

(19)



Europäisches Patentamt  
European Patent Office  
Office européen des brevets

(11) Publication number:

**0 370 970  
A1**

(12)

# **EUROPEAN PATENT APPLICATION**

(21) Application number: 89830505.7

(51) Int. Cl.<sup>5</sup>: **B65B 41/18**

(22) Date of filing: 17.11.89

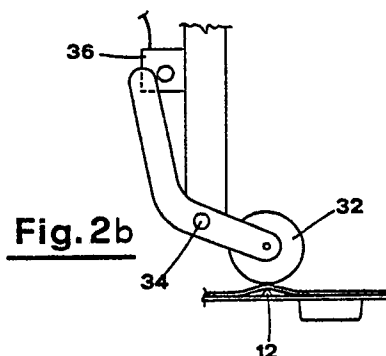
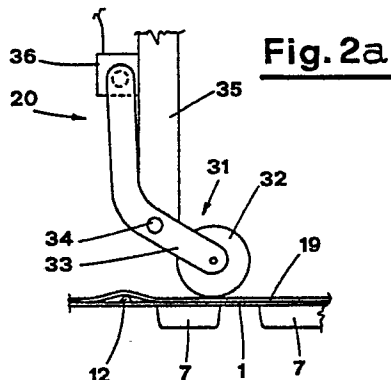
(30) Priority: 21.11.88 IT 496088 U

(43) Date of publication of application:  
30.05.90 Bulletin 90/22(84) Designated Contracting States:  
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(54) **Device for checking the centering of a band of pockets with respect to the parts for heat-sealing film to the same band of pockets.**

(57) The device for checking the centering of a band of pockets with respect to the parts created to head-seal a film to the band of pockets, is designed to operate in a packaging line consisting of stations (4, 15, 18, 21) for forming the pockets (7) on said band (1), for filling the pockets (7) with products (2), for sealing said pockets (7) with a film (19), for cutting the band (1) into single portions (22).

The device includes detecting elements (31) consisting of a roller (32) that is placed horizontally across the band (1) at the entrance to the sealing station (18), and that can turn by two symmetrical arms (33), designed to signal the passage of a raised point (12) made in the band (1) and to send to a control unit (17) a signal for to check the centering of the band of pockets (1) which is in timing with the operating of parts (24, 25) heat-sealing the film (19) to the band (1).



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## DEVICE FOR CHECKING THE CENTERING OF A BAND OF POCKETS WITH RESPECT TO THE PARTS FOR HEAT-SEALING FILM TO THE SAME BAND OF POCKETS

The present invention falls within the technical sector of automatic machines for packaging of various products in portions of a band of pockets; these portions are commonly called "blisters".

In particular the products consist of medicinal products such as capsules, tablets and similar.

The machines mentioned deal with the forming of pockets in a band of thermoformable material and subsequently with the filling of these pockets with products. The band of pockets is pulled, after filling, through a station which checks product presence in the pockets, a station where film is applied to seal the pockets, a station for cutting the individual blisters and parts designed to reject any faulty blisters, e.g. because one or more products are missing. The pocket-closing film is heat-sealed by appropriate parts to the band of pockets.

Blister packaging involves the problem of checking the exact centering of the band of pockets with respect to the parts which heat-seal the sealing film to the pockets. In fact heat-sealing takes place by pressing the film and the band of pockets between an upper sealing plate and a lower plate containing cavities in correspondence with the pockets, therefore an imperfect centering leads to the partial or total squashing of the pocket.

The known machines are therefore generally fitted with devices for checking the centering of the band of pockets with respect to the parts heat-sealing the sealing film to the pockets, to signal any imperfection in the blisters produced.

These devices, in the known form, envisage the forming of dimples, along the edge of the band of pockets, at equal distances defining corresponding housings accessible from above. In each of the said housings, in correspondence with a checking station, a suitable feeler pin will be inserted to check the centering of the band.

In this case the checking takes place upstream of the sealing-film application station, since the said housings must be open to receive the checking feeler pin. This results in the scarce reliability of the same check, since the relatively large distance between the checking position and that where the sealing-film is heat-sealed to the band of pockets does not ensure the absence of errors.

It should also be emphasised that a change in the size of the band of pockets, as occurs frequently with the production of various products, also involves the need to move the position of the checking feeler pin. For this reason the structure of the machine is more complicated and more manpower is required.

Another device adopted on the known machines envisages the presence of a feeler pin arranged down-stream of the heat-sealing parts designed to pass from below between two adjacent pockets of the band of pockets. This feeler pin can, however, only detect the incorrect position of the pocket after heat-sealing, due to the effect of the slipping of the band with respect to the predetermined centering position; also the squashing of the pocket, which is the most serious effect of this slipping, is not detected.

On the other hand it is not possible to place this tracer device up-stream of the heat-sealing parts, since contact between the feeler pin and the open belt could lead to jolting of the band itself and thus knock the products out of the pockets.

Moreover, in this case also, the position of the checking feeler pin depends on the size of the blister and must therefore be changed when size changes are made.

The aim of the present invention is that of resolving the problem described, by producing a device which permits the centering of the band of pockets to be checked in the zone immediately upstream from the station designed to heat-seal the sealing-film to the band.

Another aim of this invention is to propose a device which is produced as a simple technical solution, both functional and reliable, as well as versatile in relation to the different blister sizes to be produced.

The above-mentioned aims are achieved by the present device for checking the centering of a band of pockets with respect to the parts designed to heat-seal a film to the band of pockets, this device being made according to the invention as described in the Claims.

The device according to this invention permits a check on the centering of the band of pockets immediately up-stream of the parts designed to heat-seal the film to close the band, i.e. in correspondence with zone where the blisters are ready for sealing.

This solution prevents in practise any possible centering errors.

The centering check is also made on the moving band; the band may therefore be pulled with continuous infeed.

Specific emphasis should be given to the fact that the present device functions regardless of the band size, since it is based on the detection of a raised point made in the band. It is, therefore, not necessary to make any modifications or adjustments when this size changes.

The features of the invention are more clearly seen in the description of a version of the preferred type of device for checking the centering of a band of pockets with respect to the parts which heat-seal the film to the same band of pockets, illustrated in the enclosed drawings, in which:

- figure 1 shows a schematic view of the line for packaging products in blisters including the device subject of this invention for checking the centering of the band with pockets;

- figure 2a and 2b show a detailed picture of the said detecting elements, respectively in their non-operative stage and in the stage where they detect the passage of the said raised point created in the band of pockets;

- figure 3 shows a view from above of the said band of pockets in the area where the device subject of the invention operates.

In particular, with reference to these figures, the band of thermoformable material indicated with 1 is pulled, in the infeed direction indicated by A, along a line for packaging products 2 such as tablets, capsules and similar.

In the first part of the packaging line, the band 1 unwinds horizontally from a reel 3 and is pulled in step through a forming station 4. The forming station 4 consists, essentially of a lower mould 5 and an upper mould 6 designed to work together to create a series of pockets 7 in the band 1, with the open part uppermost.

For this purpose the lower mould 5 contains, vacuum formed, the die 8 of these pockets, whereas the upper mould 6 contains the relative punches 9.

The lower mould 5 also bears the profile of another punch 10 which works together with a corresponding die 11 on the upper mould 6 to form on the band 1 a raised point 12 which, as described below, is designed to check the centering of the band of pockets with respect to the parts which heat-seal the film to seal the pockets 7. The raised point 12 is created along the longitudinal center-line axis of the band 1, up-stream of the pockets 7 created at the same time. As appropriate, it is envisaged that at each step pockets are created in order on the band corresponding to a number of blister packs; the case illustrated shows the formation of pockets relative to four blisters, as can be seen in figure 3.

Down-stream of the forming station 4, the band of pockets is pulled with continuous infeed. For this purpose a compensating section has been included, more clearly indicated with 1a, which runs between two rollers 13, 14.

Subsequently, the packaging line consists of a filling station 15 where the pockets 7 are filled with the relative products 2; another station 16 detects the presence of products in the pockets, this con-

sists of a series of sensors of the known type interlocked with a control unit 17, by means of the connection B.

Down-stream of the detection station 16 there is a closing station 18 where the pockets 7 are sealed with a film 19 in a heat-sealing material, e.g. aluminium. At the entrance to the closing station 19 there is the checking device subject of this invention, indicated in the layout with number 20.

Finally, the packaging line has a station 21 for cutting the band 1 into single portions, corresponding to the respective blisters 22, and parts 23 designed to reject the faulty portions; the parts 23 are interlocked to the control unit 17, by means of the connection C.

The station 18 for sealing the pockets 7 is equipped with the traditional parts for the heat-sealing of the film 19 to the band of pockets 1. These heat-sealing parts consist of a lower sealing plate 24 and an upper sealing plate 25; the lower plate 24 has a series of cavities 26 to match the pockets 7, to permit the gripping of the band 1 without squashing the same pockets.

The plates 24 and 25 are driven, in a perpendicular direction to the band 1, by the relative cylinders 27, 28 fitted opposite one another on a guiding frame 29; the guiding frame 29 slides along shafts 30 arranged lengthwise with respect to the band 1.

The checking device 20 consists of detecting elements 31 designed to signal the passage of the raised point 12 created in the band 1, illustrated in detail in figure 2a and 2b. These detecting elements 31 consists of a roller 32 placed horizontally across the band 1. The roller 32 is held so that it turns, by pair of symmetrical arms 33, at the opposite ends, attached, with a central fulcrum on a pin 34, to a support 35.

The arms 33 of the roller 32 are designed to activate, at the free end, a sensor 36 which commands, through connection D, the control unit 17.

The roller 32 normally rests on the film 19 which lies on top of the band of pockets 1 (figure 2a). On the passage of the raised point 12, which protrudes upwards from the band 1 and can be detected through the film 19, the roller 32 is raised, causing a slight angular rotation of the arms 33 on the pin 34; the movement of the arms 33 enables the sensor 36 (figure 2b).

Then a centering check signal for the band of pockets 1 is sent to unit 17. This signal must in fact be in correct timing with the operation of the parts which heat-seal the film 19 to the band 1.

Heat-sealing is achieved by gripping the band 1 and the film 19 between the plates 24 and 25, driven by the cylinders 27 and 28; the plates 24, 25 are held firmly while the guiding frame 29 moves along the shafts 30, as indicated by the

broken line 29a in figure 1. Subsequently, the plates 24, 25 open to make the return stroke of the guide frame 29, while the band of pockets covered with the heat-sealed film 19 maintains its continuous infeed movement towards the cutting station 21.

If the checking signal sent by the detecting elements 31 is not in timing with the sequence for heat-sealing the film 19 to the band 1, e.g. due to sliding and/or lengthwise distortion of the same band, the unit 17 may interrupt the heat-sealing parts. As an alternative, it is possible to signal the parts 23 to reject the faulty blister, as indicated diagrammatically with the broken line 23a in figure 1.

Obviously it is possible to arrange for the raised point 12 to be placed in a different position from that described here, with respect to the series of pockets made with each moulding phase.

## Claims

1) Device for checking the centering of a band of pockets with respect to the parts created to heat-seal a film to said band of pockets, designed to operate in a packaging line along which a band (1) of thermoformable material is pulled, said line consisting of a station (4) forming the pockets (7) on said band (1), a station (15) filling said pockets (7) with the relative products (2), a station (16) interlocked to a control unit (17), for the detection of the products (2) in the pockets (7), a station (18) for sealing said pockets (7) fitted with parts (24, 25) which heat-seal a film (19) to the band (1) of pockets, a station (21) for cutting the band (1) into single portions (22) and parts (23) designed to reject the faulty portions (22); said device being characterized in that it includes detecting elements (31), operating at the entrance to said sealing station (18), designed to signal the passage of a raised point (12) made in said band (1) during the forming of said pockets (7) and positioned in an orderly way with respect to a number of these pockets.

2) Device as in claim 1, characterized in that said detecting elements (31) consist of a roller (32) placed horizontally across said band (1) and held so that it can turn by two symmetrical arms (33), at opposite ends, which have a central fulcrum and are designed to enable, at the free end, a sensor (36) which commands said control unit (17).

3) Device as in claim 2, characterized in that said roller (32) rests on said film (19) which lies on top of said band of pockets (1) and can be lifted by the passage of said raised point (12), protruding upwards from the band (1) and perceptible through the same film (19), so that it causes an angular

rotation of the arms (33) designed to determine the enabling of the said sensor (36).

4) Device as in claim 1, characterized in that said raised point (12) is created on the longitudinal center-line axis of said band (1), up-stream of said number of pockets (7) created at the same time in the said forming station (4).

5) Device as in claim 1, characterized in that said detecting elements (31) are designed to send to said unit (17) a signal for to check the centering of said band of pockets (1) which is in timing with the operating of said parts (24, 25) heat-sealing the film (19) to the band (1).

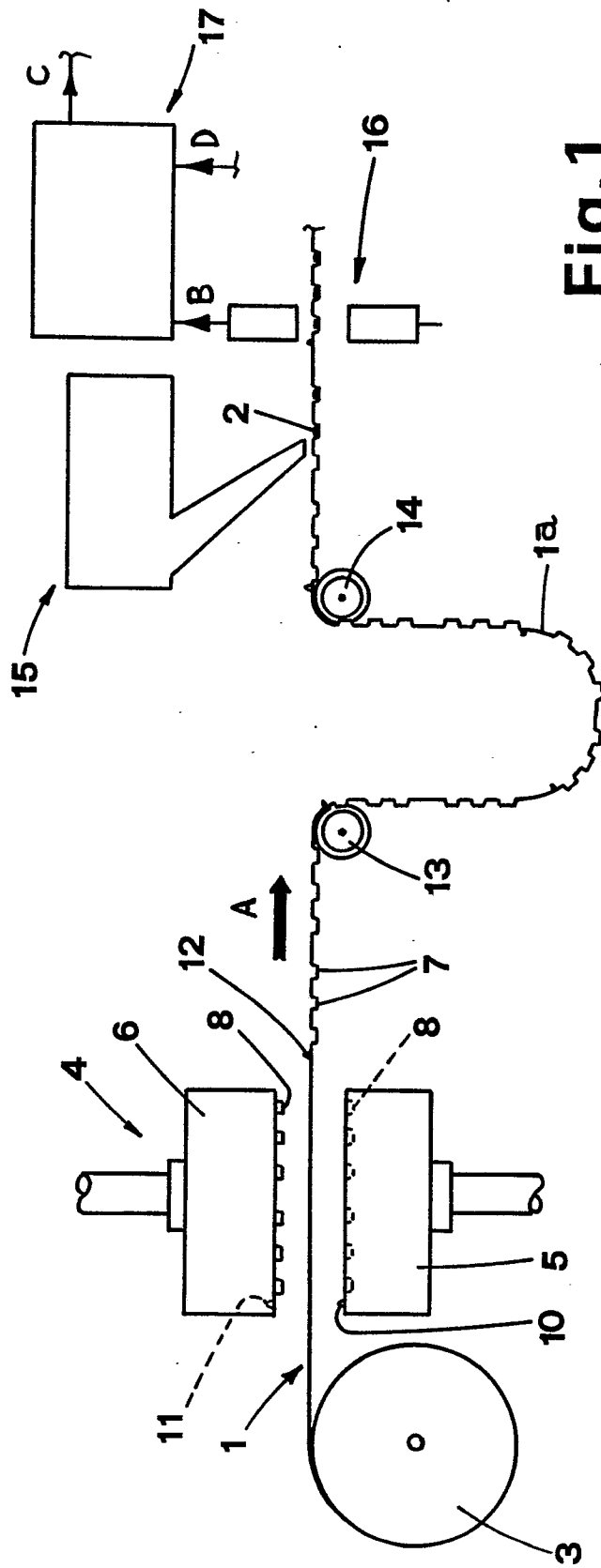
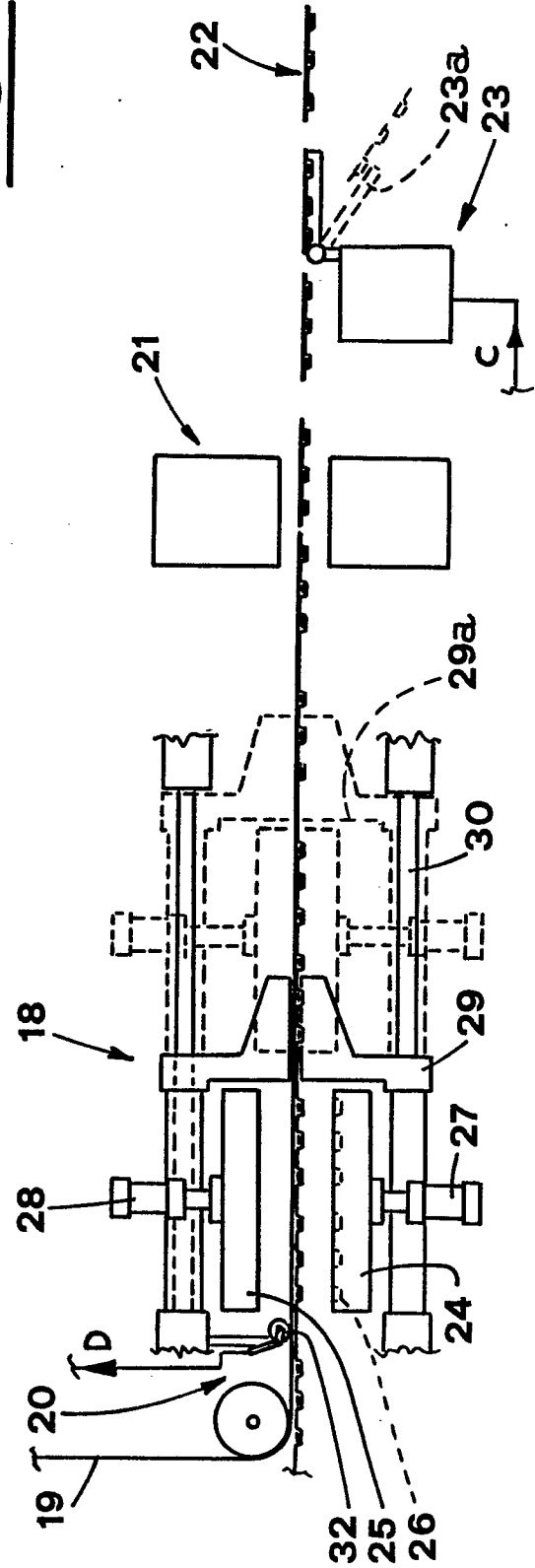
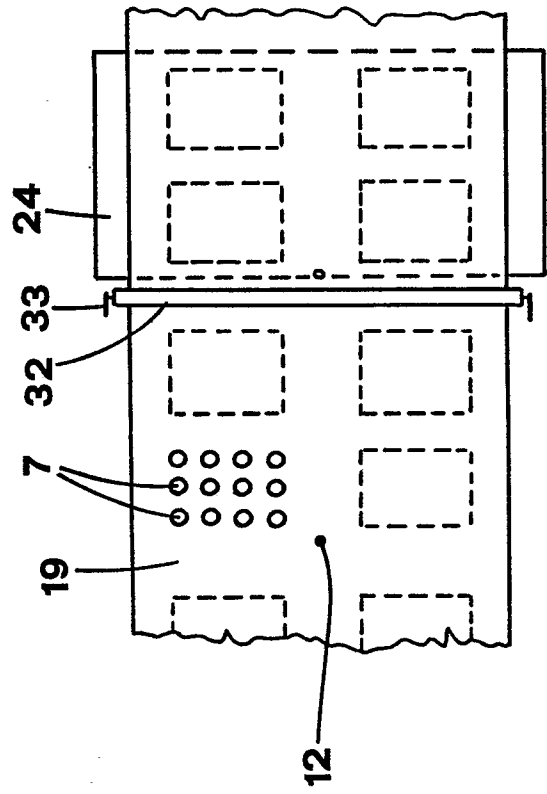
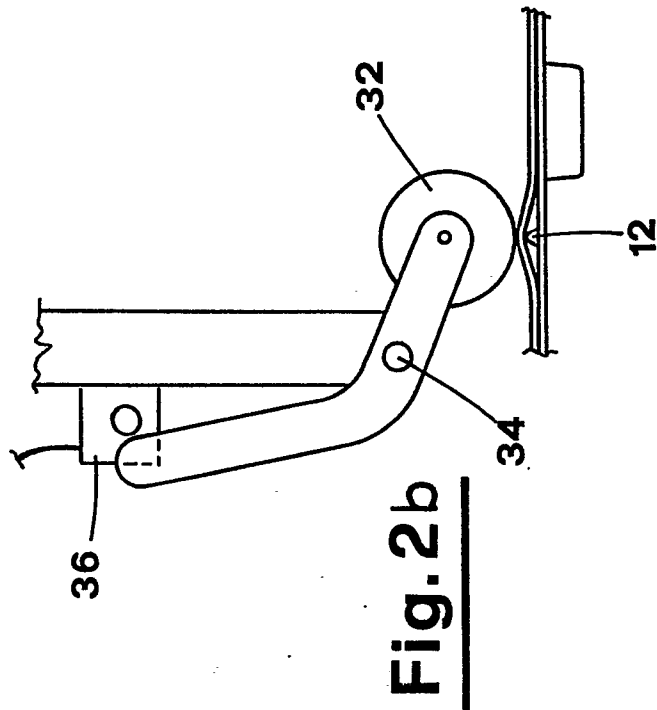
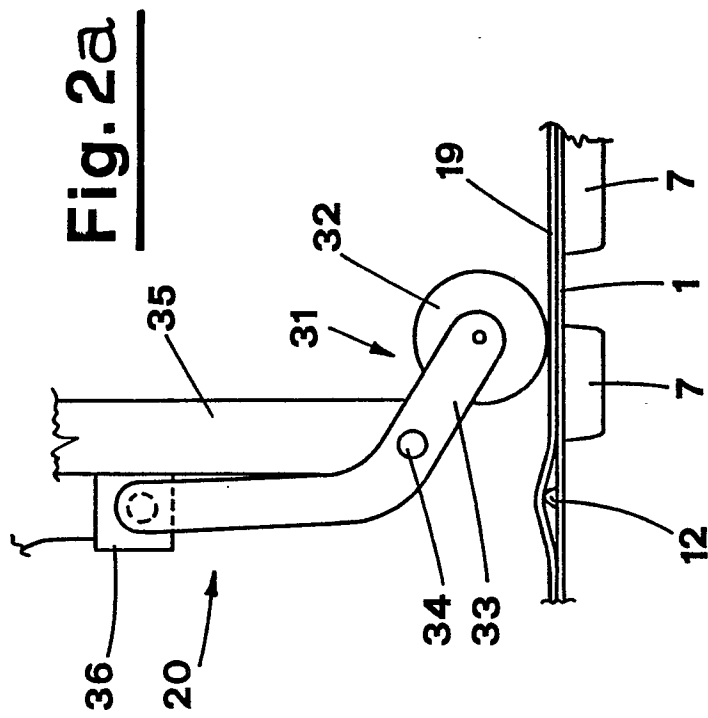


Fig. 1







| 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.5) |
| A                                                                                                                                                                                                                       | US-A-4 349 997 (HAYASAKA)<br>* Column 6, line 30 - column 8, line 54; figures 9-13 *<br>----- | 1                                                                                                                                                                                                                                                                                     | B 65 B 41/18                                  |
|                                                                                                                                                                                                                         |                                                                                               |                                                                                                                                                                                                                                                                                       | TECHNICAL FIELDS SEARCHED (Int. Cl.5)         |
|                                                                                                                                                                                                                         |                                                                                               |                                                                                                                                                                                                                                                                                       | B 65 B                                        |
| The present search report has been drawn up for all claims                                                                                                                                                              |                                                                                               |                                                                                                                                                                                                                                                                                       |                                               |
| Place of search                                                                                                                                                                                                         | Date of completion of the search                                                              | Examiner                                                                                                                                                                                                                                                                              |                                               |
| THE HAGUE                                                                                                                                                                                                               | 16-02-1990                                                                                    | CLAEYS H.C.M.                                                                                                                                                                                                                                                                         |                                               |
| CATEGORY OF CITED DOCUMENTS                                                                                                                                                                                             |                                                                                               | T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>.....<br>& : member of the same patent family, corresponding document |                                               |
| X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document |                                                                                               |                                                                                                                                                                                                                                                                                       |                                               |