Jan. 29, 1963 T. R. SCHREUDER ET AL 3,075,289

CLASSIFYING MEANS

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FIG. 2

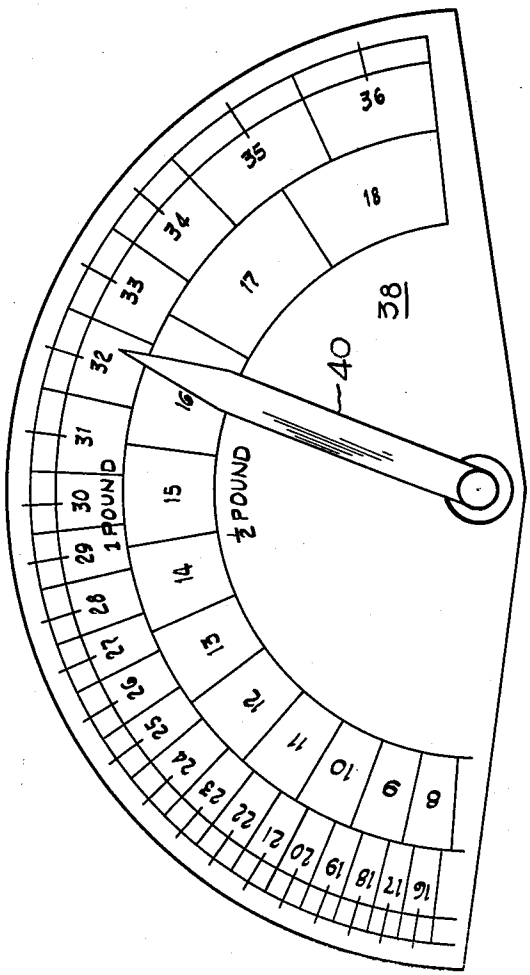
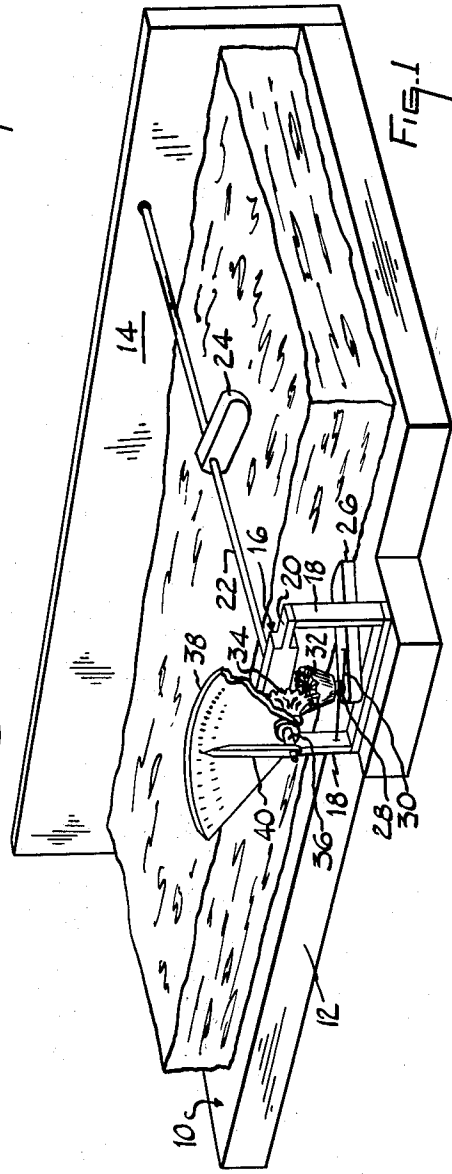


FIG. 1



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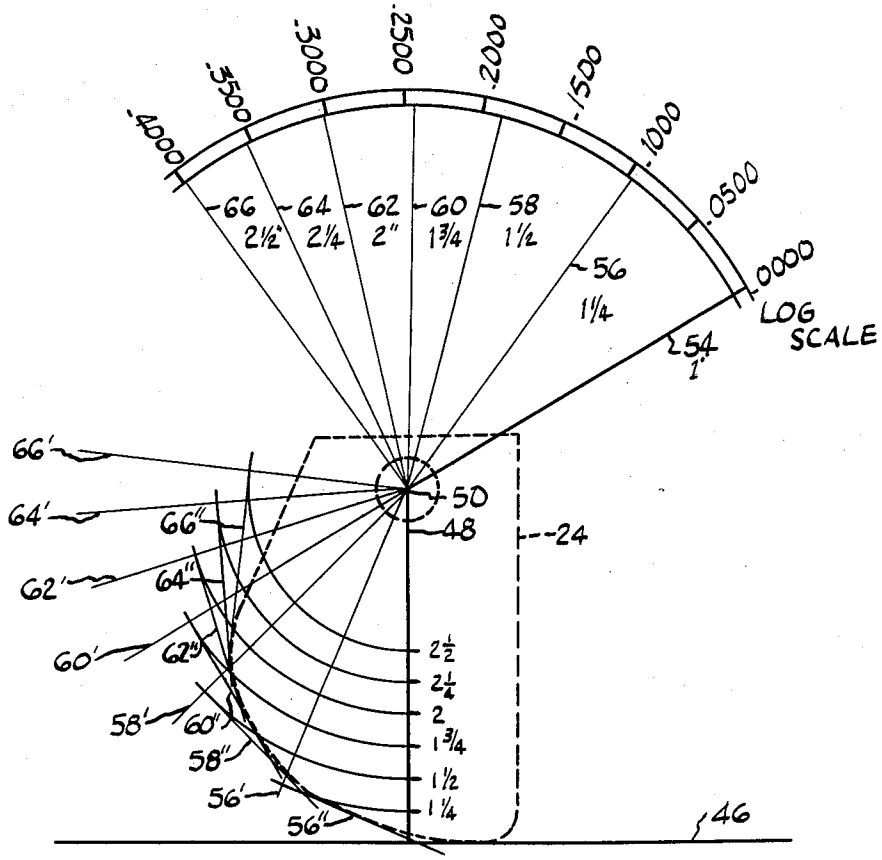


FIG. 3

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3,075,289

CLASSIFYING MEANS

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5 Claims. (Cl. 33—121)

This invention relates generally to improvements in classifying means, and more particularly to an apparatus for indicating a function of the average cross sectional area of a generally rectangular parallelepipedous article such as a bacon slab or the like.

While other adaptations of the invention will become apparent, it may best be understood as applied to the packing industry wherein it is often necessary to estimate the quantity of a finished product obtainable from a large unfinished item. For instance, the modern technique for packaging sliced meats such as bacon, requires that a certain number of slices making up a commonly salable unit of one-half or one pound be assembled for each package. One manner in which this has been done is where the slicing machine operator judges the number of slices per unit weight that a given article to be sliced will produce. Then as the slices are severed from the article, they are segregated into separate groups of the number of slices so determined. Grouping of the slices may be done automatically either by varying the speed of the means for removing slices from the slicing machine; or interrupting the feed of the article into the slicing machine. Apparatus performing in the latter manner is described in Patent No. 2,898,962 and also patent application S.N. 689,860 filed October 14, 1957, now Patent No. 3,015,350.

It will be apparent that successful grouping of slices in the foregoing manner will be dependent in large part upon the accuracy in determining the number of slices per unit weight that a given article will produce. Usually approximation of this number is difficult. In the slicing of bacon, for instance, the dimensions of successive slabs, such as height and width, may vary considerably. In practice it has been found that the usual slabs run from one to two and one-half inches in height, and from seven to ten inches in width. Additionally these dimensions may vary throughout the length of a slab. Consequently, the number of slices per pound obtainable from such slabs may vary considerably. Usually it has been the practice at the beginning of slicing operations for the operator to sort the slabs according to size ranges and then proceed to slice slabs of similar dimensions in series. However, it requires an extremely practiced operator to accurately judge the number of slices per pound obtainable for each and every slab.

Certain classifying equipment has been devised to mechanically perform this task, but for the most part it has not been employed extensively in the packing industry. Prior devices, such as that described in Patents No. 1,989,252 and No. 2,226,527, have required extensive manipulation by the operator for each slab; and have only indicated an approximate number based upon a single measurement taken at a relatively limited section of the article.

Therefore it is a primary object of this invention to provide an improved classifying means having a high degree of accuracy and which is simple to operate.

Another object is to provide an improved classifying apparatus through which a plurality of articles may be passed in rapid order.

It is a further object of this invention to provide an improved classifying apparatus which will account for the range of variation of the cross-sectional area, or a function thereof, throughout the length of an article.

A still further object of this invention is to provide

an improved bacon classifying apparatus having a minimum number of moving parts and adapted to visually indicate the average number of slices per pound obtainable from a bacon slab.

Basically the apparatus comprises a first or overhead gaging means and a second or side gaging means disposed adjacent a pathway along which the article to be classified is moved. A first and second indicator means are associated, respectively, with the first and second gaging means, and are adapted to be observed together to indicate an average function of the cross-sectional area of the item classified.

Other objects and advantages will become apparent upon reading the following specification taken in conjunction with the drawings wherein one embodiment of the invention has been illustrated. However, it is to be expressly understood that said drawings are for purposes of illustration only and are not to be taken as a definition of the limits of the invention, reference being had to the appended claims for this purpose.

In said drawings:

FIGURE 1 is a perspective view of the classifying apparatus;

FIGURE 2 is a detailed view of the indicators calibrated to show the number of slices obtainable from a bacon slab; and

FIGURE 3 is a detailed view of the overhead gaging means as shown in FIGURE 1, namely a cam, and the technique for generating the cam profile.

Referring to FIGURE 1 it may be seen that the device comprises a frame generally 10 including a bed plate 12 for supporting articles to be classified, a guide member 14 along one side of the bed plate 12, and a sub-frame generally 16 at the opposite side of said bed plate which is used to support the indicating means to be described. It will become obvious that a conveyor could be employed along the surface of bed plate 12 for moving items along the guide 14; however, in the illustrated embodiment items are moved by hand.

The sub-frame generally 16 includes vertical members 18 and a horizontal crosspiece 20. A shaft 22 journaled in guide 14 extends through the horizontal crosspiece 20 and is rotatably secured therebetween by means of a collar, not shown, adjacent the crosspiece. The overhead gaging means comprises a first cam 24 fixed to the shaft 22 about midway between guide 14 and sub-frame 16. The major portion of the first cam 24 is eccentric to the shaft 22, thus tending to slidingly rest upon the upper surface of any article passed across bed plate 12 (as shown). The side gaging means comprises a second cam 26 secured to a vertical stub shaft 28 which is rotatably held within the sub-frame generally 16 between the bed plate 12 and horizontal crosspiece 20.

The second cam 26 is urged to slidingly engage a side of an article on bed plate 12 by means of a wire spring 30 coiled about the stub shaft 28 and secured to the cam 26 and a vertical member 18 of the sub-frame 16. A beveled gear 32 is secured to the upper end of stub shaft 28 and mates with another beveled gear 34 mounted concentrically to the shaft 22. Beveled gear 34 is fixed upon a sleeve 36 rotatable about the shaft 22. Also secured to the sleeve 36 by means of a collar and set screw (not shown) is a calibrated indicator dial 38. As may be seen in FIGURE 2 the indicator dial 38 is generally fan shaped and bears substantially logarithmically-spaced calibrations. An indicator pointer 40 is secured to the end of shaft 22 extending through sleeve 36 and beyond the indicator dial 38.

Since the invention is concerned with functions of the cross-sectional area of an article, it is necessary to set up the device to multiply changes in width and height of such an article. However, the rotating indicator means

(indicator dial 38 and indicator pointer 40) are capable only of exhibiting the sum or difference of their respective rotary movements. Therefore, as shown in FIGURE 2, a logarithmic scale on indicator dial 38 is employed; and the first and second cams 24, 26, are generated to rotate their respective shafts 22 and 28 in logarithmic increments according to changes in the height and width, respectively, of the item.

Obviously increases in the cross-sectional area will decrease the number of slices of a given thickness available per pound of product. Accordingly in the illustrated apparatus, the scale on indicator dial 38 must be calibrated so that pointer 40 will sweep toward the lower designation upon increases in height; and at the time the dial 38 will indicate a lower number, with reference to an immovable reference point such as pointer 40, when stationary, as the dial is moved in accordance with increases in width.

With these requirements in mind, plus the fact that articles are to be moved from left to right through the apparatus as shown in FIGURE 1, the first cam 24 is positioned to move the shaft 22 and pointer 40 counterclockwise for increases in height. Similarly, the second cam is positioned to turn the indicator dial 38 clockwise with increases in width; and, as seen in FIGURE 2, the dial 38 is calibrated in logarithmic increments and decreasing number from right to left. The actual number of slices obtainable per pound for slabs of various cross-sections must be determined and dial 38 calibrated accordingly. Since the minimum slab size, for purposes of this illustration, is 1" x 7"; the number of slices per pound for that size will be the designation furthest to the right on the dial face. Furthermore, the apparatus is set so that when the cams 24 and 26 rest on a slab of minimum size the pointer 40 will be in line with the calibration at the right side of dial 38.

As stated, both the first and second cams 24, 26 are devised to rotate their respective shafts 22, 28 in logarithmic increments. To do this, the cams are generated as shown in FIGURE 3. The profile of overhead cam 24, for instance, is generated by first establishing a base line 46 representing the upper surface of an article 1 inch high. A perpendicular line 48 with respect to the base line is then drawn. A center point 50 (point of rotation for cam 24) is marked on the perpendicular line 48 above base line 46, a distance equal to the space between the top surface of the smallest size article (normally a 1" bacon slab) and the axis of shaft 22. The cam 24 will be generated from the point 50.

A circular logarithmic chart 52 is also drawn. As a matter of convenience, it may be described from point 50. A segment of the circle extending from a reference radius 54 is then selected, which segment will not exceed in angle the angular range through which the overhead cam 24 can be rotated mechanically (which in the illustrated embodiment should not exceed 180° and preferably is closer to 90°). A schedule is then made up listing increasing increments in height of a slab between 1" and 2½" and the log of each cumulative height, as follows (obviously a greater number of increments will provide higher accuracy):

Height of article:	Log height
1 inch	0.0000
1¼ inches	0.0969
1½ inches	0.1761
1¾ inches	0.2430
2 inches	0.3010
2¼ inches	0.3522
2½ inches	0.3979

The segment of the circle is then divided uniformly in linear units from the reference radius 54, which will represent the zero rotation of cam 24, for the logarithm spread between minimum and maximum heights; and the various points representing the log of each one-quarter inch increment of height are marked. Radii 56 through 66 are drawn from these points to point 50.

Next, the increments of height are measured from the base line 46 (which represents the minimum height of 1") and marked off on line 48. Angles are then taken from the circular chart between each radii 56—66 and the reference radius 54 to mark off corresponding rays 56' through 66' at corresponding angles from line 48 about point 50. The equal angles are swung in reverse direction from the projected motion of cam 24, considering point 50 as the axis of the cam. Arcs are then swung about point 50 from the height increments marked on line 48 to the corresponding rays 56'–66'. Perpendicular lines 56" through 66" are drawn to each respective ray at the point of intersection of an appropriate arc. The profile of cam 24 may then be described as a smooth curve drawn tangent to the perpendicular lines 56" through 66" between points of intersection with one another.

Cam 26 is similarly generated using a reference radius and base line for the minimum width (7") while maintaining the same scale (linear measure) on a circular chart for logarithms of the increments of width as used for generating cam 24.

Operation of the device will now be apparent. The cams 24, 26 are mounted upon their respective shafts 22, 28 and the dial 38 and pointer 40 are locked upon sleeve 36 and shaft 22, respectively, to indicate the minimum number (or other function) where the cams are in position for the smallest article (a slab 1" x 7"). Preferably pointer 40 should be in a near vertical attitude for the minimum dimension.

Subsequently, it is merely necessary for an operator to pass each article to be classified from left to right (as viewed in FIGURE 1) along plate 12 holding one side against guide 14. Both gaging means will be continuously displaced as the article passes. The operator notes the minimum and maximum sweep limits of pointer 40 across the calibrations on dial 38, and mentally averages the two figures. This average will usually be the classification given to the particular article. As noted in the described embodiment, the dial 38 is calibrated to read directly the number of slices of a selected thickness that will make up 1 pound of the material of the article.

Obviously many modifications and variations of the invention hereinbefore set forth may be made without departing from the spirit and scope thereof. For instance, dial 38 might be calibrated to indicate directly the cross-sectional area of some other function thereof, such as weight per unit length (where density is known), or a price factor, or the like. Furthermore, the size of the apparatus may readily be made to accommodate the various articles and materials; and as previously mentioned means, such as an endless conveyor, may be provided for conveying articles through the device. Therefore, only such limitations should be imposed as are indicated in the appended claims.

We claim:

1. A classifying device comprising: a bed plate adapted to slidably support a unit of material to be classified; a guide upstanding at one side of said bed plate; a first movable cam means positioned above said bed plate to be moved by the upper surface of said material sliding thereon; a second movable cam means positioned opposite said guide to be moved by a side surface of said material; first indicator means operatively connected to said first movable cam means to be moved thereby in a given direction according to increased height of said upper surface; second indicator means operatively connected to said second movable cam means to be moved thereby in a direction opposite said given direction according to increased width of said side surface from said guide, said first and second indicator means cooperating to exhibit visually a function of the cross-sectional area of the material.

2. A classifying device comprising: a bed plate adapted to slidably support a unit of material to be classified; a guide upstanding at one side of said bed plate; a rotatable shaft spaced above and extending across said bed plate at an angle to said guide; first movable cam means secured to said shaft, said cam means adapted to rotate said shaft in accordance with the height of material passed along said bed plate; second movable cam means rotatably secured to said bed plate opposite said guide, said second cam means adapted to move in accordance with the width of the material; first indicator means attached to said shaft and adapted to be turned in a given direction for increases in the height of said material; second indicator means operatively connected to said second cam means and adapted to be turned in a direction opposite said given direction for increases in the width of the material, said first and second indicator means cooperating to exhibit visually a function of the cross-sectional area of the material.

3. A classifying device for meat articles, said device comprising: a bed plate adapted to slidably support an article to be classified; a guide upstanding at one side of said bed plate; a rotatable shaft spaced above and extending across said bed plate at an angle to said guide; first movable cam means secured to said shaft, said cam means adapted to rotate said shaft in accordance with the height of an article passed along said bed plate; second movable cam means rotatably secured to said bed plate opposite said guide, said second cam means adapted to move in accordance with the width of said article; first indicator means attached to said shaft and adapted to be turned generally logarithmically in a given direction for increases in the height of said materials; second indicator means operatively connected to said second cam means and adapted to be turned generally logarithmically in a direction opposite said given direction for increases in the width of the material, said first and second indicator means cooperating to exhibit visually the number of slices obtainable per pound of said article.

4. A device for classifying articles in accordance with a function of the average cross-sectional area of each article, said device comprising: a horizontal bed plate for slidably supporting an article to be classified; a guide upstanding at one side of said bed plate; a vertical frame upstanding at a side opposite said one side; a shaft rotatably supported between said guide and said frame, said shaft spaced above and extending across said bed plate; a first cam secured to said shaft between said guide and said frame, said first cam adapted to turn said shaft in substantially logarithmic progressions in a given direction according to increases in height of articles on said bed; a second cam rotatably supported at a side of said bed plate, the axis of rotation of said second cam being substantially perpendicular to both the bed plate and said shaft; an indicator dial connected with said second cam to be rotatable thereby in substantially logarithmic progression in a direction opposite said given direction according to increases in width of articles on said bed, said dial being disposed to rotate about substantially the same axis as that of said shaft; and a pointer secured to said shaft adjacent said dial to be visually cooperable therewith to indicate said function.

5. A device for classifying meat slabs in accordance with the number of slices of a given thickness obtainable per unit weight from each of said slabs, said device comprising: a horizontal bed plate for slidably supporting a slab to be classified; a guide upstanding at one side of said bed plate; a vertical frame upstanding at a side opposite said one side; a shaft rotatably supported between said guide and said frame, said shaft spaced above and extending across said bed plate; a first cam secured to said shaft between said guide and said frame, said first cam adapted to rest upon the upper surface of a slab and to turn said shaft in substantially logarithmic progressions in a given direction according to increases in height of slabs on said bed; a second cam rotatably supported at a side of said bed plate, said second cam adapted to engage a side of said slab with the axis of rotation of said second cam being substantially perpendicular to both the bed plate and said shaft; an indicator dial connected with said second cam to be rotatable about substantially the same axis as said shaft in substantially logarithmic progression and in a direction opposite said given direction according to increases in width of slabs on said bed, said dial being calibrated in logarithmic progression to show numbers of slices obtainable for various cross-sectional areas of said slabs; and a pointer secured to said shaft adjacent said dial to be visually cooperable therewith to indicate an appropriate calibration on said dial.

References Cited in the file of this patent

UNITED STATES PATENTS

1,989,252	Walter	Jan. 29, 1935
2,226,527	Walter	Dec. 24, 1940

FOREIGN PATENTS

620,336	France	Jan. 17, 1927