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(54) Carton folding mechanism for wraparound cartons

Schachtel-Faltvorrichtung für Hüllkartons

Dispositif pour plier des cartons pour cartons d'emballage

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(56) References cited:
EP-A- 0 200 445
EP-A- 0 242 992
EP-A- 0 322 159

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EP 0 645 306 B1

Description

This invention relates to a carton folding mechanism for a machine for packaging articles in, for example, a sleeve type wraparound carton. Typically the carton is formed from a paperboard blank in which a side wall panel and base panel are hinged together along a fold line. Article apertures, for example, bottle heel retaining apertures incorporating hinged retaining flaps are disposed astride the fold line between the carton panels. The machine in which the mechanism of the present invention may be incorporated includes a conveyor for advancing a blank and the articles to be packaged along a predetermined feed path. The mechanism folds such retaining flaps into their required positions inwardly of the carton. The present invention is concerned with the inward folding of pairs of such retaining flaps associated with each article retention apertures. The flaps of each pair of flaps are engaged and folded inwardly while the adjacent portions of the blank are held against any substantial sidewise movement by suitable guide means.

It is known from EP-0 200 445 to provide article retaining features such as bottle heel retention apertures in the base and side walls of a wraparound carton which receive a heel portion of an article such as a bottle packaged in the carton. Such heel retaining features normally are struck from the side and base wall panels of a wraparound carton and comprise flaps which are hingably attached to the carton panel. In the flat blank the flaps close the apertures which are to provide the bottle heel retention apertures of the carton. When the blank is applied to a group of articles, it is known to open the flaps using a simple finger mechanism to later enable the heel of the article to be received in the aperture created.

A mechanism for achieving this function is disclosed in EP-0 200 445 and comprises a mechanism for engaging and folding a pair of bottle heel retention flaps so that the flaps are folded inwardly of the carton. The folding mechanism includes a pivotal folder comprising a pair of pivotal fingers which are cam actuated so as to execute a folding movement whereby the fingers progressively enter a retention aperture in the blank to fold the flaps and to execute a retracting movement. These folding and retracting movements occur during linear feed movement of the carton blank and the pivotal folder together. The pivotal folders operate sequentially upon a blank to fold open a row of such heel retention flaps and, in a folding section of the machine, move together with the blank through the machine. In order to actuate the pivotal fingers each pivotal folder engages a fixed cam track formed in a cam block and is conveyed through a working path and a return path of a chain and sprocket assembly.

The invention provides a device for use in a machine for packaging articles in a wraparound carrier of the type formed from a blank having a pair of walls adjoined together along a fold line and having a pair of article retaining and blank reinforcing flaps disposed astride said fold line said device comprising folding means for engaging and folding said pair of flaps and to fold such flaps inwardly of the carrier, said folding means comprising a folder adapted to execute a folding movement thereby progressively to enter an aperture in the blank to fold the flaps and thereafter to retract from said aperture during feed movement of the blank, said folder including a blank engaging portion and means for cooperating with actuating means to pivot the blank engaging portion during said folding movement and said retracting movement characterised in that said cooperating means is radially movable with respect to an axis of the device and said blank engaging portion comprises a pair of divergently pivotal fingers adapted to pivot upon radial movement of said co-operating means.

According to a feature of the invention, said cooperating means may comprise a cam follower which rides in an endless cam track contoured so as to cause said pivotal movement of said fingers.

According to another feature of the invention, said folding means may comprise a rotatable plate assembly incorporating said folder and said endless cam track.

In constructions where a plate assemble is provided the plate assembly may comprise, in axial series, a cam plate, an intermediate plate incorporating said folders and a top plate and wherein the intermediate and top plates are rotatable relative to the cam plate. Preferably, the plates are discs.

According to yet another feature of the invention, said folder may comprise a body which is mounted for radial movement in said intermediate plate which body carries said cam follower. The body may terminate in a head comprising a pair of said pivotal fingers which provide the blank engaging portion of said folder. Preferably, the pivotal fingers are caused to pivot substantially simultaneously and cooperate with parts of said intermediate plate to effect their pivotal movement.

According to a still further feature of the invention said body may be slidably mounted in a radial track provided in the intermediate disc.

According to another feature of the invention said plate assembly may comprise a plurality of folders arranged in discrete groups whereby a separate one of said groups of folders is provided for each successive carton to be engaged.

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

FIGURES 1 to 10 show different stages of the following operation of a mechanism according to the invention;

FIGURE 11 shows a schematic perspective view of the mechanism according to the invention shown partly broken away;

FIGURE 12 is a perspective view of part of the mechanism shown in Figure 11;

FIGURE 13 is a plan view of a pivotal finger which forms part of a folder device according to the invention; and

FIGURE 14 is a sectional side view of the finger shown in Figure 13.

Referring to the drawings, Figures 1 to 10 are a schematic representation of the operation of a carton flap opening mechanism 10 according to the invention. The mechanism comprises a number of sets of rotatably mounted folders to cooperate sequentially with a carton blank adapted to provide two heel retention apertures at each side of the carton. Figures 1-10 illustrate the sequential steps during rotation of a rotatable plate assembly 36, 38 on which a pair of such folders 12 are carried to effect the opening of heel retention apertures A by, in each case, displacing a pair of flaps f_1, f_2 of a carton blank C. I n this case the carton blank is of the wraparound type. The heel portions of a pair of bottles B_1, B_2 are then received in respective ones of the retaining apertures A.

Figure 11 is a schematic perspective view of the rotatable disc plate mechanism 10 which comprises an upper disc 38, an intermediate disc 36 and a lower fixed cam plate 34. The discs can be driven, for example, by a shaft fixed to each of the discs and rotatably journalled through the centre of the fixed cam plate. The shaft may of course be connected to be driven through some suitable form of mechanical linkage to a motor in order to effect the correct rotational speed of the wheel assembly in synchronisation with the movement of the carton blank C in the packaging process. The opening mechanism 10 in this example, comprises three series of four closely and equally spaced folders. The number and spacing of each of the folders 12 is determined by the type of carton being used to package articles. In this specific example, the cartons are configured to package a 4 X 2 arrangement so that a row of four articles will be disposed along each side wall of the carton. Hence, since there are three groups of four pivotal folders, one revolution of the wheel assembly will effect the opening of heel retention flaps in three successive carton blanks. The carton C comprises a side wall having apertures A for receiving heel portions of articles B and flaps "f" struck from the carton side wall which are required to be opened out of the flat plane of the side wall, inwardly of the carton.

A pair of blank folding mechanisms 10 is adapted to be installed adjacent the infeed end of a packaging machine. Two such mechanisms are installed in side-by-side relationship so that a blank and article feed path is provided between the mechanisms. The description hereinafter refers to only one mechanism of the pair the other mechanism being similar in all aspects. The carton blank is formed with a linear series of article heel retaining apertures A which are struck along the fold line which foldably connects a side wall panel with a bottom panel of the blank. Such heel retaining apertures are provided to receive e.g. heel portions of bottles to assist retention of the bottles in the completed carton. The heel retaining apertures are each defined in part, by foldable reinforcing flaps f which are foldable, to open the aperture, into overlapping relationship with adjacent portions of the side wall and base panel of the blank.

An individual folder 12 from one of the three groups is shown in Figure 11 wherein first and second fingers 14 and 16, respectively, are shown in their fully opened position in which they protrude from recess 40 in disc 36. Each pivotal folder comprises an elongate rod 26 which is received in a radial track 28 formed in intermediate disc 36 for reciprocal movement therein. The radially outer end of rod 26 carries a head plate 24 formed with an ovate transverse opening 22. The pivotal fingers 14 and 16 have upper locating pins 18 and 20 respectively which are slidably received in opening 22 and each have a lower locating pin 52 which are each received in a recess 50 formed in a protruding portion 37 of disc 36. The latter components are shown in Figures 12 to 14. It can be seen from the plan view of Figure 13 that pin 20 is displaced from the centre of pin 52 in order to effect the opening movement of fingers 14 and 16 during radial movement of rod 26. Preferably the angle A subtended by the axis of pin 20 at the axis of pin 52 relative to a line R' parallel to radial edge R of finger 16, which edge forms the edge which abuts finger 14, is in the order of 45°.

A cam follower, in this case a roller assembly 30, depends from the lower face of rod 26 intermediate its ends and rolls in a cam track 32 formed in cam plate 34. The pivotal fingers 14 and 16 are caused to move through the action of the reciprocating rod 26 which moves radially inwardly and outwardly along the radial track 28 in response to radial movement of the cam follower 30 in cam track 32. The cam track 32 is shown schematically in each of the Figures 1 to 10 and thus the location of fingers 14 and 16 with respect to their position in relation to cam track 32 can be followed in each of the same figures. As is apparent, the pivotal fingers are opened to their maximum extent (as shown in Figure 11) when reciprocating rod 26 is at its radially outermost limit and thus when cam follower 30 reaches the most eccentric part of cam track 32.

Figure 11 is, of course, only schematic, and it is apparent that each protruding portion 13 of upper disc 38 is provided in its lower surface with a radial groove (not shown) for receiving head plate 24 thereby to enable radial movement of head plate 24.

Referring again to Figures 1 to 10 it can be seen that as the disc assembly 36, 38 is caused to rotate clockwise, a first folder 12 engages a carton blank and penetrates an aperture A thus separating the flaps f_1, f_2 from co-planar alignment with the side panel of the carton. In Figure 1, folder 12 has rotated into abutment with the side of carton blank C, whereas in Figure 2, further rotation has caused initial penetration of folder 12 into the heel retaining aperture A.

Figure 3 illustrates folder 12 at a position where it has almost entirely penetrated the aperture A causing

the flaps f_1, f_2 to fold inwardly away from one another significantly, but not beyond a 90° position relative to the carton side panel. This is the situation also for the next sequence of events up to and including the position shown in Figure 5. It will be appreciated that up to this position the pivotal fingers of the folder 12 remain closed even though they have penetrated the blank.

In Figure 6 the pivotal fingers 14 and 16 begin to pivot apart from one another and thus open folding flaps f_1, f_2 still further.

In Figure 7 the flaps f_1, f_2 have been folded beyond the 90° position relative to the associated carton side wall and begin to be folded towards adjacent parts of the carton side wall. The second folder 12^1 is at that time beginning to penetrate the next adjacent aperture A^1 having flaps f_3, f_4.

In Figure 8 cam follower 30 has reached the radially outermost part of cam track 32 and thus reciprocating rod 26 causes head plate 24 to reach its radially outermost position. Hence, this causes maximum opening of the pivotal fingers 14 and 16 due to the action of plate 24 on locating pins 18 and 20 received in groove 22.

Figure 9 shows that cam follower 30 has passed the radially outermost extent of cam track 32 and that rod 26 is caused to retract thereby causing the pivotal fingers 14 and 16 to begin to close back together.

In Figure 10 the pivotal fingers 14 and 16 are brought even closer together and thereby enable the fingers to be retracted from the aperture A.

Thus, when the fingers are pivoted into their extreme outward position, the fingers move apart to engage and fold outwardly the tabs of the heel retaining aperture and when the fingers are pivoted into their fully retracted position, the fingers are closed together.

During this operation it is apparent from the schematic drawings 1 to 10 that the pivotal fingers operate adjacent the bases of the bottles, B_1, B_2. The bottle heels are then engaged in their respective heel apertures as the carton side panels move inwardly. This occurs by bringing the carton base panels into overlapping relationship which has the general effect of 'tightening' the carton blank about the group of bottles. In this specific example, all four adjacent apertures will have been opened before the wraparound carton is closed about the group of bottles.

It is apparent from the drawings that the pivotal fingers 13,14 of the folders have a curved outer profile in order better to effect penetration of aperture A and to enable a progressive folding effect in the expansion of the flaps f_1, f_2. It will be appreciated that an opening mechanism 10 according to the invention can be readily modified so as to operate in conjunction with cartons of a different configuration to those described here. Thus change-over from one carton form to another different form simply requires the removal of the current disc assembly and the substitution of another appropriate disc assembly whose diameter, pivotal finger grouping and number and rotational speed of the assembly are matched to the type of carton to be run on the machine. This is in contrast to the considerably more laborious change-over requirements of the known mechanism in which the number and spacing of the pivotal fingers often would need to be individually adjusted on the endless chain assembly.

Claims

1. A device for use in a machine for packaging articles in a wraparound carrier of the type formed from a blank (C) having a pair of walls adjoined together along a fold line and having a pair of article retaining and blank reinforcing flaps (F1, F2) disposed astride said fold line, said device comprising folding means for engaging and folding said pair of flaps (F1, F2) and to fold such flaps (F1, F2) inwardly of the carrier, said folding means (10) comprising a folder (12) adapted to execute a folding movement thereby progressively to enter an aperture (A) in the blank (C) to fold the flaps (F1, F2) and thereafter to retract from said aperture during feed movement of the blank (C), said folder (12) including blank engaging portion and means (30) for co-operating with actuating means (32) to pivot the blank engaging portion during said folding movement and said retracting movement characterised in that said co-operating means (30) is radially moveable with respect to an axis of the device and said blank engaging portion comprises a pair of divergently pivotal fingers (14, 16) adapted to pivot upon radial movement of said co-operating means (30) with respect to said axis.

2. A device according to claim 1 wherein said co-operating means comprises a cam follower (30) which rides in an endless cam track (32) contoured so as to cause pivotal movement of said fingers (14, 16).

3. A device according to claim 2 wherein said folding means (10) comprises a rotatable plate assembly (34, 36, 38) incorporating said folder (12) and said endless cam track (32).

4. A device according to claim 3 wherein said plate assembly comprises, in axial series, a cam plate (34), an intermediate plate (36) incorporating said folders (12) and a top plate (38) and wherein the intermediate (36) and top plates (38) are rotatable relative to the cam plate (34).

5. A device according to claim 4 wherein said plates (34, 36, 38) are discs.

6. A device according to claim 4 wherein said folder (12) comprises a body (26) which is mounted for radial movement in said intermediate plate (36) which body carries said cam follower (30).

7. A device according to claim 5 wherein said body

(26) terminates in a head (24) comprising a pair of said pivotal fingers (14, 16) which provide the blank engaging portion of said folder (12).

8. A device according to claim 6 wherein said pivotal fingers (14, 16) are caused to pivot substantially simultaneously.

9. A device according to claim 7 wherein said body (26) is slidably mounted in a radial track (28) provided in the intermediate disc (36).

10. A device according to any of claims 3 to 9, wherein said plate assembly (34, 36, 38) comprises a plurality of folders (12) arranged in discrete groups whereby a separate one of said groups of folders (12) is provided for each successive carton (B) to be engaged.

Patentansprüche

1. Vorrichtung zur Verwendung in einer Maschine zum Verpacken von Gegenständen in einem Umwickel-Träger, und zwar des Typs, der aus einem Zuschnitt (C) gebildet wird, der Zuschnitt ein Paar Wände aufweist, die entlang einer Faltlinie miteinander verbunden sind, ferner ein Paar Gegenstandsrückhalte- und Zuschnittsverstärkungs-Klappen (F1, F2) aufweist, die rittlings zu der Faltlinie angeordnet sind, wobei die Vorrichtung eine Falteinrichtung zur In-Eingriffnahme und zum Falten des Klappenpaares (F1, F2) sowie zum Falten solcher Klappen (F1, F2) ins Innere des Trägers umfaßt, die Falteinrichtung (10) einen Säumerfuß (12) umfaßt der angepaßt ist, eine Faltbewegung auszuführen und dadurch schrittweise in eine Öffnung (A) des Zuschnitts (C) einzutreten, um die Klappen (F1, F2) zu falten und daran anschließend während der Zuführbewegung des Zuschnitts (C) sich aus der Öffnung zurückzuziehen, der Säumerfuß (12) einen den Zuschnitt in Eingriff nehmenden Abschnitt umfaßt, sowie eine Einrichtung (30) zum Zusammenwirken mit einer Antriebseinrichtung (32) umfaßt, um den den Zuschnitt in Eingriff nehmenden Abschnitt während der Faltbewegung und der Rückzugsbewegung zu schwenken, dadurch gekennzeichnet, daß die Einrichtung zum Zusammenwirken (30) im Verhältnis zu einer Achse der Vorrichtung radial bewegbar ist und der den Zuschnitt in Eingriff nehmende Abschnitt ein Paar divergierender Schwenkfinger (14, 16) umfaßt, die angepaßt sind, bei der Radialbewegung der Einrichtung zum Zusammenwirken (30) im Verhältnis zu der Achse zu schwenken.

2. Vorrichtung nach Anspruch 1, in welcher die Einrichtung zum Zusammenwirken einen Nockenstößel (30) umfaßt, der in einer endlosen Nockenspur (32) reitet, und die Nockenspur derart angepaßt ist, um die Schwenkbewegung der Finger (14, 16) zu verursachen.

3. Vorrichtung nach Anspruch 2, in welcher die Falteinrichtung (30) eine drehbare Scheibenanordnung (34, 36, 38) umfaßt, die Säumerfuß (12) und endlose Nockenspur (32) in sich einschließt.

4. Vorrichtung nach Anspruch 3, in welcher die Scheibenanordnung in axialer Aufeinanderfolge eine Nockenplatte (34), eine Zwischenplatte (36) umfaßt, die den Säumerfuß (12) in sich einschließt sowie eine Kopfplatte (38) und in welcher die Zwischenplatte (36) und die Kopfplatte (38) im Verhältnis zu der Nockenplatte (34) drehbar sind.

5. Vorrichtung nach Anspruch 4, in welcher die Platten (34, 36, 38) Scheiben sind.

6. Vorrichtung nach Anspruch 4, in welcher Säumerfuß (12) einen Körper (26) umfaßt, der für eine radiale Bewegung in der Zwischenplatte (36) angebracht ist, und wobei der Körper den Nockenstößel (30) trägt.

7. Vorrichtung nach Anspruch 5, in welcher der Körper (26) in einem Kopf (24) endet, der ein Paar der Schwenkfinger (14, 16) umfaßt, die den den Zuschnitt in Eingriff nehrmenden Abschnitt des Säumerfußes (12) bereitstellen.

8. Vorrichtung nach Anspruch 6, in welcher die Schwenkfinger (14, 16) gezwungen sind, im wesentlichen gleichzeitig auszuschwenken.

9. Vorrichtung nach Anspruch 7, in welcher der Körper (26) in einer radialen Spur (28) gleitbar angebracht ist, die in der Zwischenplatte (36) vorgesehen ist.

10. Vorrichtung nach einem der Ansprüche 3 bis 9, in welcher die Scheibenanordnung (34, 36, 38) eine Vielzahl von Säumerfüßen (12) umfaßt, die in getrennten Gruppen angeordnet sind, wodurch eine getrennte einzelne Gruppe aus den Säumerfuß-Gruppen (12) für jede nachfolgende und in Eingriff zu nehmende Schachtel (B) bereitgestellt wird.

Revendications

1. Un dispositif utilisable dans une machine à emballer des articles dans un emballage extérieur du type constitué par une ébauche (C) comprenant une paire de parois reliées mutuellement le long d'une ligne de pliage et comprenant une paire de pattes de retenue d'articles et de renforcement de l'ébauche (F1, F2) disposées de chaque côté de ladite ligne de pliage, ledit dispositif comprenant des moyens de pliage pour engager et plier lesdites pai-

res de pattes (F1, F2) et pour plier ces pattes (F1, F2) à l'intérieur de l'emballage de transport, lesdits moyens de pliage (10) comprenant un dispositif de pliage (12) agencé pour exécuter un mouvement de pliage de manière à pénétrer progressivement dans une ouverture (A) de l'ébauche (C) pour plier les pattes (F1, F2) et pour les rétracter ensuite à travers ladite ouverture pendant la course d'avancement de l'ébauche (C), ledit dispositif de pliage (12) comprenant une partie d'engagement de l'ébauche et des moyens (30) coopérant avec les moyens d'actionnement (32) pour faire pivoter la partie d'engagement de l'ébauche pendant ledit mouvement de pliage et ledit mouvement de retrait, caractérisé en ce que lesdits moyens coopérants (30) sont mobiles radialement par rapport à un axe du dispositif et que ladite partie d'engagement de l'ébauche comprend une paire de doigts pivotants divergents (14, 16) agencés pour pivoter lors d'un déplacement radial desdits moyens coopérants (30) par rapport audit axe.

2. Un dispositif selon la revendication 1, dans lequel lesdits moyens coopérants comprennent un suiveur de came (30) qui se déplace sur une piste de came sans fin (32) profilée de manière à provoquer un mouvement de pivotement desdits doigts (14, 16).

3. Un dispositif selon la revendication 2, dans lequel lesdits moyens de pliage (10) comprennent un ensemble de plaques tournantes (34, 36, 38) dans lequel sont incorporés ledit dispositif de pliage (12) et ladite piste de came sans fin (32).

4. Un dispositif selon la revendication 3, dans lequel ledit ensemble de plaques comprend, en série axiale, une plaque porte-came (34), une plaque intermédiaire (36) dans laquelle lesdits dispositifs de pliage (12) sont incorporés et une plaque supérieure (38), et dans lequel les plaques intermédiaire (36) et supérieure (38) sont montées à rotation par rapport à la plaque porte-came (34).

5. Un dispositif selon la revendication 4, dans lequel lesdites plaques (34, 36, 38) sont des disques.

6. Un dispositif selon la revendication 4, dans lequel ledit dispositif de pliage (12) comprend un corps (26) monté de façon à effectuer un déplacement radial dans ladite plaque intermédiaire (36) sur le corps de laquelle est monté ledit suiveur de came (30).

7. Un dispositif selon la revendication 5, dans lequel ledit corps (26) se termine dans une tête (24) comprenant une paire desdits doigts pivotants (14, 16) qui forment la partie d'engagement de l'ébauche dudit dispositif de pliage (12).

8. Un dispositif selon la revendication 6, dans lequel lesdits doigts pivotants (14, 16) sont contraints à pivoter sensiblement simultanément.

9. Un dispositif selon la revendication 7, dans lequel ledit corps (26) est monté glissant dans une piste radiale (28) ménagée dans le disque intermédiaire (36).

10. Un dispositif selon l'une quelconque des revendications 3 à 9, dans lequel ledit ensemble de plaques (34, 36, 38) comprend une pluralité de dispositifs de pliage (12) disposés par groupes simples ou modulaires de manière que l'un des dispositifs de pliage indépendant desdits groupes de dispositifs de pliage (12) soit prévu pour chaque caisse carton (B) successive à engager.

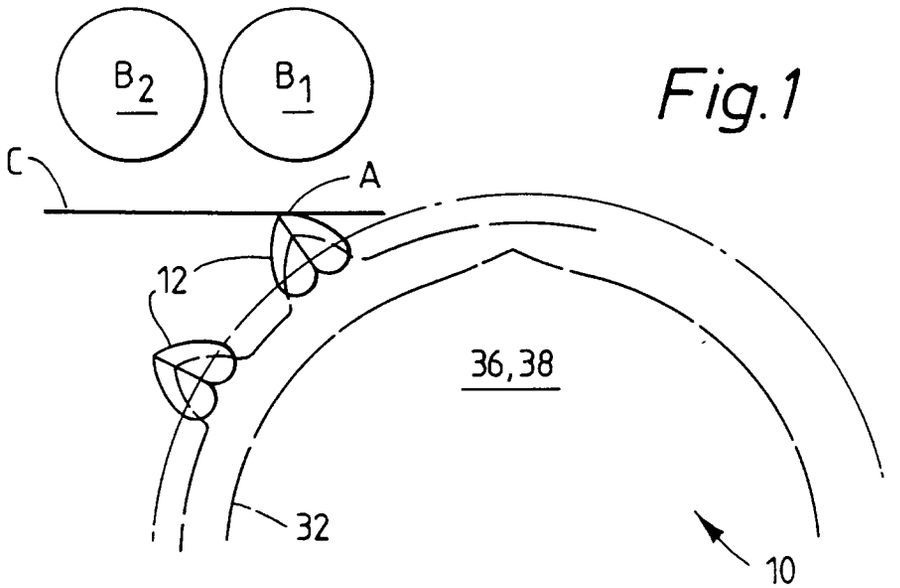


Fig. 1

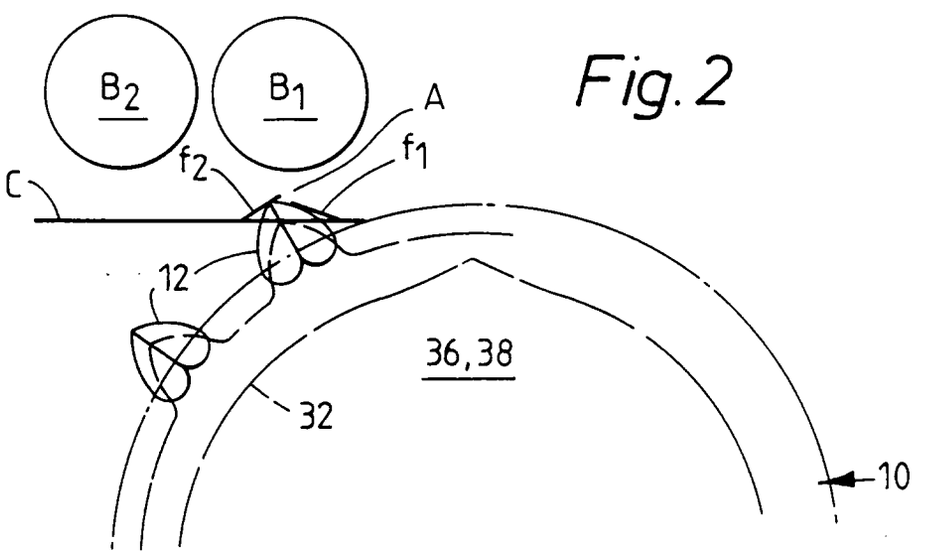


Fig. 2

Fig.3

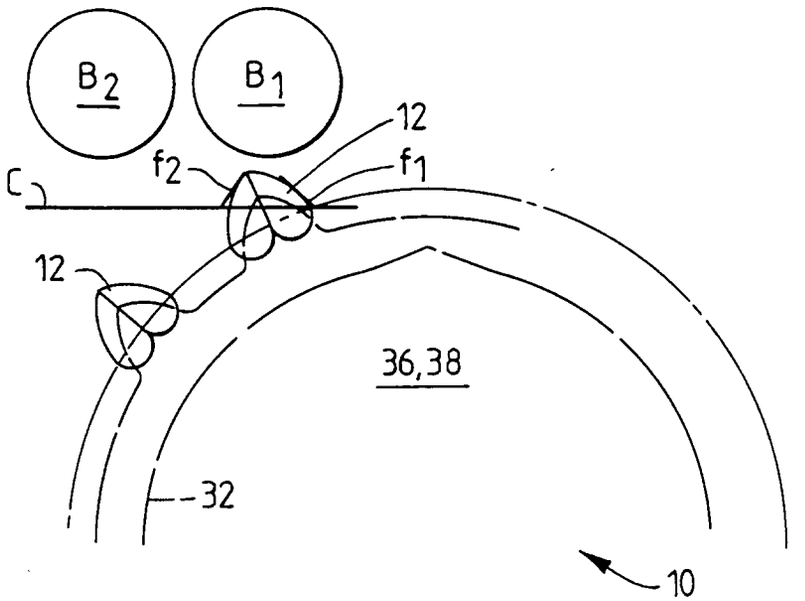


Fig.4

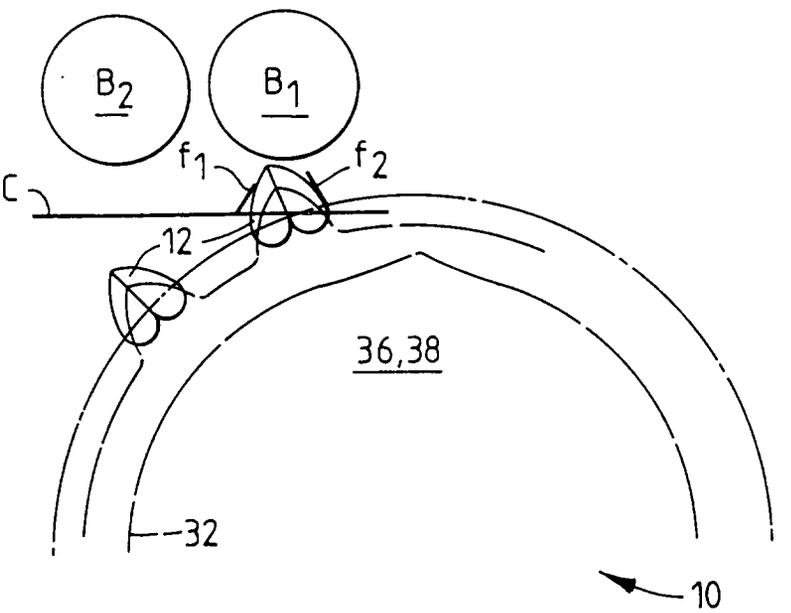


Fig.5

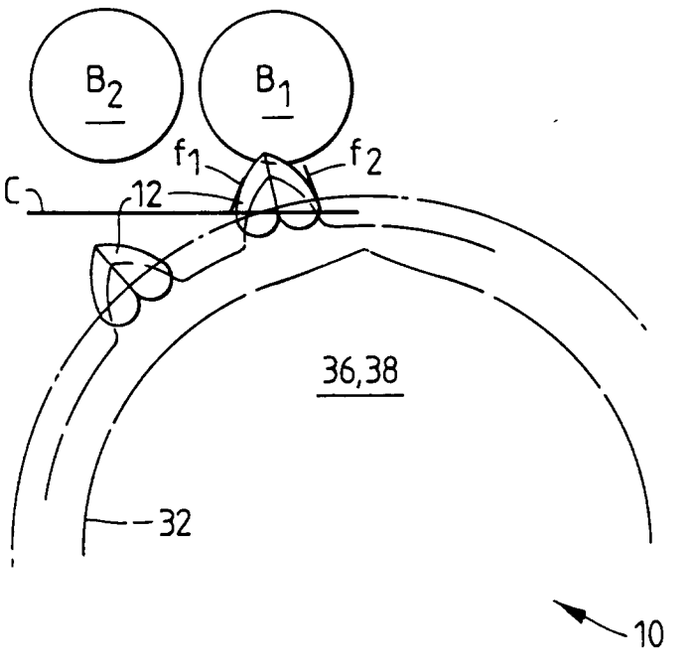


Fig.6

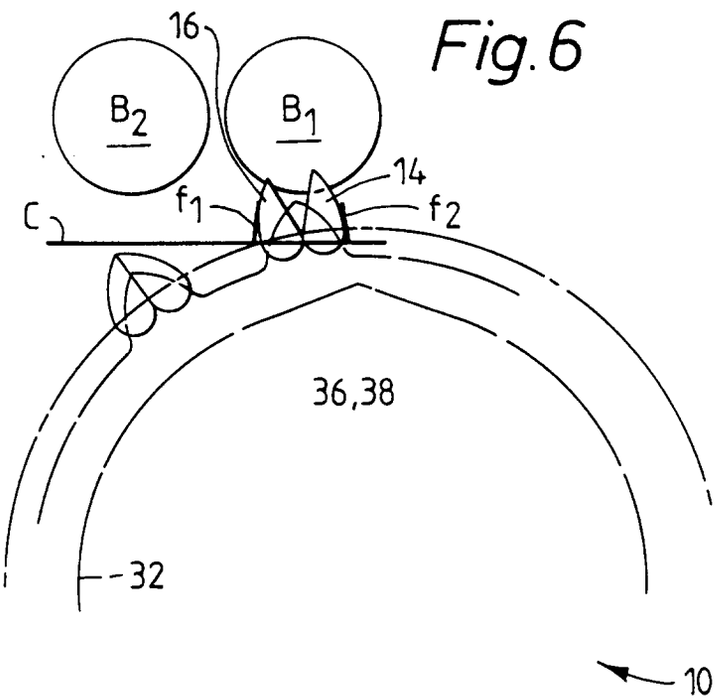


Fig.7

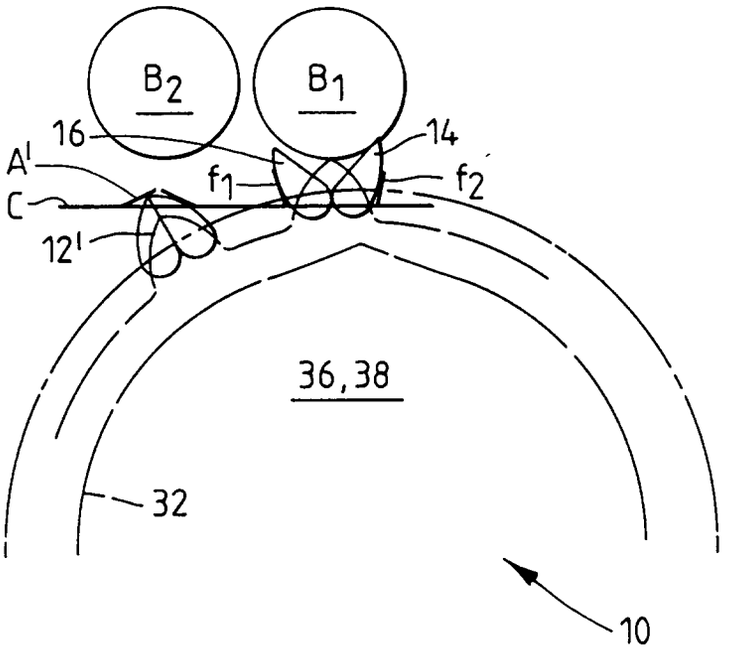

B2
B1
16
14
A'
C
f1
f2
12'
36,38
32
10

Fig.8

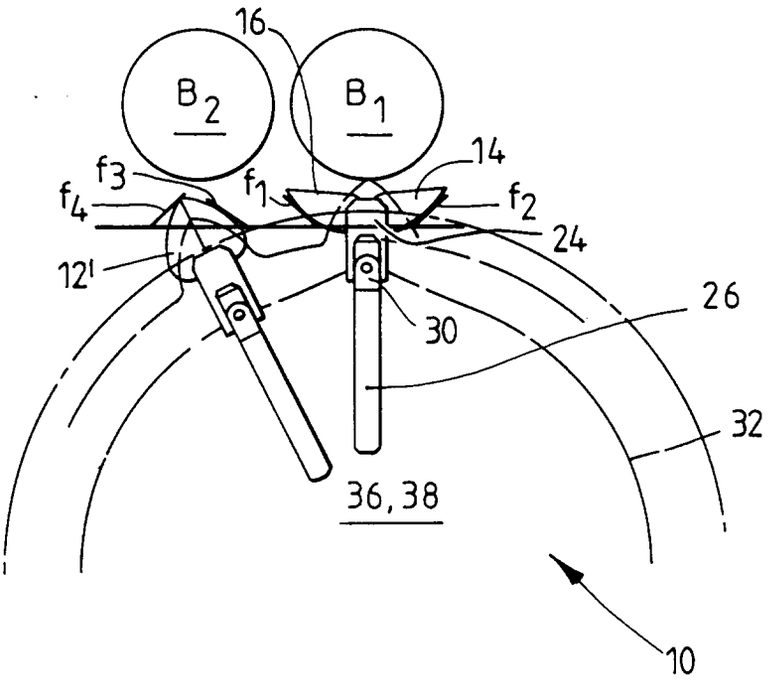

16
B2
B1
14
f3
f1
f4
f2
24
12'
26
30
32
36,38
10

Fig. 9

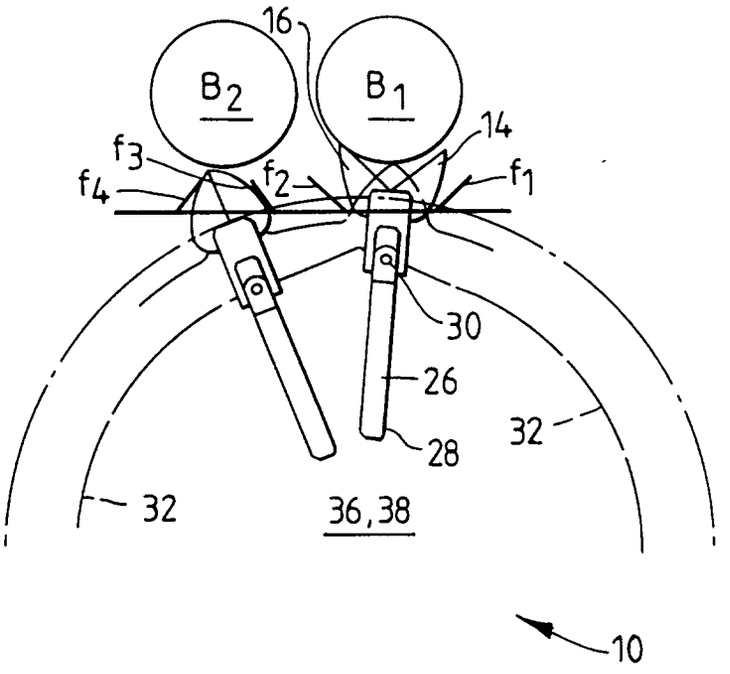
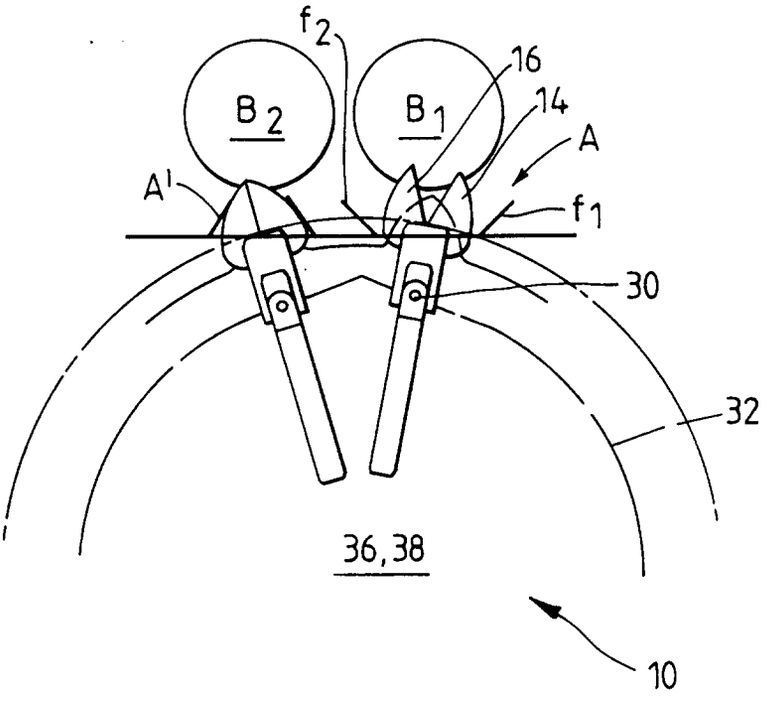

16
B2
B1
14
f3
f4
f2
f1
30
26
32
28
32
36,38
10

Fig. 10


f2
16
B2
B1
14
A
A'
f1
30
32
36,38
10

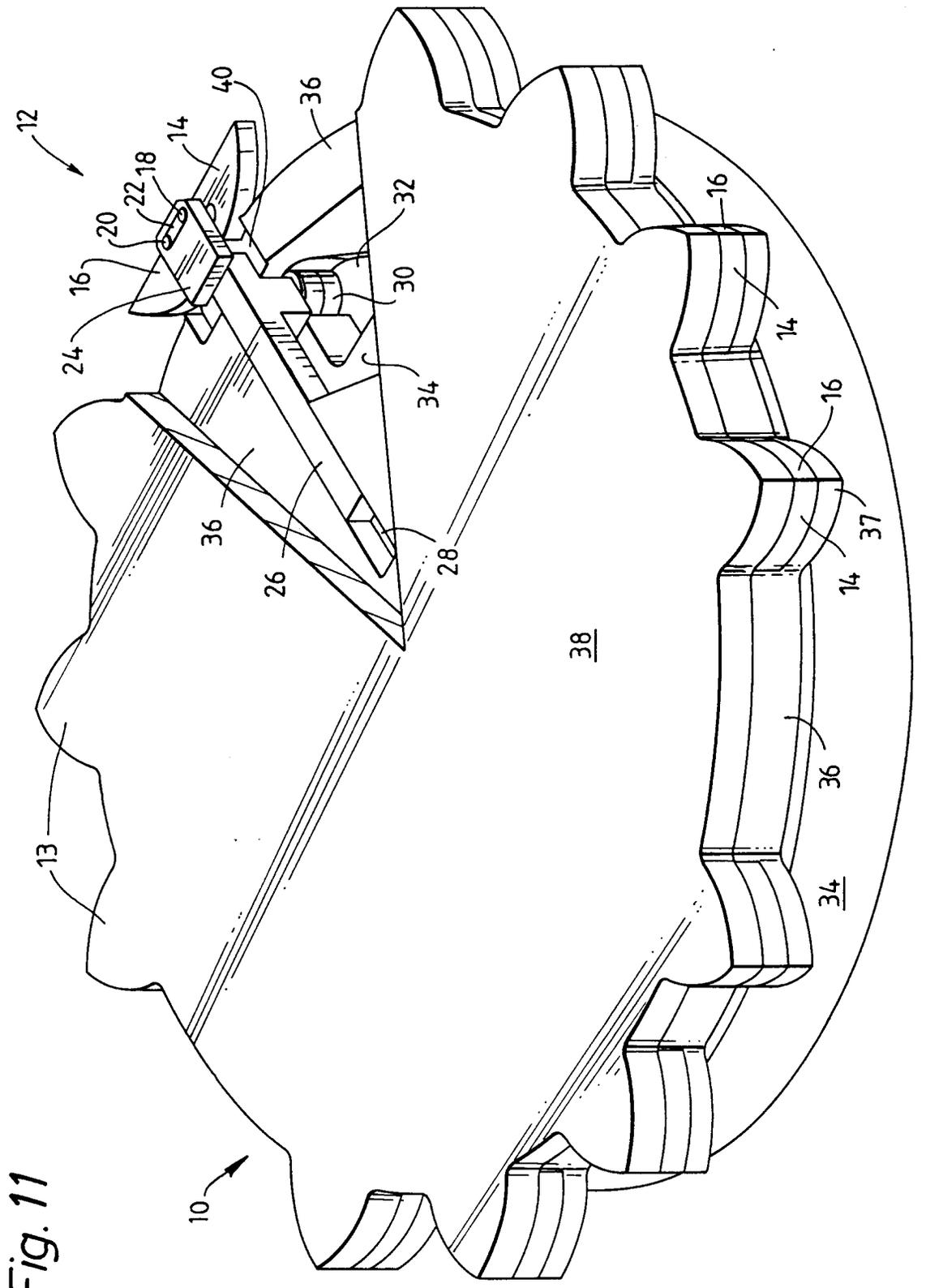

12
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Fig. 11

Fig.12

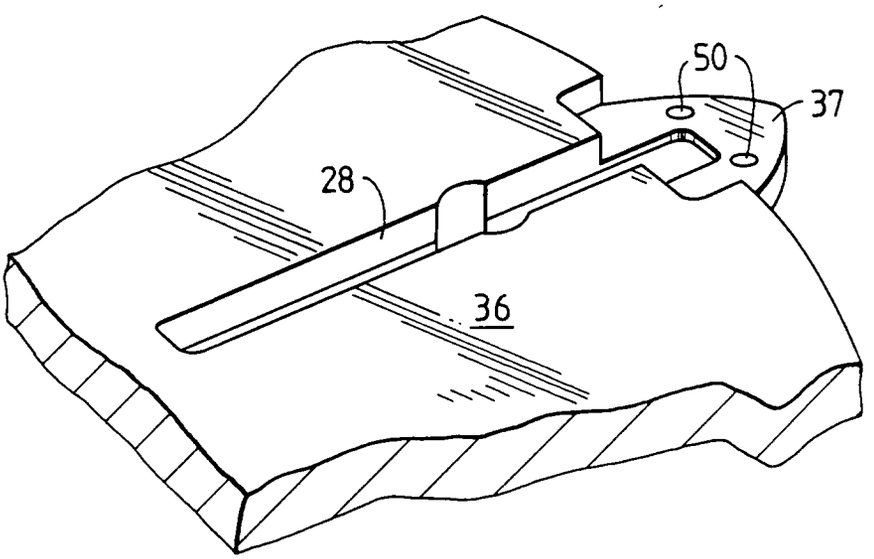


Fig.13

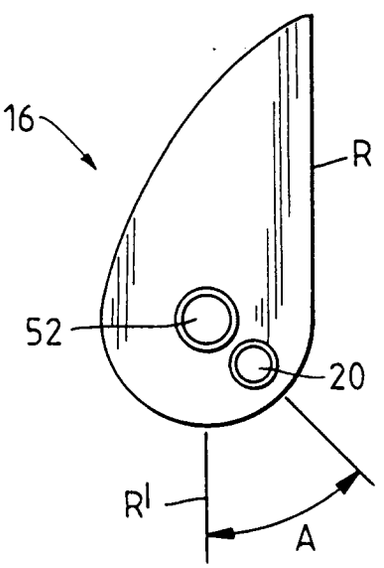


Fig.14

