

United States Patent

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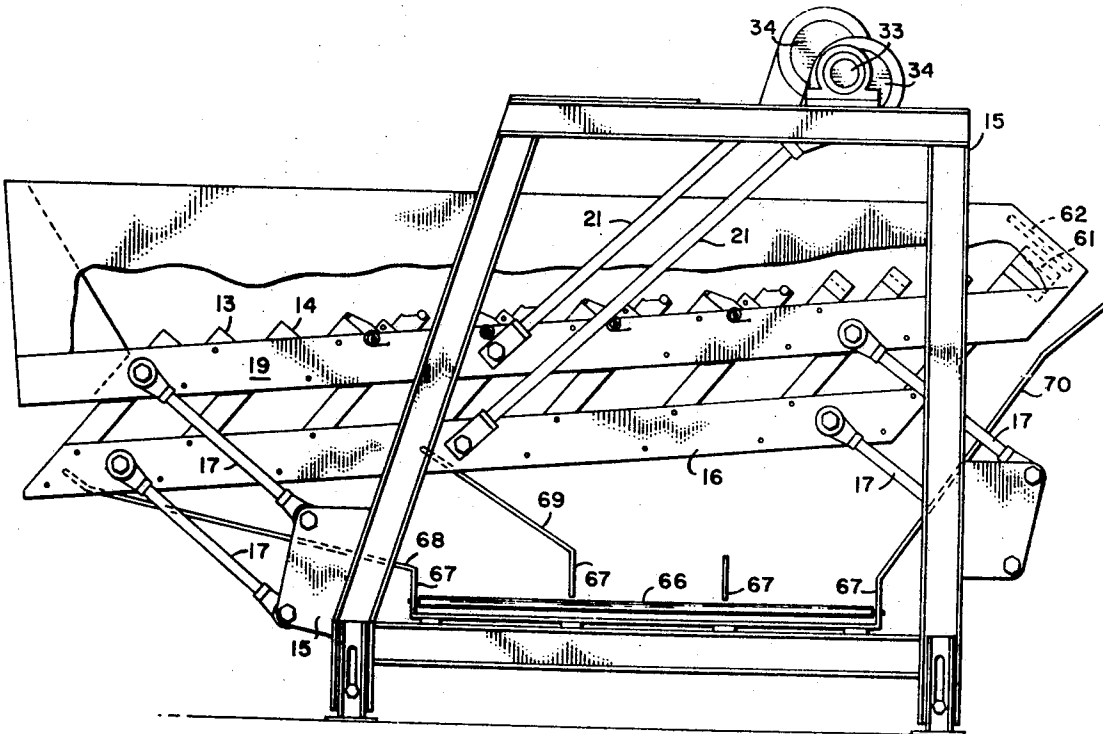
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 Attorney—Allen and Chromy

[54] **SHUFFLE FEED SIZING MECHANISM**
 11 Claims, 14 Drawing Figs.
 [52] U.S. Cl..... 209/73,
 209/98
 [51] Int. Cl..... **B07b 13/04**
 [50] Field of Search..... 209/97, 98,
 106, 85, 73, 74, 379

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ABSTRACT: A shuffle feed sizing structure wherein articles are progressed from valley to valley over a shuffle feed mechanism and as they progress the article advancing face of the shuffle feed member provides a sizing opening of a given width so that the articles small enough to fall through the opening are discharged downwardly beneath the shuffle feed at this point. Various widths of sizing openings are provided along the length of the shuffle feed as required and the largest articles are discharged over the end. Adjacent each of the sizing openings is a rotatable roller serving to roll the articles as they are advanced so that the smallest diameter of an article will determine its passing through the sizing opening. Means are also provided for ejecting articles from the sizing opening if they tend to become wedged or if they remain in front of the sizing opening but are too large to pass through the opening.



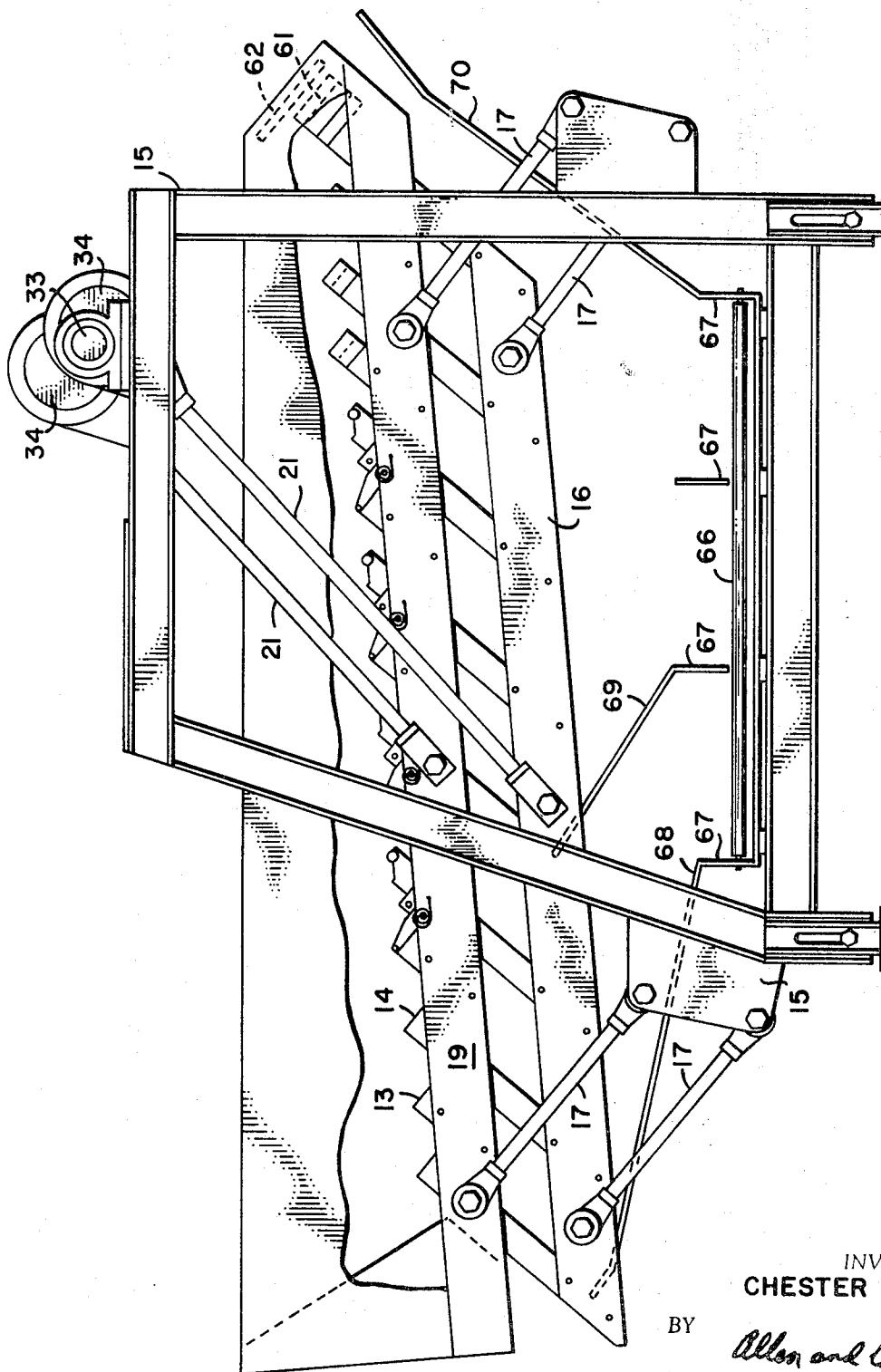


FIG. 1

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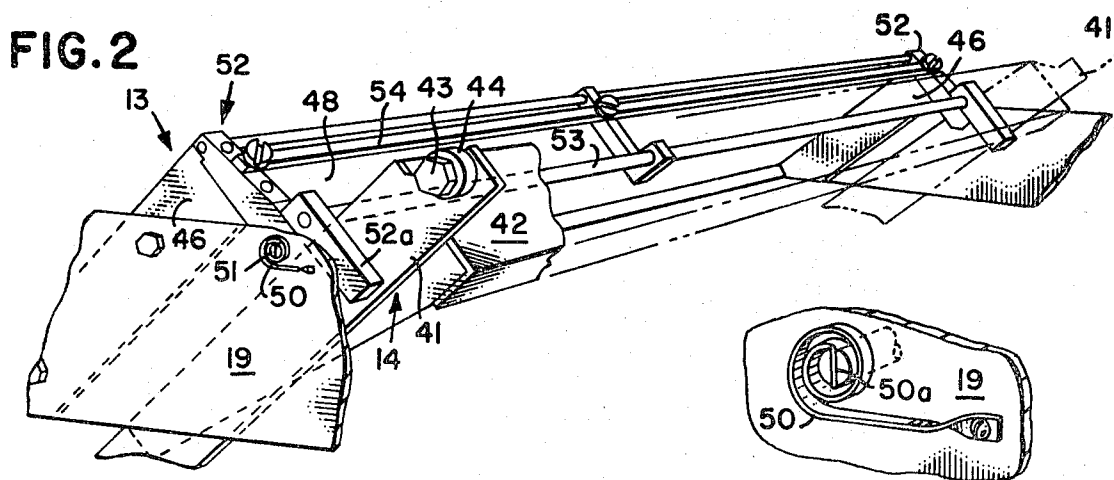


FIG. 2a

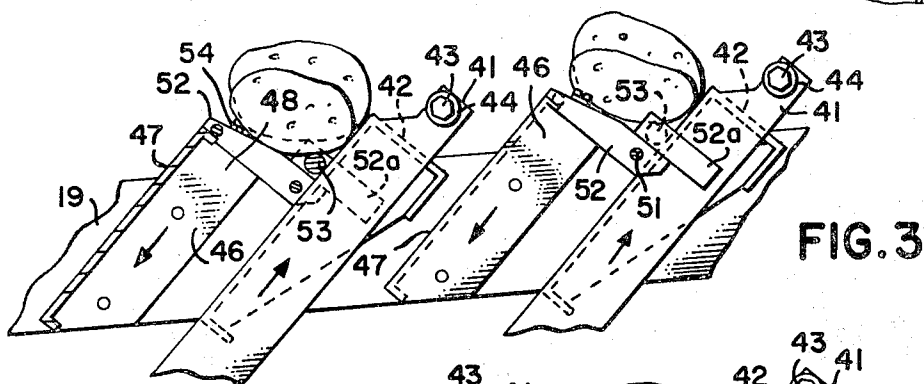


FIG. 3

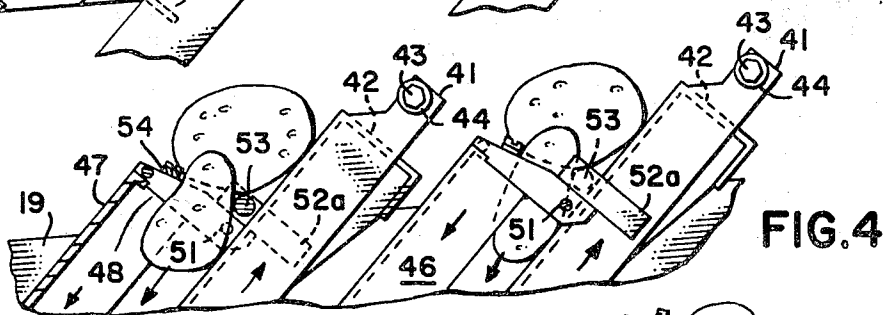


FIG. 4

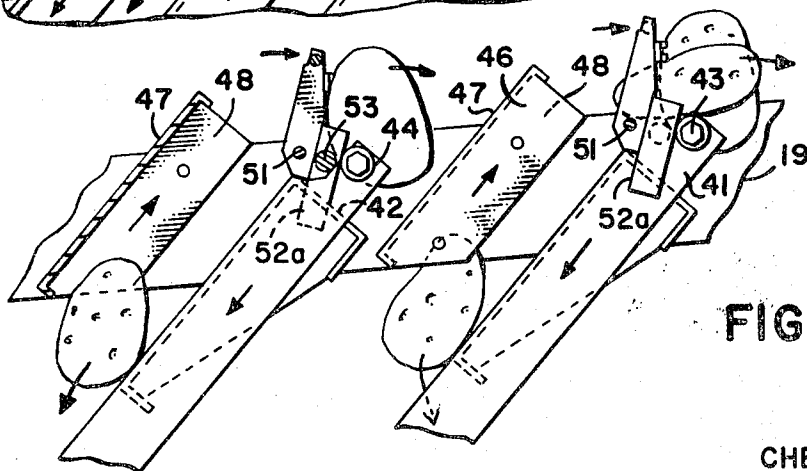
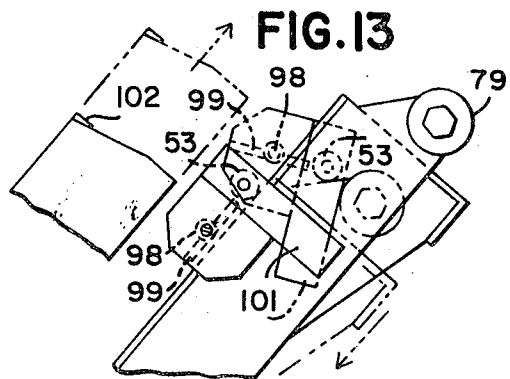
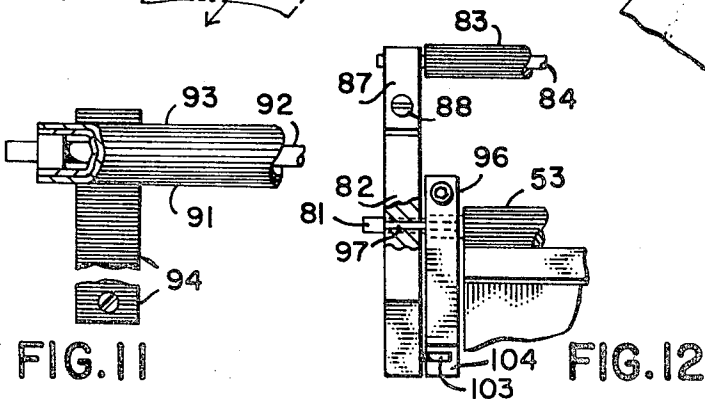
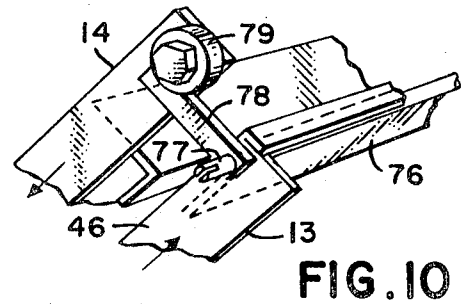
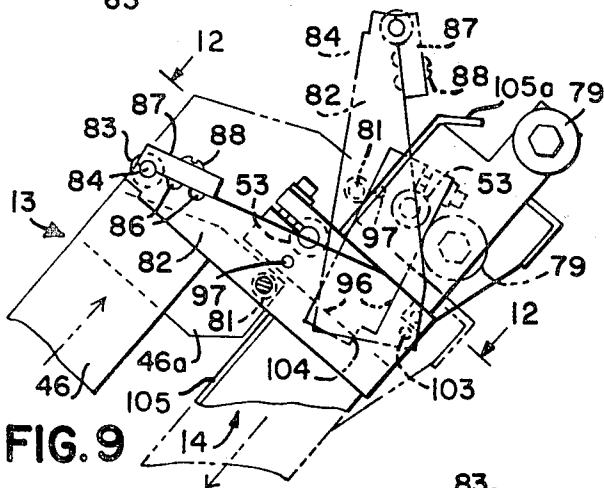
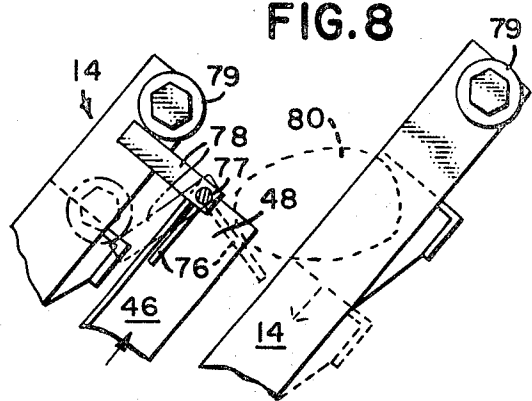
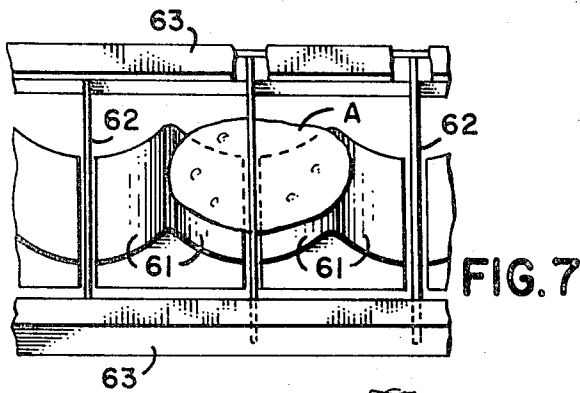
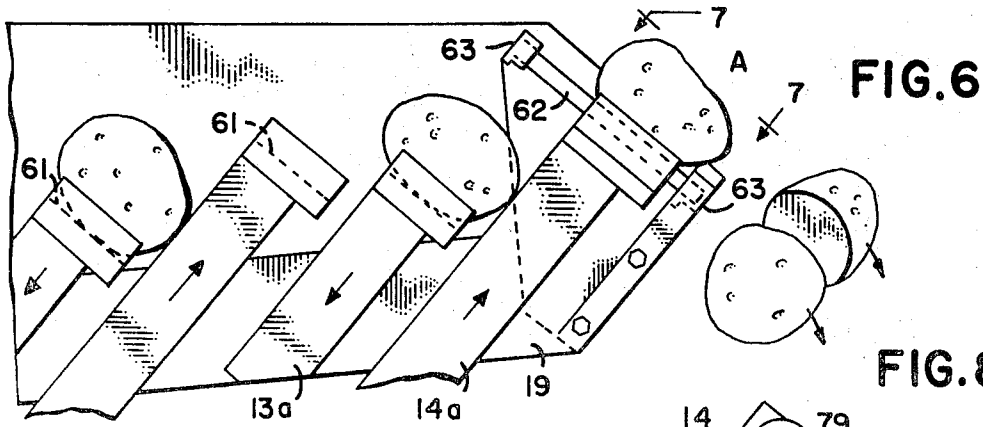


FIG. 5

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SHUFFLE FEED SIZING MECHANISM

DESCRIPTION OF INVENTION

This invention is concerned with the use of the shuffle feed members of the usual type of shuffle feed mechanism to provide a sizing operation on articles being progressed over the shuffle feed. After the articles have been alined at the bottom of the shuffle feed mechanism, so as to be oriented lengthwise and in a row, the sizing operation begins and as the articles are advanced by shuffle feed member having a sizing opening in its article advancing face, the articles are turned so that the smallest diameter of the article is presented to the opening for the sizing operation. The sorting openings become progressively wider as the articles are progressed along the shuffle feed and the largest articles which are due to pass over the end of the shuffle feed are in some cases cut into so as to be of a comparable size with some of the smaller articles, such as potatoes for example.

Accordingly, it is an object of the invention to provide a shuffle feed mechanism which will perform a sizing operation during the shuffle feed of the articles.

Another object of the invention is to provide a shuffle feed of the above character in which the sizing opening is defined by one or more rollers which provide for rotation of the article as it is being gauged for size.

Still another object of the invention is to provide a shuffle feed sizing structure of the above character in which the sizing opening is movable to an article rejecting position to eject the article which is too large at an appropriate time and to dislodge an article which may be improperly engaged with the sizing opening.

A further object of the invention is to provide a shuffle feed sizing mechanism of the above character in which after sizing stroke the sizing opening is enlarged for rejection of oversized articles from the sizing opening.

Still another object of the invention is to provide improved sizing method in which the sizing openings are periodically cleared of any objects which have become wedged therein.

Other objects and advantages of the invention will be apparent from the following description of certain preferred embodiments of the invention, as illustrated in the accompanying drawings, in which:

FIG. 1 is a side elevational view of a shuffle feed sizing structure;

FIG. 2 is a fragmentary perspective view of the sizing face of one of the shuffle feed sizing members;

FIG. 2a is a fragmentary enlarged view of a portion of FIG. 2 illustrating a spring mounting;

FIG. 3 is a schematic side elevational view, partly in section, illustrating one phase of the sizing operation on potatoes;

FIGS. 4 and 5 are views similar to FIG. 3 illustrating further relation of the parts during the relative movement between two adjacent shuffle members;

FIG. 6 is a fragmentary side elevational view of the discharge end of the apparatus and illustrating the cutting operation;

FIG. 7 is a front elevational view taken in a plane indicated by the line 7-7 in FIG. 6;

FIG. 8 is a view generally similar to FIGS. 3-5 and illustrating a modified form of the invention;

FIG. 9 is a view similar to FIG. 8 and illustrating a second modified form of the invention;

FIG. 10 is a perspective view of the modification of the invention shown in FIG. 8;

FIG. 11 is a fragmentary view of the roller having a serrated surface for engaging serrated drive members on one of the shuffle feed members adjacent thereto;

FIG. 12 is a fragmentary elevational view taken as indicated by the line 12-12 in FIG. 9; and

FIG. 13 is a fragmentary side elevational view similar to FIGS. 8 and 9, and illustrating a further modified form of the invention.

Generally, the shuffle feed structure 11 (FIGS. 1, 2 and 3) comprises similar movable sets of upper shuffle members 13 and lower shuffle members 14 which are generally rectangular in their construction and are mounted in inclined position having a long upwardly facing article supporting portion and a short upwardly facing article feeding and supporting portion. The lower set of shuffle feed members 14 extend between and are secured to opposite frame members 16 in the form of side plates which which confine the articles within the transverse dimension of the shuffle feed. These opposite lower members 14 are supported from the frame 15 by four par parallel links 17. The other shuffle feed members 13 are carried by upwardly projecting angles from an upper pair of opposite frame members or plates 19 which are supported by four parallel links 17. The means for driving or reciprocating the sets of shuffle feed members in opposite directions comprises a motor driven transverse shaft 33 suitably journaled on the frame and carrying respective pairs of eccentrics 34 whose eccentric followers are connected by the links 21 with the upper set of shuffle members 13 and the lower set of shuffle members 14, respectively. These shuffle members move in opposite directions simultaneously to effect the feeding movement.

Referring to FIGS. 2 and 3 the shuffle feed members 14 include bent side flanges 41, which project slightly beyond an article supporting and advancing face 42 which extends between the two opposite side flanges 41. Each of the flanges 41 carry a stud 43 upon which a control roller 44 is mounted referred to, more particularly, hereinafter. The adjacent shuffle feed sizing member 13 includes respective side flanges 46 joined across the top of the shuffle feed member by an article supporting surface 47, so that an opening 48 is provided in the article advancing face of this shuffle feed member 13. The respective side plates 19 for this shuffle feed member 13 provide a journal for respective pivot shafts 51 at either side and these pivot shafts 61 provide a support for a sizing frame 52 which affords a framing for the opening 48. The frame 52 (FIG. 2) is spring urged in a counterclockwise direction to be maintained in sizing position across the advancing face of the flight 13 and for this purpose the pivot shaft 51 projects through the frame member 19 (FIGS. 2 and 2 a) and is slotted to receive the end of a spiral spring 50, the projecting end of the spring being anchored by an ear 50a. The sizing frame is made up of a side lever 52, a bottom crossroller 53, and an upper sizing bar 54 attached to the respective levers 52 by means of suitable screws. The lever 52 has a depending portion 52a which is alined with the control roller 44 on the adjacent shuffle members 14. As the relative movement of the adjacent shuffle members 13 and 14 continues in the direction indicated by the arrows in FIG. 3, FIGS. 4 and 5, the roller 44 eventually contacts the lever arm 52a of the lever 52 and causes it and sizing frame 52 to rotate in a clockwise direction to eject any articles too large to pass through the sizing opening over the end of the adjacent shuffle feed member 14.

It will be noted in FIGS. 3 and 4 that during the advance of the shuffle feed members 14, each of these is contacted on its upper surface by the respective roller 53 of the adjacent sizing opening so that this roller rotates and also rotates the article resting thereagainst to insure that it presents the smallest diameter to the sizing opening. When the end of this relative movement is reached and the shuffle members 13 and 14 start to move opposite to each other then any articles remaining in contact with or partially in the sizing opening 48 are ejected.

As seen in FIGS. 1, 6 and 7, the end shuffle feed members 13a and 14a respectively are formed with arcuate pockets 61 in their article advancing faces so as to center an elongated article such as a potato with its length parallel to the transverse length of the shuffle member and centered in a pocket 61. The endmost shuffle feed member 14a has its pocket split to carry an article such as a potato A past a stationary knife 62 carried by a frame 63 so that the article is split in half to a more compatible size with the remaining articles which have been sized.

Referring to FIG. 1, a transverse feed belt 66 extends underneath the shuffle feed members and it has various partition

members 67 supported thereabove to divide the belt into different compartments to receive different sizes of the articles being sorted. For example, if potatoes are being sorted the smaller potatoes are directed by a chute 68 to the leftmost path, the intermediate sized potatoes are carried by a chute 69 to the middle compartment, and the larger potatoes will be directed by a chute 70 to the rightmost compartment on the belt 66.

Referring to FIGS. 8 and 10 a modified form of the invention is shown wherein the sizing opening 48 has provided adjacent the upper edge thereof an article ejecting blade 76 carried by a transverse shaft 77 pivoted in the sidewalls 46 of the shuffle feed sizing member 13. This ejecting blade 76 is normally in an out of the way position as seen in full lines in FIG. 8. The supporting shaft 77 for the ejecting blade 76 carries at each end an upright arm 78 which is disposed in the path of a roller 79 journaled on the adjacent shuffle member 14. The arms 78 are maintained in upright position and the blade 76 in its out of the way position by a spiral spring having one end fastened to the shaft and the other end fastened to the sidewall 46 of the shuffle feed sizing member 13. When the shuffle member 14 moves in the direction of the arrow in FIG. 8, the arms 78, the shaft 77 and the ejecting blade 76 are swung from the full line shown to the dotted line position so as to eject a potato 80 from the opening. In the event an article being sized, such as a potato for example, is late in entering the sizing opening so as to interfere with the swinging of the ejecting blade 76, such an article will be crushed or cut so as to avoid jamming of the mechanism.

Referring to FIGS. 9 and 12 another modified form of the invention is shown wherein a sizing frame 82 is mounted and controlled in the same manner as disclosed in connection with the sizing frame 52. This sizing frame 82 carries movable means in the form of a roller or sleeve 83 journaled on a transverse shaft 84 to define the upper edge of the sizing opening, the lower edge being defined by the roller 53. The shaft 84 may be mounted in any one of a series of semicircular recesses 86 in sidearms of the frame 82 and is held in place in the selected recess by respective clamping plates 87 at either side of the frame. Clamping plates 87 are each secured in place by a screw 88. To provide for sure ejection of any article which is of a size to become wedged between the upper roller 83 and lower roller 53 defining the sizing opening, means is provided at the end of the sizing stroke of the shuffle feed sizing member to separate these rollers at the same time that the sizing frame is tilted from a sizing position to an article rejecting position. The sizing frame 82 is pivotally mounted about a pivot pin 81 in a downward extension 46a carried by the sidewall 46 of shuffle member 13. The roller 53 defining the lower edge of the sizing opening is journaled in a lever 96 (FIGS. 9 and 12) which in turn is carried by a pair of pivot pins 97 in the respective side frame members 82. As seen in FIG. 12 the lever 96 depends along the side of and in alignment with the depending part of the lever or side frame member 82. The sizing frame 82 is spring urged to its normal sizing position by a coil leaf spring (not shown) similar to the spring 50 in FIGS. 2 and 2a so that the frame 82 is normally spring held in the full line position shown in FIG. 9. The lever or arm 96 is held by gravity in a similar position. A pin 98 in the depending part of the arm 82 (FIGS. 9 and 12) extends in overlapping relation with a cutaway part 99 of the lever 96 in order to hold the roller 53 against movement upwardly from its proper position in rolling contact with a track 105 secured on the lower adjacent shuffle member 14. By appropriately changing the diameter of the pin 98 an adjustment of roller 53 with reference to its track 105 can be made. Both the lever 96 and the depending part of the side frame member 82 will be engaged by the roller 79 as shown in dotted lines in FIG. 9 and will be turned about their respective pivots 81 and 97. Comparing the full line positions of the rollers 83 and 53 in FIG. 9 with the dotted line positions thereof it is seen that the dotted line positions are spaced further apart so that a potato which becomes wedged in the opening will be freed when the frame

82 and roller 53 are moved to their potato rejection positions at the end of a sizing stroke of the shuffle feed sizing member. It will be noted that the track 105 has a downwardly bent forward position 105a along which the roller 53 travels at the end of its movement to its dotted line position.

Referring to FIG. 13, a further modified form of the invention is shown which is generally similar to FIG. 8 and having a fixed bar 102 to define the upper edge of the sizing opening together with the roller 53 defining the lower edge of the sizing opening. The roller 53 is mounted in a side frame member 101 which is carried by a pivot shaft 98 in the corresponding side frame of the shuffle feed. This pivot shaft 98 also carries a rejection blade 99 extending transversely across the bottom of the sizing opening. The blade 99 is swung from its position parallel to the sizing opening to a position seen at the right in FIG. 13 where it is in inclined position, thus, making a potato ejection sweep through the sizing opening, this sweep being made at the same time that the roller 53 is lowered to increase the size of the opening so as to aid in ejection of any potato which might be wedged therein. This movement of the side frame member 101, rejection blade 99 and the bottom sizing roller 53 are all effected in the usual manner by roller 79 mounted in the adjacent shuffle feed member.

Referring to FIG. 11 a particular form of roller construction is shown for the bottom roller 53 which is journaled on the cross shaft 92 and this roller 91 has longitudinal ridges or knurls 93 which engage with and are driven by a similarly ridged plate 94 secured on the adjacent upper surface of the shuffle feed member 14. These ridges 93 and 94 are similar to straight knurling so as to enhance the drive for the roller 91.

While I have shown and described certain preferred embodiments of the invention, it is apparent that the invention is capable of variation and modification from the forms shown so that the scope thereof should be limited only by the proper scope of the claims appended hereto.

I claim:

1. In a shuffle feed sizing mechanism having a first set of shuffle members extending transversely to the length of the machine, and a second set of similarly disposed shuffle members arranged in alternating parallel relation with said first set to provide transverse valleys, means for effecting reciprocation of at least one set of said members to advance an article from valley to valley of the feed mechanism, each of said shuffle members having a front face which is primarily an article advancing face and an upper face forming a corner with said front face and providing an article supporting surface, one of said shuffle members of said first set having means defining a sizing opening in the article advancing face thereof, means responsive to movement of said defining means on said sizing mechanism to change the position of said defining means from a sizing position to an article rejecting position.

2. In a shuffle feed sizing mechanism as recited in claim 1 in which said frame is normally disposed with respect to the reciprocatory path of said one shuffle member in a sizing position in which the bottom edge of said sizing opening is in advanced position with respect to the top edge of said sizing opening and in the article rejecting position of said frame, said top edge is advanced with respect to said bottom edge.

3. In a shuffle feed sizing mechanism as recited in claim 1 in which said movably mounted frame includes a part extending in overlapping relation with a portion of said shuffle member of said second set, and means on said shuffle member of said second set to engage said overlapping part during relative reciprocatory movement of said shuffle members to effect movement of said frame away from said one shuffle member of said first set.

4. In a shuffle feed sizing mechanism as recited in claim 2, which includes a blade extending transversely across said sizing opening and normally disposed in an out of the way position so as to leave said opening unobstructed, and said blade being movable with said frame to aid in ejecting any articles which partially enter said opening but cannot pass therethrough.

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5. In a shuffle feed sizing mechanism as recited in claim 4 in which said blade has a pivotal mounting and is normally disposed out of the path of said sizing opening, and operating means on an adjacent one of said shuffle members to operate said blade to cause it to sweep through said sizing opening to eject articles therefrom.

6. In a shuffle feed sizing mechanism having a first set of shuffle members extending transversely to the length of the machine, and a second set of similarly disposed shuffle members arranged in alternating parallel relation with said first set to provide transverse valleys, means for effecting reciprocation of at least one set of said members to advance an article from valley to valley of the feed mechanism, each of said shuffle members having a front face which is primarily an article advancing face and an upper face forming a corner with said front face and providing an article supporting surface, one of said shuffle members of said first set having a sizing opening formed in the article advancing face thereof, movable means positioned on said mechanism to define the bottom of the sizing opening, said movable means being positioned to engage a part of the shuffle feed mechanism and to be operated thereby.

7. In a shuffle feed sizing mechanism as recited in claim 6 in which the upper edge of said sizing opening comprises movable means.

8. In a shuffle feed sizing mechanism as recited in claim 7 in which both said movable means comprise rollers.

9. In a shuffle feed sizing mechanism as recited in claim 6, in which movable mounting means is provided for said movable means and means is provided for actuating said movable mounting means and said movable means at the end of a sizing operation to a position to widen said sizing opening.

10. In a shuffle feed sizing mechanism as recited in claim 6, in which means are provided to widen said sizing opening after a sizing operation so as to enable discharge from said opening of an article which has become wedged therein.

11. In a shuffle feed sizing mechanism as recited in claim 6, in which the sizing opening is defined by means including a sizing frame mounted for movement on said one shuffle sizing member and in which said movably mounted frame includes a part extending in overlapping relation with a portion of said member of said second set, means mounting said movable means on said frame for movement relative thereto, said last named mounting means extending in overlapping relation with said portion of said shuffle member of said second set to be engaged thereby during relative reciprocatory movement of said shuffle members to effect movement of said movable means to enlarge said sizing opening while said frame is in article ejecting position.

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