March 18, 1958 J. EATON ET AL 2,827,150

PACKING OF BISCUITS OR THE LIKE LAMINAR ARTICLES

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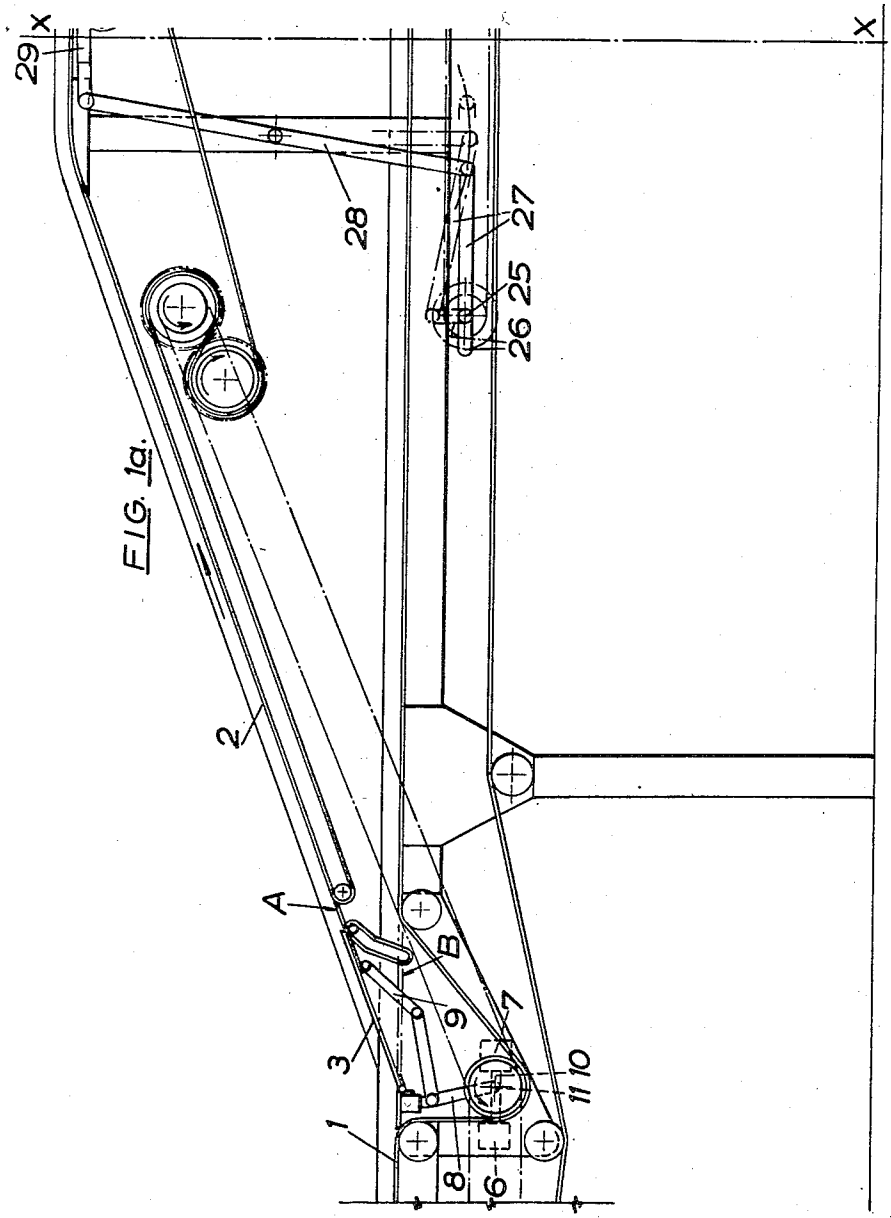


FIG. 1a.

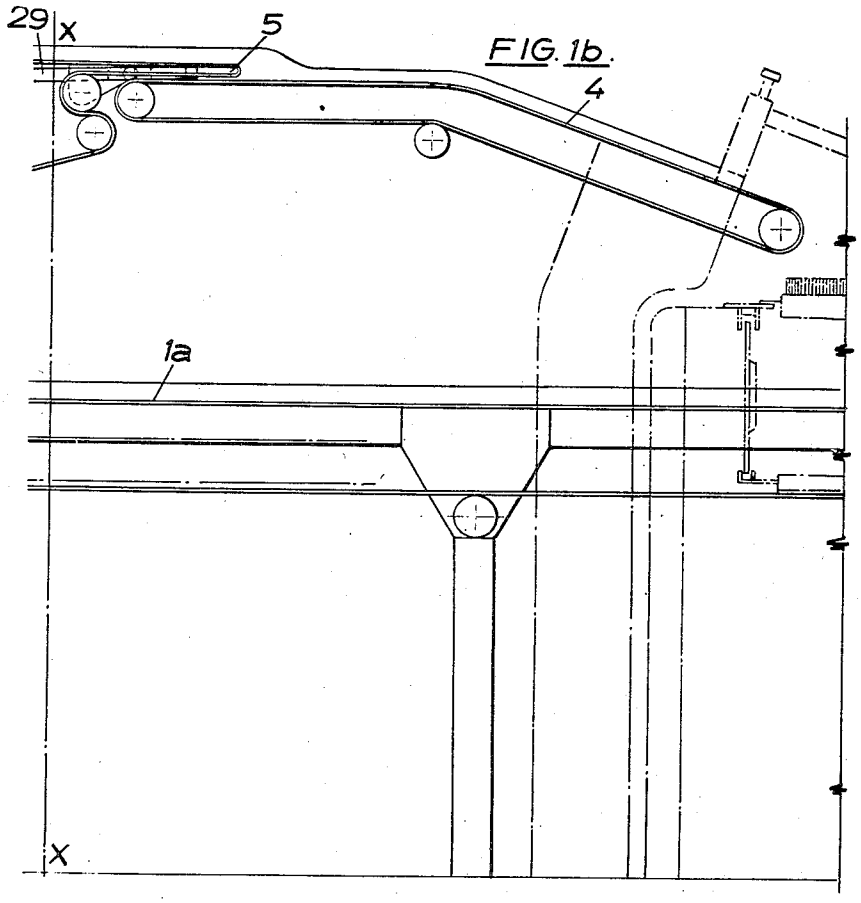
Inventors
JOHN EATON
ROBERT ALEC COULSON
By
Mead Browne, Schuyler & Beveridge
Attorneys

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FIG. 1b.



Inventors
JOHN EATON
ROBERT ALEC COULSON
By
Mead, Browne, Schirpa & Bevaid
Attorneys

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FIG. 2.

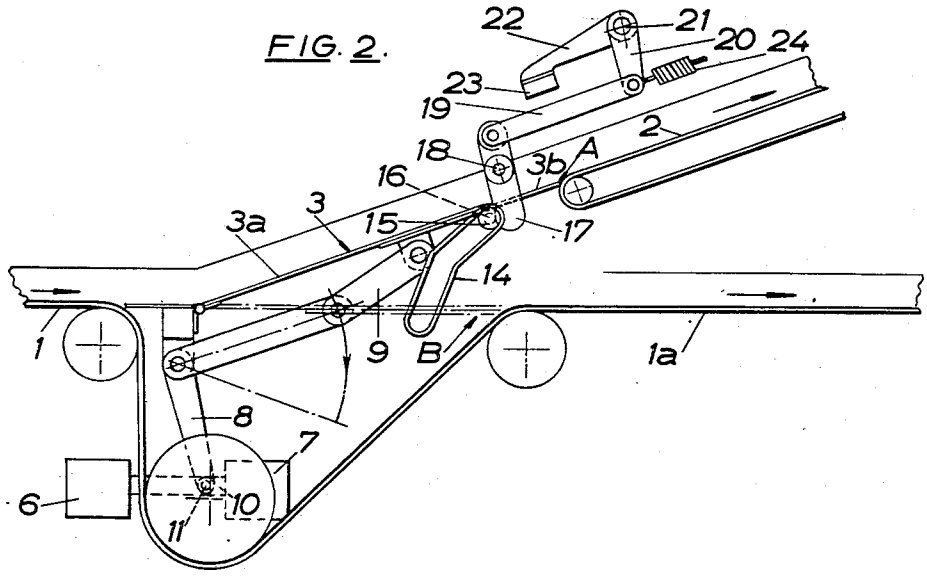
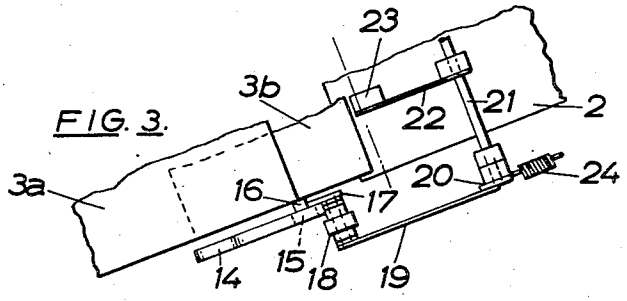


FIG. 3.



Inventors
JOHN EATON
ROBERT ALEC COULSON
By
Mead, Browne, Schuyler & Beveridge
Attorneys

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PACKING OF BISCUITS OR THE LIKE LAMINAR ARTICLES

John Eaton, Newton-le-Willows, and Robert Alec Coulson, Earlestown, Newton-le-Willows, England, assignors to T. & T. Vicars Limited, Lancashire, England, a British company

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4 Claims. (Cl. 198—31)

The present invention concerns the handling of laminar articles such as biscuits, and more particularly relates to an arrangement for dealing with such articles at one of two stations, one adapted for manual batching whilst the other is fully automatic to divide a continuous stream of the articles into batches each containing a desired number of articles. Such an arrangement is suitable, for instance, for positioning in front of a wrapping machine adapted to deal with the batches of articles as delivered thereto.

With such a device division of a continuous stream of articles into batches of equal numbers can be achieved either manually or mechanically at will.

According to the present invention, a handling arrangement for laminar articles such as biscuits includes an initial conveying section feeding the articles in closely packed upstanding formation to a transfer plate adapted to deliver the articles continuously to either of two batching stations, one of which is arranged for manual operation, the other being automatic and formed by two co-operating conveyor bands so actuated that articles delivered in a continuous stream to the first of said conveyor bands are transferred on to the second in batches of predetermined dimensions.

Preferably the transfer plate is adjustable in length and is so constructed that its length alters automatically as it moves between its two positions, selectively to connect the initial conveying section to either the manual or the automatic batching station.

When the automatic batching station is in operation, the first conveyor band can be arranged for continuous movement and can be provided with a reciprocating delivery end, from which the articles pass on to the second conveyor band which is arranged to move intermittently at an average speed equal to that of the first band. By suitable arrangement of the co-operating mechanism, it is possible to arrange for articles to be transferred on to the second band from the first only when the former is moving.

Since it may be necessary for the first conveyor band of the automatic batching station to be ascendant from the transfer plate, means may be provided to prevent any articles on the ascendant band from slipping back when the position of the transfer plate is changed to connect the initial conveying section with the manually operated station, thereby avoiding disruption of the feed.

These and other features of the invention will be more fully described in the following description wherein reference is made to the accompanying diagrammatic drawings which show, by way of example, the invention as applied to the packaging of biscuits.

In the drawings:

Figs. 1*a* and 1*b*, joined together on the line *x*—*x*, together form Fig. 1 which is an elevation of the handling arrangement associated with a wrapping machine;

Fig. 2 is a detail elevation of the transfer plate, and associated mechanism; and

Fig. 3 is a partial plan view of Fig. 2.

An initial conveying section band **1** conveys biscuits in closely packed upstanding formation to a transfer surface and is diverted by rollers beneath this transfer surface to continue in a further run **1***a* over a table to constitute a station for manual packaging of the biscuits.

The transfer surface comprises a hinged plate **3** which can be moved to either one of two positions. In the position designated A (Figs. 1*a* and 2), plate **3** connects with an ascendant endless conveyor band **2** forming the first band of an automatic batching station, while in the position B, plate **3** connects with the run **1***a* of the manual batching station. At the end remote from the plate **3** the conveyor band **2** is lapped about a blade **5** which is arranged for reciprocation in a substantially horizontal plane to facilitate the transfer of biscuits from the continuously moving band **2** to an intermittently moving band **4** (which forms the second band of the automatic batching station), in a manner hereafter described. The blade **5** is adapted for continuous reciprocation with a stroke equal to half the length of biscuit batch to be transferred at any time and at a speed equal to the surface speed of band **2**. The drives applied respectively to band **4** and the blade **5** are so synchronised that the latter moves rearwardly during movement of the former, but forwardly when the former is stationary. The movement of the band **4** is at a speed double that of the band **2**.

The transfer of a batch of biscuits from the continuously moving band **2** to the intermittently moving band **4** is achieved by a combination of the forward movement of band **2** and a simultaneous rearward movement of blade **5** (and consequently the forward edge of band **2**). A complete transfer cycle of one batch of biscuits will now be described, assuming that to start, the blade **5** is in its foremost position and is just about to commence a retracting stroke, so that band **4** is just beginning to move forward at a speed twice that of band **2**. The biscuits from the continuous stream carried by band **2**, spill over the leading edge on to band **4** as it moves forward. Assume the length of a batch containing the desired number of biscuits is L inches. Now, if blade **5** was stationary, one batch of biscuits would be delivered to band **4** when band **2** had travelled L inches. But as band **2** travels forward, blade **5** retracts. These movements are additive, so that L inches of the continuous stream of biscuits are transferred on to band **4** when the surface travel of band **2** is only $L/2$ inches. During this time band **4** has been travelling forward at a speed twice that of band **2**, i. e. it has travelled $2 \times L/2 = L$ inches. But during transfer of the biscuits to band **4**, blade **5** has moved backwards and caused the leading edge of band **2** to retract $L/2$ inches. Consequently L inches of biscuits have been transferred on to $L + L/2 = 3L/2$ inches of the surface of band **4**. The transferred batch of biscuits is therefore less tightly packed than the continuous stream on band **2**, as it occupies half as much space again.

As blade **5** travels forwardly and advances the leading edge of band **2**, the movement is subtractive to the travel of band **2** and there is no transfer of biscuits. Instead the last biscuit of the batch transferred on to the band **4**, being in contact with the advancing edge of band **2** and the first biscuit of the next batch to be transferred, and being supported also on the band **4** in front of the blade **5**, is pushed forwards urging the remainder of the transferred batch forwardly to a progressively lesser extent to close them up into their former closely packed upstanding formation. During this consolidation of the transferred batch (i. e. as the leading edge of band **2** moves forward), band **4** is stationary, so that the first biscuit of the transferred batch remains still whilst the remainder of the batch are pushed forward on to it.

The cycle is then repeated, the transferred batches passing along band 4 for introduction into, for instance, a packaging machine, the initial elements of which can be seen shown diagrammatically in chain-dotted lines at the right-hand side of Fig. 1*b*.

The hinged plate 3 may be controlled electromagnetically and, as shown in the drawings, is under the control of two solenoids 6 and 7. Preferably the movement of plate 3 is arranged to be automatic in dependence on operation of machinery associated with the automatic batching station i. e. a packing machine, so that biscuits are directed to the manual station when the associated machinery is no longer operative. When current for the motor driving the wrapping machine is switched on, the solenoid 7 becomes energised, causing the plate 3 to occupy the position A. The transmission between the solenoid 7 and the plate 3 consists of a bell crank lever 8 and a link 9, the armature 10 of the solenoid being connected to the end 11 of the bell crank lever.

The plate 3 is composed of two parts 3*a* and 3*b* (see Fig. 2). The part 3*b* is slidable underneath the part 3*a*, so that the overall length of the plate may be diminished in changing position from A to B and correspondingly enlarged when changing from B to A, for the purpose explained hereunder. Sliding of the part 3*b* is effected by a toggle action of the link 9 and the shape of guides 14 along which a roller 15 on the part 3*b* is constrained to move. It is also arranged that the forward sliding movement of the part 3*b* on changing the position of the plate from B to A is faster than the speed of forward conveyance of the biscuits on the conveyor 1, so as to ensure that the plate occupies its new delivery position in advance of the biscuits. In this way damage to the biscuits is avoided during the change from position B to A with continuous conveyance. As the plate 3 moves from position A to B, its length decreases by part 3*b* sliding beneath part 3*a*. As the stream of biscuits arriving at the plate 3 from initial conveying section 1 is continuous, they will spill over the retracting edge of the plate but will fall upon run 1*a* of the manual station, to which the continuous stream will be led when plate 3 has completed its downward movement.

Prior to attaining the position A, a pin 16 on the guide roller 15 of the part 3*b* comes into contact with one end of a lever 17 pivoted at 18 and connected by a link 19 to a lever 20. The latter is secured to a spindle 21 to which fingers are fixed, and contact of the pin 16 as aforesaid moves the fingers 22 together with pads 23 upwards to a position clear of the path of the oncoming biscuits on band 2.

Should the wrapping machine be stopped for any reason, the energising current for the solenoid 7 will also cease. However, the other solenoid 6 associated with the solenoid 7 becomes energised when the wrapping machine is cut out and causes the plate 3 to move to the position B connecting the initial conveying section 1 with the run 1*a*. On movement of the plate from position A to B, the restrain imposed on the fingers 22 is removed, and the pads 23 thereon are lowered by a spring 24 on to biscuits supported on the conveyor band 2. Such biscuits are held there (until the automatic station is brought into operation again) and prevented from slipping back.

The conveyor bands 1 and 2 are driven from a common source not appearing in the drawings, while the feed band 4 is driven from the wrapping machine. The blade 5 reciprocating the delivery end of the conveyor band 2 is driven from the wrapping machine through a crank 26 mounted on crank shaft 25, links 27 and 29 and a lever 28 to perform a length of stroke equal to half the length of biscuit batch transferred at any time. Consequently, the cam shaft makes one revolution per batch. The uppermost of the two small rider pulleys, around which the band 2 travels after passing over the blade 5 (Fig. 1*b*), reciprocates with the blade, so constituting a take-up for the conveyor band. The drive to the conveyor band 2 is through a magnetic clutch which is energised when the wrapping machine is in operation, but is deenergised when it stops, so that the conveyor band 2 moves only during operation of the wrapping machine, i. e. when the automatic station is in use.

We claim:

1. In a handling arrangement for laminar articles such as biscuits, an initial conveying section, a transfer plate of variable length, a solenoid mechanism, two batching stations and two conveyor bands, the initial conveying section being arranged to continuously feed laminar articles in closely packed upstanding formation to said transfer plate which is hinged to move under the control of said solenoid mechanisms between two limiting positions and is adapted to vary in length during said movement so that it is shorter in the lowermost of said two positions than it is in the uppermost thereof, in said lowermost position said plate connecting said initial conveying section to one of said stations arranged for manual operation and in said uppermost position said plate connecting said initial conveying section to the other of said stations arranged for automatic operation and formed by said two conveyor bands which co-operate and are so actuated that articles delivered in a continuous stream to the first of said conveyor bands are transferred onto the second of said conveyor bands in batches of predetermined dimensions.

2. In a handling arrangement for laminar articles such as biscuits, an initial conveying section, a transfer plate of adjustable length, two batching stations and two conveyor bands, said initial conveying section being arranged to feed laminar articles in closely packed upstanding formation to said transfer plate, the length of which is automatically adjusted as the plate moves between two limiting positions selectively to connect said initial conveying section to either of the said two batching stations, one of said stations being arranged for manual operation and the other being automatic and formed by said two conveyor bands which co-operate and are so actuated that articles delivered in a continuous stream to the first of said conveyor bands are transferred on to the second of said conveyor bands in batches of predetermined dimensions.

3. A handling arrangement as set forth in claim 2 wherein the co-operation and actuation of said two conveyor bands are constituted by the end portion of the first of said bands being arranged above an initial portion of the second of said bands, and said end portion of said first-mentioned band being adapted to be reciprocated in a plane substantially parallel to the initial portion of the second-mentioned band by being lapped over a movable blade.

4. In a handling arrangement for laminar articles such as biscuits, an initial conveying section, a transfer plate of adjustable length, two batching stations, two conveyor bands and gripping means, said initial conveying section being arranged to feed laminar articles in closely packed upstanding formation to said transfer plate, the length of which is automatically adjusted as the plate moves between two limiting positions selectively to connect said initial conveying section to either of the said two batching stations, one of said stations being arranged for manual operation and the other being automatic and formed by said two conveyor bands which co-operate and are so actuated that articles delivered in a continuous stream to the first of said conveyor bands are transferred onto the second of said conveyor bands in batches of predetermined dimensions, said gripping means being associated with the first-mentioned conveyor band of said automatic packing station and adapted to come into

operation and grip articles on said conveyor band only when said transfer plate is positioned to deliver articles to said manual packing station.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No.2,827,150 John Eaton et al. March 18, 1958

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the heading to the printed specification, line 10, priority date, for "December 5, 1955" read -- November 13, 1954 --.

Signed and sealed this 17th day of June 1958.

(SEAL)
Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents