J. W. PEASE.

FRUIT HANDLING MACHINE.

APPLICATION FILED NOV. 29, 1911.

1,071,334.

Patented Aug. 26, 1913.

4 SHEETS—SHEET 1.

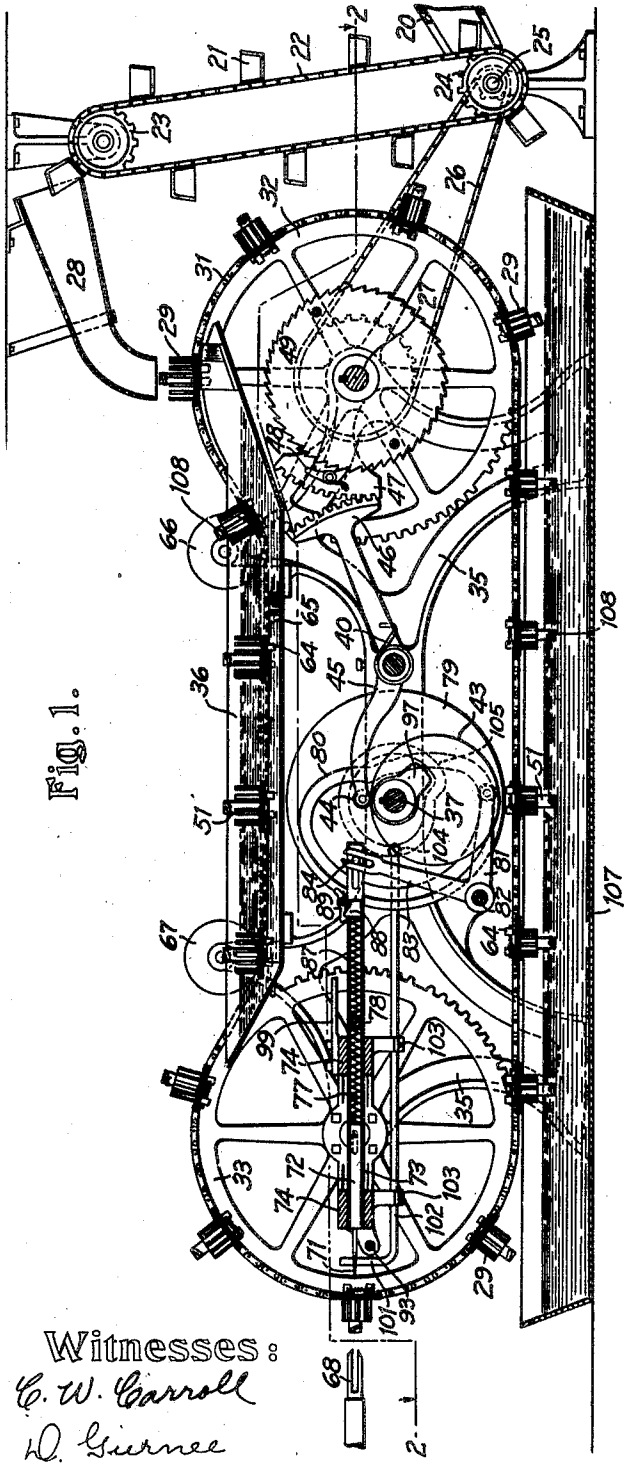

Fig. 1.

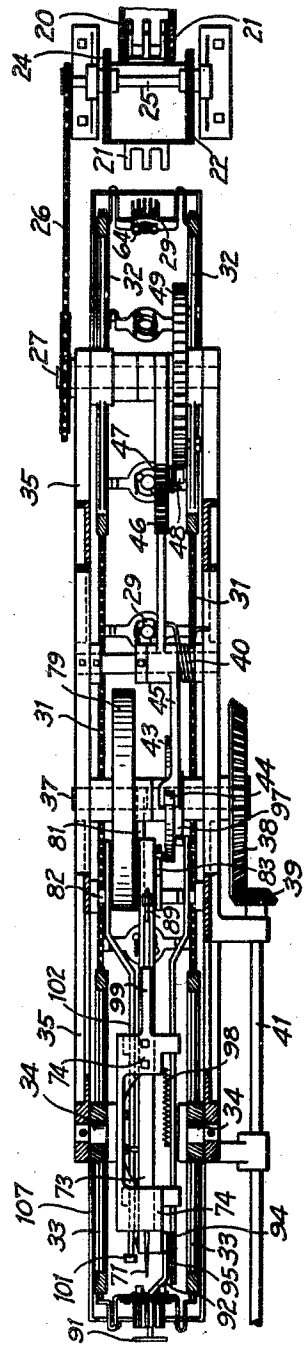

Fig. 2.

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Fig. 3.

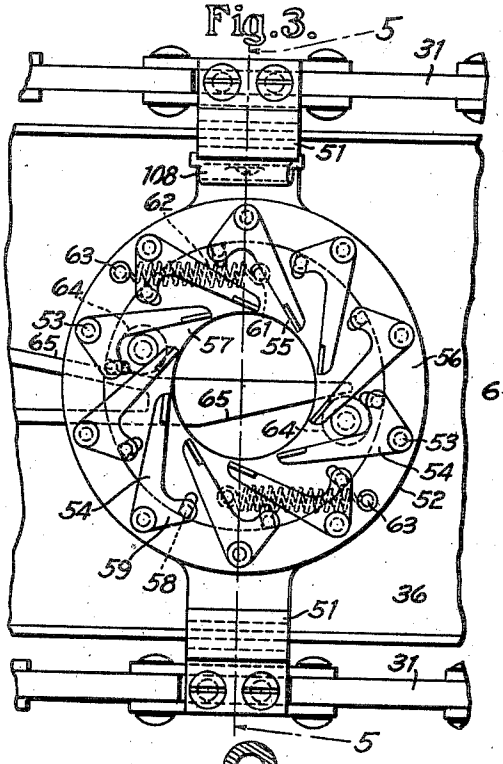


Fig. 4.

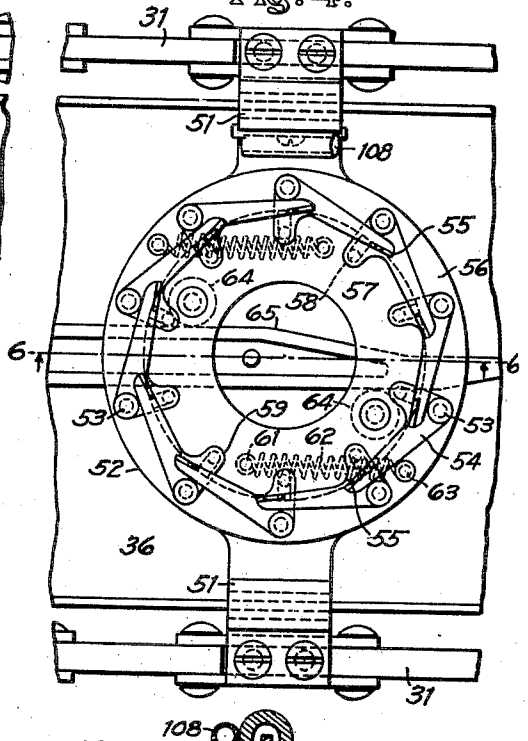
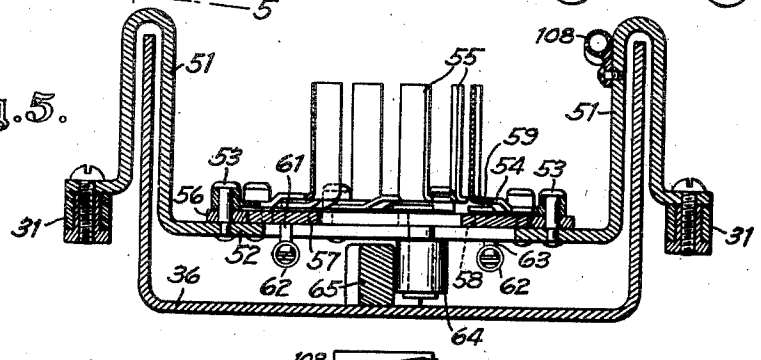


Fig. 5.



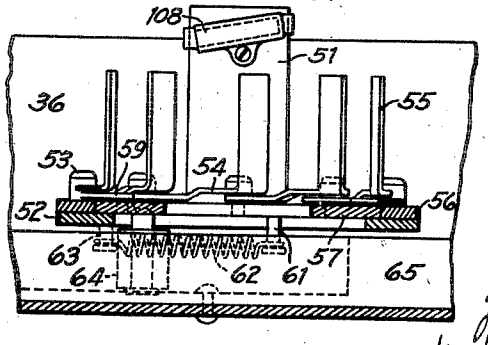


Fig. 6.

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4 SHEETS—SHEET 3.

Fig. 7.

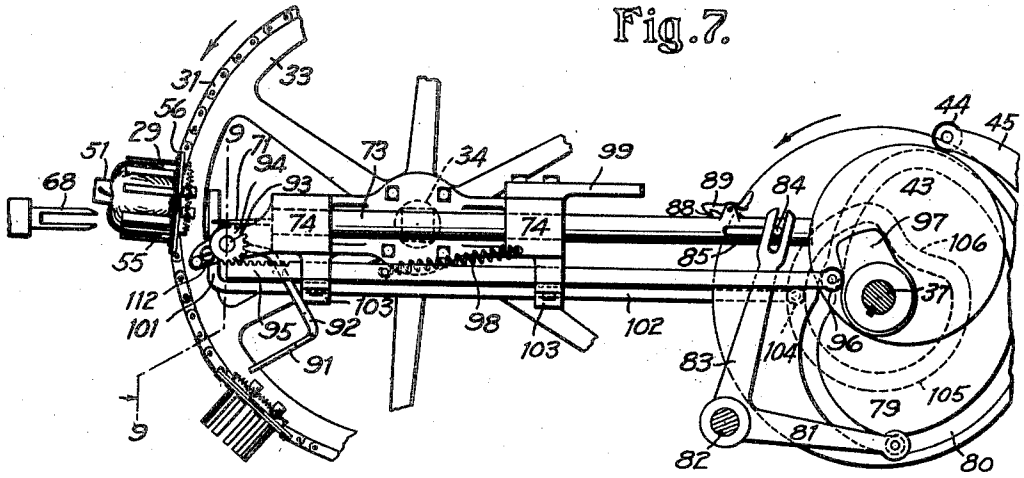


Fig. 8.

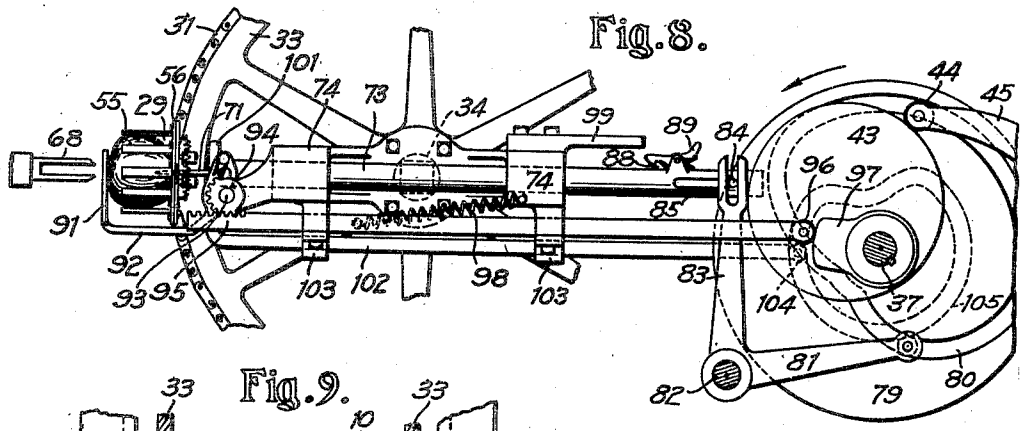


Fig. 9.

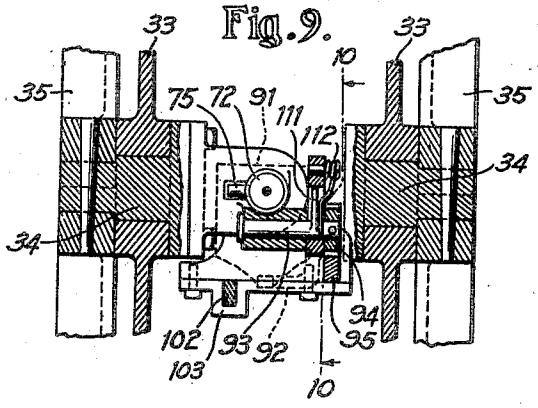
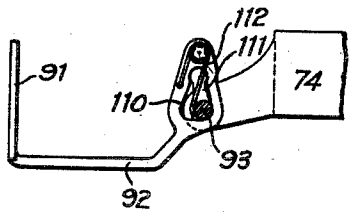


Fig. 10.



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4 SHEETS—SHEET 4.

Fig. 11.

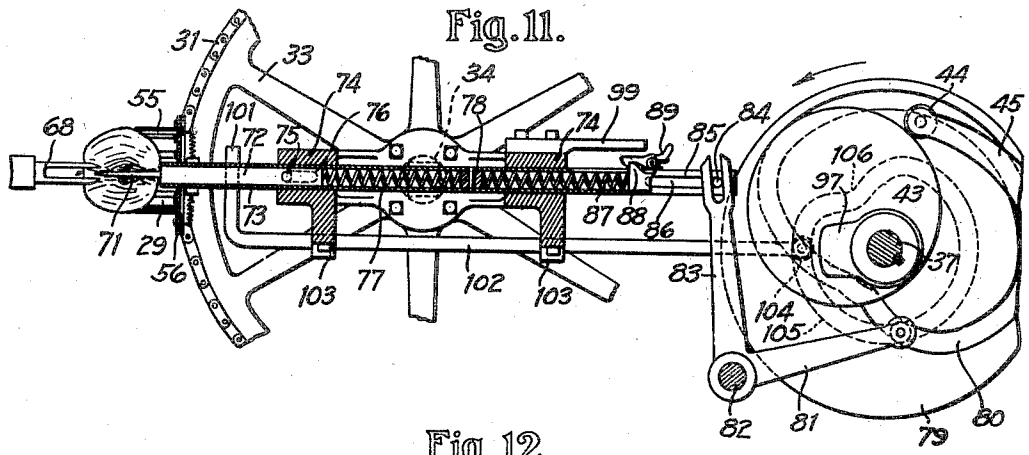


Fig. 12.

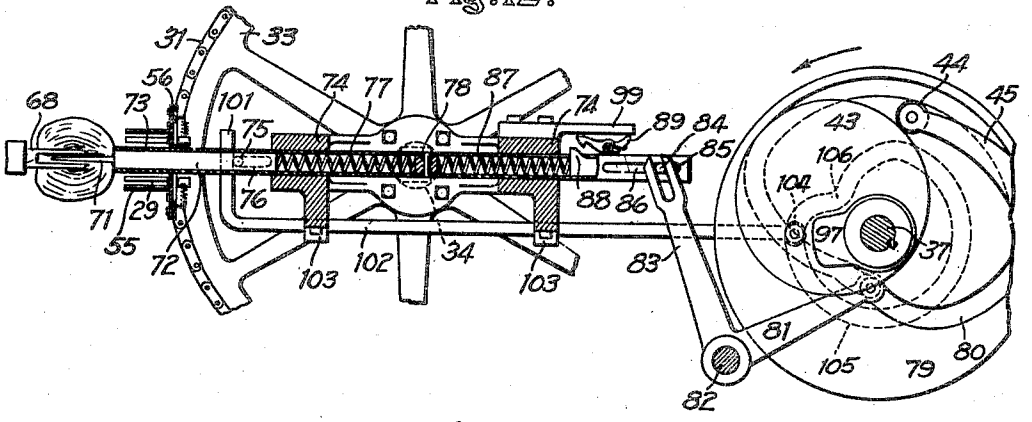
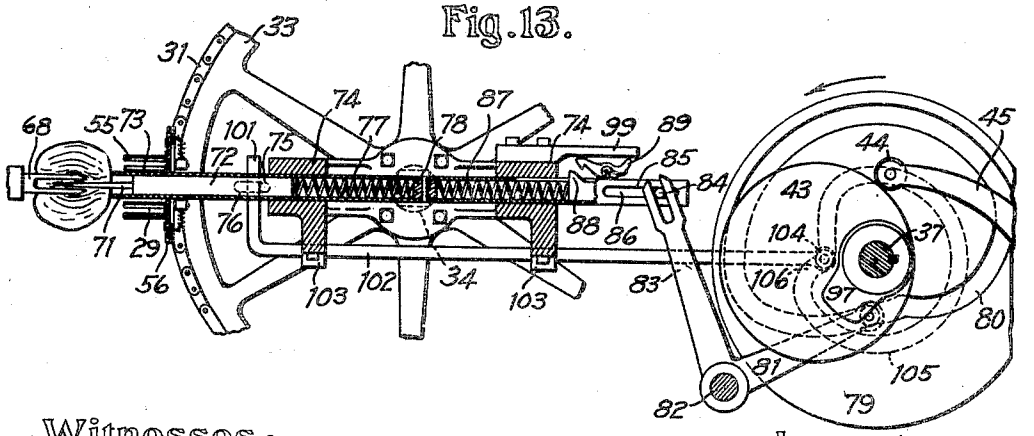


Fig. 13.



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UNITED STATES PATENT OFFICE.

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FRUIT-HANDLING MACHINE.

1,071,334. Specification of Letters Patent. Patented Aug. 26, 1913.

Application filed November 29, 1911. Serial No. 663,182.

To all whom it may concern:

Be it known that I, JOHN W. PEASE, a citizen of the United States, and resident of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Fruit-Handling Machines, of which the following is a specification.

This invention relates to machines by which apples or other fruit are automatically presented or fed to the fork or fruit-holding device of a machine for paring and coring, or otherwise treating the fruit, and particularly to feeding machines of the type in which the fruit is automatically brought to, and presented in, a position in which the core-axis of the fruit has a definite position with relation to such fork or fruit-holding device.

One object of the present invention is to provide a fruit-handling or feeding machine of the type in question with novel and effective means for holding the fruit after its position has been automatically determined and until the operation by which the fruit is transferred to the paring-machine, or other machine for operating on the fruit.

A second object of the invention is to provide the fruit-handling machine with novel and effective mechanism for so transferring the fruit and for impaling it upon a fork, or equivalent device, said means being particularly adapted to hold the fruit securely against accidental alteration in the predetermined position of its core-axis, and to attain this result without injury to the surface of the fruit.

Other objects of the invention, and the features of construction by which they are attained, will be referred to hereinafter, and the invention consists in the fruit-handling machine hereinafter described, as it is defined in the succeeding claims.

In the accompanying drawings:—Figure 1 is a side-elevation, partly in vertical section, of a machine embodying the present invention; Fig. 2 is a horizontal section on the line 2—2 in Fig. 1; Fig. 3 is a plan-view on a larger scale, of one of the apple-holders, showing the holder in closed position; Fig. 4 is a similar view showing the holder in open position; Fig. 5 is a section on the line 5—5 in Fig. 3; Fig. 6 is a section on the line 6—6 in Fig. 4; Fig. 7 is a partial side-elevation, showing particularly the mechanism for transferring the fruit to, and impaling it upon, the fork of the paring-machine; Fig. 8 is a similar view, showing the parts at the commencement of the transferring operation; Fig. 9 is a section on the line 9—9 in Fig. 7; Fig. 10 is a detail-view, in section, on the line 10—10 in Fig. 7; and Figs. 11, 12 and 13 are side-elevations, partly in vertical section, showing the parts illustrated in Figs. 7 and 8 at various subsequent points in their cycle of operations.

The invention is particularly adapted for embodiment in a machine operating upon the principle disclosed in United States Letters Patent Nos. 980,371 and 980,462, granted January 3, 1911, to John A. Warner, that is to a machine in which the apple or other fruit is brought automatically to a definite position by floating the fruit in water or other liquid, and accordingly the present invention is illustrated as embodied in a machine operating upon this principle, although it will be understood that certain features of the invention are equally adapted for use in machines in which the fruit is positioned in other ways or by other means.

In a previous application filed by me April 5, 1911, Serial No. 619,195, I have disclosed a fruit-handling machine, operating upon the flotation principle, in which the fruit is carried by a series of fruit-holders mounted upon endless chains, the fruit being first fed into the holders, then immersed in a tank of water to cause it to be automatically positioned in the holders, and the holders being then brought to a position where the fruit may be transferred to the fork of a paring-machine. The present machine operates on the general principle thus disclosed, and the invention consists particularly in the construction of the fruit-holders and the manner in which they grip the fruit after it has been automatically positioned therein, and also in the mechanism by which the fruit is transferred from the holders to the fork of the paring-machine. As in the machine disclosed in my said application, the fruit is fed one by one to the fruit-holders by means of feeding-mechanism which constitutes no part of the present invention. A suitable mechanism for this purpose is shown in Figs. 1 and 2. The fruit is supplied through a spout 20 con-

nected with a suitable hopper (not shown), and from this spout it is raised by means of a series of receptacles 21, each consisting of several spaced fingers, as shown in Fig. 2. The receptacles 21 are mounted on endless sprocket-chains 22 which pass over upper and lower sprockets 23 and 24, respectively. The sprockets 24 are fixed to a shaft 25 which is connected, by a chain 26, with a sprocket on a shaft 27 journaled in the frame 35 of the machine, and the feeding-mechanism is thus actuated through the intermittent movements of the shaft 27, which are produced by mechanism hereinafter described. Each receptacle discharges the fruit held therein, in turn, into a chute 28, through which the fruit is discharged by gravity into one of the holders, indicated generally by the reference-number 29, which at the time is momentarily held stationary beneath the chute. The fruit-holders 29 are mounted in series on a pair of endless sprocket-chains 31. At the right-hand end of the machine these chains pass over two sprocket-wheels 32 which are fixed to the shaft 27. At the left-hand end of the machine the chains pass over sprocket-wheels 33. The wheels 33 are journaled independently upon studs 34 fixed in the frame 35 of the machine, thus producing a clear space between the wheels in which the fruit-transferring mechanism operates.

A tank 36, holding the water in which the fruit is automatically positioned, is mounted at the upper portion of the frame of the machine, so that several of the fruit-holders are at all times within the tank. To bring the holders successively into, through and out of this tank, intermittent partial rotations are imparted to the shaft 27 and the sprocket-wheels 32 thereon. To this end a cam-shaft 37 is journaled in the frame of the machine, and this shaft is connected, by gears 38 and 39, with a shaft 41 which may be connected with any suitable source of power. The cam-shaft rotates constantly, and it is provided with a cam-disk 43 engaging a roller 44 on a cam-lever 45, which is pivoted upon the frame of the machine. This cam-lever is provided with a gear-segment 46 which meshes with a gear-segment 47 loosely pivoted upon the shaft 27. The segment 47 carries a spring-pressed pawl 48 which engages a ratchet-wheel 49 fixed to one of the sprocket-wheels 32. The cam-disk 43 imparts intermittent oscillating movements to the gear-segments, thus causing the pawl periodically to impart a partial rotation to the ratchet-wheel and the sprocket-wheels 32, the angular movement thus produced being equivalent to the linear distance between two successive fruit-holders. The return movement of the ratchet-mechanism is produced by a spring 40 connected with the lever 45, and this movement is idle as regards the sprocket-wheels and chains, owing to the idle movement of the pawl 48 over the ratchet-wheel.

A valuable feature of the present invention resides in an arrangement by which immersion of the chains 31 in the liquid contained in the tank is avoided. To this end the fruit-holders are arranged as shown in Figs. 3 to 6. The chains are located at the sides of the tank, and are provided, at suitable intervals, with yoke-shaped members 51 which extend upwardly and downwardly so as to bridge the sides of the tank. These members thus support the operative parts of the fruit-holders within the tank. At their inner extremities the yoke-shaped members 51 of each holder are integral with a flat ring or base-member 52, which supports the movable members of the holder. A series of studs 53 project upwardly from the base-ring, and on these studs are pivoted a series of arms 54 having, at their inner extremities, vertical blades 55. The base-ring is centrally perforated, and upon the top of the ring is fixed a second ring 56 of which the internal diameter is somewhat greater than that of the base-ring, so that an annular shoulder is thus formed, affording a bearing for a flat ring 57. This ring is provided with short radial slots, each of which is engaged by a pin 58 projecting downwardly from an arm 59 integral with one of the blade-arms 54. Accordingly, a partial rotation of the ring 57 in either direction will cause the corresponding simultaneous movement of all the blade-arms and the blades carried thereby, whereby the blades are moved simultaneously toward or from the center of the cup. The ring 57 is provided with two downwardly-projecting pins 61 to which tension-springs 62 are fixed, the opposite ends of the springs being fixed to pins 63 projecting downwardly from the base-ring 52. These springs tend constantly to rotate the ring 57 in a direction to move the blades 55 to closed position, as in Fig. 3, and this arrangement affords provision for yieldingly gripping a fruit in the holder.

The mechanism just described acts to hold the fruit in definite position in the holder while the fruit is being transferred from the tank to the fork of the paring-machine. While the fruit is being automatically positioned by flotation, however, it is necessary that it be free to turn within the holder. Accordingly, means are provided for holding the blades 55 in open position, as in Fig. 4, during this latter operation. The ring 57 is provided with two cam-rollers 64 on studs projecting downwardly from the ring, and in the bottom of the trough a double-faced cam 65 is fixed. This cam extends substantially throughout the length of the trough, from a point beneath the chute 28. Accordingly, when the fruit-holder

reaches this point the beveled end of the cam engages the rollers 64 and forces them in a direction to move the holder to open position, and in this position the holder is maintained until it reaches the left-hand end of the tank. The sprocket-chains 31 pass beneath rollers 66 by which the chains and the holders are depressed to cause the holders to enter the tank after receiving the fruit, and the chains pass under similar rollers 67 near the left-hand end of the tank and thence upwardly over the sprocket-wheels 33, thus causing the holders to rise out of the tank. The cam 65 terminates adjacent the rollers 67, so that just before each holder begins to leave the tank the blades 55 are allowed to close and grip the fruit in the position to which it has been automatically brought by flotation.

By the use of a considerable number of vertical blades I produce a holder which adapts itself to fruit of a wide range of sizes, while at the same time the space between any two successive blades is not sufficient, when the holder is wide open, to permit the smallest fruit to escape or become lodged between the blades. The simultaneous inward movement of the blades also provides for the automatic adjustment of the fruit to a position in which its core-axis is centrally located with respect to the holder, so that the fruit is properly positioned in this respect when presented to the fork of the paring-machine. The parallel vertical blades have the further advantage that when the fruit is forced out of the holder in an axial direction they diminish the tendency of the fruit to turn in consequence of the frictional engagement between the fruit and the blades.

In Fig. 1 the fork 68 of the paring-machine is illustrated in the position which it occupies with relation to the fruit-handling machine, this position being such that when the fork is reached by one of the fruit-holders the axis of the fruit held therein is horizontal and in alinement with the axis of the fork.

A valuable feature of the invention resides in the means by which the fruit is expelled from the fruit-holder and impaled upon the fork without the possibility of angular derangement of the axis of the fruit. In the machine disclosed in my prior application above referred to this operation is performed by a bodily movement of the holder toward the fork, so that the fruit is impaled before its removal from the holder. In the present machine, however, the holder remains stationary and the fruit is forced therefrom.

To hold the fruit securely with its axis in the proper horizontal position during the transferring operation I employ a slender pointed device which is hereinafter referred to as the "spear," and designated in the drawings by the reference-number 71. This spear is fixed in a slide 72 which is inclosed within a hollow plunger 73. The plunger moves horizontally in bearings 74 on the frame of the machine. A pin 75 fixed in the slide 72 projects laterally through a slot 76 in the plunger, the forward bearing 74 being recessed, as shown in Fig. 9, to clear the pin. A spring 77, inclosed within the plunger, engages the slide 72 at one end, and its other end is seated against a block 78 fixed in the plunger. The slide and the spear thus normally participate in the movements of the plunger, so that when the plunger is advanced the spear passes through the bottom of the fruit-holder and enters the fruit at or adjacent to its core-axis, thus impaling the fruit and effectually preventing it from turning out of proper position during subsequent operations.

The mechanism by which the plunger and the spear are actuated comprises a plate 79 fixed on the cam-shaft 37 and having a cam-path 80 engaged by a roller on a cam-lever 81. The lever 81 is pivoted on a stud 82 fixed in the frame of the machine, and it has an upper forked extremity 83 coöperating with a pin 84. This pin moves in a slot 85 in the plunger, and is fixed in a slide 86 inclosed within the plunger. A compression-spring 87, between this slide and the block 78, causes the plunger to participate normally in the movements imparted to the pin and the slide by the cam-mechanism. As a further provision to this end the slide is provided with a lug 88, which projects upwardly through a slot in the plunger and is normally engaged by a spring-pressed detent 89 pivoted upon the plunger. During the first part of the operative movement of the cam-mechanism the plunger is moved positively forward, carrying the spear with it and thus impaling the fruit. Through the continued movement of the plunger its forward end then engages the fruit, and acts as an abutment by which the fruit is forced out of the holder and into engagement with the fork 68, the fruit being thus impaled upon the fork. As it is necessary that the plunger move sufficiently to completely impale the smallest apples, while at the same time its movement must be arrested at an earlier point where a larger fruit is being impaled, a trip-finger 99 is mounted upon the frame of the machine, in such position that before the movement of the plunger is completed this trip engages the detent 89 and moves it so as to release the slide 86. The last part of the movement of the plunger, therefore, is not positive, but is produced through the pressure of the spring 87, so that as soon as the apple, whatever its size, has been completely impaled upon the fork the plunger may be arrested, the fur-

ther movement of the slide 86 merely compressing the spring 87. Upon the return movement of the parts the detent again engages the lug 88, however, thus locking the parts so that the first part of their next forward movement is positive.

Since considerable force may be necessary to force the spear into the fruit, particularly when its point happens to engage a stem or other unyielding part, I provide a positive abutment which is engaged by the fruit while the spear is entering the fruit. This abutment is in the form of a plate 91, integral with an arm 92 which is carried by a short rock-shaft 93. The rock-shaft is journaled in the frame of the machine between the sprocket-wheels 33. A gear 94 is fixed to the rock-shaft and meshes with a rack 95. This rack is formed on a horizontal slide-rod which slides in bearings on the frame of the machine, and carries, at its right-hand end, a cam-roll 96. A cam 97 on the shaft 37 moves the cam-roll and the slide-rod in one direction, while a spring 98, connecting the slide-rod and the frame of the machine, moves it in the opposite direction. The cam is so formed that as one of the fruit-holders attains a position of presentation, as in Fig. 7, the abutment 91 is swung forwardly and upwardly, between the sprocket-chains, into the position of Fig. 8, where its flat vertical surface may be engaged by the end of the fruit. In order that the abutment may be in engagement with the fruit, whatever the size of the latter, at the moment when the fruit is engaged by the spear, provision is made for a short rearward movement of the abutment in its operative position. To this end the arm 92 is provided, as shown in Fig. 10, with an opening 110 inclosing an arm 111 projecting upwardly from the rock-shaft 93. A spring 112, mounted on the arm, engages the rock-shaft and normally holds the parts in the position shown, but when the abutment has been raised to operative position the arm engages the bottom of the fruit-holder, as in Fig. 8, thus arresting its swinging movement, and the continued movement of the rock-shaft then causes the arm 111 to move the arm 92 and the abutment 91 rearwardly, against the opposition of the spring 112, so that as the spear engages and enters the fruit any horizontal movement of the fruit in the holder is limited by this abutment until the spear has fully entered the fruit. The abutment is then quickly released and swings backwardly to the position of Fig. 7, where it does not interfere with the subsequent movement of the chains and the fruit-holders.

Owing to the variable movements of the plunger it is necessary that the movements of the spear be, to some extent, independent of those of the plunger. Accordingly, the spear is mounted, as previously described, in the slide 72, pressed forwardly by the spring 77. The forward movement of the spear is positively arrested when it reaches the position shown in Fig. 12, so that the point of the spear may not engage the base of the fork or other parts of the paring-machine. To this end a stop-arm 101 is located in position to engage the pin 75 when the spear attains the forward limit of its movement, thus arresting the movement of the slide 72 while permitting the plunger to continue its forward movement if necessary. This stop-arm is formed upon a slide-rod 102 which has movements imparted to it for a purpose which will now be described.

After the fruit has been impaled upon the fork 68 the spear must be withdrawn from the fruit, and provision is made whereby the spear is partially withdrawn and loosened from the fruit, while the fruit is still held upon the fork by the plunger, thus insuring against the accidental withdrawal of the fruit from the fork at this time. To this end the slide-rod 102 is provided with a roll 104 engaging a cam-path 105 formed in the cam-disk 79. This cam-path has a dip 106 so located that before the retreating movement of the plunger begins a short backward movement of the slide-rod and the stop-arm 101 occurs. By this movement the slide 72 and the spear are retracted, thus loosening the spear from the fruit. The plunger then returns, carrying the slide 72 with it, and the stop-arm moves forwardly again to the normal position shown in the drawings.

At the bottom of the machine a tank 107 is provided, to receive the water dripping from the operative parts of the machine, and also to retain a supply of water from which the tank 36 may be replenished. In order that this latter operation may be performed automatically each fruit-holder is provided with a small cylindrical receptacle 108, which is mounted on one of the yokes 51 and arranged at such an inclination that it will be filled with water in the tank 107, and will carry the water so received upwardly at the right-hand end of the machine, and discharge it into the right-hand end of the tank 36 as each fruit-holder is brought to position below the chute 28.

The operation of the machine as a whole is as follows: As each fruit-holder reaches a position beneath the chute 28, it is thrown open by the action of a cam 65 located directly beneath the chute and adapted to engage the rollers 64 on the fruit-holder. Here the fruit-holder dwells for a moment while the fruit is discharged from one of the receptacles 21 into the chute, through which it rolls into the fruit-holder. At the next intermittent movement of the conveyer

the fruit-holder, with the fruit, is carried into the water in the tank, and the fruit-holder is momentarily closed upon the fruit by disengagement from the cam 65. During the next three successive forward movements of the conveyer and the intermediate dwells, the fruit is immersed in the water, while the fruit-holder is held open, and the fruit thus has ample time in which to assume a position of equilibrium with its core axis substantially coincident with the vertical axis of the fruit-holder. The next forward movement of the conveyer causes the fruit-holder to close upon the fruit and then rise from the tank. The next two successive advancing movements bring the fruit-holder into the position of presentation with respect to the fork 68 of the paring-machine, the axis of the fruit-holder and the core-axis of the fruit being in horizontal alinement with the fork. The abutment 91 now swings into position in front of the fruit, while the spear 71 advances from the rear and impales the fruit. The abutment then retreats from the fruit and the plunger advances and forces the fruit, in the direction of its core-axis, toward and upon the fork 68. While the plunger momentarily holds the fruit in this position the spear is retracted to loosen it from the fruit, and the spear and the plunger then retreat to normal position, leaving the fruit upon the fork. The operation of the machine is then complete, with respect to the fruit in question, but the fruit-holder is returned to operative position by a succeeding series of movements of the conveyer.

My invention is not limited to the embodiment thereof hereinbefore described and illustrated in the accompanying drawings, but may be embodied in various other forms within the nature of the invention as it is defined in the following claims.

I claim:—

1. A fruit-handling machine having, in combination, a fruit-holder adapted to hold a fruit with its core-axis in a predetermined position, and means for transferring the fruit from the holder by an axial movement of the fruit, said means including a device for impaling the fruit adjacent its core-axis to prevent angular movement of the fruit when so expelled.

2. A fruit-handling machine having, in combination, a holder adapted to hold a fruit with its core-axis in a predetermined position, and means for transferring the fruit from the holder comprising an impaling-device adapted to engage the fruit adjacent its core-axis to prevent angular movement of the fruit, and a plunger for expelling the fruit from the holder while so impaled.

3. A fruit-handling machine having, in combination, a holder adapted to hold a fruit with its core-axis in a predetermined position, and means for transferring the fruit from the holder comprising an impaling-device adapted to engage the fruit adjacent its core-axis to prevent angular movement of the fruit, means for expelling the fruit from the holder while so impaled, and means for imparting independent reciprocating movements to the impaling device and the expelling-means to cause them to successively engage and release the fruit.

4. A fruit-handling machine having, in combination, a fruit-holder open at the top and the bottom and having members adapted to engage a fruit laterally and hold it with its core-axis vertical, and means adapted to move through the bottom of the fruit-holder and expel the fruit therefrom by movement in the direction of its core-axis.

5. A fruit-handling machine having, in combination, a fruit-holder comprising a plurality of parallel, straight fruit-engaging members, and means for moving said members toward each other to cause them to engage and hold a fruit; means for supplying a fruit to the fruit-holder, and means operating through the bottom of the holder to expel the fruit therefrom by a movement in a direction parallel with said fruit-engaging members.

6. In a fruit-handling machine having, a combination, a receptacle adapted to contain liquid to float a fruit, a fruit-holder comprising a plurality of parallel, straight, fruit-engaging members having longitudinal smooth surfaces between which the fruit so floating may be inclosed, yielding means for moving said members toward each other to cause them to grip the fruit after it has assumed its natural position of flotation, and means for moving the fruit-holder from said receptacle to a position of presentation.

7. A fruit-handling machine having, in combination, a fruit-holder adapted to hold a fruit with its core-axis in a predetermined position; means for transferring the fruit from the holder, said means including a device for impaling the fruit to prevent angular movement thereof when so expelled; an abutment adapted to engage the fruit during the impaling operation to prevent its expulsion from the holder, and means for moving said abutment into and out of operative position.

8. A fruit-handling machine having, in combination, an open-ended fruit-holder, means for supplying a fruit to the holder, means for moving the holder to a position of presentation, and means for transferring the fruit from the fruit-holder, the transferring-means comprising members adapted to engage the fruit at opposite ends and to expel it from the open end of the fruit-holder.

9. A fruit-handling machine having, in combination, an open-ended fruit-holder, means for moving the fruit-holder from a position of reception to a position of presentation, and means operable, at the latter position, first to engage the fruit yieldingly at opposite ends, while it is in the fruit-holder, and then to expel it from the open end of the fruit-holder.

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