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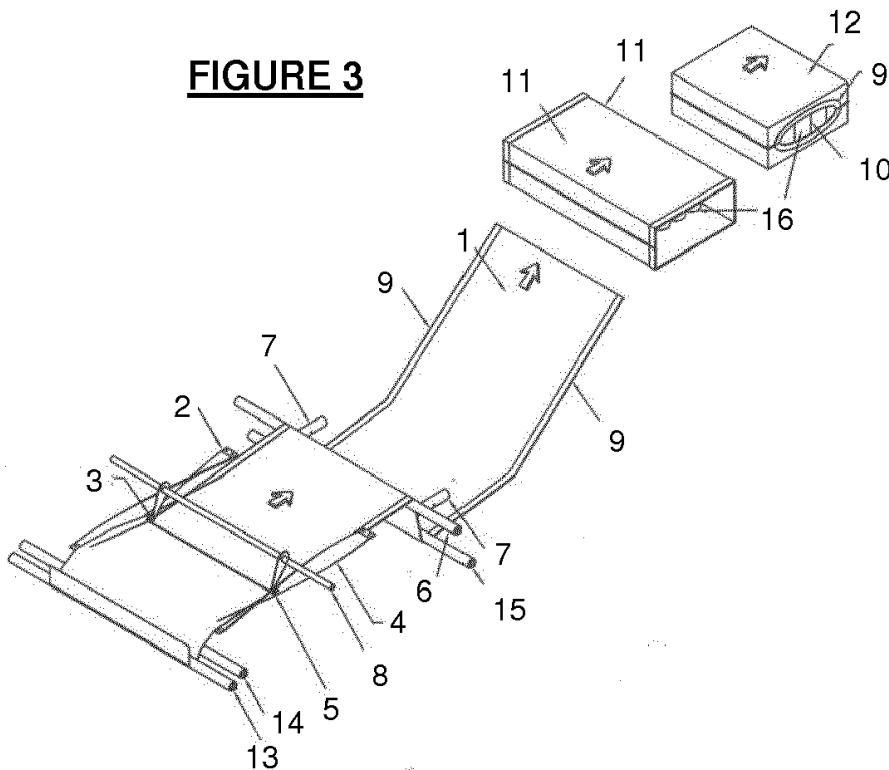
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(54) **HEAT SHRINK FILM WITH INCREASED TEAR STRENGTH**

(57) This invention provides a process and apparatus (3, 4, 5) for folding the film edges of a heat shrink film to create an overlap (9) whereby the tear strength of openings in a bundle wrapped with heat shrink film.

**FIGURE 3**



## Description

### Field of the Invention

**[0001]** This invention is related to film wrapping bundles of articles or articles with heat shrink film by providing a film having better tear strength when lifting the bundle. A bundle is defined to include an article or a collection of articles.

### Background of the Invention.

**[0002]** After heat shrinking a film wrapped bundle moving on a conveyor, the sides of the bundles are not covered with the film. This creates an opening on each side of the bundle for manually lifting the bundle by gripping the film through the opening. British Patent GB 1,341,644 discloses that to reduce the risk of tearing during the manually lifting of the bundle, the edges of the film can be folded. This reference does not describe an enabling disclosure of an apparatus or a teaching how the folded edges can be achieved.

**[0003]** The objective of this invention is to provide a commercial process and apparatus for folding the film edges of a thin film to create an overlap whereby the tear strength of the openings is substantially increased.

### Brief Description of the Drawings

#### [0004]

Fig 1 shows an unshrunk film moving on a conveyor having a twisted plate to lift the film and to fold the edges of the film.

Fig 2 shows a static seal and film folding rollers.

Figure 3 shows a heat shrunk film wrapped bundle having folded edges.

Figure 4 shows a film roller pressing against the film as the film moves on the twisted plate.

### Detailed Description of the Invention

**[0005]** Figures 1, 2 and 3 show a heat shrink film 1 leaving film folding rollers 14 and 15 and moving on top of a film folding twisted plate 2, 4. Twisted plate 2, 4 lifts and turns the edge of the moving film upward to establish a fold point for overlapping the edge of the film. The twisted plate causes the edge of the film to fold from its upward position to overlap the film. The overlapping of the film causes the folded film to move underneath the twisted plate. Film folding rollers 3 and 5 press down on film 1 to establish the desired width of the film overlap. A wider fold is formed as the film formed roller 3 and 5 increases the distance the film 1 is lowered. The location of film roller on the film with respect to the twisted plate point

can be anywhere adjacent the length of the twisted plate as long the width of the fold can be adjusted by lowering the film. Preferably the location of the roller on the film is adjacent the length of the twisted plate at its midpoint.

5 Rollers 3 and 5 can be substituted by a single roller running across the film. Afterward film 1 with folded edges 9 is moved over roller 6 to an electrostatic sealer 7 where the fold is sealed. The film with the sealed folds is used to film wrap a bundle 16 of containers at film wrapping station 11. After film wrapping, the bundle 16 is conveyed to a heat shrink tunnel 12 where the folded edges 9 of the film form an opening 10 where the folded edges provide a tear resistant opening after heat shrinking. Fig 4 shows a film folding roller support rod 8 supporting film folding rollers 3 and 5 while pressing against film 1.

**[0006]** Usually a one inch fold is sufficient to achieve a desired tear strength Other sealing devices can be used such as heat or glue to maintain the fold. The heat shrink film with the folded edges can be substituted for any film used for film wrapping bundles or articles with a heat shrink film. US Patent 9,216,832 issued on December 22, 2015, US Patent 7,836,670 issued on November 23, 2010 and US Patent 6,761,014 issued on July 13, 2004 invented by Alain Cerf are incorporated by reference in their entirety. These patents show various conventional film wrapping bundle technologies such as film wrapping and heat shrinking. During heat shrinking the folded edges can bond together to further increase the tear resistance when manually lifting the product.

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### Claims

1. A process for increasing the tear resistance of a heat shrunk film at an opening at the sides of a film wrapped bundle, the process comprising,

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forming an edge folded heat shrink film while the film is moving by lifting the edges of the film upward to establish a fold point and then folding the lifted edges to overlap the film;  
pressing the film to lower the position of the film to establish a desired width of the overlap;  
film wrapping the bundle, and  
heat shrinking the film wrapping the bundle.

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2. A process according to claim 1 including sealing of the folded edges to maintain the fold in a proper position.

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3. A process according to claim 2 wherein the sealing of the folded edges comprises electrostatic sealing of the folded edges.

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4. A process according to claim 1 where the bundle is film wrapped.

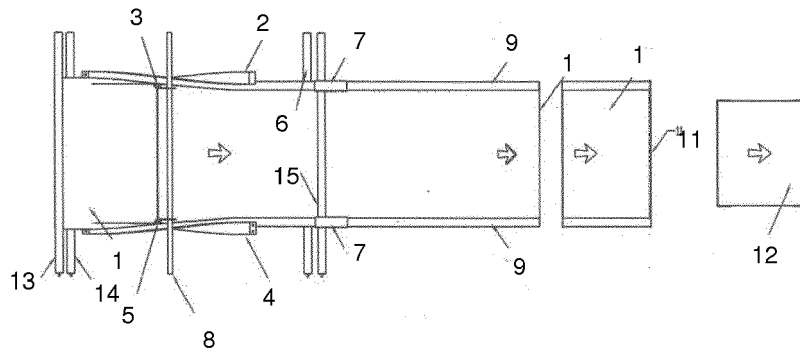
5. A process according to claim 4 wherein the film

wrapped bundle is conveyed to a heat shrink tunnel where the film is heat shrunk.

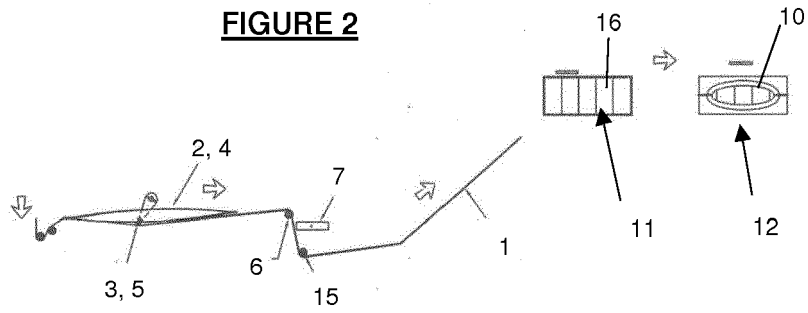
shrink film having folded edges; and means for heat shrinking the film wrapping the bundle.

6. A process for increasing the tear resistance of a heat shrunk film at an opening located at sides of a film wrapped article or a bundle of articles, the process comprising,
- forming an edge folded heat shrink film while the film is moving on a twisted plate that lifts the edges of the film upward to establish a fold point and then folds the lifted edges to overlap the film; film wrapping the bundle; and heat shrinking the film wrapping the bundle.
7. A process according to claim 6 including pressing the film to lower the position of the film to change the width of the overlap.
8. An apparatus for increasing the tear resistance of heat shrunk film wrapped around bundle by creating a folded edge, the apparatus comprising,
- means for moving a heat shrink film;  
 means for lifting the edges of the moving film and folding the edge;  
 means for establishing the width of the fold by lowering the position of the film while it is being lifted and folded;  
 means for film wrapping the bundle with the heat shrink film having folded edges; and means for heat shrinking the film wrapping the bundle.
9. An apparatus according to claim 8 having means to maintain the fold in its proper position.
10. An apparatus according to claim 9 wherein a static seal is used to maintain the fold in its proper position.
11. An apparatus according to claim 8 wherein a twisted plate is used for lifting the edges of the moving film.
12. An apparatus according to claim 8 wherein a film folding roller establishes the width of the fold by lowering the position of the film while it is being lifted and folded.
13. An apparatus according to claim 12 wherein a heat shrink tunnel heat shrinks the film.
14. An apparatus for increasing the tear resistance of heat shrunk film wrapped around bundle by creating a folded edge, the apparatus comprising,
- means for moving a heat shrink film;  
 means for lifting the edges of the moving film and folding the edges;  
 means for film wrapping the bundle with the heat
15. An apparatus according to claim 14 wherein the means for lifting the edges of the moving film and folding the edges is a twisted plate.

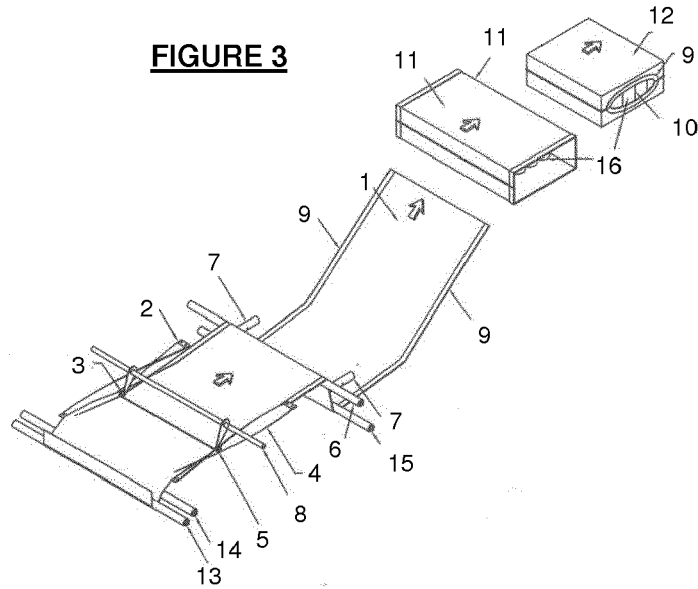
**FIGURE 1**



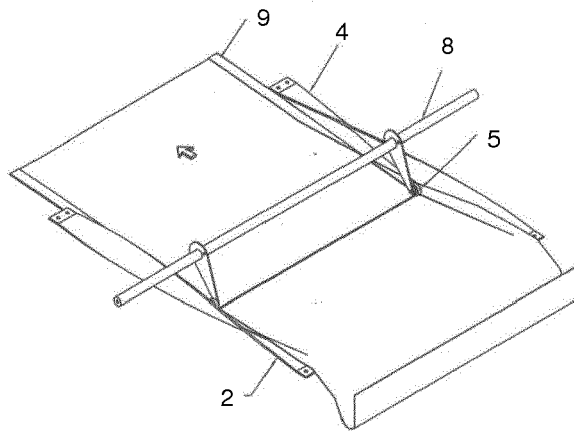
**FIGURE 2**



**FIGURE 3**



**FIGURE 4**



**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- GB 1341644 A [0002]
- US 9216832 B [0006]
- US 7836670 B [0006]
- US 6761014 B, Alain Cerf [0006]