United States Patent [19]

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[11] **3,739,546**

[45] **June 19, 1973**

[54] **APPARATUS FOR PACKAGING TOW INTO CARTONS**

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[22] Filed: **Nov. 23, 1971**

[21] Appl. No.: **201,425**

[30] **Foreign Application Priority Data**

Apr. 5, 1971 Canada 109,660

[52] **U.S. Cl.** **53/116,** 28/21

[51] **Int. Cl.** **B65b 63/04**

[58] **Field of Search** 53/116; 28/21

[56] **References Cited**

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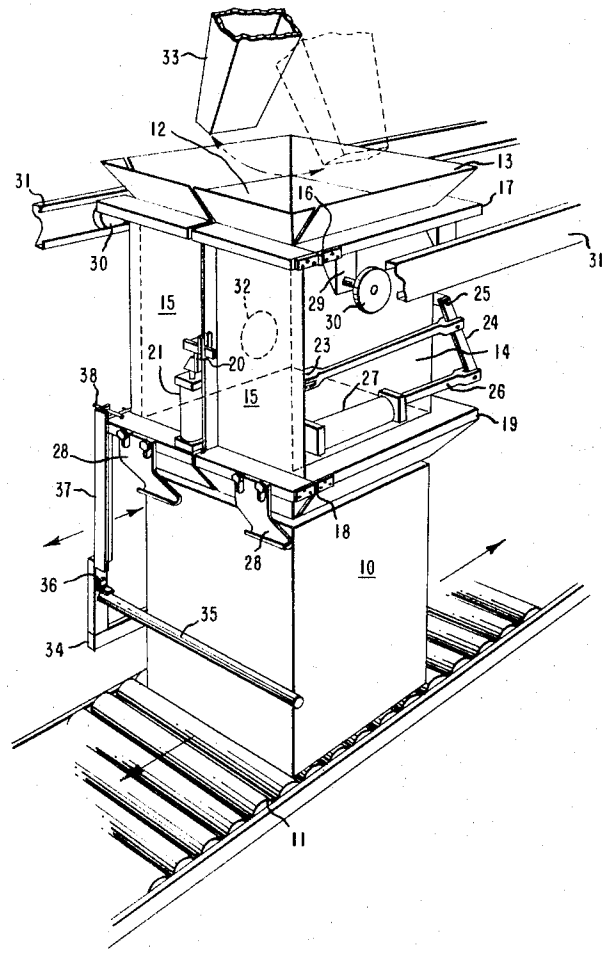
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[57] **ABSTRACT**

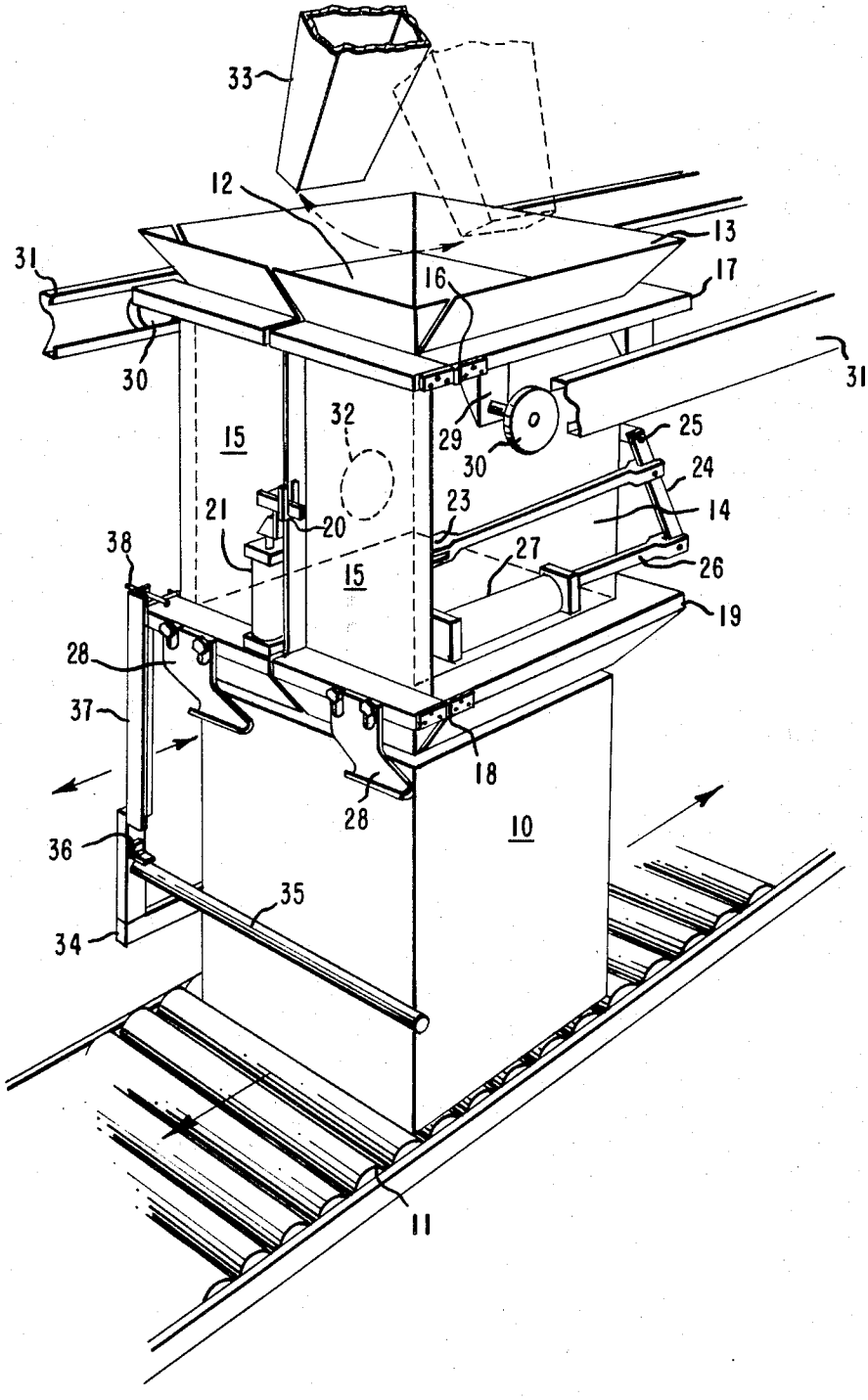
In an apparatus for packaging tow into cartons in which tow is fed from a spout reciprocating in a first plane into a carton reciprocating in a second plane at right angles to the first plane, there is provided a filler sleeve to facilitate the filling of the cartons. The filler sleeve fits over the top of the carton and has four sides which are adapted to form a vertical extension of the four sides of the carton. The filler sleeve has a flexible locating means adapted to hold the filler sleeve to the carton while the carton reciprocates. The filler sleeve has its own support means so that it may be moved either dependently or independently of the carton. At least one side of the filler sleeve may be opened by a means designed to keep the side in the opened or closed position.

6 Claims, 1 Drawing Figure



PATENTED JUN 19 1973

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APPARATUS FOR PACKAGING TOW INTO CARTONS

BACKGROUND OF THE INVENTION

This invention relates to an apparatus for packaging tow into cartons and more particularly, to a novel filler sleeve or adapter useful in the process of filling a carton with a tow and compressing the tow in the carton.

Synthetic fibers are frequently produced in the form of a tow which contains a large number of individual continuous filaments or fibers arranged in a single strand or rope. A tow is generally packaged in a carton in which form it may be stored or shipped for further processing. There are a number of well known methods for packaging a tow. In one such method, tow is fed through a spout which reciprocates backwards and forwards in one plane. The tow is laid in a carton which in turn reciprocates in a plane perpendicular to the movement of the spout. The movement of the spout and the movement of the carton are co-ordinated so that a tow is laid in a predetermined pattern to fill the carton. To obtain the maximum capacity of a carton, it is necessary that the tow be compressed after the carton has been filled. This is achieved by mounting a filler sleeve or adapter onto a carton prior to commencing the feeding of tow into the carton. The filler sleeve is generally the same size as the carton and extends the vertical walls of the carton upwards thus enabling the tow to be laid in the carton and the filler sleeve. The carton and filler sleeve is then located under a press and the tow compressed to fill only the carton. The filler sleeve is then removed and the carton closed to retain the compressed tow.

Many types of filler sleeves presently in use have certain problems. Some filler sleeves are made from light weight materials, such as glass fibers. Sleeves made from these materials are easy to handle, but are susceptible to damage with continuous manual handling. Furthermore, several of these light weight adapters are needed for each tow filling line, one adapter required for a carton being filled at a tow filling station, a second adapter required for a carton at a pressing station and several more adapters required as standbys. These light weight filling sleeves, while easy to handle are prone to damage if centered improperly under a tow press. The tow press can cause crushing or breaking of the walls of the filler sleeve, thus either extensive repairs of the filler sleeves are required or the sleeves must be replaced to maintain serviceable units in a tow filling line.

It is an object of the present invention to provide a novel filler sleeve for use with an apparatus for packaging tow in cartons.

It is another object of this invention to provide a strong filler sleeve for use in an apparatus for packaging tow in cartons that is not easily susceptible to damage in its operation.

It is still another object of this invention to provide a filler sleeve for use in a filling line for packaging tow in cartons in which only one filler sleeve is required per filling line.

SUMMARY OF THE INVENTION

With these and other objects in view, the present invention provides in an apparatus for packaging tow in cartons including a tow feeding and directing means, a means for reciprocating a carton at a tow filling station in cooperation with the tow feeding and directing means adapted to lay the tow in a predetermined pattern in the carton, a press means at a pressing station adapted to compress the tow in a carton and a conveyor means adapted to move cartons from the tow filling station to the pressing station. The improvement comprises a filler sleeve having four sides adapted to form a vertical extension of a carton, flexible locating means adapted to hold the filler sleeve to a carton while the carton reciprocates at the tow filling station, movable supporting means for the filler sleeve adapted to support the filler sleeve at a predetermined height and allow the sleeve to be moved to-and-fro between the tow filling station and the pressing station, at least one side of the filler sleeve adjacent to the pressing station having at least one hinge and means to open and close the side of the filler sleeve together with a catch means adapted to hold the side closed.

BRIEF DESCRIPTION OF THE DRAWING

The drawing which illustrates an embodiment of the invention shows a perspective view of a filler sleeve located over a carton which rests on a conveyor.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENT

Referring now to the drawing, a carton **10** is shown resting on a roller conveyor **11.** Above the carton and located to it is a filler sleeve **12.** The filler sleeve **12** has a flared entrance **13** at its top and four sides **14** which form a vertical extension of the four sides of the carton **10.** The side of the filler sleeve **12** adjacent to one of the directions of travel of the conveyor **11** has two doors **15.** The doors **15** have upper hinges **16** connected to an upper flange **17** of the filler sleeve **12** and lower hinges **18** connected to a lower flange **19.**

The doors **15** are held closed by a catch **20** which is operated by a pneumatic cylinder **21.** A connecting rod **22** is attached to each door **15** at a pin connection **23.** This pin connection **23** is inboard of the axis through the upper hinge **16** and the lower hinge **18** on each door. The other end of the connecting bar **22** is pin connected to a lever arm **24** which has one end pivoted at a pivot point **25** and the other end connected to a piston **25** of pneumatic cylinder **27.** Thus, when compressed air is supplied to the pneumatic cylinder **27,** the piston **26** moves inward pushing the connecting arm **22** against the door **15** and thus opening the door. Connected to the lower flange **19** on the bottom of the doors **15** are two front locators **28,** one per door. Attached to the flange **19** on the side of the filler sleeve **12** opposite to the side with the opening doors **15** is a back locator (not shown). The back locator has a handle which allows the back locator to be lifted to clear the carton and thus release the carton from the filler sleeve **12.** The front locators **28** and the back locator (not shown) hold the carton **10** to the filler sleeve **12** while being reciprocated during filling.

Two brackets **29** are attached to the upper flange **17** on the two sides parallel to the direction of movement of the conveyor are connected to rollers **30** which sit in tracks **31.** The tracks **31** run parallel to the direction of travel of the conveyor **11,** and support the filler sleeve **12** at a height such that the bottom of the filler sleeve **12** is just clear of the top of the carton **10.**

A transfer tail access hole **32** is located in one side of the filler sleeve **12.** This hole is used for capturing an

end of tow for a transfer tail when commencing to fill a carton with tow. A spout **33** is shown above the filler sleeve for feeding tow into the carton. The spout **33** oscillates in the plane indicated by the arrow which is at right angles to the reciprocating motion of the carton. The spout oscillates about 1 inch above the top of the flared entrance **13** of the filler sleeve **12.**

A reciprocating device bracket **34** moves the sleeve backwards and forwards in cooperation with the oscillating spout **33.** An arm **35** is shown connected to the bracket **34** by a hinge **36.** This arm **35** is not essential to the operation. The arm **35** may be raised to move the carton to a different location on the conveyor **11.** A vertical member **37** is attached to the bracket **34,** and has a spring latch **38** at the top thereof which connects with a mating hole or catch in the lower flange **19.** The spring latch **36** connects the filler sleeve **12** with the reciprocating device bracket **34.** The spring latch **36** and the vertical member **37** may be located at a corner of the filler sleeve away from the doors **15.**

As a further embodiment, an extension rod may be added extending across one side of the filler sleeve **12** at the level of the lower flange **19.** The extension rod has a release knob on the opposing side to the spring latch **38** side, thus allowing the spring latch **38** to be released without an operator having to cross the conveyor **11.**

In operation, an empty carton **10** is placed on the conveyor **11** and moved to a tow filling station. The carton is moved on the conveyor until it rests against the arm **35** of the reciprocating device bracket **34.** This arm **35** acts only as a positioning guide, and does not connect the carton **12** to the reciprocating arm bracket **34.** The arm is not essential and the filler sleeve **12** is positioned over the center of the carton **10** and connected to the reciprocating arm bracket **34** by the spring latch **38.** This may be achieved by lifting the back locator (not shown) and pushing or pulling the filler sleeve **12** from the left hand side of the drawing over the carton. The back locator is then lowered, so that the carton is located between the back locator and the two front locators **28** and also connected to the reciprocating arm bracket **34.** Tow is fed into the carton from the spout **33** which reciprocates in a plane perpendicular to the direction of travel of the conveyor **10.** In cases where a transfer tail of tow is required, tow is fed through the spout **33** after the filler sleeve **12** is positioned over the carton **10.**

The end of the tow is captured manually through the access hole **32** as it is fed into the carton **10.** The end of the tow is directed to hang over the outside of the carton between the top edge of the carton **10** and the bottom of the filler sleeve **12.** As the tow is fed into the carton the spout **33** reciprocates in one direction and the carton **12** reciprocates in a perpendicular direction, the movement of the spout **33** and carton **12** being so arranged that the tow is laid in a predetermined pattern to fill the carton **12.**

The amount of tow that is fed into a carton is metered either according to weight or according to length which in turn depends upon the feed speed and time. When sufficient tow has been metered into the carton, it generally comes three-quarters of the way up the side of the filler sleeve. The tow feed is stopped, latch **38** is released, the arm **35** raised if it has been used and the carton **10** and filler sleeve **12** are pushed or pulled on the conveyor **11** in a direction to the left hand side of the drawing and located under a pressing station. Such a station may take a number of different forms, but does not form part of the present invention. A press having a pad which corresponds to the cross section of the filler sleeve **12** compresses the tow so that it fits in the carton **10.** Then, with the press pad still compressing the tow, the catch **20** on the doors **15** of the filler sleeve **12** is opened by supplying compressed air to the pneumatic cylinder **21** and the doors **15** are opened by supplying compressed air to the pneumatic cylinder **27.** With the doors **15** of the filler sleeve **12** in the open position, the filler sleeve **12** is pushed or pulled towards the filling station. The shaft of the press does not hinder the movement of the filler sleeve **12** as the doors are in the open position. The compressed carton of tow at the pressing station may be strapped or bundled up, the press pad raised, and the full carton moved to shipping or storage.

The doors **15** of the filler sleeve **12** are closed and latched by the catch **20** and the filler sleeve **12** pushed or pulled so that the rollers **30** rotate in tracks **31** and bring the filler sleeve back to the tow filling station. At the tow filling station, the filler sleeve **12** is located over another carton by the front locators **28** and back locator (not shown), attached to the reciprocating arm bracket **34** by the spring latch **38** and the tow feed is started to fill a new carton.

The weight of the filler sleeve **12** is no longer a problem as it does not have to be manually handled but moves on rollers **30** in tracks **31.** Therefore, the filler sleeve **12** may be made out of aluminum, steel, or some other suitable material which is not damaged by the press when the tow is compressed. The preferable clearance between the bottom of the filler sleeve **12** and the top of the carton **10** is approximately 1 inch. The front locators **28** and back locators (not shown) are preferably made from 1/16 inch spring steel so that the filler sleeve moves slightly relative to the carton due to the flexibility of the spring steel. This creates a shearing effect between the carton and the filler sleeve and causes the tow to settle making room for a greater capacity of tow in the carton. It has been found that it takes 15 seconds to doff a carton, that is to say from the time the two feed stops and one carton is full to the time when the tow feed is started again to feed tow into a new carton takes approximately 15 seconds.

What is claimed is:

1. In an apparatus for packaging tow in cartons including a tow feeding and directing means, a means for reciprocating a carton at a tow filling station in cooperation with a tow feeding and directing means, adapted to lay the tow in a predetermined pattern in the carton, a press means at a pressing station adapted to compress the tow in a carton and a conveyor means adapted to move cartons from the tow filling station to the pressing station, the improvement comprising a filler sleeve having four sides adapted to form a vertical extension of a carton, locating means adapted to hold the filler sleeve to a carton while the carton reciprocates at the tow filling station, movable supporting means for the filler sleeve adapted to support the filler sleeve at a predetermined height and allow the sleeve to be moved to-and-fro between the tow filling station and the pressing station, at least one side of the filler sleeve adjacent the pressing station having at least one hinge and means to open and close the side of the filler sleeve together with a catch means adapted to hold the side closed.

2. The improvement according to claim 1, wherein the locating means adapted to hold the filler sleeve to a carton comprises spring steel clips adapted to grip two sides of the carton, one of the clips being removable.

3. The improvement according to claim 1, wherein the movable supporting means for the filler sleeve comprises four rollers, two rollers on opposing sides of the filler sleeve and attached to the filler sleeve, the two rollers on opposing sides of the filler sleeve resting on two parallel tracks.

4. The improvement according to claim 1, wherein the side of the filler sleeve adjacent to the pressing station comprises two doors with a pneumatic opening and closing means and a pneumatic catch means.

5. A filler sleeve for guiding tow into an open top carton reciprocably movable in a path on a conveyor at a filling station, said sleeve comprising two pair of opposed connected vertical sides forming an opening shaped complementally to the open top of the carton; movable support means connected to said sleeve for positioning said sleeve a predetermined height above said carton, one pair of opposed sides being oriented in a plane perpendicular to the path of the conveyor, one of said one pair of sides being hinged to an adjacent side; means connected to said hinged side for opening and closing said hinged side of said sleeve; and flexible means attached to said opposed sides adjacent said carton, engaging said carton, said flexible means permitting relative movement between said carton and said sleeve.

6. The sleeve as defined in claim 1, said flexible means comprising spring clips attached to said one pair of opposed sides adjacent said carton, said clips extending downwardly engaging said carton.

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