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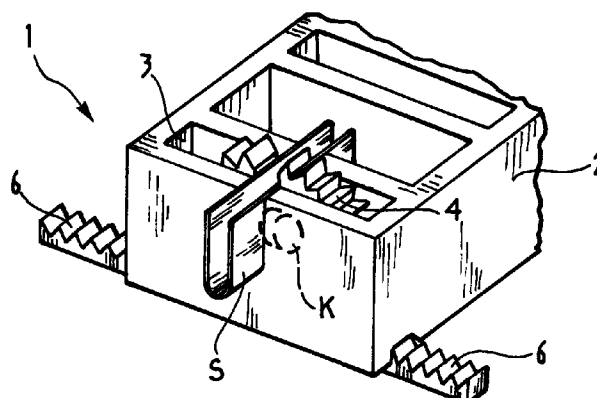
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(54) **A method for forming twist wrappers and the respective equipment**

(57) The wrapper is formed from a channel-shaped semi-finished wrapper including a body portion in which the pre-made product (K) is received and at least one end portion destined to be formed into a twist as a result of a twisting movement. The twisting movement is imparted while the or each end portion of the semi-finished wrapper is kept stationary and the body of the semi-finished wrapper itself is rotated.

FIG. 5



EP 0 802 116 A1

Description

The present invention relates to a method for forming twist wrappers and equipment for carrying out the method.

Wrappers definable as twist wrappers are usually used in the food industry, and particularly in the confectionery sector, for packaging products such as boiled sweets, comfits, pastilles, etc. Essentially, in the solutions in current use, a semi-finished wrapper is first formed comprising a hollow or tubular-shaped wrapper sheet (possibly in several layers) in which the product is inserted. After the insertion of the product, the semi-finished wrapper is twisted adjacent the or each open end which results in the formation of the respective twisted projecting end portion.

The prior art is very extensive as evidenced, for example, by the documents FR-A-1529212, GB-A-105541, GB-A-1365840, US-A-2243633, US-A-2744370, US-A-3131522, US-A-3899865, US-A-4352265, US-A-4768639, US-A-4866922, US-A-4918901 and US-A-5016421.

With a certain degree of simplification but keeping essentially to the facts, one can say that, in prior-art solutions, each twisted end is formed with the "body" of the semi-finished wrapper (that is, the part in which the product is located) held stationary while the end portion or portions projecting therefrom are acted upon by a twisting member, typically a rotary gripper. In essence, all these known solutions duplicate, by means of a machine, the action of an operator who forms the twist manually.

The use of this type of solution on an industrial scale runs into an obstacle when it is desired to operate at very high rates on huge quantities of the product because of the intrinsic complexity of the apparatus which in fact prevents certain speeds and production levels from being achieved.

The object of the present invention is to provide a solution which overcomes the intrinsic difficulties linked with the use of prior-art solutions, particularly in relation to the following factors:

- complexity of the members which form the twists,
- formation of the semi-finished wrapper, and
- insertion of the product in the semi-finished wrapper and retention thereof during the formation of the twist or twists.

According to the present invention, this object is achieved by a method having the characteristics called for in the claims which follow.

A further subject of the invention is equipment for carrying out this method.

The invention will now be described, purely by way of non-limitative example, with reference to the appended drawings comprising Figures 1 to 10 which illustrate schematically a typical sequence by which the method of the invention is carried out.

By way of introduction it should be noted that the representations provided in the appended drawings are deliberately simplified and aim primarily to show the essential characteristics of the method of the invention.

More particularly, the description which follows relates specifically to an element or module of equipment for forming a twist wrapper (in this specific case a double-twist wrapper) around one product at a time. Since the module may be reproduced on a large scale, for example in the form of a matrix structure (each including m rows of n modules of the type illustrated in the appended drawings), it is possible to form equipment which is able to act simultaneously on m by n products, where $m \times n$ is a very large number (even of the order of hundreds). It is thus possible to form equipment which is able to achieve productivity levels of the order of thousands (in some cases tens of thousands) of wrapped products every minute.

It should also be pointed out that the structure of the equipment shown in the appended drawings is deliberately simplified by the omission of several parts having structures and functions which are well known in this branch of the art and which are not, in any case, essential for an understanding of the invention. Again it must be pointed out that the example illustrated is, indeed, just that, since the same method can be carried out by equipment very different from that illustrated by way of example.

In the appended drawings reference 1 generally indicates equipment usable to package products (typically sweet products such as boiled sweets and pastilles) in a twist wrapper. One is dealing specifically with a double-twist wrapper of the type generally indicated P in Figure 10.

In a known solution, the wrapper in question is made from sheet material (of paper, laminated plastics, aluminium etc), possibly with several layers. The wrapper in question is first wrapped around the pre-made product (here shown in the form of a disc-shaped pastille K) so as to form a channel-shaped, semi-finished wrapper and then it is twisted adjacent its ends to form two twisted, projecting end portions indicated F.

The core of the equipment 1 is constituted by a support 2, for example of metal, having an opening or cavity 3 in which a gear wheel 4 is mounted for rotation (in this embodiment about a horizontal axis), the gear having a radial slit or notch 5. The notch 5 may be seen as corresponding to a sort of slot created in the body of the gear 4 so as to create a recess which extends from a central portion of the gear 4 to open into its periphery which is toothed (partially or completely). In the embodiment illustrated, the notch in question is generally straight which, although preferred, should not be understood as imperative.

The same is also true with regard to the peripheral teeth of the gear 4 which cooperate, according to criteria which will be more fully explained below, with a rack or toothing 6 illustrated here as generally beneath the support 2, the support 2 being able to move relative to

the rack 6. As will be more fully explained below, the meshing of the gear 4 with the rack 6 is intended to make the translational movement of the support 2 along the rack 6 cause the gear 4 itself to rotate about its central axis. Although the illustration shows the solution which is currently preferred in terms of reliability and simplicity, the same practical result (rotation of the gear 4) could be achieved in a different manner, for example by a drive associated with the gear 4. Needless to say, in this case, the gear need not necessarily be toothed and, in general, the gear could be replaced by any body capable of achieving the rotation of the notch 5, it thus not being essential to make use of a gear as such.

Consequently, even though the description below will make reference to the gear 4 and, in particular, a gear 4 which cooperates with a rack 6, it is understood that this choice is in no way binding.

Reference 7 indicates (see in particular Figure 2) a sort of die intended to be superposed on the support 2 so as to locate a slot 8 for use in the formation of the semi-finished wrapper and in the insertion of the product K in the semi-finished wrapper over the cavity 3 in which the gear 4 is located.

From an observation of Figure 1, it will further be noted that the support 2 also has a further notch 9 in a position generally aligned with the slot 8 when the die 7 is applied to the support 2, this further notch being coextensive with the notch 5 in the gear 4 in the position of formation of the semi-finished wrapper and introduction of the product (in practice in the position illustrated in Figure 1). A similar notch, indicated 10 and only partly visible in Figure 1, is provided in the other wall of the support 2 which defines the cavity 3 and is also aligned with the notch 5 and the notch 9.

Figure 3 illustrates an assembly for supplying sheet material G, for forming the twist wrapper which it is desired to make, located above the die 7 and, specifically, above the slot 8 (shown in broken outline in Figure 3).

In the embodiment illustrated, the assembly in question includes winding and unwinding reels (not illustrated, the structure being widely known in general) which carry the strip of sheet material G so that it passes over two drive rollers or rods 11. In use, the rods or rollers 11 are brought close to the upper, flat face of the die 7 in correspondence with the slot 8. Thus a given quantity of sheet material, possibly perforated to define a piece T intended to form the wrapper for a respective product, faces the top of the slot 8.

Reference 12 indicates a punch assembly comprising:

- a guide element 13 intended to be lowered (by drive means known per se and not illustrated) over the piece of sheet material G located over the slot 8, and
- a punch 14 proper which can enter the slot 8 through a respective slot 15 formed in the guide element 13. The whole is as illustrated in greater

detail in Figure 4.

From an observation of Figures 3 and 4, it will also be noted that the punch 14 is in turn traversed vertically (in the embodiment illustrated) by a further slot 16 constituting a channel or duct for the insertion of the product K to be packaged in the semi-finished wrapper formed in the support 2 and, more precisely, in the combination of notches 5, 9 and 10 illustrated in Figure 1.

In particular, Figure 5 shows the result achieved by the lowering of the assembly 12 within the complex constituted by the support 2 and the die 7.

More particularly, when the element 13 is lowered over the sheet material G facing the slot 8, the slot 15 is located exactly in line beneath the slot 8. The two slots in question usually have approximately corresponding dimensions, the slot 15 preferably being slightly larger and/or having a slight flair so as to provide a "lead-in" to the punch 14 when it is lowered.

As it is lowered through the slots 15 and 8, the punch 14 enters the notches 5, 9 and 10, carrying with it the piece T of sheet material taken from the strip G. All this results in the formation of a semi-finished wrapper S of generally channel shape as shown schematically in Figure 5.

The product K subsequently introduced (by known means) into the duct 16 falls vertically within the punch 14 so as to be deposited in the bottom loop of the semi-finished wrapper S in the notch 5 in the gear 4.

At this point, the sheet-supply assembly (comprising the elements 11 and the strip G of sheet material from which the portion T forming the semi-finished wrapper S has been removed), as well as the inserter assembly (comprising the elements 13 and 16) are moved away from the support 2.

Clearly this movement may be of relative type. In the currently preferred solution, the two assemblies in question are usually made in the form of vertically-movable assemblies which are able to descend to engage the support 2 and the die 7. Naturally, in a wholly equivalent solution, the complex formed by the support 2 and the die 7 (and rack 6 which - for reasons which will become clear below - must be held in a fixed position relative to the elements 2 and 7 initially) may be movable so as to allow its disengagement from the assemblies indicated above.

In each case, the desired result is as follows: the support 2 containing (within the cavity 3) the gear 4 with the notch 5 within which is the semi-finished wrapper S and the product K is accessible from the open side of the semi-finished wrapper once the die 7 has been removed from the support 2.

As will readily be understood, in the embodiment illustrated, the die 7 itself serves both as a guide element for the sheet-supply assembly and the inserter assembly and as a stabilising element for cooperating with the support 2 during the formation of the semi-finished wrapper S.

Once the condition shown schematically in Figure 5

has been reached, a new supply assembly, generally indicated 17, is brought close to the support 2 so that it can cooperate with the semi-finished wrapper S. Specifically the assembly 17 is intended to cooperate with the end portions of the semi-finished wrapper S which project laterally (at both ends in the example illustrated which shows the formation of a double-twist wrapper) from the body of the semi-finished wrapper S containing the product K and, hence, from the outer faces of the walls of the support 2 defining the cavity 3.

The assembly 17 is composed essentially of a pair of retaining or gripping elements 18 shown here in the form of jaws. Once the assembly 17 has been lowered so as to bring the jaws 18 to the height of the projecting ends of the semi-finished wrapper S, the jaws themselves, here shown with the clamping zone oriented vertically, may be closed so as to grip the ends of the semi-finished wrapper S between them, these ends also extending vertically.

The gripper elements here shown in the form of the jaws 18 are intended to hold the ends of the semi-finished wrapper S during the formation of the wrapper twists.

From this it results that the gripping action must at the same time be firm and not too vigorous: on the one hand it must prevent the ends of the semi-finished wrapper S escaping the gripping action but it is also true that this same gripping action must not oppose the formation of the twists by the twisting of the semi-finished wrapper S about its longitudinal axis. In other words, the jaws 18 must be able to allow the sheet material constituting the end portions of the semi-finished wrapper S to slide between them to a certain extent during the formation of the twisted ends. The degree and intensity of the gripping action must thus be determined selectively and in dependence on specific applicational requirements, taking into account firstly parameters such as the dimensions of the wrapper (and hence of the twisted ends) and the characteristics of the sheet material constituting the wrapper itself (thickness, degree of deformability, maximum breaking stress, slip, etc).

Once the position illustrated in Figure 7 has been reached, with the jaws 18 gripping the ends of the semi-finished wrapper S between them, the complex constituted by the support 2 and the assembly 17 is moved translationally relative to the rack 6.

Usually this result is obtained with the support 2 and the assembly 17 held stationary, in a fixed relative position, and the rack 6 being slid longitudinally. It is, however, also possible to do this in the complementary manner, the rack 6 being kept stationary while the support 2 and associated assembly 17 are moved, or, again, with both the rack 6 and the support 2 and the assembly 17 being moved.

Whatever solution is adopted, the result is the movement of the rack 6 relative to the support 2 and the consequent rotation of the gear 4 (the outer teeth of which mesh with the rack 6) about its axis within the its housing cavity 3 in the support 2. The rotation imparted

to the gear 4 results in a corresponding rotation of the notch 5 in which the central portion, or body, of the semi-finished wrapper S containing the product K is located while the ends of the semi-finished wrapper S are held stationary by the jaws 18 of the assembly 17 so as not to be able to rotate. The overall result is that the body of the semi-finished wrapper S rotates relative to the ends and consequently the two twisted end portions, or twists F shown in Figure 10 are formed.

The solution according to the invention is thus aimed in a different direction from the prior art solutions in which the twisting of the semi-finished wrapper S required to form the twist or twists F is achieved by the rotation of the end or ends of the semi-finished wrapper relative to the body of the semi-finished wrapper. On the contrary, in the solution of the invention, the or each end is held stationary (in the embodiment illustrated, by the jaws 18) while the body is rotated (in the example illustrated by the gear 4).

The invention thus enables the equipment used for the formation of the twists to be simplified considerably in that the gripper elements 18 need not rotate which considerably simplifies the structure. On the contrary, it is the part which houses the body of the semi-finished wrapper that is rotated, this, in the example illustrated, being the same part in which the semi-finished wrapper has previously been formed and in which the product K has been inserted (preferably, as in the example illustrated, by being dropped) into the semi-finished wrapper itself.

These aspects also constitute a further simplification over the previously known solutions with regard to the formation of the semi-finished wrapper, the retention of the product within the semi-finished wrapper and the retention of the semi-finished wrapper, with the product within it, during the formation of the twist.

Above all, the solution of the invention enables the structure of the semi-finished wrapper to be simplified, with the use of a simple channel shape (see in particular Figures 5 and 6) without the need to close the semi-finished wrapper itself into a tube around the product K: this latter operation, in various prior art solutions, involves the use of further shaping and/or temporary retaining elements for shaping the semi-finished wrapper tube and/or holding the semi-finished wrapper closed during the formation of the twists.

Starting from the position illustrated in Figure 8, the assembly 17 is raised so as to remove it from the support 2 (again in this case, the same result could be achieved by the lowering of the support 2 and associated members relative to the assembly 17) with the jaws 18 kept closed so as to retain the wrapper P, now completely formed with the twists F, between them and to remove it from the notch 5 and hence from the support 2. At this point, the assembly 17 may be used for example to transfer the completed wrapper P to a further work-station (for example a machine for inserting it in a box or bag) where the completed wrappers are freed by the opening of the jaws 18 so as to release the twisted

ends F.

Naturally the pick-up action shown in Figure 9 is here made possible by the fact that the notch 5 is again aligned (vertically in the embodiment illustrated) with the notches 9 and 10. Naturally this does not exclude the possibility of the completed wrapper being withdrawn to some extent even in the absence of such alignment.

In any case, the situation illustrated is not a limitation in that, in most cases, it corresponds to the need to rotate the gear 4 through 360° by means of the relative movement of the rack 6 and the support 2. Even if the material of the wrapper has a certain resilience so that it tends to return to its undeformed condition after the formation of the twists, this angle of rotation suffices, without any other means, to create twists which remain firmly closed.

Claims

1. A method for forming twist wrappers, including the steps of:

- forming a semi-finished wrapper (S) of sheet material (G) including a body portion which houses the pre-made product (K) in the wrapper and at least one end portion which projects from the body portion, and
- producing relative twisting of the at least one end portion and the body portion so as to form at least one twist, characterised in that the twisting is effected with the at least one end portion held stationary and the body portion being rotated.

2. A method according to Claim 1, characterised in that the body portion is rotated through an angle of substantially 360°.

3. A method according to Claim 1 or Claim 2, characterised in that it includes the steps of:

- providing a body (4) having a notch-like recess (5) for the formation of the semi-finished wrapper (S),
- introducing the sheet material (G) into the notch-like recess (5) so as to form the semi-finished wrapper (S) with a generally channel shape and at least one end portion projecting from the notch-like recess (5),
- gripping (18) the at least one end portion of the semi-finished wrapper (S), and
- imparting a generally rotational movement to the body (4) and hence to the notch-like recess (5) while holding the at least one gripped end portion of the semi-finished wrapper (S) substantially stationary.

4. Equipment for forming twist wrappers, character-

ised in that it comprises:

- a rotary body (4) which can rotate about an axis and has a notch-like recess (5) extending radially relative to the axis,
- supply means (11) for supplying sheet material (G) for forming the wrapper,
- inserter means (12 to 16) for inserting the sheet material (G) into the notch-like recess (5) so as to form a semi-finished wrapper (S) having a generally channel shape with a body portion housed in the notch-like recess (5) and at least one end portion projecting from the notch-like recess (5),
- supply means (16) for inserting a product (K) to be wrapped in the body portion of the semi-finished wrapper (S),
- retaining means (18) for engaging the at least one end portion of the semi-finished wrapper (S) so as to retain it against rotational movement, and
- drive means (6) for selectively rotating the rotary body (4), and hence the notch (5), about the axis, with the consequent rotation of the body portion of the semi-finished wrapper (S) relative to the at least one end portion engaged by the retaining means (18) and the formation of a twist in the at least one end portion.

5. Equipment according to Claim 4, characterised in that the rotary body is constituted by a gear wheel (4) and the drive means comprise gear teeth (6) meshed with the teeth of the gear wheel.

6. Equipment according to Claim 5, characterised in that the notch-like recess is constituted by a radial notch (5) formed in the gear wheel (4).

7. Equipment according to any one of Claims 4 to 6, characterised in that it includes a support (2) having a cavity (3) in which the rotary body (4) is rotatable.

8. Equipment according to Claim 7, characterised in that the support (2) has respective notches (9, 10) aligned with each other and with which the notch-like recess (5) in the rotary body can be aligned in use to receive the sheet material (G) from the inserter means (12 to 16).

9. Equipment according to any one of Claims 4 to 8, characterised in that it includes a die element (7) including a slot (8) with which the notch-like recess (5) can be aligned selectively and in that the inserter means (12 to 16) insert the sheet material (G) in the notch-like recess (5) through the slot (8).

10. Equipment according to any one of Claims 4 to 9, characterised in that the inserter means comprise a punch element (14) which can enter the notch-like

recess (5) so as to thrust the sheet material (G) into the notch (5).

11. Equipment according to Claim 10, characterised in that the punch element (14) has a longitudinal hole (16) defining a duct for the introduction of the product (K) into the body portion of the semi-finished wrapper (S). 5
12. Equipment according to Claim 10 or Claim 11, characterised in that the punch element (14) carries an associated guide element (13) with a respective slot (15) forming an insertion- and guide-aperture for the punch element (14). 10 15
13. Equipment according to any one of Claims 4 to 12, characterised in that the retaining means comprise at least one gripper formation (18) which is movable relative to the rotary body (4) so as to grip the at least one end portion of the semi-finished wrapper (S). 20
14. Equipment according to Claim 13, characterised in that the retaining means comprise a pair of jaws (18) which are movable relative to the rotary body (4) so as to be locatable on opposite sides of the rotary body (4) itself so as to grip respective end portions of the semi-finished wrapper (S) projecting from opposite sides of the rotary body (4). 25 30

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FIG. 1

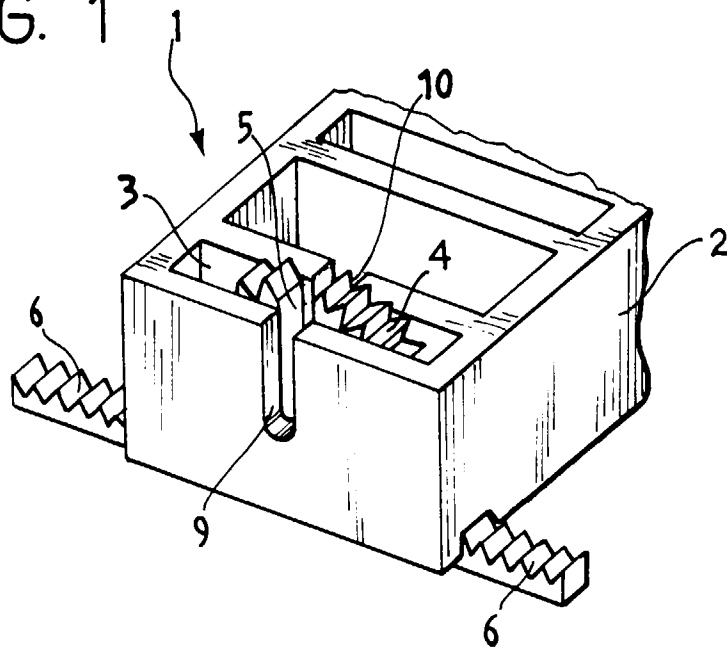
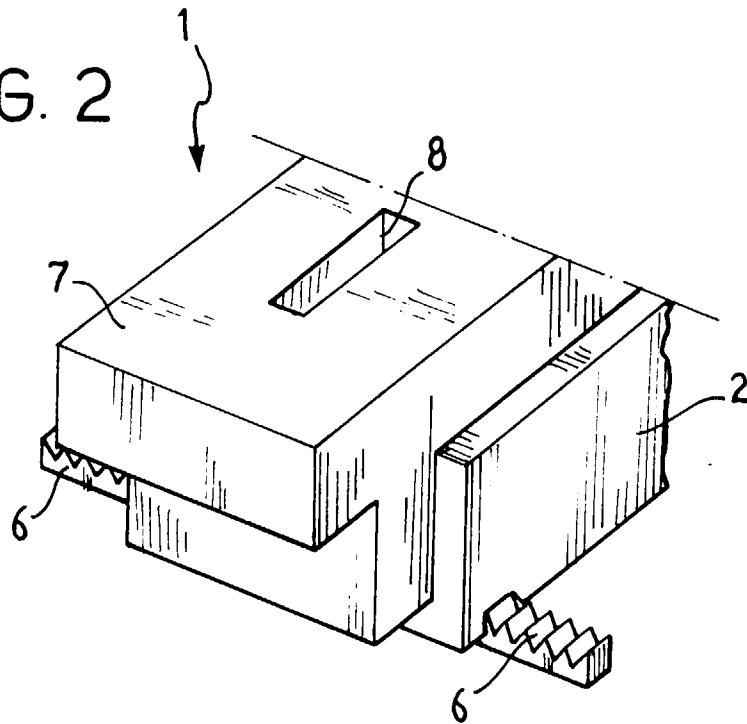


FIG. 2



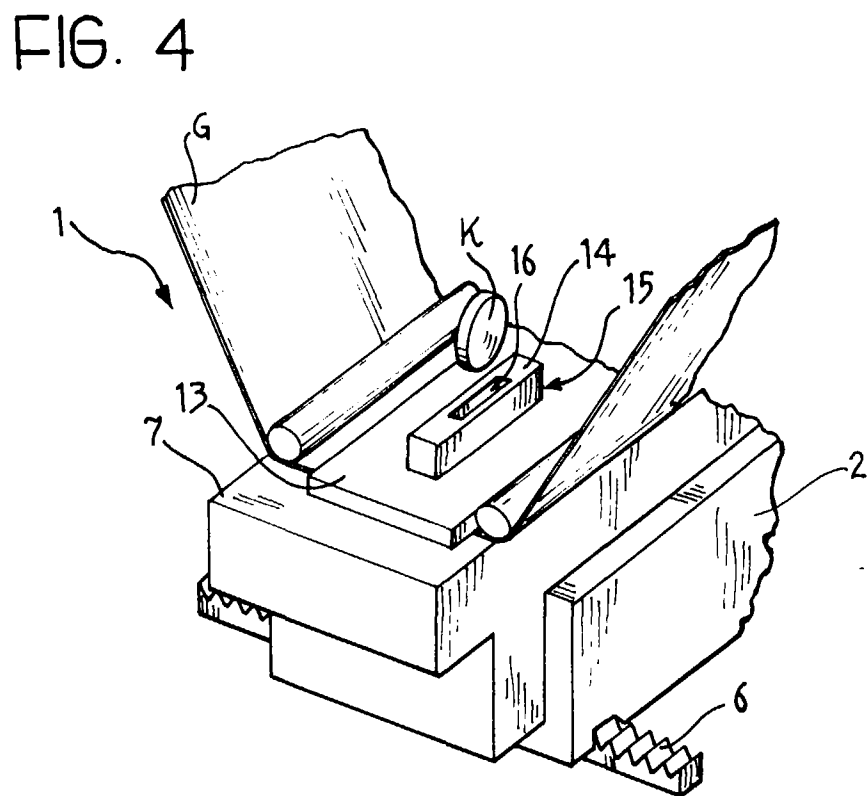
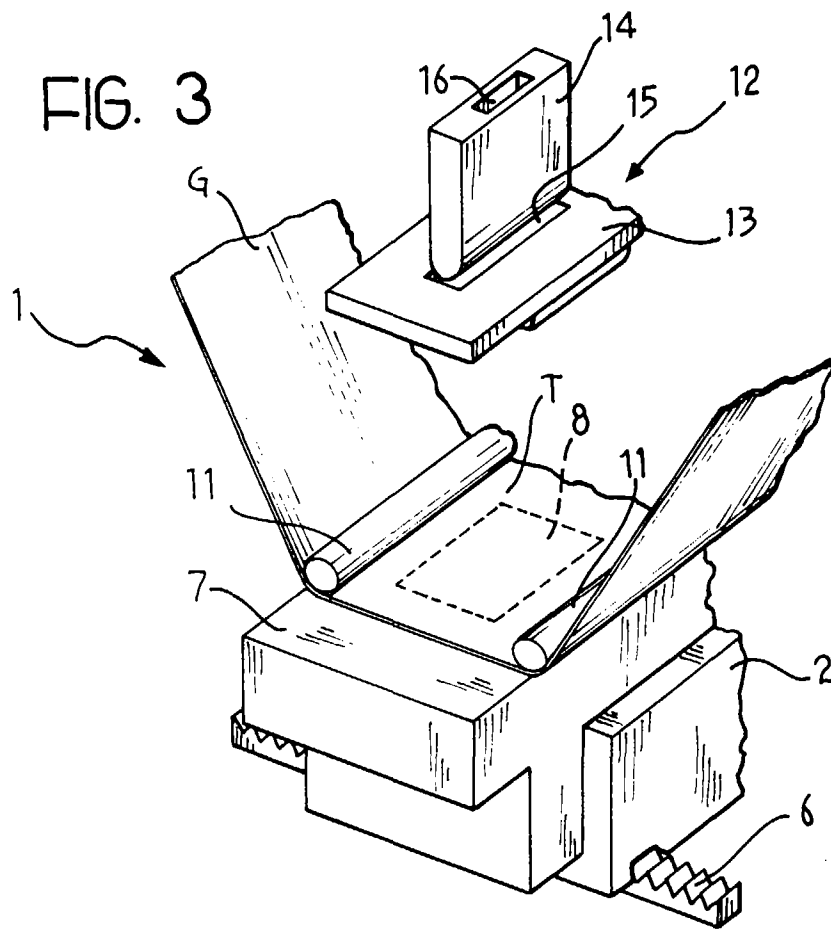


FIG. 5

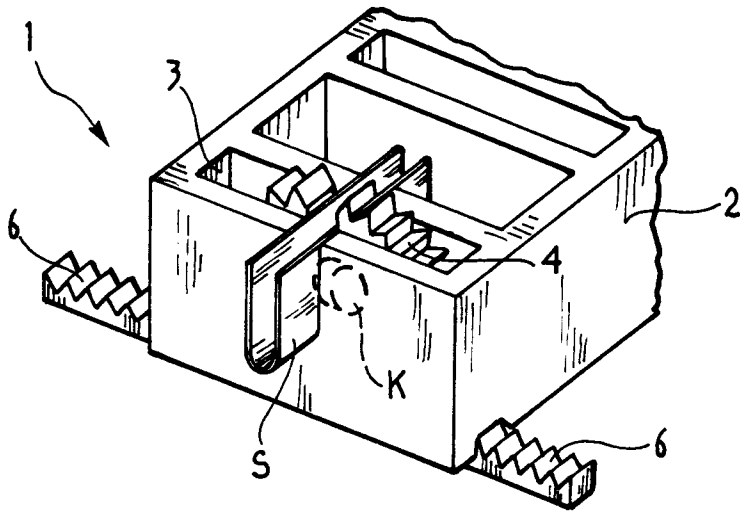


FIG. 6

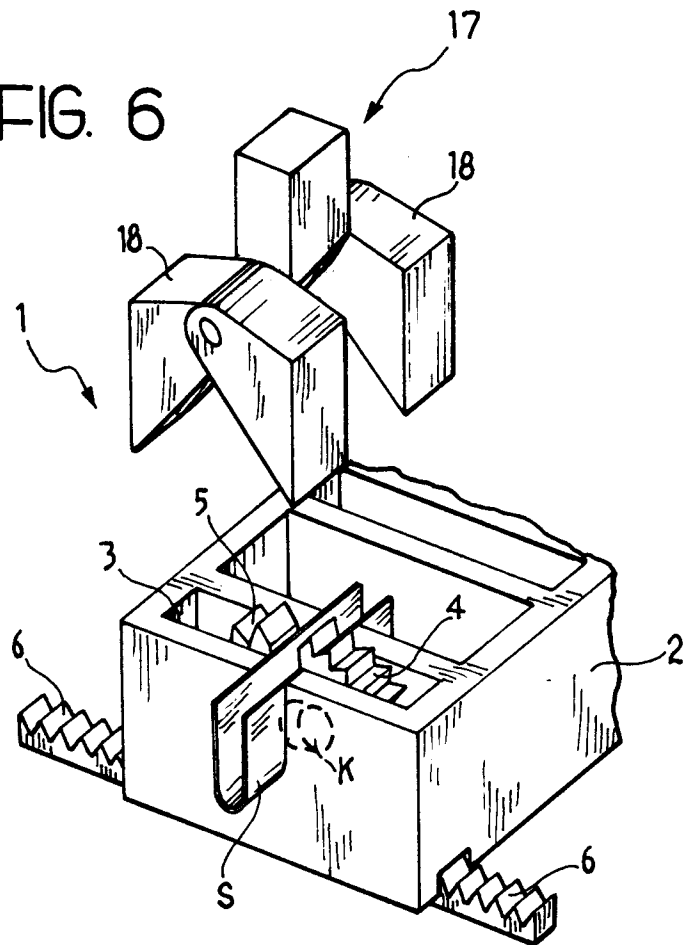


FIG. 7

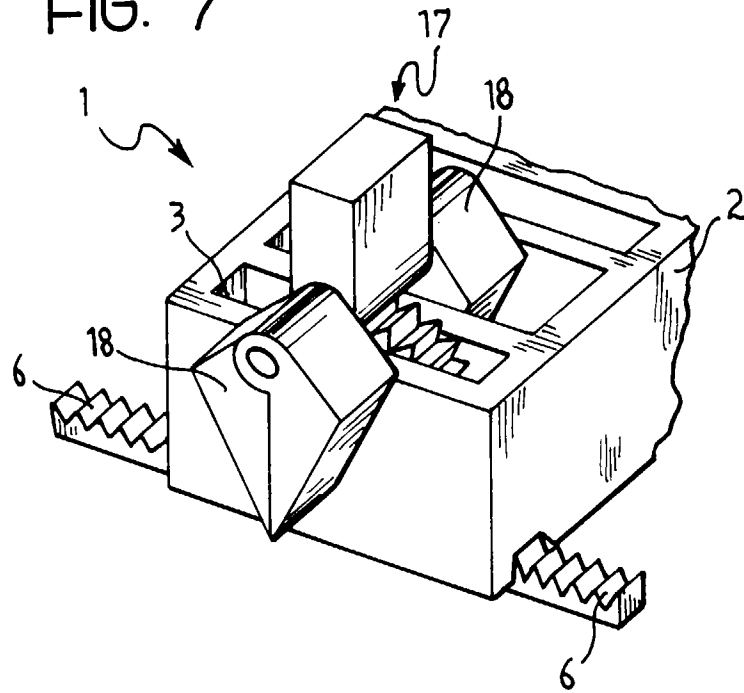


FIG. 8

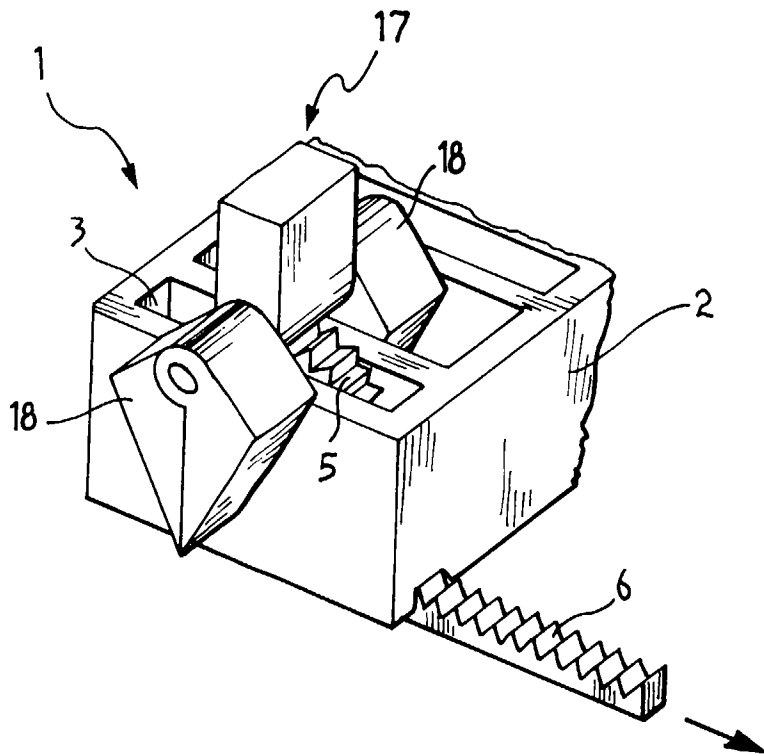


FIG. 9

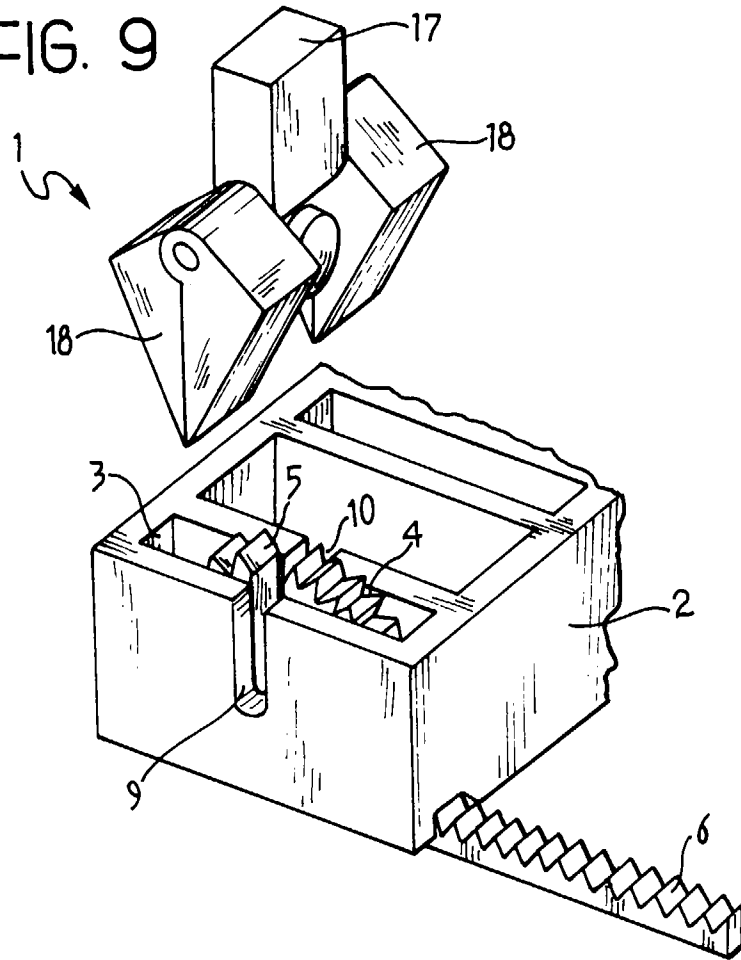
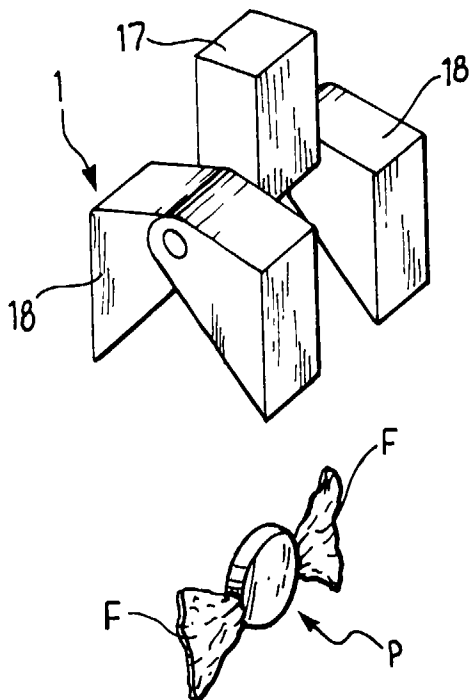


FIG. 10





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EUROPEAN SEARCH REPORT

Application Number
EP 97 10 5913

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	DE 25 52 600 A (POPEL) * the whole document *	1-6,13	B65B51/00
X A	GB 2 043 021 A (FEIGHERY) * abstract * * page 3, line 16 - page 4, column 1; figures 12-16 *	1,2 4	
X	US 2 346 613 A (RUMSEY) * the whole document *	1,2	
X	US 2 598 073 A (RUMSEY) * column 3, paragraph 4; figures 1-7 *	1,2	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B65B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 8 July 1997	Examiner Claeys, H
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