



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
14.01.2004 Bulletin 2004/03

(51) Int Cl.7: **B65B 41/18, B65B 57/12**

(21) Application number: **03425454.0**

(22) Date of filing: **10.07.2003**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PT RO SE SI SK TR
 Designated Extension States:
AL LT LV MK

(72) Inventor: **Gasparini, Tiziano**
40122 Bologna (IT)

(74) Representative: **Pederzini, Paolo**
c/o BUGNION S.p.A.
Via Goito, 18
40126 Bologna (IT)

(30) Priority: **12.07.2002 IT BO20020448**

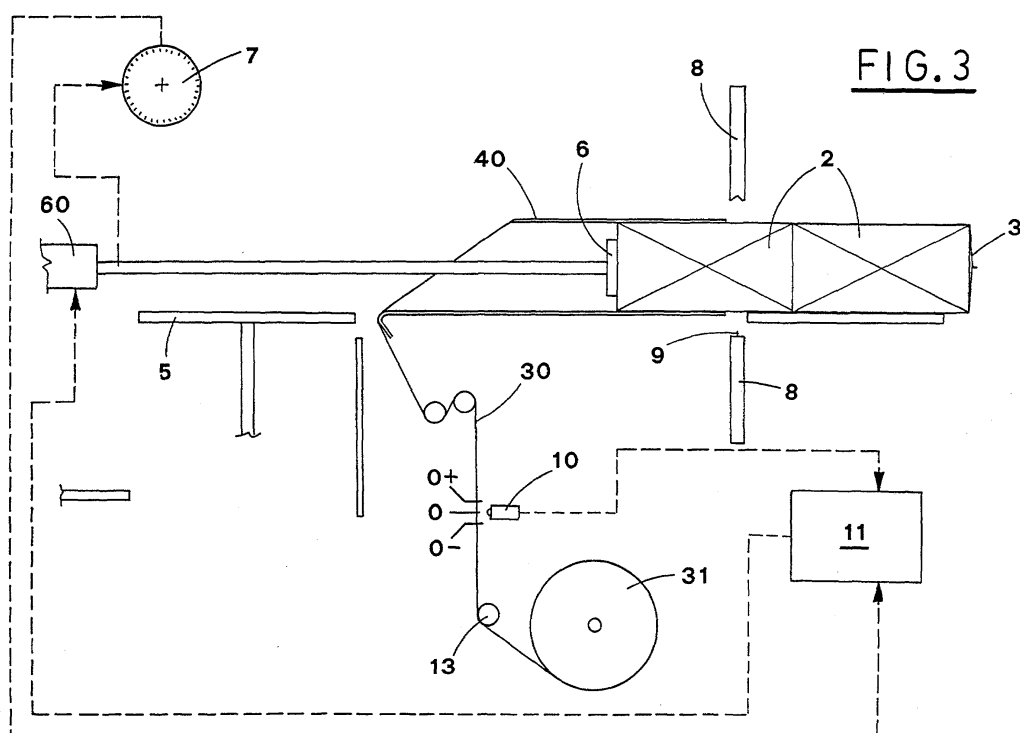
(71) Applicant: **T.M.C. S.p.A.**
40057 Cadriano Di Granarolo Emilia,
Bologna (IT)

(54) **A method for centring the print on the wrapper of packs of items**

(57) The method for centring print on the wrapper (3) of packs of items (2) involves an initial calibration step in which correct centring of a first print in a first wrapper (3) containing a first pack of items (2) is pre-determined.

The corresponding reference data is acquired and saved in electronic control means (11).

The method then involves a normal operating cycle in which the data relative to each wrapper (3) being formed is compared with the reference data to verify correct print centring and, if the print is incorrectly positioned relative to the data saved, suitable corrective action is activated, to be imparted, by the control means (11), to the operating parts of the machine which implements the method.



Description

[0001] The present invention relates to a method for centring the print on one face of the wrapper of packs of items.

[0002] In the sector for packaging items in bundles the need is known for putting printed information on the pack wrapper, for example marketing or advertising information. The bundles of items are normally packaged in a wrapper made using a sheet of material such as cellophane. In a known solution, the sheet of cellophane is taken from a web which is unwound from a reel, folded into the shape of a tube and sealed longitudinally. The tube obtained in this way is sealed transversally to form a sort of bag designed to receive the bundle of items to be packaged. The wrapper is then closed by sealing and cutting the sheet of cellophane at the back of the items packaged, at the same time forming the base of the wrapper for the subsequent pack.

[0003] The print is applied to the cellophane web, at suitable intervals, so that it is located on a predetermined face of the wrapper produced. The print may be in any position considered suitable, except, obviously, in the wrapper sealing zone. Often, for example, the print is present on one side of the pack so that it is visible when the packs are arranged on a pallet or stored using other methods.

[0004] In the specified sector, there is the problem of guaranteeing correct positioning of the print on the predetermined face of the wrapper, within a predetermined size range. The print applied to the cellophane web may have an error which is reproduced on the pack or the error, for example print which is shifted so that it is early or late relative to the condition initially required, may occur during the packaging steps.

[0005] Obviously, such print positioning errors, although limited in themselves, tend to add up as the number of packs produced rises, since the print gradually shifts relative to the required position, until it is in an unacceptable position.

[0006] The aim of the present invention is to overcome the above-mentioned disadvantage by providing a method which allows the automatic centring of the print on a predetermined face of the wrapper of packs of items.

[0007] Another aim of the present invention is to provide a method which allows the real time correction of any errors.

[0008] Yet another aim of the present invention is to provide a method which allows the above-mentioned print centring by means of an operating structure which has a simple design with reliable and versatile operation.

[0009] The aforesaid aims are achieved as described in the claims.

[0010] The features of the invention are now described with reference to the accompanying drawings, in which:

- Figure 1 is a schematic side view of a machine for packaging items in bundles, centring the print according to the method disclosed;
- Figure 2 is a corresponding plan view;
- Figures 3 and 4 illustrate the above-mentioned side view of the machine in successive operating steps of the method according to the present invention;
- Figure 3A illustrates an operating mode of the method relative to an initial calibration step;
- Figure 3B illustrates an alternative embodiment of the mode illustrated in Figure 3A.

[0011] With particular reference to the accompanying drawings, the numeral 1 denotes as a whole a machine for packaging items 2 in bundles inside a wrapper 3 produced using a sheet of material such as cellophane. The sheet of cellophane is obtained from a web 30 which is unwound from a reel 31 and engages with a set of tensioning rollers 13.

[0012] At appropriate intervals, the cellophane web 30 has a set of printed information. Said print includes a reference section (mark) designed to be detected by suitable sensor means 10, for example of the photocell type, located downstream of the reel 31. The signal detected by the sensor means 10 is sent to electronic control means 11.

[0013] The cellophane web 30 is fed to a folder part 4 with a shaped opening 41 designed to fold the web 30 (see in particular Figure 2) into the shape of a tube. The folder part 4 constitutes a tubular guide 40 with a transversal profile substantially corresponding to the dimensions of the items 2 to be packaged. Longitudinal sealing means 42 are attached to the folder part 4. The sealing means are designed to seal the tube shaped cellophane web 30 closed. The longitudinal seal line of the tube shaped folded web 30 is normally positioned at the centre line of the pack.

[0014] The items 2 are fed to a lift part 5 which transfers them to a raised position coplanar with the base of the tubular guide 40 of the folder part 4. A pusher part 6, driven by an actuator 60, on a horizontal axis, is designed to move the items 2 in a direction longitudinal to the folder part 4. This movement of the pusher part 6 is controlled, as is better explained below, by detector means 7. The detector means 7 are connected to the electronic control means 11, which suitably control the pusher part 6 actuator 60. In particular, the detector means 7 are designed to compare the movement of the pusher part 6 with the machine cycle degrees.

[0015] At the folder part 4 outfeed there are transversal sealing means 8 designed to transversally seal the cellophane web 30 folded into the shape of a tube. Cutting means 9 are attached to the sealing means 8 and simultaneously cut the web 30 along a cutting line in the middle of two adjacent seal lines.

[0016] The method disclosed for centring print on the wrapper 3 of packs of items 2 involves an initial calibration step, with which reference parameters are saved

on the control means 11, as explained below. The first operation in the calibration step consists of predetermining the correct centring of a first print in a first wrapper at the wrapping station formed by the folder means 4, which are designed to fold the cellophane web 30 into a tube shape, and by the longitudinal sealing means 42.

[0017] A manual jog control is used to operate the machine to feed a first bundle of items 2 to the lift part 5, against a panel 15.

[0018] Continuing operation, the lift part 5 moves to its raised position, in which the first bundle 2 is coplanar with the base of the tubular guide 40 of the folder part 4.

[0019] Inside the tubular guide the cellophane web 30 folded into a tube shape was previously stretched, for example manually, at the shaped opening 41. The tube obtained in this way is sealed transversally by the sealers 8 to form a sort of bag designed to receive the above-mentioned bundle of items 2 to be packaged.

[0020] It should be noticed that in this preparation operation the web 30 is fed into the tubular guide 40 until a first print applied to the web 30 is in the desired position, relative to the dimensions of the bundle of items to be packaged. Said print position is upstream of the sealers 8.

[0021] The first bundle of items 2 transferred to the raised position is then moved longitudinally, by the pusher part 6, into the first partially formed wrapper 3 in the wrapping station consisting of the folder means 4.

[0022] The forward movement of the pusher part 6 moves the first bundle of items 2 until it is close to the transversal seal which forms the base of the wrapper. The machine parts open the sealers 8 in a suitably synchronised fashion.

[0023] Continuing the pusher part 6 forward movement, the first bundle of items 2 drags the web 30, unwinding it from the reel 31. As a result of this forward movement, a reference section of a subsequent print applied to the web 30 is detected by the photocell sensor 10 (line "0" in Figure 3A).

[0024] In this particular situation, the detector means 7 acquire the parameters relative to the position of the pusher part 6 (first characteristic position P; see Figure 3A), as well as the corresponding machine cycle degrees. The data is recorded in the control means 11 which, at this point, create a triple link in the memory between the pusher 6 first characteristic position P, the machine cycle degrees and simultaneous detection of the reference section, which correspond to print centring in the wrapper.

[0025] The second operation in the initial calibration step involves moving the pusher part 6 further forward, again with the jog control, until it reaches the ideal end of stroke point, corresponding to the reference line "Ao" in Figure 4.

[0026] Said point is established in such a way that the subsequent closure of the sealers 8 creates a first wrapper 3 with the desired tension characteristics. The pusher 6 end of stroke position "Ao" is also saved by the con-

trol means 11 together with the relative machine cycle degrees value.

[0027] Continuing with manual operation, there is a suitably synchronised backward movement of the pusher, the sealers 8 move towards one another, closing the first wrapper 3 produced in this way, separated from the tubular web by the simultaneous action of the cutting means 9, and at the same time closing the base of the wrapper designed to receive the next bundle of items 2 (see Figure 1). The pack produced rests on a table 14 at the folder part 4 outfeed, downstream of the sealers 8.

[0028] The normal automatic cycle for packaging the items 2 can then be started, during which the method disclosed is designed to check the position of the print in each wrapper as they are produced and to intervene with suitable corrections if positioning errors are encountered. In a suitably synchronised fashion, the bundles of items 2 to be packaged are transferred from the lift part 5 in the raised position and pushed by the pusher part 6 into the tube shaped cellophane web at the wrapping station. During the pusher part 6 stroke, the bundle of items 2 to be packaged drags the cellophane web 30 which is wrapped around it.

[0029] The pusher part 6 stroke continues until the first position (characteristic P) is reached (Figure 3A). If the detector means 7 detect the first characteristic position P correctly, it must coincide with the reading of a reference section by the sensor 10. In such cases, the control means 11, verifying a match, issue the actuator 60 command so that the pusher part 6 completes its stroke to the point previously set (reference line "Ao", Figure 4).

[0030] Completion of the pusher part 6 stroke also causes the pack previously produced to be unloaded from the table 14.

[0031] The cyclical comparison between the parameters detected by the means 7 and the sensor 10 and those saved guarantees that the position of the print in the wrapper is correct when the correspondence between said parameters is verified.

[0032] The deviation of the print position relative to the predetermined position P is detected when the sensor 10 detects the reference section early or late (lines 0+ and 0- in Figure 3) relative to the position in which the pusher part reaches the first characteristic position P.

[0033] The deviation value is combined with the relative machine cycle degrees, so as to check if it lies within a predetermined "range" in which a correction can be made with a single corrective movement.

[0034] Said correction is made in real time, intervening to restore the correct position starting with the next pack.

[0035] For example, if a print delay is detected (line "0-" in Figure 3) relative to the predetermined position P, a command to increase the pusher 6 stroke (line "A+" in Figure 4) is automatically issued, causing a corresponding increased traction on the tubular cellophane

web. If, on the other hand, early print is detected (line "0+" in Figure 3 in sensor 10) a command is issued to reduce the pusher 6 stroke (line "A-" in Figure 4), therefore causing reduced traction on the web.

[0036] Said correction may be applied gradually over several successive packs, so as to avoid unwanted effects on the tension of the wrapper.

[0037] In an alternative embodiment of the method, in the first operation of the initial calibration step the position of the pusher part 6 in which the first bundle of items 2 is close to the base of the wrapper, before the sealers 8 open (position P* in Figure 3B) is saved.

[0038] The photocell sensor 10 is simultaneously adjusted one way or the other (arrow F) to align it with a reference section of a print, after the one centred on the wrapper.

[0039] As already indicated, this establishes a triple link of data saved in the control means 11 which, in the normal machine operating cycle, allows correct print centring to be checked and, if necessary, definition of the extent of the correction to be applied in the subsequent pusher part 6 end of stroke position.

[0040] Therefore, the method disclosed achieves the aim of automatically maintaining print centring on a predetermined face of the wrapper of items to be packaged in bundles, within a predetermined tolerance "range".

[0041] It should be noticed that the correction of any print centring errors on the cellophane web is performed in real time without compromising normal machine operation.

[0042] One advantage of the invention is the fact that the above-mentioned print centring, according to the method disclosed, is performed by an operating structure with a simple design and reliable, versatile operation.

[0043] It shall be understood that the above is described by way of example and in a non-restrictive way, therefore, any alternative construction variations do not depart from the inventive concept of the present technical solution, as described above and in the claims herein.

Claims

1. A method for centring the print on the wrapper of packs of items, said wrapper obtained from a web, unwound from a reel, having equidistant prints, each marked by a relative reference section, and wrapped, in a closed tubular shape, in a wrapping station in a packaging machine, the front end being transversally sealed so that the opposite end can receive a pack of items, and finally, being sealed upstream of the pack to form the wrapper, the method being **characterised in that** it comprises an initial calibration step, in which correct centring of a first print is predetermined in a first wrapper 3 containing a first pack of items 2 and the corresponding

reference data is acquired and saved in electronic control means 11, and a subsequent normal machine operating cycle, in which the data relative to each wrapper being formed is compared with the above-mentioned reference data to check that print centring is correct and, if the print positioning is incorrect relative to the data saved, corrective action is implemented by the machine operating parts through the control means 11.

2. The method according to claim 1, **characterised in that** the initial step of the calibration cycle involves:

- positioning the web 30 at the wrapping station so that the web forms a sort of bag in which the print is in a predetermined position relative to the first wrapper to be produced;
- insertion of a first pack of items in the bag by a pusher part 6;
- detection of a first characteristic position of the pusher part 6 and the relative machine cycle degrees, functionally defined by detection of the reference section of the print after that relative to the print of the first wrapper;
- detection of the end of stroke reference position Ao of the pusher part 6 together with the relative machine cycle degrees.

3. The method according to claim 2, **characterised in that** the first characteristic position P is obtained by using the pusher part 6 to move the first pack until it is close to the base of the bag, consequently dragging the latter, and the attached web 30, until the reference section is detected, consequently establishing a triple link between the position of the pusher, the machine cycle degrees and detection of the reference section.

4. The method according to claim 2, **characterised in that** the first characteristic position P* is obtained by using the pusher part to move the pack until it is close to the base of the bag, stopping the pusher part stroke, and adjusting the position of the sensor parts designed to detect the reference section until the latter section is detected.

5. The method according to claim 1, **characterised in that** the following takes place during the normal machine operating cycle:

- check of the correct position of each print relative to the wrapper 3, verifying the correspondence between the pusher part 6 reaching the first characteristic position P, P* and detection of the reference section by the sensor means 10;
- activation, by the electronic control means 11, of the pusher part 6 so that it reaches the pre-

determined end of stroke position Ao, when the result of the previous check is positive;

- definition of one or more corrective movements to be applied, changing the pusher part 6 end of stroke position, if the previous check detected print deviation relative to the wrapper 3, so that after the movements, the print on the next wrapper 3 is in the predetermined position or has a difference relative to the latter position which is less than the deviation detected.

5

10

6. The method according to claim 5, **characterised in that** during the corrective movements the pusher part 6 is activated by the control means 11, so that it reaches an end of stroke position A+ beyond the reference position Ao, following delayed detection of a reference section of one of the prints by the sensor means 10.

15

7. The method according to claim 5, **characterised in that** the pusher part 6 is activated by the control means 11 so that it reaches an end of stroke position A-, located before the reference position Ao, after early detection of a reference section of one of the prints by the sensor means 10.

20

25

30

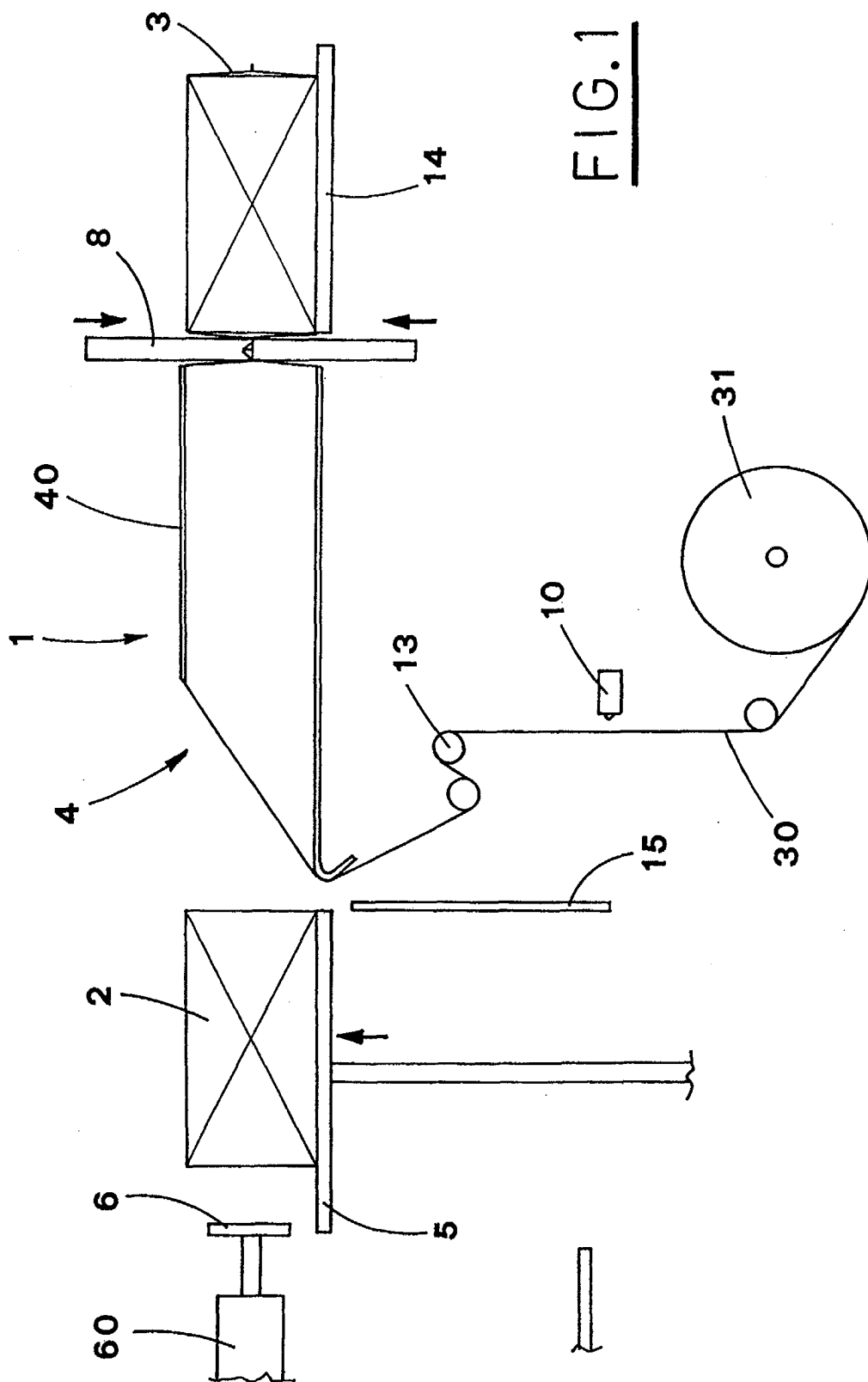
35

40

45

50

55



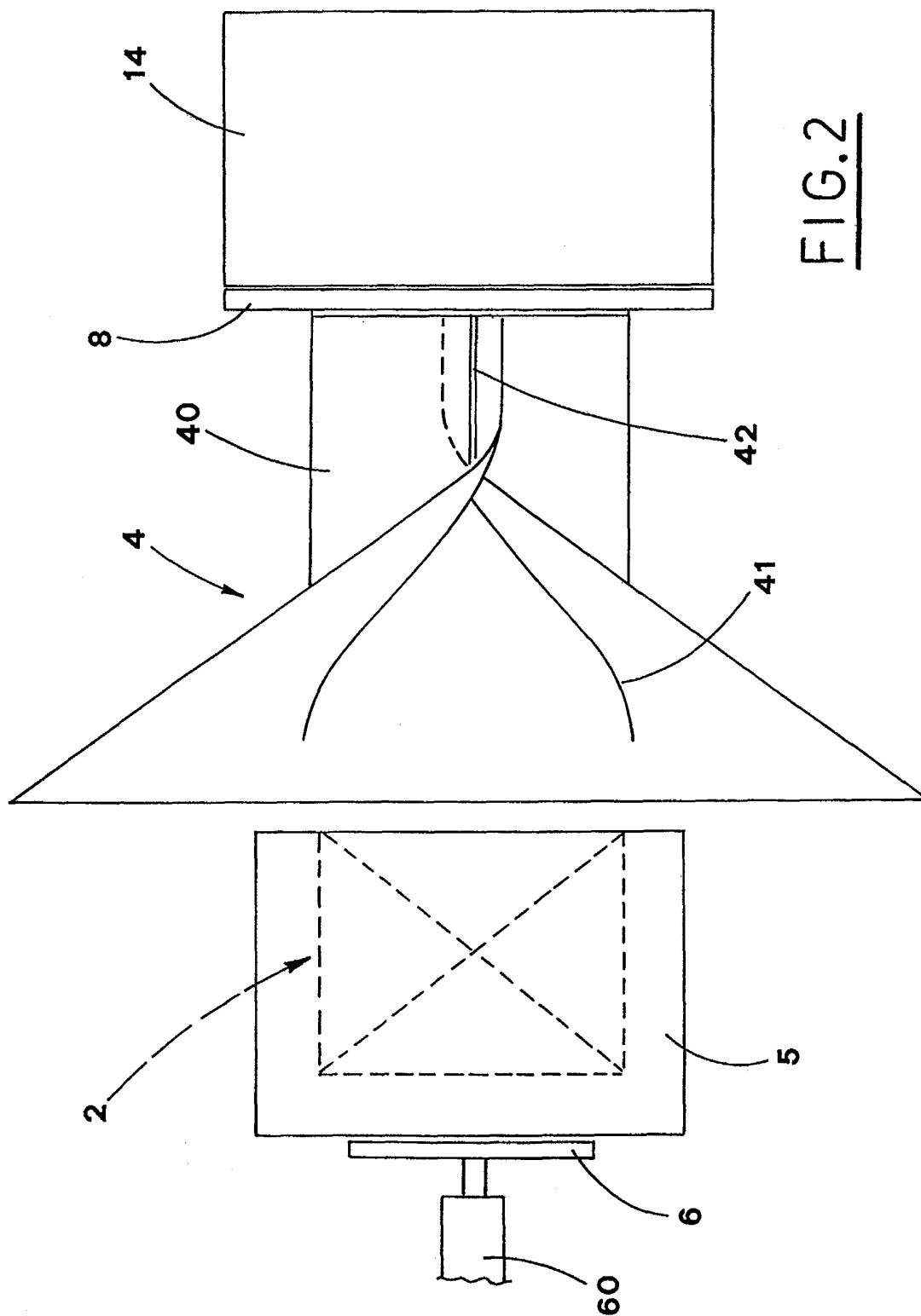
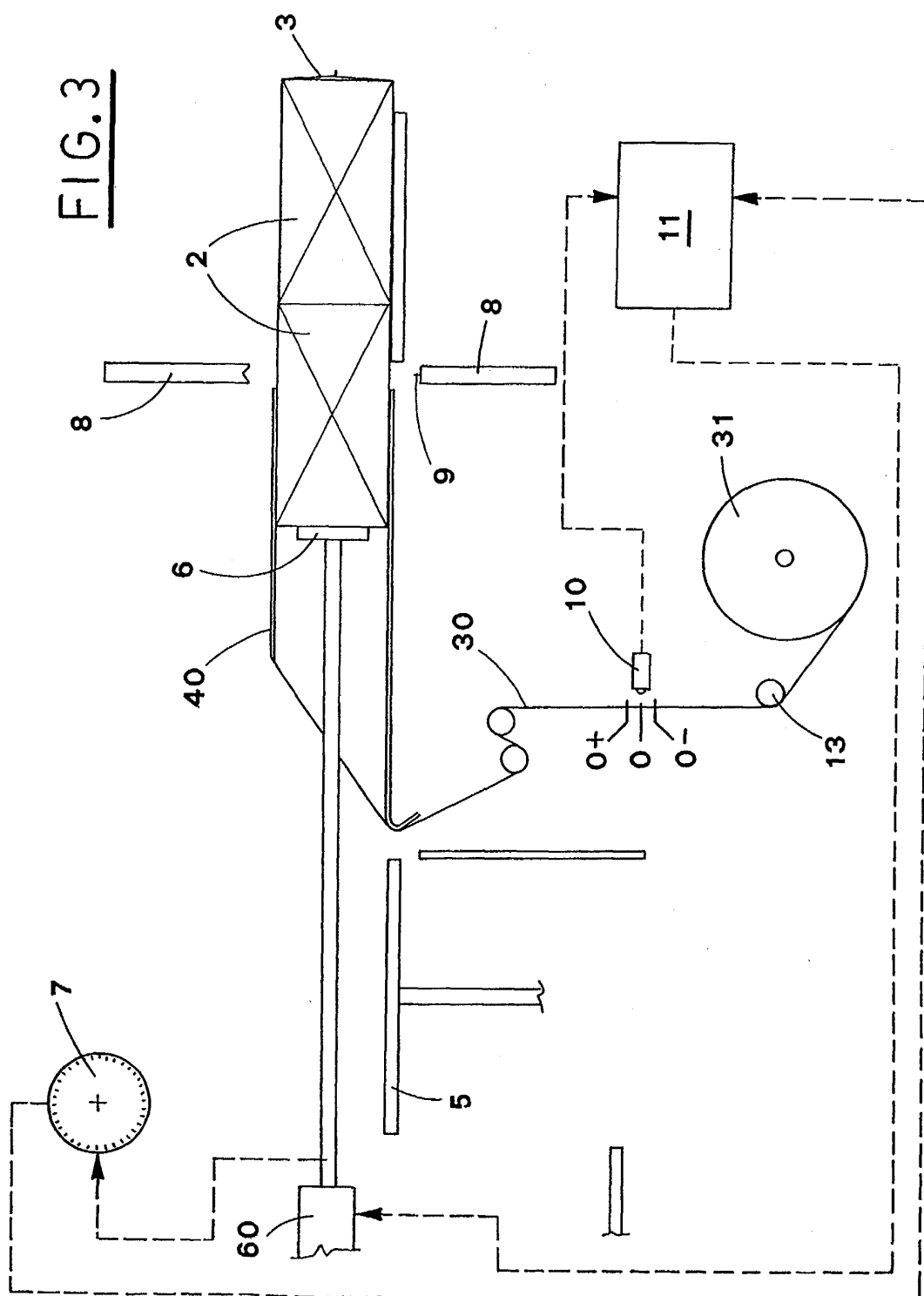


FIG. 2

FIG. 3



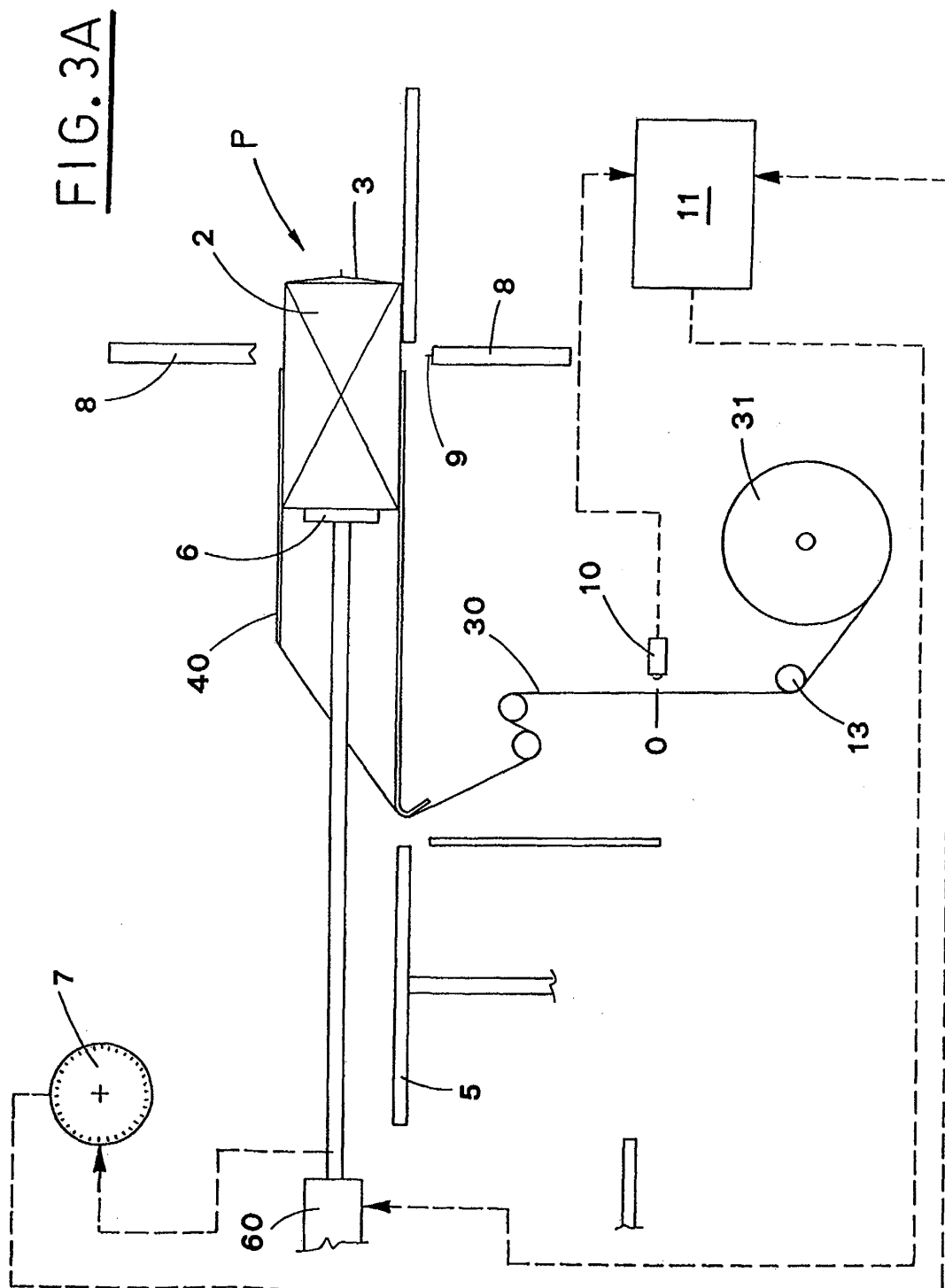


FIG. 3B

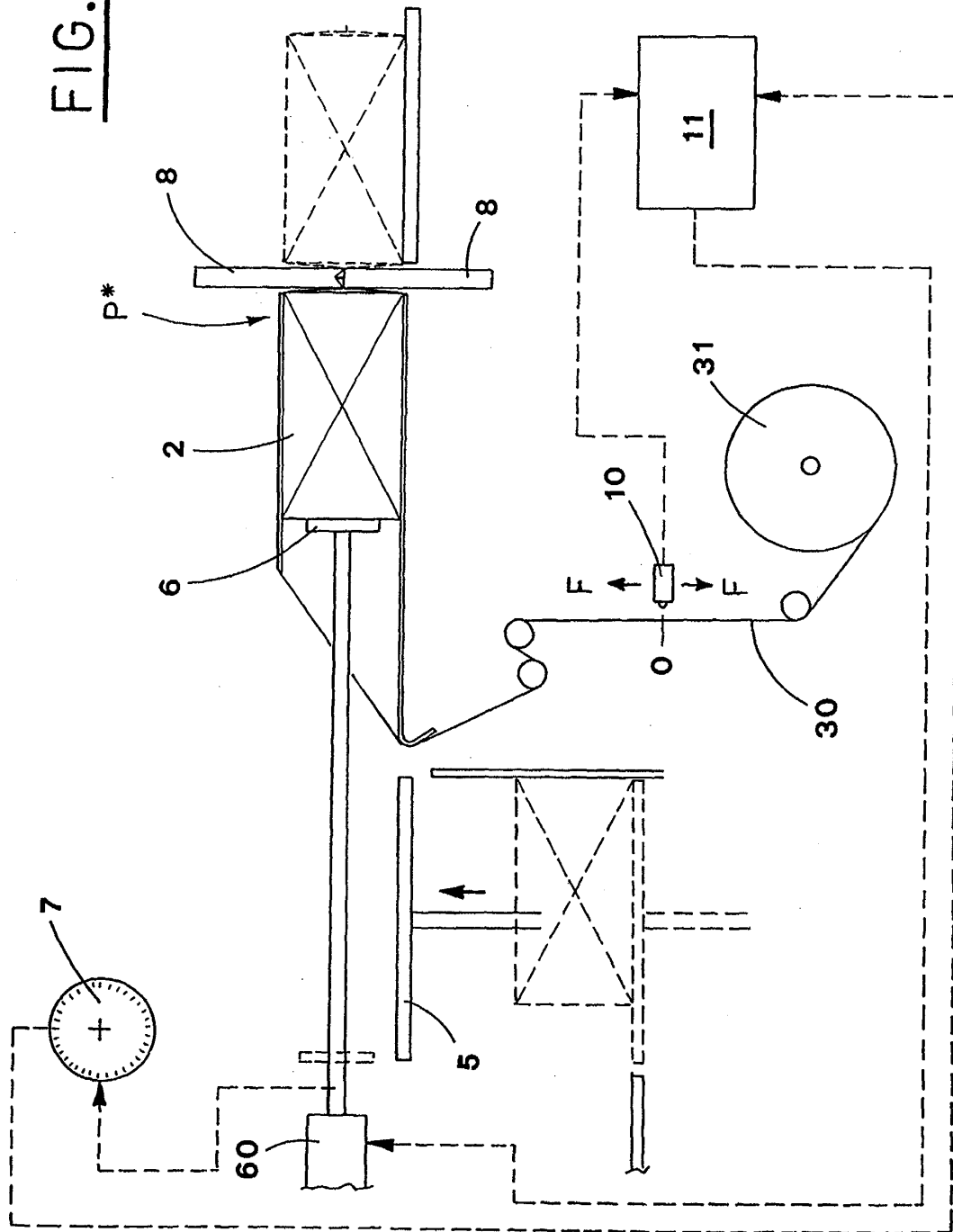
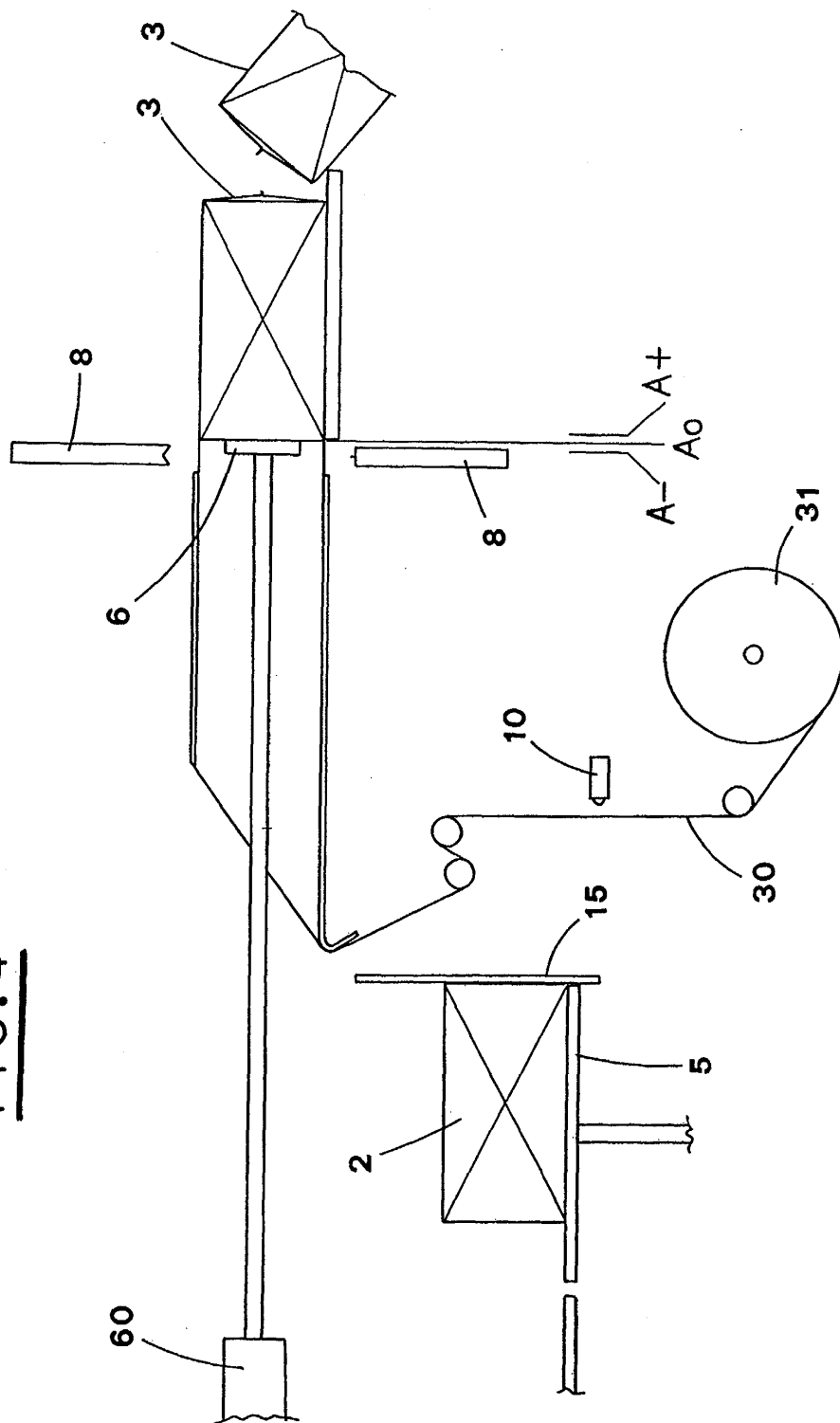


FIG. 4





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 42 5454

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	EP 0 761 546 A (SHIKOKU KAKOKI CO LTD) 12 March 1997 (1997-03-12) * paragraph '0008! - paragraph '0012!; figures 1-4 *	1	B65B41/18 B65B57/12
A	EP 0 348 065 A (HAYSEN MFG CO) 27 December 1989 (1989-12-27) * column 2, line 34 - column 6, line 54; figures 1-9 *	1	
A	EP 0 699 583 A (FUJI MACHINERY CO) 6 March 1996 (1996-03-06) * claim 12 *	1	
A	GB 903 693 A (GLOBE ROOFING PRODUCTS CO INC) 15 August 1962 (1962-08-15) * the whole document *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			B65B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 24 October 2003	Examiner Vigilante, M
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 03 42 5454

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

24-10-2003

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
EP 0761546	A	12-03-1997	JP	9077021 A	25-03-1997
			DE	69603421 D1	02-09-1999
			DE	69603421 T2	05-01-2000
			DK	761546 T3	29-11-1999
			EP	0761546 A1	12-03-1997
			US	5756979 A	26-05-1998
EP 0348065	A	27-12-1989	US	4860522 A	29-08-1989
			AT	96748 T	15-11-1993
			CA	1295037 C	28-01-1992
			DE	68910390 D1	09-12-1993
			DE	68910390 T2	03-03-1994
			EP	0348065 A1	27-12-1989
			JP	2072009 A	12-03-1990
EP 0699583	A	06-03-1996	JP	2801530 B2	21-09-1998
			JP	8058705 A	05-03-1996
			AT	188934 T	15-02-2000
			AU	686789 B2	12-02-1998
			AU	2181595 A	29-02-1996
			DE	69514592 D1	24-02-2000
			DE	69514592 T2	21-06-2000
			EP	0699583 A1	06-03-1996
			NO	952547 A	19-02-1996
			US	5524420 A	11-06-1996
GB 903693	A	15-08-1962	NONE		

EPO FORM P0459

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