United States Patent [19]

Brown et al.

[11] **3,721,345**

[45] **March 20, 1973**

[54] **METHOD AND MACHINE FOR SELECTING POTATOES OF GIVEN SIZE FROM MASSED POTATOES OF RANDOM SIZE**

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[22] Filed: **May 6, 1971**

[21] Appl. No.: **140,881**

[52] **U.S. Cl.** **209/107**

[51] **Int. Cl.** **B07b 13/04**

[58] **Field of Search** 209/107, 106, 97, 99

[56] **References Cited**

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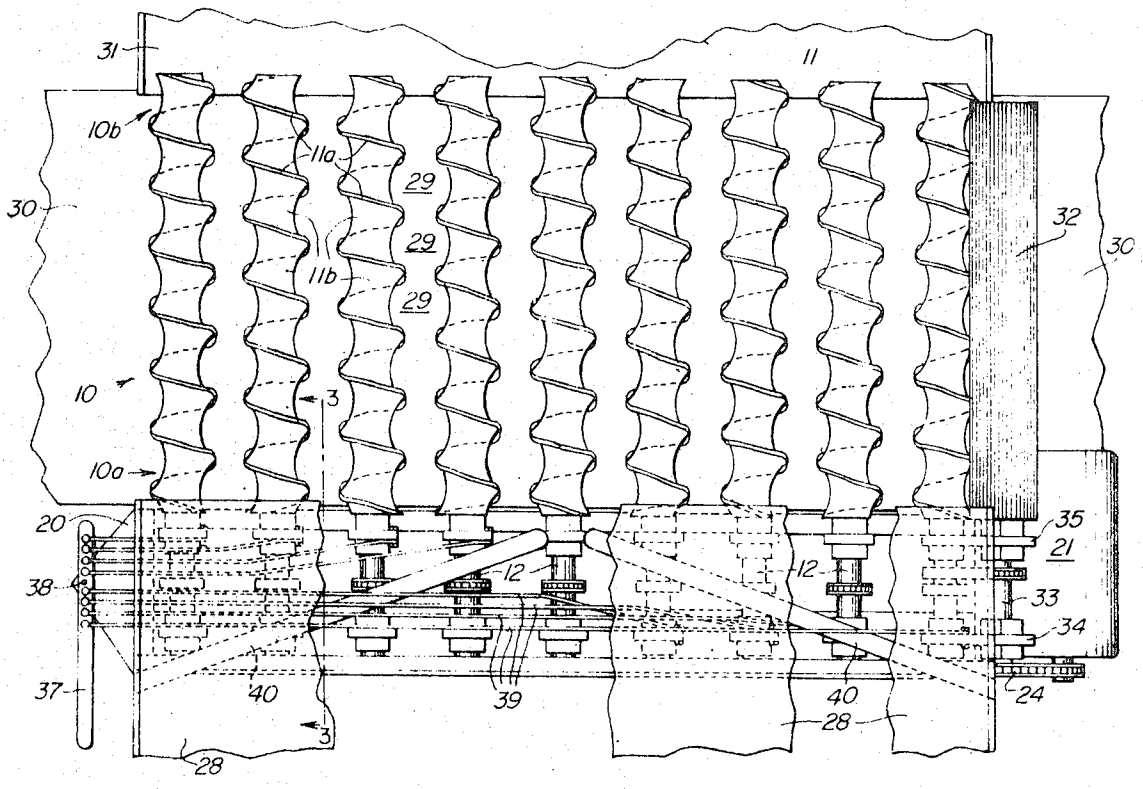
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[57] **ABSTRACT**

Potatoes or other items of random sizes are fed, en masse, onto one end of a sizing deck made up of longitudinally extending screw rolls rotatably mounted in mutually spaced, side-by-side relationship, and are conveyed toward the opposite, discharge end of the deck. Oversize items are retained by the deck and travel thereover to discharge, while others drop through the deck and are collected below. The screw threading of the rolls is of the same hand throughout and of scalloped formation, with uppermost portions of the screw thread and valley substantially aligned, respectively, diagonally across the deck, so as to define longitudinally extending, side-by-side series of sizing openings. The rolls are all rotated in the same direction for conveying the fed items toward the discharge end of the deck, and guide means, preferably a rotating roller, is provided along the side of the deck toward which the items tend to move in their travel from the feed end toward the discharge end of the deck. Provision is preferably made for adjusting the spacing of the rolls relative to each other.

10 Claims, 6 Drawing Figures

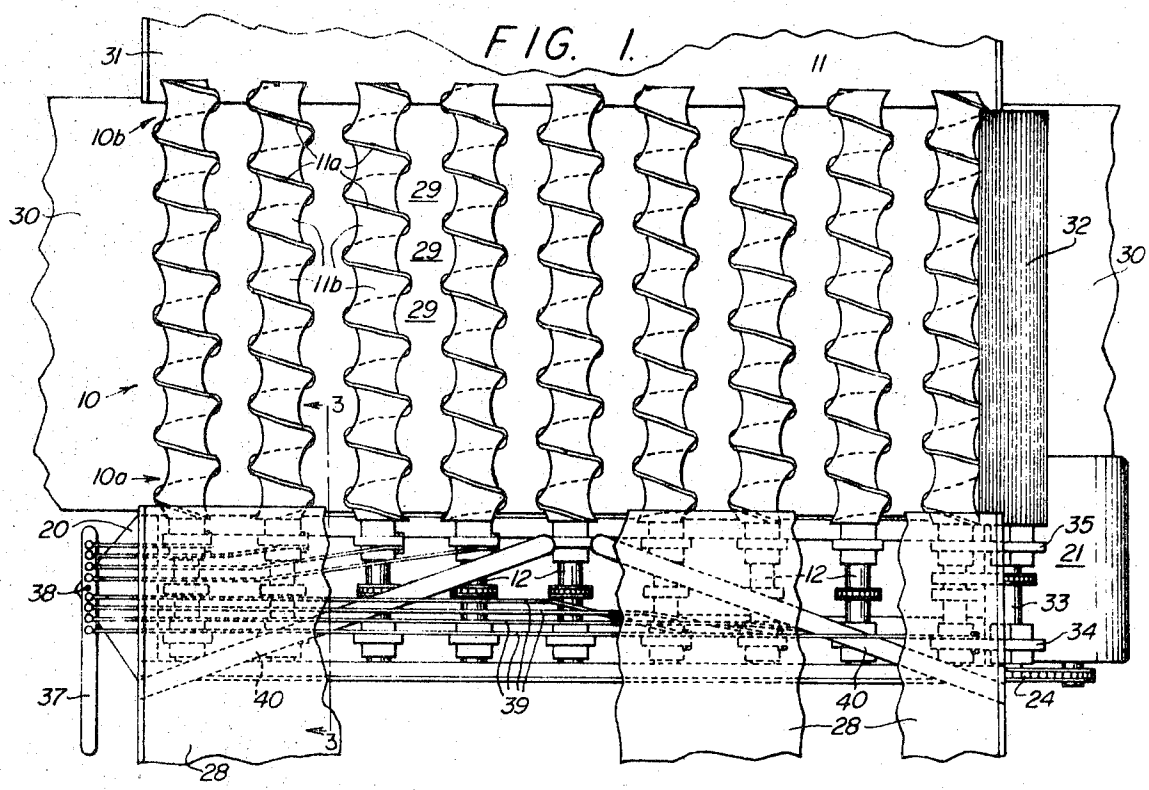


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SHEET 1 OF 2

FIG. 1.



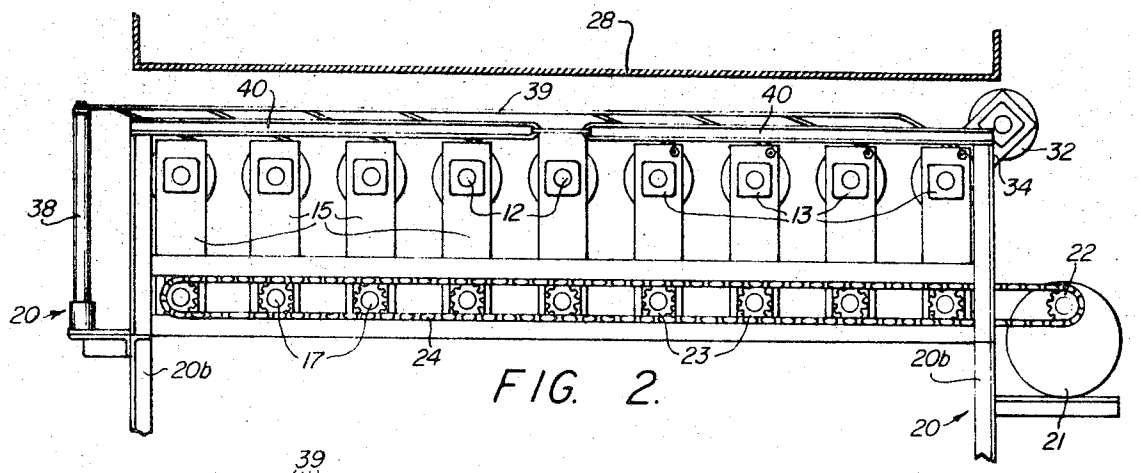


FIG. 2.

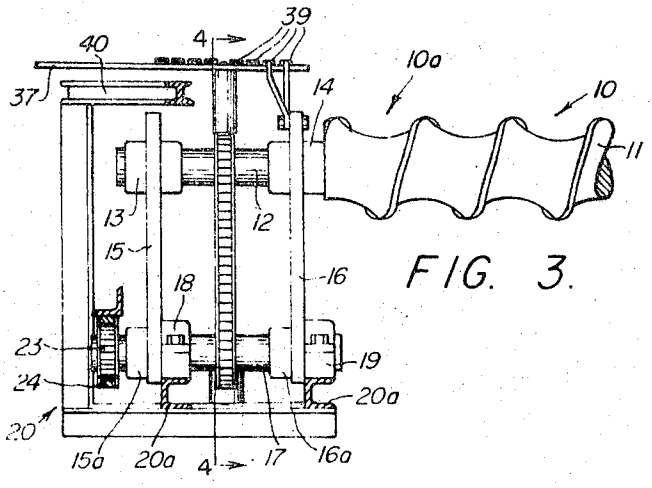


FIG. 3.

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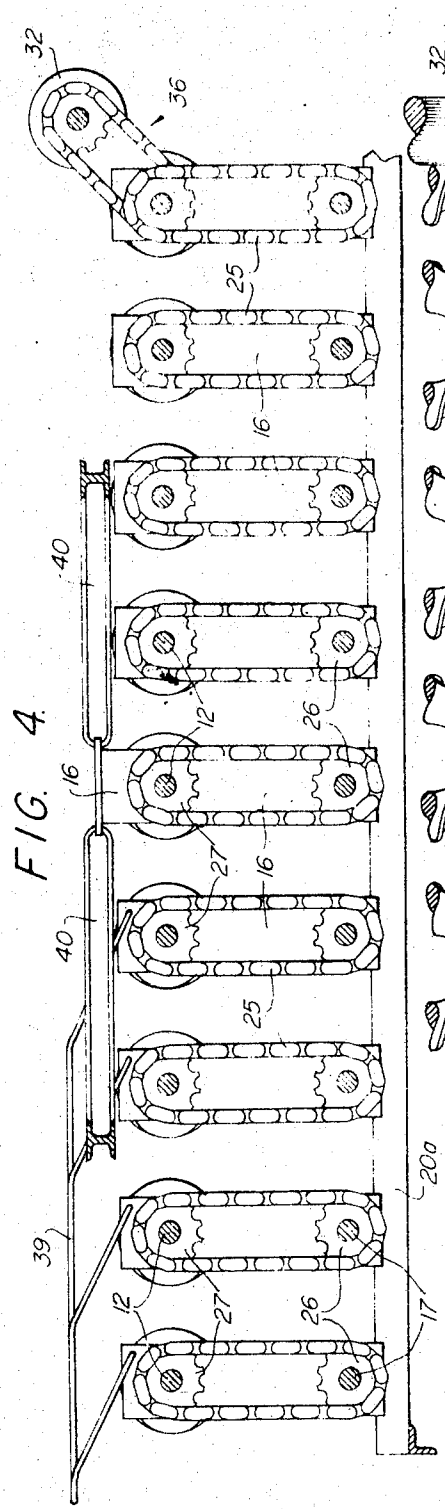


FIG. 4.

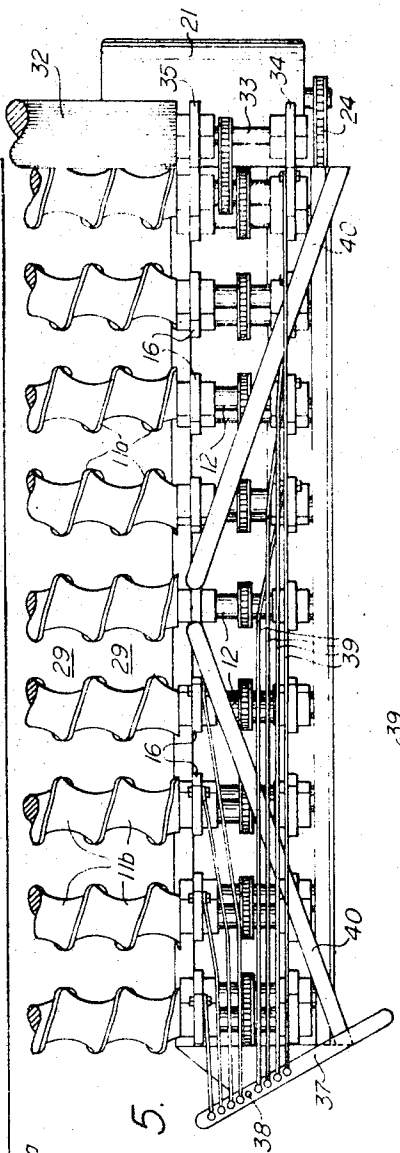


FIG. 5.

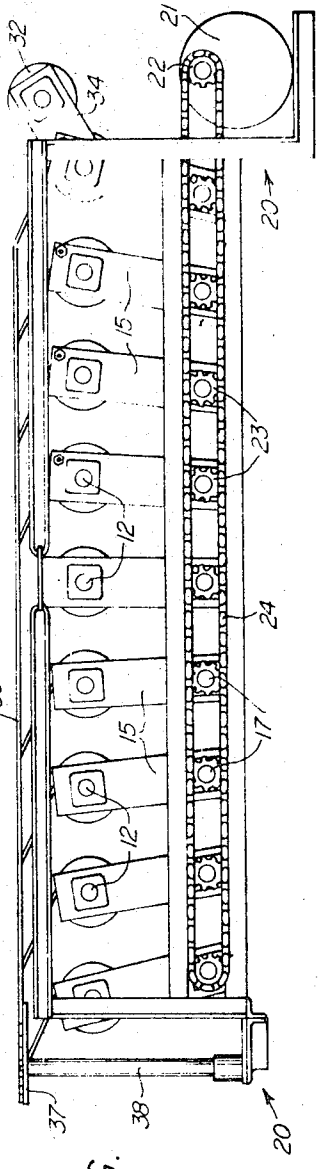


FIG. 6.

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METHOD AND MACHINE FOR SELECTING POTATOES OF GIVEN SIZE FROM MASSED POTATOES OF RANDOM SIZE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention is in the general field of methods and apparatus for separating items of a given size or sizes from a mass of such items of random sizes indiscriminately grouped, and is particularly concerned with selecting potatoes having given size characteristics from a mass of random sized potatoes by passing such mass over a dynamic sizing deck made up of mutually spaced and rotating sizing rolls.

2. State of the Art

The art concerned is highly developed. Mutually spaced, sizing rolls have long been used as a sizing deck for a variety of items of agricultural produce. Mutually adjacent rolls have usually been of opposite hand and have usually been rotated in opposite directions. These have left much to be desired, especially in the handling of potatoes.

SUMMARY OF THE INVENTION

In accordance with the present invention superior sizing results have been achieved with respect to both unpeeled and peeled potatoes, with little or no damage to the potatoes, by utilizing longitudinally extending, screw configurated, sizing rolls of the same hand rotating in the same direction, usually in combination with longitudinally extending guide means, such as a rotating roller, along the side of the sizing deck toward which the mass of potatoes tend to migrate as they travel from the feed end toward the discharge end of the deck. Means are provided, such as a multiple link and lever system (somewhat similar to that disclosed in our copending application Ser. No. 769,022 filed Oct. 21, 1968) for adjusting the spacings of the sizing rolls relative to each other to change the screening size of the sizing deck.

THE DRAWINGS

A specific construction of sizing machine for potatoes, representing the best mode presently contemplated of carrying out the invention, is illustrated in the accompanying drawings in which:

FIG. 1 is a fragmentary plan view of the machine, with portions broken away to reveal the sizing deck and the sizing roll driving and spacing mechanisms therefor;

FIG. 2, a view in elevation looking toward the feed end of the machine, only the sizing deck and its operating mechanism being shown;

FIG. 3, a fragmentary, longitudinal, vertical section taken along the line 3—3 of FIG. 1 and drawn to a larger scale;

FIG. 4, a transverse vertical section taken along the line 4—4 of FIG. 3 and drawn to the same scale;

FIG. 5, a view similar to that of FIG. 1 but fragmentary and showing the sizing rolls and operating mechanism adjusted to widen the spacings between mutually adjacent rolls; and

FIG. 6, a view similar to that of FIG. 2, but corresponding to the roll-adjusted condition of FIG. 5.

DETAILED DESCRIPTION OF ILLUSTRATED EMBODIMENT

In the specific form illustrated, the machine of the invention comprises a sizing deck **10** having a feed end **10***a* and a discharge end **10***b*. Such deck **10** is formed by a plurality of sizing rolls **11**, which extend longitudinally in mutually spaced, preferably parallel, side-by-side relationship from the feed end **10***a* to the discharge end **10***b*.

Each of the rolls **11** is of scalloped screw formation, having a continuous screw thread **11***a* defining a continuous valley **11***b* arcuate in cross-section. The rolls **11** are so arranged in the sizing deck that the uppermost portions of the screw threads **11***a* of the several rolls are substantially aligned diagonally across the deck and so that the uppermost portions of the valleys **11***b* of the several rolls are also substantially aligned diagonally across the deck, all as can be seen from FIG. 1.

The rolls **11** are rotatably mounted at and cantilevered from the feed end **10***a* of the deck by means of respective stub shafts **12** that may be formed integrally with the rolls or may be rigidly secured thereto. Respective sets of bearings **13** and **14**, FIG. 3, rotatably support the stub shafts **12** and are themselves supported by respective sets of uprights **15** and **16**, which are mounted by means of respective hubs **15a** and **16a** for back and forth pivotal movement on respective shafts **17**. Such shafts **17** are journaled by respective sets of bearings **18** and **19** resting on stringers **20a** of a structural framework **20** having legs **20***b* that support the machine wherever located, inside a building or outside on the ground.

The shafts **17** are driven in common from a prime mover **21**, such as an electric motor or internal combustion engine, by means of a chain and sprocket drive comprising a drive sprocket **22**, driven sprockets **23** secured to respective shafts **17**, and an elongate roller chain **24**. Respective roller chains **25**, see especially FIG. 4, connect sprockets **26** on shafts **17** with corresponding sprockets **27** on stub shafts **12**, thereby driving sizing rolls **11** all in the same direction, clockwise as viewed from the several figures of the drawings.

Accordingly, when items such as potatoes are passed en masse onto the feed end **10***a* of the sizing deck, as from the chute **28**, FIG. 1, they are conveyed by the screw action of the sizing rolls **11** toward the discharge end **10***b* of such deck. En route, those items whose size in at least one dimension — in the instance of potatoes usually girth transversely of length — corresponds to or is less than the size of the sizing openings **29**, slip through such sizing openings during travel and fall onto a collecting means below. As shown, such collecting means may be the receiving run **30** of a belt conveyor. The oversize items continue to be conveyed along the sizing deck to the discharge end **10***b* thereof, where they are discharged onto suitable receiving means, such as disposal chute **31**.

Since the tendency of sizing rolls **11** is to move the items being conveyed along sizing deck **10** somewhat toward one side, guide means are provided along the side concerned, here the right side of the deck as viewed in FIG. 1. As shown and as preferred, such guide means takes the form of a cantilevered fluted

roller 32, having a stub shaft 33 rotatably mounted in a set of bracket arms 34 and 35. Such roller 32 is rotated away from deck 10, i.e. clockwise as are the sizing rolls 11, by sprocket and roller chain drive connection indicated generally at 36.

It is a preferred feature of the machine that the spacings between sizing rolls be adjustable within reasonable limits. In the handling of potatoes, the size presently regarded as optimum for many purposes is a girth of about two inches in diameter. Accordingly, for most purposes the respective sizing openings 29 will be maintained at a diameter of two inches. Yet, it is preferred that there be provision for enlarging and reducing this size somewhat, e.g. enlarging the width of the sizing openings to three inches and reducing such widths to an inch. To this end, means for adjusting the spacings between adjacent rollers, so that all of such spacings will remain equal and all of the sizing rolls will remain in parallel, are provided.

As shown, the adjusting means advantageously comprises a manually operable lever arm 37, FIGS. 1 and 5, pivoted to frame 20 at 38 and connected by respective links 39 of respectively different lengths to the uprights 16 in which those several sizing rolls 11 that lie at opposite sides of the center one are journaled. Such center sizing roll is held firmly against lateral movement, i.e., movement transversely of the sizing deck 10, by braces 40 secured to frame 20 and to the upright 16 in which that center sizing roll is journaled. In view of the pivotal mounting of the uprights 16 at their lower ends, movement of lever arm 37 to the left as seen in FIG. 1 will move the rolls 11 simultaneously toward one another to reduce the size of the sizing openings 29, while movement of such lever arm 37 to the right will move rolls 11 simultaneously away from one another to increase the size of such sizing openings 29.

Whereas this invention is here illustrated and described with respect to a certain preferred form thereof, it is to be understood that many variations are possible without departing from the inventive concepts particularly pointed out in the claims.

We claim:

1. A machine for selecting items, such as potatoes, of given size from a random sized mass of same, comprising a sizing deck having a feed end and a discharge end and formed by a plurality of sizing rolls extending longitudinally from said feed end to said discharge end in mutually spaced, side-by-side relationship, each of said rolls being of scalloped screw formation and all being of the same hand with the ridges and valleys thereof substantially aligned, respectively, diagonally across said deck to form longitudinally extending series of sizing openings; and means for rotating said rolls unidirectionally to convey items from said feed end toward said discharge end of the sizing deck.

2. A machine in accordance with claim 1, wherein the sizing rolls are cantilevered for rotation by respective stub shafts extending from corresponding ends of the rolls and journaled in respective sets of mutually spaced uprights at corresponding ends thereof; and wherein the means for rotating said rolls comprise other shafts for the respective rolls that correspond to said stub shafts and are themselves journaled in the respective sets of uprights; means gearing together the stub shafts and the other shafts, respectively; sprockets rigidly secured, respectively, to the said other shafts; an endless roller chain looped around said sprockets in common; and a drive sprocket at one end of said roller chain.

3. A machine in accordance with claim 2, wherein the sets of uprights are pivotally mounted, respectively, on the other shafts; and wherein means are provided for laterally displacing the sizing rolls simultaneously relative to one another, said means comprising an operating lever pivotally mounted independently of said rolls, and links respectively interconnecting said lever with the free ends of uprights of said sets of uprights.

4. A machine in accordance with claim 3, wherein means are provided holding the center sizing roll of the sizing deck rigidly against lateral movement; the operating lever is pivoted intermediate its length; and the links connected with rolls lying at one side of said center roll are all connected to said lever at one side of its pivot, while the links connected with rolls lying at the other side of said center roll are all connected to said lever at the other side of its pivot.

5. A machine in accordance with claim 1, wherein guide means extends longitudinally along the side of the sizing deck toward which the items tend to migrate as they travel from the feed end toward the discharge end of the deck.

6. A machine in accordance with claim 5, wherein the guide means comprises a roller, and means are provided for rotating said roller toward the sizing deck.

7. A machine in accordance with claim 6, wherein the roller is longitudinally fluted.

8. A machine in accordance with claim 1, wherein the sizing rolls are mounted for lateral displacement relative to one another, and means are provided for laterally displacing said rolls relative to one another.

9. A machine in accordance with claim 1, wherein means are provided for feeding massed items onto the feed end of the sizing deck; means are provided below said deck for collecting items that pass through said deck; and means are provided at the discharge end of said deck for receiving items discharged from the deck.

10. A method of selecting potatoes of given size from a mass of potatoes of random size, comprising feeding said mass onto the feed end of the sizing deck of a machine constructed in accordance with claim 1, conveying the fed potatoes longitudinally of said deck toward the discharge end thereof by rotating the sizing rolls of the deck; and discharging from said deck those potatoes that do not pass through sizing openings of the deck.

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