

(19)



(11)

EP 2 544 950 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:

09.11.2016 Bulletin 2016/45

(51) Int Cl.:

B65B 5/12 ^(2006.01) **A61J 1/03** ^(2006.01)
B65B 37/00 ^(2006.01) **B65B 9/04** ^(2006.01)
B65B 39/00 ^(2006.01) **B65B 5/10** ^(2006.01)

(21) Application number: **11752743.2**

(86) International application number:

PCT/AU2011/000255

(22) Date of filing: **08.03.2011**

(87) International publication number:

WO 2011/109861 (15.09.2011 Gazette 2011/37)

(54) **BLISTER SHEET LOADING APPARATUS WITH BOUNCE PREVENTION MEANS**

BLISTERFOLIENLADEGERÄT MIT RÜCKPRALLVERHINDERUNG

**APPAREIL DE CHARGEMENT DE PLAQUETTES ALVÉOLÉES AVEC MOYENS D'ÉVITEMENT DE
REBONDISSEMENT**

(84) Designated Contracting States:

**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**

(72) Inventor: **KNOTH, Norman D.**

**Clearwater
FL 33759 (US)**

(30) Priority: **11.03.2010 AU 2010901017**

(74) Representative: **Harrison IP Limited**

**Westminster Business Centre
10 Great North Way
Nether Poppleton
York YO26 6RB (GB)**

(43) Date of publication of application:

16.01.2013 Bulletin 2013/03

(73) Proprietors:

- **Manrex Pty. Ltd**
Leichhardt, NSW 2040 (AU)
- **Qem Inc.**
Largo, FL 33773 (US)

(56) References cited:

EP-A1- 1 086 892 FR-A1- 2 391 916
US-A- 3 775 941 US-A- 4 627 225
US-A- 4 627 225 US-A- 5 802 804
US-A1- 2006 076 077 US-A1- 2006 076 077
US-A1- 2010 031 611 US-B1- 7 225 597

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 2 544 950 B1

Description

Field of the invention

[0001] THIS INVENTION relates to the prevention of bounce occurring when small objects are loaded into pockets into which they may be subsequently sealed. The invention is particularly well-suited, although not exclusively so, to preventing solid medication doses, such as tablets, from bouncing when falling into a pocket formed by the cavity of a blister of a blister sheet.

[0002] For convenience and ease of understanding, the description of the invention which follows has been limited to its use in loading medication doses into blister cavities of a blister sheet but it is to be understood that the invention is applicable to a much wider range of usage than this particular activity.

State of the Art.

[0003] The provision of prescribed medication to a patient by means of a pre-loaded blister package is commonly used to enable the patient to carry several days supply of prescribed doses of medication. The doses are prescribed by a doctor and appropriately packaged by a pharmacist to provide the patient with a sealed blister sheet having individual blisters marked with the days and times at which the doses in each blister are to be administered to the patient.

[0004] It is convenient to mechanize the loading of the blister sheet with the prescribed doses to save time and apparatus to achieve this has been devised which relies on a large number of storage containers having bottom openings from which tablets are released into the cavities of blisters in accordance with a computerized program. The program determines which blister of the blister sheet is to be loaded at a particular moment with a particular prescribed medication. The blister sheet is normally loaded while inverted and has its blisters extending downwardly into respective openings provided in a horizontal support table. The table can be indexed horizontally in its own plane by a mechanism to bring each blister in turn to a pre-arranged loading position at which the appropriate medication dose selected from one of the containers can be released into its cavity.

[0005] The blister sheet is normally made from a plastics material which has a natural resilience, and it is convenient to rely on gravity to transfer a dose from a selected storage container to the blister cavity. However the natural resilience of the blister sheet can cause a dose to bounce back out of the blister cavity if it is the first dose to be placed in it, and there is also a risk that the descending dose will impact on a dose already in the cavity and damage one or both doses as a consequence.

[0006] To reduce the risk of damage occurring when a dose is dropped into a blister, the distance through which the dose drops from the underside of the container should be made as small as is practical. However there

is a limit to the reduction of this distance if there is to be no risk of a dose bouncing out of the cavity interfering with the operation of the indexing mechanism.

[0007] US 8,915,051 discloses a method of transferring a plurality of tablets of a product from a first blister card including a first plurality of blisters to a second blister card including a second plurality of blisters includes discharging the plurality of tablets from the first plurality of blisters of the first blister card. Then, each of the plurality of tablets are guided along one of a plurality of inclined passageways defined by a transfer fixture positioned between the first blister card and the second blister card. Finally, the plurality of tablets are received in the second plurality of blisters of the second blister card.

[0008] US 3,775,941 discloses an article packaging machine particularly suitable for use in depositing capsules into rows of pockets formed in a web. As the web pockets are formed by separate apparatus, the web is periodically advanced a predetermined distance. The packaging machine includes a depositer which oscillates over the web pockets, the depositer moving forward with the advancing web. Shortly after the web movement stops, the depositer reaches the end of its forward stroke where the first capsules are discharged. Remaining capsules are sequentially discharged during the return stroke, the capsules being arranged in columns in vertically arranged passageways formed in the depositer. A plurality of vertically arranged pin gates in each passageway hold the capsules therein until the depositer reaches the proper discharge zone. When the depositer reaches the end of its rearward stroke, a top pin gate opens and a bottom gate closes in each of the passageways. This allows a column of capsules to drop within each of the passageways, and be held therein by the bottom gate. The depositer is thus ready to repeat the cycle when the web is once again advanced. A stationary transition member is mounted between the depositer and web, this member having a plurality of openings extending through which openings are located over the web pockets to be filled; because the openings are suitably shaped, this member accepts the discharged capsules so as to allow them to clear the moving depositer, and at the same time guides the discharged capsules into the web pockets.

[0009] US 4627225 a loading apparatus that comprises a filling shoe for input of small products, particularly pharmaceutical products, into a plurality of receptacles of a package component moving by and below the filling shoe. The filling shoe is provided with at least one feed chamber for receiving and dispensing the product which has a mouth opening below to the package component. A product duct for feeding the products one after the other is connected to and ends in the feed chamber. Each feed chamber is connected to at least one vacuum passage which is connected to and communicates with a vacuum source. The front side of the feed chamber in the motion direction of the package component may be formed as a guide slope running slantedly downward toward the

package component opening in or to a vacuum passage with the feed chamber and to the package component. Vacuum slots may be provided running in a wall of the product duct and ending in the feed chamber to augment the vacuum effect in the product duct.

[0010] US 7225597 discloses a device having a plurality of cassettes, each filed with a supply of pills and positionable over a target location. The device has a platen beneath the target location with receptacles configured to hold both vials and blister packs. The platen or the cassette is movable so that any blister of the blister pack or the vial can be positioned under the target location to receive a quantity of pills from a cassette.

[0011] US2006/0076077 discloses a method and an apparatus that serve to place tablets into pockets of thermoformed bottom foil. The tablets are accumulated as they are located in their flat position. The tablets are rotated in an erecting station such that they reach an approximately upright position. A plurality of lines of approximately upright tablets is formed. The approximately upright tablets are rotated back into their flat position by a transfer unit including a plurality of channels. The tablets are then placed into the pockets of the bottom foil by the transfer unit.

[0012] None of the above references recognizes nor solves the problems that occur when objects are allowed to free-fall into a cavity under action of gravity. In particular there is a risk a fast moving object bouncing out of a cavity and when two or more objects are being loaded into the same cavity, the impact of a falling object can damage or dislodge an object previously loaded into the same cavity.

Object of the Invention

[0013] An object of this invention is to reduce the risk of problems occurring during loading of doses or other hard objects into a blister cavity.

The invention in its broadest aspect

[0014] In accordance with the present invention, there is provided an apparatus for loading individual cavities of a blister sheet with doses that are formed by small hard objects released into the cavities from above, including: dose-storage containers and first means for locating the individual dose-storage containers holding the objects at a level above the position of a blister cavity to be loaded; second means for releasing an object from the respective dose-storage container so that it falls down a path leading downwards towards the cavity; and third means located in the path of descent of the object and configured to retard its rate of descent to an acceptable level before it reaches the cavity, wherein an acceptable level is a level at which the object will not bounce back out of the cavity, the third means including deflectors provided by the internal surfaces of respective axially parallel cylindrical bores formed through a horizontal plate locat-

ed between the level of the blister sheet and the level of the dose-discharge position of the containers, wherein the fall height and the deflectors are configured with respect to the objects such that a falling object is deflected by the respective deflector laterally towards a side-wall of the selected blister such that it impacts the side wall.

[0015] The portion of the lower end-portion of the bore opposite the side first struck by a descending tablet may be rebated to avoid the risk of tablets stacking up against one side of the cavity and possibly interfering with the correct operation of the apparatus.

[0016] When a particular dose is to be loaded into a selected blister cavity, an indexing mechanism of the table may be operated to bring the cavity of the blister to be loaded and its associated deflector, to a position at which the deflector is located beneath the lower end of a storage container from which the dose is to be released. The dose then strikes the deflector during its descent, and its momentum is reduced as a consequence. The deflection also deflects the descending dose towards a side-wall of the selected blister. Impact with the side wall slows down the descent still further so that the risk of the descending dose damaging itself or other doses which may already be in the blister is reduced still further.

Introduction to the drawings

[0017] The invention will now be described in more detail, by way of examples, with reference to accompanying partly-diagrammatic drawings, in which:

In the drawings

[0018]

FIGURE 1 is a perspective view from above of a relatively thick plate penetrated by an array of axially-parallel bores inclined to the plane of the plate and providing one form of deflecting means;

FIGURE 2 is a diagrammatic plan view of the plate of figure 1 ;

FIGURE 3 is a side view of the plate of figure 2;

FIGURE 4 is an end view of the plate of figure 2;

FIGURE 5 shows diagrammatically, and to a greatly enlarged scale, the path of descent of a dose through one bore of the plate, the dose being released from a dose-storage container above the plate and striking against a deflecting surface provided by the interior wall of the bore so that the dose is deflected towards the upper internal wall of a blister cavity beneath; and,

FIGURE 6 shows a modification of figure 5 and where identical parts bear identical reference numer-

als but they are primed, and the lower end of the bore is rebated.

Description of first example of the invention

[0019] For convenience the example of the invention now to be described is designed to be used in conjunction with apparatus of the general design described in United States Patent Specification Nos. 7,225,597 B1; 7,426,814 B2; and, 7,510,099 B2. These specifications are hereby inserted by way of reference to enable the reader to understand how the apparatus works and to avoid burdening the present specification with unnecessary detail well known in the art. In the first two of the above-numbered prior art patent specifications a blister support table is identified in Figure 1 by the reference number 'thirty' and the same reference numeral is used in figure 5 of the present specification to denote a like part. The support table 30 of figure 5 is provided with openings 14 for the reception of respective blisters 15 of an inverted blister sheet 12 moulded from a resilient plastics material and placed blistered-side down on the table 30.

[0020] Figures 1 to 4 show a flat thick nylon plate 1 formed with an array of identical cylindrical and axially-parallel bores 2 inclined at an angle to the plane of the plate of about sixty degrees. The plate 1 is slightly less than two centimetres thick. The diameter of each hole is slightly more than sixteen millimetres. None of these dimensions or angles is critical and are only given as one example of the invention.

[0021] Figure 5 shows one of a number of dose-storage containers 6 located at a level spaced above the plate 3 and at a dose-discharge position vertically above the upper end of a bore 2. A mechanism (not shown) at the lower end of the container 6 and controlled by a computerized control system (also not shown) allows a dose to be released from the container 6 in response to a control signal generated by the system and controlling operation of the apparatus.

Operation of the first example of the invention

[0022] A dose in the form of a hard solid medication tablet or pill, shown at 4 in figure 5, is dropped from the lower end of the container 6 into the upper end of the bore 2 immediately beneath, and descends along the fall line indicated by a broken line in figure 5. As the axis of the bore 2 is at thirty degrees to the vertical, the dose strikes against the inside wall of the bore intermediate its ends, at a location 7. The distance through which the dose falls before striking the location 7 is found empirically and ensures that the momentum of the dose 4 is insufficient to cause damage to 1 when impacting on the location 7. This fall distance may be varied in the apparatus to achieve this result and it will be found empirically and changed to suit different types of dose. The contact of the dose with the location 7 acts to reduce the vertical

momentum of the dose 4 and deflects it down the inclined bore 2 towards its lower end. The dose leaving the lower end still has a horizontal component of velocity so that it impacts on the side wall of the blister cavity positioned beneath the lower end of the bore 2 and associated with it..

[0023] Were the dose 4 allowed to fall vertically onto the floor of the cavity, there would be a risk that the resiliency of the material from which the blister sheet is made, might bounce the dose 4 back out of the cavity. It might then cause damage to an indexing mechanism used to move the table 30. There is also risk that a dose descending vertically into the blister cavity from the bore 2 could have sufficient momentum to impact against, and possibly damage itself and/doses already in the blister cavity.

First modification of described example

[0024] In the modification of figure 5 shown in figure 6, a rebate 100 is provided on the side of the lower portion of the bore 2 opposite the location 7. This rebate 100 serves to accommodate overflow of doses within the cavity of a blister being loaded, and also to prevent doses from stacking up at one side of the blister and possibly blocking the lower end of the bore 2.

Interpretation of the width of the wording used in this specification

[0025] Although the invention has been specifically described in the above examples with reference to medication doses being loaded into blister cavities, it is to be understood that its usage is not limited to this application. The invention is capable of being used in any apparatus where it is required to reduce the velocity of descent of hard solid objects which might otherwise free-fall with an undesirably high velocity. The deflecting bores of such apparatus may, for example, be used to reduce the velocity with which tablets or other solid medication doses are inserted into respective single dose blisters, or to orientate the dose to a desired position required for entry into a blister.

Claims

1. Apparatus for loading individual cavities of a blister sheet with doses that are formed by small hard objects released into the cavities from above, including:

dose-storage containers and first means for locating the individual dose-storage containers holding the objects at a level above the position of a blister cavity to be loaded;
second means for releasing an object from the respective dose-storage container so that it falls down a path leading downwards towards the

cavity; and
 third means located in the path of descent of the object and configured to retard its rate of descent to an acceptable level before it reaches the cavity,
 wherein an acceptable level is a level at which the object will not bounce back out of the cavity, the third means including deflectors provided by the internal surfaces of respective axially parallel cylindrical bores formed through a horizontal plate located between the level of the blister sheet and the level of the dose-discharge position of the containers, wherein the fall height and the deflectors are configured with respect to the objects such that a falling object is deflected by the respective deflector laterally towards a side-wall of the selected blister such that it impacts the side wall.

2. Apparatus as claimed in claim 1, in which the lower end-portion of the bore opposite its side first struck by a descending dose, is formed with a rebate.
3. Apparatus as claimed in Claim 1 or 2, including an indexing mechanism for traversing the deflectors and table horizontally to bring the cavity of a selected blister to be loaded together with its associated deflector, to a position beneath the dose-discharge position of the dose-storage containers.

Patentansprüche

1. Vorrichtung zum Beladen einzelner Vertiefungen einer Blisterfolie mit durch kleine harte Objekte gebildeten Dosen, welche in die Vertiefungen von oben abgegeben werden, umfassend:

Dosisvorratsbehälter und ein erstes Mittel zum Anordnen der einzelnen die Objekte enthaltenden Dosisvorratsbehälter auf einer Höhe über der Position einer zu beladenden Blistervertiefung;
 ein zweites Mittel zum Abgeben eines Objekts aus dem jeweiligen Dosisvorratsbehälter, so dass es über einen Pfad herunterfällt, der nach unten zur Vertiefung führt; und
 ein drittes Mittel, das in dem Abwärtspfad des Objekts angeordnet und dazu ausgelegt ist, seine Abwärtsgeschwindigkeit auf ein annehmbares Maß abzubremesen, bevor es die Vertiefung erreicht,
 wobei ein annehmbares Maß ein Maß ist, bei dem das Objekt nicht aus der Vertiefung zurückprallt, und das dritte Mittel Ablenkeinrichtungen umfasst, die von den Innenflächen von jeweiligen achsparallelen zylindrischen Bohrungen bereitgestellt werden, die durch eine horizontale

Platte ausgebildet sind, welche zwischen der Ebene der Blisterfolie und der Ebene der Dosisaustragsposition der Behälter angeordnet ist, wobei die Fallhöhe und die Ablenkeinrichtungen in Bezug auf die Objekte derart ausgelegt sind, dass ein fallendes Objekt durch die jeweilige Ablenkeinrichtung seitlich zu einer Seitenwand des ausgewählten Blisters hin so abgelenkt wird, dass es gegen die Seitenwand stößt.

2. Vorrichtung nach Anspruch 1, wobei der untere Endabschnitt der Bohrung gegenüber ihrer zuerst von einer herabfallenden Dosis getroffenen Seite mit einem Falz ausgebildet ist.
3. Vorrichtung nach Anspruch 1 oder 2, umfassend einen Rastmechanismus zum horizontalen Verfahren der Ablenkeinrichtungen und des Tisches, um die Vertiefung eines ausgewählten zu beladenden Blisters zusammen mit seiner entsprechenden Ablenkeinrichtung in eine Position unterhalb der Dosisaustragsposition der Dosisvorratsbehälter zu bringen.

Revendications

1. Dispositif destiné à charger des cavités individuelles d'une plaquette alvéolée avec des doses qui sont formées de petits objets durs libérés dans les cavités par le haut, incluant :

des contenants de stockage de dose et un premier moyen destiné à localiser les contenants de stockage de dose individuels maintenant les objets à un niveau au-dessus de la position d'une cavité alvéolée devant être chargée ;
 un deuxième moyen destiné à libérer un objet depuis le contenant de stockage de dose respectif de manière à ce qu'il tombe le long d'un chemin conduisant vers le bas en direction de la cavité ; et
 un troisième moyen situé sur le chemin de descente de l'objet et configuré pour retarder sa vitesse de descente à un niveau acceptable avant qu'il n'atteigne la cavité,
 dans lequel un niveau acceptable est un niveau auquel l'objet ne rebondira pas hors de la cavité, le troisième moyen incluant des déflecteurs prévus par les surfaces internes de trous cylindriques axialement parallèles respectifs formés à travers une plaque horizontale située entre le niveau de la plaquette alvéolée et le niveau de la position de déchargement de dose des contenants, dans lequel la hauteur de chute et les déflecteurs sont configurés par rapport aux objets de manière à ce qu'un objet tombant soit dévié par le déflecteur respectif de manière latérale en direction d'une paroi latérale de l'al-

véole sélectionnée de manière à ce qu'il heurte la paroi latérale.

2. Dispositif selon la revendication 1, dans lequel la partie d'extrémité inférieure du trou opposé à son côté touché en premier par une dose tombante, est formée par une feuillure. 5
3. Dispositif selon la revendication 1 ou 2, incluant un mécanisme d'indexation destiné à traverser les déflecteurs et la table horizontalement pour amener la cavité d'une alvéole sélectionnée à être chargée conjointement à son déflecteur associé, jusqu'à une position sous la position de décharge de dose des contenants de stockage de dose. 10 15

20

25

30

35

40

45

50

55

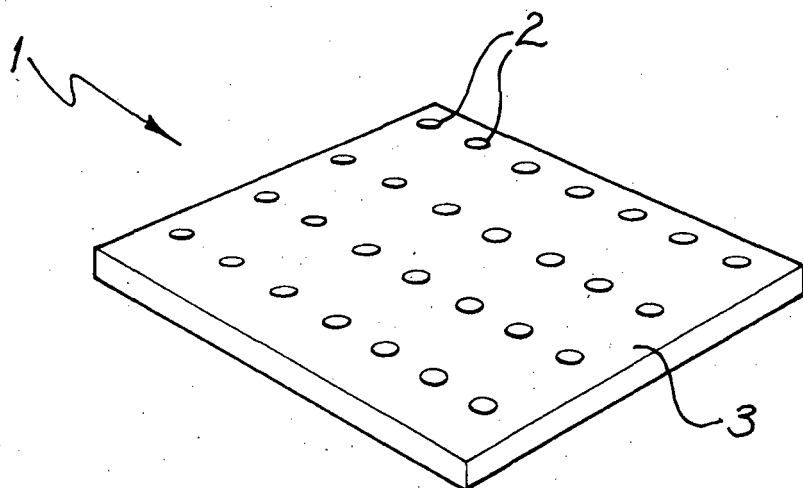


FIG. 1

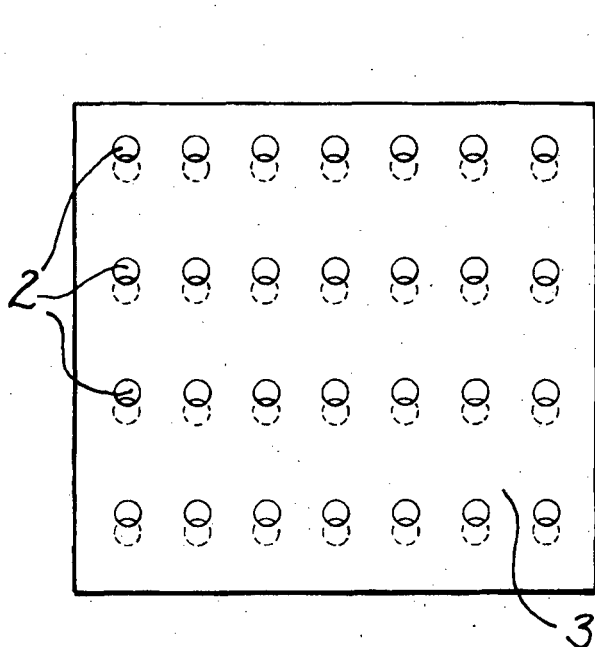


FIG. 2

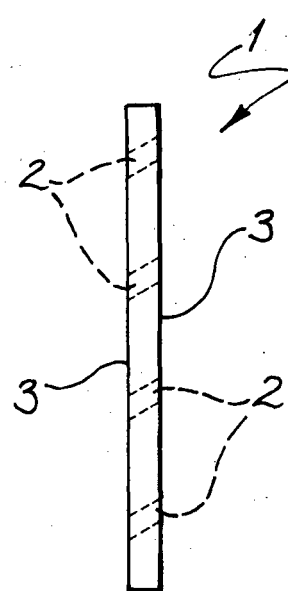


FIG. 3

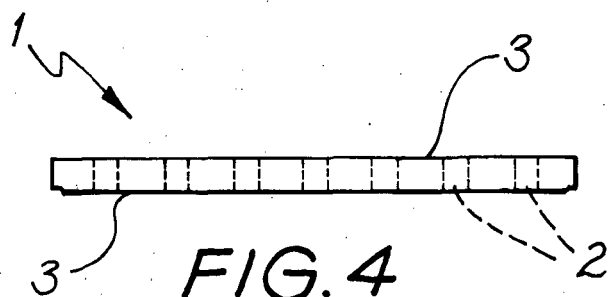


FIG. 4

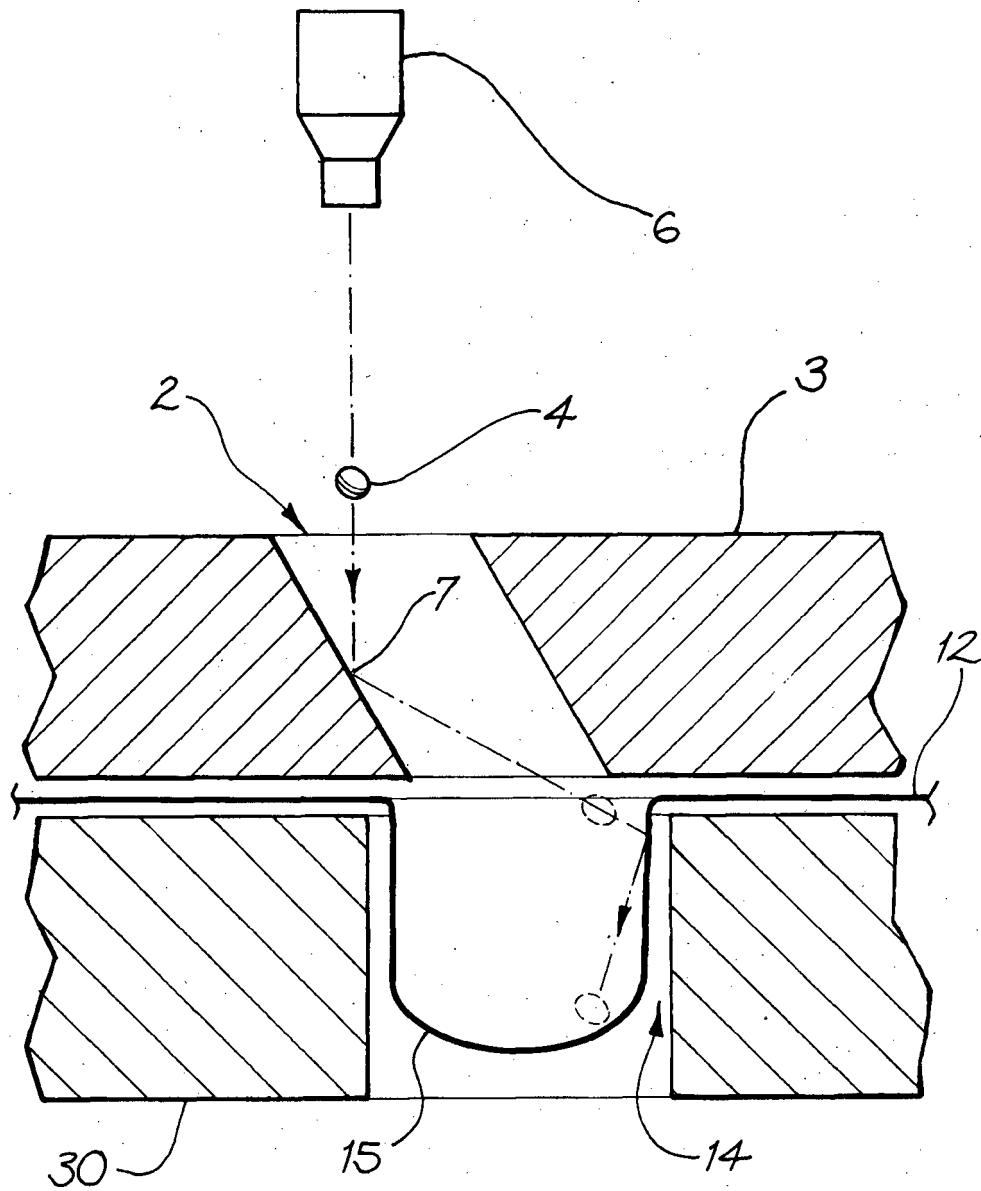


FIG. 5

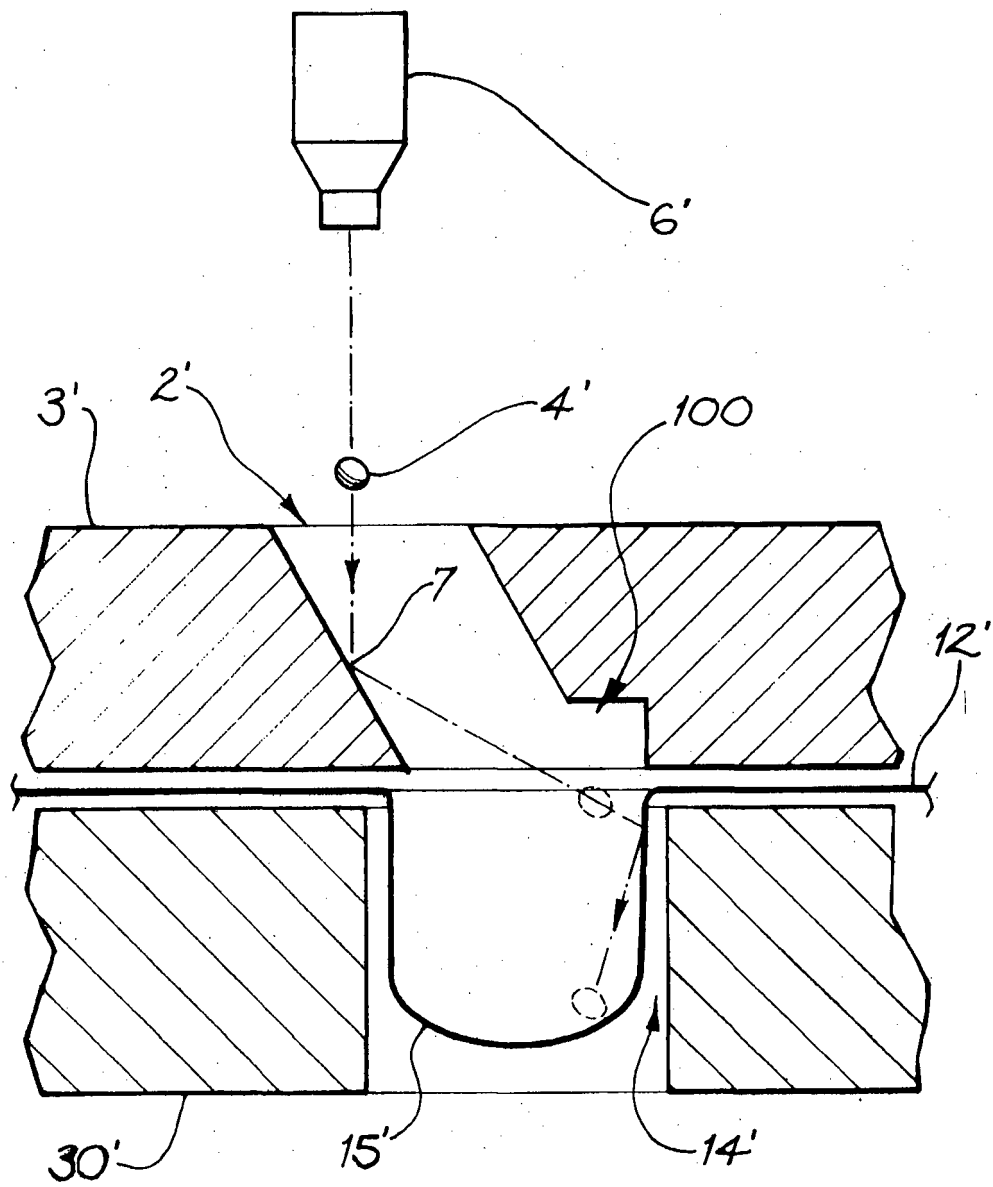


FIG. 6

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 8915051 B [0007]
- US 3775941 A [0008]
- US 4627225 A [0009]
- US 7225597 B [0010]
- US 20060076077 A [0011]
- US 7225597 B1 [0019]
- US 7426814 B2 [0019]
- US 7510099 B2 [0019]