

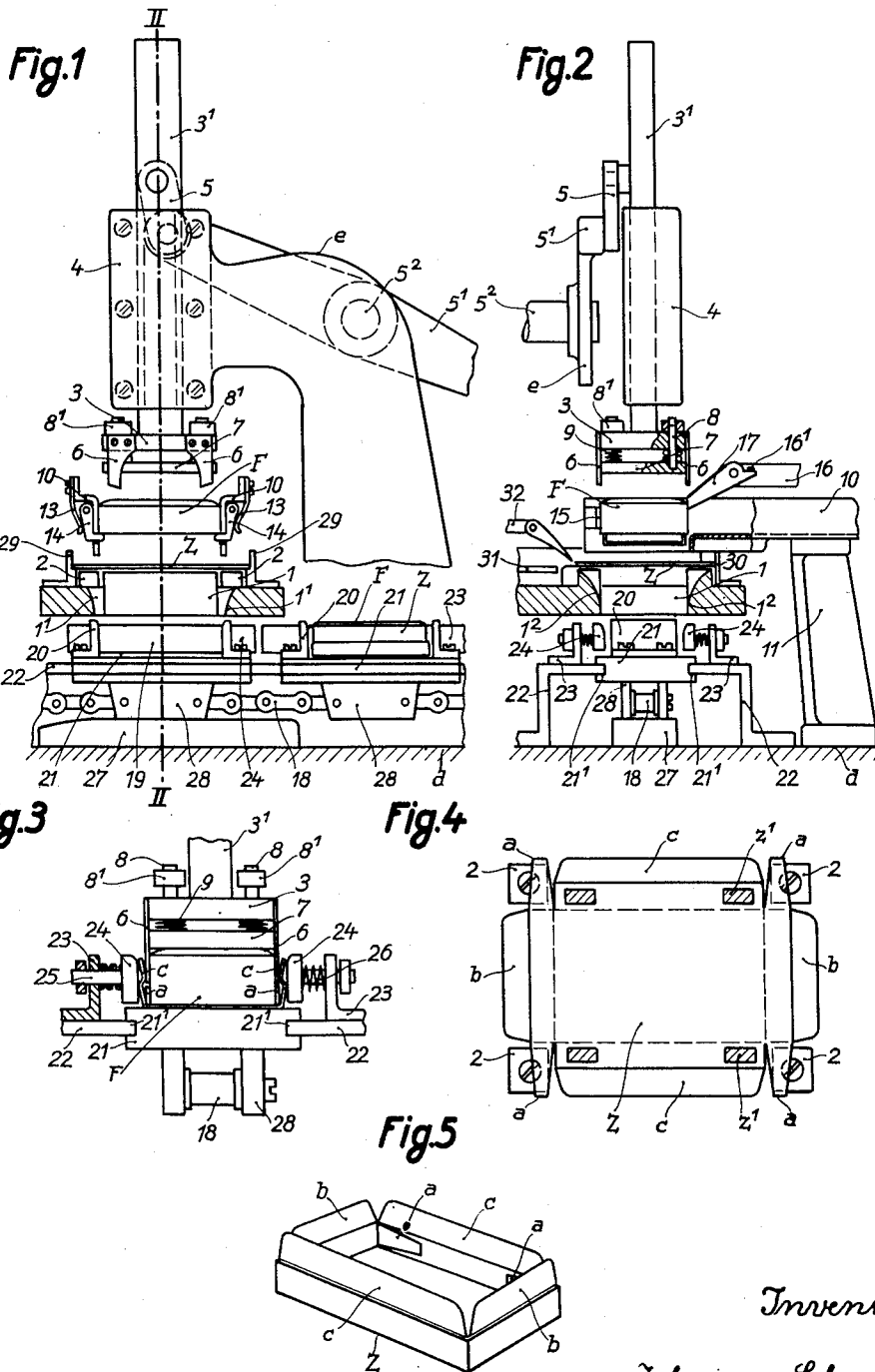
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FOLDING MACHINE

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FOLDING MACHINE

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My invention relates to folding machines, and more particularly to a folding machine for cigarette and other packages.

It is an object of my invention to provide improved means for positioning the gluing flaps of the packages. To this end, in a machine having a folding gauge, a folding slide adapted to force a folding block through the folding gauge with the blank, and an abutment for supporting the block and the blank, I provide a resiliently supported pressure plate on the folding slide for engaging the upper side of the block and fingers, also on the slide, for engaging the gluing flaps.

My invention will be described as applied to the folding of cigarette packages consisting of a box and a lid. The walls of the box are offset for forming a seat or neck for the lid. Such a box normally receives two layers of cigarettes, the lower layer being at the level of the plain, and the upper layer being at the level of the offset or neck portions, of the walls. Due to the offsetting, the lower portion of the package is a little wider than its upper portion so that the lower layer of cigarettes has some play in the lower portion of the box. It has already been suggested, as described in German Patent 513,984, to insert filling strips in the wider portion below the set-off seat or neck for the lid, and it has also been suggested in the same patent to provide gluing flaps in the extension of two opposite walls of the box which flaps, when the box is folded, bear on the adjacent side walls below the offset seat or neck and partly fill in the wider space. The flaps can fulfill their task only if they are moved into the proper position when folding the box.

According to my invention in which a folding block together with the blank is forced through an opening in a folding gauge until both are arrested by an abutment or table, the flaps are positioned by providing the folding slide with fingers and two relatively movable parts which are held in a given initial position with respect to each other by springs or the like. Folding slides having two relatively movable parts are old in the art. The fingers project downwardly from, and are rigidly connected to, the body of the

slide. When the folding operation has been completed the folding block with the folded blank and the movable part of the slide which bears on the block, are arrested by the abutment and the springs between the body and the movable part are compressed as the body of the slide moves on, the fingers engage the previously folded-up gluing flaps and move them into the proper position in which they bear on the inner walls of the blank below the offset portion.

It is another object of my invention to provide improved means for receiving the boxes folded from the blanks and the folding blocks which are within the boxes. To this end I design each abutment or table as the bottom of a tray for the reception of a box and its folding block and provide resiliently supported walls at the sides of the tray which are in line with the side walls of the box to which the gluing flaps on the end walls are attached. By these means the side walls are moved aside against the action of the resiliently supported walls when the fingers on the body of the slide enter the box, but after the fingers have been retracted upon the up or return stroke of the slide, the side walls are forced inwardly against the block together with the gluing flaps which have been positioned by the fingers.

It is still another object of my invention to provide improved means for removing the finished boxes and the folding blocks from the machine. To this end I provide a conveyer, for instance, a chain, to which the tables are attached at regular intervals. The trays on the tables are successively and intermittently moved into registering relation with the folding gauge and the finished boxes are moved on by the conveyer. The boxes are held on the folding blocks by the walls of the trays while being removed by the conveyer.

It is still another object of my invention to relieve the means for conveying the trays of the folding pressure. To this end I provide a fixed abutment for the tables or tray bottoms to bear on under the pressure of the folding slide.

At the station to which the boxes are transported by the trays on the conveyer, lids may

be placed on the seat or neck portions of the boxes and box and the lid may be connected by a strip so that after the strip has been severed at three sides a package with a hinged lid is obtained in which the unsevered portion of the strip constitutes the hinge and also the corner connections.

In the drawing affixed to this specification and forming part thereof a folding machine embodying my invention is illustrated diagrammatically by way of example.

In the drawing

Fig. 1 is a partly sectional elevation of the machine,

Fig. 2 is a section on the line II—II in Fig. 1,

Fig. 3 is a partly sectional elevation of the folding slide and a tray, viewed as in Fig. 2 but drawn to a larger scale,

Fig. 4 is a plan view of the blank ready for folding, and

Fig. 5 is a perspective illustration of the folded box.

Referring now to the drawing, and first to Figs. 4 and 5. Z is the blank. It has a rectangular bottom, end flaps *b*, side flaps *c* and gluing flaps *a* at opposite sides of the end flaps *b*. The bottom of the blank is nicked along the dotted lines. Fig. 4, and the end flaps *b* are also nicked where gluing flaps *a* are connected to them. Both the end and the side flaps are set off, as best seen in Fig. 5, and glue is applied at *z'* where the gluing flaps *a* engage the inner sides of the side flaps *c*.

Referring now to Figs. 1 to 3, *d* is the base plate of the machine and *e* is an upright on the base plate, with a guiding block 4 at its upper end. 3 is the folding slide and 3' is a slide bar at the upper end of the folding slide which is mounted to reciprocate in the block 4. Reciprocation may be imparted to the folding slide 3 by any suitable means, for instance, by a rocking lever 5' which is fulcrumed in the upright *e* at 5² and connected to the slide bar by a link 5. The lever 5' may be operated by any suitable means (not shown).

1 is a folding gauge which is arranged at a suitable distance above and in parallel to, the base plate *d*. The blanks Z are located by angular end checks 29, 29 and a side check 30, Fig. 2, at three sides of the opening in the gauge 1. 31 is a plate or chute along which the blanks Z are fed by any suitable means, for instance, a hinged finger 32. The finger pushes each blank into engagement with the side check 30 as shown in Fig. 2. The blank is further located by the end checks 29, Fig. 1. 2 are blocks at the sides of the opening in the gauge 1 for supporting the gluing flaps *a*, the position of the blocks with respect to the blank Z being indicated in dotted lines in Fig. 4.

The blanks are folded through the medium

of folding blocks *f*. The folding blocks are fed along a channel 10 at the upper end of a support 11 on the base plate *d*. A push bar 16 with a finger 17 hinged to it, the downward movement of which is limited by a check 16', is provided for feeding the blocks. In the final position above the opening in the gauge 1, the blocks are retained by a check 15 at the end of the channel 10, Fig. 2, and by spring catches 13, 14 at the sides of the channel 10, as shown in Fig. 1. The bottom of the channel is cut away at its end to permit the blocks F to move into the opening of the gauge 1 with the blank Z, as will be described.

7 is a resiliently supported pressure plate at the lower end of the folding slide 3 as best seen in Fig. 3, 8 are pins which extend upwardly from the pressure plate 7 through the body of the slide 3, 9 are springs inserted between the body 3 and the pressure plate 7 and surrounding the pins 8, and 8' are checks or heads at the upper ends of the pins 8. Normally the springs 9 are distended and the checks or heads 8' bear on the upper face of the slide body, as shown in Fig. 2. 6 are fingers extending downwardly from opposite end faces of the slide 3 for positioning the gluing flaps *a*. One finger per flap is provided.

18 is a conveyer below the gauge 1 for receiving and removing the finished boxes from the gauge 1. The conveyer is here shown as a chain in which normal links alternate with pairs of parallel and vertical supporting ribs 28. Each pair of supporting ribs are attached to, or integral with, the lower side of a supporting table or abutment 21 which is fitted to slide on horizontal slide bars constituted by the upper flanges of Z-sections 22 on the base plate *d*, Fig. 2, which are arranged at opposite sides of the conveyer 18 and engage in notches 21' in the sides of the tables 21. Each table is equipped with a tray having angular end plates 20 and angular side plates 23. 24 are buffers extending in parallel to the inner faces of the side plates 23, 25 are pins to which the buffers are attached and 26 are springs which are inserted between the inner faces of the angular side plates 23 and the outer faces of the buffers 24 and surround the pins 25, i. e. the trays may have resilient walls instead of the buffers, as best seen in Fig. 3. Instead of providing springs the buffers themselves may be made resilient. 27 is a fixed abutment on the base plate *d* which is arranged below the opening of the gauge 1 and adapted to support the pairs of parallel ribs 28 on the tables 21. The end of the fixed abutment 27 which extends against the direction in which the trays 20, 23 are fed toward the gauge 1 (from the left to the right in Fig. 1), is beveled in order to facilitate the rising of the ribs 28 onto the parallel portion of the abutment with

consideration of the inevitable slack at the slide bars 22 and the tables 21.

In operation a blank *z* is fed by the finger 32 and placed with one of its side flaps *c* engaging the fixed side check 30, Fig. 1. At the same time a folding block *F* is fed along the channel 10 and retained above the opening in the gauge 1 by the fixed check 15 and the spring catches 13, 14. The push bar 16 is reciprocated by any suitable means (not shown). The finger 17 is free to move across the folding blocks *F* which are still in the channel 10 when the push bar is retracted but is retained by the check 16' when the push bar 16 advances. Glue is applied to the side flaps *c* at *z'*, Fig. 4, for holding the gluing flaps *a*, as will be described.

The slide 3 now descends, its pressure plate 7 bears on the upper face of the folding block *F* and forces the block down onto the blank, moving aside the spring catches 14. The folding block *F* now bears on the blank *Z* with its lower face and upon the further descent of the slide 3 causes the gluing flaps *a* to be folded up by the blocks 2. This operation is performed without the end flaps *b* being supported but there is no difficulty about this because the nicked connection of the bottom of the blank and the end flaps *b* is larger than the short nicked connection for the gluing flaps *a* and therefore exerts a higher resistance to bending. The flaps *b* and *c* are folded up upon the further descent of the slide 3. First, the side flaps *c* are folded up by the sides 1² of the opening in the gauge 1 and then the end flaps *b* are folded up by the sides 1' of the opening. This prevents interference of the gluing flaps *a* with the side flaps *c* when the gluing flaps *a* enter between the side flaps *c*.

The strength of the springs 9 between the pressure plate 7 and the body of the slide 3 is so determined that the pressure plate is not forced up in the slide 3 by the reaction of the folding operations. However, when the finished box with the block *F* in it is moved down onto that table 21 which is in line with the opening in the gauge 1, the springs 9 are compressed while the slide 3 descends further. The fingers 6 of the slide now engage the gluing flaps *a*. It will appear from Fig. 3 that the fingers 6 which, as shown, project downwardly from the slide 3, force apart the side flaps *c* against the pressure of the spring buffers 24 so that the gluing flaps, if not properly positioned already, are forced into the proper position with respect to the offset lower portions of the side flaps *c* by the fingers 6. Fig. 3 shows the slide 3 in its lower final position. Damage to the offset side flaps *c* is prevented as they are free to yield against the pressure of the buffers 24 or the resilient walls (not shown) of the tray while on the other hand the buffers hold the side flaps applied to the gluing flaps which

in turn are supported by the block *F*, when the fingers 6 recede with the ascending slide 3. When the springs 9 are compressed the checks or heads 8' at their upper ends rise above the descending slide 3 as shown in Fig. 3. The clearance is so determined that upon the upward stroke of the slide 3 the pressure plate 7 remains on the upper face of the folding block *F* while the fingers 6 move out of engagement with the gluing flaps *a*. The pressure plate 7 is retracted after the slide 3 has engaged the checks or heads 8' from below. In this manner the folding block *F* is retained on the table 21 with the finished box by the plate 7 and not entrained by the fingers 6. The table 21 which is in line with the gauge 1, bears on the fixed abutment 27 with the ribs 28 so that the pressure exerted on the block and the blank will not bend the slide bars 22 which is important as the pressure is rather high. As mentioned, the abutment 27 is beveled at the end toward which the arriving tables 21 move. The finished boxes, with the folding blocks *F* therein, are then intermittently fed to a station where the lid is fitted to the box and connected with the box by a strip of paper, as described.

In the example shown and described only the box portion of the package is folded. Obviously the machine may also be used for folding boxes from a blank having a box and a lid portion, with a folding block *F*.

My novel machine may be used as an independent unit or as part of a plant in which the box is folded at one station, the lid is folded at another station and the lid and the box are connected at a third station. The lid is placed on the box and the lid and the box are connected by a strip of paper, as described. In this manner a package is obtained which after having been cut open at three sides, makes up a box with a hinged lid in which the strip forms the connections at the corners and the hinge.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described for obvious modifications will occur to a person skilled in the art.

In the claims affixed to this specification no selection of any particular modification of the invention is intended to the exclusion of other modifications thereof and the right to subsequently make claim to any modification not covered by these claims is expressly reserved.

I claim:—

1. In a machine for folding packages from blanks having gluing flaps, a folding gauge, a folding slide adapted to force a folding block through an opening in said gauge together with the blank, an abutment for supporting the block and the folded blank, a resiliently supported pressure plate on said folding slide for holding said block on said

blank and said abutment, and fingers on said slide for applying said gluing flaps to the corresponding walls of the folded blank.

2. In a machine for folding blanks having offset walls and gluing flaps adapted to engage the lower portions of the corresponding offset walls, a folding gauge, a folding slide adapted to force a folding block through an opening in said gauge together with the blank, an abutment for supporting the block and the folded blank, a resiliently supported pressure plate on said folding slide for holding said block on said blank and said abutment, and fingers on said slide for applying said gluing flaps to said lower portions.

3. In a machine for folding packages from blanks having glueing flaps, a folding gauge, a folding slide adapted to force a folding block through an opening in said gauge together with the blank, a table for supporting the block and the folded blank, a resiliently supported pressure plate on said folding slide for holding said block on said blank and said table, a fixed abutment for supporting said table, and fingers on said slide for applying said gluing flaps to the corresponding walls of the folded blank.

4. In a machine for folding packages from blanks having gluing flaps, a folding gauge, a folding slide adapted to force a folding block through an opening in said gauge together with the blank, a table for supporting the block and the folded blank, a resiliently supported pressure plate on said folding slide for holding said block on said blank and said table, a tray on said table for supporting the folded blanks, a fixed abutment for supporting said table, and fingers on said slide for applying said gluing flaps to the corresponding walls of the folded blank.

5. In a machine for folding packages from blanks having gluing flaps, a folding gauge, a folding slide adapted to force a folding block through an opening in said gauge together with the blank, a table for supporting the block and the folded blank, a resiliently supported pressure plate on said folding slide for holding said block on said blank and said table, a tray on said table for supporting the folded blanks, resilient walls forming part of said tray for supporting those walls of the blank to which said gluing flaps are applied, a fixed abutment for supporting said table, and fingers on said slide for applying said gluing flaps to the corresponding walls of the folded blank.

6. In a machine for folding packages from blanks having gluing flaps, a folding gauge, a folding slide adapted to force a folding block through an opening in said gauge together with the blank, a table for supporting the block and the folded blank, a resiliently supported pressure plate on said folding slide for holding said block on said blank and said table, a tray on said table for supporting the

folded blanks, movable walls forming part of said tray for supporting those walls of the blank to which said gluing flaps are applied, resilient means for holding said movable walls engaged with the walls of said blank, a fixed abutment for supporting said table, and fingers on said slide for applying said gluing flaps to the corresponding walls of the folded blank.

7. In a machine for folding packages from blanks having gluing flaps, a folding gauge, a folding slide adapted to force a folding block through an opening in said gauge together with the blank, movable abutments each adapted to support one of said blocks and the corresponding folded blank, a conveyer for intermittently presenting said abutments to the opening in said gauge, a resiliently supported pressure plate on said folding slide for holding each block on the corresponding blank and the corresponding abutment, and fingers on said slide for applying said gluing flaps to the corresponding walls of the folded blank.

8. In a machine for folding packages from blanks having gluing flaps, a folding gauge, a folding slide adapted to force a folding block through an opening in said gauge together with the blank, movable abutments each adapted to support one of said blocks and the corresponding folded blank, a conveyer for intermittently presenting said abutments to the opening in said gauge, a fixed abutment for supporting that movable abutment which is presented to the opening in said gauge, a resiliently supported pressure plate on said folding slide for holding each block on the corresponding blank and the corresponding abutment, and fingers on said slide for applying said gluing flaps to the corresponding walls of the folded blank.

9. In a machine for folding packages from blanks having gluing flaps, a folding gauge, a folding slide adapted to force a folding block through an opening in said gauge together with the blank, movable abutments each adapted to support one of said blocks and the corresponding folded blanks, a tray on each movable abutment for supporting the folded blank on the corresponding folding block, a conveyer for intermittently presenting said abutments to the opening in said gauge, a resiliently supported pressure plate on said folding slide for holding each block on the corresponding blank and the corresponding abutment, and fingers on said slide for applying said gluing flaps to the corresponding walls of the folded blank.

10. In a machine for folding packages from blanks having gluing flaps, a folding gauge, a folding slide adapted to force a folding block through an opening in said gauge together with the blank, movable abutments each adapted to support one of said blocks and the corresponding folded blank, a tray on

each movable abutment for supporting the folded blank on the corresponding folding block, resilient means on each tray for applying the blank to the corresponding block, a
5 conveyer for intermitently presenting said abutments to the opening in said gauge, a resiliently supported pressure plate on said folding slide for holding each block on the corresponding blank and the corresponding
10 abutment, and fingers on said slide for applying said gluing flaps to the corresponding walls of the folded blank.

In testimony whereof I affix my signature.

JOHANNES SCHMIEDEL.

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