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(54) **Heat-shrinkable film packaging for bottles, process for manufacturing said packaging and score-cut equipment used in said process**

(57) A packaging for bottles made with a heat-shrinkable film, of the type divisible into submultiples or with an easy-opening feature, in which the series of incisions provided in the film, to obtain its opening in the required zones, are performed with the score cut method. There are described series of incisions consisting of

two or more lines of aligned incisions, parallel and close one another, which allow to obtain a better directionality and a reduced tearing energy. The invention also includes the manufacturing process of said packaging and the score cut equipment apt to perform said lines of incisions in the heat-shrinkable film.

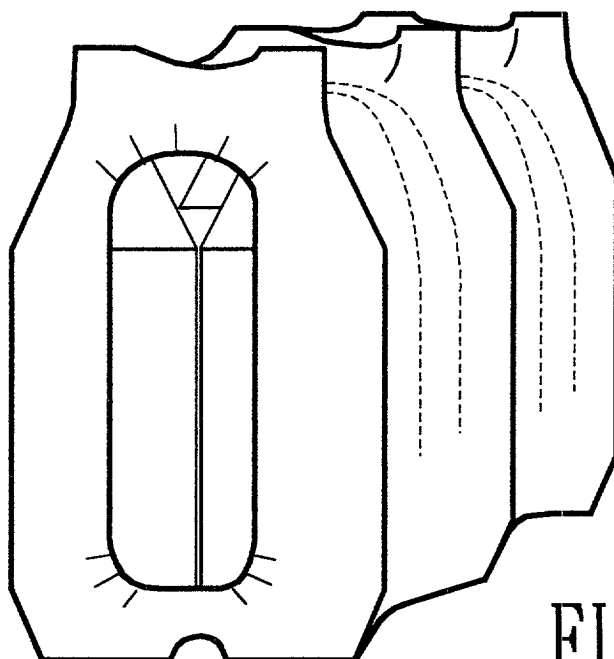


FIG. 18

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Description

[0001] The present invention relates to a heat-shrinkable film packaging for bottles. With the word "packaging" is herein indicated the well-known wrapping used to market any kind of containers - particularly plastic bottles - obtained by wrapping a group of containers with a length of heat-shrinkable polyethylene film so as to cause the overlapping of the two free strips of the film at the bottom of the containers, and then performing a heat treatment so as to obtain the heat-shrinking of the film on the group of containers, and the mutual sealing of the two free strips of the film length. The number and arrangement of the containers of the group can vary according to their shape and volume and according to the material they are made of; the arrangement by far most used, for example to market mineral waters and/or soft drinks in 1,5 or 2 litres bottles, being the one formed by a group of six bottles arranged in three parallel rows of two bottles each. In the following description and drawings, for simplicity and uniformity's sake, reference is exclusively made to containers of the "bottle" type, which in fact represent the type of container more frequently packaged in the above mentioned packaging; it is however to be understood that the invention is not limited in any way to such a particular application, but includes any kind of known container present on the market, either made of paper, carton, plastic, metal or any combination of said materials.

[0002] Particularly the invention refers to a packaging of this kind which can be easily divided into several portions, each one containing a smaller number of bottles while keeping the integrity of the packaging wrapper to make it easier carrying away thereof. Characteristics and advantages of such a kind of container are widely described in the Patent EP-B-717.712, in the name of the same Applicant, whose contents are herein totally incorporated by reference.

[0003] The present invention also refers to a packaging for bottles made with a heat-shrinkable film, of the so called easy-opening type, that is to a packaging provided with means to render the film tearing easier in pre-determined positions and allow, in so doing, to take out one or more bottles from the packaging, free from the packaging film.

[0004] The present invention as well includes a manufacturing process of a heat-shrinkable film packaging for a group of bottles arranged alongside one another in parallel rows, of the kind wherein: an heat-shrinkable film is prepared with a series of aligned incisions positioned at a middle portion of the film zones comprised between adjacent rows of bottles; an even number of bottles are arranged in a group including more adjacent parallel rows; a length of said film is wrapped around to said group of bottles so as to cause the overlapping of the free strips thereof at the bottom of the group of bottles; the length of film so wrapped around the group of bottles is heated in a hot-air oven so as to cause the

heat-shrinking thereof on the bottles.

[0005] The invention finally concerns a score cut equipment wherein a reel of film is processed with suitable cutting tools to provide on the film one or more lines of incisions.

[0006] The above mentioned Patent EP-717.712 has provided a new type of packaging for bottles by using a packaging film wherein a plurality of linear incisions, spaced by a suitable pitch, are performed along separation lines positioned between two rows of bottles. This type of packaging is easily divisible along said incision lines in submultiples of at least two bottles, every bottle of each sub-multiple being firmly held in position by the of packaging portion separated therewith. This new type of packaging - distinguished on the market by the trade mark ZIPACK® - has solved a number of problems related to transportation and marketing of bottles packaged in heat-shrinkable plastic film packagings, nowadays largely widespread in place of previous form of transportation such as wooden or plastic made cases with internal separating frames. Among the major advantages provided by the ZIPACK® system - in addition to the fundamental one, which is to allow the purchasing and carrying of a smaller number of bottles than that characterising the standard packaging, firmly held and easily transportable - it's worth mentioning the following: the quickness and easiness of separation of submultiples with the only help of the hands, the elimination of any piece or reminder of packaging film in sales points, the possibility to choose the size of the submultiple in relation with purchasing needs and carrying capability of each single consumer and, finally, discouraging consumers from purchasing only one bottle, due to the fact that the smallest submultiple, comprising two bottles, is much easier to carry away than a single bottle.

[0007] During the first period of use of the ZIPACK® system some technical peculiarities and marketing requirements came to evidence, indicating the necessity to introduce some updating and improving of the system which, precisely, represent the subject matter of the present invention.

[0008] More in details, a first technical peculiarity of the ZIPACK® packaging, which in certain conditions could give rise to problems, is the effective directionality of the tearing line of the film, driven by each single incision, when the detachment of a submultiple is undergoing. In the known manufacturing methods, actually, the incisions - consisting of linear cuts of some mm of length - are performed by rotary cutting devices with blades which penetrate into the film, shown in the figures from 1 to 3. A cutting disk T provided with cutting teeth D on its circumference (fig. 1) is mounted, coaxial and adjacent to one or possibly two supporting wheels R, R' (fig. 2), upon the film P to be cut. The wheels R, R' have a diameter slightly smaller than the diameter of the disk T, so as to allow the teeth D to jut out the necessary amount to cut the film. The wheels R, R' lean and roll on a contrast roll C placed under the film P, while the teeth

D of the disk T go through the film P and get into an appropriate groove provided for in the roll C. Both the wheels R, R', and the cutting disk T included between them, and the roll C turn preferably idle, being driven by the movement of the film P which is wound around a separate powered reel. The cutting line obtained with such a device is shown in figure 3 and includes a series of aligned incisions of a length t repeated with a constant pitch L, so as to leave an uncut length $p = L - t$, in the following simply indicated as "uncut", between two subsequent incisions. The ratio incision/uncut and the value of the pitch L can be varied modifying the dimensions and the pitch of the teeth D on the disk T.

[0009] With this cutting method, however, it is not possible to avoid that, either when the blade "enters" into and, even if with a smaller effect, when it comes out from an incision, the blade slightly tear the film producing two little opposite rips, so that the two ends of each linear incision take a Y shape, whose size mainly depends on the construction and operational characteristics of the cutting equipment, on the quality of the blades and on their maintenance level. When - for example due to either an inadequate maintenance or an excessive blades penetration - the size of said Y shaped rips becomes tangible, after the shrinking phase of the film, the incision shape, instead of the required buttonhole shape with sharp ends, will have an ovalized-rectangular shape characterised by a reduced capability of imparting a correct directionality to the tearing line when separating the submultiples of the packaging. In this cases, the tearing of the packaging film might not result quite regular so that the tearing line could deviate, in one or more zones - particularly those where the packaging shows an important curvature - from the incision line provided beforehand in the film. A tearing of this type is not satisfactory, not only from an esthetical point of view, but also as it might require an higher tearing energy and, sometimes, could determine a not satisfactory holding of the bottles contained in the separated submultiple.

[0010] A first object of the present invention, therefore, is to provide a packaging - and a relative manufacturing method - in which the incision lines of the film show such a conformation to ensure a perfectly regular separation of the packaging into submultiples, which means an extremely easy separation, exactly performed along the incision line provided in the film, besides ensuring a perfect mechanical resistance of the packaging during the transportation thereof.

[0011] A second technical problem considered by the Applicant has been to achieve an easy and clear separation of the packaging submultiples even in the bottom portion of the packaging, i.e. where the two free strips of the length of packaging film are overlapped and sealed each other. As a matter of fact, being the alignment of the two overlapped free strips never perfect, sometimes it may happen that the incisions of one of the free strips actually overlap to an uncut zone of the other free strip, so as to be partially sealed during the shrink-

ing phase, making less quick and effective the separation of the packaging submultiples.

[0012] An higher refinement of the wrap around techniques to wrap the length of film around the group of bottles of the packaging has allowed to improve the alignment of the two free strips and consequently the overlapping the respective incision lines, thus reducing remarkably the magnitude of such a problem, which nevertheless cannot be totally eliminated in this way.

[0013] In patent IT-1.289.944, in the name of the same Applicant, some innovative packaging processes have been proposed, allowing to solve this problem maintaining or restoring the open-state of the incisions of at least one of the two overlapped free strips of the length of film. In particular a first process provides for adjusting the temperature of the film in the bottom area of the packaging, along the incision lines, by positioning shielding frames in the heat-shrinking oven, so as to reduce or to cool down the air flow in correspondence with the above mentioned area, and consequently avoid the sealing of the incisions. In a second process the open-state of the incisions in the bottom area of the packaging is restored, after the exit from the heat-shrinking oven, using appropriate cutting means operating on the finished packaging. In a third process, the incision lines on one of the two said free strips consist in two wide buttonholes, sufficiently large to completely overlap to the normal incision lines provided on the other free strip, so avoiding their sealing. In a fourth and latter process one band of film along each incision lines is subject to a corona treatment, so as to reduce the superficial reactivity thereof and prevent the subsequent sealing of the free strips in correspondence with said bands, thus maintaining the open-state of the incisions.

[0014] In the patent EP-868.364 it is suggested another type of solution to this problem, according to which, in correspondence with each incision line, is provided a band of film coated with a printing ink so as to impart to said band an unsealing feature. This technique allows to avoid sealing of the two overlapped free strips of film just in correspondence with the incision lines and nearby of the same, so that the open-state of the incisions is maintained even in presence of alignment errors in the overlapping of the two free strips.

[0015] Both above mentioned patents allow to definitely solve the above described problem, even if at the cost of introducing some process variations or an additional working phase of the film, imposing unwanted additional costs to the packaging manufacturing process.

[0016] A second object of the present invention therefore is to provide a new type of packaging - and the relative manufacturing method - where the separation of the submultiples occurs in a quick and clear way along all the perimeter of the packaging, including the bottom portion thereof, without any necessity of modifying the existent manufacturing methods of the packaging or performing any additional treatments to the film other than providing the incision lines.

[0017] In addition to the above mentioned technical improvements, the commercial experience so far carried out with the ZIPACK® system has underlined the necessity to also make available - at least for some quite conservative market segments - an easy-opening system for the packaging, to allow the easy and quick picking up of one or more loose bottles from the packaging. The easy-opening systems so far offered by the known techniques, are not enough satisfactory both from a practical and economical point of view so as to reach a real and wide diffusion on the market. The disadvantages more frequently present in such known systems are relative to the fact that the easy-opening feature is obtained either with the use of additional materials along the opening lines provided on the packaging (such as threads, strips, etc.), either with some special additives integrating the normal components of the packaging film (such as polymer materials with an high tearing directionality, etc.), which materials generate in both cases an increase of the overall costs of the packaging. Moreover these known systems are not always practical in their opening mode, presenting sometimes the disadvantage to generate stripes or scraps of torn film which make out of order and less attractive the sales point, requiring additional time for their elimination.

[0018] A third object of the present invention is then to provide a packaging with an easy-opening feature - and the relative manufacturing method - which do not require the use of any additive or special material, in addition to the heat-shrinkable film normally used to produce a traditional packaging, and which, moreover, do not give rise to film stripes or scraps when the easy-opening operation takes place.

[0019] A fourth object of the present invention is finally to provide a cutting equipment apt to perform incision lines in an heat-shrinkable plastic film, and to be successfully used in the manufacturing methods of the bottles packaging according to the present invention.

[0020] These objects are all achieved, according to the present invention, through a packaging with the characteristics as defined in the independent claims 1 or 5, through a manufacturing method with the characteristics as defined in the independent claims 10 or 14, and through a cutting equipment with the characteristics as defined in the independent claims 17, 19, 21, 23 or 24. Other characteristics of the invention are defined in the secondary claims.

[0021] Further characteristics and advantages of the packaging, of the manufacturing method and of the cutting equipment according to the present invention, will result in much more evidence from the following detailed description of some favourite embodiments of the packaging and of the cutting device, which are illustrated in the enclosed drawings, wherein:

fig. 1 is a front view of a penetration cutting device according to the prior art, which can be used to perform the incision lines on a ZIPACK® packaging;

fig. 2 is a lateral view, partially in section, of the cutting device of fig. 1;

fig. 3 is a plan view illustrating an incision line performed in a film length, through the cutting device shown in fig. 1 and 2;

fig. 4 is a front view of a score cut device according to the prior art;

fig. 5 is a lateral view, partially in section, of the cutting device of fig. 4;

fig. 6 is a plan view illustrating an incision line performed in a film, through the cutting device shown in figs. 4 and 5;

fig. 7 is a front view of a score cut device with supporting cams, which can be used to perform incision lines in a packaging according to the present invention;

fig. 8 is a lateral view, partially in section, of the cutting device of fig. 7;

fig. 9 is a front view of a score cut device provided with resilient wheels, which can be used to perform incision lines in a packaging according to the present invention;

fig. 10 is a lateral view, partially in section, of the cutting device of fig. 9;

fig. 11 is a lateral view, partially in section, of a score cut device provided with a resilient supporting wheel having a variable diameter, which can be used to perform incision lines in a packaging according to the present invention;

fig. 12 is a lateral view, partially in section, of the cutting device of fig. 11 in a different working position;

fig. 13 is a plan view illustrating an incision line performed in a film, through the cutting device shown in figures from 7 to 12;

fig. 14 is a front view of a score cut device having a plurality of cutting discs, which can be used to perform incision lines in a packaging according to the present invention;

fig. 15 is a lateral view, partially in section, of the cutting device of fig. 14;

fig. 16 is a plan view illustrating an incision line performed in a film, through the cutting device shown in figs. 14 and 15;

fig. 17 is a perspective schematic view of a packaging divisible into separable sections, according to the present invention;

fig. 18 is a perspective schematic view of a packaging with an easy-opening feature, according to the present invention;

fig. 19 is a schematic front view of a cutting equipment according to the present invention; and

fig. 20 is a lateral view of the cutting equipment of fig. 19.

[0022] Having accurately studied the formation mechanism of the film cutting as well as that of the heat-shrinking of the packaging, the Applicant has succeeded-

ed in finding out the defects - illustrated in the preliminary section of the present description - belonging to the traditional cutting devices used to perform incision lines in films used for producing ZIPACK® packaging, i.e. penetration cutting devices.

[0023] The Applicant has therefore carried out a market search, even in market sectors far off that one of the present invention, in order to verify the availability of other cutting methods which would be free from the above mentioned disadvantages. Among the various cutting methods examined during that search, that one showing the better intrinsic cutting characteristics, at least at a potential level, has proved to be the score cut method. A cutting device of such a type is schematically illustrated in figs. 4 to 6.

[0024] Also in this case the cutting tool consists of a disc T, yet directly leaning, through its teeth D, on a contrast roll C with the interposition of the film P to be cut. With the aim to provide a constant contact with the contrast roll C, the teeth D have in this case an external profile perfectly circular with an edge not particularly sharpened, so as not to engrave the surface of such a contrast roll C. The cutting disc T is mounted on a mobile holder S, pneumatically controlled so that the disk T will exercise a predetermined constant pressure on the contrast roll C.

[0025] This type of score cut device performs cuts of high quality, since there is no relative movement between the film P and the teeth D apart from the simple compression along the cutting line; in this way it is not possible that the short rips or lateral tearings typical of the penetration cutting method take place. Normally score cut devices are used for continuous cuttings, by means of a disk T provided with a single edge perfectly circular; their use has been further extended to obtain incision lines of the kind illustrated in fig. 6, in which the ratio incision/uncut is extremely high. To reach such a result short interruptions or interspaces are provided on the outline of a disk T with a continuous edge, so as to determine the formation of teeth D with a circular profile on that disk. The wideness of these interspaces must be very small; as a matter of fact it has to be considered that the cutting disk T is continuously in contact and pressed against the roll C so that if the interspace between two subsequent teeth D would be too wide, a sudden approach of disk T to roll C would take place in correspondence with the interspace between two teeth; as a consequence, as the front edge of the subsequent tooth will run into the roll C, an unacceptable strike and sudden return of disk T will take place, generating in so doing an unacceptable beating of the disk T. Practically, to maintain such a beating within a sufficiently low level so as to avoid a quick deterioration of the teeth D, it is necessary that the interspace between two adjacent teeth, for standard disks with a diameter of 100 mm, is not higher than 1 mm. Interspaces proportionally higher can be admitted with cutting disks having an higher diameter.

[0026] Taking all this under consideration, it appears quite clear that the score cut devices of a known type are completely unsuitable for the realisation of incision lines in a film to be used for producing a ZIPACK® packaging; as a matter of fact the incision lines on such a film must present the "uncut" of the incision line wide enough to ensure the necessary stability of the packaging, during the heat-shrinking and transportation operations, thus at least equal to 4-8 mm in a normal packaging containing 6 bottles of 1,5- 2 litres.

[0027] Quite recently a new type of holder S has been developed for the cutting disk T of a score cut device in which, in addition to the constant cutting pressure, also the longitudinal stroke of the disk is made adjustable. As a matter of fact such a stroke is not only limited, as in the previous versions, to 2-3 mm millimetres of maximum run, but it is finely adjustable through a micrometric regulation so as to allow the disk to run the only necessary stroke to go through the whole film, cutting the same, thus without allowing any further advancing of the cutting disk in the interspace between two subsequent teeth and therefore without giving rise to the above mentioned problems, i.e. the beating of the disk T in correspondence with said interspaces.

[0028] However, neither this technical device is suitable to solve the problem; as a matter of fact, since both the cutting disk T and the contrast roll C rotate idle (devices with a mechanical connection between the disk T and the roll C, as well as powered versions, in fact are not generally used due to higher cost and device complication) so that their rotation is ensured only by the film P movement, it is quite clear that in case the contact between disk T and roll C should be regularly and repeatedly lost in correspondence with each interspace between subsequent teeth (where such an interspace would be sufficiently wide to generate an incision line with the desired uncut length, driving on the cutting disk could become highly irregular, determining as a consequence an unacceptable unevenness in the formation of the incision lines.

[0029] The Applicant, faced by these problems, nevertheless willing to take advantage of the positive technical performances of the score cut system, has conceived a cutting device which allows to score cut a film performing on it incision lines with a ratio incision/uncut whose value can be set at will, without giving rise to any problem concerning beating of the disk T on the contrast roll C. On the ground of such a device the present invention has been accomplished.

[0030] A first embodiment of such a cutting device is illustrated in figs. 7 and 8. As shown in fig.7, a cutting disk 1 - of a kind suitable for score cut, but with quite wide interspaces between its teeth 2, suitable to perform incision lines for a ZIPACK® packaging - is provided with a cam disk 3 of the same diameter, coaxial and fixedly connected in rotation thereto. The cams 4 of the cam disk 3 are positioned exactly in correspondence with the interspaces between teeth 2 of the cutting disk 1 (as it

appear in fig. 7 where, for sake of simplicity, only few cams are shown) and the minimum circumferential extension of each cam is equal to the extension of the corresponding interspace diminished by a maximum value of circumferential clearance equal to 2/100 of the diameter of the cam disk. The cams 4 have a thickness sufficiently wide to guarantee a good support of the cutting disk 1 between two subsequent teeth (as clearly shown in fig. 1) without, however, determining any deterioration of the film P on which they lean on; to this purpose, they preferably have their edges adequately smoothed. In this way the cutting tool, consisting of the set of disks 1 and 3, during its rotation leans on the contrast roll C alternatively with one tooth 2 of the disk 1 or with one cam 4 of the disk 3, while a soft passage from the first to the second is preferably granted by the presence of the above mentioned circumferential clearance, equal to 1/100 of the cam disk diameter, between the end of one tooth 2 and the beginning of a cam 4 and vice versa. It has to be clearly understood that while said clearance can not have a value higher than the one indicated to avoid the rising of beatings of the cutting tool, such clearance can assume a inferior, null or negative value (i.e. the circumferential extension of the cams 4 can be higher of the one of the corresponding interspaces of the disk 1) without that the functionality of the cutting tool would be substantially compromised; however such a solution, presently, is not preferred. A second cam disk 3' (of which only the outline is indicated in fig. 8) can be placed on the other side of the disk 1, in case one likes to obtain a perfectly symmetrical construction of the cutting tool.

[0031] Thus, with this solution it is possible to form the teeth 2 of the cutting disk 1 at any desired distance, and in particular at that specific distance which is needed to perform incision lines suitable to provide films for a ZIPACK® packaging, completely avoiding any beating of the cutting disk on the contrast roll. As a matter of fact, when none of the teeth 2 is in touch with the contrast roll C, the needed stability of the cutting tool, which means the substantial absence of any movement in the direction of arrow F of fig.8, is ensured by the presence of the cams 4 leaning on the contrast roll C.

[0032] With the above described device it is thus possible to produce films P performed with incision lines having the desired ratio incision/uncut like, for example, the film illustrated in fig. 13, totally suitable to produce a ZIPACK® packaging such as schematically shown in fig.17. These incision lines, thanks to the score cut method by which they have been obtained, are completely free from any defects found in the incision lines performed with the known penetration cutting devices, so that they present an high tearing directionality and fully reach the first object of the present invention.

[0033] A version of this first embodiment, which also allows an additional technical function, is illustrated in the figs. 9 and 10. In this case the cutting disk 1, is coaxial to and fixedly connected in rotation with a support-

ing wheel 5. The supporting wheel 5 consists of a metallic hard core 6 whose peripheral rim is provided with an adequately resilient covering 7 made from an elastomeric material. In an unstressed state, the external diameter of the supporting wheels 5 is equal to or slightly higher than the cutting disk 1 diameter, in relation to the resiliency degree of the elastomeric covering 7, in such a way that, when the holder of the disk 1(not illustrated) is pushed at its working pressure against the contrast roll C, the covering 7 of the supporting wheels 5 yields sufficiently so as to allow the cutting disk 1 and in particular its teeth 2 to go completely through the film P which has to be cut.

[0034] This very simple solution makes it possible to completely avoid the beating phenomenon, thus allowing to form the teeth 2 of disk 1 at a distance suitable to perform the incision lines needed to prepare the film for a ZIPACK® packaging. In fact, when the direct support of teeth 2 on the contrast roll C is missed, the desired stability of the system, i.e. the absence of perceptible movements in the direction indicated by arrow G of fig. 10, is ensured by the elastomeric covering 7 of wheels 5 which will react elastically to the higher load determined by the absence of a tooth and - thanks to a correct choice of the relative coefficient of elasticity - can succeed in avoiding any sensible lowering of the cutting disk 1, at the interspace between two subsequent teeth 2, avoiding, as a consequence, any beating phenomenon. In the drawings only one supporting wheel 5 has been shown, yet it is clear that, with the obvious modifications of the cutting tool, it will be possible to provide a second supporting wheel 5' (illustrated in fig. 10 with dotted lines) symmetrically positioned on the other side of the cutting disk 1, where this would be useful or effective to ensure a better working of the same device.

[0035] In addition to the above mentioned fundamental function of supporting the cutting disk within the interspace between two subsequent teeth, the above described supporting wheel 5 achieves also a second very important function, which is to ensure a correct and continuous driving of the cutting device, and therefore of the cutting disk 1, thanks to the motion of the film P, with which the supporting wheel 5 keeps a continuous contact. Such an additional function keeps its importance even in case the stroke end of the cutting disk 1 is controlled - by the way with a more costly solution - through a micrometric stop regulation, such as to mechanically prevent the longitudinal movement of the cutting disk 1 from extending beyond the value needed to cut the film P. As a matter of fact, even in this case, the supporting wheel 5 is essential to keep the continuity of contact with the film P between two subsequent teeth of the cutting disk 1 so as to avoid a possible reciprocal sliding between the film P and the cutting tool which would negatively affect the position and the quality of the incisions.

[0036] A second version of the first embodiment of the invention is shown in the figs. 11 and 12 and provides, in addition to the above mentioned advantages of the

first version, a second additional function. According to this version, the supporting wheel 5 consists of a metallic core 6 provided with a circumferential cavity in which it is lodged an elastomeric gasket 17, ring shaped and hollowed inside, ensuring to the cutting tool the same continuous supporting function ensured, in the first version, by the elastomeric covering 7. The cutting device of this second version allows - as already anticipated - a second additional function, thanks to the fact that the metallic core 6 of the wheel 5, and as a consequence the elastomeric gasket 17, can assume the two different positions shown in figs. 11 and 12 under the action of the electromagnet 9 placed around the mobile nucleus 8, apt to longitudinally slide with respect to the supporting shaft (not illustrated) of the cutting device. When the electromagnet 9 is activated, the nucleus 8 moves from position $\underline{d}$ (fig. 11) to position $\underline{d'}$ (fig. 12) shifting towards the left side of the drawing and, through a bell-shaped flange 10 fixedly connected thereto, determines a corresponding movement of an external flank of the core 6 so as to reduce the inner volume of the lodging cavity holding the gasket 17. Therefore, said gasket is correspondingly squeezed and a reduction of the volume of its inner cavity as well as an increase of its diameter will take place, so as to determine a lifting $\underline{z}$ of the cutting device, sufficient to allow a similar lifting of the cutting disk 1 from the film P and thus the interruption of the incision line. The above mentioned electromagnetic control is characterised by both an high speed performance and a low inertia, and therefore it is perfectly suitable to perform the cyclical interruption of the incision lines even at an high working speed, as necessary in one of the embodiments of the packaging according to the present invention described in the following.

[0037] Obviously, the supporting wheels according to the two versions above described, having the peripheral rim made from an elastomeric material, can also be profitably used in conjunction with the cam disk of the first embodiment of the present invention. As a matter of fact, such a coupling will allow to achieve a very good driving effect of the film and to exploit the interesting opportunities of spaced cutting offered by the supporting wheel with variable diameter, yet maintaining the mechanical positioning precision typical of the cam disk.

[0038] A second embodiment of the cutting device according to the present invention is illustrated in figs. 14 and 15, and has been studied by the Applicant with the aim of providing incision lines characterised by an high directionality as well as by a low tearing energy. In this second embodiment, the cutting tool consists of two cutting disks 1 and 1', coupled on a same axis and fixedly connected each other, laterally to which one or two supporting wheels 5, like those illustrated for the two versions of the first embodiment, may or may not be used. In the figures, for simplicity sake, it has been illustrated only the version without the supporting wheels. The distance $\underline{i}$ (fig. 16) between the two disks 1 and 1' is in the order of some millimetre, and more precisely is com-

prised between a minimum value of about 1 mm and a maximum value approximately equal to the length of the uncut $\underline{p}$ existing between two subsequent incisions of the same incision line; preferably such a distance is included into the range of 2-3 mm.

[0039] The disks 1 and 1' have the same number of teeth 2 and 2' set out with an identical pitch, and are reciprocally mounted in such a way so that the teeth of one of the two disks take a configuration perfectly alternate with respect to those of the adjacent disk, as shown in fig. 14. The particular incision line obtained with the above described cutting device of the second embodiment of the invention, is illustrated in fig. 16. In the above illustrated embodiment and with reference to disks of a standard type having a diameter of about 100 mm, the maximum value of the pitch $\underline{L}$ of the teeth 2, 2' is 2 mm longer than the double cutting length $\underline{t}$ of a tooth so that, during the rotation of the cutting tool between one tooth and the subsequent one of the adjacent disk, there will not be an interval $\underline{s}$ longer than about 1/100 of the diameter of the cutting disk, i.e. about 1 mm in the case of standard cutting disks with a diameter of 100 mm. In this condition the teeth 2, 2' can have, for example, a length of 4 mm and a pitch length up to 10 mm. In this case no beating of the cutting tool on the contrast roll C will take place, since its correct support on the contrast roll C is ensured alternatively by one tooth 2 of disk 1 and by one tooth 2' of disk 1'; such a cutting tool therefore can be used as it is, with a clear advantage for the simplicity of the system.

[0040] On the contrary, in case the interspace between two subsequent teeth 2 and 2' (of the two adjacent disks 1 and 1') has a length higher than the above mentioned one, it is necessary to couple the cutting tool with at least one cam disk 3 and/or at least one supporting wheel 5 of the type above illustrated, suitable for giving an adequate support to the cutting tool also in correspondence with the interspace between two subsequent teeth, whatever the interspace length is.

[0041] As above said such a cutting tool has been thought with the aim to obtain incision lines for a ZIPACK® packaging, provided with better characteristics such as an high directionality and a reduced tearing energy. As a matter of fact, in applying such a cutting line on a film P used to produce a ZIPACK® packaging, the Applicant has obtained the factual confirmation that said cutting line actually provides absolutely superior performances both from the point of view of the high directionality of the film tearing and from the point of view of the reduced energy necessary to tear the film, so that this operation is performed in a much easier way by the user. In addition to this, the packaging formed using this type of incision lines proves to be much more stable during the heat-shrinking as well as during the transportation, as all the tensions on the film P are subdivided among a double number of incisions and, consequently, the stress on each single incision is substantially reduced. Finally, surprisingly enough, the packaging pro-

duced with the above mentioned incision line demonstrate to ensure a complete detachment of the packaging submultiples, even in the bottom area of the packaging-where, in relation with what has been said in the introductory section, the most critical conditions take place - without the necessity to apply any special treatment to the film P or to modify in any way the packaging manufacturing method.

[0042] An explanation for such a particularly positive performances is probably to be seen in the fact that in the traditional incision line, to proceed from one incision to the subsequent one during the tearing operation, it is necessary to tear a portion of film rather long (4-8 mm) in a well established direction, i.e. the incision line direction. Using, on the contrary, the particular double incision line of the second embodiment, the tearing of the film can take place either along the above mentioned direction of the incision line, or even along an oblique direction, i.e. proceeding from one incision on a first incision line to the one laterally positioned on the adjacent incision line, increasing in this way the overall probability that the double incision line open along the established direction; as a matter of fact is quite unlikely that, starting from a predetermined incision, the tearing line will go on in a transversal direction opposite to that where the lateral subsequent adjacent incision is positioned as, at the moment in which the tearing action reaches a determined incision, the film already shows a remarkable weakening toward the lateral subsequent incision which has already started to become deformed. Since this phenomenon will happen alternatively on the two adjacent incision lines, the more probable tearing pattern - actually that one requiring the minimum opening energy - will assume a typical "slalom" pattern configuration.

[0043] Besides, considering that the energy required by a "lateral tearing" - i.e. the one taking place between a given incision and the subsequent lateral one - is on average lower than the energy required by a "longitudinal tearing" - i.e. the one taking place between a given incision and the subsequent one on the same line - due to the fact that the length of film to be teared is shorter (about 2-3 mm compared with 4-8 mm), with this new type of incision line it is also achieved an overall reduction of the energy required to separate two submultiples of the packaging.

[0044] Finally, even in regard to the positive characteristic of allowing a complete and easy division of the packaging into submultiples of a very good quality - independently from any possible sealing of the incisions which could have taken place between the two free strips of the packaging - one can assume that it could depend on the fact that the possible zigzag proceeding of the tearing line is such as to allow a previous reopening of the incisions possibly sealed during the heat-shrinking of the packaging, as long as the tearing goes on.

[0045] To leave apart, however, the actual mechanism of action taking place during the tearing of the film

- being the above mentioned explanations to be considered only mere explanatory hypothesis, not having any limitative value on the scope of the invention - a large number of trials and production tests carried out in the most different heat-shrinking conditions of the packaging have proved that the particular double incision line, obtained with the cutting device of the second embodiment of the invention, allows to obtain: a better stress distribution among the different incisions during the heat-shrinking phase and consequently a lower ovaling of the same, all this allowing to avoid in a very safe way any accidental opening of the packaging either during the manufacturing or transportation; a very good directionality of the tearing line and a lower quantity of energy needed to achieve the tearing operation, so as to ensure the first object of the invention with even better performances as compared to the first embodiment above illustrated; a perfect and easy division of the packaging into submultiples, also in the bottom zone of the packaging, without the necessity to apply any preventive treatment to the film and without any modification of the manufacturing method, so reaching also the second object of the present invention.

[0046] In the above illustrated embodiment, only two cutting disks 1 and 1' are provided. However, cutting experiments as well as packaging manufacturing tests with an higher number of cutting disks, for example 3 or more adjacent disks, each one positioned with the teeth staggered with respect to the adjacent disk, have been carried out by the Applicant. By this type of cutting tool particular incision lines are obtained which, after the heat-shrinking phase has been completed, assume a typical honeycomb configuration, showing a very high mechanical resistance and, contemporaneously, a very important tearing easiness so as to be quite useful for specific applications. A convenient application for this type of incision lines is, for example, that of using them for packages with an easy-opening feature; as a matter of fact, due to the higher wideness of the tearing area, the access to the packaging, in order to take the bottles out, results much easier.

[0047] Moreover, a packaging with an easy-opening feature, can also be obtained according to the third embodiment of the present invention, which provides a cutting device consisting in just two cutting disks associated but reciprocally positioned at a distance much higher than the one discussed at in the second embodiment, for example of 2-3 cm, so as to generate two incision lines distant enough to be independent and not cooperating each other. Also this cutting tool, as the one described in relation with the second embodiment, may or may not be associated with one or two supporting wheels provided with a peripheral rim made from an elastomeric material to ensure a correct and continuous support to the cutting tool when the support provided by the cutting disks should not be sufficient because of the specific ratio incision/uncut of the same disks. Preferably in this case the supporting wheel will be just one,

positioned between the two cutting disks, so as to usefully become also their spacer element. Besides, the two incision lines could also be of the type obtained with both the cutting devices above described, so as to be either single or double lines, obtaining in the last case - even in this type of application - the same additional advantages already seen and above described.

[0048] In the final packaging produced with a film performed with the cutting device according to this third embodiment, the incision lines are no more positioned in the middle zone between two adjacent bottle rows, but on the contrary closer to the necks of the same bottles as shown in fig. 18. In such a way, it is therefore possible, after one has opened the packaging in correspondence with the said lines, to take away with much more easiness the loose bottles from the packaging itself.

[0049] In this type of application for a packaging with an easy-opening feature it is often advisable to limit the incision lines to the upper zone of the packaging, so as to avoid either the accidental division of the packaging into submultiples, that in this case it is not welcome, or the detachment of stripes of film from the packaging, so as to achieve also the third object of the invention. The arrangement of these partial incision lines is illustrated in fig. 18, in reference to the embodiment with two incision lines spaced out.

[0050] The periodical interruption of the incision lines can be obtained either with a temporarily detachment of the cutting disks from the film P during the cutting operation of the same film, or using a cutting disk with an higher diameter with respect to the one of the disks previously described, whose external circumference will have a length identical to the one of the film lengths used for manufacturing the packaging. In both cases, during the packaging process it will be then necessary - using a method widely known and already used for advertising printing synchronisation - to synchronise the cutting operations of the film lengths so as to insure that the portion of film with the incisions will be positioned in the required zone.

[0051] In the first solution, due to the high advancing speed of the film during the cutting operation of the incision lines on the same film (normally 2-3 m/sec), the periodical detachment of the cutting tool from the film has to be achieved with low inertia devices, so as to obtain sufficiently rapid times of intervention. A first alternative is to use the same pneumatic device which maintains under pressure the cutting tool on the film P using, for instance, a double effect piston to achieve the quick rising and lowering of the cutting tools together with an appropriate control system to activate the piston movements in relation with the advancing speed (often variable) of the film. Such a result can also be obtained according to the present invention, with a very simple and compact construction which foresees to equip the cutting tool with at least a supporting wheel with a variable diameter, of the type illustrated in figs. 11 and 12 as above described, so as to achieve the repeated rising

and lowering of the cutting disks with the required quickness and low inertia needed to get the desired frequency of intervention with the advantage of a great simplicity of the device.

[0052] In the second solution, taking into consideration that the length of the film lengths normally needed - for a standard packaging containing 6 bottles of 1,5 or 2 litres capacity-varies between 105 and 110 cm, the cutting disks will correspondingly have a diameter included between 335 and 350 mm, so that their external circumference will be exactly the same as the length of the film lengths. By using these disks and setting the teeth only in one sector of the same disks, it will be possible to obtain the cutting of the film only in the required zone, after carrying out a careful centring of the film before the starting of the cutting operations.

[0053] However, the positives characteristics of the above described third embodiment of the invention do not limit themselves to the form where the incision lines are extended only to a portion of the packaging. As a matter of fact, it is also possible to extend the incision lines to the whole packaging and purposely transversally displace, of an adequate entity, the two overlapped free strips of the length of film P, so as to determine a complete sealing of the bottom portion of the packaging, and consequently to avoid that the separation of the film proceeds all along the incision lines, determining the complete detachment of submultiples of the packaging. Alternatively, it is possible to provide the two series of incisions in a adequately staggered way - using two cutting disks with teeth distributed only in given sectors of their circumference and positioning said disks one another in such a way that their sectors with teeth will result reciprocally staggered - so that in the bottom area of the packaging the two free strips will be sealed due to the lack of overlapping between the series of incisions performed on the same free strips, while the easy-opening feature will be exploited in a satisfactory way using alternatively one or the other of the two series of incisions.

[0054] The different type of cutting devices above described with reference to the different embodiments of the present invention, are preferably incorporated in a self-standing cutting equipment as illustrated in figs. 19 and 20. Such a unit is completely autonomous, and allows to prepare pre-cut reels of film P to be used with packers of any known kind, so as to allow a very high flexibility in the application of the present invention even in case of already existing plants. Obviously, there's nothing preventing such a device, with the necessary modification, from being installed on-line on a specially designed packer, so as to perform the incision lines during the unwinding of the film still uncut, before the film itself is transversally cut to generate the lengths of film for manufacturing the packaging.

[0055] In the unit illustrated in figs. 19 and 20, the film P is of a double width so as to allow the feeding of a double path packer, where the film P is divided longitudinally in correspondence with its middle line. In the

case of standard packaging with 6 bottles each, the number of incision lines to be performed on the film is two for each packaging, so that for a double size film P is in all four. Thus, the unit is provided with four cutting devices D, adjustably positioned on a common trans-
versal bar, as shown in fig. 19. The supporting bar of the devices D is fixed, while the single cutting devices are movable in a direction perpendicular to the supporting bar itself and to the contrast roll C positioned below the same, under the action of the respective pneumatic pressure devices (not illustrated).

[0056] The film P is unwound from a supplying reel A and is rewound on a receiving reel B, after having passed on a series of rolls M including, where necessary, two dancer rolls N and finally on the contrast roll C. The contrast roll C, as already mentioned in detail, is in contact with the cutting devices D and in particular with the cutting disks 1 thereof. To perform the incisions, the reel B is put into rotation as its drive shaft is properly powered; normally the motorization do not provide, for simplicity sake, a speed control system, so that the re-winding of the film takes place at a constant angular speed and, consequently, at a linear speed increasing as the diameter of the reel B grows up. Thanks to the different type of cutting devices illustrated, insuring a continuous contact between the film P in movement and the cutting tool - should this last include either a cam disk 3 or a supporting wheel 5 - it is possible to avoid any reciprocal sliding between the film P and the cutting tools, thus obtaining a cutting with characteristics of a very high regularity. It is possible, where required, to design a cutting equipment provided with constant speed, which equipment however will obviously be more sophisticated and expensive. Such a result can be achieved, for example using to rewind reel B, a motorization equipped with a speed control system controlled by a film speed measurement system associated with roll C. Alternatively, it is possible to insert along the film path - preferably just after the contrast roll C - a couple of rolls powered with a motor at constant speed and to provide the motor of reel B with an inverter adjusting electronically its revolving speed to insure a controlled rewinding of the pre-cut film.

[0057] The present invention has been described with reference to some preferred embodiments of the cutting device and of the packaging, as well as of the relevant manufacturing method. It is clear, however, that the scope of the invention is not limited to those embodiments, but includes all other possible variants at the reach of an expert in the field, as long as falling in the definitions given in the attached claims.

Claims

1. Heat-shrinkable film packaging, divisible into sub-multiples, of a group of bottles arranged alongside one another in parallel rows, of the type in which a

length of said film is wrapped around said group of bottles so as to present the overlapping zone of its free strips in correspondence with the bottom zone of the group of bottles and in which a series of incisions is provided on the film in correspondence with the planes separating adjacent rows of bottles, **characterised in that** said series of incisions consists of two or more lines of aligned incisions, parallel and close one another.

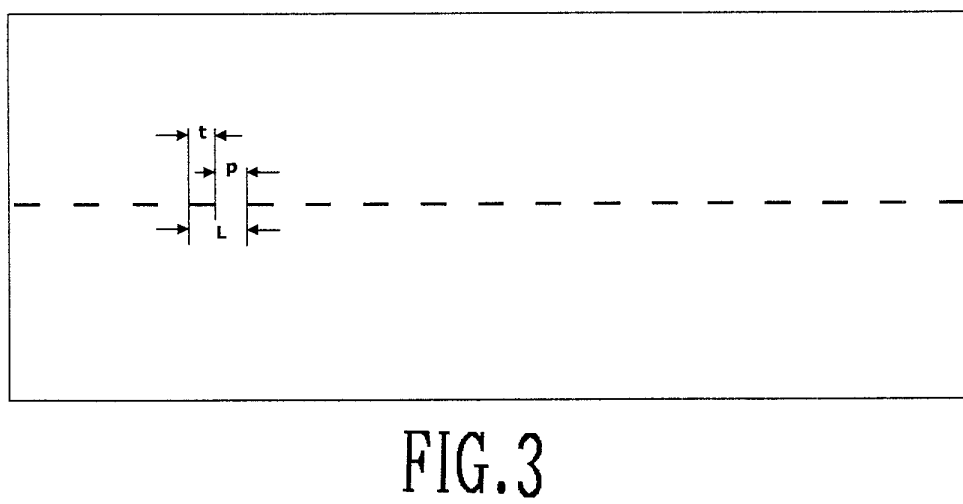
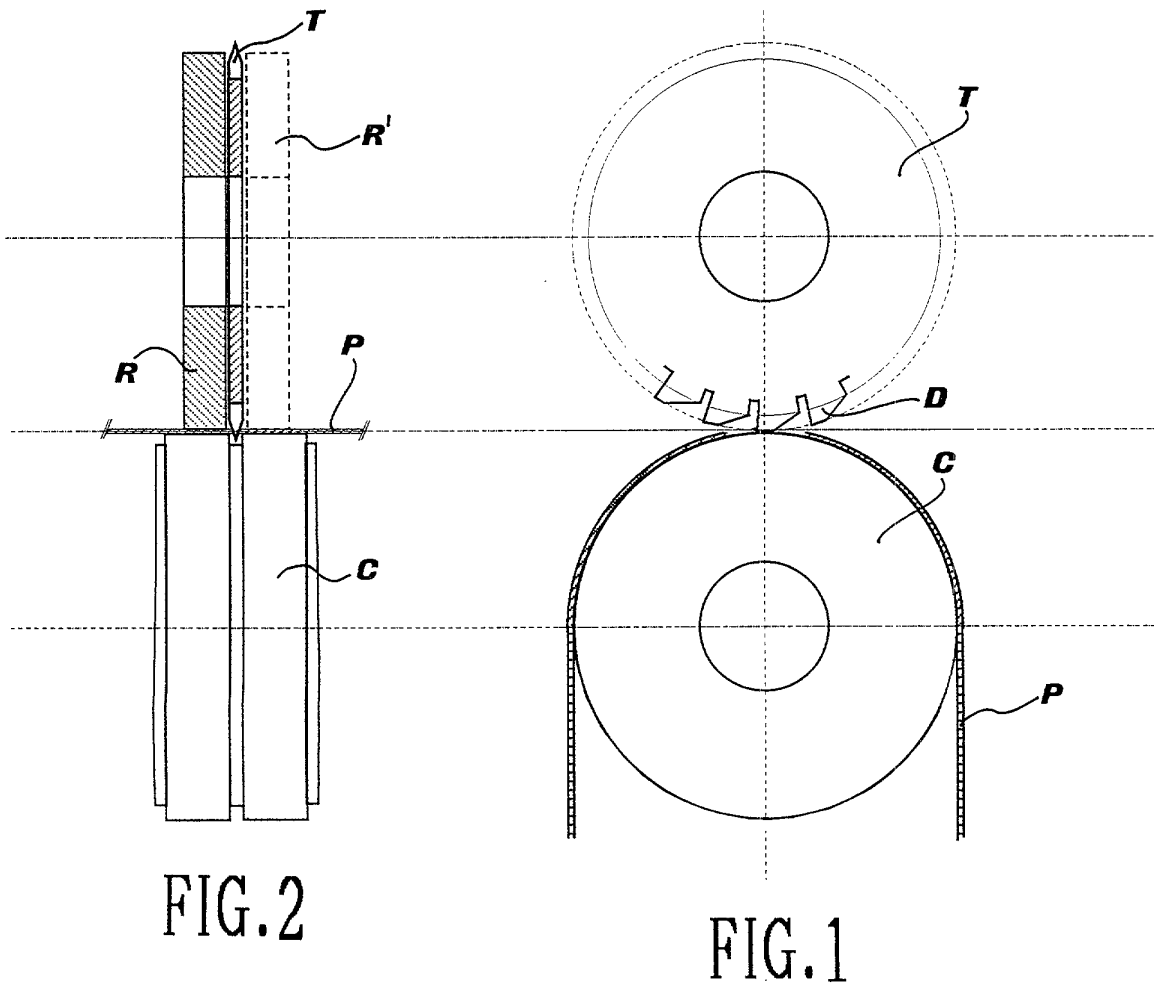
2. Heat-shrinkable film packaging as in Claim 1, wherein the incisions of one of said lines of incisions are alternated in position with respect to the incisions of another of said lines immediately adjacent thereto.
3. Heat-shrinkable film packaging as in Claim 2, wherein the distance between said incision lines is included between a minimum value of 1 mm and a maximum value equal to the uncut length of one of the incision lines, and preferably between 2 and 3 mm.
4. Heat-shrinkable film packaging as in Claim 3, wherein said lines are in number of two.
5. Heat-shrinkable film packaging, provided with an easy-opening feature, of a group of bottles arranged alongside one another in parallel rows, of the type in which a length of said film is wrapped around said group of bottles so as to present the overlapping zone of its free strips in correspondence with the bottom zone of the group of bottles, **characterized in that** in correspondence with the zones of the film included between adjacent rows of bottles, and on opposite sides with respect to the planes separating said rows of bottles, two series of incisions are performed, said incisions being parallel and spaced out from said planes and extending themselves at least on the upper portion of the packaging.
6. Heat-shrinkable film packaging as in Claim 5, wherein said series of incisions have a reciprocal distance included between 1 and 3 cm.
7. Heat-shrinkable film packaging as in Claim 6, wherein said series of incisions extend for the entire length of film and include zones without incisions, alternately positioned along the same.
8. Heat-shrinkable film packaging as in Claim 6, wherein each one of said series of incisions consists of one or more lines of aligned incisions, parallel and close one another, the incision of one of said incision lines being alternated in position with respect to the incisions of another of said incision lines immediately adjacent thereto.

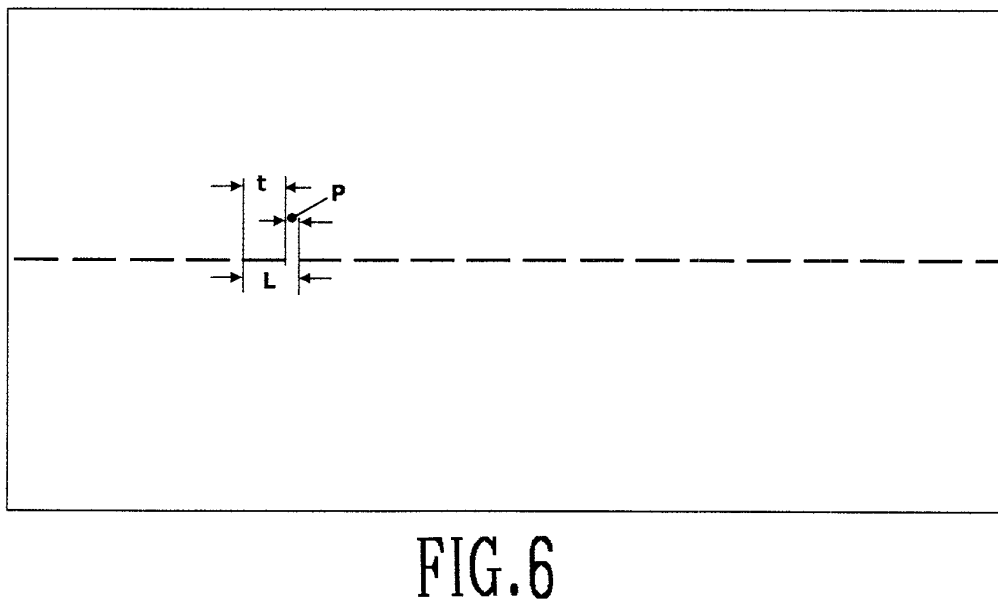
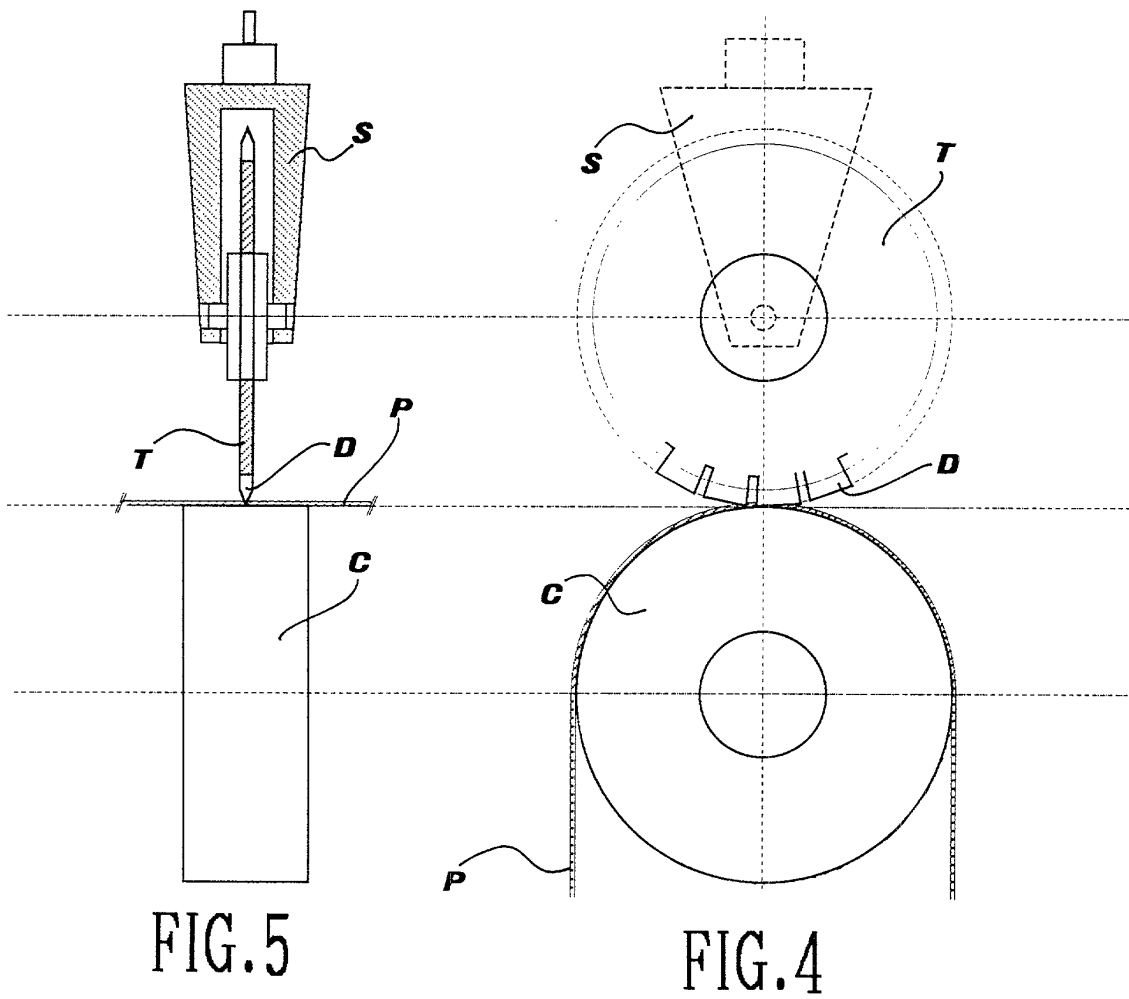
9. Heat-shrinkable film packaging as in Claim 8, wherein the distance between said incision lines is included between a minimum value of 1 mm and a maximum value equal to the uncut length of one of the incision lines, and preferably between 2 and 3 mm. 5
10. Manufacturing process of a heat-shrinkable film packaging, divisible into submultiples, of a group of bottles arranged alongside one another in parallel rows, of the type comprising the following steps: 10
- a) perform in said film a series of incisions in correspondence with a central portion of the film zones included between adjacent rows of bottles; 15
 - b) arrange an even number of bottles in a group composed by two or more adjacent and parallel rows;
 - c) wrap around said group of bottles a length of said film so as to position the overlapping zone of the free strips of the film in correspondence with the bottom zone of the group of bottles; 20
 - d) heat said length of film wrapped around the group of bottles to determine its heat-shrinking; 25
- characterised in that**
- e) each one of the series of incisions provided in step a) is performed in the film along two or more lines, parallel and close one another, of aligned incisions. 30
11. Manufacturing process of a heat-shrinkable film packaging as in Claim 10, wherein the incisions of a first of said lines are alternated in position with respect to the incisions of a second one of said lines immediately adjacent to said first line. 35
12. Manufacturing process of a heat-shrinkable film packaging as in Claim 11, wherein the distance between said lines of incisions is included between a minimum value of 1 mm and a maximum value equal to the uncut length of one of the incision lines, and preferably between 2 and 3 mm. 40
13. Manufacturing process of a heat-shrinkable film packaging as in Claim 12, wherein said lines are in number of two. 45
14. Manufacturing process of a heat-shrinkable film packaging, provided with an easy-opening feature, of a group of bottles arranged alongside one another in parallel rows, of the type comprising the following steps: 50
- a) arrange an even number of bottles in a group formed by two or more adjacent and parallel rows; 55
 - b) wrap around to said group of bottles a length of said film so as to position the overlapping zone of the free strips of the film in correspondence with the bottom zone of the group of bottles;
 - c) heat said length of film wrapped around the group of bottles to determine its heat-shrinking;
- characterised in that**, before step a), it includes the following steps:
- a) perform in said film two series of incisions in correspondence with the film zones included between adjacent rows of bottles, on opposite sides with respect to the planes separating said bottle rows, and parallel and spaced out from said planes; and
 - b) extend said series of incisions to a zone of each length of film at least corresponding to the upper region of the packaging.
15. Manufacturing process of a heat-shrinkable film packaging as in Claim 14, wherein each one of said series of incisions consists of two or more lines of aligned incisions, parallel and close one another, the incisions of one of said lines of incisions being alternated in their position with respect to the incisions of another of said incision lines immediately adjacent thereto.
16. Manufacturing process of a heat-shrinkable film packaging as in Claim 15, wherein the distance between said lines of incisions is included between a minimum value of 1 mm and a maximum value equal to the uncut length of one of the incision lines, and preferably between 2 and 3 mm.
17. Score cut equipment for sheet materials, to perform a line of aligned incisions with a freely predetermined pitch, of the type in which the sheet material proceeds between a contrast roll and a cutting disk having a cutting edge provided with interruptions, **characterised in that** to said cutting disk at least one coaxial cam disk is associated, said cams being positioned in correspondence with said interruptions of the cutting disk.
18. Score cut equipment according to Claim 17, wherein said cams have a circumferential extension not shorter than the circumferential extension of the corresponding interruptions reduced by a maximum value equal to the 2/100 of the diameter of the cutting disk.
19. Score cut equipment for sheet materials, to perform a line of aligned incisions with a freely predetermined pitch, of the type in which the sheet material proceeds between a contrast roll and a cutting disk having a cutting edge provided with interruptions,

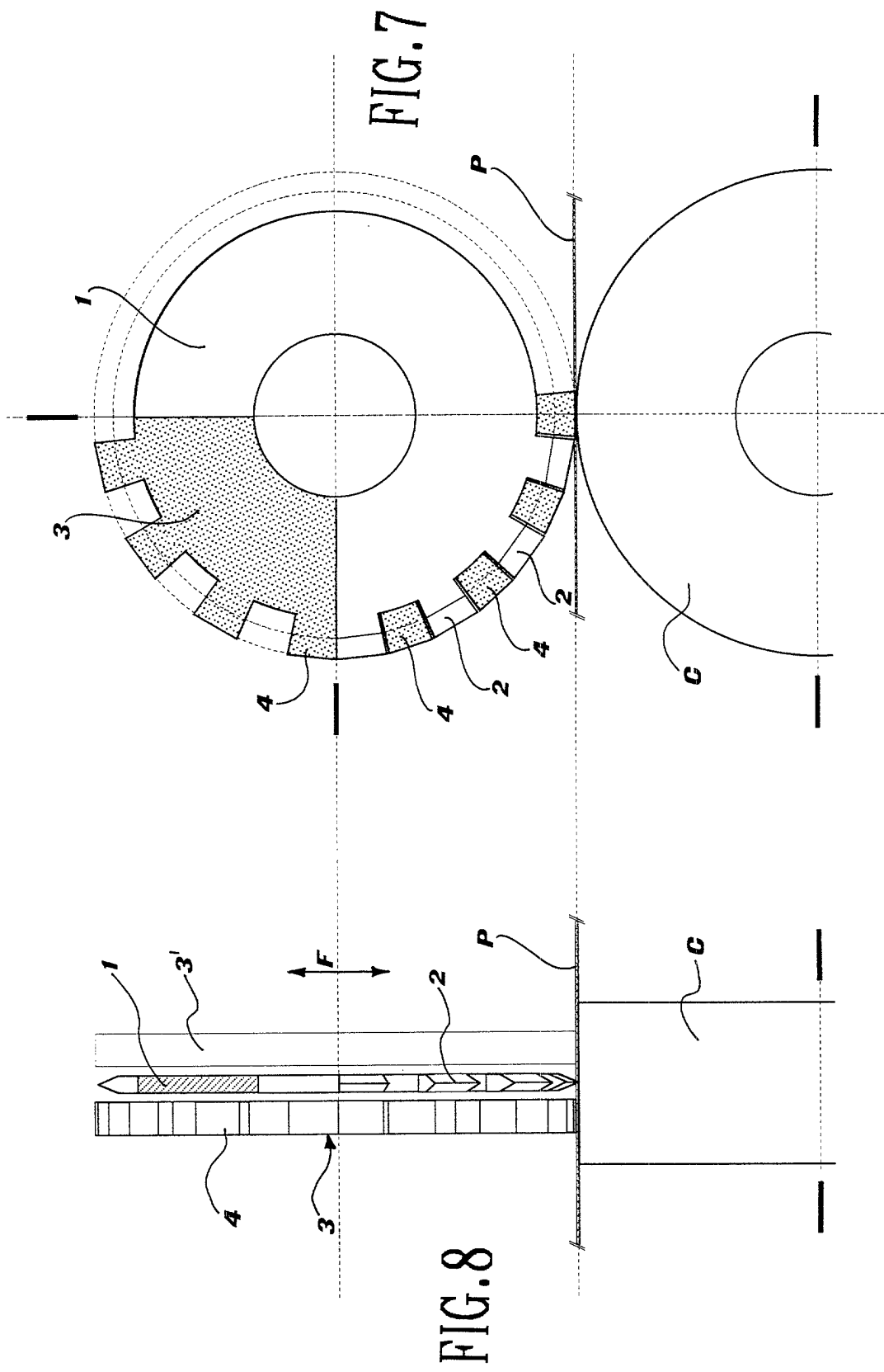
characterised in that to said cutting disk at least one coaxial supporting and driving wheel is associated, whose external rim consists of a resilient element made of an elastomeric material.

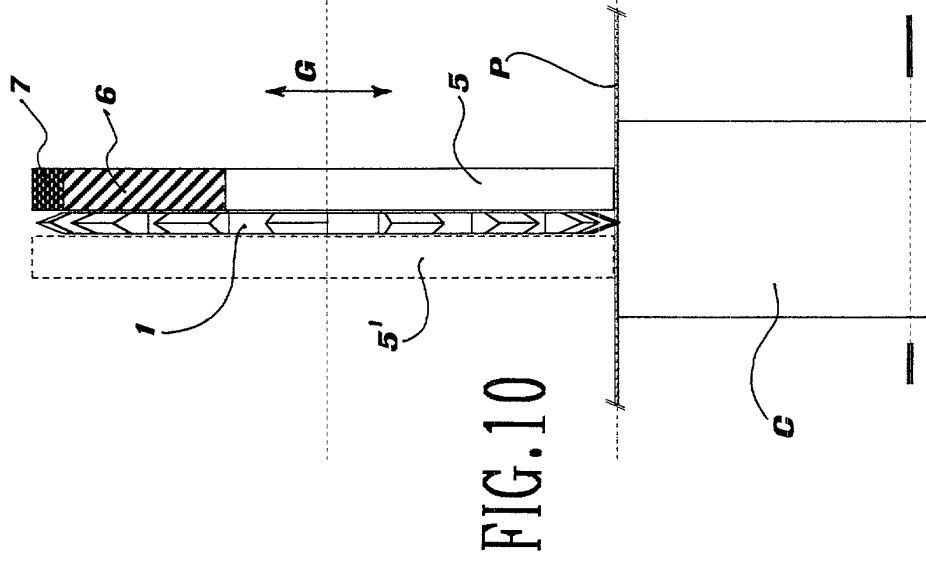
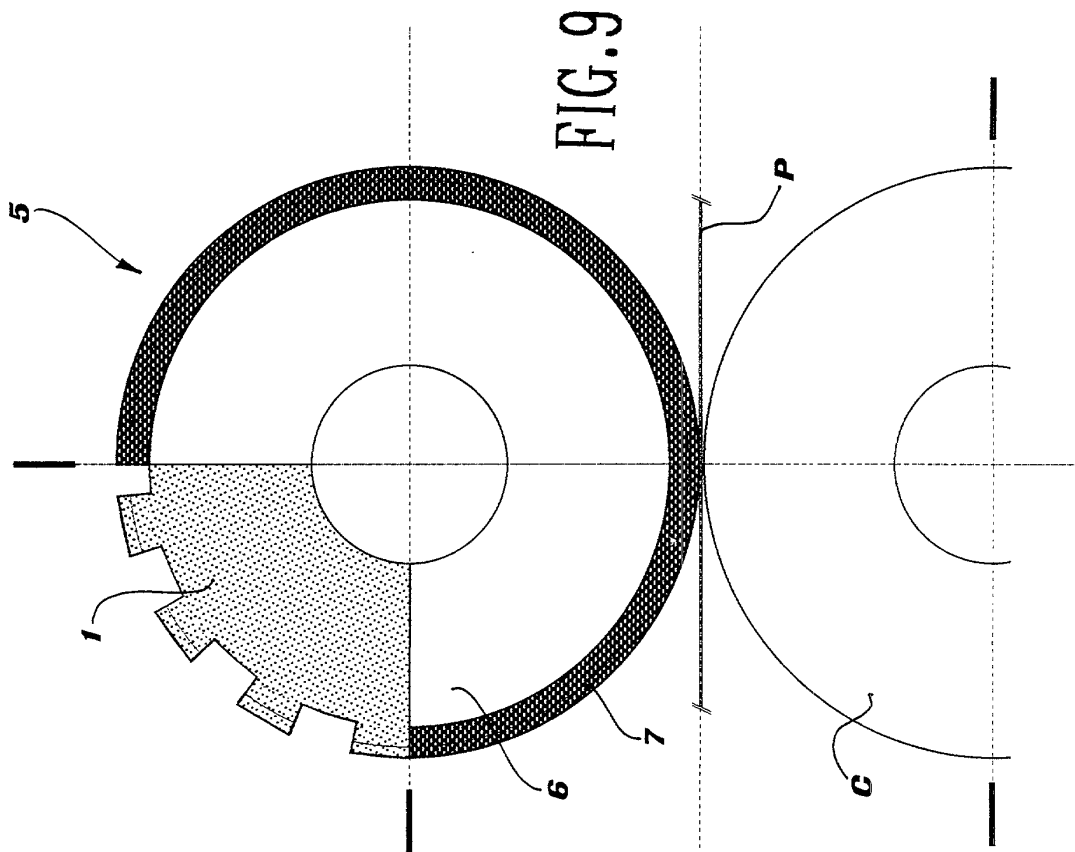
of a resilient element made of an elastomeric material.

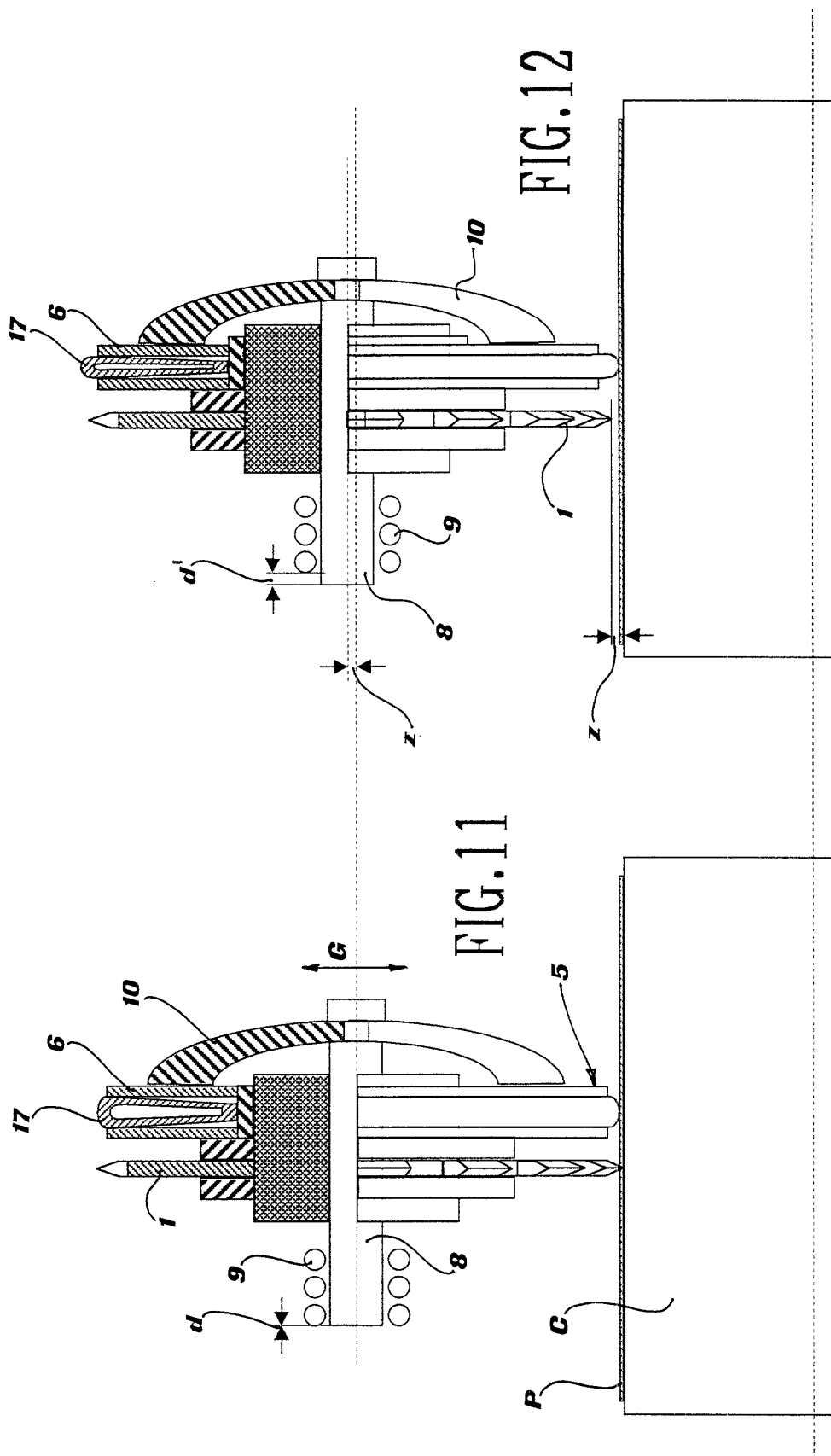
- 5
20. Score cut equipment according to Claim 19, wherein the resiliency of said elastomeric material is sufficient to allow, at the working pressure, the cutting disk to completely go through the sheet material to be cut. 10
21. Score cut equipment for sheet materials, to perform a line of aligned incisions with a freely predetermined pitch, of the type in which the sheet material proceeds between a contrast roll and a cutting disk having a cutting edge provided with interruptions, **characterised in that** to said cutting disk at least one coaxial supporting and driving wheel is associated, said wheel having a variable diameter and being provided with an internal cavity with variable volume wherein it is housed an elastomeric gasket protruding from the wheel so as to form its external supporting rim. 15 20
22. Score cut equipment according to Claim 21, wherein the volume of said internal cavity varies in response to an electromagnetic control associated to said wheel. 25
23. Score cut equipment for sheet materials, to perform two or more parallel lines of aligned incisions with a freely predetermined pitch, of the type in which the sheet material proceeds between a contrast roll and a cutting disk having a cutting edge provided with interruptions, **characterised in that** to said cutting disk one or more coaxial similar cutting disks are associated, the interruptions of each one of said cutting disks being positioned in correspondence with at least one cutting element of one of the other disks. 30 35 40
24. Score cut equipment for sheet materials, to perform two or more parallel lines of aligned incisions with a freely predetermined pitch, of the type in which the sheet material proceeds between a contrast roll and a cutting disk having a cutting edge provided with interruptions, **characterised in that** to said cutting disk are associated one or more coaxial similar cutting disks and at least 45 50
25. Score cut equipment according to Claim 24, wherein said cutting disks are two and said supporting wheel is interposed between them.
26. Score cut equipment according to Claims 17 or 18, wherein to said cutting disk and to said cam disk one coaxial supporting and driving wheel is associated, said wheel having an external rim consisting

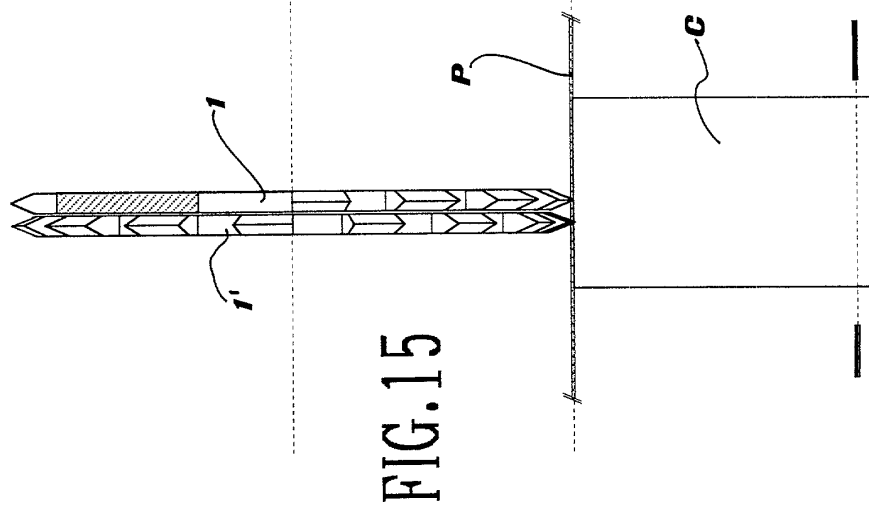
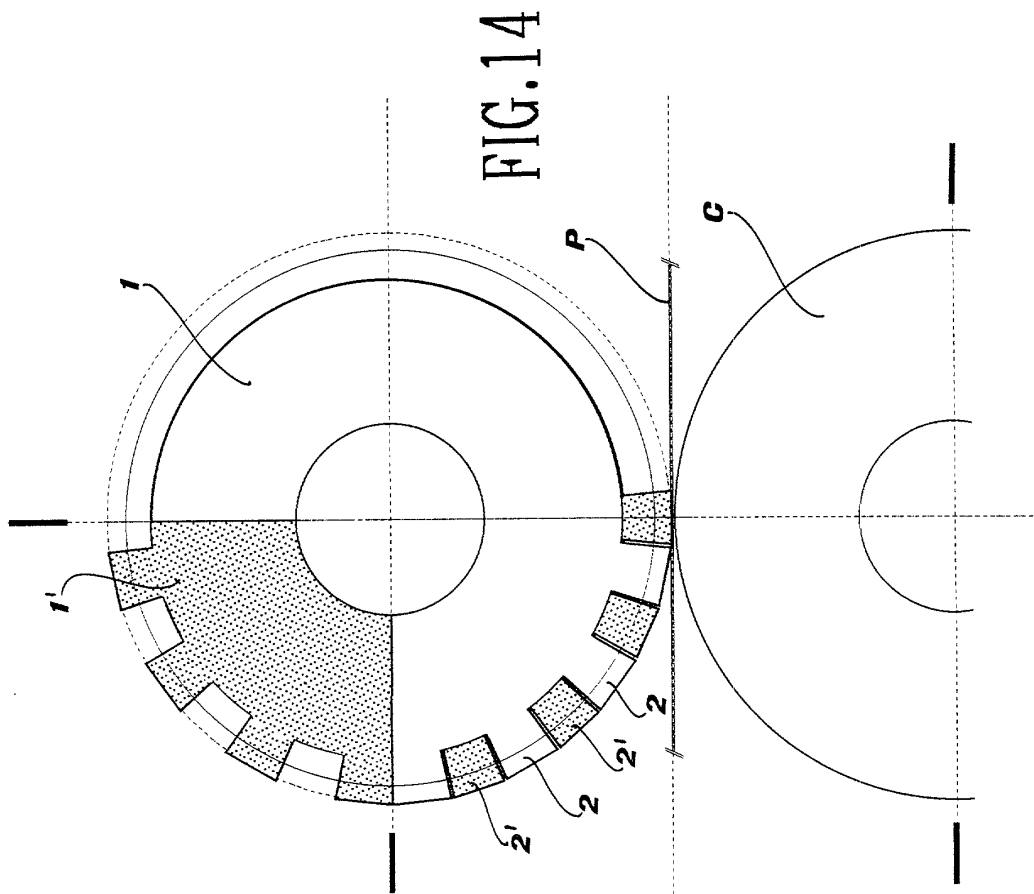












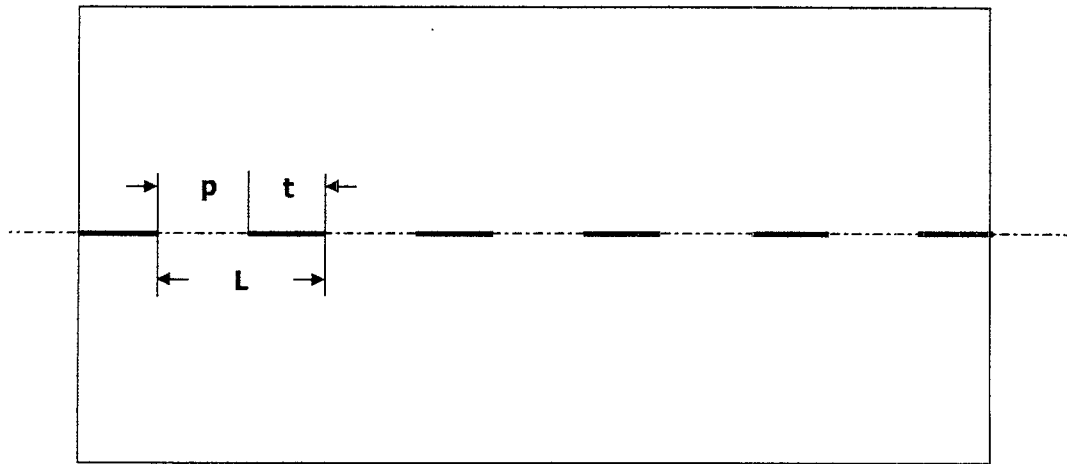


FIG. 13

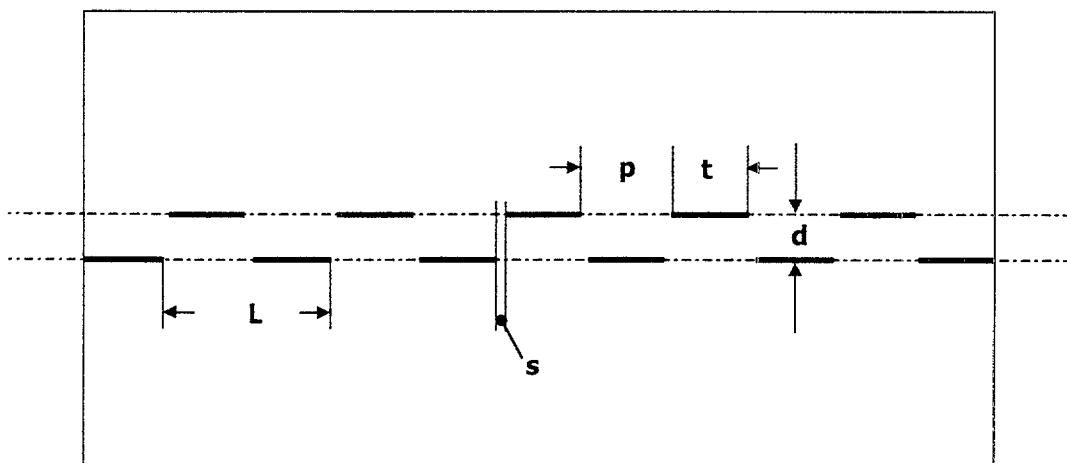


FIG. 16

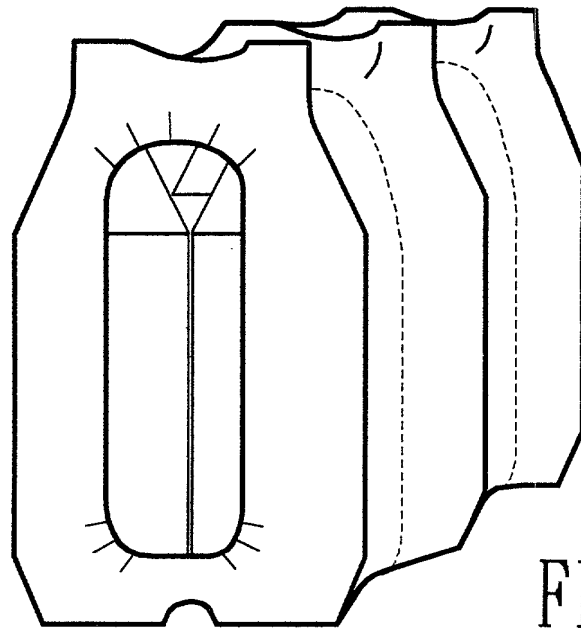


FIG. 17

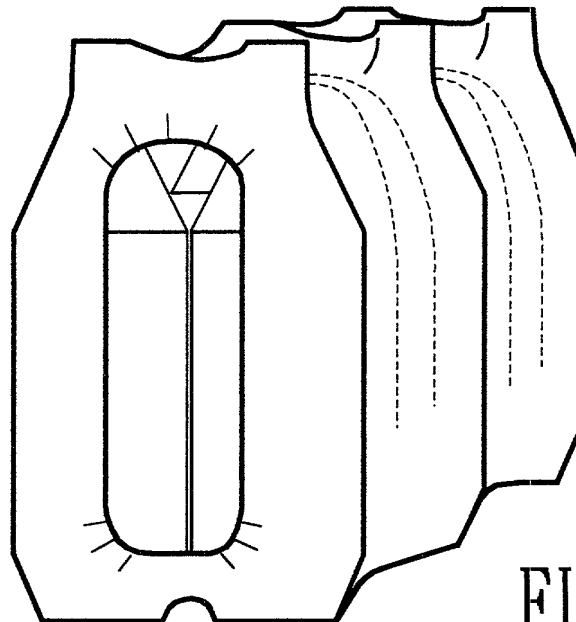


FIG. 18

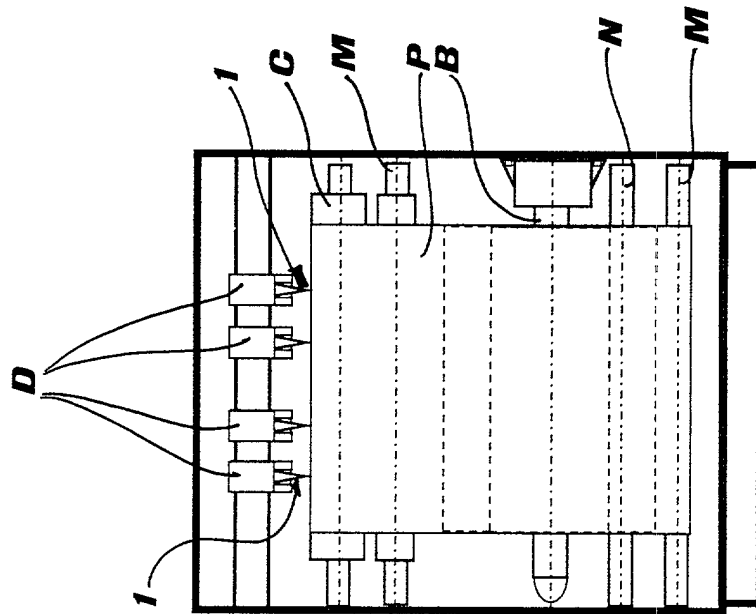


FIG. 19

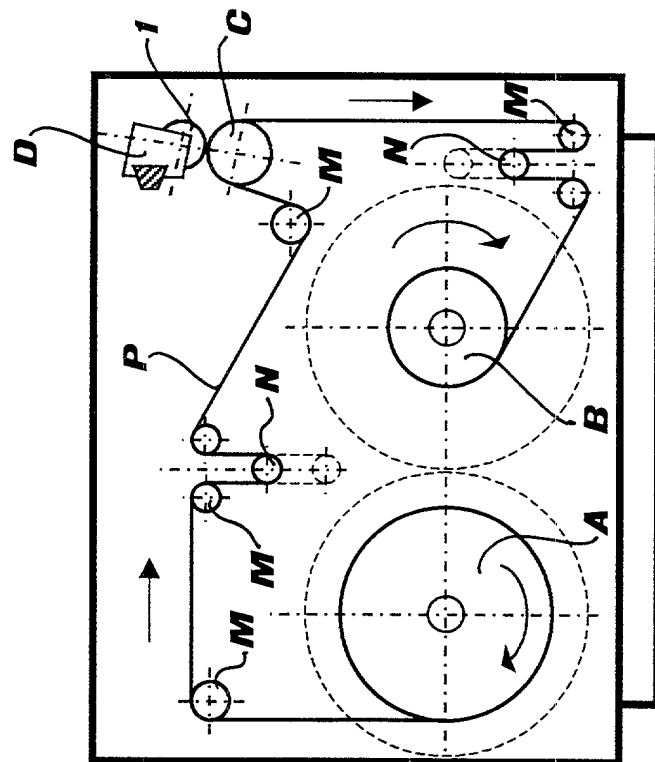


FIG. 20



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EUROPEAN SEARCH REPORT

Application Number
EP 01 83 0790

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.7)
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X	PATENT ABSTRACTS OF JAPAN vol. 2002, no. 04, 4 August 2002 (2002-08-04) -& JP 2001 334495 A (HARADA TOYOHICO), 4 December 2001 (2001-12-04) * abstract *	23-25	TECHNICAL FIELDS SEARCHED (Int.Cl.7) B65D B26F
X	PATENT ABSTRACTS OF JAPAN vol. 016, no. 578 (M-1346), 17 December 1992 (1992-12-17) -& JP 04 226899 A (NIPPON PETROCHEM CO LTD), 17 August 1992 (1992-08-17) * abstract *	23-25	
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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 2 October 2002	Examiner Fournier, J
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 83 0790

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.7)
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A	WO 01 32527 A (ONO TADASHI ;KATORI SHOJI (JP); KAWANO TOMOTAKA (JP); KOU DA MINORU) 10 May 2001 (2001-05-10) * figures *	1	
A	US 6 050 058 A (LORETO CORRADO ET AL) 18 April 2000 (2000-04-18) * figures *	1	
A	EP 0 376 793 A (EVIAN EAUX MIN) 4 July 1990 (1990-07-04) * figures *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 2 October 2002	Examiner Fournier, J
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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Application Number

EP 01 83 0790

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☒ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
1-16, 23-25
- ☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



European Patent
Office

**LACK OF UNITY OF INVENTION
SHEET B**

Application Number
EP 01 83 0790

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-16

Subject I (claims 1-16) relates to a heat-shrinkable film packaging and to a process for manufacturing a heat-shrinkable film packaging.

2. Claims: 17-18, 26

Subject II (claim 17-18, 26) relates to a score cut equipment having a cutting disc associated to a coaxial cam disk.

3. Claims: 19, 20, 21, 22

Subject III (claim 19, 20, 21, 22) relates to a score cut equipment with a cutting disk associated to at least one coaxial supporting and driving wheel having an external rim comprising elastomeric material.

4. Claims: 23, 24, 25

Subject IV (claim 23, 24, 25) relates to a score cut equipment having a plurality of cutting disks.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 01 83 0790

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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