

- [54] **APPARATUS AND METHOD FOR INVERTING TUBULAR CASING**
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- [73] Assignee: **Tee-Pak, Inc.**, Chicago, Ill.
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- [58] Field of Search 17/43, 42, 45, 49

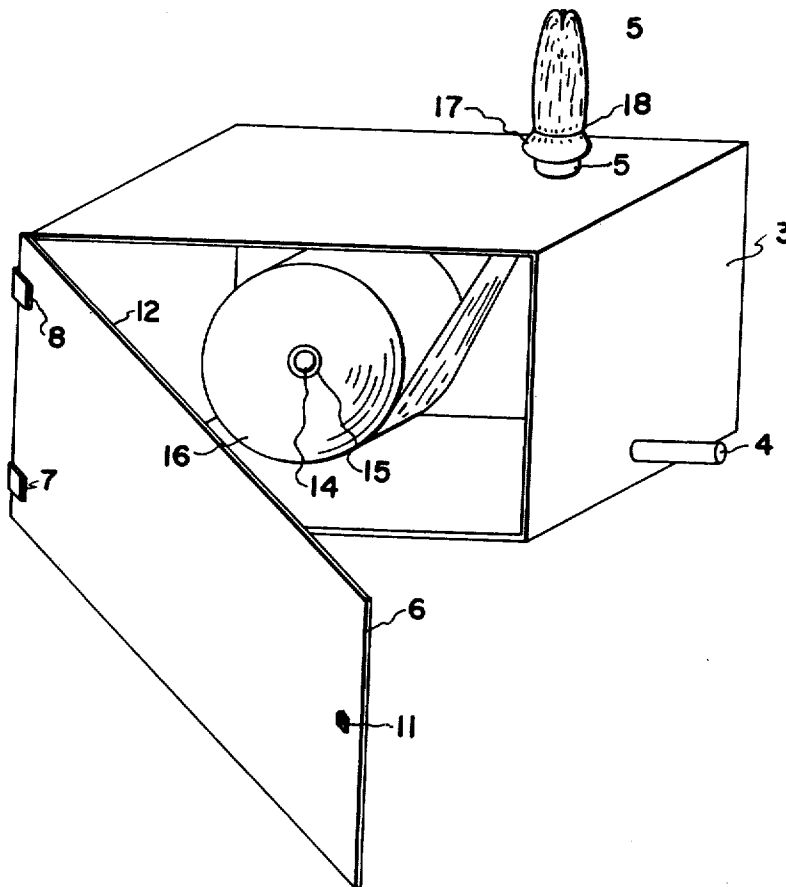
[57] **ABSTRACT**

This invention relates to an apparatus and a method for inverting a flexible tubular film casing.

The method for inverting the tubular film comprises: mounting, in an enclosed housing, carrying a tubular extension and a gas passageway, a reel of flexible tubular film stock onto a supporting member which permits unwinding of the film. An end of the film then is threaded through the bore of a tubular extension carried by the housing, inverted, placed over the external surface of the tubular extension and clamped. The housing then is pressurized with gas by introducing it through the gas passageway. The film is caused to unwind from the reel and be pulled through the tubular extension by pressurizing the housing with gas.

9 Claims, 6 Drawing Figures

- [56] **References Cited**
- UNITED STATES PATENTS**
- 2,231,954 5/1939 Scherubel 17/45
- FOREIGN PATENTS OR APPLICATIONS**
- 350,562 11/1960 Switzerland 17/43
- 562,969 10/1932 Germany 17/43



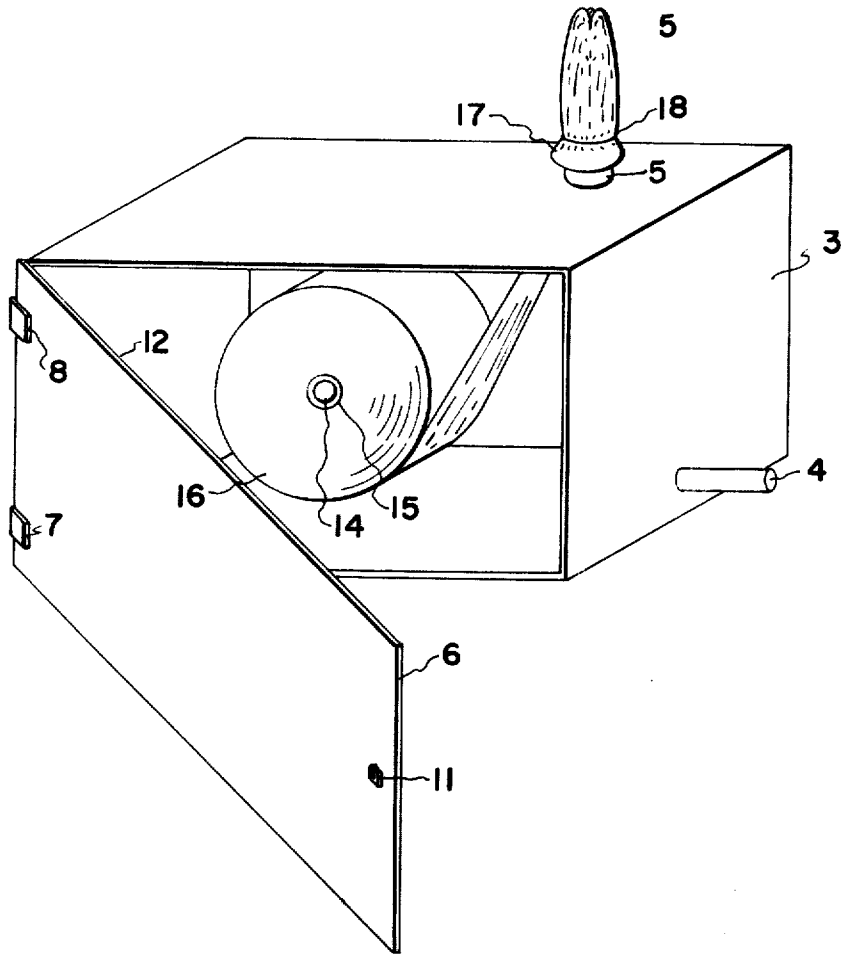


FIG. 1

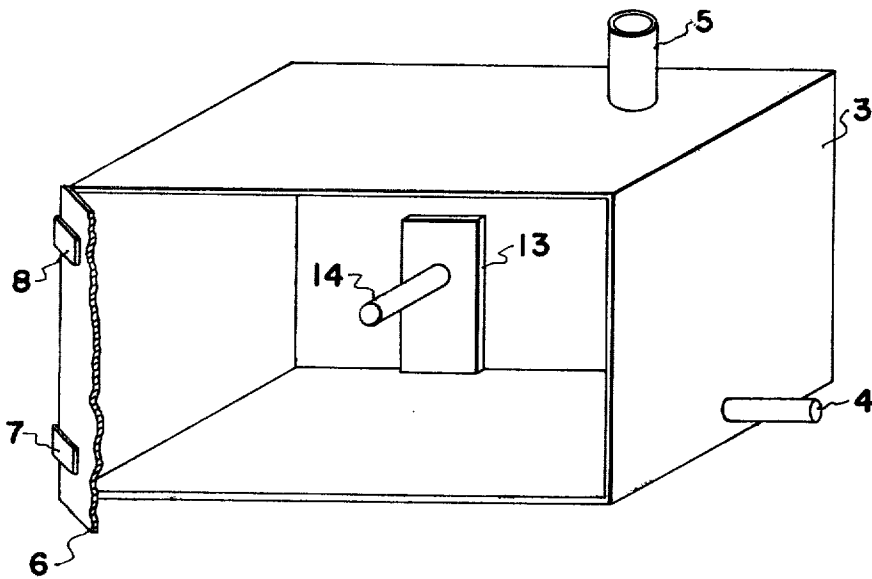


FIG. 2

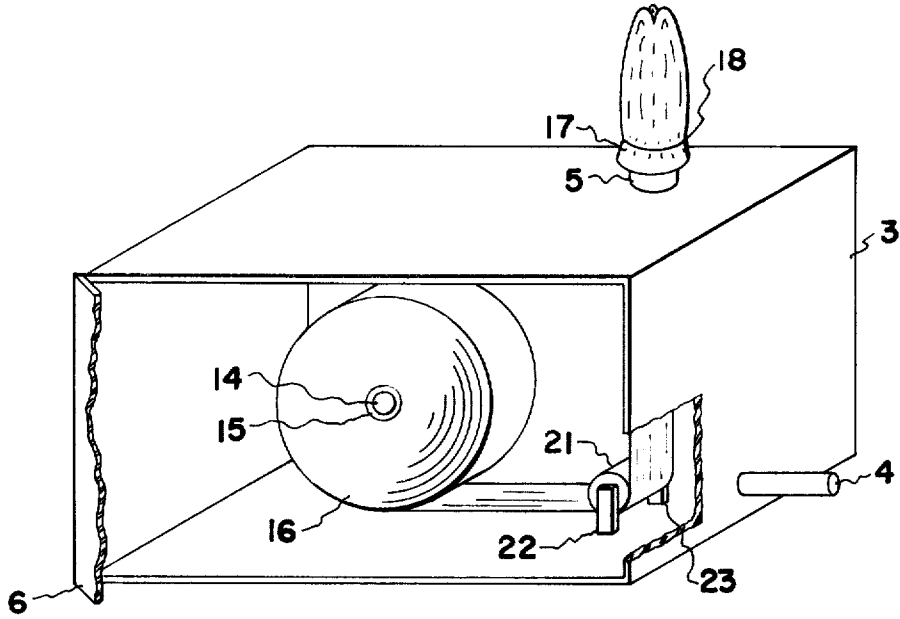


FIG. 3

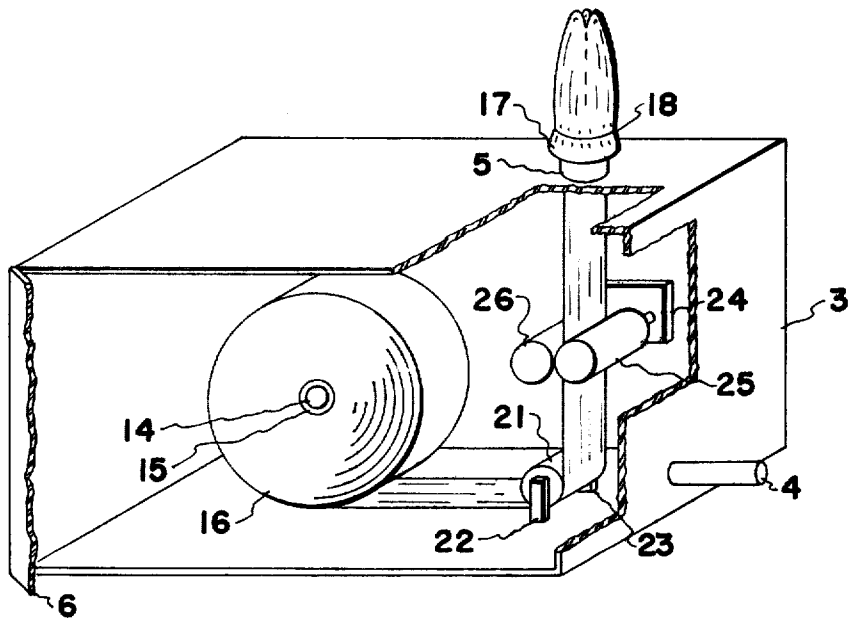


FIG. 4

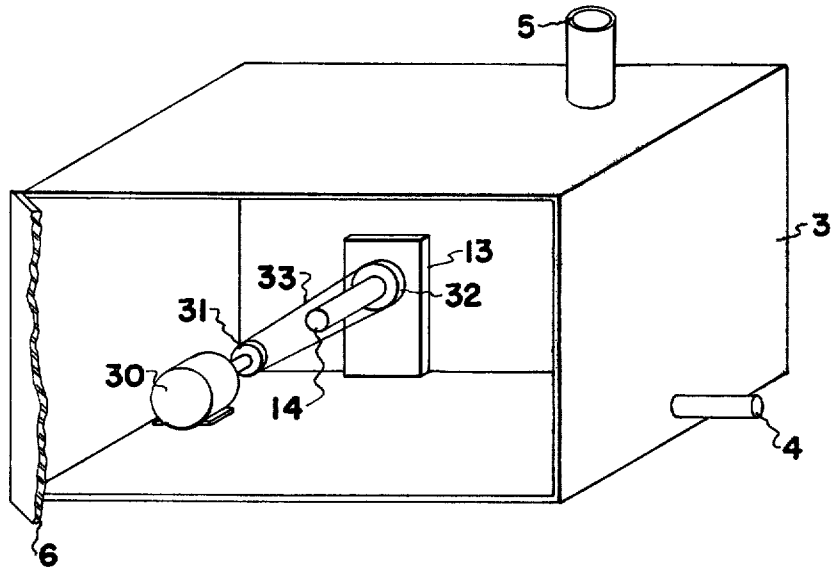


FIG. 5

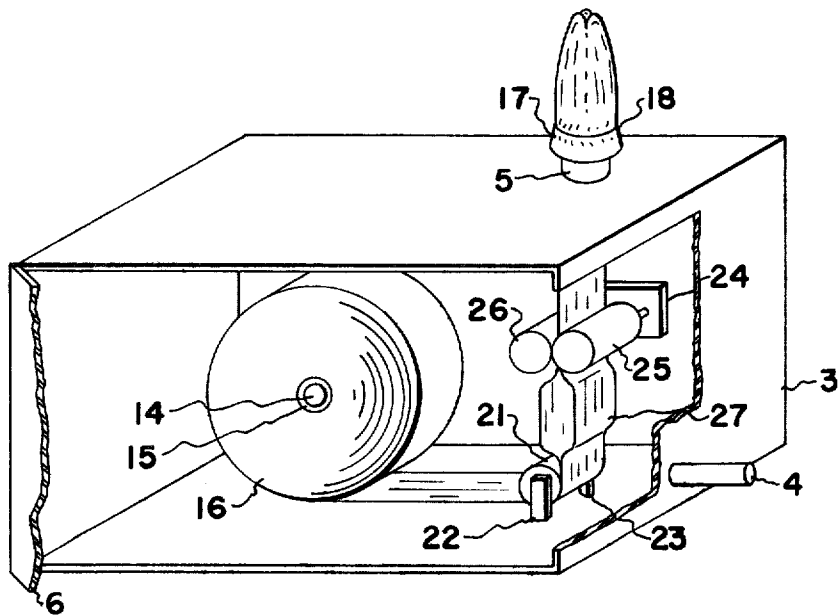


FIG. 6

APPARATUS AND METHOD FOR INVERTING TUBULAR CASING

FIELD OF THE INVENTION

This invention relates to an improvement in an apparatus and a process for inverting flexible tubular material. More particularly, the invention is related to a method for inverting coated sausage casings.

DESCRIPTION OF THE PRIOR ART

In the past, it has been common practice to invert flexible tubular material, e.g., sausage casings, by hand. In manual processes, one end of the individual casing is pulled through the bore of the casing so that the casing is inverted. As might be expected, the process was tedious, time consuming, and expensive.

In a later development for inverting flexible tubular film, such as sausage casings, inversion is effected by passing an end of flexible tubular film through the bore of a hollow member, then inverting the film end and securing it onto the external surface of the hollow member in inverted form. The film as it is introduced into the hollow member is gripped by a sealing member across the bottom of the hollow member. Air pressure then is introduced into the hollow member to inflate the film and pull it through the sealing member. The gas pressure causes the tubular material to expand and be pulled through the hollow member which thereby inverts the film.

Some of the disadvantages with this type of equipment for inverting tubular film stock is that the film has to be threaded through a sealing member prior to introducing the film into the hollow member. Another is that sealing member results in substantial frictional drag against the film as it is inverted thereby requiring increased gas pressure to effect movement of the film through the sealing member and hollow member. This reduces the amount of film that normally could be inverted at a given gas pressure. Another disadvantage is that the sealing mechanism is complex and difficult to keep in alignment.

SUMMARY OF THE INVENTION

This invention relates to an improvement in an apparatus and in the method for inverting lined flexible tubular film stock which is wound upon a reel and is substantially impervious to gas.

The apparatus of the invention comprises: an enclosed housing for the flexible impervious tubular film to be inverted, the housing carrying a tubular extension for receiving an end of said tubular material and permitting the tubular material to pass through the bore of the tubular extension and be coupled thereon, and carrying an aperture therein for permitting flow of gas into or out of the housing, a member mounted in the housing for supporting the flexible tube and permitting unwinding of the tubular film stock, means for access to the interior of the housing to permit mounting of tubular reel stock on the support member, and a flexible tube wound upon a reel mounted on said supporting member. Optionally, a drive mechanism for the support member or a drive mechanism for pulling the film from the reel may be included in the apparatus to enhance the rate of inverting of the film.

The method of inverting the film with this apparatus comprises: placing a reel of tubular film stock onto the supporting member in the enclosed housing and feed-

ing an end of the tubular feed stock through the bore of the tubular extension, inverting the film at the end; securing the inverted end over the external surface of the tubular extension; and pressurizing the housing with a gas, preferably air, to provide positive internal pressure on the film. This pressure, optionally coupled with a drive mechanism, causes the film stock to unwind from the reel and be inverted. When the appropriate length of film stock is inverted, the film stock is severed.

Because only one-half of the film which has passed through the tubular extension is inverted, the film is severed near the tubular extension in order to permit complete inversion of the film. After the film is inverted, it is wound onto a reel for storage. The free end of the severed casing then is passed through the bore of the tubular extension, inverted, the end secured to the tubular extension, and the inversion method repeated.

Advantages of the instant apparatus and processes include: the ability to conveniently and economically invert flexible tubular material; the ability to provide for multiple unit inverting of tubular film reel stock; the elimination of complex sealing equipment normally required for inverting tubular film, which reduces the potential for damage to coated films, e.g., saran coated, since sliding contact between the coated surface and seal wipers is eliminated; and the ability to employ practically maintenance free apparatus.

THE DRAWINGS

FIG. 1 is an oblique view of the apparatus showing the housing and the film mounted on a support member and passed through the tubular extension and coupled thereon.

FIG. 2 is an oblique view of the apparatus showing details of the support mounting for the tubular feed stock and the tubular extension and air inlet in the housing.

FIG. 3 is an oblique view of the apparatus including a guide roller mounted directly underneath the tubular extension.

FIG. 4 is an oblique view of the apparatus shown in FIG. 1 including a guide roller and a pinch roll drive for aiding in feeding of the tubular material from the supporting reel.

FIG. 5 is an oblique view of the apparatus illustrating a drive mechanism for the support member on which the tubular reel stock is mounted.

FIG. 6 is an oblique view of the apparatus which illustrates moistening the casing to enhance the flexibility thereof prior to inverting.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The basic apparatus is illustrated in FIGS. 1 & 2. The apparatus comprises a gas-tight rectangular housing 3 which is enclosed on all sides and at the bottom or floor. The housing 3 carries a gas passageway 4 in order that the housing may be pressurized with gas or depressurized. It also carries a tubular extension 5 which preferably is circular and of smaller diameter than the tubular film to be inverted. A door 6 is mounted on the housing by means of hinges 7 and 8. A latch 11 is mounted on the door which can be used to open the door and gain access to the interior of the housing. When the door is closed the housing is sealed against

gas leakage and the only means of gas escape is through the tubular extension 5.

A mounting 13 is positioned on the floor of the housing 3 and extends vertically upward. The mounting 13 carries roller 14 which extends horizontally from the vertical member 13. The roller 14 is used to support the casing reel stock and permit an unwinding movement of reel stock supported on the mounting 13. The support member which comprises the mounting 13 and the roller 14 is more clearly shown in FIG. 2.

A reel 15 carries flat casing reel stock 16. The casing may be uncoated or coated or lined or laminated and is substantially impervious to gas. The reel 15 is placed over roller 14 and is supported thereby during the casing inverting process. The roller permits rotation of the casing reel stock thereby permitting unwinding of the casing. With the reel stock on the support mounting, the basic apparatus described is complete and ready for operation.

An illustration of a modified view of the basic apparatus described in FIG. 1 is shown in FIG. 3. This apparatus is essentially the same except that it includes a guide roller 21 positioned directly below the tubular extension 5. It is supportably mounted by upright brackets 22 and 23 which are securely positioned on the floor or base of the housing. The guide roller permits easy unwinding of the casing reel stock and accurate alignment of the film stock with the tubular extension 5.

FIG. 4 represents an illustration of an embodiment of the apparatus similar to that described in FIG. 3. In this instance, however, there is included a drive mechanism to facilitate the unwinding of the casing reel stock from the reel. The drive mechanism comprises a pinch roll mounting 24 which extends vertically from the floor of the housing 3 and pinch rolls 25 and 26 in juxtaposition with each other and rotatably supported thereon. These pinch rolls 25 and 26 grasp the casing 16 at the external surface thereof and pull it through the rollers to feed it to the tubular extension 5. The power source for the pinch roll drive mechanism is not shown but it is within the skill of those in the art to couple a power source to these pinch rolls 25 and 26 for effecting rotary movement thereof.

FIG. 5 represents an illustration of an embodiment of the apparatus similar to that of FIG. 3 except that a drive mechanism is included for effecting rotation of roller 13 on which the tubular feed stock is mounted instead of a pinch roll drive system. The drive mechanism comprises a motor 30 having a pulley 31 coupled to the motor shaft. A pulley 32 is mounted at the end of roller 14. Power is supplied to pulley 32 by means of a belt 33 which engages pulley 31 and pulley 32. The rate of rotation of the roller 14 for unwinding the casing reel stock can be regulated by means (not shown) such as an idler assembly.

Without a drive mechanism, unwinding of the casing is effected by gas pressure in the housing. Therefore, to reduce the amount of pressure required to unwind the tubular stock, a drive mechanism preferably is included in the apparatus.

The basic mode of operation of the apparatus for inverting the casing reel stock which is wound upon a reel is as follows. The reel of casing reel stock is placed upon roller 14 and end 17 of the casing and is threaded underneath guide roller 21. The end 17 then is passed through the bore of tubular extension 5, inverted and

fastened over and around the external surface of tubular extension 5. A sealing means 18 (a rubber band, belt or clamp) is placed over the film and binding the end of the film 17 to the external surface of the tubular extension to prevent gas from passing between the casing and the external surface of the tubular extension 5 while the inverting process is conducted. After the casing is threaded into position, door 6 is closed thereby enclosing housing 3.

If a drive mechanism such as shown in either FIGS. 4 and 5 is employed, it is activated and adjusted for unwinding the casing 16 from the reel 15 at a desired rate. Then, gas is introduced into the housing through gas passageway 4 thereby pressurizing the housing 3. With the drive mechanism activated and the housing pressurized, the casing 16 is caused to unwind from the reel 15 and be passed through the bore of the tubular extension 5. The casing 16 inverts as it is passed from the tubular extension 5 and forms a large expanded inverted tube.

When the desired length of casing 16 is inverted, the casing is severed by a cutter (not shown) positioned between pinch rolls 25 and 26 and the tubular extension. The cutter is conventional and can be a knife, cutter bars, or a heated wire which can be activated by conventional means, e.g., manual, photoelectric, splice detector, etc. After the film is severed, the end of the film can pass through the tubular extension in order to fully complete the inversion for that section of film. At this point, the housing is depressurized. The end of the casing 17 is removed from the tubular extension 5 and the inverted film wound onto a reel.

In a variation of the process, the tubular film is filled prior to inverting with water or wetting agent. This is particularly advantageous where cellulosic casings are to be inverted. The use of a wetting agent or water softens the cellulose substrate making it more flexible for processing and inverting. Otherwise, the cellulose substrate may crack because of its lack of flexibility. The apparatus as shown in FIG. 6 is basically the same as that shown in FIG. 4 except that a slug 27 of water is employed to moisten the cellulose portion of the casing prior to inverting.

It is possible to effect self-threading of the severed casing through the tubular extension by placing the end of the non-inverted casing into the open end of the casing immediately to be inverted thereby forming a friction splice.

I claim:

1. An apparatus for inverting a flexible tubular film which is substantially impervious to gas which comprises:

- a tubular film wound upon a reel;
- a housing carrying a tubular extension for receiving an end of said tubular film and permitting said tubular film to pass through its bore and be coupled to its external surface and carrying a gas passageway for permitting flow of gas into or out of said housing for pressurizing and de-pressurizing thereof;
- a member mounted in said housing for supporting said reel of tubular film and permitting unwinding of said tubular film;
- a drive mechanism for feeding said tubular film to said tubular extension, said drive mechanism mounted in said housing; and

5

means for access to the interior of said housing to permit mounting of said reel of tubular film on said support member.

2. The apparatus of claim 1 wherein said drive mechanism comprises a pair of pinch rolls for embracing said tubular film and effecting movement of said tubular material to said tubular extension.

3. The apparatus of claim 1 wherein said support member includes a roller for supporting said tubular film and a drive mechanism which comprises means for driving said roller.

4. The apparatus of claim 2 which includes means for pressurizing the enclosed housing with gas.

5. The apparatus of claim 4 wherein said means for access includes a door mounted on a side of said housing to permit access to the interior of said housing for introduction and removal of said tubular film when the stock is exhausted and means for sealing said door against said housing during the pressurization of said housing.

6. A method for inverting a lined flexible tubular film

6

which is substantially impermeable to gas which comprises: placing a reel of said tubular film in an enclosed housing which carries a tubular extension for receiving an end of said tubular stock and permitting passage of said film through said tubular extension and carries a gas passageway for permitting gas flow into and out of said housing a supporting member for said reel stock and onto a support member, passing an end of said tubular material through the bore of said tubular extension, inverting the film at said end, fastening said inverted end to the external surface of the tubular extension and pressurizing said enclosed housing with gas thereby causing the film to be pulled through said tubular extension and subsequent inverting thereof.

7. The method of claim 6 wherein said gas is air.

8. The method of claim 7 wherein said tubular film is a sausage casing.

9. The method of claim 8 wherein said sausage casing is a saran-coated regenerated cellulose casing.

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