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**VFFS/HFFS packaging with opening aid on the longitudinal seam and process of making such a packaging**

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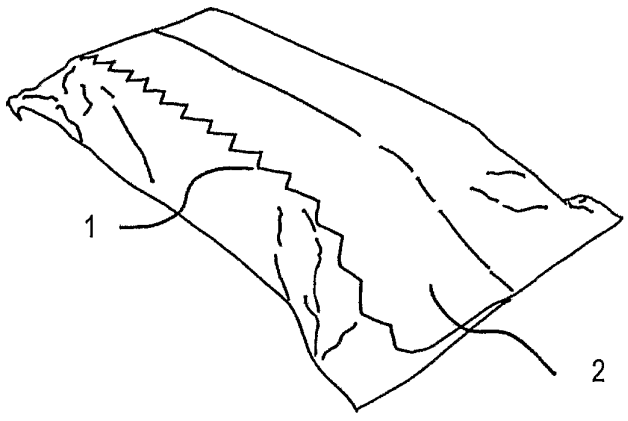
(54) Title: VFFS/HFFS PACKAGING WITH OPENING AID ON THE LONGITUDINAL SEAM AND PROCESS OF MAKING SUCH A PACKAGING




(57) Abstract: The present invention is related to a VFFS/HFFS packaging comprising a plastic film, a longitudinal seam (2) and a cross-directional seam (5), wherein the longitudinal seam comprises a continuous teeth structure (1) of adjacent notches representing tear initiations over the whole length of the longitudinal seam to enable easy opening of said packaging. The present invention is also related ot a process of making such a packaging, said process starting out from a reel comprising a continuous teeth structure on its lateral edges.The present invention is also related to a process of making such a packaging said process starting out from a reel comprising a continuous teeth structure on its lateral edges.

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**Description**

**Field of the invention**

**[0001]** The present invention relates to flexible packaging and in particular to vertical and horizontal form, fill and seal packaging (VFFS/HFFS) with a continuous teeth structure on the longitudinal seam of said packaging.

**State of the art**

**[0002]** VFFS/HFFS packaging machine reels exhibit in the extrusion direction of the plastic film uncontrolled tear behaviour and the tear tends to continue in the extrusion direction. The majority of VFFS/HFFS packagings are positioned in a way that the length of the pack is parallel to the extrusion direction of the film. The consequence of this positioning is that the cross seam or transversal seam of the packaging generally comprises the opening initiations of the packaging. The mostly used opening initiations are uninterrupted teeth structures in the cross seam of the VFFS/HFFS packaging. The opening of the pack at the top of such a VFFS/HFFS packaging including a teeth structure as opening initiations, as mentioned above, often leads to uncontrolled tear in the extrusion direction of the plastic film (machine direction).

**[0003]** In the prior art, several documents present opening initiations such as "V-shaped" incisions or notches on the longitudinal seal.

**[0004]** Document US 5,409,115 discloses a tubular bag packaging for bandage-like material. This packaging exhibits at least one opening initiation on the longitudinal seam positioned between continuously recurring longitudinal spaces with tear-off tongs between notches for tearing limiting one another. In this packaging, the teeth structure is interrupted by longitudinal spaces defining tear-off tongs of possibly different widths. The opening initiation structure on the longitudinal seam is achieved during the VFFS/HFFS process, which slows down the packaging speed. Furthermore, this kind of opening initiation on the longitudinal seam generates scrap in the VFFS/HFFS process because material is removed.

**[0005]** Document CH 651 795 A5 discloses a VFFS/HFFS packaging with opening initiations in the longitudinal seam of said packaging. In this case, the opening initiations are cut incisions present on determined positions of said seam. No material is

removed in this technique. Nevertheless, the teeth structure is not a continuous and uninterrupted structure. A continuos teeth structure allows the tear of the packaging in a transverse direction to the extrusion direction (machine direction) at any position of the seam. Furthermore, the incisions have to be achieved during the VFFS/HFFS process, again slowing down the packaging speed.

**[0006]** Document EP 0 400 577 A1 discloses micro-cuts in the side margin. This type of micro-cuts represents non-controllable tear initiations for oriented polymer films.

**Aim of the invention**

**[0007]** The present invention aims to provide a VFFS/HFFS packaging with a continuous teeth structure on the longitudinal seam, said teeth structure being present from the beginning on the packaging machine reel and therefore independent of the packaging process itself, the technique of the present invention having therefore no influence on the packaging speed and generating no additional scrap.

**Summary of the invention**

**[0008]** The present invention discloses a vertical/horizontal form, fill and seal packaging comprising a plastic film, a longitudinal seam and a cross-directional seam, characterised in that the longitudinal seam comprises a continuous teeth structure of adjacent notches with no remaining horizontal cutting lines, representing tear initiations over the whole length of the longitudinal seam, said packaging being obtained by a plastic film comprising on both lateral edges said continuous teeth structure before being formed into a tube in the VFFS/HFFS packaging process.

**[0009]** In a particular embodiment of the present invention, **said** packaging further comprises tear initiations on the cross directional seam.

**[0010]** Preferably, said tear initiations on the cross directional seam comprises a continuous teeth structure.

**[0011]** Generally, the longitudinal seam is a fin seal or a lap seal.

**[0012]** In practice, the lap seal presents a seal-free continuous teeth structure.

**[0013]** The present invention further discloses a VFFS/HFFS packaging process comprising the step of unwinding a reel of a plastic film, characterised in that

said reel comprises a continuous teeth structure on the lateral edges of said reel, said continuous teeth structure forming in the finished package tear initiation over the whole length of the longitudinal seal avoiding additional scrap in the VFFS/HFFS packaging process.

**[0014]** A key feature of the process of the present invention is that said process is a packaging material waste-free process, except for the usual side-slitting waste of said reel.

**[0015]** Furthermore, the VFFS/HFFS packaging process is characterised in that the continuous teeth structure on the lateral edges is performed by rotary knives having a substantially continuous teeth structure.

**Short description of the drawings**

**[0016]** Fig. 1 shows a VFFS/HFFS packaging with a continuous teeth structure of adjoining notches on the cross seam as usually produced in the prior art.

**[0017]** Fig. 2 shows a VFFS/HFFS packaging with a continuous teeth structure of adjoining notches on the longitudinal seam according to the invention.

**[0018]** Fig. 3 shows another example of a VFFS/HFFS packaging bag with a continuous teeth structure of adjoining notches on the longitudinal seam according to the invention.

**[0019]** Fig. 4 shows the same packaging as that of Fig. 3 with the particular opening possibility by tearing the packaging in the cross-direction to the extrusion direction of the plastic film.

**[0020]** Fig. 5 shows a VFFS/HFFS packaging machine reel where the teeth structure of adjoining notches is present on the reel to be used on the VFFS/HFFS machine.

**[0021]** Fig. 6a shows a diagrammatic representation of the length necessary for a VFFS/HFFS packaging on the unwound reel if the teeth structure of adjoining notches is present at the top of the packaging.

**[0022]** Fig. 6b shows the length of the VFFS/HFFS necessary on the reel if the teeth structure of adjoining notches is present on the lateral side of the web.

**[0023]** Fig. 7 shows a VFFS/HFFS process where the reels used have a lateral teeth structure of adjoining notches.

[0024] Fig. 8 shows the cutting of an extrusion film in different strips where the teeth structure of adjoining notches is achieved by rotary slitting knives exhibiting a teeth structure.

[0025] Fig. 9a shows a teeth structure present in the cross direction of the extrusion direction (E.D) and a dotted line showing the privileged tear direction.

[0026] Fig. 9b shows the teeth structure of adjacent/adjoining notches laterally present on the VFFS/HFFS packaging machine reel where the privileged tear directions of the film are represented in dotted lines.

[0027] Fig. 10 shows a longitudinal seam of a VFFS/HFFS packaging where the teeth structure of adjacent notches is not perfectly superposed.

**Detailed description of the invention**

[0028] The present invention discloses a VFFS/HFFS packaging with a continuous teeth structure present at least on the longitudinal seam of said packaging. The expression "continuous teeth structure" should be understood as substantially non-interrupted "V-shaped" incisions also called adjacent notches or adjoining notches as shown on the different figures relating to the present invention. The expression "adjoining notches" or "adjacent notches" are indistinctly used in the text.

Such a teeth structure is created simultaneously with the cutting of the extrusion film into the right width for the packaging machine reels. The first side of the film cut in a "V-shape" representing the counterpart of the second side, in such a way that no horizontal cutting lines remain, allowing a scrap-free cutting (see Fig. 8). In US 5,409,115, the cutting leaves cutting lines that are parallel to the seam, which does not allow the tear of the film at any place. Furthermore, the cutting of the film in US 5,409,115 generates scrap and has to be performed during the packaging operation to build proper tear-off tongues.

[0029] There are different possibilities for creating such a teeth structure by means well-known by those skilled in the art (laser cutting, water-jet cutting, rotary-knife cutting, etc.). The teeth structure can consist of big or small adjacent notches, depending on the application.

[0030] In the prior art, the teeth structure in the cross seam of the packaging is achieved by a cutting device during the cross seal and cutting operation. If the notches are big, the sealing bars in the cross seal must be much more spread than if

the cross-cutting was a straight cutting, this is well known by those skilled in the art. The consequence of this spread is a globally higher length of the packaging representing loss of packaging material. By positioning the continuous teeth structure on the lateral edges of the reel, the global length of the packaging is reduced by a length X, where X represents up to 10%. This principle is shown on Fig.6a (prior art) and 6b (invention).

**[0031]** The teeth structure interrupted by recurring longitudinal spaces to build tear-off tongs, as shown in document US 5, 409,115, requires the cutting-away of material and generates waste during the process. As mentioned above, the generation of scrap in a VFFS/HFFS process is a major drawback. In the case of the present invention, the continuous teeth structure is directly available on the reel (see Fig.5) with no scrap, except for the usual side-slitting waste Y, as shown on Fig.8.

**[0032]** Therefore, the first reason for positioning the continuous teeth structure on the longitudinal seam is that the total length of the VFFS/HFFS packaging can be reduced up to 10%, which represents a considerable packaging material saving, without generating any additional scrap.

**[0033]** The second reason for positioning the continuous teeth structure on the longitudinal seam is the possibility to tear the pack in a transverse direction to the extrusion direction of the film (see figure 9a and 9b). This allows a more predictable opening and sometimes a particular opening of the packaging as shown in figure 4. The fact that the teeth structure is a continuous structure further allows a tear at any position on the longitudinal seam.

**[0034]** The manufacturing of such packaging machine reels is shown in Fig. 8. The side-slitting scrap Y is always present, even in traditional cutting, and kept as small as possible.

**[0035]** A finished reel is shown in Fig. 5 and its use on a VFFS/HFFS packaging machine is shown in Fig. 7.

**[0036]** The presence of the teeth structure on the machine reel has no influence on the running speed of the packaging machine because the cutting knife does not slow down the VFFS/HFFS process.

**[0037]** The fact that the teeth structure is present from the beginning on the machine reel has the consequence that the teeth structure of both sides of the reel is never perfectly superposed 8 on the longitudinal seam, as it is in Document US 5,409,115. This is represented in figure 10. Nevertheless, this has no effect on the tear

possibilities in the cross direction of the extrusion direction of the plastic film because the tear initiation is still present.

**[0038]** An additional advantage of the present invention is a positive influence on tamper evidence for peel opening. In a prior art VFFS/HFFS packaging, the cross sealed top can be peeled open by pulling on the fin seal of said packaging. If the longitudinal seams (seals) are equipped with a continuous teeth structure, the pack will start to tear at the longitudinal edge before the peeling can start. This makes it almost impossible to peel and reseal the pack without tearing it assuring in this way a certain tamper proof (tamper evidence).

**[0039]** The plastic materials suitable for VFFS/HFFS packaging produced via a reel equipped with a continuous teeth structure are not limited. Representative examples widely used in the market are BOPP, PET, PS, PE, PA, CPP, mono or multilayer combinations as well as laminates with paper or metallized films, etc.

**Legend**

1. Continuous teeth structure of adjacent notches
2. Longitudinal seam of the VFFS/HFFS packaging
3. Torn piece on a VFFS/HFFS packaging with tearing in the cross direction to the extrusion direction
4. Plastic film cut in the right width for the packaging machine reel
5. Cross directional seam of the VFFS/HFFS packaging
6. Sealing bars on the VFFS/HFFS process
7. Rotary knives for cutting the teeth structure
8. Not perfectly superposed continuous teeth structure

## CLAIMS

1. Vertical/horizontal form, fill and seal packaging comprising a plastic film, a longitudinal seam (2) and a cross-directional seam (5), characterised in that the longitudinal seam (2) comprises a continuous teeth structure of adjacent notches (1) with no remaining horizontal cutting lines, representing tear initiations over the whole length of the longitudinal seam (2) said packaging being obtained by a plastic film comprising on both lateral edges said continuous teeth structure (1) before being formed into said packaging in the VFFS/HFFS packaging process.

2. VFFS/HFFS packaging as recited in claim 1, characterised in that said packaging further comprises tear initiations on the cross directional seam (5).

3. VFFS/HFFS packaging as recited in claim 2, characterised in that said tear initiations on the cross directional seam (5) comprises a continuous teeth structure (1).

4. VFFS/HFFS packaging as recited in claim 1, characterised in that the longitudinal seam (2) is a fin seal or a lap seal.

5. VFFS/HFFS packaging as recited in claim 4, characterised in that the lap seal presents a seal-free continuous teeth structure (1).

6. VFFS/HFFS packaging process comprising the step of unwinding a reel of a plastic film, characterised in that said reel comprises a continuous teeth structure (1) on the lateral edges of said reel, said continuous teeth structure forming in the finished package tear initiation over the whole length of the longitudinal seal avoiding additional scrap in the VFFS/HFFS packaging process.

7. VFFS/HFFS packaging process as recited in claim 6, characterised in that said process is a packaging material waste-free process, except for the usual side-slitting waste of said reel.

8. VFFS/HFFS packaging process as recited in claim 6, characterised in that the continuous teeth structure (1) on the lateral edges is performed by rotary knives having a substantially continuous teeth structure.

Figure 1

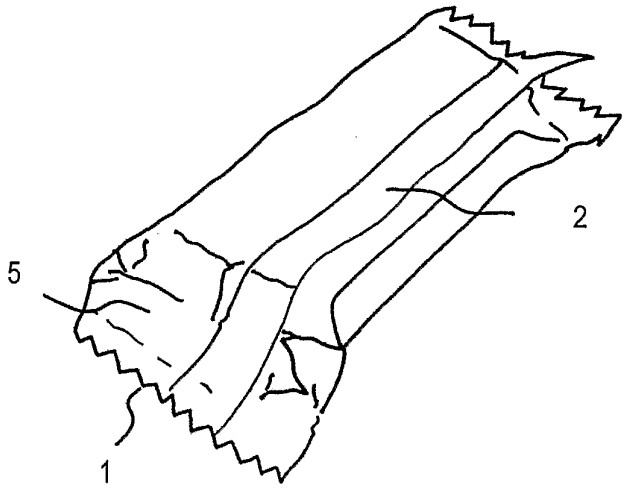



Figure 2

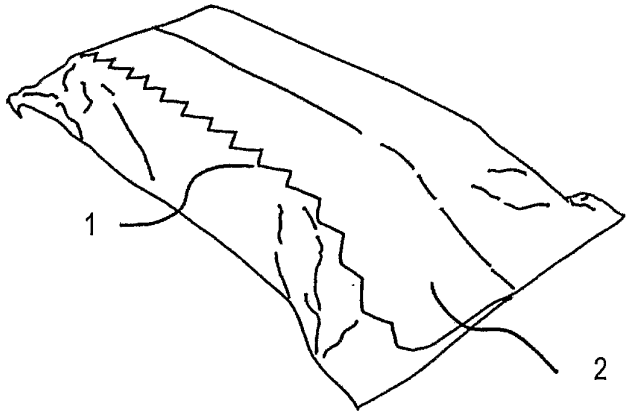


Figure 3

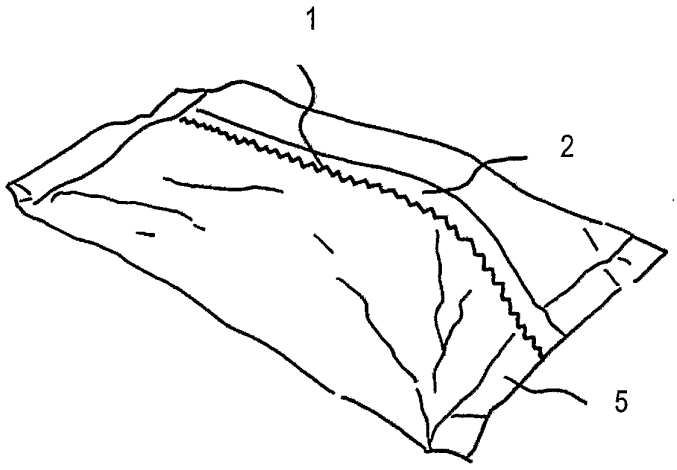



Figure 4

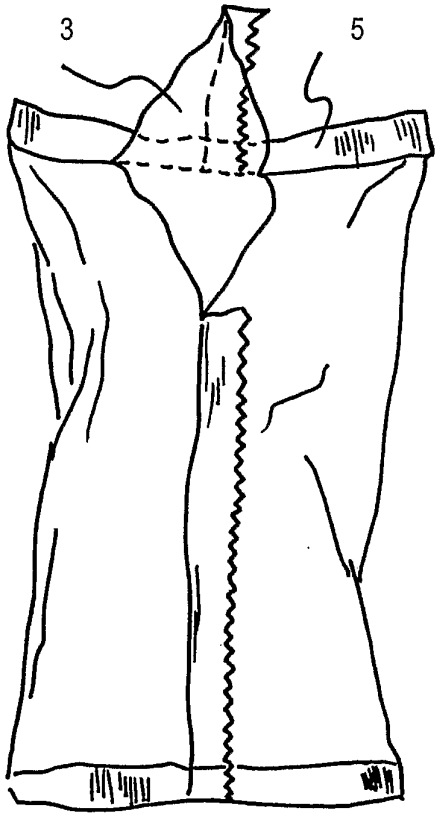


Figure 5

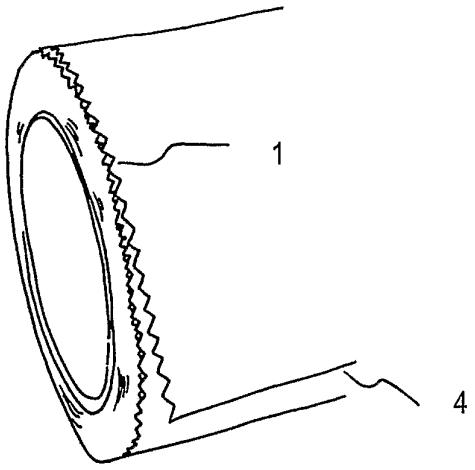
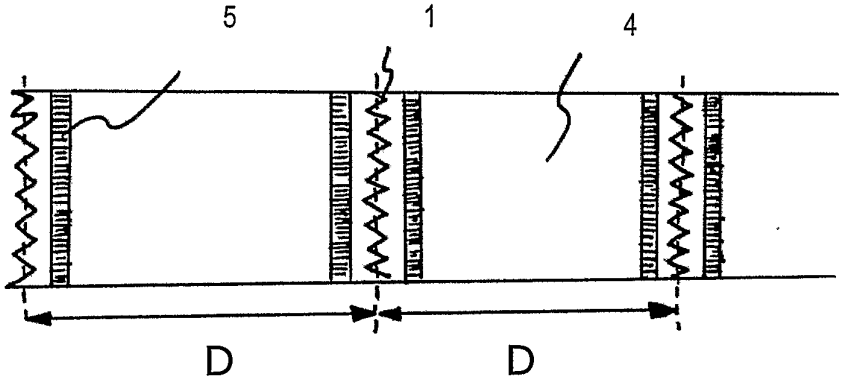



Figure 6 (a,b)

(a)




(b)

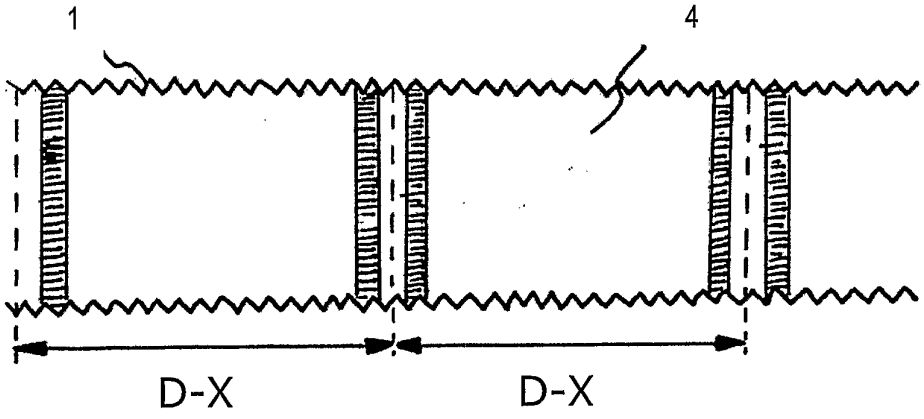


Figure 7

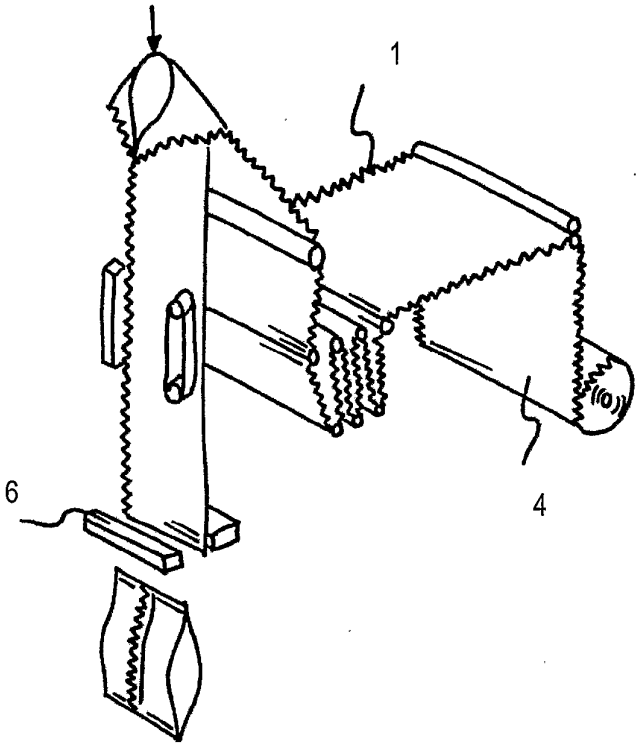



Figure 8

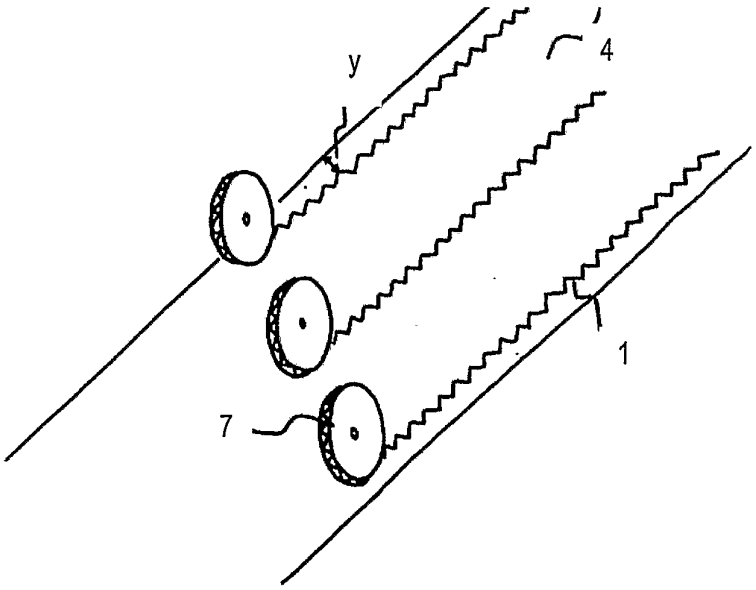


Figure 9

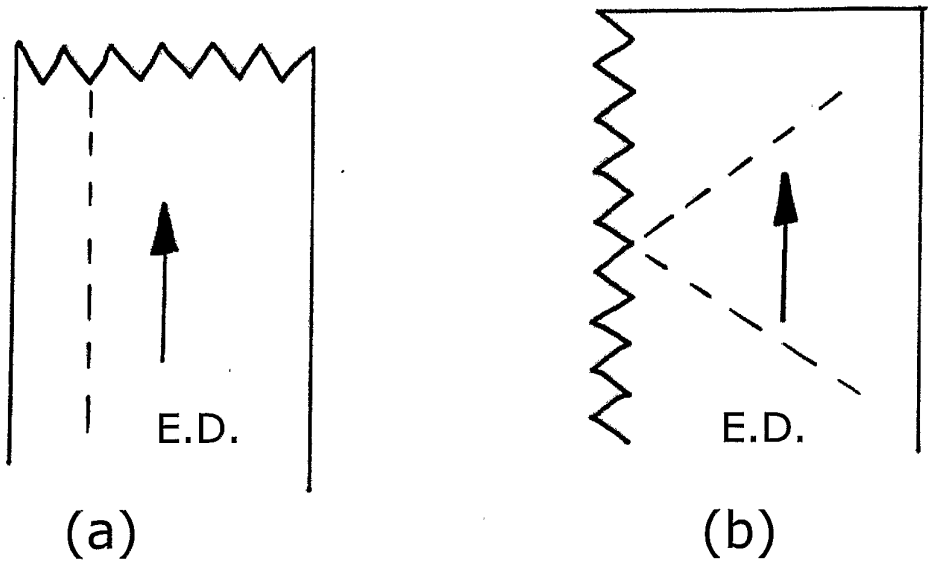



Figure 10