Feb. 5, 1952 O. E. KÄLL 2,584,465

LEVEL CONTROL APPARATUS RELATING TO FILLING OF RECEPTACLES WHICH ARE CLOSED BY FLAPS

Filed Feb. 28. 1949 2 SHEETS—SHEET 1

Fig. 1.

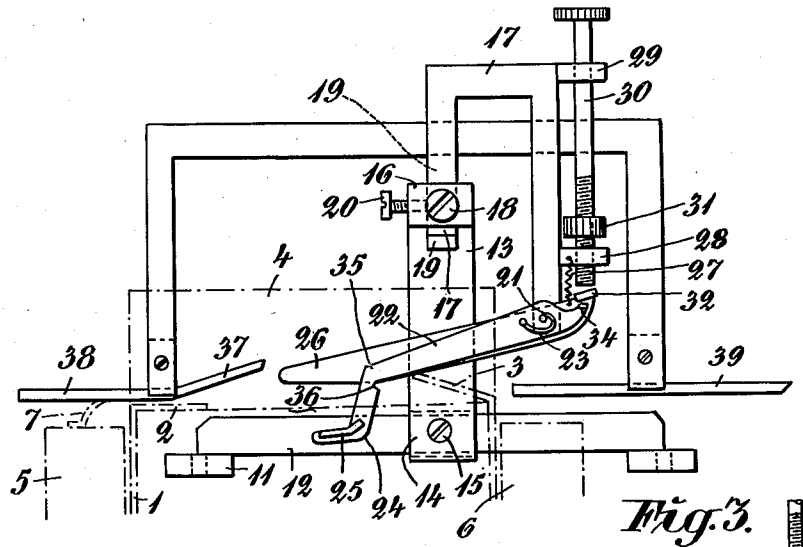

Fig. 3.

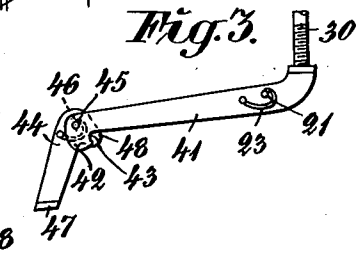

Fig. 2.

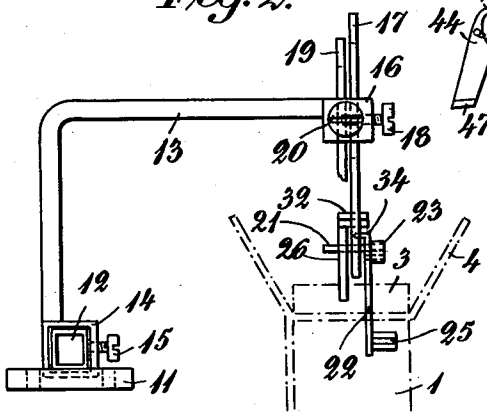

Fig. 4.

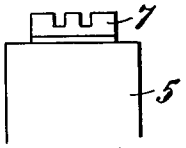

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Fig. 6.

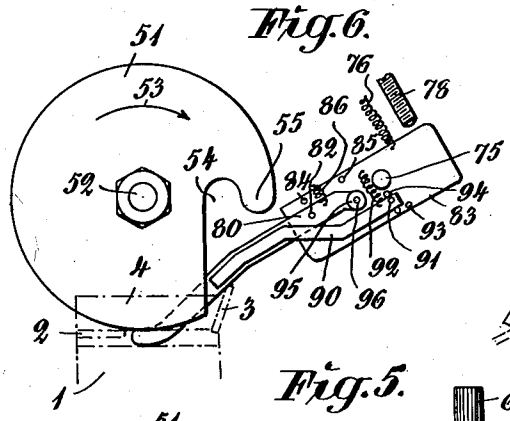


Fig. 7.

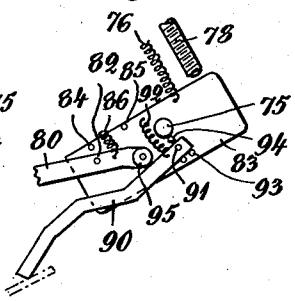


Fig. 5.

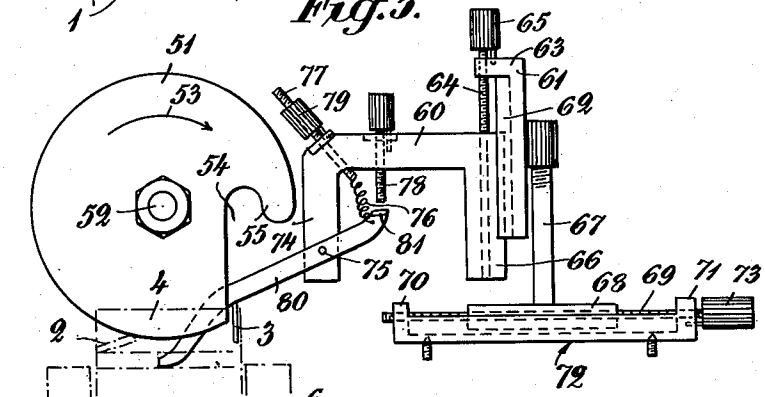
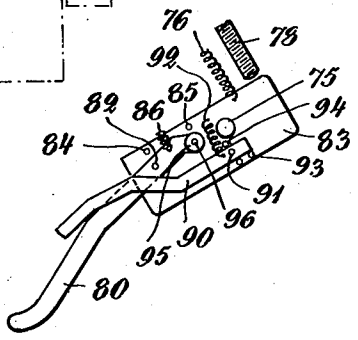


Fig. 8.



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LEVEL CONTROL APPARATUS RELATING TO FILLING OF RECEPTACLES WHICH ARE CLOSED BY FLAPS

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Application February 28, 1949, Serial No. 78,823
In Sweden February 28, 1948

14 Claims. (Cl. 226—129)

1

The present invention refers to means for the control of the level to which materials of some kind or other, such as washing powder, have been filled into a receptacle, and more especially the invention relates to the filling of receptacles adapted to be closed by means of flaps, such as cardboard boxes, which are being advanced on a track. The material being filled may be of any arbitrary kind, but in practice only materials capable of a streaming motion, such as pulverulent or granulated materials, are believed to come into consideration.

The object of the invention is to provide an apparatus which is of a comparatively simple construction while being still capable of functioning rapidly and safely by marking an unsatisfactory degree of filling through the folding out of a flap in the receptacle or by scoring the rim of the receptacle, when the latter does not possess any flaps.

The invention is primarily distinguished by an arm adapted to be brought down into the receptacle on the filling of the latter, said arm being of such configuration and arrangement as to come to rest in its lowered position (and to slide in this position) on the surface of the material—at least if the level of the latter is not too low—whereas, if the level is outside the permissible interval of variations, that is to say, below a given, preferable adjustable value or, perhaps, above a corresponding value, said arm will at the advancement of the receptacle on its track seize the trailing border or flap of the receptacle so as to fold the flap outwardly. In a suitable embodiment, the apparatus consists of two or more pivotally mounted arms which are movable relatively to each other into different angular positions, the axes of said arms being preferably adjustable into different positions in a vertical direction and/or in the direction of conveyance. In a further embodiment, where a special folding-in member is provided for the trailing flap in connection with the level control, the apparatus comprises a scanning arm, which is preferably pivoted within certain limits about a preferably adjustable axis toward the interior of the receptacle under a yielding load, said scanning arm being of such configuration as to permit, at a suitable adjustment of said axis, an unobstructed inward folding of the flap when the level of the material is within the permissible interval of variations, whereas it will fold the flap outwardly, when the level of the material is below or above said permissible interval.

The invention will be described hereinafter with reference to a few forms of embodiment for

2

the filling of receptacles provided with flaps, as illustrated in the accompanying drawings, but it should be understood that the invention is not limited to these embodiments.

In the drawings, Fig. 1 is a diagrammatic representation of a control apparatus viewed in elevation, and Fig. 2 shows a front view of the same apparatus, a few details having been omitted from the latter figure, however. Fig. 3 shows a modified detail, and Fig. 4 shows an auxiliary member for the apparatus disclosed in Figs. 1 and 2. Fig. 5 is an elevation of a modified construc- and Figs. 6–8 show details of an apparatus of the type illustrated in Fig. 5, but provided with special members to indicate too high a degree of filling.

In Figs. 1 and 2, the cardboard box to be filled is indicated by chain-dotted lines, the leading end flap being designated by 2, the trailing end flap by 3, and the side flaps by 4. The box 1 is taken to move from the right to the left along a conveying path or track while being supported by a distance block 5 at the front and a distance block 6 at the rear. The front block is provided with a scraper 7, which is shown as viewed from the front in Fig. 4. This scraper may be directed forwardly instead of rearwardly, and has for its object to keep certain arms to be described more closely hereinbelow clean from adhering filling materials and any adhesive that may have been transferred from the flaps 2 and 3.

The control device proper is mounted by means of an angle arm 13 on a running rail 12 provided with feet 11, said arm being displaceably secured to the rail 12 by means of the screw 15 threaded into the sleeve 14. Secured to the extreme end of the arm 13 is an attachment 16 for the frame 19 and the holder 17, which are adapted to be raised and lowered in the attachment 16 and to be secured therein by means of the screws 20 and 18, respectively.

The scanning arm 22 is pivoted about an axis 21 in the holder 17 so as to be capable of swinging in a vertical plane substantially parallel to the conveying path of the boxes while forming different acute angles to the direction of advance of the boxes. The scanning arm is angularly bent so as to form a knee 35, the upper portion of the arm forming an obtuse angle with the lower portion thereof. A notch 36 is provided on the back of the knee, and the lower portion of the scanning arm forms a substantially horizontal foot 24 at the lower end thereof. If desired, this foot may be rounded in the direction of conveyance of the box so as to be capable of sliding easily on the filling of material at various angular positions of

the arm. Furthermore, the scanning arm 22 is loaded by a spring 23 secured to the arm, said spring tending to move the foot end of the arm downwardly. The foot 24 may be provided with a horizontal vane or carrying plate 25, particularly where fine-grained materials are to be handled, said vane or carrving plate being adapted to rest on the material filled into the box 1. The plate may have a convex upper side to prevent powder from remaining on the same.

A screening arm 26 is also pivoted about the axis 21 against the action of a spring 27 secured to the lug 28 of the holder 17, as shown. The spring 27 tends to move the arm 26 in the same direction in which the arm 22 is turned by the spring 23. The rotary movement of the arm 26 is limited by the screw 30, which is adjustably displaceable in the lugs 28 and 29 of the holder 17 and adapted to be locked in its adjusted position by means of the nut 31. The screw 30 limits the movement of the arm 26 by abutting against the plate 32 on this arm. The turning movement of the scanning arm 22 is also limited by the projection 34 thereon, which is adapted to abut against the plate 32.

This embodiment operates in the following manner. When the box 1 is advanced underneath the controlling device, the arm 22 is caused to slide on the flap 2, and after the latter has moved past the arm 22, the latter falls down into the receptacle wherein it is stopped with the aid of the vane 25 at a level determined by the filling of material in the box. Upon the continued movement of the box to the left the previously inwardly bent flap 3 will slide along the lower side of the screening arm 26 or, perhaps, the lower side of the scanning arm 22, until the end of the flap meets the notch 36. If by reason of an insufficient degree of filling in the box the arm 22 should now be at so low a level as to cause the notch 36 to be located below the lower side of the arm 26, the position of which is fixed by the screw 30, the flap will project into the notch 36 to be retained and raised by the arm 22 at the continued advancement of the box, the arm 22 as well as the arm 26 being then raised against the action of the springs 23 and 27, respectively. This results in that the flap 3 is bent upwardly and outwardly to be still retained in its folded-out position by the arms 22 and 26 and the catch member 37 and the keep-down member 38 at the continued movement of the box. Said members are, the same as the guide member 39, secured to the adjustable frame 19.

On the other hand, should the degree of filling in the box be sufficient, the arm 22 will be located in so high a position that the notch 36 is screened off, the forwardly bent flap 3 then continuing, upon sliding along the lower side of the arm 26, to slide along the lower portion of the arm 22 and the foot portion 24 thereof, to be caught in its folded-in position by the catch member 37.

In connection with receptacles without any flaps, the notch 36 may make a mark in the border of the receptacle, for instance by scoring said border.

In the construction shown in Fig. 3, the arms 22 and 26 have been replaced by a flap seizing arm 41 provided with a notch and a screening leg 44, said arm being pivoted about an axis 21 against the action of a spring 23 secured in the arm, in the manner described with reference to Fig. 1. This arm is provided at the foreend thereof with a nose 42 forming the notch 43. The screening leg 44 is pivoted at said nose end about an axis 45 against the action of a spring 46 secured to the arm 44. The screening leg 44 has a foot plate 47, and is provided at the upper portion thereof with a screening portion 48 adapted to screen off the notch 43 within a certain angular range. Both of the arms 41 and 44 are adapted to be turned downwardly by the springs 23 and 46, respectively, so as to cause the footplate 47 to dip down into the box passing underneath the same. According to the configuration and the size of the screening portion 48, the notch 43 will be screened off within a certain angular range of the leg 44 relatively to the arm 41, which involves that the notch 43 becomes uncovered, when the leg 44 is outside said angular range, that is to say, when the degree of filling in the box falls below or exceeds a certain permissible interval of variations.

This arm construction functions so that the leg 44 will in its lowered position within the box rest and slide on the filling of material in the box to screen off or uncover the notch 43 according to the level of the filling. If the notch 43 is screened off, the flap 3 slides in its folded-in position over the notch, but if it is uncovered, substantially the same upward and outward folding of the flap, in case flaps are missing, or marking of the border of the receptacle will take place as in the embodiment shown in Fig. 1. In difference from said embodiment, however, the arms according to Fig. 3 also operate at a degree of filling which is too high.

The illustrated arms are only given as an example and may obviously be formed or pivoted in other suitable ways only the scanning arm in this construction is provided with a recess in the arm or in one of the arms, adapted within the permissible interval of level variations, if desired through screening by an other arm, to permit the inwardly bent flap to maintain its inwardly bent position at the advancement of the receptacle, whereas said recess is adapted, outside said interval, to perform its indicating function.

Figs. 5–8 show an embodiment, wherein the contrivance adapted to fold in the end flaps of the receptacle is arranged in connection with the level controlling device. As in the preceding figures, the cardboard box is designated by 1, the leading and trailing end flaps by 2 and 3, respectively, and the side flaps by 4. The distance blocks are denoted by 5 and 6. Above the place on the conveying track of the box, where the scanner of the controlling device is to dip down into the box, the folding contrivance, which is formed into a disk 51, is pivoted about an axis 52. The folding disk, which rotates in the direction of the arrow 53 at a peripheral speed, which is about 5 times greater than the conveying speed of the box, has a recess 54 with a projecting nose 55. The dimensions and the location of the disk are so adapted that on the advancement of the box the flap 2 will, on the one hand, strike against (the periphery of) the disk 51 to be folded inwardly while, on the other hand, the flap 3 passes normally into the recess 54 to be folded in by the nose 55.

The controlling device has a frame 60 mounted in a holder 61, wherein it is adapted to be raised and lowered in guides 62 with the aid of a screw 64 adapted to be turned in a lug 63 on the holder, said screw having a head 65 while being threaded into a vertical shank 66 of the frame 60. The holder 61 is carried by the post 67, about which it is pivoted, if desired. The post is secured to a

slide piece 68, which is threaded on a screw 69, mounted in the bearings 70 and 71 on a guide piece 72 so as to be axially non-displaceable therein, said guide piece 72 being secured to the frame. The screw is adapted to be turned by means of the knob 73, whereby the post 67 and thus the frame 60 is displaceable in the conveying direction.

The scanning arm 80 is pivoted about a pin or stud 75 in the front shank 74 of the frame 60, and is adapted to be actuated by the spring 76, which may be controlled by means of the screw 77 and the knurled nut 79. The turning movement of the arm 80 is limited by the screw 78, which strikes against the plate 81 on the arm 80.

The arrangement shown in Fig. 5 functions in the following manner. At the normal degree of filling in the box 1, the arm 80 permits, by the shape thereof and the adjusted position of the stud 75, the flap 3 to be folded inwardly by the folding disk 51. Should the filling be insufficient, however, the scanner 80 will dip further down into the box, the flap 3 being thus brought into contact with the arm 89, before the nose 55 has time to seize it and fold it inwardly. Instead, the scanner 80 moves the flap outwardly to indicate an insufficient filling.

The action and the sensitivity of the contrivance may be controlled by an adjustment of the stud 75 in the vertical direction and in the conveying direction by means of the screws 64 and 69, respectively. When the position of the stud 75 is raised, the scanner will assume a steeper inclination to the surface of the powder in the box, the path of movement of the point of the scanner within the region of the box being then caused to coincide with the surface of the powder, whereby the sensitivity of the apparatus is increased. By a displacement of the stud 75 to the right by means of the screw 69, the apparatus will indicate a higher powder level; the flap 3 is folded rearwardly earlier.

Figs. 6–8 show a supplementing contrivance, through which the apparatus will also indicate at a level of the material in the box 1 which is too high. Here, the scanner 80 is pivotally mounted about a stud 82 on an arm carrier in the form of a plate 83, which is in turn pivotally mounted about the pin or stud 75, while being under the influence of the spring 76, like the arm 80 in Fig. 5, the turning movement of said plate being limited by the screw 78. The arm 80, the turning movement of which is limited by the stop abutments 84 and 85, is under the influence of a spring 86 tending to move the outer end of the arm downwardly.

The arrangement so far described functions substantially in the manner shown in Fig. 5. However, in order that the contrivance shall be capable also of indicating a degree of filling which is too high, the level indicating arm 90 is pivotally mounted about the stud 91 on the plate 83. The arm is actuated by the spring 92 into a raised position, the movement being restricted by the stop abutment 93 or a projecting part of the stud 82. The stud 91 is displaceable and adjustable in a slot 94 so as to permit of being raised and lowered. Through the action of the spring 92, the arm 90 is kept in contact with the inner end of the scanner 80, said inner end being constituted by a roller 95, for example, which is rotatable about the pin 96 in the arm 80.

When the level of the material in the box 1 is higher than a previously fixed and adjusted maximum level, the scanner 80 will press down the level indicating arm 90 by means of the roller 95, so that the position shown in Fig. 7 is reached, for example, the arm 90 being thus caused to fold out the flap 9, so that the nose 55 on the folding disk 51 cannot seize the flap. On the other hand, when the level of the material is lower than a previously fixed and adjusted minimum level, the arm 90 will, as shown in Fig. 8, be retained in an inoperative raised position, the arm 80 then functioning instead in the manner above described.

By suitably adjusting the position of the stud 75 in the vertical direction and in the conveying direction, and by setting the pivot 91 of the level indicating arm into a suitable position in the slot 94, it is possible to provide for suitable sensitivity and a suitable permissible interval of the filling degree of the material.

I claim:

1. Apparatus for controlling the level of material filled into receptacles advanced in a path and adapted to be closed by means of flaps, at least one of which being positioned at the rear end of the advancing receptacle, comprising a scanning arm, a pivot above said path, said scanning arm being pivoted about said pivot, a sliding shoe at the free end of said scanning arm, said scanning arm being rotatable in a vertical plane substantially parallel to said path to form acute angles to the direction of advance of said receptacles and to permit said sliding shoe to plunge into said receptacle, a projecting portion on said scanning arm adapted to seize the edge of said rear flap, a screening member movable relative to at least a portion of said scanning arm so as in certain positions to screen off said projecting portion.

2. Apparatus as claimed in claim 1, comprising a screening arm and a pivot above said path, said screening arm being pivoted about said pivot and extending substantially parallel with said scanning arm.

3. Apparatus as claimed in claim 2, characterized in a stopper member in the path of movement of at least one of said arms to limit the downward movement thereof.

4. Apparatus as claimed in claim 3, characterized in resilient means for urging at least one of said arms towards said stopper member.

5. Apparatus as claimed in claim 1, in which the pivot of said scanning arm is adjustable at least in a direction parallel to said path.

6. Apparatus for controlling the level of material filled into receptacles advanced in a path and adapted to be closed by means of flaps, at least one of which being positioned at the rear end of the advancing receptacle, comprising a scanning arm consisting of a flap seizing arm and a screening leg, a pivot above said path, said flap seizing arm being pivoted about said pivot and provided with a projecting portion adapted to seize the edge of said rear flap, said screening leg being pivoted on said flap seizing arm so as in certain relative positions to screen off said projecting portion, a sliding shoe at the free end of said screening link, said scanning arm being rotatable in a vertical plane substantially parallel to said path to form acute angles to the direction of advance of said receptacles and to permit said sliding shoe to plunge into said receptacle.

7. In a machine for closing the flaps of receptacles filled with material and being advanced in a path past a flap closing member arranged to close the rear flap within a limited interval of movement of the receptacle an apparatus for controlling the level of material in each recep-

tacle, comprising a scanning arm, a pivot above said path, said scanning arm being pivoted about said pivot, a sliding shoe at the free end of said scanning arm, said scanning arm being rotatable in a vertical plane substantially parallel to said path to form acute angles to the direction of advance of said receptacles and to permit said sliding shoe to plunge into said receptacle, said pivot being adjustable to such a position relative to said limited interval and said scanning arm being so shaped that below a given angular position thereof said scanning arm will keep said rear flap out of the operating sweep of said closing member within said interval.

8. An apparatus as claimed in claim 7, characterized in an indicating member extending over said rear flap when near said flap closing member and movable downwards, a motion transmitting member between said scanning arm and said indicating member adapted at least above a given angular position of said scanning arm to move said indicating member downward as the scanning arm moves upwards.

9. An apparatus as claimed in claim 8, in which said indicating member consists of an indicating arm and a pivot therefor, the axis of the latter pivot being substantially parallel to the axis of the pivot of said scanning arm.

10. An apparatus as claimed in claim 9, comprising resilient means for urging said indicating arm upwards.

11. An apparatus as claimed in claim 10, characterized in a stopper member in the path of said indicating arm.

12. An apparatus as claimed in claim 7, characterized in a stopper member in the path of movement of said scanning arm and resilient means for urging said arm towards said stopper member.

13. An apparatus as claimed in claim 7, further characterized in an indicating arm and a pivot therefor, said indicating arm extending over said rear flap when near said flap closing member, an extention of said scanning arm beyond the pivot of this arm, a projection on said extention arranged to engage said indicating arm so as to move the latter downwards as the scanning arm moves upwards.

14. An apparatus as claimed in claim 13, having an arm carrier, the pivots of said scanning and indicating arms being mounted on said carrier, a pin substantially parallel to said pivots, the carrier being rotatable about the axis of said pin, a stopper member in the path of movement of said carrier to limit the downward movement of said scanning arm, and resilient means for urging said carrier towards said stopper member.

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No references cited.