wheeled vehicle which may be hauled by means of an automotive vehicle or tractor, from set to set in the orchard where the apples are to be graded. The implement may also be employed in a warehouse for grading the apples.

As here illustrated the machine is operated by power from either an electric motor or a gasoline motor, and the operating parts are compactly arranged in order that the apples may quickly pass from the feed end to the delivery end, and in their passage from one end to the other of the machine they are accurately graded, sorted and sized without bruising or marring.

My invention consists in certain novel combinations and arrangements of parts as will hereinafter be more fully set forth and claimed. In the accompanying drawings I have illustrated one complete example of the physical embodiment of my invention wherein the parts are combined and arranged according to one mode I have thus far devised for the practical application of the principles of my invention. The drawings exemplify a working machine that is successfully operating, but it will be understood that various changes and alterations may be made in the exemplified structure, within the scope of my claims, without departing from the principles of my invention.

Figure 1 is a view in side elevation showing the grading machine of my invention, set up and in position for use.

Figure 2 is a plan view of the machine as shown in Figure 1.

Figure 3 is a view in side elevation of the machine with the combined hopper and elevator folded to compact position on the machine frame, and the end delivery table omitted, disclosing the machine in condition for transportation, or for storage.

Figure 4 is an enlarged detail vertical sectional view of the combined feed hopper and elevator, showing the lower end as resting upon the ground or floor.

Figure 5 is a plan view of the portion of feed hopper and elevator shown in Figure 4, parts being broken away for convenience of illustration.

Figure 6 is a detail view in side elevation at the front of the machine, showing the first grading chain, the motor or power plant a portion of the elevator complementary to Figure 4, and the safety device for the driving belt.

Figure 7 is a perspective view of one of the bridges employed to bridge the gap between ends of adjoining units of the machine.

Referring to Figures 1 and 2 where the general assembly and arrangement of parts are best disclosed, it will be understood that the apples, whether the machine is used in the orchard or in the warehouse are emptied into the hopper A at the rear end of the vehicle, which end becomes the front or feed end of the machine. From the hopper, the apples are carried by an endless elevator B to the top of the machine and discharged onto a flexible grading chain C of suitable type, where the culls are disposed of. From the first grading chain the apples are next passed to an endless belt or sorting table D where they may be manually sorted, and some of them disposed of as required. After manual sorting of the apples the endless belt or sorting table carries the apples to the second grading chain E having larger orifices or openings than the chain C, and from thence the remaining apples pass to the third and largest grading chain F for the final grading of the apples. The apples that have successfully passed the three different grading chains finally reach the discharge table G, and these apples are the select or highest grade of fruit. An auxiliary eliminator H for low grade apples, in the form of a grading chain, is also shown at the rear end of the machine, below the level of the three main grader chains, C, E and F.

The implement is shown with steering wheels 1, draft tongue 4, a counterweight 10, and the body frame 14 is supported on wheels 1 and 15 and axle 16. A running board 17 is shown, upon which the operators stand, and the usual posts 18, side bars 19, and braces 20 form the superstructure for the main body frame 14.

The front end of the grader is at the rear of the vehicle, and the combined hopper and elevator A and B are pivotally supported from the transversely arranged shaft 21 which is journaled in suitable bearings at the end of the frame and

near its top portion. The elevator comprises a pair of side bars 22, pivoted on the shaft and spaced apart as shown, and guide rails 23 are mounted on the side bars to prevent escape of apples as they ascend by way of the elevator from the hopper. The elevator B is preferably an endless canvas belt with edge sprocket chains 24 passing over sprocket wheels 25 on the drive roller 26 and the driven roller 27, the latter at the lower end of the side bars. Longitudinally extending slats 28 are provided for the working flight of the elevator, and the latter, as shown in Figure 4, is supported on the upper or outer face of the slatted frame, or floor. This frame or floor, made up of spaced parallel slats and cross bars, is secured at the inner sides of the two side bars 22, and the structure forms a resilient floor which cannot be misshapen or twisted, but which springs back to normal position if and when the elevator is raised or folded on its pivot 21, in an unbalanced manner.

At spaced intervals on the canvas belt or endless elevator B are secured cross slats 29, and as indicated, the endless belt is longer than the two side sprocket chains, thereby permitting the portions of the belt between the cross slats, to which the chains are attached, to sag slightly and form depressions or recesses in which the apples are carried, above the cross slats, on the ascending flight of the elevator. The lower end of the elevator terminates at the bottom of the hopper A, which is provided with two side walls 30, and an end wall 31, and the slatted bottom 32. The apples are dumped or emptied into the hopper, which may be filled thereby to a suitable height, and the succeeding cross slats lift the apples and carry them in the depressions or pockets of the elevator B.

Between the end of the slatted bottom 32 and the elevator, a floating bridge 33 is provided, to support the apples in the bottom of the hopper and feed them to the cross slats 29, as they pass up and around the roller 27. The bridge between the hopper and the elevator is provided with novel supports which allow folding of the elevator without danger of crushing the bridge and without danger of cutting the canvas of the elevator. These novel supports also permit the bridge to move out of danger in case of backlash of the elevator, due to improper operation of the machine, thus preventing damage to the bridge and preventing cutting of the canvas elevator.

The bridge, as best shown in Figure 7, is made up of a sheet metal plate having a canvas cushion or face 34 secured to the plate by fasteners 35 along its upper edge, leaving the cushion or face loose and soft in order that the apples may not be bruised by contact therewith. One edge of the plate is fashioned as a sleeve 36 in which is enclosed a rod or shaft 37, the ends of which rod are journaled in plates 38 having slots 39 to receive the journal ends. As best seen in Figure 4, the journal ends 37 are normally located at the lower ends of the two slotted plates, one of which is attached to the inner face of a side wall 30 of the hopper. This pivotal arrangement of the bridge permits the cross slats 29 to pass under and lift the free edge of the bridge, but should a reverse movement of the elevator occur, and the slat 29 be backed against the free edge of the bridge, it will be apparent in Figure 4 that the journals of the bridge will slide backward and upwardly in the slotted plates, thus preventing cutting of the canvas or breaking of the bridge.

In Figure 4 it will be seen that the combined hopper and elevator is supported by the ends of the side bars 22 resting upon the ground or floor, and the roller 27 has a shaft 40 journaled in bearings near this lower end of the elevator and hopper. The shaft 21 of the roller 26 is provided with a sprocket wheel 41 and chain 42 which passes down to the sprocket 43 on the shaft 44 journaled in bearings at the end of the vehicle frame, and the shaft 44 operates the power chain 45. A small roller or pulley 46 is journaled on the stud shaft 46' mounted on the frame, for the purpose of tightening the sprocket chain 42.

The power chain 45, which is endless and extends longitudinally of the machine, is driven from a gas or electric motor 46a, supported in the main frame near its front end, and provided with the usual accessories, as the balance or fly wheel 47, and the drive shaft 48 is provided with a small drive pulley 49. The belt drive 50 passes over the large pulley 51 on shaft 52 and by means of the sprocket drive 53, 54 and 55 in Figure 2 the power is transmitted to the shaft 21 of the elevator.

The grader chain C as indicated passes over rollers, one roller 57 on shaft 56 and the other roller 58 on shaft 58', and the upper flight of the chain conveys the apples to the left in Figure 2, from the elevator.

In connection with the belt drive 50 a safety device and belt tightener is employed in connection with the motor as it applies power to the machine for the purpose of compensating for any back lash or excessive resistance in the operating parts of the machine. For this purpose a floating roller or small pulley 59, which is journaled in yoke 60, is located just above the drive pulley 49 in position to bear against the belt, and the yoke is pivoted and spring pressed to provide a resilient pressure for holding the roller 59 to the belt, thereby taking up the slack in the belt under normal conditions, and permitting back pull on the belt to release the driving power in case of emergency.

The yoke 60 has an upright stem 61 and cross trunnion or pin 61 which is pivoted in a bracket 63 and a second bracket 64 to form a rock shaft that is retained by the cross bolt 65 in the bracket 64. A spring lever-arm 66 extends downwardly from the rock shaft and the free end of the arm is provided with spaced holes 67 to which one end of a spring 68 is attached, the other end of the spring being retained by the bracket 69 attached to the side beam 14 of the frame. By changing the location of the spring in its attachment to the lever arm the tension of the spring as applied to the arm is varied, and in this manner the pressure of the roller 59 on the drive belt is also varied to suit different conditions.

In Figures 1, 2, and 3, some of the devices of the grading machine are indicated, for the purpose of showing the relation of parts and operation of the machine, as for instance, the longitudinally extending partitions 72 and 72' forming sorting areas for the apples; 74, 75, 76, and 77 are side chutes for the sorted apples; 91 and 92 are endless conveyers for the apples; 99 is a coupling between parts of the implement; and 106, 107 and 108 are sorting trays at the sides of the machine.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In a grading machine, the combination with an elevator frame and a hopper rigid therewith, an endless elevator operating in the frame, and said hopper having a bottom disposed at an angle to the elevator, of a gravity-actuated gate having

an edge resting on the elevator and closing a gap between the elevator and the bottom of the hopper, said gate having axially alined journals at its opposite ends, and said hopper having supporting means for the journals mounted on opposite walls, whereby the gate may slide toward and away from the elevator.

2. In a grading machine, the combination with an elevator frame and a hopper rigid therewith, and an endless elevator operating therein, of a transversely arranged gate bridging a gap between the bottom of the hopper and said elevator, said elevator having transversely arranged conveyer-slats mounted thereon and adapted to pass under a free edge of the gate, said gate having axially alined journals at opposite ends, supports mounted on opposite walls of the hopper, and said supports having bearing faces for said journals, whereby the gate may slide toward and away from the elevator.

3. In a grading machine, the combination with an elevator frame, of a V-shaped hopper rigid with said frame, a transversely disposed bridge closing a gap between the bottom of the hopper and the elevator, a pivot shaft for said bridge, a pair of slotted plates supported in the hopper for suspending said shaft, and said plates being inclined upwardly from said bridge to retain the bridge in operative position.

4. In a grading machine, the combination with an elevator frame and an endless elevator operating therein, of a V-shaped hopper rigid with the lower end of the frame and spaced therefrom to form a gap, a transversely arranged bridge having a longitudinally extending edge resting on said elevator and closing the gap between said hopper and the elevator, and means on opposite side walls of the hopper for supporting said bridge to permit a backward sliding movement of said bridge.

5. The combination in a combined elevator and hopper, with a pair of slotted, inclined bearing plates secured to opposite walls of the hopper, of a gravity-adjusted bridge having one longitudinal edge resting on the elevator and comprising a metal plate, pivotal journals at the ends of said plate extending from the other longitudinal edge and having bearings in the slotted plates, and a flexible, soft, facing on said metal plate.

6. The combination in a portable grading machine with a foldable frame hinged to the machine, an endless elevator mounted in the frame, and means for operating the elevator, of a feed hopper rigid with the free end of said frame, said hopper having a bottom opening for the elevator, a gravity-actuated gate bridging said opening with one of its edges resting on the elevator, and co-acting means on the hopper and gate for supporting the latter in operative position.

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