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METHOD OF AND MEANS FOR HANDLING BISCUITS

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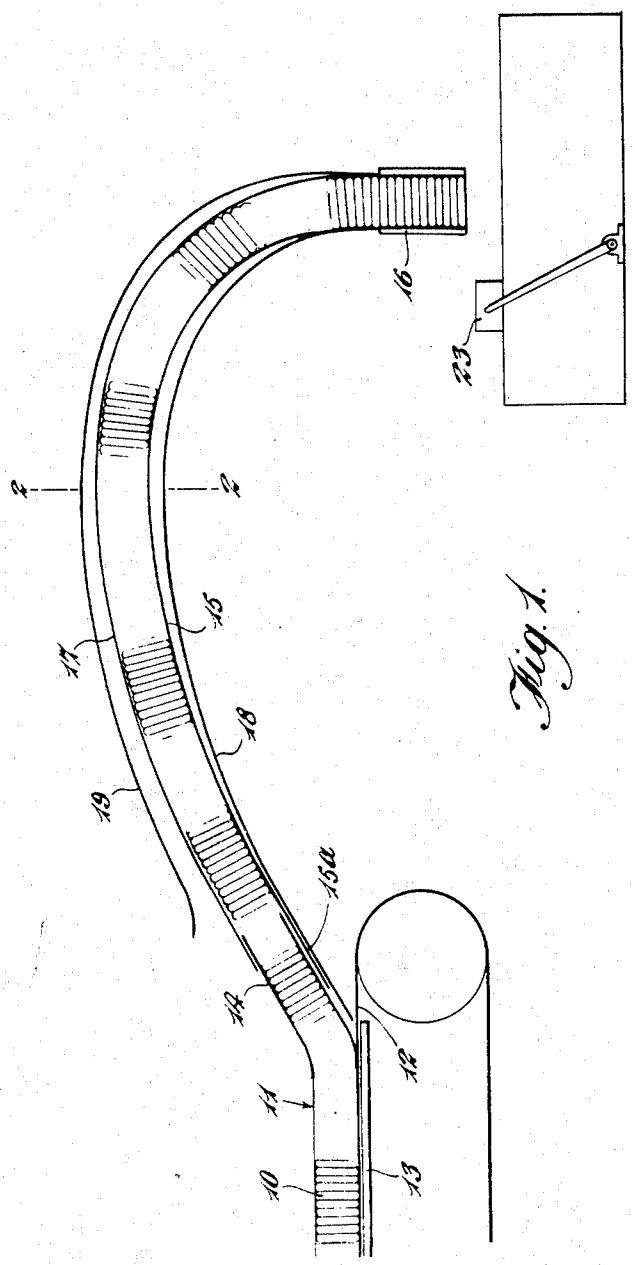


Fig. 1.

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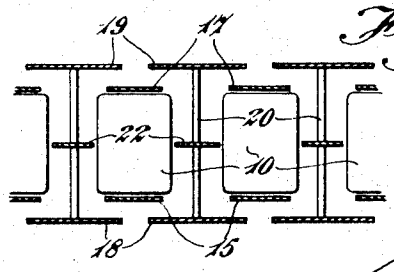
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Fig. 2.



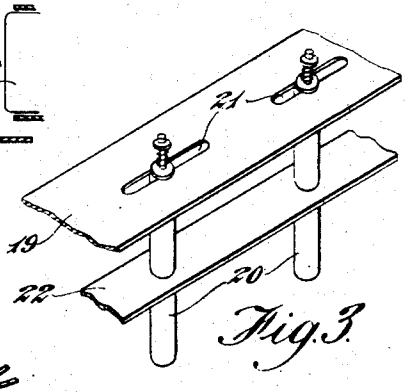


Fig. 3.

Fig. 4.

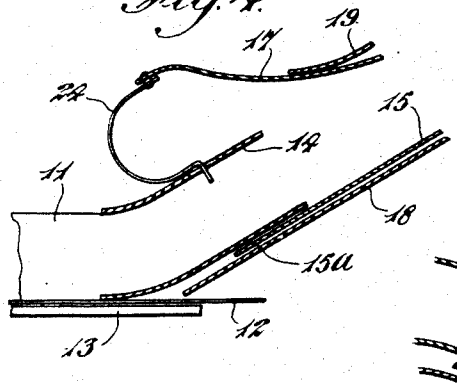


Fig. 5.

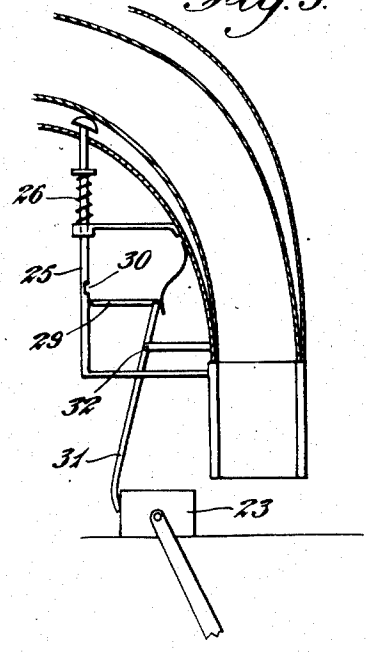
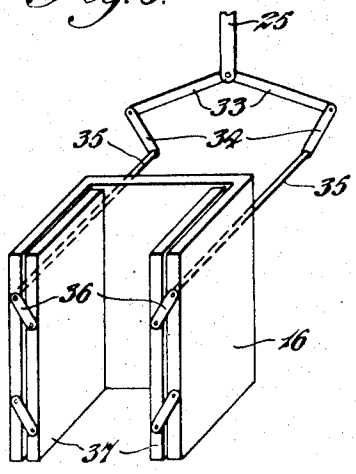


Fig. 6.



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METHOD OF AND MEANS FOR HANDLING BISCUITS

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Application September 21, 1949, Serial No. 116,966
In Great Britain October 21, 1948

7 Claims. (Cl. 193—25)

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This invention relates to the handling of biscuits.

Heretofore, biscuits have had to be taken by hand from a stacking machine for the purpose of feeding them to the hoppers of other machines such, for example, as wrapping machines, creaming machines, chocolate coating machines, icing machines, marshmallow machines, tin-foiling machines, and so forth. This necessity of taking the biscuits from the stacker guides by hand and filling them into the hoppers results not only in a loss of time, but also in the employment of labour which may be usefully employed for other purposes. The chief object of the present invention is to provide a method of, and apparatus for, automatically feeding biscuits to hoppers or the like from which they may be extracted for use in the desired manner. A further object of the present invention is automatically to control the feed of biscuits to the hoppers or the like in a manner which will be described more fully hereinafter.

The method of automatically feeding biscuits from a stacking machine to a vertically disposed hopper or the like according to the present invention comprises confining the biscuits between side guides and causing the biscuits, on edge, between the said guides to push one another along from behind over a band or table which is curved over at right angles in the vertical plane so that the biscuits are turned from what may be regarded as a vertical position to a horizontal position, said band or table terminating at the entrance to the hopper or the like.

The apparatus for automatically feeding biscuits from a stacking machine to a vertically disposed hopper or the like according to the present invention comprises means for feeding the biscuits on edge from the stacking machine to the beginning of a table or band which is curved over at right angles in the vertical plane and leads to the entrance of the hopper and side guides to confine the biscuits laterally on said band or table, the biscuits on edge pushing one another along from behind over said band or table between said side guides.

Preferably, there is provided a further band spaced above the band over which the biscuits push one another along from behind in order to confine the biscuits vertically.

Conveniently, the curved bands between which the biscuits on edge are confined vertically are flexible being fixed at the entrance to the hopper or the like and being adapted to float in use under the pressure of the biscuits thereon.

Means may also be provided for automatically stopping the feed of biscuits on to the curved band when the bands vertically confining the

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biscuits bulge beyond their normal floating position due to the presence of an excess number of biscuits between the bands.

Additionally means may be provided for automatically stopping the feed of biscuits from the curved bands to the hopper or the like should the flexible curved bands sag below their normal floating position due to the presence thereon of less than a predetermined number of biscuits.

In order that this invention may be the more clearly understood and readily carried into effect, reference may be made to the accompanying drawings, which illustrate by way of example and somewhat diagrammatically, the preferred embodiment of this invention and in which:

Figure 1 is a longitudinal sectional view through the means for automatically feeding biscuits from a stacking machine to a hopper.

Figure 2 is a section on line 2—2 of Figure 1.

Figure 3 is a fragmentary perspective view of a part of the apparatus.

Figure 4 is a section through a portion of the apparatus showing the means for arresting the feed of biscuits to the curved flexible band, should there be too many biscuits on the same.

Figure 5 is a section through a further portion of the machine showing the means for arresting the feed of the biscuits to the hopper, should there be insufficient biscuits on the curved flexible band.

Figure 6 is a perspective view showing the means for automatically stopping the feed of biscuits from the curved bands to the hopper when the flexible curved bands sag below their normal floating position.

Referring now to the accompanying drawings, the biscuits 10 on edge from the stacking machine (not shown) are fed between side guides 11 in order to space the lines of biscuits, by any suitable means, for example, by means of an endless conveyor 12 running over a table 13. In practice, a single machine would preferably be arranged to deal with a plurality of lines of biscuits (see Figure 2) each of which would be fed to its own individual hopper, but as the feeding means and control means are similar for all of the lines of biscuits only the operation of the feeding and control means for a single line will be described hereinafter, it being appreciated that the feeding means and control means for the various lines of biscuits are independent of one another.

The biscuits, on edge, are fed by the conveyor 12 to a sleeve 14 which is preferably inclined slightly upwardly, and from the end of the sleeve 14 they are fed on to a flexible steel band 15 which is curved over at right angles in the vertical plane, as shown, and terminates at the en-

trance to a vertical hopper 16. Above the flexible band 15 is a similar flexible steel band 17 spaced from the band 15 by a distance slightly greater than the height of the biscuits being fed, said further band 17 being likewise curved over at right angles in the vertical plane and terminated at the entrance to the hopper 16. The two spaced flexible bands 15 and 17 serve to confine the biscuits vertically and it will be seen that in travelling from the sleeve 14 to the hopper 16, the biscuits are turned from what may be regarded as a vertical position to a horizontal position. It should be noted that from the point where the biscuits enter the sleeve up to the point where the biscuits reach the hopper, the biscuits on edge push one another along from behind. The free end 15*a* of the band 15 is freely slidable under the upper end of the sleeve 14, for a purpose which will be explained more fully hereinafter.

The flexible steel bands 15 and 17 are housed between a fixed lower guide 18 which is, similarly to the bands 15 and 17, curved over at right angles in the vertical plane and extends from the conveyor 12 to the hopper 16, and an upper curved guide 19 the spacing of which from the fixed guide 18 is adjustable in order to enable the machine to be adjusted to handle different sizes of biscuits. To this end, the upper guide 19 is supported from the fixed guide 18 by means of pillars 20, and the guide 19 is provided with slots 21 to receive the upper ends of the pillars 20 so that the spacing of the guide 19 above the guide 18 may be varied by substituting different heights of pillars. The pillars 20 carry side guides 22 to confine the biscuits laterally and to prevent them slipping out between the bands 15 and 17.

There is the fixed curved band 18 and above it the fixed curved band 19. Between these fixed bands 18 and 19 there are the flexible bands 15 and 17, between which the biscuits are fed, the bands 15 and 17 being fixed to the entrance to the hopper 16. The end 15*a* of the lower band 15 slides freely under the sleeve 14 and the end of the upper band 17 is provided with a stop member 24 which will be described more fully hereinafter. Now consider the bands 15 and 17. The biscuits on edge are fed between the bands and, it will be seen that the biscuits are of such a height that they contact (or can, in circumstances which will be described later, contact) the band 17. They rest on the band 15.

In use, the biscuits, and the bands 15 and 17 carrying the same, float between the guides 18 and 19, as shown, and the effective length of the band 15 is made extensible in order to permit of this floating action, and to enable variation of the bulge in the line of biscuits to take place by reason of the free end 15*a* of the band 15 sliding backwards and forwards under the sleeve 14.

It will be seen that I have now provided means for automatically feeding biscuits from a stacker to a hopper without their being handled in any way, and that, assuming the ideal conditions in which the rate of feed of biscuits to the sleeve 14 is the same as the rate of take-off from the lower end of the hopper, the machine will work quite satisfactorily. It is convenient to take off the biscuits from the lower end of the hopper 16 by means of a reciprocating blade 23 in a manner more fully described in my co-pending patent application Serial No. 117,615, filed September 24, 1949, and now abandoned. The fact that the take-off of the biscuits from the lower end of the hopper 16 is, in this case, intermittent gives rise to no disadvantage since the bands 15 and 17 can bulge and will restore themselves due to the free end 15*a* of the band 15 sliding under the sleeve 14.

In practice, however, such ideal conditions will not occur since the feed from a stacking machine is not constant. In order, therefore, to overcome any disadvantage that might arise as a result of the fluctuating feed from the stacker, means are preferably provided for arresting the feed of biscuits to the band if the rate of feed from the stacker is too great, and, similarly, for arresting the feed into the hopper if the rate of feed of biscuits on to the band 15 is too low, and it is in connection with this automatic control of the feed that the floating mounting of the bands 15 and 17 is particularly advantageous.

The operation of the device up to this point is as follows:

It is to be considered that the state of affairs shown in Figure 1 is the normal one. Now it is assumed that the conveyor 12 feeds biscuits on to the band 15 at a rate greater than they are discharged from the hopper 16. In these circumstances there is only one thing that the biscuits can do. They must bulge the bands further, i. e. the curve of the bands must move upwardly. This is the only way in which more biscuits can be accommodated between the end of the sleeve 14 and the entrance to the hopper 16. The limit is, of course, when the upper band 17 contacts the fixed band 19, when the conveyor 12 will slip under the biscuits, but things are so arranged in practice, that this limit is not reached. This is due to the stop 24. Figure 4 of the drawings shows the stop in the terminating position. Normally when the biscuits are being fed, the stop is out of the sleeve. When, however, the bands bulge upwardly, as explained above, the curve of the band 17 increases, and this will cause the stop 24 to move downwardly into the sleeve, in fact to the position shown in Figure 4. The stop 24 lies at right angles to the plane of the band 17 and as this plane swings, so the position of the stop will vary. Figure 4 shows a very extreme case which in practice would not probably be reached. It is to be appreciated that the biscuits lift the band 17 and that the band 15 is, with the construction shown in this application, lifted by reason of the pressure of the return spring 26 (Figure 5).

As take-off from the lower end of the hopper 16 continues, the bands 15 and 17 will tend to relax to their normal floating position and when this is re-assumed the stop 24 will be automatically moved out of the path of the biscuits in the sleeve 14 and the feed of biscuits on to the band 15 will recommence. This arrangement automatically ensures that the rate of feed to the hoppers shall not exceed a predetermined figure.

Now in respect to the case where the number of biscuits being fed on to the band 15 is less than the number of biscuits being fed out of the hopper. The biscuits in this instance will no longer bulge off the band 15 and contact the band 17, but will rest on the band 15 and their weight is such as to overcome the pressure of the return spring 26 which is made only sufficiently strong to lift the band 15 alone, and not the band 15 plus the weight of the biscuits. In other words, when the weight of the biscuits is on the band 15, the band 15 will sag and in so doing will depress a rod 25 so as to depress the same against the action of a light return-spring 26. The lower end of the rod 25 is connected by links 33 to levers 34 mounted on rods 35, which are freely carried by

the sides of the hopper 16. The rods 35 are also, at the appropriate point, provided with arms 36, the free end of said arms 36 being connected to clamping plates 37. These clamping plates 37 are preferably covered with rubber or other suitable material and it will be seen that when the rod 25 is depressed due to the curved bands 15 and 17 sagging the clamping plates 37 will be moved inwardly to grip the biscuits within the hopper 16 and so to prevent the biscuits being fed out from the hopper. Biscuits continue to be fed on to the band 15 which, due to the fact that biscuits are no longer being extracted from the hopper, will commence to reassume its original floating position. The spring 26 functions to return the rod 25 and to move the clamping plates 37 out to their original position in which the biscuits in the hopper are free. It is preferable to correlate the resumption of feeding of the biscuits to the hopper 16 to the position of the reciprocating take-off blade 23 in order to prevent jamming, and to ensure that the feed of biscuits to the hopper 16 is only re-assumed when the reciprocating blade 23 is in one of its extreme positions. To this end, a small latch 29 is provided to take into a detent 30 in the lever 25 to hold the same in position when it is depressed. The latch 29 is urged towards the detent 30 by means of a spring, as shown, and is connected to one arm of a lever 31 the lower end of which projects into the path of the reciprocating blade 23 so as to be rocked about its pivot 32 to remove the latch 29 from the detent 30, against the action of the spring, at the end of the stroke of the reciprocating blade. By this means it is possible automatically to ensure that even after the band 15 has re-assumed its normal floating position, feed to the hoppers will not be resumed until such time as the reciprocating blade 23 is well clear of the bottom of the hopper.

Here follows a further description of the hopper elements and their operation, in different terminology.

As explained above, when too few biscuits are present on the band 15, the rod 25 is depressed. Now the rods 35 of Figure 6 are pivoted in the hopper walls 16 and so can only turn about their own axis. Depression of the rod 25 flattens the toggle links 33 and moves the arms 34 downwardly. In so doing, the rods 35 are turned about their own axis and the levers 36 move inwardly to bring the plates into contact with the biscuits. The latch 29, 30 operates in the following way. When the rod 25 is depressed, the end of the latch 29 projects into the detent 30 and so the rod 25 is held in its depressed position with the biscuits held within the hopper until the latch is released. Thus, even should the number of biscuits between the bands increase so that the biscuits bulge off the band 15, the plates 37 within the hopper are held. The extracting pusher 23 is adapted to strike the pivoted lever 31 at the end of each stroke to the left and in so doing moves the latch 29 out of the detent 30. If the weight of the biscuits is off the band 15, the rod 25 will rise to free the biscuits within the hopper, but if the weight of the biscuits is still on the band 15, the rod will not rise and on the return movement of the pusher 23, the latch will re-engage with the detent 30.

The apparatus according to the present invention is simple, and effectively ensures automatic feed of biscuits from a stacking machine to a hopper without their being handled at any point. Furthermore, the automatic and continuous turning of the biscuits from their edge-on position to the flat position in the hoppers facilitates the manipulation of the biscuits at further stages in the process of producing and/or handling the same.

I claim:

1. In a biscuit feeding machine of a type wherein a series of biscuits entering a hopper are sequentially fed along a chute comprising two curved bands arranged so as to rotate the respective axis of each biscuit, seriatim, from a vertical to an horizontal plane, the improvement which includes means whereby said curved bands become flexible at the portions thereof between which said biscuits are vertically confined, and other means affixing the respective ends of both bands to said hopper, whereby said bands are adapted to float in use under pressure exerted thereupon by said biscuits.

2. A curved band chute as described in claim 1, wherein the curved band over which the biscuits push one another along from behind is effectively extensible, its free end being slidable under the point at which the biscuits are fed on to the same.

3. A chute as described in claim 1, also including means for automatically stopping the feed of biscuits on to the curved band when the bands vertically confining the biscuits bulge beyond their normal floating position, due to the presence of an excess number of biscuits between the bands.

4. A chute as described in claim 1, also including an ingress sleeve for said chute, the free end of the upper curved band extending above said sleeve and being provided with a biscuit stop slidable transversely in said sleeve, the arrangement of said stop being such that with the curved bands in their normal floating position said biscuit stop is maintained clear of the biscuits in said sleeve, whereas when the curved bands bulge beyond their normal floating position due to the presence of an excess number of biscuits therein said biscuit stop is automatically moved into said sleeve, and thereby into the path of the biscuits, whereby to arrest the feeding of biscuits on to the curved band.

5. A chute as described in claim 1, wherein are also provided means for housing the curved flexible bands between a lower fixed curved guide and an upper guide, the spacing of which from the lower guide is adjustable.

6. A chute as described in claim 1, wherein are also provided band housing guides and pillars for spacing apart said band housing guides, the upper guide being provided with slots to receive the upper ends of said pillars in order to permit the spacing between the upper and lower guides to be varied by the alternative use of pillars of different lengths.

7. A chute as described in claim 1, also including band housing guides and pillars spacing apart said band housing guides and simultaneously carrying the side guides which confine said biscuits laterally.

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