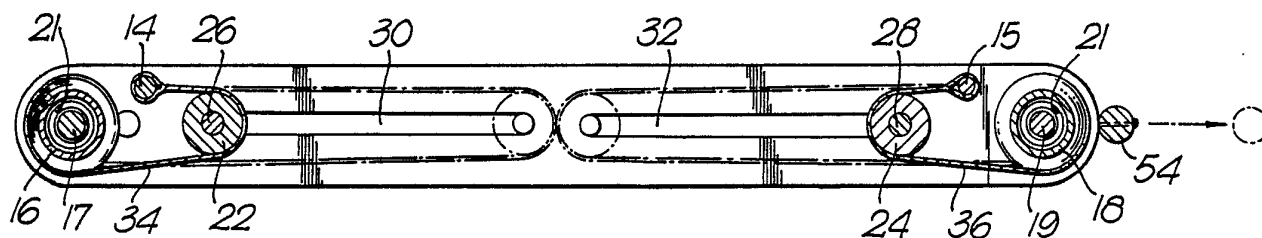




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(21) International Application Number: PCT/GB87/00318 (22) International Filing Date: 12 May 1987 (12.05.87) (31) Priority Application Numbers: 8611642 8619048 (32) Priority Dates: 13 May 1986 (13.05.86) 5 August 1986 (05.08.86) (33) Priority Country: GB (71) Applicant (for all designated States except US): THE SECRETARY OF STATE FOR TRADE AND INDUSTRY IN HER BRITANNIC MAJESTY'S GOVERNMENT OF THE UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND [GB/GB]; 1 Victoria Street, London SW1H 0ET (GB). (72) Inventor; and (75) Inventor/Applicant (for US only) : BRYCE, Graham, Watt [GB/GB]; 63 Atholl Drive, Giffnock, Glasgow G46 6QW (GB).		(74) Agent: BECKHAM, Robert, William; Procurement Executive, Ministry of Defence, Patents 1A(4), Empress State Building, Lillie Road, London SW1A 2HB (GB). (81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US. Published <i>With international search report.</i>

(54) Title: LOADING DEVICE**(57) Abstract**

A device for the accurate placement of material in a press, for example, for manufacturing printed circuit boards or fibre reinforced plastic panels. The device has a frame holding two outer fixed rollers (16, 18) and two inner slideable rollers (22, 24), a flexible covering (34) extending between each outer to inner roller. Material is placed on the flexible covering when the inner rollers are adjacent to each other and can then be carefully placed in a press as the inner rollers (22, 24) slide apart.

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LOADING DEVICE

This application relates to a device for accurate placement of sheets in a press, for example, for manufacturing printed circuit boards or fibre reinforced plastic panels.

At present such sheets are placed manually in the press. This method of placing is very labour intensive. There is also a problem experienced in handling and placing sheets which have a large area and a relatively shallow depth. Also the working environment for placement of sheets in the press is not always suitable, especially where a hot curing press is involved. Furthermore the placement of sheets in the press can be very messy especially where a layer of adhesive is applied to one side of each sheet. There is also a problem experienced, for example, where more than one layer of sheet has to be accurately placed in the press.

One purpose of the present invention is to provide a device which will allow sheets to be consistently and accurately placed in the press.

This invention accordingly consists of a device for accurate placement of material characterised in that it comprises a framework, a first and a second fixed roller transversely arranged adjacent the ends of the framework, a third and a fourth slidable and rotatable roller interdisposed between the first and second rollers, a flexible support member extending from each of the fixed rollers and round the adjacent roller to a fixture on the framework, the third and fourth rollers being in a support position when the rollers are adjacent to each other near the centre of the framework and in a release position when the third roller is adjacent and first roller and the fourth roller is adjacent the second roller, whereby material placed on the flexible support members in the support position peels away from the material as the third and fourth rollers move towards the release position.

Preferably the fixtures on the framework are located above and adjacent the fixed rollers.

Preferably slots for the third and fourth rollers are provided in the framework, to allow axial spigots of the rollers to slide therein.

Alternatively a slide mechanism on the framework can be provided for the axial spigots of the third and fourth roller.

Preferably the flexible support members extend along the full length of the rollers.

Preferably the fixed rollers have a resilient biasing means such that when axial spigots of the third and fourth roller slides towards the release position, the flexible support members wind onto the fixed rollers.

By way of example, one embodiment of the invention will be described with reference to the accompanying diagrammatic drawings of which,

Figure 1 is a perspective view of the device in a release position in accordance with the invention.

Figure 2 is a perspective view of the device in a support position.

Figure 3 is a sectional view along III - III of Figure 1.

Figure 4 is similar to Figure 2 but shows bands of flexible strips rather than a single flexible support member.

Referring to Figures 1 - 3 of the drawings, the device generally indicated at 10 includes a general framework having two longitudinal members 12 and two transversely extending bars 14 and 15.

A first roller 16 and a second roller 18 are attached transversely between the ends of the two longitudinal members 12. The rollers 16 and 18 are rotatable about axial spigots 17 and 19 respectively as shown in Figure 3. Resilient biasing means 21 are incorporated within the rollers 16 and 18, the purpose of the resilient biasing means will become apparent later in the description.

Also forming part of the device 10 is a third roller 22 and a fourth roller 24 which are interdisposed between the first roller 16 and the second roller 18. The four rollers are preferably arranged to be substantially in parallel between the two longitudinal members 12. Axial spigots 26, one at each end of the roller 22 and axial spigots 28, one at each end of roller 24 extend through slots 30

and 32, formed in the longitudinal members 12. Slots 30 extending from adjacent the roller 16 and slots 32 extending from adjacent the roller 18 are of such a length that the spigots 26 and spigots 28 can slide from a release position, adjacent to the rollers 16 and 18 respectively, towards the centre of the device 10 to a support position.

A flexible support member 34 is connected to the roller 16 underneath and round the adjacent roller 22 to the transversely extending bar 14 of the framework. Similarly a flexible support member 36 is connected to the roller 18 underneath and round the adjacent roller 24 to the transversely extending bar 15 of the framework. Conveniently, the bars 14 and 15 of the framework lie above and adjacent the rollers 16 and 18 respectively. The flexible member 34 and 36 extend along the full length of the rollers.

Identical pulleys 42, 44 and cables 46, 52 are arranged on the outer sides of the longitudinal members 12 to allow axial spigots 26 and 28 to slide away from their release position, as shown in Figures 1 and 3 to the support position as shown in Figure 2. The pulley 42 is rotatably mounted on the longitudinal member 12 adjacent the roller 16. The pulley 44 is provided on the axial spigot 26. To provide the sliding action for the axial spigot 28, the cable 46 is connected to a axial spigot 28. The cable 46 passes underneath the pulley 44, underneath and round the pulley 42 and through a guide hole 48 formed in an extension 50 which is attached to the member 12 adjacent the roller 18. Similarly the sliding action for the axial spigot 26 is provided by connecting the cable 52 directly to the axial spigot 26 and passing it through the guide hole 48. The two cables 46 and 52 through the guide hole 48 on each side of the longitudinal members 12 are connected to a pull rod 54.

It will be realised that the device 10 has to be positioned directly over a top of a press (not shown). The device 10, for example, can be arranged on a trolley (not shown) where the height can be adjustable for positioning.

Alternatively, where the press has to be enclosed, for example, in the case of a hot curing press and the only access for the material sheet placement is through a side, a trolley comprising the

device 10 can be arranged on a track, allowing the trolley to move in and out of the press..

In use the pull rod 54 is pulled away from the position adjacent the roller 18 in a direction as shown in Figures 1 and 3. The cables 46 and 52 cause the axial spigots 26 and 28 to slide along the slots 30 and 32 respectively towards the support position from the release position as shown by chain-dotted lines in Figure 3. The sliding action of the axial spigots 26 and 28 allows the rollers 16 and 18 to rotate and unwind the flexible support sheets 34 and 36 from the rollers 16 and 18 respectively. The rollers 22 and 24 also rotate due to the unwinding of the flexible support members 34 and 36. The area within the device is substantially enclosed by the flexible support members 34 and 36 when the two rollers 22 and 24 have completed their movements.

A material sheet 60 is placed on the extended flexible support sheets 34 and 36. The pull rod 54 is then allowed to move towards its normal position adjacent the roller 18. The fixed rollers 16 and 18, due to the resilient biasing means 21, start to rotate and wind the flexible support member 34 and 36 respectively and move the rollers 22 and 24 towards their release position. The flexible support member 34 and 36 peel away from the material sheet 60 allowing it to drop into the press when the support provided by the flexible sheets 34 and 36 is no longer available.

In an alternative version, instead of the flexible support members 34 and 36, a series of flexible support bands 40 can be provided as shown in Figure 4.

In an alternative embodiment, the two longitudinal members 12 of the framework can be replaced by circular rods. The axial spigots 26 and 28 of the rollers 16 and 18 respectively can be connected to slide mechanisms which can slide along the circular rods and provide the necessary sliding action. An attachment arrangement for the rollers 16 and 18 will have to be provided at the ends of the two circular rods.

It will be realised that with the arrangements just described the material sheet 60 must not be greater than the area defined between the two rollers 22 and 24 and the two longitudinal Sections 12, when the device 10 is in its inoperative position.

It will, of course, be realised that a multiple layer of material sheets can be positioned at one time on the device for placement into the press.

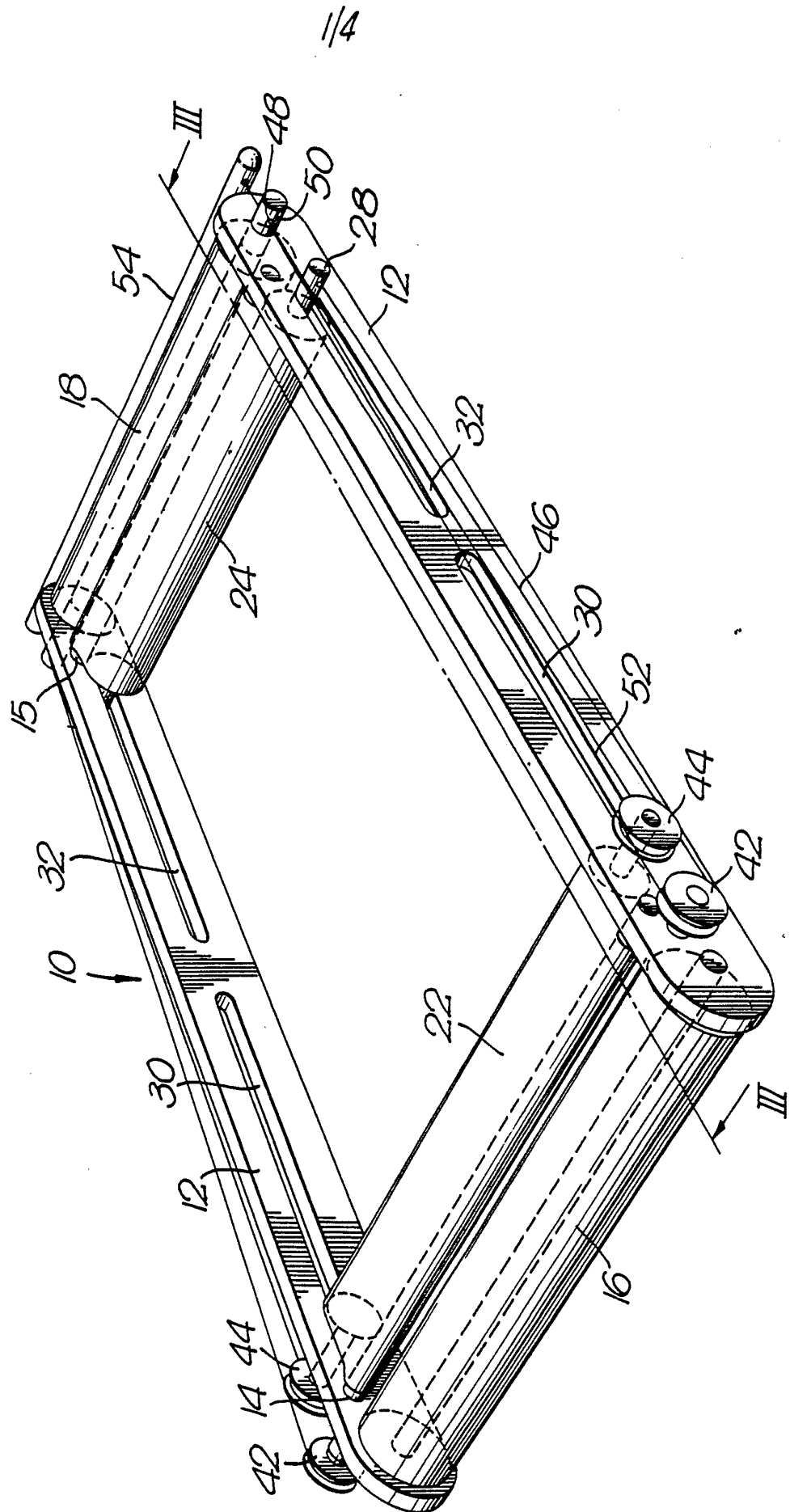
In another alternative embodiment, one of the longitudinal member 12 can be removed and the remaining longitudinal member 12 can be reinforced so that it provides the support for the rollers and the bars 14, 15. Pulleys 42, 44 and cables 46, 52 on the removed side of the longitudinal member 12 will also be eliminated. With this arrangement the material sheet larger than the length of the rollers and bars 14, 15 can be supported.

It will be clear to those skilled in the art that the invention is not restricted for accurate placement of material sheet in the press. It could, for example, be used for stacking up materials in a warehouse or for unloading material for transportation on a conveyor belt.

CLAIMS

1. A device for accurate placement of material characterised in that it comprises a framework, a first and a second fixed roller transversely arranged adjacent the ends of the framework, a third and a fourth slidable and rotatable roller interdisposed between the first and second rollers, a flexible support member extending from each of the fixed rollers and round the adjacent roller to a fixture on the framework, the third and fourth rollers being in a support position when the rollers are adjacent to each other near the centre of the framework and in a release position when the third roller is adjacent the first roller and the fourth roller is adjacent the second roller, whereby material placed on the flexible support members in the support position peels away from the material as the third and fourth rollers move towards the release position.
2. A device according to Claim 1 characterised in that each fixture on the framework is located above and adjacent the associated fixed roller.
3. A device according to Claim 2 characterised in that slots for axial spigots of the third and fourth rollers are provided in the framework.
4. A device according to Claim 3 characterised in that the first and second rollers have a resilient biasing means such that when axial spigots of the third and fourth roller slides towards the release position, the flexible support members wind onto the fixed rollers.
5. A device according to Claim 4 characterised in that the flexible support members extend along the full length of the rollers.
6. A device according to Claim 5 characterised in that the flexible support member is in a form of flexible band strips.
7. A device according to Claim 6 characterised in that axial spigots of the third and fourth rollers are attached to sliding mechanisms.
8. A device according to Claim 7 characterised in that the sliding mechanisms are slidably arranged on the circular rods of the framework.
9. A device according to Claim 1 characterised in that the framework is formed from circular rods.

Fig. 1.



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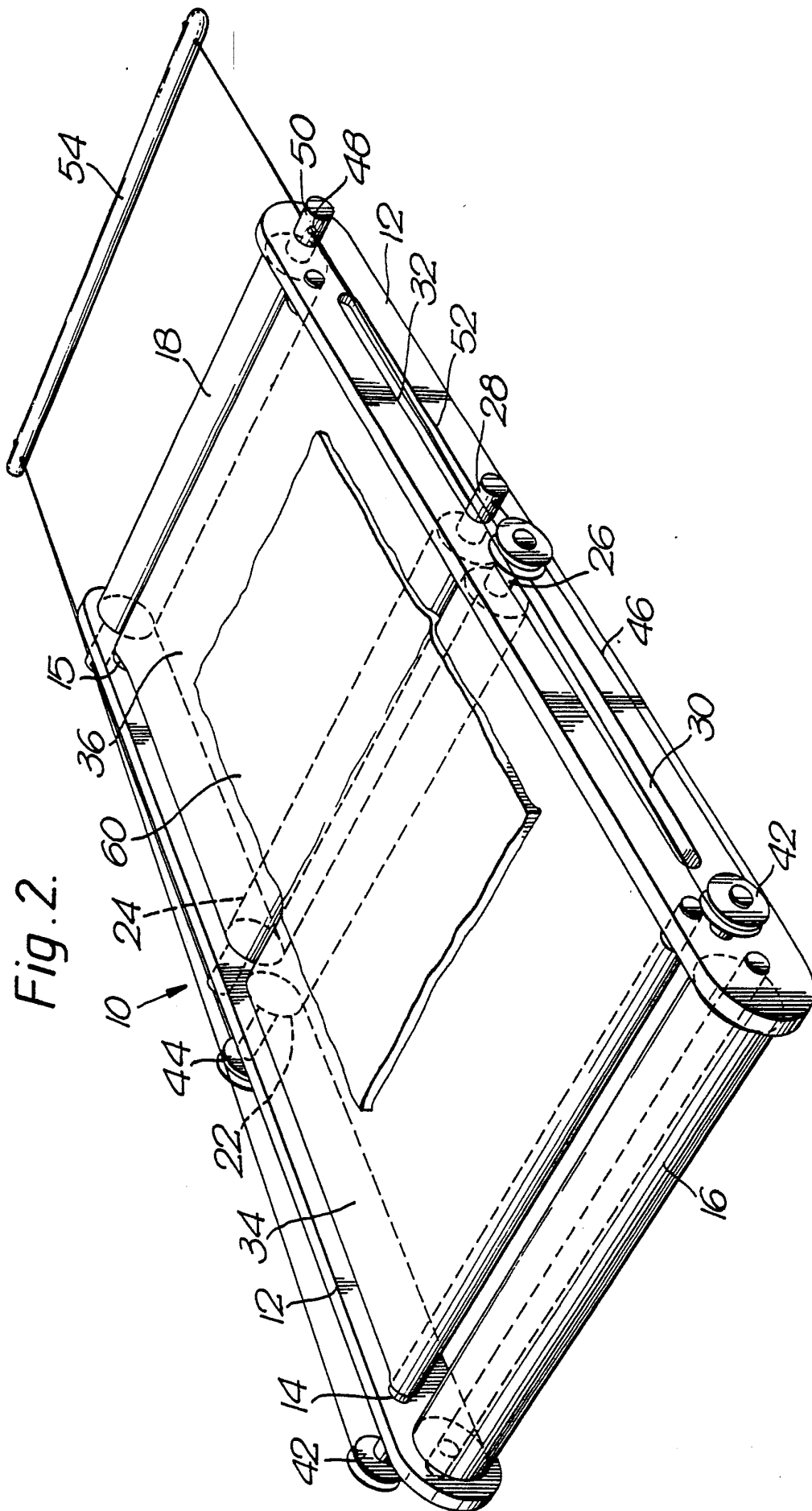


Fig. 3.

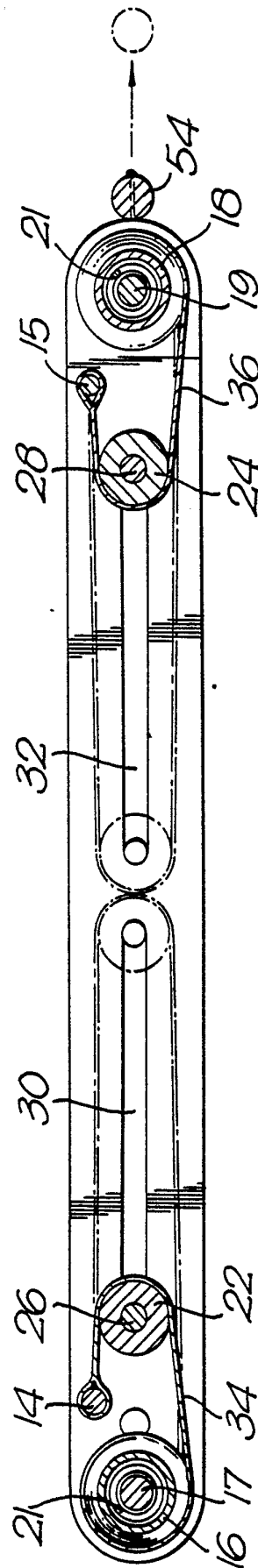
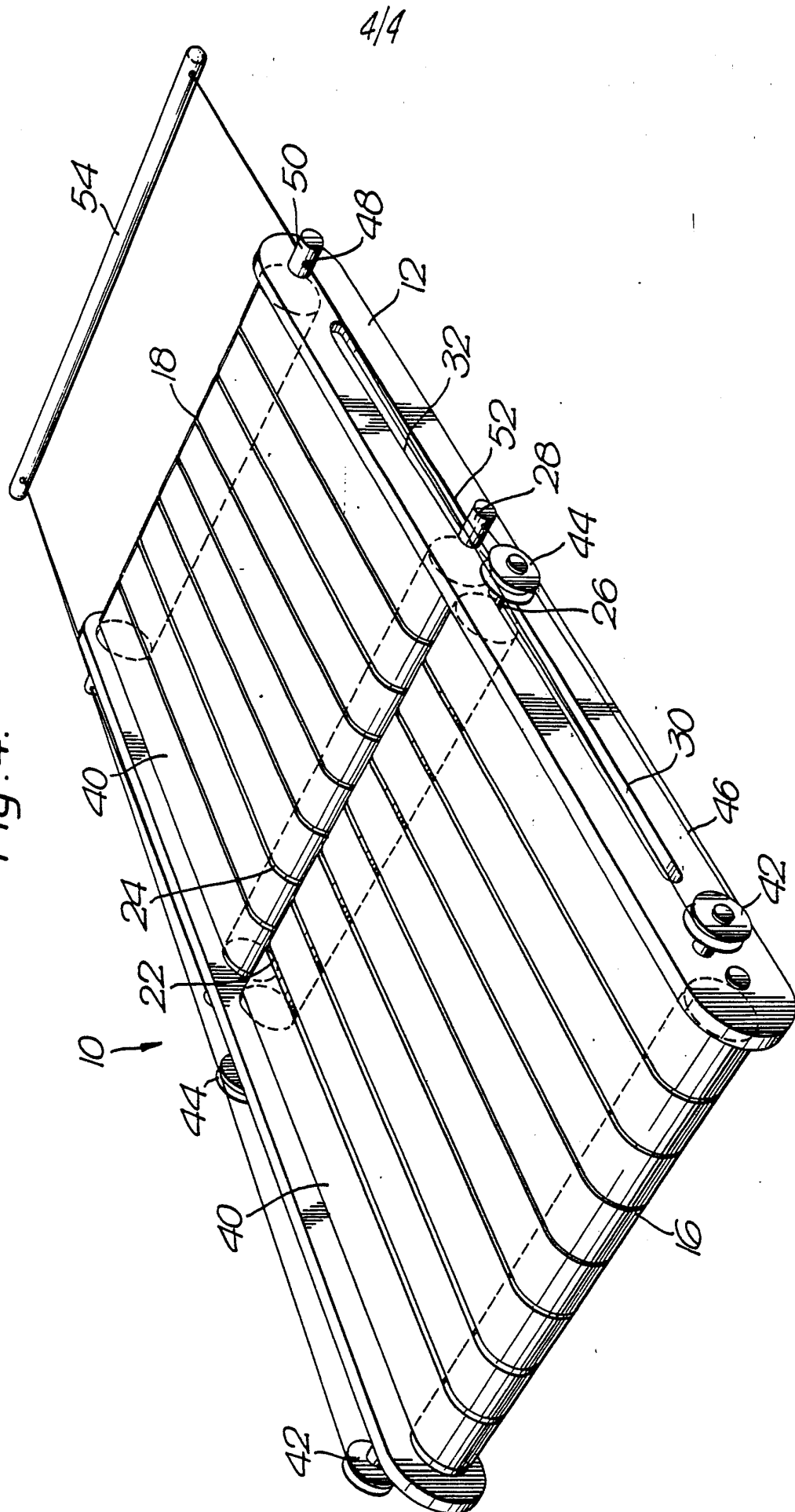


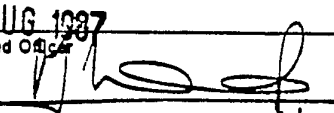
Fig. 4.



INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 87/00318

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) *		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC ⁴ : B 65 G 47/52; B 65 G 21/14		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
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IPC ⁴	B 65 G; B 65 D; B 30 B; A 61 G	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched *		
III. DOCUMENTS CONSIDERED TO BE RELEVANT *		
Category *	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
Y	DE, A, 3151654 (LONGINOTTI) 15 July 1982 see page 7, line 5 - page 8, line 34; figures 1-4	1-5,7-9
Y	US, A, 1793006 (O'NEILL) 17 February 1931 see the whole document	1-5,7-9
A	US, A, 3631812 (WINSLOW) 4 January 1972 see figure 24	1
A	US, A, 4460110 (HELANDER) 17 July 1984 see the whole document	1

* Special categories of cited documents: ¹⁰ "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
4th August 1987	24 AUG 1987	
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ANNEX TO THE INTERNATIONAL SEARCH REPORT ON

INTERNATIONAL APPLICATION NO. PCT/GB 87/00318 (SA 17207)

This Annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 12/08/87

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-A- 3151654	15/07/82	None	
US-A- 1793006		None	
US-A- 3631812	04/01/72	None	
US-A- 4460110	17/07/84	None	

For more details about this annex :
see Official Journal of the European Patent Office, No. 12/82