May 8, 1928. 1,669,087

W. H. HUNGERFORD

BISCUIT FACING MACHINE

Filed Oct. 29, 1923 2 Sheets-Sheet 1

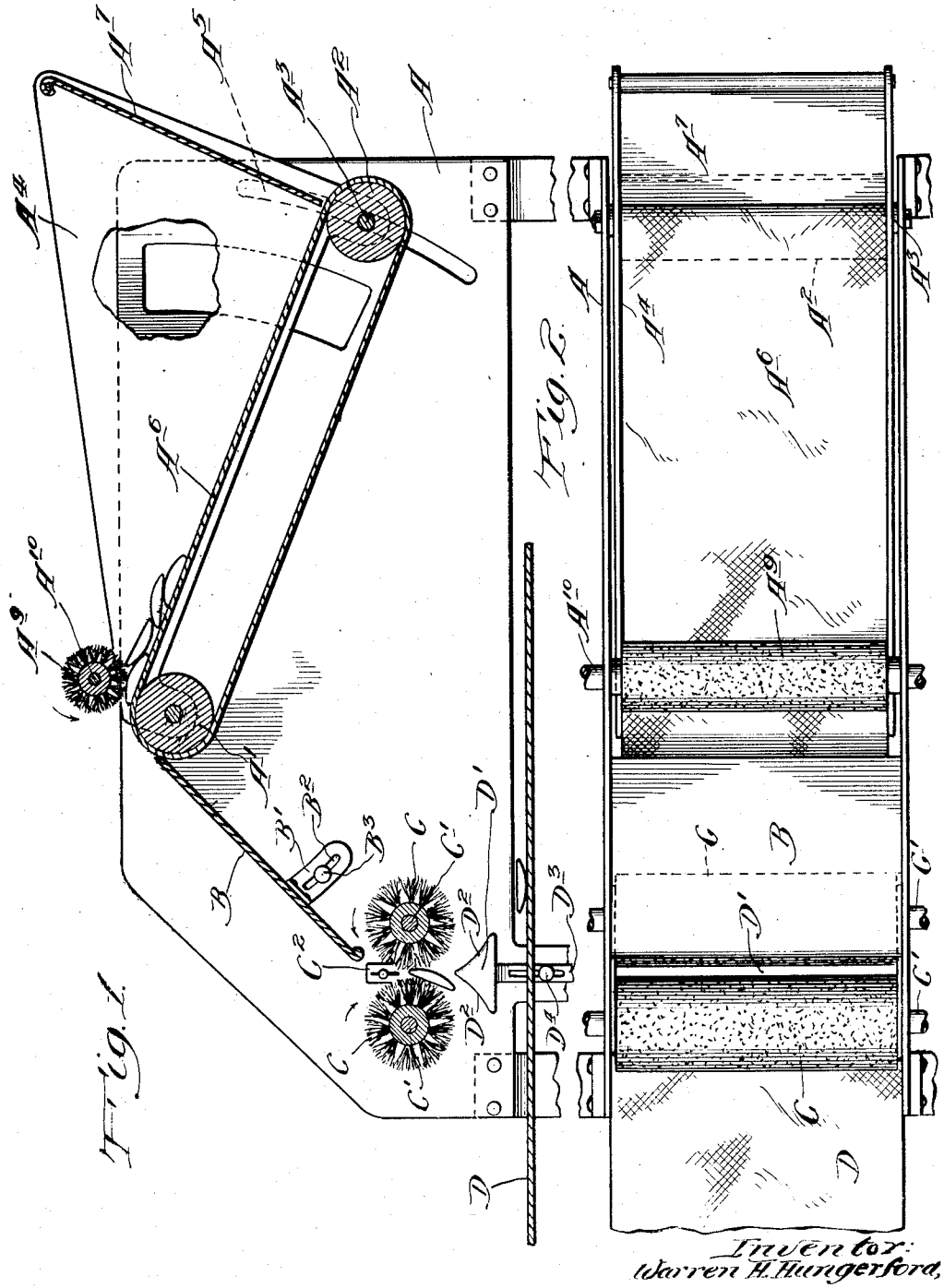


Fig. 1.

Fig. 2.

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Fig. 4.

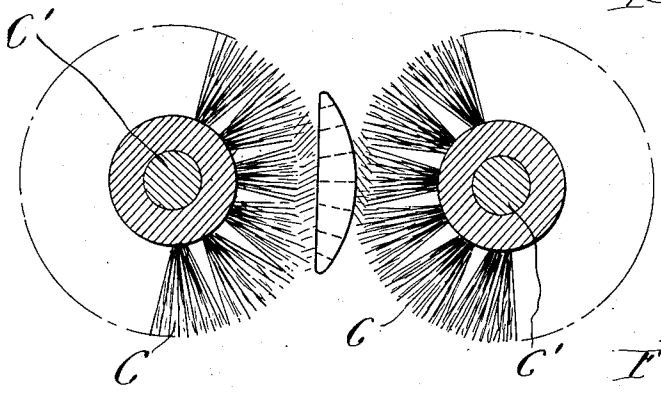
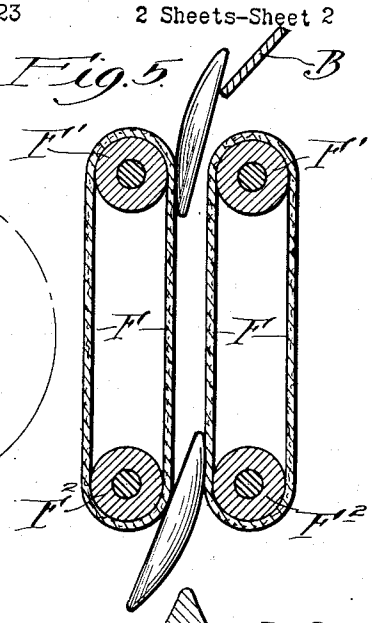


Fig. 5.



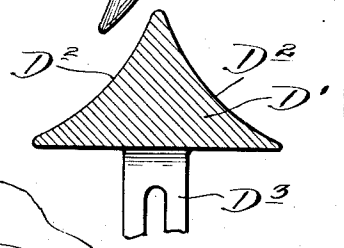
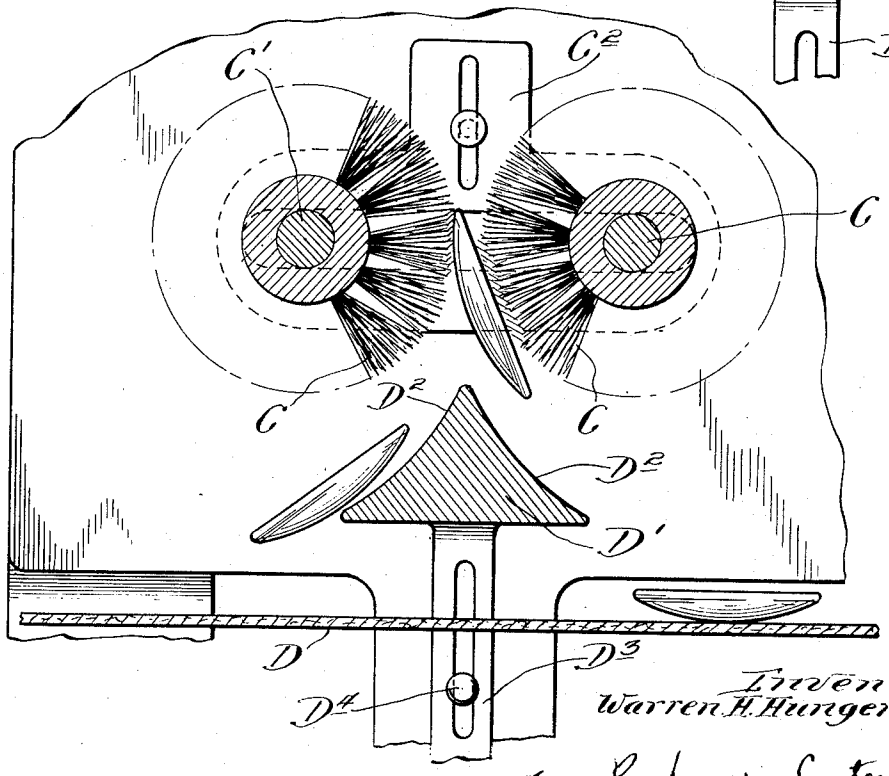


Fig. 3.



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UNITED STATES PATENT OFFICE

WARREN H. HUNGERFORD, OF CHICAGO, ILLINOIS.

BISCUIT-FACING MACHINE.

Application filed October 29, 1923. Serial No. 671,327.

My invention relates to improvements for facing biscuits, crackers, cookies and similar articles. It has for one object to provide a new and improved means for facing all the articles handled with the same side of each object facing in the same direction.

Other objects will appear from time to time in the course of the specification and claims.

The invention is described in connection with handling biscuits or cookies, but I do not wish to be limited to such use. The machine may take the form of a separate unit or it may from part of and be associated with baking, handling, icing or packing machinery. The articles to be faced may be fed to the facer automatically or by hand and they may be discharged and stacked automatically or by hand.

My invention is illustrated more or less diagrammatically in the accompanying drawings wherein:

Figure 1 is a vertical longitudinal section;

Figure 2 is a plan view;

Figure 3 is an enlarged detail;

Figure 4 is a diagrammatic illustration; and

Figure 5 is a detail of an alternative form.

Like parts are illustrated by like characters throughout the specification and drawings.

A, A represents any suitable parallel frame or supporting members. Rotatably mounted on these members is the feed roller A^1 which is driven from any suitable power source not herein shown. A^2 is a roller mounted on a shaft A^3 which is adjustable on the frame members A, A about an arc of which the axis of the roller A^1 is the center. The roller A^2 may, for example, be mounted on the hopper side members A^4 adjustable along the arcuate slots A^5 in the side frame members A. A^6 is a belt conveyor adapted to travel about the rollers A^1 and A^2 and to be driven by the roller A^1. It forms in effect the bottom of the hopper, the sides of which are formed by the adjustable gate member A^7 and the side members A^4 which may be adjusted as a unit with the roller A^2 along the slots A^5. It will be understood that the edges of the members A^4 always lie below and along the sides of the working surface of the belt conveyor and that the end or gate member A^7 closely approaches the roller A^2 leaving just sufficient room for the belt conveyor A^6 to pass therebetween. A^9 is a rotary brush, the shaft A^{10} of which may be mounted in any suitable manner on the side frame members A. The brush A^9 is preferably arranged with sufficient clearance above the roller A^1 to permit only a single layer of biscuits to pass out between the brush and the conveyor belt. The brush is preferably rotated in the direction of the arrow in Figure 1 to oppose the upward travel of the biscuits along the conveyor A^6.

B is an inclined chute mounted in any suitable manner upon the main frame and having just sufficient clearance at its upper end between it and the roller A^1 to permit the passage of the belt conveyor A^6. B^1 is an adjusting element having an arcuate adjusting slot B^2 through which passes the screw B^3 in the side frame member A. The chute B receives the biscuits fed by the belt conveyor beneath the brush and deposits them between the facing brushes.

These brushes C, C are mounted on the shafts C^1, C^1 the ends of which are supported in the side yoke elements C^2 and vertically adjustable upon the side frame elements A. The brushes C^1, C^1 are also horizontally adjustable in the yoke C^2 and are driven in unison and in opposite rotational direction by any suitable driving means, the details of which are not shown herein.

Underlying the brushes C is any suitable lateral conveyor D which may be, for example, an endless belt conveyor. Under suitable circumstances an inclined chute might be used. Extending from side to side of the conveyor is the guide D^1 having opposed inclined surfaces or chutes D^2. It is mounted at each end upon a slotted bar D^3 through which passes any suitable securing means D^4 whereby it may be vertically adjusted.

In the alternative form shown in Figure 5 I substitute for the rolls C, C the conveyor belts F, F which are driven about the rollers F^1, F^1 and F^2, F^2. The biscuits are delivered between said belts and pass therethrough just as they pass between the brushes of the form shown in Figure 1. However, I might reverse the drive of said belts and feed the biscuits to the bottom of the belt assembly and deliver them from the top to any suitable lateral conveyor.

It will be realized that while I have shown an operative device, many changes might be made in the size, shape, number, relation and disposition of parts without departing from the spirit of my invention, and I there-

fore wish my description and drawings to be taken as in a large sense diagrammatic.

The use and operation of my invention are as follows:

In handling and packing biscuits, crackers and the like, it is desirable to arrange the biscuits with the same sides facing the same direction. Where combination biscuits or sandwich biscuits with two biscuits or layers are employed with an intermediate layer of icing or some other material, it is necessary to sort the biscuits out before putting them together. Since biscuits are prevailingly made by dropping the batter on a flat surface, they have a flat lower surface and an irregular upper surface which is frequently convex. My device is particularly adapted to handling biscuits or other objects wherein one side of the object is flat and the other side is convex or irregular or is inclined about the periphery toward the flat side. In fact practically the only form of small and relatively flat or thin object which I cannot face with my machine is a disc in which the two sides or faces are parallel and of equal area.

I employ the following general elements; first, a feeding conveyor; second, an inclined chute down which the biscuits pass from the conveyor; third, a pair of opposed rolls or brushes which receive between them the biscuits dropped from the end of the inclined conveyor; and fourth, a conveyor surface beneath the rolls. Biscuits may be dropped helter skelter upon the first conveyor, and in fact I illustrate a species of hopper of which this conveyor forms the bottom. To prevent the jamming of the biscuits at the top of the hopper conveyor and to control the feed of biscuits to the inclined chute, I use a vertically adjustable rotary brush which is driven in opposition to the movement of the hopper conveyor belt. This brush permits the passage of only one layer of biscuits at a time and these biscuits pass in a forward stream down the inclined conveyor chute. They are received by the two facing rolls which are so driven as to draw the biscuits between and through them and to deliver them below. These rolls may be of any suitable material, but I illustrate them as having any suitable brush body with bristles projecting therefrom. They are mounted on a yoke which is itself vertically adjustable and they are adjustable on the yoke toward and away from each other so that any size or shape of biscuit may be handled. In operation they are adjusted so that the bristles are compressed against the biscuits which pass between the rolls, and it is this compression of the biscuits between the rolls which performs the facing operation.

If a parallel sided disc were fed between the rolls, the rolls, being horizontally aligned, would tend to hold it in vertical position, since the shortest distance through the disc at any point on its surface would be a line perpendicular to each face of the biscuit. Where a biscuit is straight on one side and convex on the other and is passed between the rolls, the shortest distance through the biscuit is at the center of the biscuit represented by a line perpendicular to the flat bottom of the biscuit and erected on the central point of the biscuit. At no other point on the biscuit, however, is the shortest distance through the biscuit represented by a line perpendicular to the flat bottom. As shown in Figure 4 the shortest distance through the biscuit at any point except its center is a line inclined outwardly from the central perpendicular line. The biscuit being gripped between two resilient surfaces naturally, in response to the thrust of the two resilient surfaces takes that position which will permit the resilient surfaces, in this case the surfaces of the compressed brushes, to approach most closely together. As a convex sided biscuit, in response to the rotation of the rolls, passes through the gap between them, the biscuit tilts, as shown in Figure 3 and tends to drop with the convex face down. The biscuit would act in the same way were it gripped between solid cylinders, but yielding cylinders, rolls or brushes are necessary to prevent breakage of the biscuit. As a further assistance in turning the biscuit convex face down, I may employ a double chute or guide vertically adjustable along the path down which the biscuit drops. The biscuits strike either side of this vertical chute and are slid to the right or the left and are finally deposited on a horizontal conveyor, there being a clearance between the horizontal conveyor and the lower edge of the chute to permit the passage of biscuits under the chute.

Under some conditions it is possible to dispense with this double chute or guide. Under some circumstances a wire may be used in its place or any other element adapted to aid in directing the path of the falling biscuits or adapted to break their fall.

In an alternative form of my device, I use instead of the two rolls or brushes, two parallel belts, for example of felt, between which the biscuit is gripped. Along the parallel stretches of the opposed belts the biscuits are carried with the straight side parallel to the abutting belt, but as the biscuits pass between the centers of the belt driving or guiding rolls, the ends of the belts perform the same function as the rolls and act as above described, to tilt the biscuit. If the biscuit is fed upwardly through the belts it tilts with the flat side down. If it is fed downwardly through the belts, it is tilted with the convex side down.

While I have illustrated my machine as employing brushes or belts, it will be obvious that I might obtain a similar result with any opposed elements which are adapted to permit the passage therebetween of biscuits in such manner as to grip them successivly at a plurality of points along the biscuit. As the biscuit shifts between the two opposed gripping elements, it may be tilted just as between the rollers and belts herein shown, conforming to changes in the angular relation of its two sides, and to changes in the thickness of the biscuit.

While in my claims I have used the word "biscuit" I do not wish to be limited thereby, since I may handle any objects which by shape and material lend themselves to similar handling and facing, and it will therefore be understood that the term "biscuit" is used as an illustration and not as a limitation.

I claim:

1. The process of facing articles having opposite sides of different contour which includes gripping them between opposed elements and in tilting them in response to the angular variation of the line of the shortest distance through each article, as it passes between said gripping elements.

2. The process of facing articles having opposite sides of different contour which includes feeding said articles between opposed gripping elements and pressing the articles therebetween, moving said elements in unison to convey the articles so pressed through the space therebetween, tilting each article, in response to the pressure so exerted, at an angle to the axis of alignment of the opposed gripping elements, and discharging said articles from between said opposed elements.

3. The process of facing articles having opposite sides of different contour which includes feeding said articles downwardly between opposed substantially horizontally aligned gripping elements and pressing the articles therebetween, moving said elements in unison to convey the articles so pressed downwardly through the space therebetween, tilting each article from its normally substantially vertical plane, in response to the pressure so exerted, and discharging said articles from between said opposed elements.

4. The process of facing relatively thin articles having one plane side and one side of different contour which includes applying pressure to the opposite sides of said articles and in passing them progressively through said zone of pressure and in tilting them in response to such application of pressure simultaneously to the opposite sides of each article.

5. The process of facing articles having opposite sides of different contour which includes gripping them between opposed elements and in tilting them in response to the angular variation of the line of the shortest distance through each article, as it passes between said gripping elements, and discharging them, when so tilted with the same face of each article facing downwardly upon a conveying member.

6. The process of facing articles having opposite sides of different contour which includes feeding said articles between opposed gripping elements, moving said elements in unison to convey the articles being faced through the space therebetween, discharging said articles from between said opposed elements, each article being tilted out of alignment with a plane perpendicular to the plane of alignment of the opposed gripping elements, and discharging them, when so tilted with the same face of each article facing downwardly upon a conveying member.

7. The process of facing articles having opposite sides of different contour which includes feeding said articles vertically downwardly between opposed substantially horizontally aligned gripping elements, moving said elements in unison to convey the articles being faced downwardly through the space therebetween, and discharging said articles from between said opposed elements, each article being thereby tilted out of alignment with the perpendicular, and discharging them, when so tilted with the same face of each article facing downwardly upon a substantially horizontal conveying member.

8. In a machine of the class described, means for exerting yielding pressure upon opposite sides of a flat article having a beveled edge-portion, and means for moving said article beyond said pressure-exerting means, whereby said article will be discharged therefrom with its body disposed at an angle to the normal direction of feed.

9. A machine of the class described, including, in combination, a pair of rollers having yielding contact surfaces, each adapted to engage one of the faces of a flat article presenting a beveled edge-portion, and means for rotating said rollers whereby to effect a discharge of said article with its body disposed in a plane at an angle to the normal direction of feed.

10. The method of facing flat articles, each having an edge- or face-portion extending at an angle to the other face thereof, which method includes the exerting of pressure adjacent such portion to shift the body of the article to extend at an angle to a receiving surface and thereupon disposing said article upon such surface with one of its faces adjacent thereto.

11. The method of facing flat articles each having an edge- or face-portion extending at an angle to the other face thereof, which method includes the application of pressure upon the articles to cause said portion to

extend downwardly and thereupon permitting the articles to fall upon a receiving surface.

12. A machine of the class described, including, in combination, opposed roller elements having yielding contact surfaces, each adapted to engage one of the faces of a flat article having an edge or face portion extending at an angle to the other face thereof and means for actuating said roller elements, whereby to effect a discharge of said article with its body disposed in a plane at an angle to the normal direction of feed.

13. A machine of the class described, including, in combination, opposed roller elements having yielding contact surfaces, each adapted to engage one of the faces of a flat article having an edge or face portion extending at an angle to the other face thereof, and means for actuating said roller elements, at substantially equal peripheral speeds, whereby to effect a discharge of said article with its body disposed in a plane at an angle to the normal direction of feed.

14. A machine of the class described, including, in combination, opposed roller elements having yielding contact surfaces, each adapted to engage one of the faces of a flat article having an edge or face portion extending at an angle to the other face thereof, and means for actuating said roller elements, whereby to effect a discharge of said article with its body disposed in a plane at an angle to the normal direction of feed, the distance between the opposed effective surfaces of said roller elements, prior to the compression of the flat article therebetween, being substantially less than the thickness of such article.

15. A machine of the class described, including, in combination, opposed roller elements having yielding contact surfaces, each adapted to engage one of the faces of a flat article having an edge or face portion extending at an angle to the other face thereof, and means for actuating said roller elements, whereby to effect a discharge of said article with its body disposed in a plane at an angle to the normal direction of feed, and means for adjusting the distance between said roller elements.

16. A machine of the class described, including, in combination, opposed roller elements having yielding contact surfaces, each adapted to engage one of the faces of a flat article having an edge or face portion extending at an angle to the other face thereof, and means for actuating said roller elements, whereby to effect a discharge of said article with its body disposed in a plane at an angle to the normal direction of feed, guiding means adapted to receive the articles so discharged and a lateral conveyor, underlying the guiding means and adapted to receive and convey the articles delivered thereby.

17. A machine of the class described, including, in combination, opposed roller elements having yielding contact surfaces, each adapted to engage one of the faces of a flat article having an edge or face portion extending at an angle to the other face thereof, and means for actuating said roller elements, whereby to effect a discharge of said article with its body disposed in a plane at an angle to the normal direction of feed, a vertically adjustable inclined sided guide positioned beneath said elements and adapted to receive the articles so discharged, and a lateral conveyor therebeneath.

18. A machine of the class described, including, in combination, a pair of opposed members having yielding contact surfaces, each adapted to engage one of the faces of a flat article having an edge or face portion extending at an angle to the other face thereof, and means for actuating said members whereby to effect a discharge of said article with its body disposed in a plane at an angle to the normal direction of feed.

19. In a machine of the class described, means providing a surface adapted to receive dissimilarly faced articles, a pair of driven rollers having bodies presenting yieldable peripheries, means for delivering said articles to and through said rollers, said rollers being adapted to grip and yieldably engage the opposed sides of said articles and being adapted to dispose said articles upon the delivery surface with similar faces extending in the same direction.

20. In an article facing machine, a pair of cooperating rollers having yieldable contact surfaces adapted positively to engage the opposite sides of the articles to be faced, and means for driving said rollers.

Signed at Chicago, county of Cook and State of Illinois, this 26th day of October, 1923.

WARREN H. HUNGERFORD.