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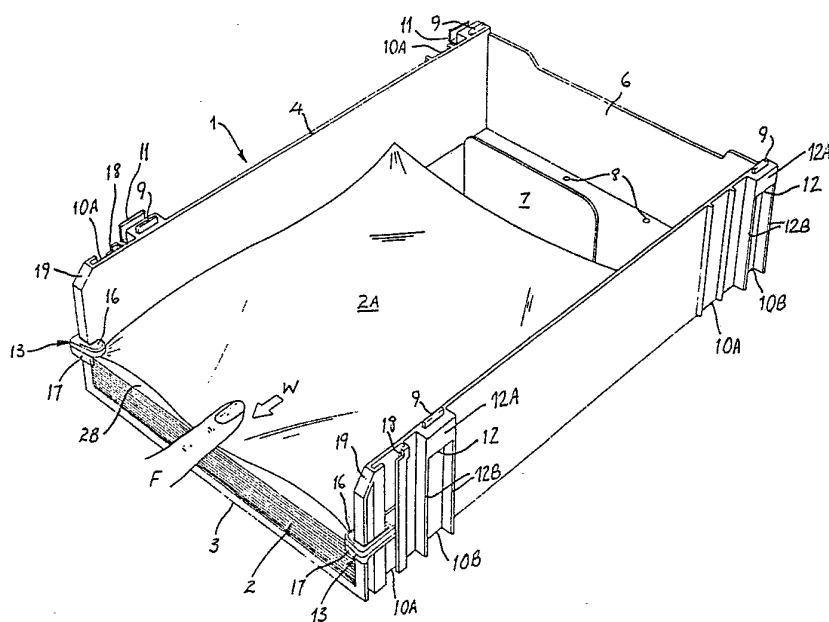
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(54) Title: A SHEET DISPENSER



(57) Abstract

A sheet dispensing tray (1) has sheet separator members (13) freely slidable under their own weight in external key-way slots (10A) in its side walls (4) at its open end (5). These separator members (13) have portions (16) which rest on the leading corners of the uppermost sheet (2A) of a stack of sheets (2) in the tray, and portion (17) which abut the ends of the leading edges of some underlying sheets (2), whereby the uppermost sheet is caused to buckle and become separated from the underlying sheet (2B) during withdrawal (W) from the tray. The tray (1) has complementary hooks (11) and sockets (12) on opposite sides, and complementary tongues (9) and grooves (10B, 10A) on the upper and lower edges of its sides, so that a number of trays can be locked together side by side in a row and/or superimposed in stacks.

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A Sheet Dispenser

The present invention relates to dispensers for sheets of paper and the like, of type comprising a tray adapted to hold a vertical stack of sheets and having opposite side walls defining an open end through which the sheets are withdrawn individually from the top of the stack, and a pair of sheet separator members having respective first portions which overlie the leading corners of the uppermost sheet in the stack and respective second portions which project downwardly from the first portions across the leading edges of the uppermost sheet and a number of the underlying sheets.

Dispensers of this type are disclosed, for example, in EP-A-0010280, GB-A-1135746, GB-A-1185455 and GB-A-1206717, and are intended mainly for use in photocopying machines and the like, which withdraw sheets of paper from the top of the stack with a predetermined pressure. In order to maintain the top of the stack at a constant level for withdrawal, these trays usually incorporate or are associated with resilient means which urge the stack towards the sheet withdrawal means of the machine - see, for example, EP 0031878, GB-B-2061231 and GB-B-2038289. The withdrawal means, such as rubber rollers or suction pads, initially drag the top sheet of the stack against the separator members in order to buckle the sheet and separate it from the underlying sheet, and then remove the sheet in the feed direction.

It is well known that the separation and dispensing of individual sheets of paper and the like from a stack of sheets is often problematical because the sheets tend to stick together due to dampness or electrostatic attraction. This problem is encountered in the afore-



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mentioned field of photocopying machines, but it is particularly apparent during the manual collation of printed sheets and in other situations where single sheets are dispensed manually from a stack or pile.

5 Practically the only solution to this problem in the field of manual sheet dispensing is the use of a so-called rubber finger by the dispenser to facilitate the separation of the sheets, but this can result in the disarrangement of the stack and the inconvenience
10 of frequently having to rearrange the stack. Clearly, where such dispensing of single sheets is necessary on a large scale, such as for collation in printing works, the need to employ specific personnel and the interruptions resulting from multiple separations
15 can result in considerable hold-ups in production.

The object of the present invention is to provide a dispenser for sheets of paper and the like, which avoids the drawbacks discussed above. The invention also aims to provide a sheet dispenser adapted for use in
20 a manual collation system.

Accordingly, in a first aspect, the present invention provides a dispenser of the aforesaid type, in which the two said portions are carried by respective L-shaped parts of the separator members and are guided for
25 vertical movement by respective key portions attached to or integral with the L-shaped parts and freely slidable in respective vertical keyway slots in the external surfaces of the two side walls, so that the weight of the separator members bears through the first
30 portions upon the uppermost sheet of the stack in use of the dispenser.



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A single sheet can be withdrawn from the tray simply by applying a finger to the central region of the uppermost sheet just behind its leading edge, and moving it towards the open end of the tray to pull the sheet along due to the friction between the sheet and the finger. As the sheet is withdrawn, its leading corners are restrained by the first and second portions of the separator members, causing the sheet to buckle slightly by arching in the regions behind the leading corners and between the corners and the finger. Since the restrained corners are turned downwardly and bear upon the underlying sheet to hold it down, and the latter is prevented from moving towards the open end of the tray by the second portions of the separator members, the buckled uppermost sheet is separated from the underlying sheet. As the withdrawal of the sheet continues, the leading corners disengage themselves from the separator members and the sheet slides freely from the tray without entraining any of the underlying sheets, which are still restrained by the separator members.

The dispensing tray of the present invention may be used individually for typing paper, information sheets and the like, but for use in a manual collating system to hold printed sheets which are to be put into sequence the tray should preferably be stackable with like trays.

According to a second aspect, therefore, the present invention provides a dispenser for sheets of paper and the like, comprising a tray adapted to hold a vertical stack of sheets and having opposite side walls defining an open end through which the sheets are withdrawn individually from the top of the stack, and a pair of sheet separator members having respective first portions which overlies the leading corners of the uppermost sheet in the stack and respective second



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portions which project downwardly from the first portions
portions across the leading edges of the uppermost
sheet and a number of the underlying sheets, in which
the two separator members are guided for vertical
5 movement under their own weight in respective guide
slots formed in the two side walls of the tray, which
are also formed with complementary tongues and grooves
on their upper and lower edges to enable a number of
the trays to be stacked and interlocked.

10 In both aspects of the invention, while the tray may
have fixed dimensions for a specific sheet size, it
preferably includes an adjustable back-stop so that
one tray can accommodate a number of different common
sizes of sheet. The back-stop may be slidable
15 longitudinally of the tray or, preferably,
locatable at a number of discrete longitudinal
positions along the base or the side walls.

One embodiment of the invention will now be described,
by way of example, with reference to the accompanying
20 drawings, in which:

Figure 1 is a perspective view of a dispensing tray
for sheets of paper and the like, according to the
present invention;

Figure 2 is a view similar to Figure 1 showing the
25 tray during the dispensing of a sheet;

Figure 3 is a plan view of the tray of Figures 1 and
2 in its empty condition;

Figure 4 is a partial section of four interlocked,
stacked trays of the invention, taken in the plane
30 shown by the line IV-IV of Figure 3;



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Figure 5 is a partial side view showing the stacking of three trays of the present invention;

Figure 6 is a partial perspective view of a detail of the tray of Figures 1, 2 and 3 on an enlarged scale, showing a separator member removed from the tray, and

Figure 7 is a view similar to Figure 6, showing the separator member in its raised position.

Referring now to the drawings, there is shown a tray 1 for dispensing sheets 2 of paper which are stacked in the tray. This tray 1 is made entirely of moulded plastics and comprises a base 3, two side walls 4 defining an open end 5 through which the sheets 2 are withdrawn from the top of the stack in use, an end wall 6, and an adjustable back-stop 7 facing the open end 5. The back-stop 7 is locatable in a number of discrete longitudinal positions between the side walls 4 by means of a pair of integral pins (not shown) which are engageable in an appropriate pair of holes of a longitudinal series of pairs of holes 8 in the base 3. The adjustability of the back-stop 7, together with the chosen spacing between the side walls 4, enables the tray 1 to be adapted to accommodate different paper sizes, such as A4, foolscap and A5, with a clearance, typically 1-2 mm, between the walls 4 and the edges of the stacked sheets 2.



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To enable a number of trays 1 to be stacked to form, for example, a manual collating system, the side walls 4 are formed with complementary tongues 9 and grooves 10 on their upper and lower edges. In the illustrated embodiment, there are respective pairs of opposing tongues 9 on the upper edges of the walls 4 adjacent the open end 5 and the end wall 6, while there are two pairs of opposing grooves 10 at the the lower edges of the walls 4, one pair of these grooves 10B being directly beneath the corresponding pair of tongues 9 and the other pair 10A being offset slightly towards the open end relative to the corresponding pair of tongues 9. The arrangement is such that a number of trays 1 can be superimposed by the interlocking of respective tongues 9 and grooves 10 to form a stack in which the trays 1 are staggered (to facilitate access to the trays) or aligned vertically (when space is limited). Both alternative stacking arrangements are shown diagrammatically in Figure 5.

In order that a number of trays 1 can be interlocked side by side in a row, as well as or instead of being stacked, the opposite side walls 4 of the tray 1 are formed externally with complementary lateral hooks 11 (Figures 6 and 7) and sockets 12 (Figures 1 and 2). As shown, one side wall 4 has a hook 11 adjacent its upper edge near each end, and the other wall 4 has respective sockets 12 in corresponding positions. The manner in which a number of trays 1 can be locked together side-by-side and stacked is shown in Figure 4. The sockets 12 are formed in the undersides of respective respective laterally outwardly projecting spacers 12A located at the upper ends of the grooves 10B, which are defined by respective pairs of vertical ribs 12B.



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In this typical embodiment, the tray 1 measures 330mm long, 210 mm wide, and 75 mm high internally. The base 3 and side walls 4 have minimum thicknesses of about 2 mm, and the back-stop 7 has a height of 60 mm.

Associated with the side walls 4 at the open end 5 of the tray 1 are respective separator members 13 which are guided slidably in respective external keyway slots formed in the walls 4 perpendicularly to the base 3 and, in this case, constituted by the front pair of the aforesaid grooves 10A. Each separator member 13 is moulded in plastics in a single piece and comprises an L-shaped part 14 extending from a key portion 15 freely slidable in the respective keyway slot 10A around the front or open end edge of the wall 4, and carrying respective first and second portions 16, 17 which project towards the other member 13. The first portions 16 lie parallel to and rest on the top surface of the stack of sheets 2 at the leading corners of the uppermost sheet 2A, and the second portions 17 lie parallel to a plane containing the leading edges of the stacked sheets 2 and abut the end portions of the leading edges of the uppermost sheet 2A and, say, ten of the underlying sheets 2. The first and second portions 16, 17 of each separator member 13 comprise mutually-perpendicular tabs and the first portions 16 have smoothly rounded upper surfaces.



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In use, the sheets 2 are withdrawn individually from the tray 1 simply by applying a finger F to the centre of the uppermost sheet 2A just behind its leading edge, and moving the finger F towards the open end 5, in the direction of the arrow W in Figure 2, to draw the sheet 2A along by friction. As the sheet 2A is withdrawn, its leading corners are restrained by the first and second portions 16, 17 of the separator members 13, causing the sheet 2A to buckle away from the immediately underlying sheet 2B. Since the restrained corners of the sheet 2A are turned downwardly and tend to hold the underlying sheet 2B down, and the latter is prevented from moving out of the open end 5 by the second portions 17 of the separator members 13, the uppermost sheet 2A becomes separated from the underlying sheet 2B. With the continued withdrawal of the sheet 2A, its leading corners disengage themselves from the separator members 13 and the sheet 2A slides freely from the tray 1 without drawing any of the still-restrained underlying sheets with it. As the level of the top surface of the stack drops with the withdrawal of successive uppermost sheets 2A, the separator members 13 slide downwardly under their own weight to maintain their positions relative to the currently uppermost sheet.

Clearly, the amount by which the separator member 13 impinge on the leading corners of the sheets 2 is not sufficient to crease or tear the uppermost sheet 2A as it is disengaged from the members 13, even when the sheet is of the flimsiest paper. The rounded upper surfaces of the first portions 16 facilitates the smooth disengagement of the uppermost sheet 2A from the separator members 13.



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When the tray 1 is to be loaded with a fresh stack of sheets 2, the separator members 13 are pushed upwardly in the keyway slots 10A to a raised position (Figure 7). At their upper ends, the keyway slots 10A have enlarged parts formed with steps 18 and the front edges of the side walls 4 have bevels 19, whereby the key portions 15 of the separator members 13 rest on the respective steps 18 and the L-shaped parts 14 rest on the respective bevels 19, to support the separator members 13 in their raised positions.

It will be appreciated that the illustrated configurations of the moulded parts defining the tongues 9, grooves 10A, 10B, hooks 11 and sockets 12, and the fact that some of these parts are common to more than one feature, are dictated largely by the exigencies of moulding.



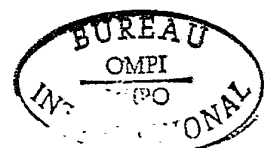
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CLAIMS

1. A dispenser for sheets of paper and the like, comprising a tray (1) adapted to hold a vertical stack (2) of sheets and having opposite side walls (4) defining an open end (5) through which the sheets are withdrawn individually from the top of the stack (2), and a pair of sheet separator members (13) having respective first portions (16) which overlie the leading corners of the uppermost sheet (2A) in the stack (2) and respective second portions (17) which project downwardly from the first portions (16) across the leading edges of the uppermost sheet (2A) and a number of the underlying sheets, characterised in that the two said portions (16,17) are carried by respective L-shaped parts (14) of the separator members (13) and are guided for vertical movement by respective key portions (15) attached to or integral with the L-shaped parts (14) and freely slidable in respective vertical keyway slots (10A) in the external surfaces of the two side walls (4) so that the weight of the separator members (13) bears through the first portions (16) upon the uppermost sheet (2A) of the stack (2) in use of the dispenser.

2. A dispenser according to Claim 1, characterised in that each keyway slot (10A) has an enlarged part formed with a step or shoulder (18) adjacent its upper end, upon which the associated key portion (15) can rest to support the respective separator member (13) in a raised position.

3. A dispenser according to Claim 2, characterised in that the front edge of each side wall (14) has a bevel or shoulder (19) at its upper end upon which the L-shaped part (14) of the respective separator member (13) may rest when the separator member (13) is in its raised position.



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4. A dispenser according to Claim 1, Claim 2 or Claim 3, characterised in that the first portion (16) of each separator member (13) has a smoothly rounded upper surface.

5. A dispenser according to any one of the preceding claims, characterised in that each separator member (13), including the first and second portions (16, 17), the L-shaped part (14), and the key portion (15), is made of plastics material moulded in a single piece.

6. A dispenser for sheets of paper and the like, comprising a tray (1) adapted to hold a vertical stack (2) of sheets and having opposite side walls (4) defining an open end (5) through which the sheets are withdrawn individually from the top of the stack (2), and a pair of sheet separator members (13) having respective first portions (16) which overlie the leading corners of the uppermost sheet (2A) of the stack (2) and respective second portions (17) which project downwardly from the first portions (16) across the leading edges of the uppermost sheet (2A) and a number of the underlying sheets, characterised in that the two separator members (13) are guided for vertical movement under their own weight in respective keyway slots (10A) formed in the two side walls (4) of the tray (1), and the side walls (4) are also formed with complementary tongues (9) and grooves (10, 10A) on their upper and lower edges to enable a number of the trays (1) to be stacked and interlocked.

7. A dispenser according to Claim 6, characterised in that the opposite side walls (4) of the tray (1) are formed externally with complementary lateral hooks (11) and sockets (12) such as to enable adjacent trays (1) to be locked together side by side in a row.



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8. A dispenser according to Claim 6 or Claim 7, characterised in that each side wall (4) of the tray (1) is formed with a pair of tongues (9) adjacent opposite respective ends of one edge of the side wall (4) and with at least two pairs of complementary grooves (10B,10A) in the opposite edge of the side wall (4), such that a number of the trays (1) can be stacked and interlocked either with their open ends (5) in a common vertical plane or staggered relatively to each other.

9. A dispenser according to Claim 6 or Claim 7 or Claim 8, characterised in that the complementary tongues (9) and grooves (10,10A) are formed on the upper and lower edges respectively of the side walls (4), two of the grooves being defined by the lower ends of the respective keyway slots (10A) in the side walls (4).

10. A dispenser according to Claim 7, characterised in that the side walls (4) of the tray (1) are formed with at least one pair of vertical ribs (12B) between which a groove (10B) is defined, the lower end of the groove being engageable by a complementary tongue (9) of an underlying tray (1), and including a laterally outwardly projecting spacer (12A) at the upper end of the groove, formed on its underside with a respective said socket (12) for engagement by a lateral hook (11) of a neighbouring tray (1).

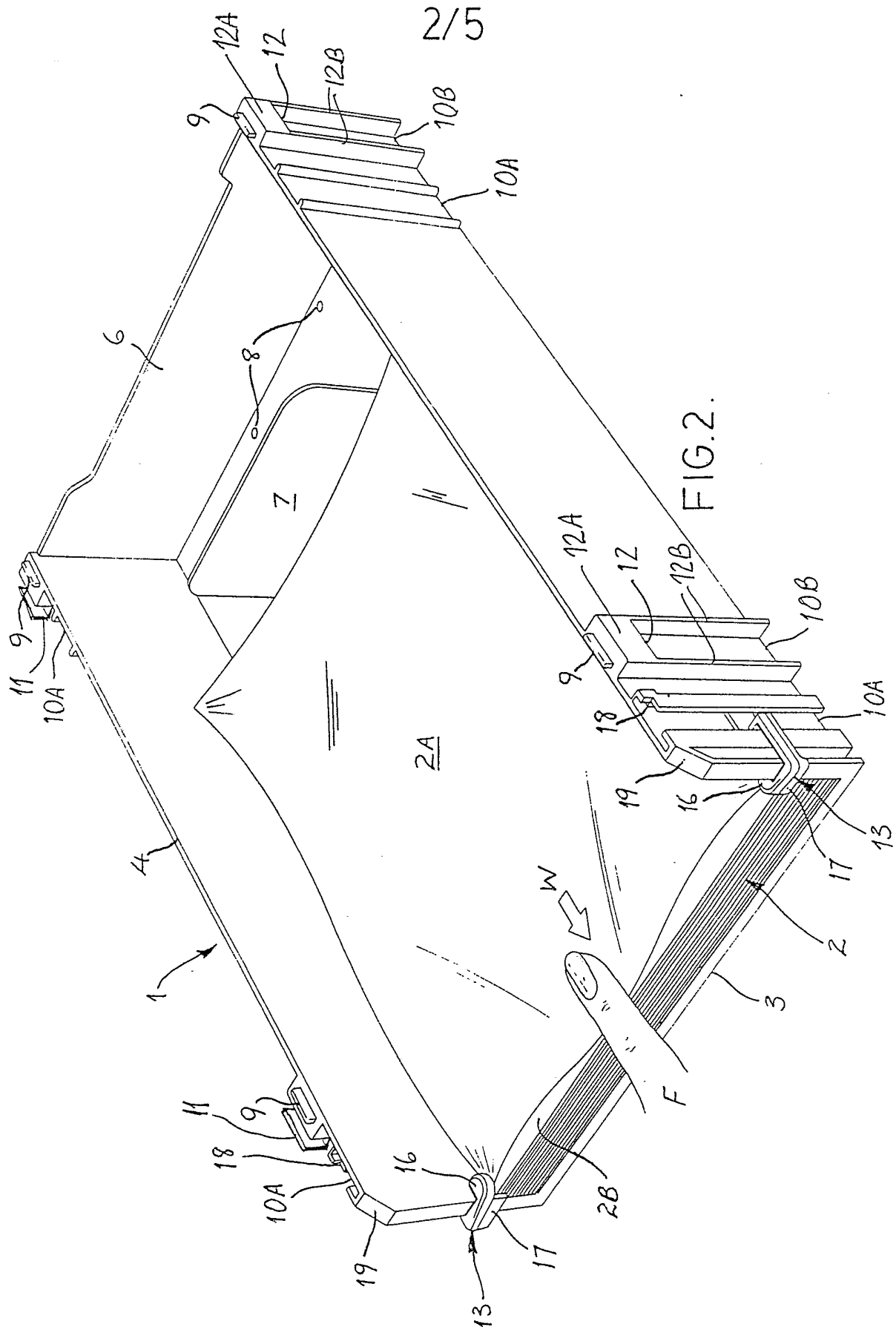
11. A dispenser according to any of Claims 6 to 10, characterised in that the two said portions (16,17) of the separator members (13) are carried by respective L-shaped (14) parts of the separator members (13) and are guided for vertical movement by respective key portions (15) attached to or integral with the L-shaped parts (14) and freely slidable in respective said keyway slots

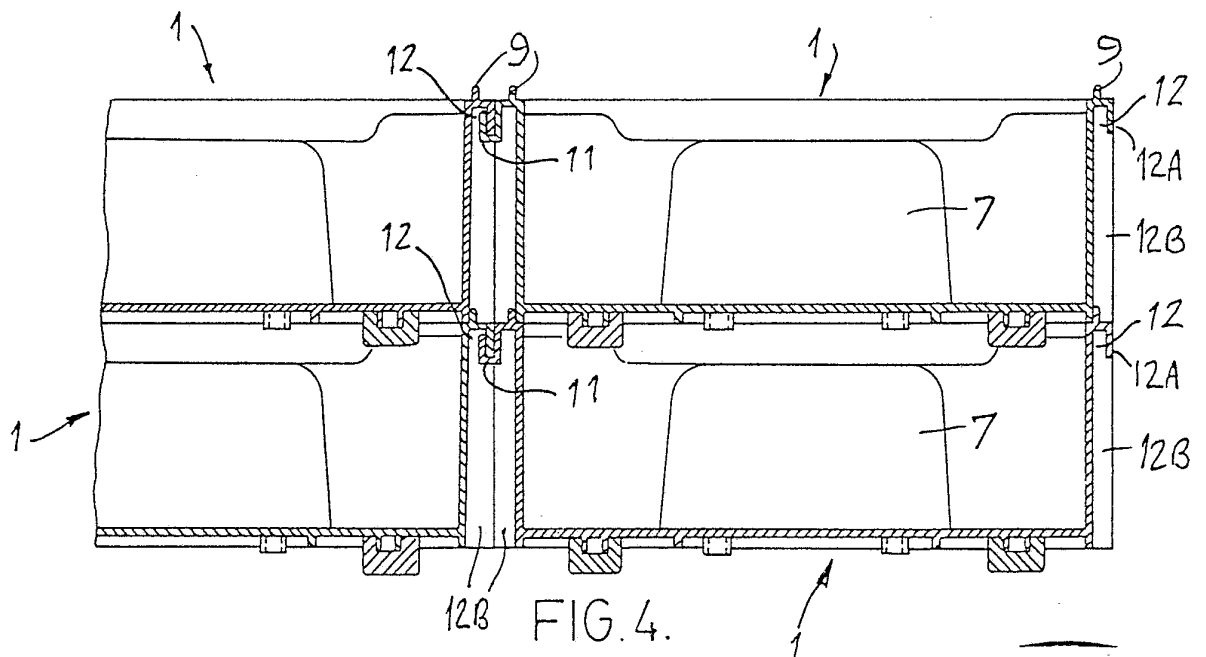
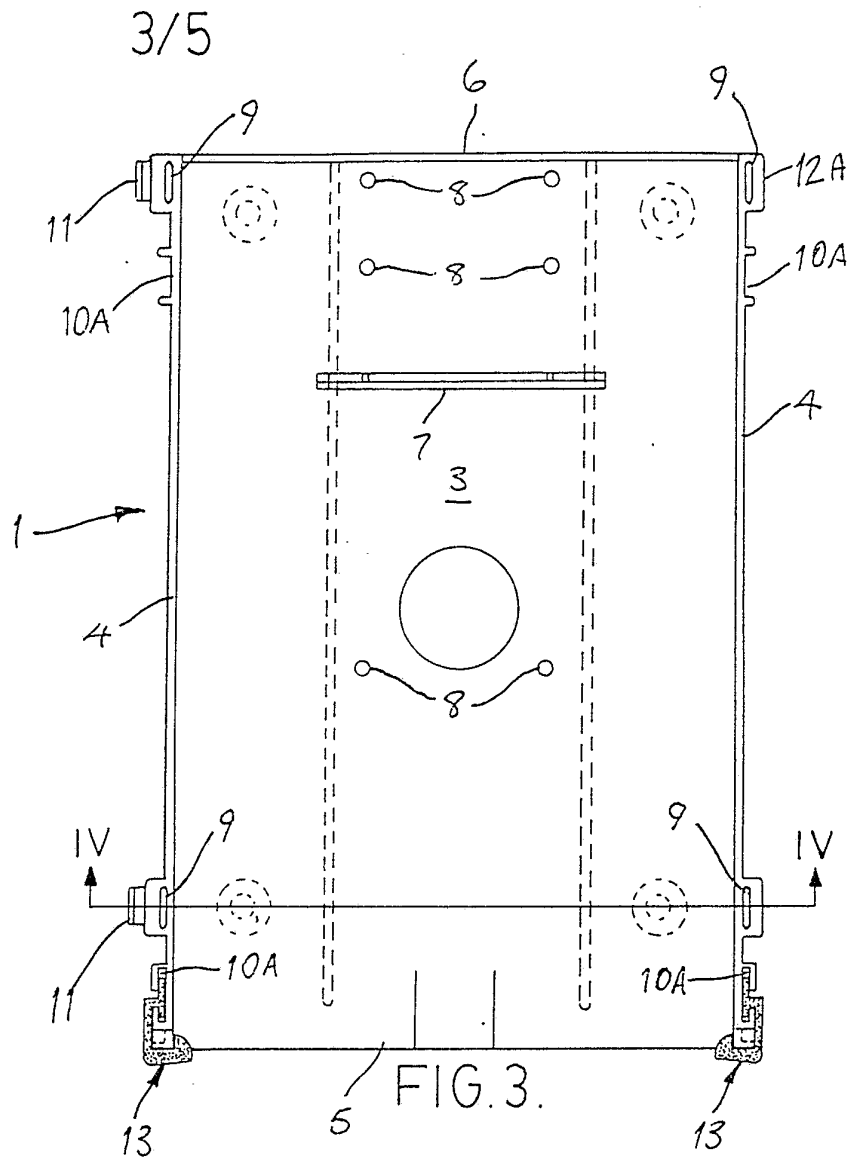


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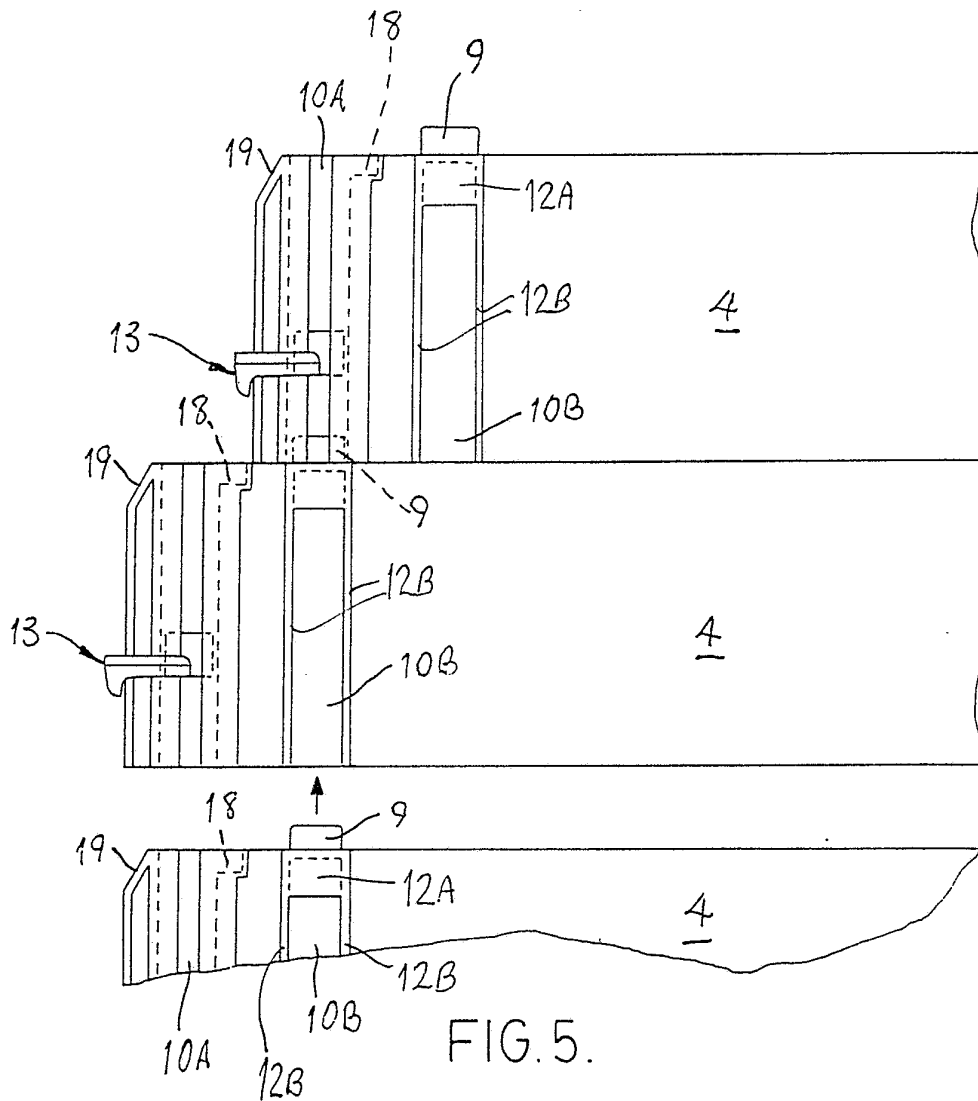
(10A) in the external surfaces of the two side walls (4), so that the weight of the separator members (13) bear through the first portions (16) upon the uppermost sheet (2A) of the stack (2) in use of the dispenser.



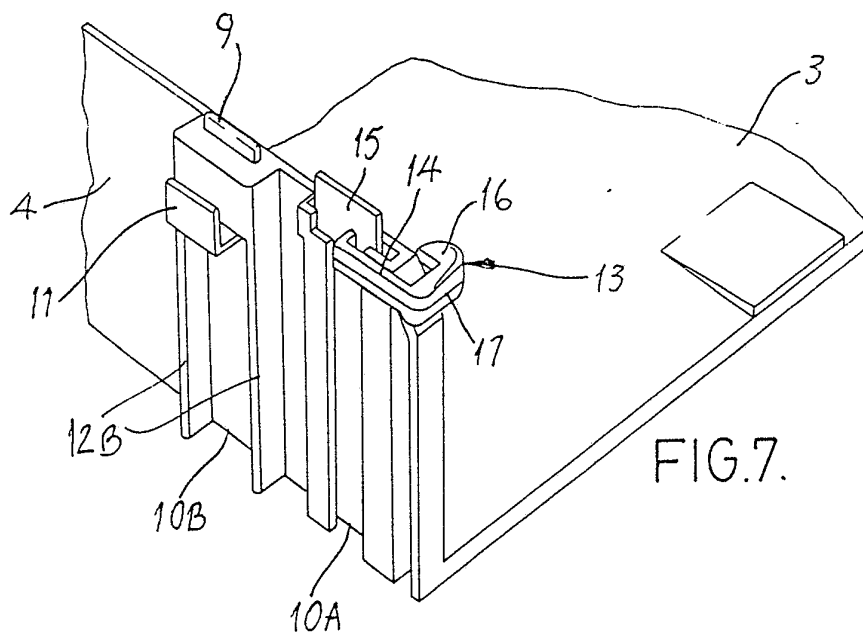
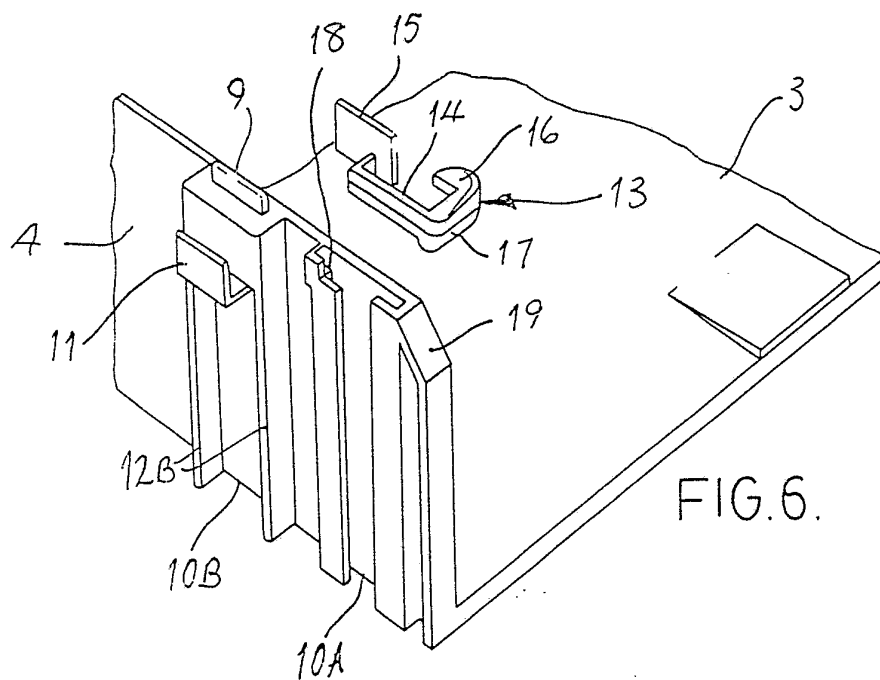




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INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 84/00077

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ³		
According to International Patent Classification (IPC) or to both National Classification and IPC IPC ³ : B 65 H 3/54; B 65 H 39/042; B 42 F 7/12		
II. FIELDS SEARCHED		
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Classification System	Classification Symbols	
IPC ³	B 65 H; B 42 F; A 47 B	
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III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴		
Category ⁸	Citation of Document, ¹⁶ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸
X	US, A, 4192498 (PITNEY-BOWES) 11 March 1980 see column 4, line 61 - column 5, line 24; figures	1,4,5
Y		6
A		11
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Y	FR, A, 2425823 (WEBER) 14 December 1979 see page 2, line 15 - page 3, line 30; figures	6
A		7
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A	US, A, 1504256 (MARCUSON) 12 August 1924 see the whole document	1,6
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A	FR, A, 1388354 (MARCH) 28 December 1964 see the whole document	1,6
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A	US, A, 2914189 (PIERCE) 24 November 1959 see the whole document	1,6

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IV. CERTIFICATION		
Date of the Actual Completion of the International Search ⁹	Date of Mailing of this International Search Report ¹	
15th May 1984	07 JUIN 1984	
International Searching Authority ¹	Signature of Authorized Officer ¹⁰	
EUROPEAN PATENT OFFICE	G.L.M. Kreydenberg	

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON

INTERNATIONAL APPLICATION NO. PCT/GB 84/00077 (SA 6769)

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 4192498	11/03/80	None	
FR-A- 2425823	14/12/79	None	
US-A- 1504256		None	
FR-A- 1388354		None	
US-A- 2914189		None	

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