

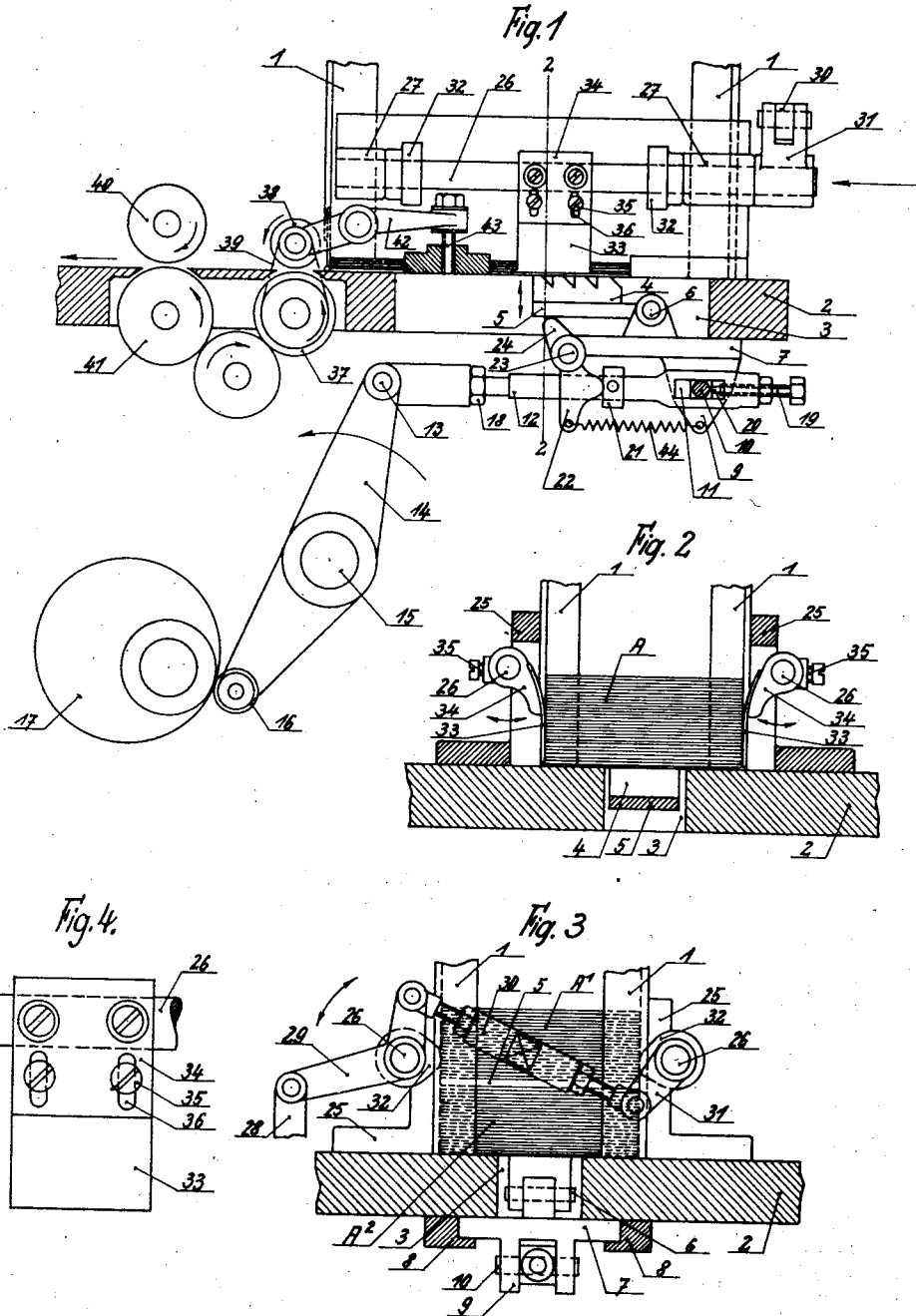
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REMOVING SHEETS FROM PILES

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REMOVING SHEETS FROM PILES.

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In labelling machines, packing machines and machines for the manufacture of cardboard boxes and the like, cut blanks are used, which are fed separately to the particular machine. These blanks are placed in a pile which is supported in vertical guides. In high speed machines the pile must be kept as large as possible in order that the pile need be replenished and the machine stopped for this purpose only at as great intervals of time as possible.

Numerous suggestions have been made for the removal of the last sheet of the pile and for feeding it to the machine. When the pile is one which is raised each time a sheet is removed, i. e. where the top sheet of the pile has to be removed, experience has shown that the simplest and most reliably operating arrangement is one in which a controlled sheet shifter is used, which is laid on the top sheet of the pile and carries it along by friction. As, however, such a pile has always to be replenished from below, this replenishing operation entails the machine being stopped.

If, however, the arrangement be such that the pile is replenished from above and the bottom sheet is each time removed, it is possible to replenish the pile without stopping the machine. A disadvantage when using the controlled shifter which removes the bottom sheet by friction is the weight of the pile, which in high speed machines, using a suitably large pile of sheets, is considerable.

In order that such a shifter which carries along the bottom sheet by friction can be used with large piles of sheets, the new method consists in this, that the shifter acts on the bottom sheet of the pile and that, while it is performing this function, a considerable portion of the pile is raised for easing the weight. In this way resistance due to the considerable weight of the pile is counteracted, so that the shifter which acts by friction can readily take the bottom sheet of the pile and remove it in a reliable manner.

The means for easing the pile are removed, after having performed this function, away from the pile and come into operation each time at the same level of the pile. The result of this is that the portion of the pile not raised by the lifting members

is always replenished as the sheets are removed.

An apparatus for carrying out the new method, having suitable means for ensuring the correct functioning of the shifter, so that only the bottom sheet is each time fed to the machine, is illustrated in the accompanying drawing, in which

Fig. 1 is a side elevation of the new apparatus,

Fig. 2 a vertical section on line 2—2 of Fig. 1 and

Fig. 3 an end elevation viewed in the direction of the arrow shown in Fig. 1.

Figure 4 shows to an enlarged scale a detail of the apparatus shown in Figure 1.

The pile A of sheets is guided and supported at its corners in a known manner by the vertical angle bars 1. The pile of sheets rests on a table 2 which is provided with a slot 3 for the shifter 4. The shifter consists of a serrated rubber block the upwardly directed teeth of which present their steep sides in the direction in which the sheets are to be pushed forward. The rubber block is mounted on a rocking lever 5 pivoted on the pin 6 in a slide 7. This plate-shaped slide is guided with its lateral edges in guides 8 on the lower side of the table 2. The slide is provided on its under side with a forked bearing 9 for a transverse pin 10. The latter extends through the longitudinal slot 11 in a push bar 12 lying between the bearing plates 9, which push bar is pivoted at 13 to a two-armed lever 14 which rocks about the pin 15 in the machine frame and carries at its unsupported end a roller 16, which rests against the eccentric disc 17. The bar 12 which is adjustable in length at 18 carries on its unsupported end an adjusting screw 19, the end 20 of which extends into the longitudinal slot 11 and serves the purpose of accurately adjusting the throw of the cam 24.

On the bar 12 an adjustable stop 21 is provided which is capable of engaging with a two-armed lever 22 which rocks about the pin 23 supported by the slide 7. One end of the two-armed lever forms the cam 24 and engages from below the supporting lever 5 of the serrated rubber block 4.

Above the table 2 at either side of the

pile of sheets A and externally of the angle rails 1 or the sockets 25 for the same, which are fixed on the table 2, the parallel shafts 26 are journaled in the bearings 27. These shafts lie parallel to the direction of motion of the slide 7. The shafts 26 are turned to and fro by an eccentric rod 28 (Fig. 3) through the bell crank 29 mounted on one of the shafts 26 and the longitudinally adjustable connecting rod 30, the other end of which is connected to the lever 31 on the other shaft. On the shafts 26 cams 32 are mounted, which are made of rubber and are capable of engaging with the pile of sheets A during the rocking motion of the shafts 26. These cams thus act as fingers, engaging the sides of the pile of sheets and raising (easing) the portion A¹ of the pile lying above the points of the contact, while the lower portion A² of the pile, which is resting on the table, remains in position, but is relieved of the load due to the weight of the upper portion A'.

On the shafts 26 there are also fixed the leaf spring plates 33 (see Figs. 1 and 2) by means of the supporting members 34 and the screws 35. These leaf spring plates rock outwards and inwards together with the cams 32 so that they rest against the sides of the pile and exert a braking action when the cams 32 are operative. The length of the spring plates 33 is made such that, when in the braking position (Fig. 2) they leave between their lower end and the surface of the table 2 a gap corresponding exactly to the thickness of one sheet of the pile. In order to make them accurately adjustable, slots 36 for the screws 35 are provided in the spring plates 33 to enable the spring plates 33 to be adjusted vertically.

For receiving the bottom sheet of the pile which has been pushed out by means of the rubber block 4 which engages with the lower surface of the said sheet, a rubber covered roller 37 and a roller 38, having no rubber covering but a smooth surface, are provided, between which the pushed-out sheet is delivered. The roller 37 is mounted on a driven shaft which rotates in the direction shown by the arrow. This roller projects through a slot in the table 2 just so far that its surface lies flush with the surface of the table and is therefore capable of feeding the sheet moving from the pile along the table. The upper roller 38 acts both as a guide for the sheet, so that it may be fed along by the roller 37, and also as a stripper. For this purpose the roller 38 is driven by means of a cord 39 from the shaft of the cam 37. As the roller 38 has a considerably smaller diameter than the roller 37 it has a correspondingly higher speed of revolution. As this roller rotates in the opposite direction to the roller 37 (as indicated by the arrow),

it serves the purpose of stripping off or holding back any second sheet that may have been carried along so that only a single sheet, namely the bottom sheet of the pile, can pass between the pair of rollers 37, 38 to the pair of feed rollers 40, 41 of the machine, to which the sheets are to be fed. In order to ensure the correct functioning of the roller 38 since it must not bear hard against the lower roller, the roller 38 is mounted on a two-armed lever 42 at the other end of which an adjusting screw 43 is provided, by means of which the exact position of the roller may be adjusted.

The apparatus operates in the following manner:—

In the first place the shafts 26 are turned by means of the eccentric rod 28, so that the cam fingers 32 move into the position shown in Fig. 3. In this position, the fingers will lift the portion A¹ of the pile so that between it and the lower part A² resting on the table there will be a slight gap S' (see Fig. 3). At the same time the spring plates 33 will have come in contact with the sides of the pile (position shown in Fig. 2). They will rest against the sides of the lower part A² in such a manner that only the bottom sheet is not subjected to the braking action.

The lever 14 will thereupon rock over, causing the bar 12, with its longitudinal slot 11, to perform an idle motion until the end 20 of the adjusting screw 19 strikes against the transverse pin 10. This idle motion is utilized for bringing the stop 21 in contact with the two-armed lever 22. The two-armed lever is rocked over in opposition to the tension of the spring 44 attached to it, such that the cam 24 raises the supporting lever 5, and the rubber block 4 presses with its serrations against the bottom sheet of the pile. As soon as this has taken place, and the parts in question are in the positions shown in Fig. 1, the two armed lever 14, on continuing to rock in the direction shown by the arrow, will carry along the slide 7, the rubber block shifter 4 pushing the bottom sheet of the pile to the left (Fig. 1). The sheet is pushed between the rollers 37 and 38 and delivered by the roller 37 to the feed rollers 40, 41 of the machine.

As soon as the slide has completed its stroke, a reversal takes place, during which, owing to the bar 12 first performing an idle motion, the lever 22 is in the first place led to follow the tension of its spring 44, for moving the rubber block shifter 4 out of contact with the pile of sheets. The cams 32 are thereupon turned back so that they will no longer be in contact with the pile, the spring plates 33 also ceasing to engage the sides of the pile. The upper part A¹ of the pile will then sink down on to the lower part A², and the entire pile will sink by the thickness of

one sheet. As, when they next engage with the sides of the pile, the cams 32 will make contact at the same level again, they will, owing to the pile having been lowered, raise one sheet less than they did previously, so that the number of sheets in the lower part A² of the pile always remains constant.

What I claim is:

1. An apparatus for removing the end sheet of a pile of sheets supported between vertical guides, comprising in combination a shifter capable of being brought into frictional contact with the bottom sheet of the pile and means capable of entering into engagement with the pile for raising a considerable portion thereof and easing the weight while the shifter is operative, as set forth.

2. An apparatus for removing the end sheet of a pile of sheets supported between vertical guides, comprising in combination a shifter capable of being brought into frictional contact with the bottom sheet of the pile and means capable of entering into engagement with the pile for raising a considerable portion thereof and easing the weight while the shifter is operative, of being disengaged from the pile when the shifter ceases to be operative and of re-engaging the pile at the same level for the next operation of the shifter, as set forth.

3. An apparatus for removing the end sheet of a pile of sheets supported between vertical guides, comprising in combination a shifter capable of being brought into frictional contact with the bottom sheet of the pile, cam fingers of yielding material positioned at opposite sides of the pile and means for jointly actuating the said cam fingers for causing them to rock so as to be in engagement with the sides of the pile for raising the portion thereof lying above the point of engagement and easing the weight while the shifter is operative, and to rock so as to be

out of engagement with the sides of the pile, while the shifter is inoperative, as set forth. 50

4. An apparatus for removing the end sheet of a pile of sheets supported between vertical guides, comprising in combination a slide, a shifter pivoted to the said slide, means for reciprocating the said slide in the direction in which the sheet is to be withdrawn, said means comprising a bar capable of longitudinal reciprocating motion, a stop member on the said bar, a cam member pivoted on the slide and capable of being pressed against the shifter from below, an extension on the said cam member, a spring capable of keeping the extension in engagement with the said stop member and means on the said bar capable of allowing the said bar to perform an idle motion for bringing the cam member into its operative position in opposition to the spring, as set forth. 60

5. An apparatus as claimed in claim 3 and comprising yielding members capable of being pressed against the sides of that part of the pile of sheets which is not raised by the cam fingers, and supports for the said yielding members mounted on the means for jointly actuating the cam fingers, the yielding members and the fingers being so mounted with respect to one another that they become operative and inoperative together, as set forth. 70

6. An apparatus as claimed in claim 3 and comprising a pair of conveying rollers for receiving the bottom sheet pushed out by the shifter, means for adjusting the rollers with respect to one another and means for rotating the upper roller of the pair at a considerably higher speed than the lower one, as and for the purpose set forth. 80

In testimony whereof I have signed my name to this specification. 85

ERNST HERMANN JÄHNE.