May 8, 1956 D. T. MILNE 2,744,336

THREADING APPARATUS FOR A TUBULAR DRIER

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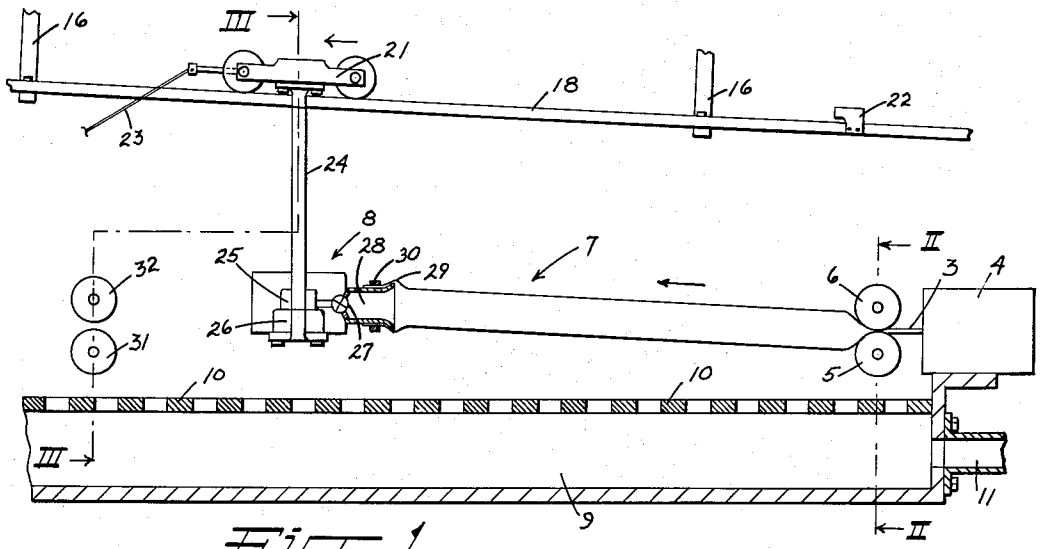
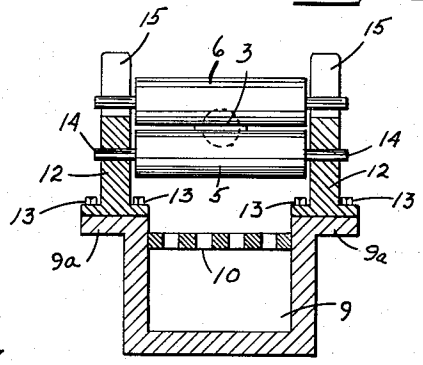


Fig. 1

Fig. 2



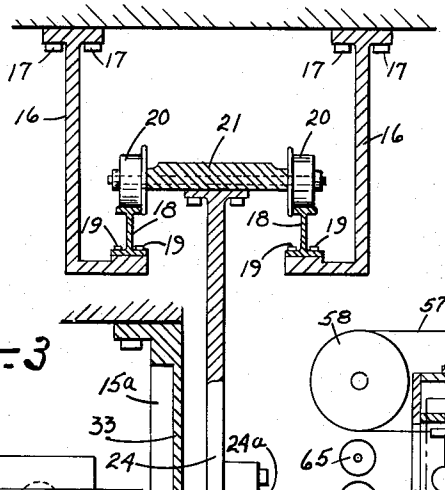
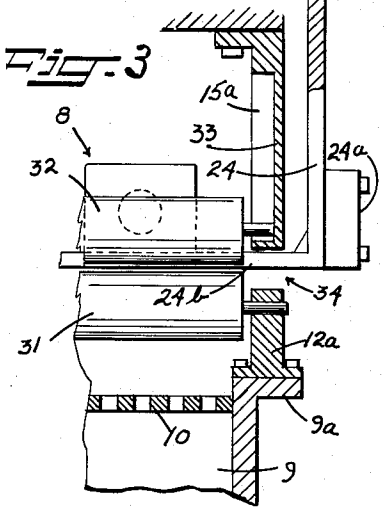


Fig. 3



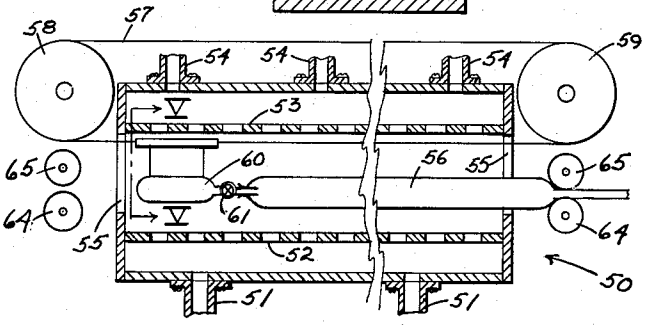


Fig. 4

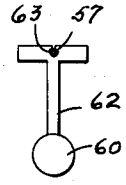


Fig. 5

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THREADING APPARATUS FOR A TUBULAR DRIER

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6 Claims. (Cl. 34—21)

This invention relates to drying apparatus for tubular products and more particularly to a novel and improved means for lacing or threading a tubular product such as a cellulose casing through drying apparatus.

In the manufacture of tubular products such as artificial sausage casings and the like, it is customary in the art to convey the same in an inflated condition over a drying path between two pairs of squeeze rolls. Such a drying procedure has been found particularly advantageous due to the buoyant effect of the upwardly directed drying medium upon the inflated portion of the tubing. Thus, undue stresses which are ordinarily produced in the sensitive tubular structure by the sliding friction of other known tubing conveyor apparatus are practically eliminated.

Considerable difficulty, however, has been experienced in the past in initially threading such apparatus between the pairs of squeeze rolls, which are oftentimes several hundred feet apart. For example, in accordance with one threading or lacing operation which has been commonly employed herebefore, a suitable cord, rope or the like is first draped between the conventional squeeze rolls positioned at opposite ends of the drier and is thereafter utilized to draw the tubular product, which has been secured thereto, through the drying apparatus. Due, however, to the dragging tendency of the wet relatively sensitive tubing along the floor of the drying apparatus, it has been found that the said tubing oftentimes becomes ruptured or otherwise damaged. In a like manner although various other lacing methods and procedures for such apparatus have been employed in the past, each has been found to be characterized by similar or other inherent defects and objectionable features.

It is a principal object of the present invention to provide a novel and improved means for threading a tubular product through drying apparatus wherein the various disadvantages and defects of previous methods and procedures are eliminated.

Other objects and advantages of the invention will be apparent from the following description.

In the drawing which is illustrative of the present invention,

Fig. 1 is a partially sectional side elevational view of one embodiment of the present invention;

Fig. 2 is a section along reference line II—II in Fig. 1;

Fig. 3 is a section along reference line III—III in Fig. 1;

Fig. 4 is a partially sectional side elevational view of another embodiment of the present invention;

Fig. 5 is a section along reference line V—V in Fig. 4.

In general the improved threading device of the present invention comprises any suitable source of compressed gas such as air, nitrogen, carbon dioxide or the like, means for attaching the tubular product to the source for inflation thereof, and conveyor means for moving the compressed gas source and the attached tubular product between two pairs of squeeze rolls. It has

been found that with such apparatus, tubular products such as sausage casings may be simply and conveniently threaded through drying apparatus without causing undue damage to the tubular product.

One preferred embodiment of the apparatus of the present invention is disclosed in Fig. 1 of the drawing. As illustrated therein, the tubing 3 may be extruded from a suitable source and proceed through various intermediate processing stations which are shown diagrammatically in the drawing by the reference numeral 4. It thereafter passes between the first pair of squeeze rolls 5 and 6 at the drying station 7 and during the threading operation is secured to the movable compressed gas source 8 in a manner which will be more fully described hereinafter.

The elongated channel 9 extends along the full length of the drying station 7 and directs drying gases upwardly through the grating or screen 10 and about the periphery of the inflated portion of tubing 3. The drying gases may be supplied to the channel 9 in any convenient manner such as through the pipe or conduit 11 which is secured to one end of the channel from a suitable source which is not shown on the drawing.

As shown in Fig. 2 of the drawing, the squeeze rolls 5 and 6 are suitably positioned adjacent one end of the elongated channel 9 in the guide members 12 which are preferably secured by the cap screws 13 to the flanged portions 9*a* of the channel and extend upwardly therefrom. Each of the guide members 12 includes a suitable aperture 14 adjacent a lower portion thereof wherein the stationary roll 5 may be conveniently journaled and a slot 15 which extends downwardly from the top thereof wherein the movable roll 6 is vertically slidable. Each of the stationary rolls is preferably positively driven by a suitable conventional driving means which has not been shown in the drawing. As will be more fully described hereinafter the movable roll is thereby adapted to move in a vertical manner toward and away from the stationary roll such that the tubing 3 may be respectively clamped or passed freely therebetween.

Although normally the weight of the movable roll provides sufficient compression of the tubing 3, it is to be understood that an additional downwardly biasing means such as a coil spring may be employed. Likewise, although not shown in the drawing a conventional hook or latch means may be provided in the present invention, if desired, to maintain the movable squeeze roll 6 in its elevated position.

In general, the squeeze rolls 31 and 32 are preferably mounted above the channel 9 adjacent the opposite end thereof in a manner which is similar to the way in which rolls 5 and 6 are mounted. It is to be noted, however, as shown in Fig. 3 of the drawing that one of the slots 15*a* which slidably receives the movable roll 32 is formed in a member 33 which extends downwardly from a suitable support above the drying apparatus. Thus, a space 34 between the member 33 and the guide member 12*a* permits permits insertion of the cantilever arm 24*b* and the attached gas source 8 between the rolls 31 and 32 as will be more fully described hereinafter. If desired, both ends of the movable roll 32 could be slidably mounted in a pair of members such as members 33 thereby permitting use of a U-shaped support means for the gas source 8 rather than the cantilever means 24*b*.

As shown in Fig. 3 of the drawing a plurality of L-shaped brackets 16 are secured preferably by the cap screws 17 to a suitable support above the drying apparatus such as the ceiling and extend downwardly therefrom. The flanges of a pair of track rails 18 are mounted upon the extremities of the horizontal leg portions of the brackets by means of the cap screws 19 and provide a

track upon which the wheels **20** of the carriage **21** is supported. The track is preferably sloped upwardly slightly from right to left as shown in Fig. 1 of the drawing such that the cantilever arm **24***b* may be passed over the stationary roll **31** during the threading operation as will be explained more fully hereinafter.

The carriage may be drawn along the track rails between the stop means **22** located at either end of the track by any convenient means such as by the cable **23** shown in Fig. 1 of the drawing.

The support member **24**, which is secured to the underside of the carriage **21** and which extends downwardly therefrom and the cantilever arm **24***b* attached thereto provides a support for the compressed gas source **8** which may take a variety of forms but which preferably includes a suitable cylinder **25**, a compressor motor **26**, and a reducer valve **27** all of which are shown diagrammatically in Fig. 1 of the drawing. The counterweight **24***a* is preferably provided as shown in Fig. 3 to properly distribute the load carried by the carriage **20**.

It is to be understood that although a preferred means for conveying the tubular product along the drying apparatus has been described heretofore, other conventional conveying means as well as other forms of track systems such as one employing a monorail could be employed without departing from the spirit or scope of the present invention. Likewise it is to be understood that means for supporting the tubular product conveying means could extend upwardly from the floor or the base of the apparatus rather than from above the apparatus as hereinbefore described without departing from the spirit of the invention.

The extremity of the tubular product or tubing **3** may be secured in its wet pliant condition to the cylindrical nipple or fitting **28** which is preferably flanged or beaded as at **29** to prevent the tubing from being detached therefrom. The removable strap or clip means **30** which may be of any suitable or desirable construction is preferably also provided to secure the tube to the setting substantially in an air-tight manner.

It is to be understood that although a preferred means for securing the tubing to the conveyor means has been described hereinbefore, other conventional means such as merely tying by string or the like could be employed without departing from the spirit or scope of the present invention.

In operation when it is desired to thread the drying apparatus of the present invention, the carriage **21** with its attached compressed air source **8** is moved to the end of the drying station **7** adjacent the first pair of squeeze rolls **5** and **6**. The movable roll **5** thereof is then lifted momentarily so as to permit the tubing **3** in its collapsed condition to be passed between the movable and stationary rolls. The end of the tubing is then properly attached to the air compressor setting **28** by means of the strap or clip **30**. By proper adjustment of the reducer valve **27** the degree of inflation of the tube between the fitting and the first pair of squeeze rolls may be properly set and maintained. The carriage **21** is then moved toward the opposite end of the drying apparatus at a rate which is dependent upon the rate at which the tubing is fed toward the drying station. When the carriage approaches the second pair of squeeze rollers **31** and **32** the movable roll **32** thereof is lifted temporarily so that the carriage and the tubing may be passed over the stationary roll **31**. Movable roll **32** is then returned to its normal lowermost position thereby sealing a column of air between the pairs of squeeze rolls. Thereafter, the end of the tubing is removed from the fitting **28** and is led to a suitable storage device not shown on the drawing.

Thus in the above described embodiment of the present invention it is to be noted that as the tubular product is conveyed between the pairs of squeeze rolls of a drying station it is buoyed by the drying gases such that dragging and damaging of the same is avoided.

Although the cantilever arrangement for passing the gas source and the tubing attached thereto between the pair of squeeze rolls **31** and **32** involves a preferred feature of the present invention, it is to be understood taht, by removing the tubing from the gas source before it is fed between the said rolls, the same could be eliminated without departing from the spirit or scope of the present invention.

Another preferred embodiment of the present invention is disclosed in Figs. 4 and 5 of the drawing. As illustrated therein, the drying chamber **50** is supplied from a suitable hot air or gas source or the like not shown in the drawing through the various supply pipes or conduits **51**. The drying air or gases thereafter pass upwardly through the screen-like grating members **52** and **53** and ultimately through the various discharge pipes or conduits **54**. The opposite extremities of the chamber **50** are apertured as at **55** to accommodate the passage of the tubular product **56** and its threading means as will be described more fully hereinafter.

The said threading means includes an endless cord **57** or the like which extends between the pulley members **58** and **59** and the compressed gas source **60** with its associated control valve **61**. The compressed gas source which may take any convenient form such as the cylinder shown herein is detachably secured to the cord **57** by means of the T-shaped member **62** which is preferably slotted or notched as at **63** to frictionally receive the cord. Thus, it is seen that the tubular product **56** in the present embodiment of the invention is adapted to be conducted from the various conventional processing stations not shown on the drawing between the first pair of squeeze rolls **64** and **65** and secured in any convenient manner to the compressed gas source **60**. Thereafter, by suitably engaging the slotted portion of the T-shaped extension of the source **60** with the endless cord **57**, the tubular product may be readily threaded through the drying chamber in a buoyed condition such that dragging and damaging of the same is avoided.

It is to be understood, that although the various embodiments of the improved threading device of the present invention are disclosed in connection with drying apparatus, other processing apparatus could be similarly threaded or laced without departing from the spirit or scope thereof.

While preferred embodiments of the invention have been disclsoed, the description is intended to be illustrative only and it is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined by the appended claims.

I claim:

1. Apparatus for threading a tubular product through drying apparatus comprising reciprocating supporting means suspended above and substantially parallel to the drying apparatus, a carriage adapted to move back and forth on the supporting means, a cantilever member secured at one end to the carriage and extending downwardly therefrom, and a compressed gas source connected to the other end of the cantilever member whereby a portion of the tubular product may be inflated.

2. Drying apparatus for a tubular product comprising an elongated channel which directs a drying medium upwardly about the tubular product, a pair of squeeze rolls positioned adjacent each end of the channel, supporting means suspended above and substantialy parallel to the channel, a carriage adapted to move along the supporting means and means connected to the carriage for inflating a portion of the tubular product.

3. Drying apparatus for a tubular product comprising an elongated channel which directs a drying medium upwardly about the tubular product, a pair of squeeze rolls positioned adjacent each end of the channel, a suspended track system including a pair of track rails positioned above and substantially parallel to the channel, a

carriage mounted on the track rails for movement therealong and means connected to the carriage for inflating a portion of the tubular product.

4. Drying apparatus for a tubular product comprising an elongated channel which directs a drying medium upwardly about the tubular product, a pair of squeeze rolls positioned adjacent each end of the channel, a suspended track system including a pair of track rails positioned above and substantially parallel to the channel, a carriage mounted on the track rails for movement therealong, a cantilever member which is secured at one end to the carriage and which extends downwardly therefrom, a compressed gas source connected to the other end of the cantilever member and means for attaching the end of the tubular product to the gas source.

5. Apparatus for transferring an unsupported end of a flexible tubular product from a first set of squeeze rolls to a second set of squeeze rolls comprising a carriage movable back and forth in a path between said squeeze roll sets, means on said carriage for attaching one end of the tubular product thereto, and means on the carriage for introducing gas under pressure through said attached end while the carriage is moving between the roll sets.

6. The method of lacing a sausage casing drier comprising the steps of extruding a length of flattened sausage casing through a first pair of rolls, attaching the end of said extruded casing to a linearly moving carriage, inducing gas under elevated pressure to the casing from the carriage, simultaneously transferring the carriage and the casing from the first pair of rolls to a second pair of rolls, and inserting the inflated casing in said second rolls to entrap the gas in the substantially straight casing between the rolls.

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