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(54) **CARTON SET-UP MACHINE AND METHOD**

VERFAHREN UND VORRICHTUNG ZUM AUFRICHTEN VON FALTSCHACHTELN
LIGNE DE MISE EN FORME DE CARTONS ET PROCEDE CORRESPONDANT

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(56) References cited:

EP-A- 0 669 254	US-A- 3 058 271
US-A- 3 300 947	US-A- 3 682 052
US-A- 3 728 945	US-A- 3 747 482
US-A- 4 012 887	US-A- 4 633 655
US-A- 4 802 324	US-A- 4 982 551
US-A- 5 120 295	US-A- 5 473 868
US-A- 5 531 661	US-A- 5 562 581

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Description

[0001] This invention relates to a packaging machine and is particularly useful for processing cartons of the end loading type comprising end panels which are adapted to accommodate a plurality, for example twelve, glass beverage bottles.

[0002] US-A-3 682 052 discloses a mechanism for erecting carton sleeves without end panels.

[0003] End loading cartons for accommodating glass bottles normally have side walls whose upper portions taper inwardly in an upwards direction to take account of the shape of the group of articles within and therefore provide a tight fitting package in which firm glass to glass contact is provided to minimise breakage, and comprise end walls formed by end panels.

[0004] Such cartons incorporate a midrift foldline about which the cartons are hinged when erected from a flat collapsed condition into a set-up condition ready for end loading. There is a tendency for the cartons to collapse back to their flat condition during or immediately after set-up prior to loading and it is necessary to set-up the carton and to support the carton immediately after set-up so that this tendency to collapse is mitigated.

[0005] To this end, one aspect of the invention provides a method of continuously setting up and loading end loaded type cartons comprising end panels which method comprises causing each such carton sequentially to be delivered in flat collapsed condition to an in-feed end of a packaging machine, engaging lower restraining means to hold down lower portions of the carton and engaging upper raising means to raise upper portions of the carton as it is moved downstream, gradually causing the carton to be disengaged from said lower restraining means and to be engaged by carton end panel engaging elements provided on conveying means to hold down and convey the carton while it is brought into set-up condition, causing the carton to be transferred from engagement with said carton end panel engaging means as it is moved downstream and thereafter supported by leading and trailing support means when set-up so that it is held thereby in set-up condition whereby means for raising upper portions of the carton can be released and thereafter causing the carton to be end-loaded with product.

[0006] Another aspect of the invention provides a packaging machine for continuously setting up and loading end-loaded type cartons which machine comprises feed means sequentially to deliver successive cartons from a supply in flat collapsed condition to a setting up stations of the machine, an adjustable restraining means to restrain lower portions of the carton relative to upper portions thereof, and means to engage and raise upper portions of the carton as it is moved downstream by carton conveying means positioned downstream said lower restraining means, said conveying means comprising adjustable carton end panel engaging elements to hold down and convey the carton while it is

brought into a set-up condition by said means to engage and raise said upper portions, leading support means adapted to be brought into position at the leading face of the carton and trailing support means adapted to be brought into position at the trailing face of the carton during movement thereof downstream so that the carton is supported in its set up condition the relative operation of the means to engage and raise said upper portion, the adjustable carton end panel engaging elements and the leading and trailing support means being such that support by said raising means is relieved after the carton is transferred from engagement with the carton end panel engaging elements downstream to the leading and trailing support means.

[0007] According to a feature of this aspect of the invention, further leading and trailing support means may be provided by overhead carriers to engage upper portions of said leading and trailing faces of the carton.

[0008] An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

Figures 1 and 1a to 1c are various views of an end-loading carton suitable for use with a machine according to the invention;

Figures 2 and 2a are perspective side views of a machine according to the invention;

Figure 3 is a perspective view of the carton supply/feed and setting-up station of a machine according to the invention;

Figures 4 and 4a are perspective views of the setting-up station in a machine according to the invention;

Figure 5 is a perspective view of an overhead unit at the setting-up station of the machine;

Figure 6 is a perspective view of a plunger device contained within the overhead unit shown in Figure 5;

Figure 6a is an exploded view of the plunger device of Figure 6; and

Figure 7 is a side view of the upstream end of a machine according to the invention.

[0009] Referring first to Figures 1 to 1c of the drawings, carton C of the end loading type is shown in Figure 1 in a set-up condition ready for end-loading. The carton C includes a top panel 10, a base panel 12, a first side wall 14 including upper side wall panel 14a and lower side wall panel 14b hinged together about a midrift fold line 16. The carton further includes a second side wall 18 comprising upper side wall panel 18a and lower side

wall panel 18b hinged together about a midrift fold line 20. The ends of the carton are closed after the end-loading process by an end panel flap structure shown generally by reference numerals 22 and 24 at respective ends of the carton. The various dimensions of the carton can vary depending upon the shape and/or quantity of the articles to be packaged and accordingly, a machine in accordance with the present invention is adjustable in numerous respects so that it can process a wide variety of such cartons. The principal dimensions which are likely to be varied are shown in Figures 1a and 1b in which 'H' is the overall height of the set-up carton equivalent to the distance between the top panel and the base panel. 'L' is the overall length of the carton when the end closure flaps are open and (because the carton is end loaded) dimension 'L' corresponds to the transverse direction of the machine. In contrast, distance '1' shown as the width of the carton corresponds to the longitudinal direction of the machine. It is also envisaged that dimension 'A' being the vertical height of an upper side wall panel of the carton can vary as can the pitch of that panel relative to the vertical shown in Figure 1a as angle β° .

[0010] Referring now to Figures 2, 2a and 3 of the drawings, there is shown a machine 'M' for processing cartons 'C' of the type referred to above. The upstream end of the machine includes a hopper 'H' in which a multiplicity of cartons 'C' in flat collapsed condition are held ready for processing. The cartons are removed from the hopper sequentially by a rotary vacuum feeder 26 and fed one at a time between the nip 'n' of a set of upper and lower vacuum infeed belts shown generally at 'B'. The infeed belt set includes two pairs of upper and lower receiving belts 28, 30 and 32, 34 spaced apart so as to receive the end closure flaps of a flat carton delivered by the rotary feeder 26 (see eg. Figures 1 and 3). The infeed belt set also includes a second two pairs of upper and lower belts 36, 38 and 40, 42 intermediate and downstream of the receiving belts which act on the main panels of the flat collapsed carton. The belt sets are connected to a vacuum source (not shown) and vacuum is applied by known means to the lower face of the lowermost panels of a carton C passing through the belt set to hold the base panel against the lower belts of the sets. In order to accommodate cartons having different lengths 'L' the nearside belt sets (as viewed in the drawings) 28, 30 and 36, 38 are adjustable transversely of the machine so that the nearside belt sets can be moved in and out, relative to the farside belt set, as a unit.

[0011] The cartons are erected into a set-up condition sequentially as they are moved downstream through a set-up station 'S' which is shown generally in Figure 4 but carton set up is shown more clearly in Figure 3 and Figure 4a.

[0012] The set-up station includes a pair of overhead vacuum plunger units 44 and 46 respectively of which the nearside unit 44 is adjustable relative to the farside unit 46 transversely of the machine to reflect the adjust-

ments made to the vacuum belt sets thereby to take account of variations in the length 'L' of cartons being processed. The plunger units are similar and hence only unit 44 is described in detail with reference to Figure 5. More generally, in order to bring a carton into a set up condition vacuum cup devices 48, 50 of units 44, 46 respectively are caused to engage the top panel of the carton as the carton is held by its lower panels against the vacuum belts. Thus, when vacuum is applied and the vacuum cups raised as they travel downstream, the top panel of the carton is separated and moved apart from the bottom panel of the carton so that the carton progressively is brought into a set-up condition.

[0013] During this initial setting-up process, the cartons leave engagement with the vacuum belts and engagement gradually is transferred, as the cartons move downstream, to a pair of side lug chain sets 52, 54 which are of similar construction. The side lug chain sets each include endless chains having a plurality of spaced lugs 'sl' which engage the end flaps of the carton in order to continue the downstream progress of the carton and to retain the bottom panel while the top and side panels are being raised by the rising vacuum cup devices. The nearside side lug chain 52 set is adjustable relative to the farside set 54 transversely of the machine also to reflect adjustments made to account for variations in the length dimension 'L' of cartons being processed.

[0014] Referring now to Figure 5, plunger unit 44 is shown in more detail. The unit comprises a plurality of vacuum plunger devices 56, each of which is of similar form, and carried by upper and lower endless chain and sprockets sets 58, 60 respectively. Each plunger arm 56 comprises a mounting bracket 62 secured at each of its opposite ends to the upper and lower chain and sprocket sets so that the plunger devices can be caused to move continuously around the unit 44. During movement around the unit, a reciprocal arm 64 of each device which carries at its lower extremity a vacuum cup unit 66 is caused to be downwardly extended relative to its mounting bracket, so that it can engage the top wall of a carton below, during which time vacuum is applied, and thereafter retracted so that it can move around the unit after vacuum has been relieved so that the unit 66 disengages the carton to repeat its cyclic reciprocal action.

[0015] Reciprocal movement of arm 64 together with the vacuum cup unit 66 is caused by means of a cam track 68 disposed between the chain and sprocket sets and engaged by a roller follower 70 carried by the arm 64. A plunger device is shown in more detail in Figure 6 and Figure 6a of the drawings.

[0016] With reference to Figures 3 and 7, as each carton is moved into a set-up condition its leading face is brought into engagement with a pair of spaced upstanding lugs, referenced 4 in Figure 7 carried by endless chain sets 72 and 74 respectively. At this location the carton C₁ is in its set-up condition but still held set-up by action of the overhead vacuum plungers. However,

upstanding lugs, referenced 3 in Figure 7, also carried by the endless chain sets are brought into position against the trailing face of the carton so that support of the carton is achieved by a pair of leading lugs 4 and a pair of trailing lugs 3. As soon as the carton is adequately supported by the upstanding lugs, the vacuum applied by the vacuum units 66 can be relieved and the vacuum cups disengage from the carton top wall as the plunger arms are retracted to their raised positions. In order to accommodate cartons of various widths which is dimension '1' in the longitudinal direction of the machine, the leading lugs 4 are adjustable longitudinally relative to the trailing lugs 3 on both sets of lug chains 72 and 74. Also in order to reflect adjustments to the machine made upstream in respect of carton length 'L', the nearside chain set 72 is adjustable transversely relative to chain set 74.

[0017] Further support is given to the upper parts of each carton to facilitate the end-loading process by a pair of overhead booms 76, 78 each of which comprises an endless chain and sprocket set each carrying an endless series of downwardly dependant lugs. Leading boom lugs, referenced 2 in Figure 7, engage the sloping upper parts of the leading carton side wall while trailing boom lugs, referenced 1 in Figure 7, engage the sloping upper parts of the trailing carton side wall. As is the case in respect of the lower support lugs, in order to accommodate cartons of various widths '1' and/or to accommodate variations in angle β° at this upper sloping side wall panels, the leading boom lugs 2 are adjustable longitudinally relative to the trailing boom lugs 1 on both sets of boom chains 76, 78. In addition, in order to accommodate cartons of various heights H, both overhead booms are adjustable vertically. Moreover, the nearside overhead boom 76 is adjustable transversely relative to the farside overhead boom in order to accommodate variations in carton length dimension 'L'.

[0018] End loading of products into the line of moving cartons is achieved by means known per se while the cartons travel between the overhead booms and the bottom lug chains whereby the cartons are well supported against side to side racking to facilitate the end loading process. Once a carton is loaded both sets of its end closure flaps 22, 24 are folded, closed and secured to complete the packaging operation.

Claims

1. A method of continuously setting up and loading end loaded type cartons comprising end panels (22; 24) which method comprises causing each such carton sequentially to be delivered in flat collapsed condition to an infeed end of a packaging machine (M), engaging lower restraining means (38, 42) to hold down lower portions of the carton and engaging upper raising means (48, 50) to raise upper portions of the carton as it is moved downstream, grad-

ually causing the carton to be disengaged from said lower restraining means and to be engaged by carton end panel engaging elements (s1) provided on conveying means (52, 54) to hold down and convey the carton while it is brought into set-up condition, causing the carton to be transferred from engagement with said carton end panel engaging means as it is moved downstream and thereafter supported by leading and trailing support means (3, 4) when set-up so that it is held thereby in set-up condition whereby means for raising upper portions of the carton can be released and thereafter causing the carton to be end-loaded with product.

2. A packaging machine (M) for continuously setting up and loading end-loaded type cartons which machine comprises feed means (28, 30; 32, 34) sequentially to deliver successive cartons from a supply in flat collapsed condition to a setting up station (S) of the machine, an adjustable restraining means (38, 42) to restrain lower portions of the carton relative to upper portions thereof and means (48, 50) to engage and raise upper portions of the carton, as it is moved downstream by carton conveying means (52, 54) positioned downstream said lower restraining means, said conveying means comprising adjustable carton end panel engaging elements (s1) to hold down and convey the carton while it is brought into a set-up condition by said means (48, 50) to engage and raise said upper portions, leading support means (4) adapted to be brought into position at the leading face of the carton and trailing support means (3) adapted to be brought into position at the trailing face of the carton during movement thereof downstream so that the carton is supported in its set up condition the relative operation of the means to engage and raise said upper portion, the adjustable carton end panel engaging elements and the leading and trailing support means being such that support by said raising means is relieved after the carton is transferred from engagement with the carton end panel engaging elements downstream to the leading and trailing support means.
3. A packaging machine according to claim 2 wherein further leading and trailing support means (2) are provided by overhead carriers (76) to engage upper portions of said leading and trailing faces of the carton.

Patentansprüche

1. Verfahren zum kontinuierlichen Aufrichten und Beladen von Schachteln des stirnseitig zu befüllenden Typs, welche Endwandflächen (22; 24) umfassen, wobei das Verfahren das Veranlassen umfasst, dass jede solche Schachtel nacheinander in fla-

chem zusammengeklappten Zustand zu einem Vor-
schubende einer Verpackungsmaschine (M) geför-
dert wird, das Ineingriffnehmen von unteren Rück-
haltemitteln (38, 42), um die unteren Abschnitte der
Schachtel gedrückt zu halten, und das Ineingriff-
nehmen von oberen Anhebemitteln (48, 50), um
obere Abschnitte der Schachtel anzuheben, wäh-
rend diese stromabwärts bewegt wird, das stufen-
weise Veranlassen, dass die Schachtel von den un-
teren Rückhaltemitteln außer Eingriff gebracht wird
und durch die Schachtelendwandfläche in Eingriff
nehmende Elemente (s1) in Eingriff genommen
wird, die auf Fördermitteln (52, 54) bereitgestellt
sind, um die Schachtel gedrückt zu halten und zu
fördern, während diese in einen aufgerichteten Zu-
stand gebracht wird, das Veranlassen, dass die
Schachtel aus der Ineingriffnahme mit den die
Schachtelendwandfläche in Eingriff nehmenden
Mitteln übertragen wird, während diese stromab-
wärts bewegt und danach durch Führungs- und
Nachlaufhaltemittel (3, 4) gehalten wird, wenn sie
aufgerichtet ist, so dass sie dadurch in aufgerichte-
tem Zustand gehalten wird, wodurch Mittel zum An-
heben oberer Abschnitte der Schachtel gelöst wer-
den können, sowie danach das Veranlassen, dass
die Schachtel stirnseitig mit Produkt befüllt wird.

2. Verpackungsmaschine (M) zum kontinuierlichen
Aufrichten und Beladen von Schachteln des stirn-
seitig zu befüllenden Typs, wobei die Maschine Zu-
föhrmittel (28, 30; 32, 34) umfasst, um aufeinander-
folgende Schachteln aus einer Materialzufuhr in flach-
chem zusammengeklappten Zustand nacheinan-
der zu einer Aufrichtstation (S) der Maschine zu för-
dern, einstellbare Rückhaltemittel (38, 42), um un-
tere Abschnitte der Schachtel relativ zu oberen Ab-
schnitten davon zurückzuhalten, und Mittel (48, 50),
um obere Abschnitte der Schachtel in Eingriff zu
nehmen und anzuheben, während diese durch
Schachtelfördermittel (52, 54), die stromabwärts
der unteren Rückhaltemittel positioniert sind,
stromabwärts bewegt wird, wobei die Fördermittel
einstellbare, die Schachtelendwandfläche in Fin-
griff nehmende Elemente (s1) umfassen, um die
Schachtel gedrückt zu halten und zu fördern, wäh-
rend diese durch die Mittel (48, 50) in einen aufge-
richteten Zustand gebracht wird, um die oberen Ab-
schnitte in Eingriff zu nehmen und anzuheben, Füh-
rungshaltemittel (4), die angepasst sind, um an der
Führungsfläche der Schachtel in Position gebracht
zu werden, sowie Nachlaufhaltemittel (3), die ange-
passt sind, um an der nachlaufenden Fläche der
Schachtel während der Stromabwärtsbewegung
davon in Position gebracht zu werden, so dass die
Schachtel in ihrem aufgerichteten Zustand gehalten
wird, wobei die relative Betätigung der Mittel
den oberen Abschnitt in Eingriff nimmt und anhebt,
wobei die einstellbaren, die Schachtelendwandflä-

che in Eingriff nehmenden Elemente und die Füh-
rungs- und Nachlaufhaltemittel derart sind, dass die
Abstützung durch die Anhebemittel verringert wird,
nachdem die Schachtel aus der Ineingriffnahme mit
den die Schachtelendwandfläche in Eingriff neh-
menden Elementen stromabwärts der Füh-
rungs- und Nachlaufhaltemittel übertragen worden
ist.

3. Verpackungsmaschine nach Anspruch 2, in wel-
cher ferner Führungs- und Nachlaufhaltemittel (2)
durch oben liegende Träger (76) bereitgestellt sind,
um obere Abschnitte der Führungs- und Nachlauf-
flächen der Schachtel in Eingriff zu nehmen.

Revendications

1. Procédé pour déployer et charger en continu des
cartons du type à chargement par les extrémités,
comprenant des panneaux d'extrémités (22, 24), le-
quel procédé comprend les étapes consistant à
amener chaque carton à être acheminé successi-
vement à plat jusqu'à une extrémité d'introduction
d'une chaîne d'emballage (M), engager des
moyens inférieurs de retenue (38, 42) pour mainte-
nir dans le bas les parties inférieures du carton et
engager des moyens supérieurs de retenue (48, 50)
pour lever des parties supérieures du carton au fur
et à mesure que celui-ci se déplace vers l'aval, ame-
ner progressivement le carton à se dégager desdits
moyens inférieurs de retenue et à être intercepté
par des éléments (s1) d'interception de panneaux
d'extrémités de cartons présents sur des moyens
de convoyage (52, 54) afin de retenir et de trans-
porter le carton pendant que celui-ci se déploie,
amener le carton à se dégager desdits moyens d'in-
terception de panneaux d'extrémités de cartons à
mesure que celui-ci se déplace vers l'aval puis à le
faire supporter par des moyens avant et arrière de
support (3, 4) lorsqu'il est déployé de façon à être
retenu par ceux-ci en position en position déployée,
grâce à quoi les moyens pour lever les parties su-
périeures du carton peuvent être libérés, puis ame-
ner le carton à être chargé avec le produit par les
extrémités.
2. Chaîne d'emballage (M) pour déployer et charger
en continu des cartons du type à chargement par
les extrémités, laquelle chaîne comprend des
moyens d'alimentation (28, 30 ; 32, 34) pour ache-
miner successivement des cartons successifs à
plat depuis une réserve jusqu'à un poste de déploie-
ment (S) de la chaîne, un moyen de retenue réglable
(38, 42) pour retenir des parties inférieures du
carton par rapport à des parties supérieures de ce-
lui-ci, et un moyen (48, 50) pour intercepter et lever
des parties supérieures du carton, à mesure que

celui-ci se déplace vers l'aval sous l'action de moyens de convoyage (52, 54) de cartons placés en aval dudit moyen inférieur de retenue, ledit moyen de convoyage comportant des éléments réglables (s1) d'interception de panneaux d'extrémités de cartons servant à retenir et acheminer le carton pendant qu'il se déploie sous l'action dudit moyen (48, 50) pour solliciter et lever lesdites parties supérieures, un moyen avant de support (4) conçu pour se mettre en place au niveau de la face avant du carton et un moyen arrière de support (3) conçu pour se mettre en place au niveau de la face arrière du carton pendant que celui-ci se déplace vers l'aval de façon que le carton soit supporté, déployé, sous l'action du moyen pour intercepter et lever ladite partie supérieure, les éléments réglables d'interception de panneaux d'extrémités de cartons et les moyens avant et arrière de support étant tels que le support par ledit moyen de levage est supprimé après que le carton s'est dégagé des éléments d'interception de panneaux d'extrémités de cartons vers l'aval en direction des moyens avant et arrière de support.

3. Chaîne d'emballage selon la revendication 2, dans laquelle d'autres moyens avant et arrière de support (2) sont constitués par des supports suspendus (76) destinés à intercepter des parties supérieures desdites faces avant et arrière du carton.

FIG. 1

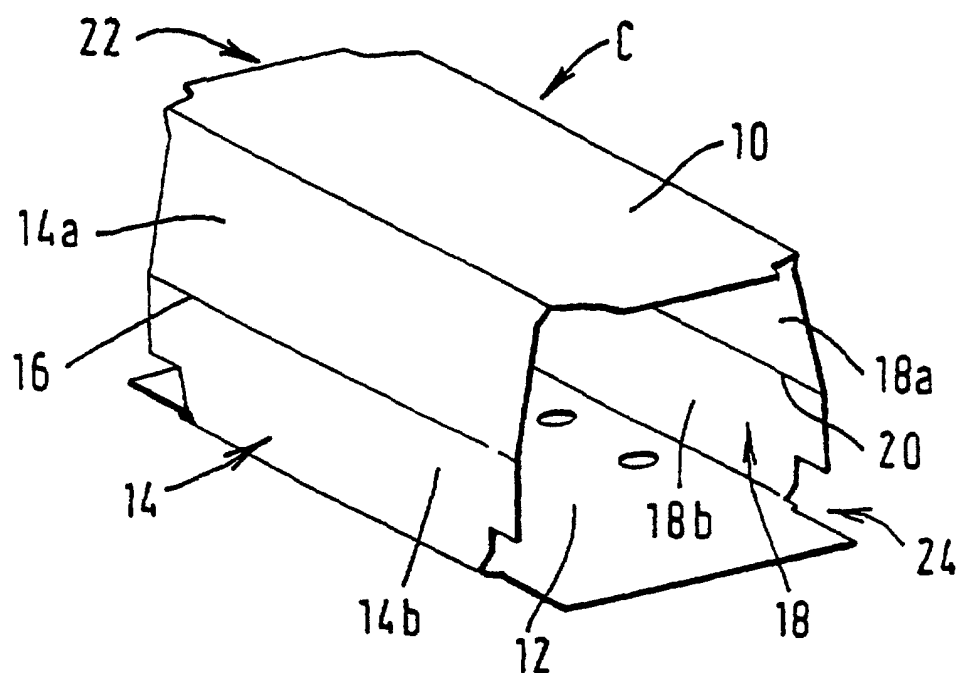


FIG. 1a

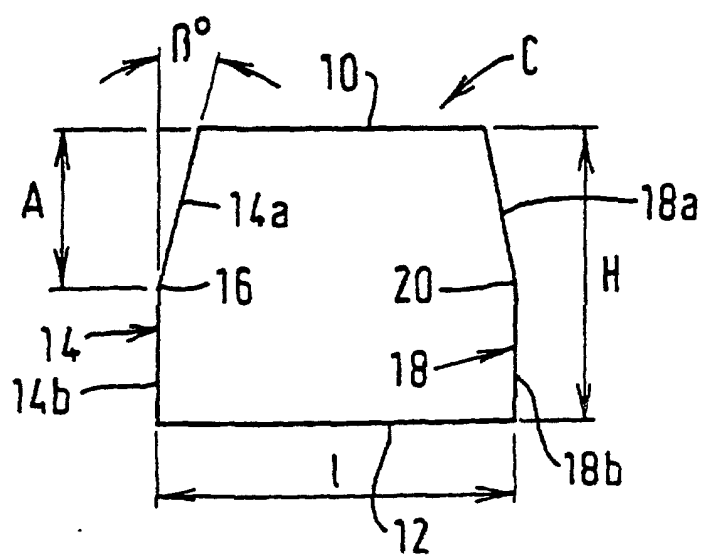


FIG. 1b

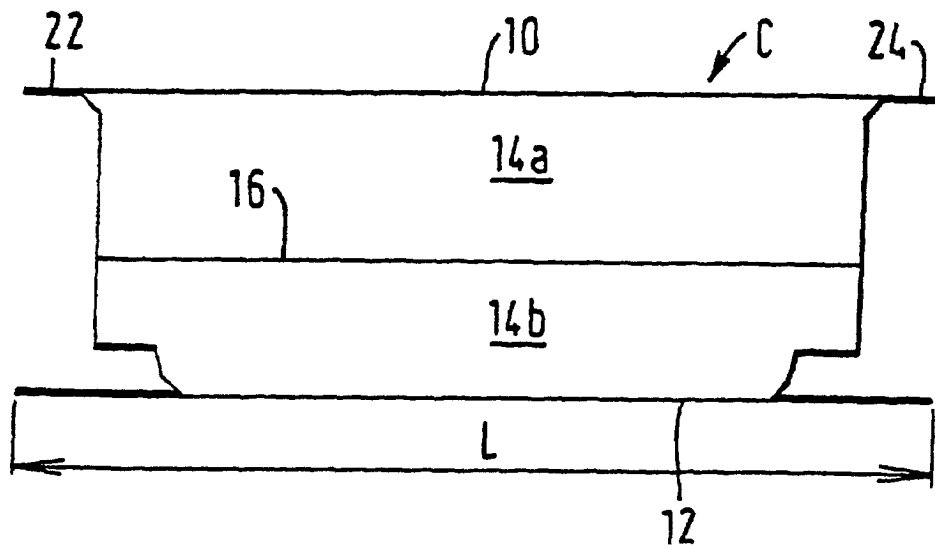
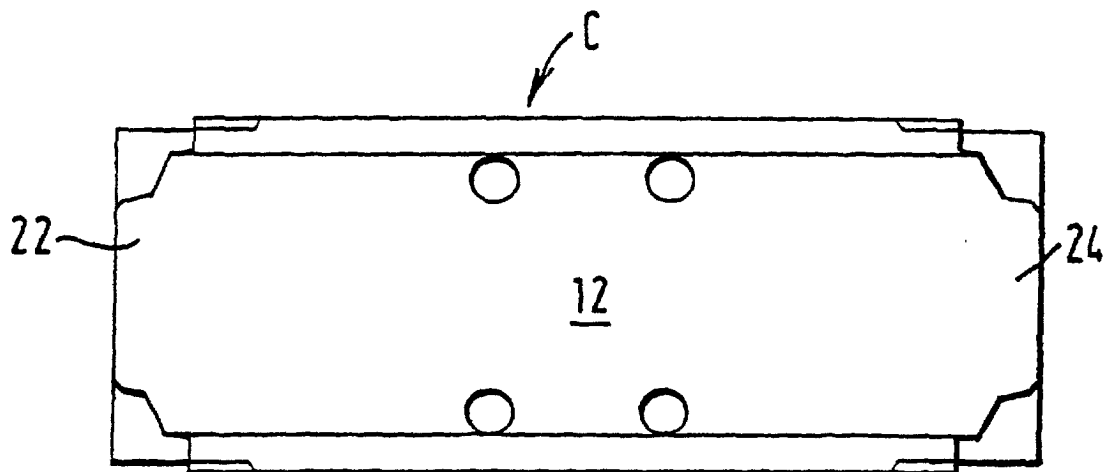


FIG. 1c



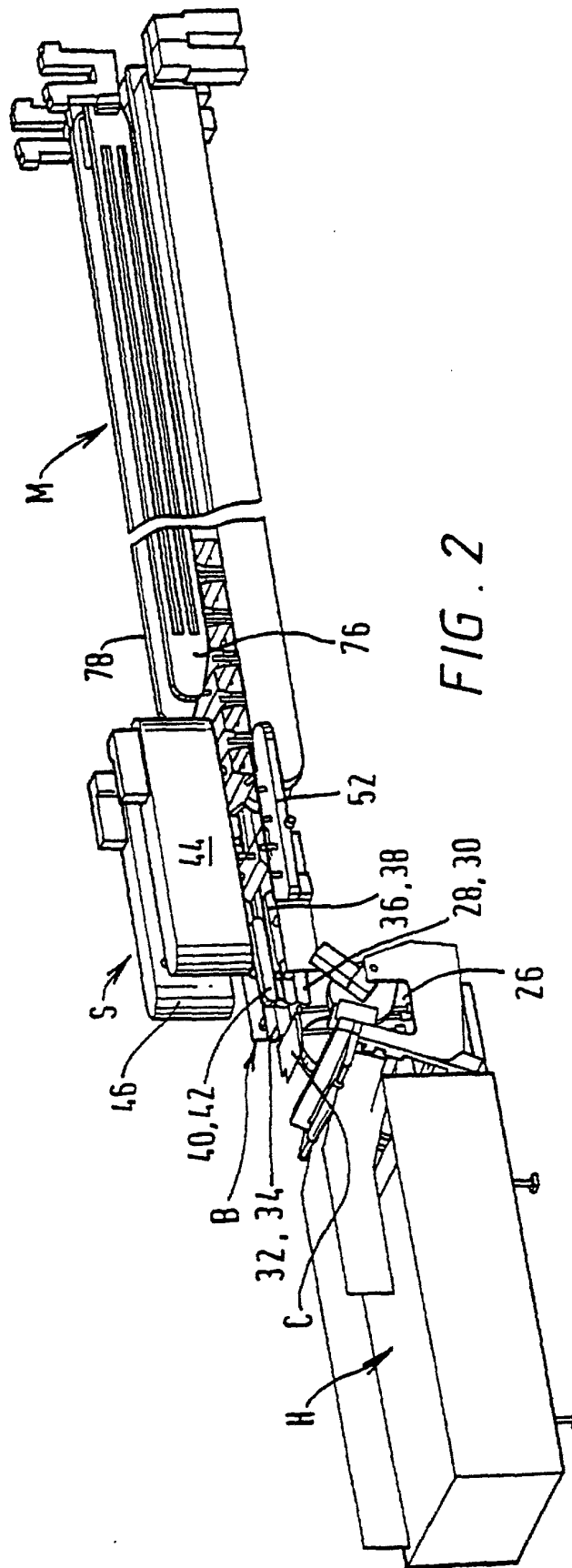
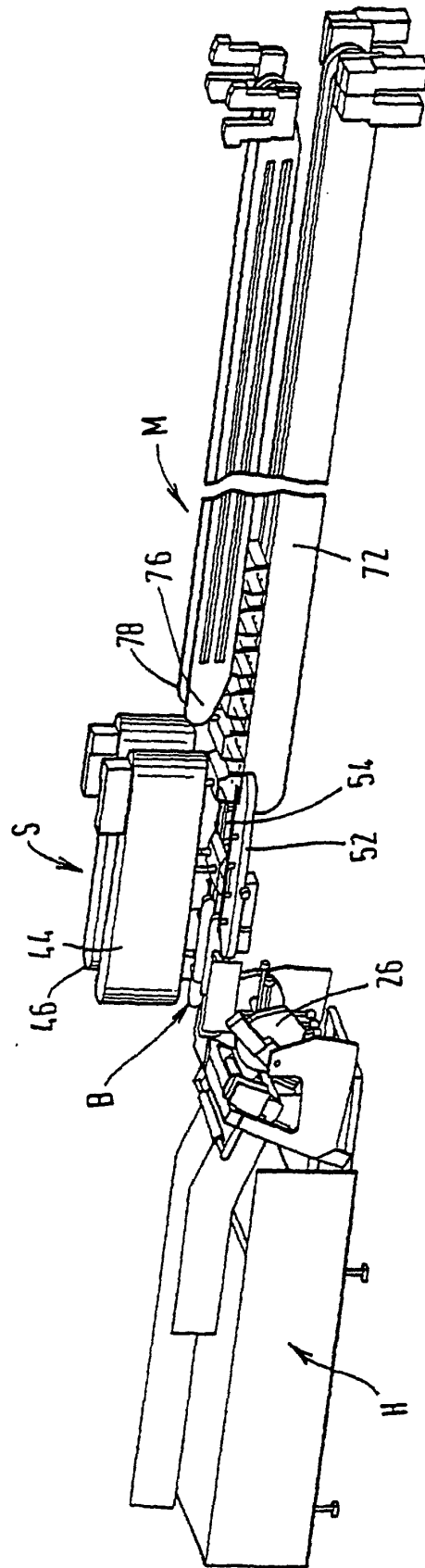
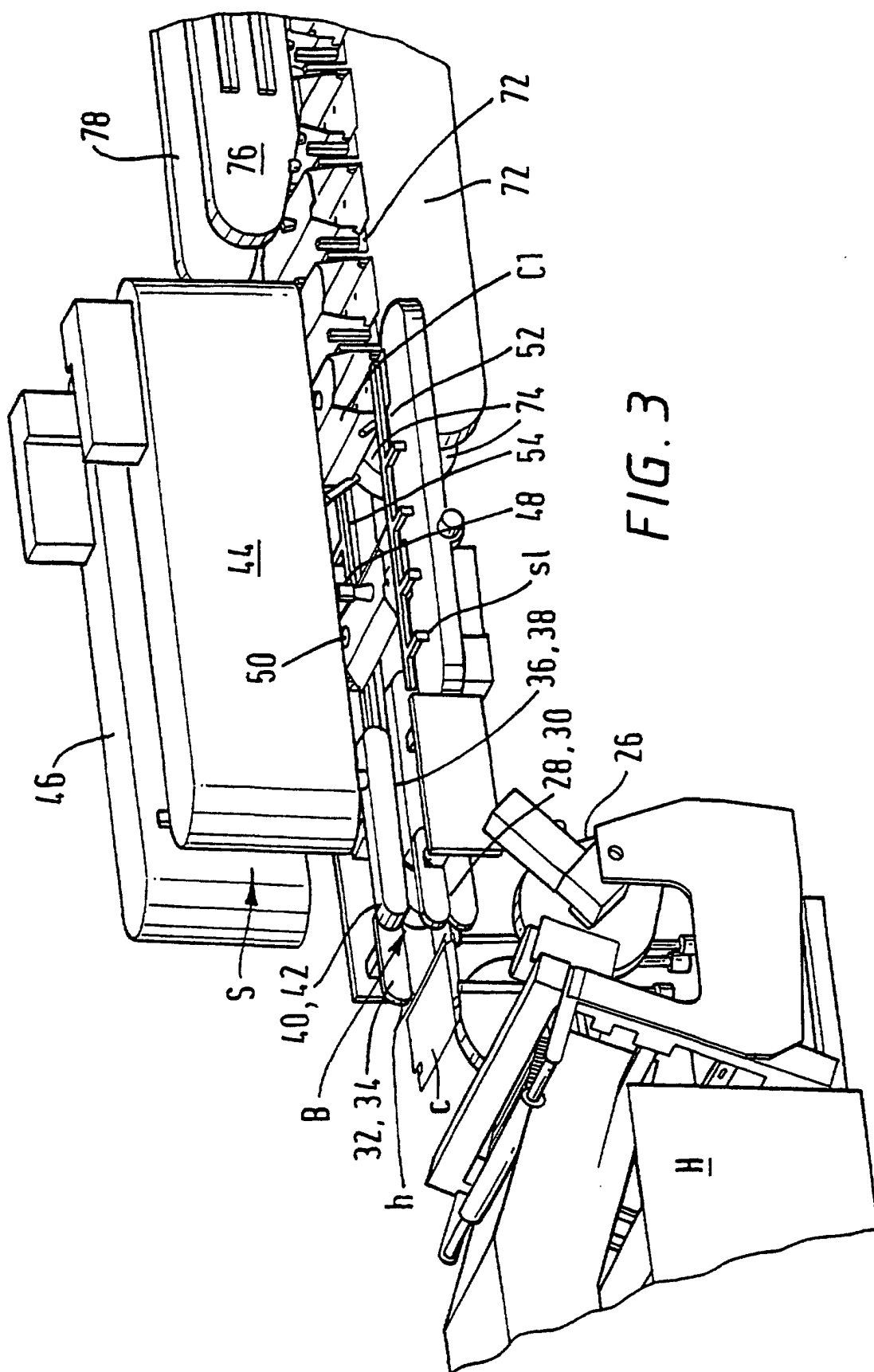


FIG. 2

FIG. 2a





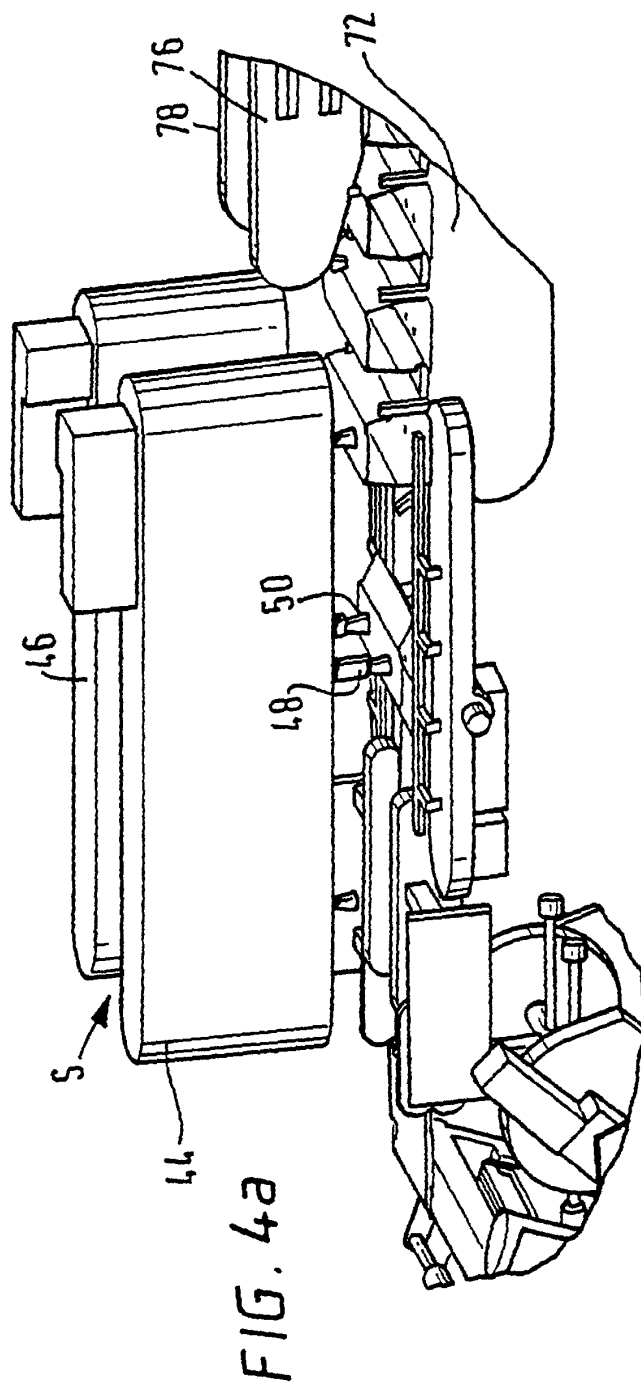
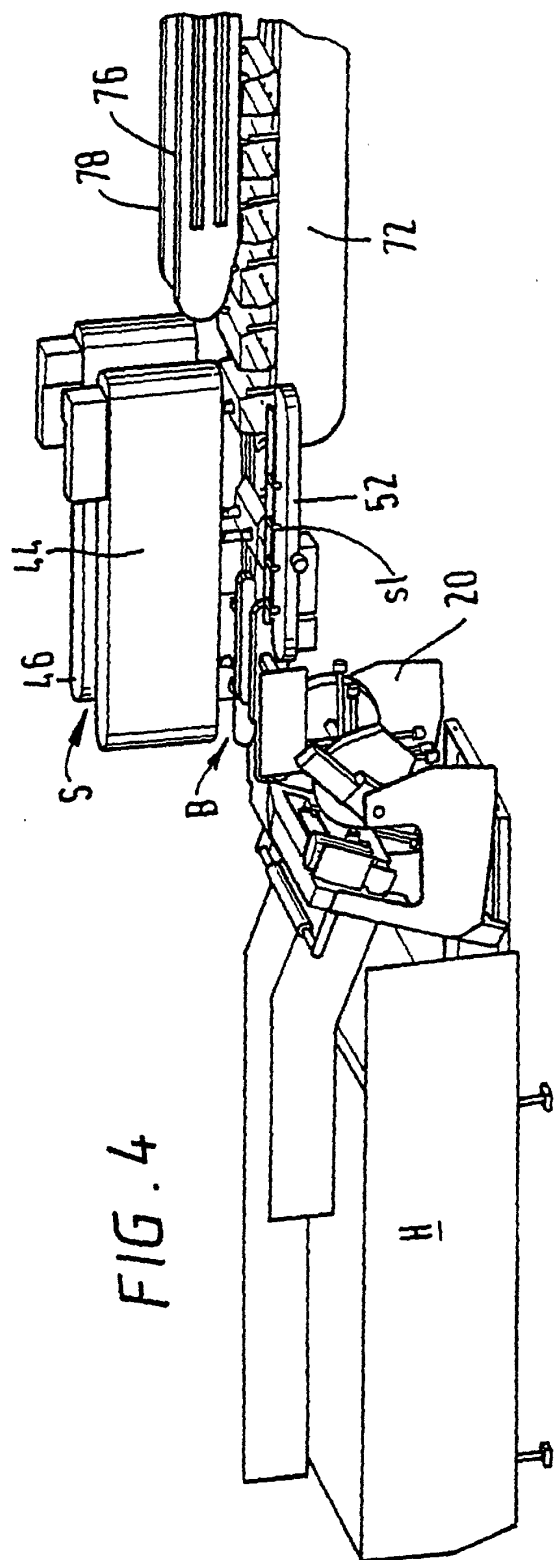
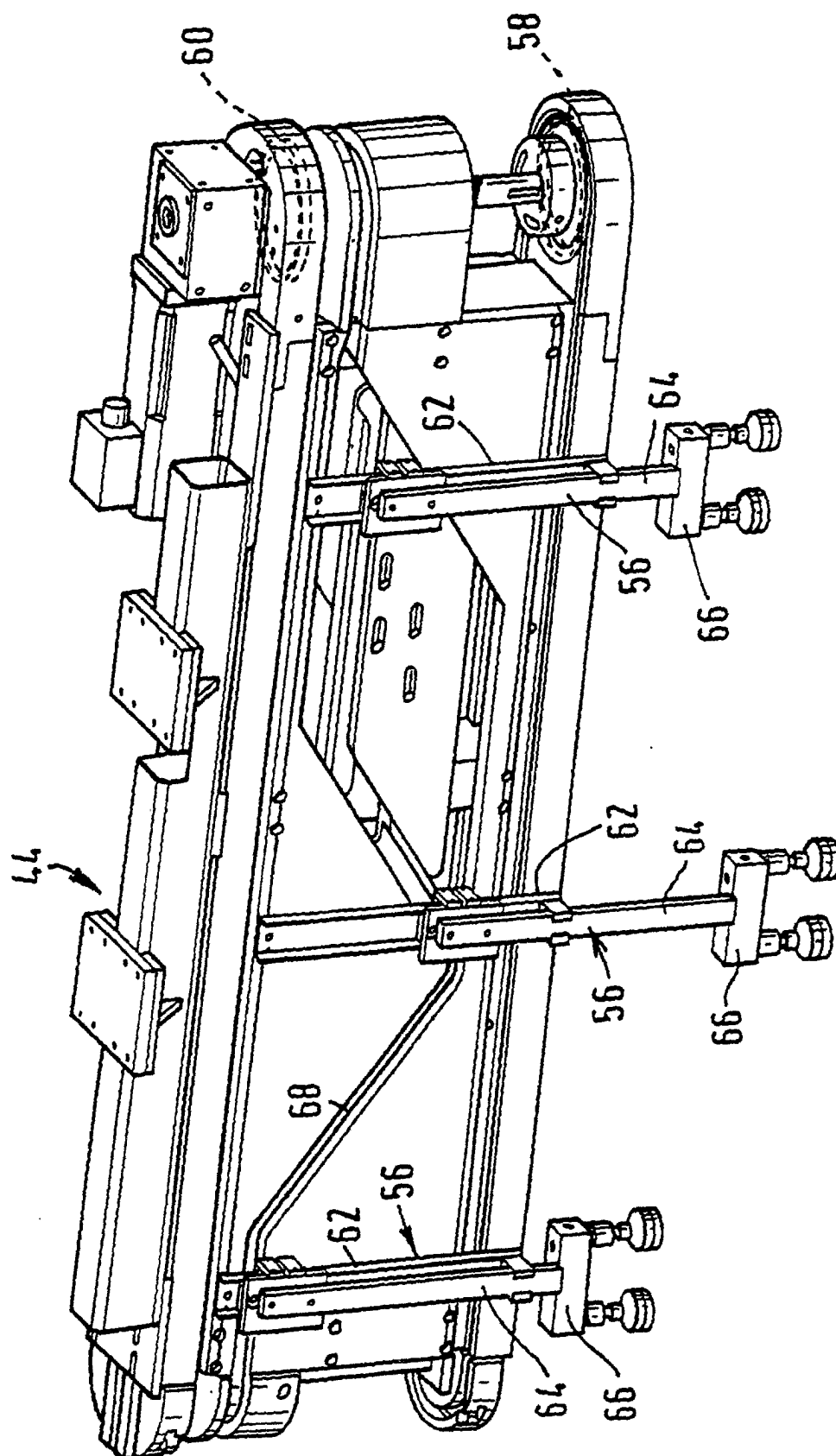


FIG. 5



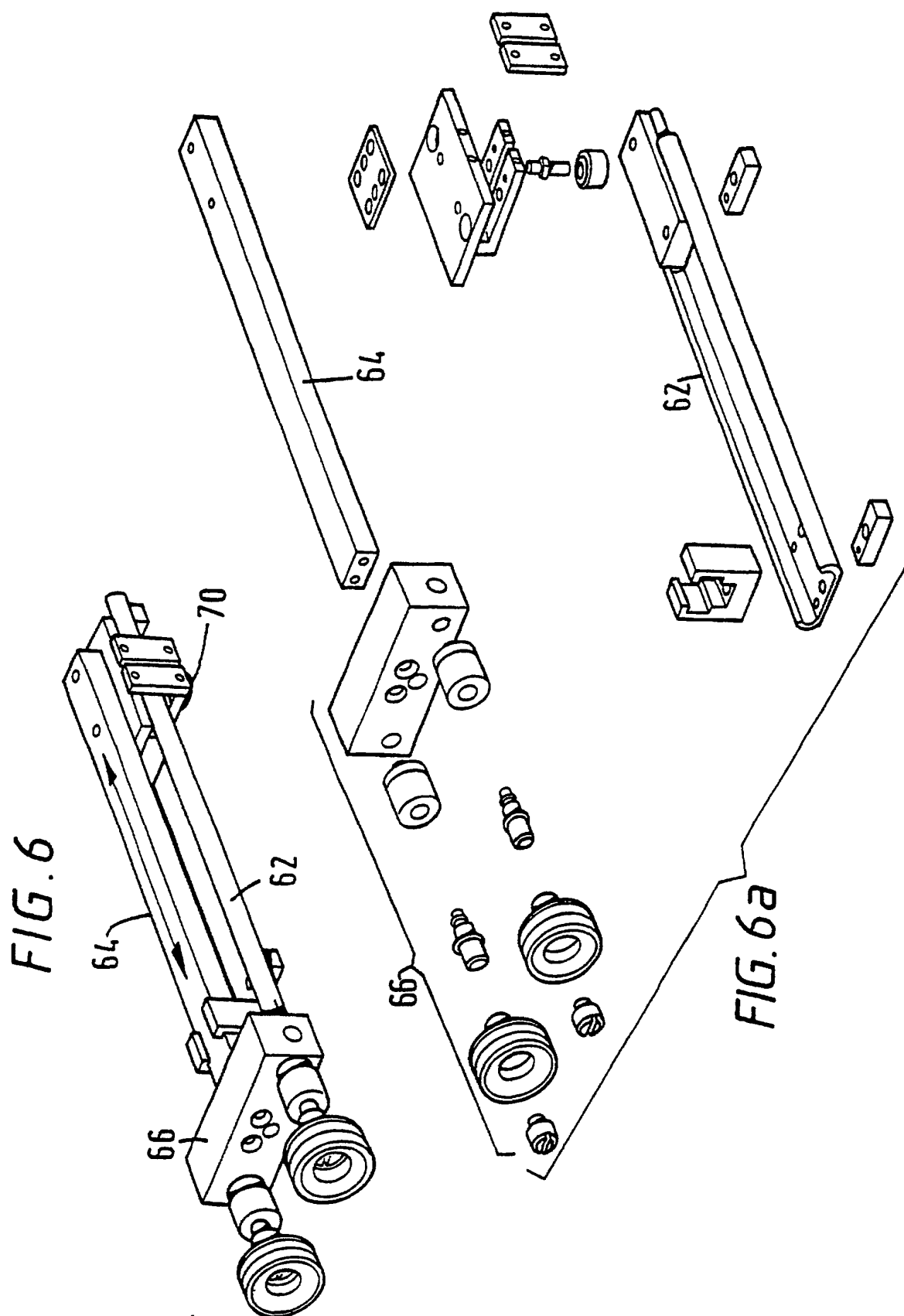


FIG. 7

