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(54) **A method and a machine for inserting a plurality of components which are to be assembled to form a toy in a generally egg-shaped case**

Verfahren und Vorrichtung zum Einbringen von Montage-Komponenten zum Formen eines Spielzeugs in eine eiförmigen Dose

Procédé et machine pour introduire des composants, qui servent à en assembler un jouet, dans une boîte en forme d'un oeuf

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(56) References cited:
GB-A- 934 389
US-A- 3 527 015
US-A- 3 707 825

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Description

The present invention relates to a method and to a machine for inserting a plurality of components which are to be assembled to form a toy in a generally egg-shaped case formed by two half-shells.

In the confectionery industry small, hollow chocolate eggs containing gifts enclosed in generally egg-shaped cases which take up almost the entire space in the cavity of the egg are very widespread. The gifts are often constituted by toys which can be assembled from a certain number of components (normally up to eight different components).

In order to produce better quality gifts, it is desirable to make the components as large as possible to make maximum use of the space in the case. However, this considerably complicates the packaging of the gifts, that is, the operation of inserting the various components in the generally egg-shaped case. Whereas with smaller gifts composed of a smaller number of components it was possible to produce automatic machines which inserted the unitary gifts or the various components inside the case, with larger toy gifts constituted by larger numbers of components, a machine which can automatically package the gifts is not yet available and the packaging has to be done manually with considerable labour costs.

The object of the present invention is to provide a method and a machine which can insert the components in their cases automatically even when the components together take up a considerable portion of the space available in the case.

According to the invention, this object is achieved by a method and a machine having the characteristics which form the subjects of Claims 1 and 2.

The present invention is based on the concept of transforming the gift constituted by several distinct components into a single unit by binding the various components with a sheet of heat-shrinkable material which is first welded so as to wrap the various components and is then heated, packing the components close together (as an example see GB-A-934 389). The group of bound components can thus be treated as an independent body the insertion of which in one of the half-shells of the case is greatly simplified in comparison with the insertion of several loose components.

Further characteristics and advantages of the present invention will become clear in the course of the following detailed description given purely by way of non-limiting example, with reference to the appended drawings, in which:

Figure 1 is a schematic perspective view of a machine according to the present invention,

Figure 2 is a schematic plan view of the machine of Figure 1,

Figs. 3-6 are perspective views showing the details indicated by the arrows III, IV, V and VI in Figure 2, and

Figures 7-11 are schematic views showing the sequence of the packaging of the components, based on the method according to the invention.

With reference initially to Figures 7-11, the method of binding several components which are intended to form a generic toy and packing them close together will now be described.

A sheet 1 of heat-shrinkable plastics material (for example PVC) is cut to the desired length and constitutes a substrate on which the components 2a, 2b, 2c, etc., are placed in a predetermined sequence. The sequence in which the components are deposited on the sheet 1 and their relative positions are determined in dependence on the shapes and sizes of the components and remain the same for all toys of the same type.

When the components 2 have been deposited on the sheet 1, the opposite ends of the sheet 1 are raised (as shown in Figure 9). After this, the ends of the sheet 1 are placed close together and welded together (as shown in Figure 10) so as to wrap the components. Upon completion of the welding, the various components are held quite firmly but the group of components is not yet compact enough to be treated as a unitary body. Upon completion of the welding, a step for heating the group is consequently carried out (Figure 11) to shrink the sheet of heat-shrinkable material 1 to a predetermined extent. The various components are thus packed close together and reach and maintain a stable overall shape which approximates as closely as possible to the shape of a generally egg-shaped case which is intended to house them.

The group of components bound by the sheet 1 of heat-shrinkable material is then inserted between the two half-shells 4, 6 constituting the case.

An automatic machine for putting the method just described into practice will now be described with reference to Figures 1-6.

With reference initially to Figures 1 and 2, the machine, generally indicated 10, comprises a plurality of parallel belt conveyors 12a, 12b, ... 12f, each of which supplies components of a particular type 2a, 2b, ... 2f in the direction indicated by the arrows 14 in Figure 2.

Along a line for packaging the components 2a-2f, indicated 15 in Figure 2, can be distinguished a station 16 for the supply of a sheet of heat-shrinkable material, a plurality of stations 18a, 18b, ... 18f which load the components 2a-2f onto the sheet 1 of heat-shrinkable material, a welding station 20 and a heating station 22. At the end of the line 15 is a device 24 which picks up the group of components bound together by the sheet 1 of heat-shrinkable material and inserts it in the half-shells of the case which are supplied by a conveyor 25.

A plurality of transfer members 26 is movable in

steps along the line 15 in the direction indicated by the arrows 28 in Figure 2. The transfer members 26 are spaced uniformly along the line 15 and, if the distance between two adjacent stations is not equal to the distance between two adjacent transfer members (as is the case for the distances between the loading stations 18a-18f), it is equal to an integer multiple of the spacing of the transfer members 26.

With reference to Figure 3, the machine 10 comprises a straight guide 30 along which a motor-driven chain 32, to which the transfer members 26 are fixed, is movable. Each transfer member 26 has an upper horizontal surface 34 in which a seat 36 opens for receiving the components 2a-2f. The profile of the seat 36 is of a shape corresponding to that produced by a section taken in a plane extending through the larger axis of symmetry of the case in which the components 2a-2f are to be inserted. The base of the seat 36 is formed by a piston 38 which is movable relative to the transfer member 26 in the directions indicated by the double arrow 40. The movement of the piston 38 relative to the transfer member 26 is brought about by the reaction of a projecting element 42 thereof on a fixed profile 44 extending parallel to the direction of movement of the transfer members 26.

The piston 38 of each transfer member 26 has a suction hole which puts the seat 36 into communication with a pipe 46 connected to a vacuum source by means of a rotary distributor (not shown). Each transfer member 26 also has a series of grooves 48 disposed transverse the direction of movement of the member 26 and communicating with the seat 36.

As already stated above, the transfer members 26 which are moved by means of the motor-driven chain 32, advance in steps and remain stationary at each station for the time necessary for the execution of the operative steps described in detail below.

If a transfer member 26 is followed in its movement along the line 15, it first comes to the station 16 for the supply of a sheet of heat-shrinkable material (Figure 2). In the station 16 there is a reel 50 on which a strip of heat-shrinkable material is wound. When the transfer member 26 stops in the station 16, the end of the strip is placed on the surface 34 of the transfer member 26 by a conventional linear actuator (not shown).

The strip is then cut along the line indicated 52 in Figure 2. The sheet 1 which remains on the transfer member 26 is restrained by the vacuum inside the cavity 36. In fact, as explained with reference to Figure 3, the transfer members 26 are constantly connected to a vacuum source by means of respective flexible pipes 46 and by means of a rotary distributor which prevents the pipes 46 from becoming twisted during the movement of the transfer members 26 along the closed loop of the chain 32.

Still with reference to Figure 2, after receiving the sheet 1 of heat-shrinkable material, the transfer member 26 is brought to the loading stations 18a-18f. In each of these stations there is a pneumatic actuator 54a-54f carrying, at its end, suction cup means 56a-56f which are movable between a position for picking up a component 2a-2f and a position for depositing the component on the sheet 1 in the seat 36 of the transfer member 26. The positions and the sequence in which the components are deposited are established in a manner such as to reduce the size of the group of components to a minimum. It is important to note that the loading stations 18a-18f can achieve a high degree of repeatability in the composition of the pack of components, ensuring that the final dimensions of the finished pack of components fall within quite tight tolerance margins.

With reference now to Figure 4, upon completion of the loading of the components, the transfer member 26 is brought to the welding station 20. In this station there are two positioning members 58 for clamping together the ends of the sheet 1 which project from the seat 36 perpendicular to the upper surface 34 of the transfer member. The positioning members 58 are movable towards one another transverse the direction of movement of the transfer member 26 and have prongs 60 which are inserted in the grooves 48 of the transfer member 26. After the ends of the sheet 1 of heat-shrinkable material have been placed close together, a pair of heating elements 62 comes into action clamping together and welding the close-together edges of the sheet 1.

With reference now to Figure 5, upon completion of the welding, the transfer member 26 is brought to the heating station 22 and is placed adjacent a supply spout 64 which sends a jet of hot air at about 300°C onto the group of components wrapped in the sheet 1 of heat-shrinkable material. The supply spout 64 is shaped so as partially to surround the group of components to improve heat-exchange efficiency. The temperature of the hot-air jet is quite high since the time for which the transfer member 26 remains in the heating station is very short (no more than a few seconds) and it is necessary for sufficient heat to be transferred to the sheet 1 of heat-shrinkable material to shrink the sheet so as to pack the components close together within this limited time.

Finally, with reference to Figure 6, after the heating station, the transfer member 26 reaches the end of the line where the group of components enclosed by the sheet of heat-shrinkable material is urged out of the seat 36 by the piston 38. The group of components can thus be picked up by the gripping device 24 which has a movable pincer 70 for gripping the group of components and inserting it in a half-shell which is supplied by a conveyor 25 (Figure 2) synchronized with the line for preparing the pack of components.

It will be appreciated that the machine according to the invention prevents all the problems of hygiene connected with manual handling of the components, which is of particular value in view of the fact that the compo-

nents are then inserted in a food product intended for children.

Claims

1. A method of inserting a plurality of components (2a-2f) which are to be assembled to form a toy in a generally egg-shaped case formed by two half-shells, comprising the following steps, in order:

   - the components (2a-2f) are placed on a sheet (1) of heat-shrinkable material in a predetermined sequence,
   - the opposite ends of the sheet (1) are welded together so as to wrap the components (2a-2f),
   - the sheet (1) is heated so as to be shrunk to a predetermined extent causing the components (2a-2f) to be packed close together, and
   - the group of components bound together by the sheet (1) of heat-shrinkable material is inserted in one of the half-shells of the case.

2. A machine for inserting a plurality of components (2a-2f) which are to be assembled to form a toy in a generally egg-shaped case formed by two half-shells, comprising:

   - a station (16) for supplying a sheet (1) of heat-shrinkable material,
   - a plurality of stations (18a-18f) for loading components (2a-2f) in a predetermined sequence onto the sheet (1),
   - a welding station (20) for joining the opposite ends of each sheet (1) so as to wrap the components (2a-2f),
   - a heating station (22) in which the heat-shrinkable material undergoes shrinkage which packs the components (2a-2f) close together,
   - a plurality of transfer members (26) movable in steps along a path extending through the stations (16-22), and
   - a gripping device (24) for picking up the group of components (2a-2f) bound together by the sheet (1) of heat-shrinkable material and inserting the group in one of the half-shells of the case.

3. A machine according to Claim 2, characterized in that each of the transfer members (26) has a seat (36) in which a respective sheet (1) of heat-shrinkable material is restrained by suction means connected to a vacuum source.

4. A machine according to Claim 2, characterized in that each of the loading stations (18a-18f) comprises an actuator (54a-54f) having gripping means (56a-56f) movable between a position for picking up components (2a-2f) and a position for depositing components (2a-2f).

5. A machine according to Claim 3, characterized in that the welding station (20) comprises a pair of heating elements (62) which can clamp together the end portions of a sheet (1) of heat-shrinkable material projecting from the seat (36) in the respective transfer member (26).

6. A machine according to Claim 5, characterized in that the welding station (20) has positioning means (58) for placing the projecting portions of the sheet (1) of heat-shrinkable material close together before the welding is carried out.

7. A machine according to Claim 2, characterized in that the heating station (22) comprises a hot-air supply spout (64) shaped so as at least partially to surround the group of components (2a-2f) enclosed in the sheet (1) of heat-shrinkable material.

Patentansprüche

1. Verfahren zum Einbringen einer Vielzahl von Komponenten (2a bis 2f), die zusammenzusetzen sind, um ein Spielzeug zu bilden, in ein im allgemeinen eiförmiges Gehäuse, das durch zwei Halbschalen gebildet ist, umfassend die folgenden Schritte im Ablauf:

   - die Komponenten (2a - 2f) werden auf eine Folie (1) aus wärmeschrumpfbarem Material in einer vorbestimmten Abfolge angeordnet,
   - die gegenüberliegenden Enden der Folie (1) werden miteinander verschweißt, um die Komponenten (2a - 2f) zu umwickeln,
   - die Folie (1) wird derart erhitzt, daß sie auf ein vorbestimmtes Ausmaß geschrumpft wird, was bewirkt, daß die Komponenten (2a - 2f) dicht aneinander gepackt werden, und
   - die durch die Folie (1) aus wärmeschrumpfbarem Material zusammengebundene Komponentengruppe wird in eine der Halbschalen des Gehäuses eingebracht.

2. Vorrichtung zum Einbringen einer Vielzahl von Komponenten (2a bis 2f), die zusammenzusetzen

sind, um ein Spielzeug zu bilden, in ein im allgemeinen eiförmiges Gehäuse, das durch zwei Halbschalen gebildet ist, umfassend:

- eine Station (16) zum Bereitstellen einer Folie (1) aus wärmeschrumpfbarem Material,
- eine Vielzahl von Stationen (18a - 18f) zum Laden von Komponenten (2a - 2f) in einer vorbestimmten Abfolge auf die Folie (1),
- eine Schweißstation (20) zum Verbinden der gegenüberliegenden Enden jeder Folie (1), so daß die Komponenten (2a - 2f) umwickelt werden,
- eine Heizstation (22), in der das wärmeschrumpfbare Material Schrumpfung erfährt, die die Komponenten (2a - 2f) eng aneinanderpackt,
- eine Vielzahl von Übergabeelementen (26), die in Schritten entlang eines sich durch die Stationen (16 - 22) erstreckenden Pfads bewegbar sind, und
- eine Greifeinrichtung (24) zum Aufnehmen der durch die Folie (1) aus wärmeschrumpfbarem Material zusammengebundenen Gruppe von Komponenten (2a - 2f) und Einbringen der Gruppe in eine der Halbschalen des Gehäuses.

3. Vorrichtung nach Anspruch 2, dadurch gekennzeichnet, daß jedes der Übergabeelemente (26) einen Sitz (36) aufweist, in dem eine jeweilige Folie (1) aus wärmeschrumpfbarem Material durch eine Saugeinrichtung zurückgehalten ist, die mit einer Vakuumquelle verbunden ist.

4. Vorrichtung nach Anspruch 2, dadurch gekennzeichnet, daß jede der Beladestationen (18a - 18f) ein Betätigungsmittel (54a - 54f), das ein Greifmittel (56a - 56f) aufweist, das zwischen einer Position zum Aufnehmen von Komponenten (2a - 2f) und einer Position zum Ablegen von Komponenten (2a - 2f) bewegbar ist.

5. Vorrichtung nach Anspruch 3, dadurch gekennzeichnet, daß die Schweißstation (20) ein Paar Heizelemente (62) umfaßt, die die Endabschnitte einer Folie (1) aus wärmeschrumpfbarem Material zusammenklammern kann, das von dem Sitz (36) in dem jeweiligen Übergabeelement (26) vorspringt.

6. Vorrichtung nach Anspruch 5, dadurch gekennzeichnet, daß die Schweißstation (20) ein Positioniermittel (58) aufweist, um die vorspringenden Abschnitte der Folie (1) aus wärmeschrumpfbarem Material eng aneinander anzuordnen, bevor das Schweißen durchgeführt wird.

7. Vorrichtung nach Anspruch 2, dadurch gekennzeichnet, daß die Heizstation (22) eine Warmluftversorgungstülle (64) umfaßt, die derart geformt ist, daß sie die Gruppe von Komponenten (2a - 2f), die in der Folie (1) aus wärmeschrumpfbarem Material eingeschlossen ist, zumindest teilweise umgibt.

Revendications

1. Procédé pour insérer une pluralité de pièces (2a-2f), destinées à être assemblées en un jouet, dans une capsule généralement en forme d'oeuf formée par deux demi-coques, comprenant les phases suivantes, dans l'ordre :

- les pièces (2a-2f) sont placées sur une feuille (1) de matériau thermorétractable en une séquence prédéterminée,
- les extrémités opposées de la feuille (1) sont soudées l'une à l'autre afin d'envelopper les pièces (2a-2f),
- la feuille (1) est chauffée afin d'être rétractée d'un degré prédéterminé amenant les pièces (2a-2f) à se serrer les unes contre les autres, et
- le groupe de pièces agglomérées par la feuille (1) de matériau thermorétractable est inséré dans l'une des demi-coques de la capsule.

2. Machine pour insérer une pluralité de pièces (2a-2f), destinées à être assemblées en un jouet, dans une capsule généralement en forme d'oeuf formée par deux demi-coques, comprenant :

- un poste (16) pour distribuer une feuille (1) de matériau thermorétractable,
- une pluralité de postes (18a-18f) pour charger les pièces (2a-2f) en une séquence prédéterminée sur la feuille (1),
- un poste de soudage (20) pour relier les extrémités opposées de chaque feuille (1) afin d'envelopper les pièces (2a-2f),
- un poste de chauffage (22) dans lequel le matériau thermorétractable est rétracté, ce qui serre les pièces (2a-2f) les unes contre les autres,
- une pluralité d'organes de transfert (26) se déplaçant pas à pas le long d'une trajectoire passant par les postes (16-22), et
- un dispositif de préhension (24) pour saisir le groupe de pièces (2a-2f) agglomérées par la feuille (1) de matériau thermorétractable et insérer le groupe dans l'une des demi-coques de la capsule.

3. Machine selon la revendication 2, caractérisée en ce que chacun des organes de transfert (26) comporte un siège (36) dans lequel une feuille respective (1) de matériau thermorétractable est retenue par un moyen d'aspiration relié à une source de vide.

4. Machine selon la revendication 2, caractérisée en ce que chacun des postes de chargement (18a-18f) comprend un organe d'actionnement (54a-54f) comportant un moyen de préhension (56a-56f) adapté à être déplacé entre une position pour saisir les pièces (2a-2f) et une position pour déposer les pièces (2a-2f).

5. Machine selon la revendication 3, caractérisée en ce que le poste de soudage (20) comprend une paire d'éléments de chauffage (62) qui peuvent serrer l'une contre l'autre les parties d'extrémité d'une feuille (1) de matériau thermorétractable en projection depuis le siège (36) dans l'organe de transfert respectif (26).

6. Machine selon la revendication 5, caractérisée en ce que le poste de soudage (20) comporte des moyens de positionnement (58) pour placer les parties en projection de la feuille (1) de matériau thermorétractable l'une près de l'autre avant que le soudage soit effectué.

7. Machine selon la revendication 2, caractérisée en ce que le poste de chauffage (22) comprend un bec de distribution d'air chaud (64) d'une forme telle qu'il entoure au moins en partie le groupe de pièces (2a-2f) enfermées dans la feuille (1) de matériau thermorétractable.

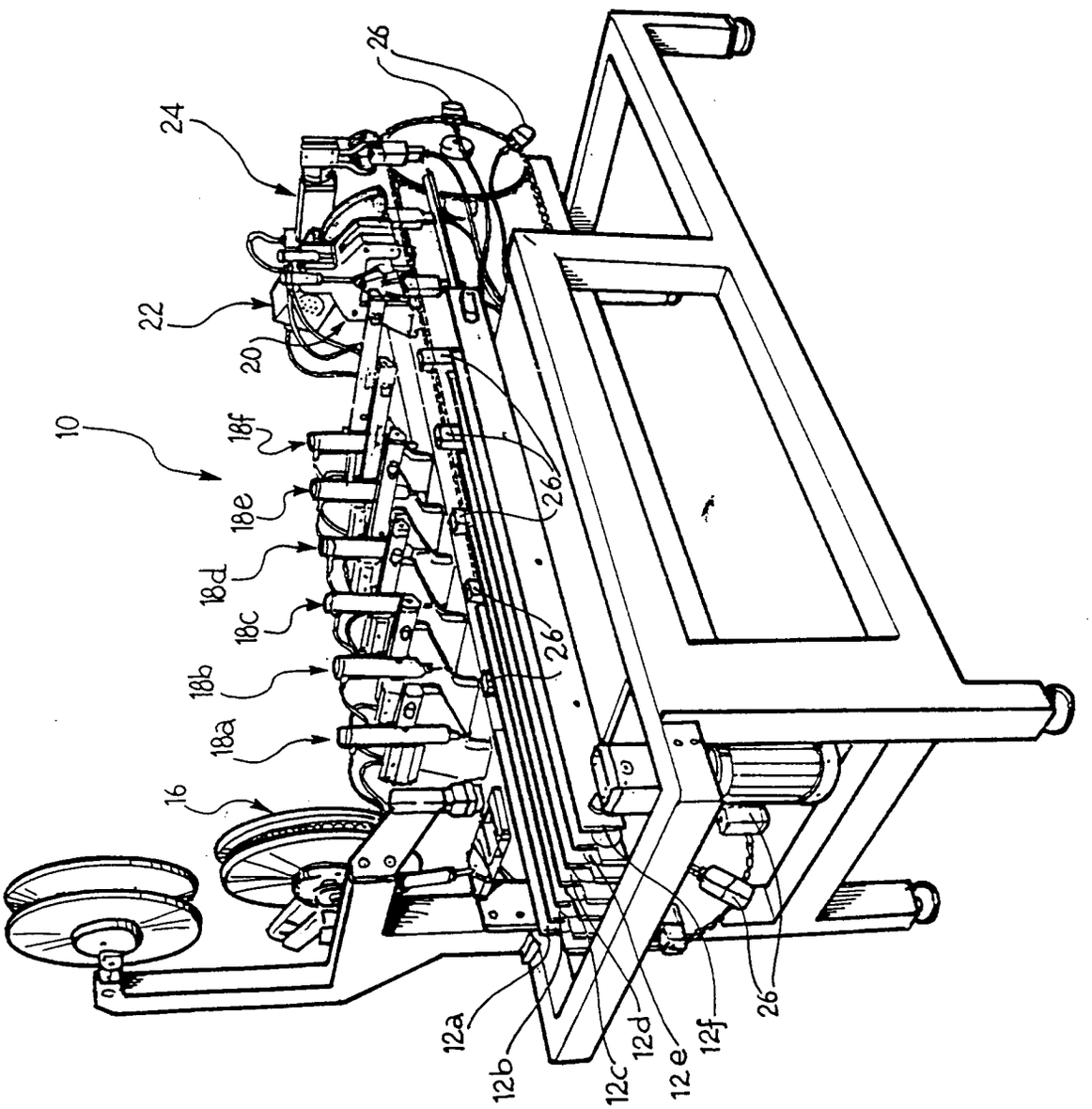
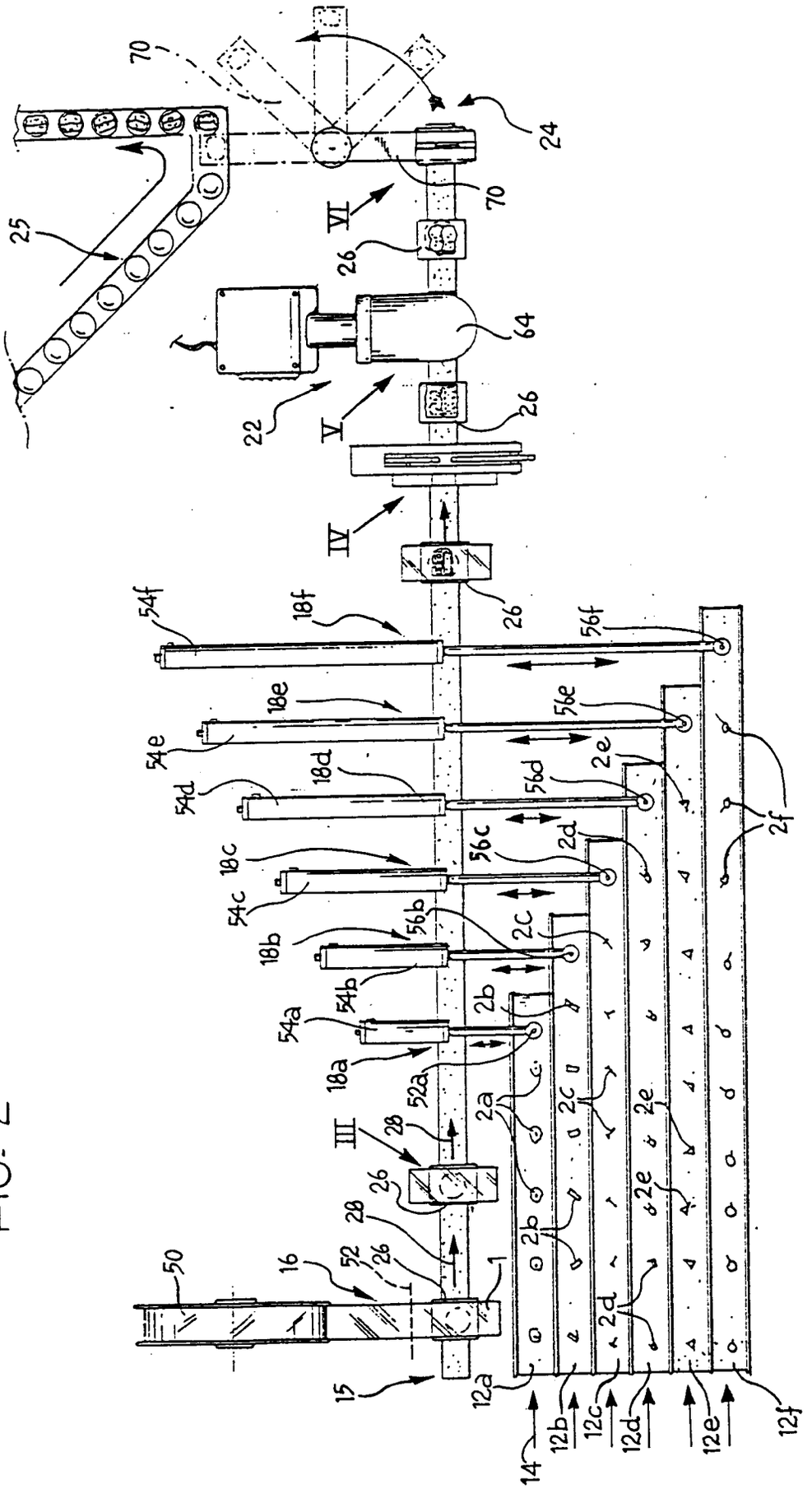


FIG. 1

FIG. 2


70
24
25
VI
26
64
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V
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IV
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54f
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18d
56d
2e
2f
18c
56c
2d
54c
56b
2c
18b
54b
2b
54a
18a
52a
2a
III
28
26
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1
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12a
12b
12c
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12f
14

FIG. 3

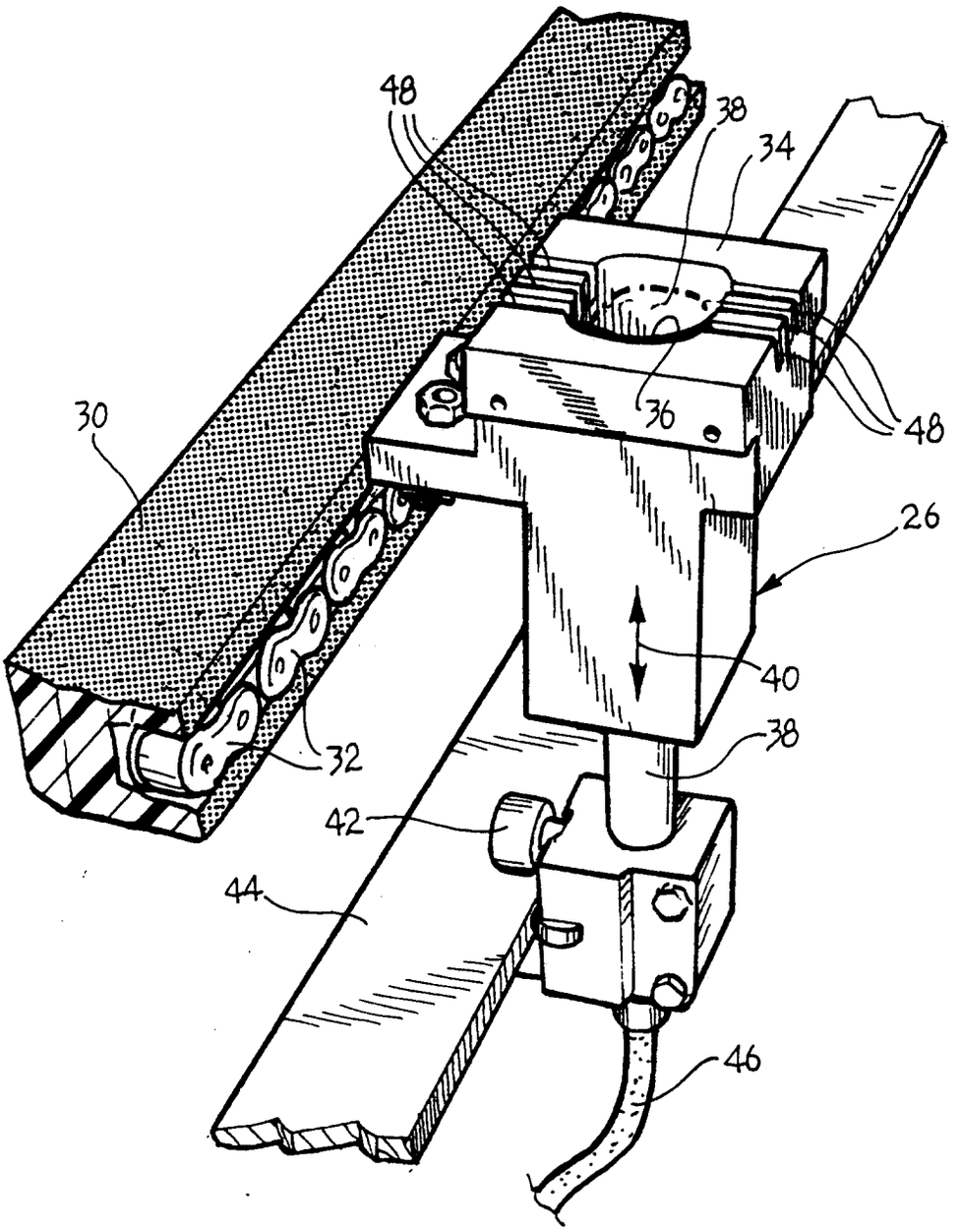

FIG. 4

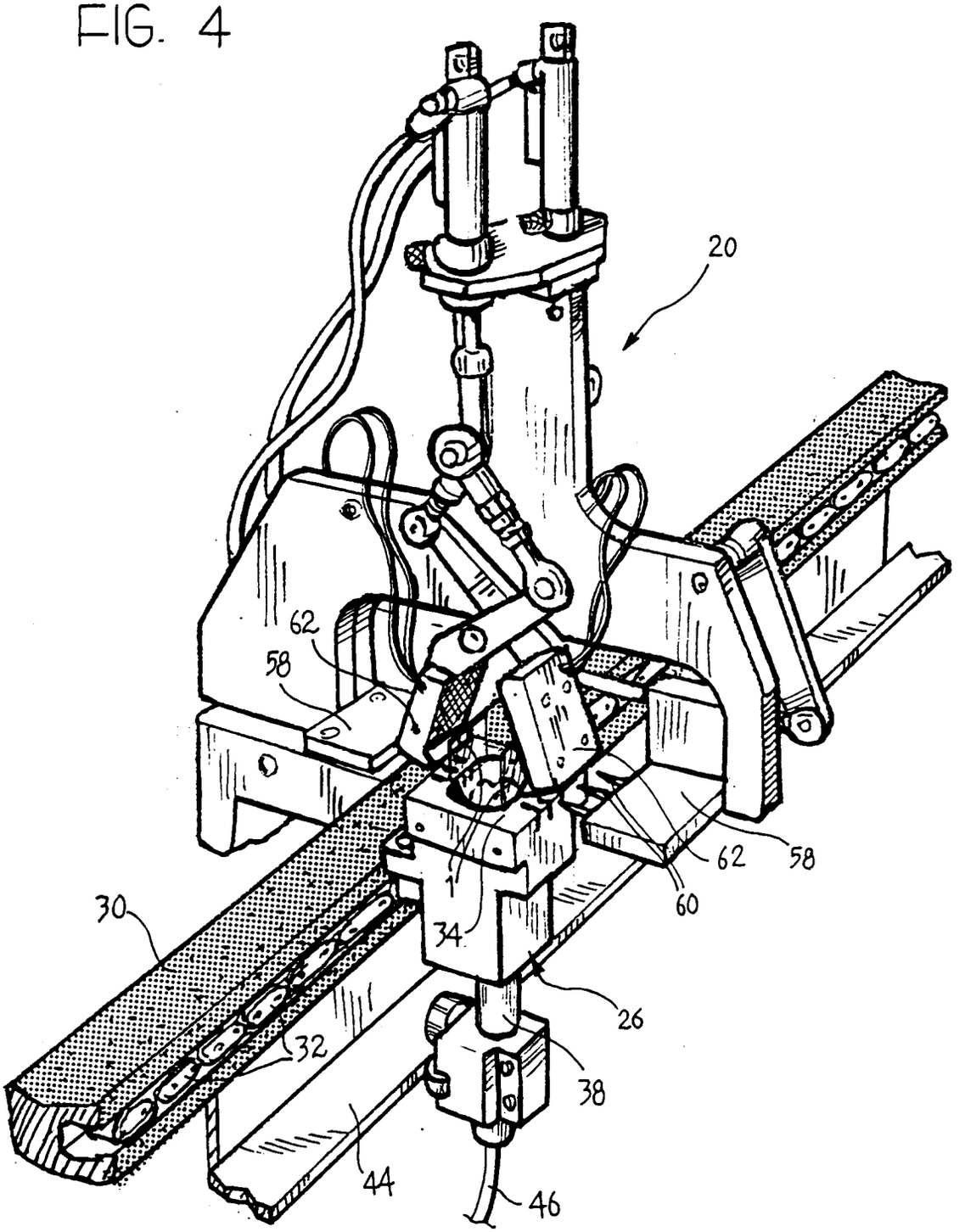

FIG. 5

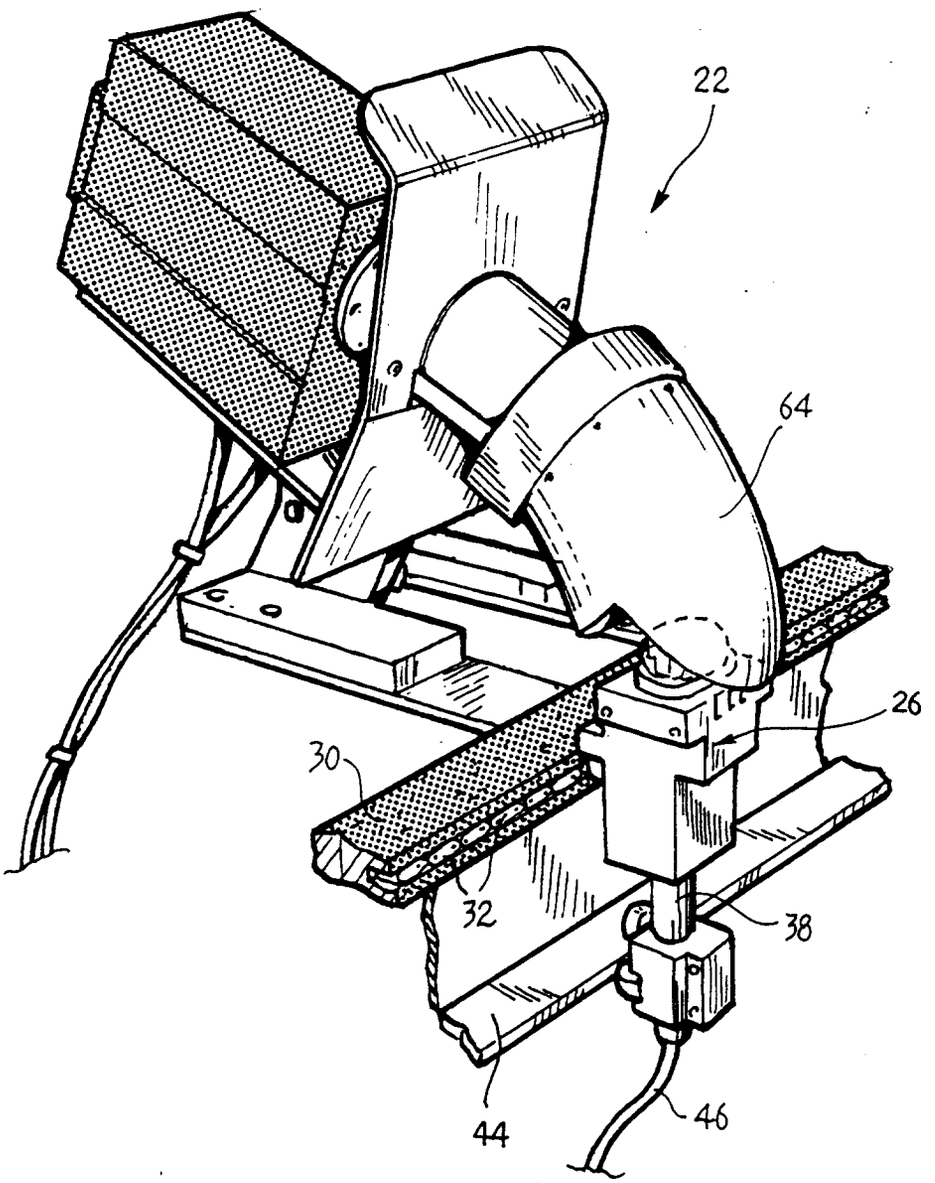

FIG. 6

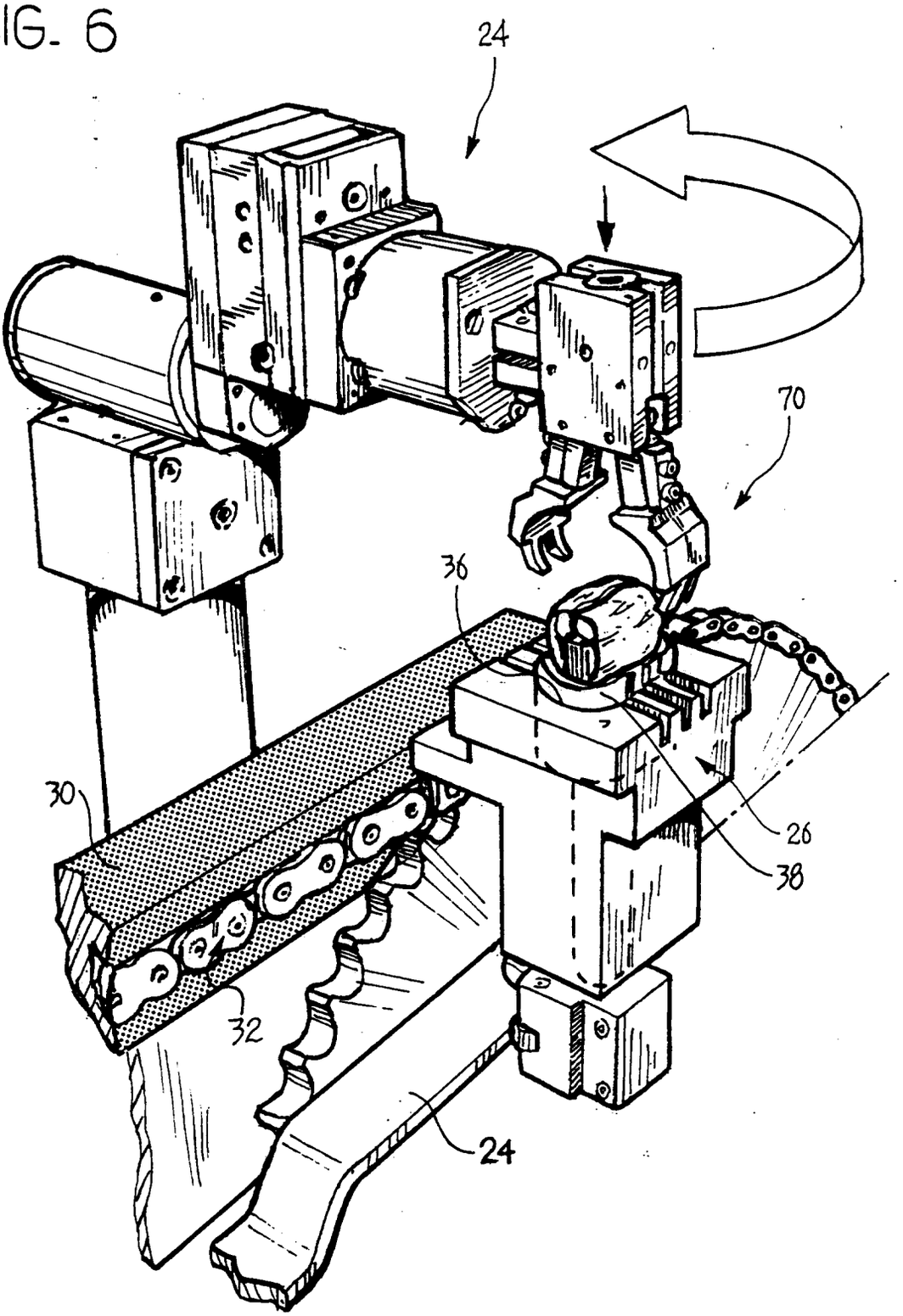

FIG. 7

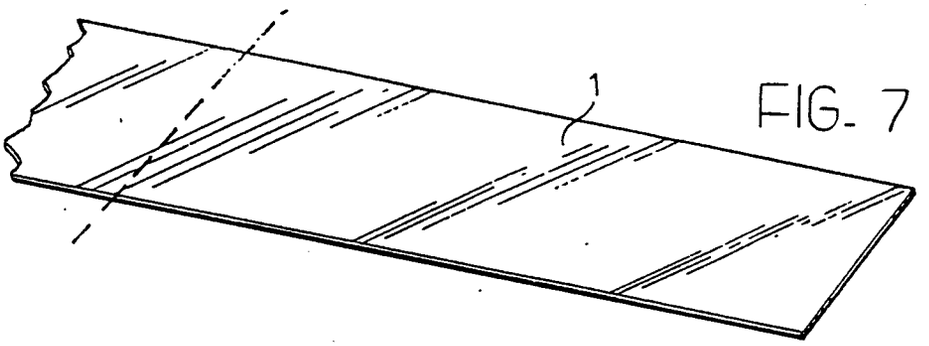

FIG. 8

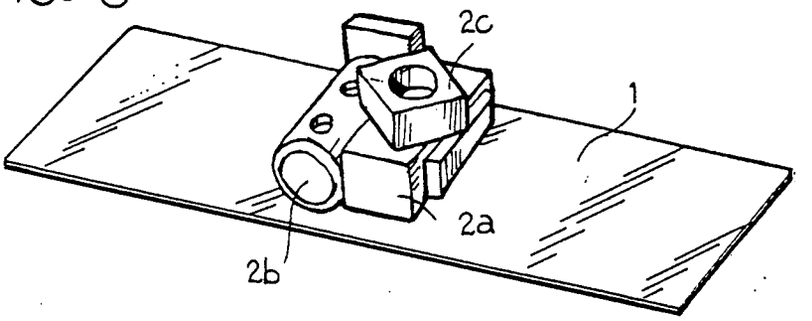

FIG. 9

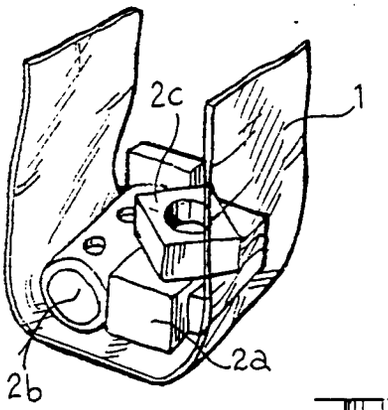

FIG. 10

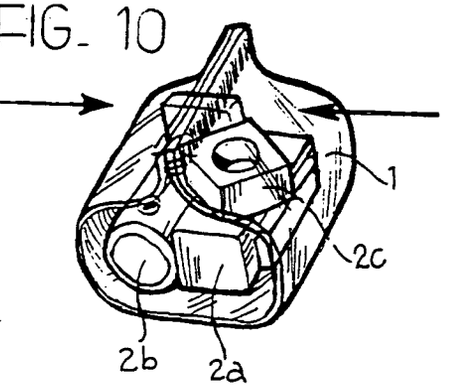

FIG. 11