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(54) Device and method for feeding and opening cartons

Vorrichtung und Verfahren zum Zuführen und Aufrichten von Faltschachteln

Appareil et procédé pour amener et dresser des cartons

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US-A- 4 982 551

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EP 0 558 347 B1

Description

This invention relates to a device and method for feeding flat cartons from a supply and opening the cartons for loading. During transfer from the supply each carton is opened from a flat stowed condition into a substantially opened position so that the carton can be presented for loading.

The invention is particularly useful in conjunction with end loaded type cartons suitable for processing over a packaging machine of the type disclosed in our European Patent (UK) 0 107 333 and in relation to apparatus disclosed in our pending UK patent application number 9108774.2.

The packaging machine disclosed in European patent number 0 017 333 is designed to form packages containing, 12, 18, 24 or more cans or bottles in a continuous high speed operation. To this end, open ended sleeve type cartons are advanced on a platform while a stream of cans or bottles moving along both sides of the platform is separated into successive groups. These groups are then loaded through the open ends of the carton as both cartons and groups are advanced through the machine. Thereafter, the ends of the cartons are closed and secured to complete the package.

US 4 982 551 to Nigrelli shows a packaging machine for loading cartons of the end loading type comprising means to transfer, erect and maintain the carton in an erected form. The machine performs these functions along a horizontal path and the method of erecting the carton is much slower than the present invention.

The handling of the carton, forming of the groups of cans and the loading of such groups into the carton is performed by one and the same machine element, namely metering bars of so called flight bars which are arranged to move in spaced relationship from the in-feed to the out-feed end of the machine. Thus, one of the functions of these metering bars is to move together with the cartons and to hold the cartons in a properly set up position for loading. It is important that when the open ended carton sleeves arrive at the loading point for the cans or bottles, the cartons are upright and have not shifted longitudinally (either forwards or backwards), in the feed direction. Thus the space between an adjacent pair of metering bars is chosen substantially to correspond to the width of a carton sleeve so that the carton can be accurately received and supported. As a result the cartons are maintained in the correct position and attitude for loading from the moment they are introduced between an adjacent pair of metering bars until the cartons are loaded from both ends.

GB 9108774.2 relates to a cam assembly and feeder mechanism which is used in a paperboard carton packaging machine in which the cam assembly and feeder mechanism is used to withdraw collapsed flat carton sleeves from a hopper, partially or fully erect the carton sleeve blank and move it to a point of loading with articles such as bottles or cans.

The present invention is more concerned with the feeding and opening of a carton which is suitable most particularly for packaging bottles in a packaging machine of the type referred to above. End loaded cartons for packaging bottles on such a machine as opposed to those suitable for packaging cans are shaped somewhat differently. In particular, the bottle cartons have their side walls (and end walls) tapered towards the top panel of the carton in order to take account of the general shape of the group of bottles within the carton. Hence, the side walls of the carton each include a fold line intermediate the top and bottom of the carton which defines the juncture at which a lower vertical part of that side wall becomes inwardly and upwardly sloping. The presence of these side wall fold lines make the set up carton more prone to collapse and creates additional difficulties in bringing the carton into a properly set up condition ready for loading. The present invention seeks to improve the feeding and opening of such cartons and also relates to the equipment which achieves that end.

Figure 1 shows schematically at 1a a carton being transferred by means of a rotary vacuum cup assembly from a hopper in which it is stored in collapsed condition to a packaging machine ready for loading. As can be seen, with reference to Figure 1a the leading edge 'e' of the carton (C) comprises the side wall fold line referred to above. The fold line extends along the leading face (side wall) of the carton which, when brought into engagement with a relatively stationary part of the machine while the carton is being moved forward, causes the carton panels to hinge relative to one another so that the top and bottom panels of the carton move apart and initiate the setting up process of the carton. In Figure 1b the same carton is illustrated but showing the effect caused when the speed of the transfer of the carton from the hopper to the machine is increased (in this instance to over 150 packs per minute). At high speeds the leading edge 'e' of the carton is pushed rearwardly so that the carton has a tendency to collapse in a direction towards its trailing edge, as shown in the Figure. Accordingly when the package is delivered to its position for loading, the leading edge of the carton is no longer effective in assisting the setting up operation as is the case in relation to the situation shown in Figure 1a.

The present invention seeks to overcome this difficulty to ensure that cartons can be properly set up ready for loading even at relatively high transfer speeds.

One aspect of the present invention provides in a packaging machine for loading a carton of the end loading type, means (10) for withdrawing a carton (C) in collapsed condition from a supply (H) and for transferring the carton from the supply to a position of loading within the machine, guide means (12) to act upon the carton during the transfer and to move the carton along a predetermined transfer path towards said position of loading, means (14, 16) to prevent any substantial movement of opposed carton panels away from one

another during said transfer and restraining means (18) to act upon the leading face of the carton to support against relative forward movement of the carton and restraining means to act upon a trailing face of the carton and means to manipulate the trailing face of the carton relative to the leading face thereof while the leading face is held restrained from forward movement by said restraining means and thereby to put the carton into a substantially set up condition.

According to a feature of this aspect of the invention, said manipulating means comprises rotary means to wipe across the trailing face of the carton to push it forwardly so that the leading face thereto conforms against the trailing face of said restraining means.

According to another feature of this aspect of the invention said restraining means may comprise successive metering bar means which facilitates and loading of said carton.

According to yet another feature of this aspect of the invention said rotary means may act on said carton between said successive metering bars.

According to a still further feature of this aspect of the invention, said means to prevent any substantial movement of opposed carton panels away from one another may comprise carton transfer means which act on one panel of the carton and means to direct of fluid jet against an opposite panel of the carton.

Another aspect of the invention provides a method of setting up a carton of the end loading type in a packaging machine comprising the steps of withdrawing a carton (C) in substantially collapsed condition from a supply (H), transferring the carton from the supply to a position of loading and, during transfer, restraining opposed upper and lower walls of the carton from any substantial movement away from one another, bringing a leading face (e) of the carton into abutment with a restraining means (16) provided by the packaging machine, causing the trailing face (t) of the carton to be moved forwardly relative to the restraining means so that the carton is put into a set up condition by allowing the said upper and lower faces of the carton to move away from one another and causing further restraining means (22) to be brought into position behind the trailing face of the carton so that the set up carton is maintained in its set up condition between the first and second restraining means.

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

Figure 2 shows schematically a carton being withdrawn from a hopper by a rotary vacuum cup assembly and transferred through a guide path between the hopper and the loading platform of a packaging machine;

Figure 3 illustrates schematically a carton being delivered into its position for loading in which the leading edge of the carton is brought into abutment with a flight bar of the packaging machine;

Figure 4 is a view similar to that shown in Figure 2 but in which the carton has moved further downstream of the machine compared to the Figure 3 location;

Figure 5 is another similar schematic view of the carton but shown with its trailing edge being manipulated by a rotary folder in order to bring the carton into its set-up condition; and

Figure 6 shows the carton held supported between two successive flight bars of the machine ready for loading.

Referring to Figures 2 to 6 of the drawings, Figure 2 shows a rotary vacuum cup assembly 10 which picks up and transfers successive cartons (C) from a supply (H). The vacuum cups of the assembly fasten onto the carton top panel and, during transfer, bring the top panel Ct into contact with a guide assembly (12) which has static guides 14 of substantially arcuate configuration adjacent the hopper so that the top panel of the carton is wiped along the surface of the arcuate static guides. An air blower 16 is disposed beneath the path of travel P of the carton and directs a jet of air Ar against the bottom panel Cb of the carton so that it is prevented from any substantial movement away from the top panel. The carton therefore remains in its substantially flat folded (collapsed) condition, in which it is folded along each of the side wall fold lines, thereby providing the leading edge 'e' and trailing edge 't' of the carton.

As the carton is drawn further away from the hopper and generally downwardly into a more horizontal path of movement, it is brought into the path of movement of an upstanding lug 18a of a flight bar 18 of a packaging machine until, at a point which substantially corresponds to the lowermost arc of travel of the vacuum cup assembly, the guide assembly flattens out into a substantially horizontal form. The leading edge 'e' of the carton is brought into abutment with the trailing face 20 of the flight bar lug 18a moving downstream relative to the guide assembly in the feed direction (arrow P) so that the leading edge of the carton is restrained by the flight bar lug as best seen in Figure 3 of the drawings. In practice, there are normally two similar lugs for each flight bar which are engaged at spaced locations by the leading edge of the carton.

Figure 4 shows the position of the carton 'c' further downstream of the machine after it has left contact with the guide assembly and an upper wall portion Pu of the leading side wall is in abutment with the rearwardly raked trailing face 20 of the flight bar lug. At this position the vacuum cup assembly 10 is still operative against the top wall of the carton and therefore gives support, movement and some stability to the carton and the vacuum cup arm moves in a substantially horizontal path generally in synchronism with the movement of the flight path. Before the next succeeding flight bar 21 is brought into position behind the trailing face of the carton, a rotary folder 24 activated by suitable drive means acts on the trailing edge 't' of the carton as shown in Figure 5

of the drawings. The action of the rotary folder "kicks in" the trailing end face of the carton to push it forwardly so that the leading face of the carton conforms against the trailing face of flight bar lug 18a. Flight bar lug 22 arrives in position at the trailing face of the carton substantially at the moment when the rotary folder has completed its rotary wiping action to "kick in" the trailing face of the carton. This "kicking in" action causes the carton to adopt a set-up condition because the leading face of the carton is restrained from forward movement by the trailing face of the flight bar lug 16.

Figure 6 shows the situation just described during which stage of the process the vacuum is released from the vacuum cup in contact with the top wall of the carton and the vacuum cup assembly, by continuing its rotation, is moved out of contact with the top wall of the carton. Generally simultaneously with this action the trailing flight bar lug 22 is moved into position in abutment with the trailing face of the carton so that the set up carton is both maintained in its set up condition and restrained from lateral or skewing movement between the two successive flight bars of the machine. Therefore the carton is positioned ready to be end loaded with product. As the trailing flight bar lug 22 is brought into abutment with the trailing face of the carton, the rotary folder is moved out of contact with the trailing face after having completed its wiping action. Of course, this is achieved by causing the driver means to rotate in synchronism with movement of the flight bars.

Claims

1. In a packaging machine for loading a carton of the end loading type, means (10) for withdrawing a carton (C) in a collapsed condition from a supply (H) and for transferring the carton from the supply to a position of loading within the machine, guide means (12) to act upon the carton during the transfer and to move the carton along a predetermined transfer path towards said position of loading, leading restraining means (18a) to act upon the leading face (e) of the carton (C) to support against relative forward movement of the carton (C) and by trailing restraining means (22) to act upon a trailing face (t) of the carton (C) so that the leading and trailing restraining means (18a, 22) support the carton (C) when in its set up condition characterised in that the collapsed carton (C) is withdrawn from said supply (H) by transfer means (10) which moves the carton (C) through an arcuate path and in that means (16) is provided to counteract centrifugal force and thereby prevent any substantial movement of opposed upper and lower carton panels (Ct, Cb) away from one another during the early stages of said transfer so that carton (C) set up is discouraged but thereafter allowing said opposed upper and lower walls (Ct, Cb) of the carton to move away from one another so that carton (C) set up is enabled and in that means (24) to displace the trailing face (t) of the carton (C) relative to the leading face (e) thereof while the leading face (e) is held restrained against said leading restraining means (18) thereby to cause the carton (C) to be put into a substantially set up condition.
2. A packaging machine according to claim 1 wherein said displacement means (24) comprises rotary cam (24) means to wipe across the trailing face (t) of the carton (C) to push it forwardly so that the leading face (t) thereof conforms against the trailing face (20) of said restraining means (18).
3. A packaging machine according to claim 2 wherein said restraining means (18a, 22) to act on said leading face (e) and said trailing face (t) of the carton (C) comprises successive metering bar (18, 21) means so shaped as to support said carton (C) in the required configuration in its set up condition.
4. A packaging machine according to claim 3 wherein said rotary means (24) acts on said carton (C) between said successive metering bars (18, 21).
5. A packaging machine according to any of the preceding claims wherein said means to prevent any substantial movement of opposed carton panels away from one another comprises a carton transfer means (10) which act on one panel (C+) of the carton (C) and means (16) to direct the fluid jet against an opposite panel (Cb) of the carton (C).
6. A packaging machine according to any of the preceding claims wherein said supply (H) is so positioned to facilitate, during transfer opposed upper and lower walls (Ct, Cb) of said carton (C) to move away from one another.
7. A method of setting up a carton of the end loading type in a packaging machine comprising the steps of withdrawing a carton (C) in substantially collapsed condition from a supply (H), transferring the carton (C) from the supply (H) to a position of loading, bringing a leading face (e) of the carton (C) into abutment with the restraining means (18a) provided by the packaging machine, causing the trailing face (t) of the carton (C) to be moved forwardly relative to the restraining means (18a) so that the carton (C) is put into a set up condition and characterised in that the collapsed carton (C) is withdrawn from said supply (H) by transfer means (10) which moves the carton (C) through an arcuate path and in that means (16) is provided to counteract the centrifugal force to which the carton (C) is subjected such that any substantial movement of opposed upper and lower carton panels (Ct, Cb) away from one another is restrained so that carton (C) set up is discouraged but thereafter allowing said opposed upper and lower walls (Ct, Cb) of the carton (C) to

move away from one another so that carton (C) set up is enabled, and causing further restraining means (22) to be brought into position behind the trailing face (t) of the carton (C) so that the set up carton (C) is maintained in its set up condition between the first and second restraining means (18a, 22).

Patentansprüche

1. Verpackungsmaschine zum Beschicken einer Schachtel des stirnseitig zu befüllenden Typs, die umfaßt: eine Einrichtung (10) zum Entnehmen einer sich in zusammengeklappten Zustand befindlichen Schachtel (C) aus einer Zuführeinrichtung (H) sowie zum Überfahren der Schachtel von der Zuführeinrichtung zu einer Beschickungsposition innerhalb der Maschine, eine Führungseinrichtung (12) zum Einwirken auf die Schachtel während des Überführens sowie zum Bewegen der Schachtel entlang eines vorbestimmten Überführungsweges hin zu der Beschickungsposition, eine vordere Rückhalteeinrichtung (18a) zum Einwirken auf die vordere Stirnseite (e) der Schachtel (C) sowie zum Abstützen der Schachtel (C) gegen eine entsprechende Vorwärtsbewegung, eine hintere Rückhalteeinrichtung (22) zum Einwirken auf eine hintere Stirnseite (t) der Schachtel (C), so daß die vordere und hintere Rückhalteeinrichtung (18a, 22) die Schachtel (C) stützt, wenn sie sich in ihrem aufgerichteten Zustand befindet, dadurch gekennzeichnet, daß die zusammengeklappte Schachtel (C) aus der Zuführeinrichtung mittels einer Überführungseinrichtung (10) entnommen wird, die die Schachtel (C) über eine bogenförmige Wegstrecke bewegt und dadurch, daß eine Einrichtung (16) vorgesehen ist, um der Zentrifugalkraft entgegenzuwirken und dadurch jegliche wesentliche Bewegung von gegenüberliegenden oberen und unteren Schachtelwandflächen (Ct, Cb) weg voneinander während des frühen Stadiums des Überführens zu verhindern, so daß die Schachtel (C) am Sich-Aufrichten gehindert ist, gleichwohl hieran anschließend es den gegenüberliegenden oberen und unteren Wänden (Ct, Cb) der Schachtel möglich ist, sich voneinander weg zu bewegen, so daß ein Sich-Aufrichten der Schachtel (C) ermöglicht wird, sowie gekennzeichnet durch eine Einrichtung (24) zum Versetzen der hinteren Stirnseite (t) der Schachtel (C) im Verhältnis zu deren vorderen Stirnseite (e) während die vordere Stirnseite (e) eingespannt gegen vordere Rückhalteeinrichtung (18a) gehalten wird, um dadurch die Schachtel (C) in eine im wesentlichen aufgerichtete Lage zu bringen.
2. Verpackungsmaschine nach Anspruch 1, in welcher die Einrichtung zum Versetzen (24) eine rotierende Nockeneinrichtung (24) umfaßt, um über die

hintere Stirnseite (t) der Schachtel (C) zu wischen und diese nach vorne zu stoßen, so daß deren vordere Stirnseite (t) sich gegenüber der hinteren Seite der Rückhalteeinrichtung (18) anpaßt.

3. Verpackungsmaschine nach Anspruch 2, in welcher die zum Einwirken auf die vordere Stirnseite (e) und hintere Stirnseite (t) der Schachtel (C) vorgesehene Rückhalteeinrichtung (18a, 22) aufeinanderfolgende Rollraket-(18, 21)-Mittel umfaßt, die derart gestaltet sind, um die Schachtel (C) in der erforderlichen Konfiguration, nämlich in ihrem aufgerichteten Zustand zu halten.
4. Verpackungsmaschine nach Anspruch 3, in welcher die rotierende Einrichtung (24) auf die Schachtel (C) zwischen den aufeinanderfolgenden Rollraketen (18, 21) einwirkt.
5. Verpackungsmaschine nach einem der vorhergehenden Ansprüche, in welcher die Mittel zu Vermeidung von jeglicher wesentlicher Bewegung der gegenüberliegenden Schachtelwandflächen weg voneinander eine Schachtel-Überführungseinrichtung (10) umfassen, die auf eine Schachtelwandfläche (Ct) der Schachtel (C) einwirkt sowie eine Einrichtung (16) zum Lenken des Flüssigkeitsstrahls gegen eine gegenüberliegende Wandfläche (Cb) der Schachtel (C).
6. Verpackungsmaschine nach einem der vorhergehenden Ansprüche, in welcher die Zuführeinrichtung (H) derart positioniert ist, um während der Überführung gegenüberliegenden oberen und unteren Wandflächen (Ct, Cb) der Schachtel (C) das Bewegen voneinander weg zu erleichtern.
7. Verfahren zum Aufrichten einer Schachtel des stirnseitig zu befüllenden Typs in einer Verpackungsmaschine, das die Schritte der Entnahme einer Schachtel (C) in im wesentlichen zusammengeklappten Zustand aus einer Zuführeinrichtung (H) umfaßt, die Überführung der Schachtel (C) von der Zuführeinrichtung (H) zu einer Beschickungsposition, das In-Anstoß-Bringen von einer vorderen Stirnfläche (e) der Schachtel (C) mit der durch die Verpackungsmaschine bereitgestellten Rückhalteeinrichtung (18a), das Herbeiführen einer im Verhältnis zu der Rückhalteeinrichtung (18a) nach vorne gerichteten Bewegung der hinteren Stirnseite (t) der Schachtel (C), so daß die Schachtel (C) in eine aufgerichtete Lage gebracht wird, dadurch gekennzeichnet, daß die zusammengeklappte Schachtel (C) mittels einer Überführungseinrichtung (10) aus der Zuführeinrichtung (H) entnommen wird, die die Schachtel (C) über eine bogenförmige Wegstrecke bewegt, und dadurch, daß eine Einrichtung (16) vorgesehen ist, um der Zentrifugalkraft, der die Schachtel ausgesetzt ist,

entgegenzuwirken, so daß jegliche wesentliche Bewegung von gegenüberliegenden oberen und unteren Schachtelwandflächen (Ct, Cb) weg voneinander verhindert wird, so daß die Schachtel (C) am Sich-Aufrichten gehindert ist, gleichwohl hieran anschließend es gegenüberliegenden oberen und unteren Wänden (Ct, Cb) der Schachtel (C) möglich ist, sich voneinander weg zu bewegen, so daß ein Sich-Aufrichten der Schachtel (C) ermöglicht wird, sowie dem Bewirken, daß eine weitere Rückhalteeinrichtung (22) eine Position hinter der hinteren Stirnseite (t) der Schachtel (C) einnimmt, so daß die aufgerichtete Schachtel (C) in ihrer aufgerichteten Lage zwischen der ersten und zweiten Rückhalteeinrichtung (18a, 22) gehalten wird.

Revendications

1. Dans une machine à emballer pour le remplissage d'un carton du type à remplissage par les extrémités des moyens (10) pour prélever un carton (C) dans un état aplati d'une station d'alimentation (H) et pour transférer le carton de la station d'alimentation jusqu'à une position de remplissage à l'intérieur de la machine, des moyens de guidage (12) pour agir sur le carton pendant le transfert et pour déplacer le carton le long d'un trajet de transfert prédéterminé vers ladite position de remplissage, des moyens de retenue avant (18a) pour agir sur la face avant (e) du carton (C) afin de la soutenir contre un déplacement relatif vers l'avant du carton (C) et des moyens de retenue arrière (22) pour agir sur une face arrière (t) du carton (C), de manière que les moyens de retenue avant et arrière (18a, 22) supportent le carton (C) lorsque celui-ci est dans son état monté, caractérisé en ce que le carton aplati (C) est prélevé de ladite station d'alimentation (H) par des moyens de transfert (10) qui déplacent le carton (C) suivant un trajet incurvé et en ce que des moyens (16) sont prévus pour s'opposer à la force centrifuge et empêcher ainsi tout déplacement important de panneaux supérieur et inférieur opposés (Ct, Cb) du carton dans un sens les éloignant l'un de l'autre au cours des premières étapes dudit transfert, de manière que le montage carton (C) soit entravé mais en permettant ensuite auxdites parois supérieure et inférieure opposées (Ct, Cb) du carton de s'éloigner l'une de l'autre afin que le montage du carton (C) puisse se faire et en ce que des moyens (24) sont prévus pour déplacer la face arrière (t) du carton (C) par rapport à sa face avant (e), pendant que la face avant (e) reste maintenue contre lesdits moyens de retenue avant (18), afin de forcer ainsi le carton (C) à se mettre dans un état sensiblement monté.
2. Une machine à emballer selon la revendication 1, dans laquelle lesdits moyens de déplacement (24) comprennent des moyens formant came rotative

(24) destinés à exercer un balayage transversal sur la face arrière (t) du carton (C), pour le pousser vers l'avant afin que sa face avant (e) s'applique, en épousant la forme, contre la face arrière (20) desdits moyens de retenue (18).

3. Une machine à emballer selon la revendication 2, dans laquelle lesdits moyens de retenue (18a, 22), pour agir sur ladite face avant (e) et ladite face arrière (t) du carton (C), comprennent des moyens en forme de barres de gabarit successives (18, 21) profilés de manière à supporter ledit carton (C) dans la configuration requise dans son état monté.
4. Une machine à emballer selon la revendication 3, dans laquelle lesdits moyens rotatifs (24) agissent sur ledit carton (C) entre lesdites barres de gabarit successives (18, 21).
5. Une machine à emballer selon l'une quelconque des précédentes revendications, dans laquelle lesdits moyens empêchant tout déplacement important de panneaux opposés du carton dans un sens les éloignant l'un de l'autre comprennent des moyens de transfert de carton (10) qui agissent sur un panneau (C+) du carton (C) et des moyens (16) pour diriger le jet de fluide contre un panneau opposé (Cb) du carton (C).
6. Une machine à emballer selon l'une quelconque des précédentes revendications, dans laquelle ladite station d'alimentation (H) est positionnée de manière à faciliter, pendant le transfert, un déplacement de parois supérieure et inférieure opposées (Ct, Cb) dudit carton (C) dans un sens les éloignant l'une de l'autre.
7. Un procédé de montage d'un carton du type à chargement par les extrémités dans une machine à emballer, comprenant les étapes de prélèvement d'un carton (C) dans l'état sensiblement aplati d'une station d'alimentation (H), de transfert du carton (C) de la station d'alimentation (H) jusqu'à une position de remplissage, d'amenée d'une face avant (e) du carton (C) en appui contre les moyens de retenue (18a) offerts par la machine à emballer, de déplacement de la face arrière (t) du carton (C) vers l'avant par rapport aux moyens de retenue (18a), de manière que le carton (C) soit mis dans un état monté, et caractérisé en ce que le carton aplati (C) est prélevé de ladite station d'alimentation (H) par des moyens de transfert (10) qui déplacent le carton (C) suivant un trajet en courbe, et en ce que des moyens (16) sont prévus pour s'opposer à la force centrifuge à laquelle le carton (C) est soumis, de manière que tout déplacement important de panneaux supérieur et inférieur opposés (Ct, Cb) du carton dans un sens les éloignant l'un de l'autre soit empêché afin que le montage du carton (C) soit

entravé, mais en permettant ensuite auxdites parois supérieure et inférieure opposées (Ct, Cb) du carton (C) de s'éloigner l'une de l'autre de manière à autoriser le montage du carton (C), et en amenant d'autres moyens de retenue (22) à venir 5 se placer derrière la face arrière (t) du carton (C) afin que le carton monté (C) soit maintenu dans son état monté, entre les premiers et seconds moyens de retenue (18a, 22).

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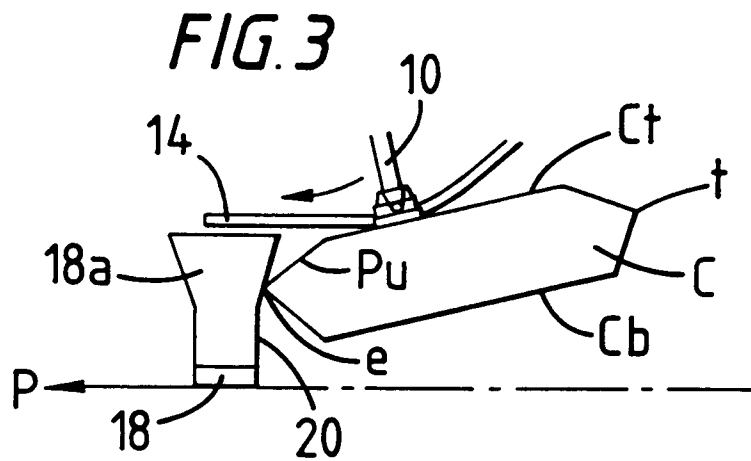
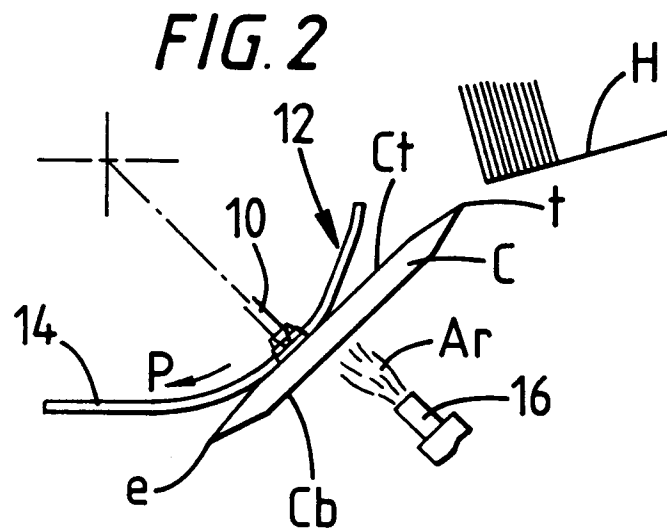
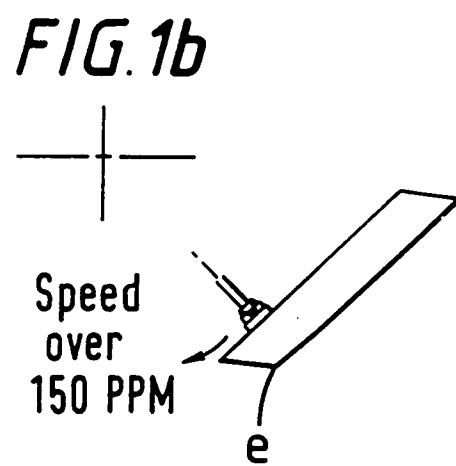
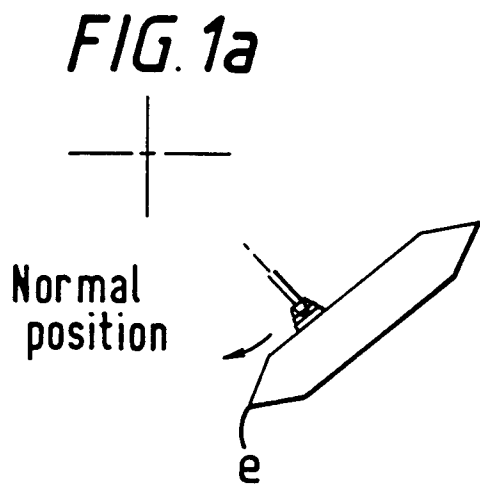


FIG. 4

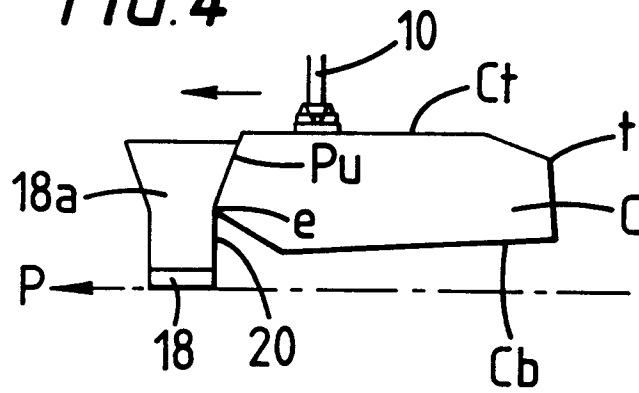


FIG. 5

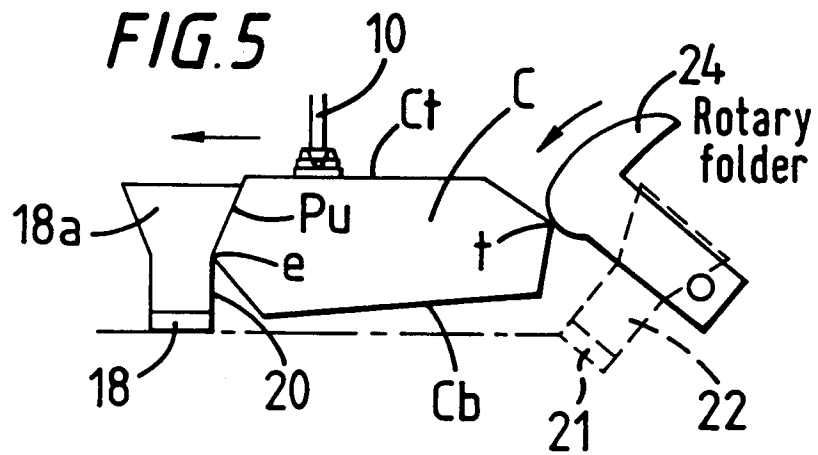


FIG. 6

