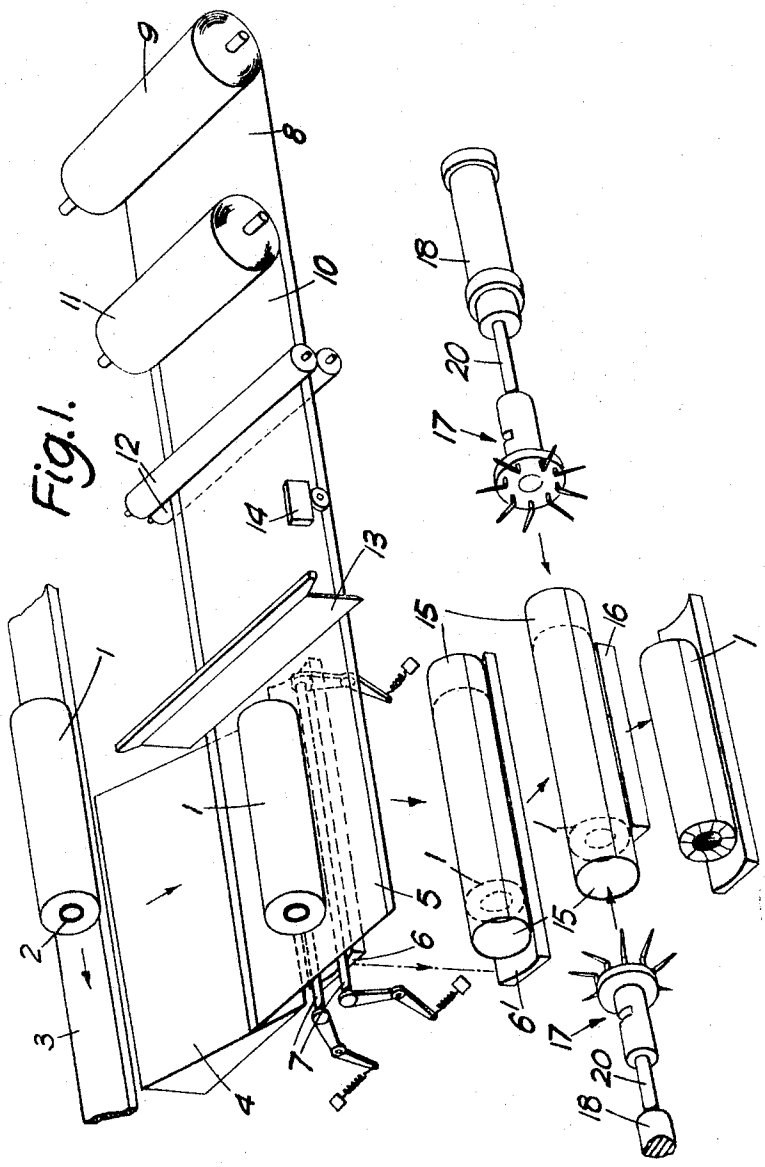
Jan. 10, 1967 J. S. BARKER 3,296,772

WRAPPING OF CYLINDRICAL ROLLS

Filed Dec. 30, 1963 3 Sheets-Sheet 1

Fig. 1.



INVENTOR
John S. Barker

By Watson, Cole, Grindle & Watson
ATTORNEYS

Jan. 10, 1967 J. S. BARKER 3,296,772

WRAPPING OF CYLINDRICAL ROLLS

Filed Dec. 30, 1963 3 Sheets-Sheet 2

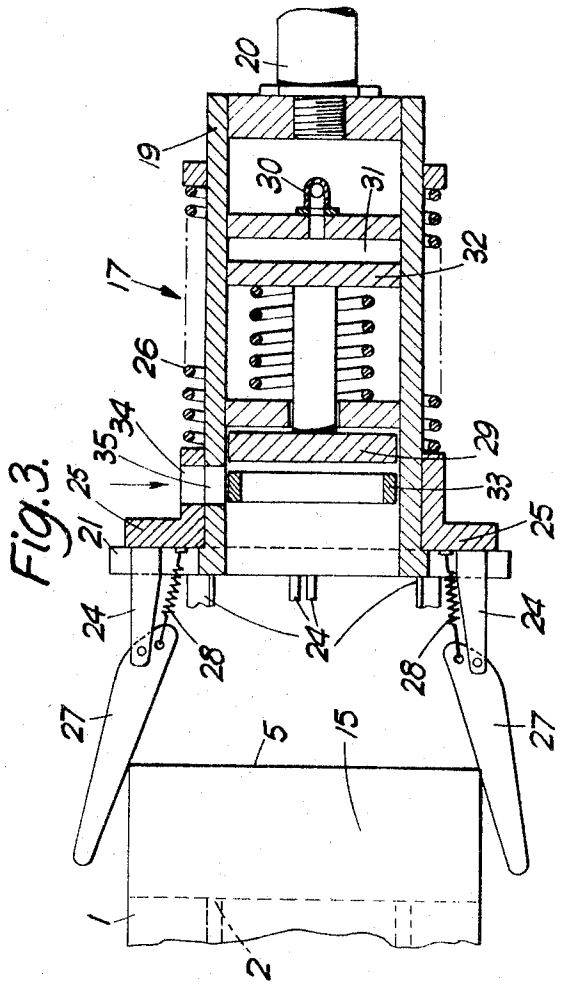


Fig. 3.

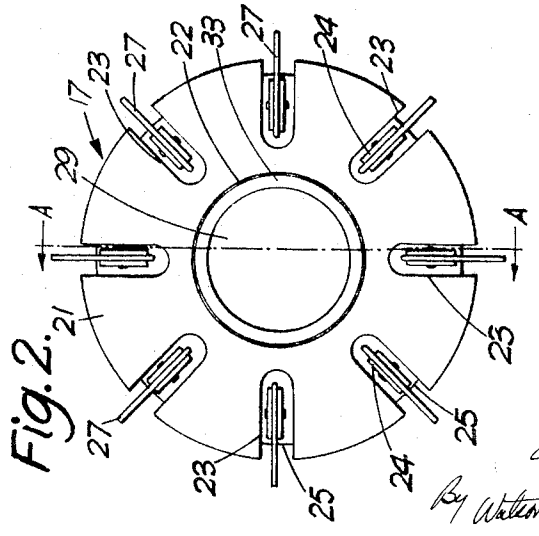


Fig. 2.

INVENTOR
John S. Barker
By Watson, Cole, Grindle & Watson
ATTORNEYS

Jan. 10, 1967 J. S. BARKER 3,296,772

WRAPPING OF CYLINDRICAL ROLLS

Filed Dec. 30, 1963 3 Sheets-Sheet 3

Fig.4.

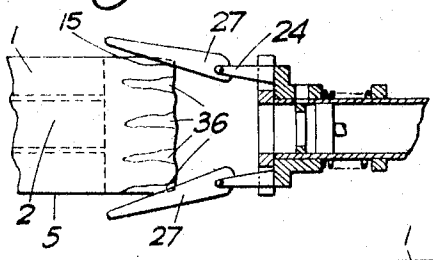


Fig.5.

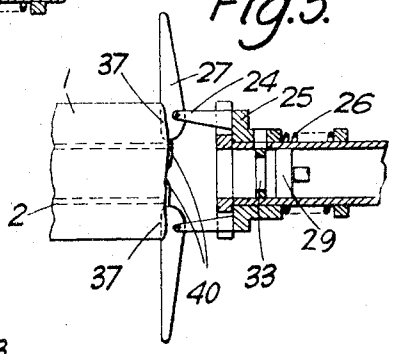


Fig.6.

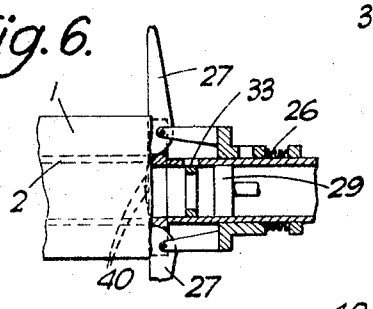


Fig.7.

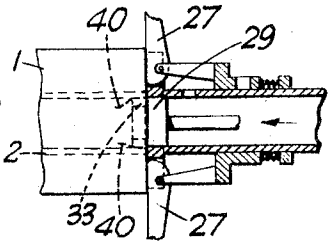


Fig.8.

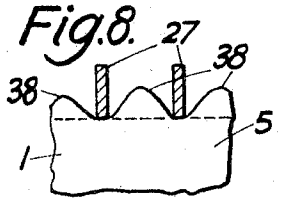


Fig.9.

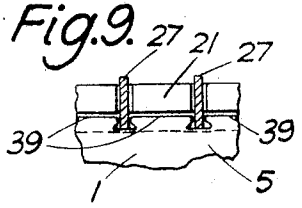
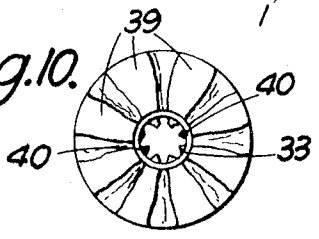


Fig.10.



INVENTOR
John S. Barker

By Watson, Cole, Grindle & Watson
ATTORNEYS

United States Patent Office 3,296,772 Patented Jan. 10, 1967

3,296,772

WRAPPING OF CYLINDRICAL ROLLS

John Sidney Barker, Burnham-on-Sea, England, assignor to British Cellophane Limited, Somerset, England, a British company

Filed Dec. 30, 1963, Ser. No. 334,347
Claims priority, application Great Britain, Jan. 9, 1963, 1,071/63
8 Claims. (Cl. 53—380)

This invention relates to the wrapping of cylindrical rolls in sheet wrapping materials, and in particular to the wrapping of cylindrical rolls having plug-receiving recesses at each end.

Many flexible materials in the form of continuous webs, for example, fabrics, foils, films, paper and the like, are stored in the form of rolls. The material is usually wound upon a supporting core which may be hollow, or which may be solid and have hollowed-out ends. Such rolls are normally wrapped in protective sheet wrapping material which not only protects the wound webs from atmospheric changes but also protects the webs from damage due to handling. In particular, the end faces of such rolls may need extra protection.

The present invention is concerned with means for mechanically wrapping such rolls.

According to the present invention a wrapping head for folding an overlapping end portion of a cylindrical envelope of wrapping material formed round a cylindrical roll against the corresponding end of the roll and sealing marginal portions of the folded end portion of the envelope into a plug receiving recess in the end of the core of the roll comprises a folding head for engaging and folding inwardly the overlapping end portion of the cylindrical envelope against the end face of the roll along radially disposed fold lines, a compression member capable of movement axially towards the end of the roll for flattening upstanding portions of the envelope against the end face of the roll and a ram for forcing a plug together with marginal portions of the folded end portion of the envelope into the plug receiving recess of the roll, so as to seal the said marginal portions in the recess.

The folding head may consist of a ring member lying concentric with the end of the roll from which fingers project inwardly to fold the end portion of the cylindrical envelope along radial fold lines.

In the preferred form of the invention, however, the folding head comprises a body member, for example a ring member, capable of relative movement axially towards the end of the roll and having a ring of fingers projecting forwardly and outwardly from the face of the body member for engaging and folding the overlapping end portion of the cylindrical envelope of wrapping material, the fingers being pivoted to the body member and capable of being splayed outwardly against a return spring and the fingers having heel portions which press the portion of wrapping material beneath each finger firmly into contact with the end face of the roll on the fingers being caused to splay outwardly on making contact with the end of the roll.

The compression member may conveniently consist of a plate having cut-away portions so that it can move forward past the pivoted ends of the fingers and collapse the upstanding folds in the wrapping material between the fingers at the end face of the roll to form radial pleats while the heel portions of the fingers hold the wrapping material along the fold lines, and to hold the marginal portions of the wrapping material over the mouth of the plug-receiving recess.

Preferably, the ram is mounted in an open-ended cylindrical member forming the main body member of the wrapping head and is capable of being forced forward

by hydraulic or pneumatic means through a central aperture in the compression member to force a plug into the plug-receiving recess of the roll. The plugs are conveniently fed to the front face of the ram from a magazine through a feed passage communicating with the interior of the cylindrical member. The plug on entering the mouth of the plug-receiving recess carries with it the marginal portions of the folded end portion of the wrapping material which are firmly trapped in the recess by the plug.

The plug may take the form of a solid bung or a cylindrical ring of cardboard or synthetic plastic material.

When the core is hollow, the open ends form convenient plug-receiving recesses. If, however, the core is solid, then it is necessary for suitable plug-receiving means to be formed in the ends.

The invention also includes a wrapping machine for wrapping a cylindrical roll having a core with a plug-receiving recess at each end in a sheet of wrapping material comprises an enveloping means for enveloping the roll in a cylindrical envelope of wrapping material overlapping each end of the roll and at least one wrapping head as described herein for folding and sealing the overlapping end portions of the cylindrical envelope against the end faces of the roll.

The enveloping means for enveloping the roll in a cylinder of the sheet wrapping material may be of any known form. For example, it may comprise a pair of spaced guides between which the roll is supported upon a sheet of the wrapping material. The guides are caused to separate, either by the weight of the roll or by other means so that when the roll passes between the guides, the sheet is closed round the roll and the longitudinal edges of the sheet are sealed together by an adhesive previously applied to one of the edges of the sheet.

In the wrapping machine in accordance with the invention, one wrapping head only may be employed. In this case, after sealing the wrapping material at one end of the roll, the roll is turned round to permit the sealing of the opposite end.

Preferably, however, two opposed wrapping heads are employed so that each end of the roll may be sealed at the same time.

The sheet wrapping material may consist of any of the conventional materials such as paper, foil, or film of cellulosic or synthetic plastic material. One suitable material is regenerated cellulose film coated with a suitable moistureproofing coating composition such as a nitrocellulose/wax coating or a coating of a suitable polymeric material, for example, a vinylidene chloride copolymer. The sheet wrapping material may consist of two or more plies of suitable material, for example, an inner sheet of moistureproof coated cellulose film and an outer sheet of kraft paper.

A specific wrapping machine constructed and adapted to operate in accordance with the invention will now be described with reference to the drawings, in which:

FIGURE 1 is a diagrammatic perspective view of the wrapping machine,

FIGURE 2 is an end elevation of a wrapping head,

FIGURE 3 is a longitudinal cross section of a wrapping head through A—A of FIGURE 2,

FIGURES 4 to 7 are diagrammatic side elevations of wrapping head illustrating stages in the sealing operation,

FIGURE 8 is a diagrammatic representation showing a first folding stage,

FIGURE 9 is a diagrammatic representation showing a second folding stage and,

FIGURE 10 is an end view of a wrapped roll.

Referring to FIGURE 1, a roll 1 of a sheet material such as regenerated cellulose film wound onto a hollow core 2 is delivered by a conveyor 3 to a chute 4 down

which the roll 1 passes on to a sheet 5 of wrapping material laid over a support 6 between a pair of spaced tubular guides 7. The sheet 5 comprises a ply of kraft paper 8 drawn from a supply roll 9 and a ply of moistureproof coated regenerated cellulose film 10 drawn from a supply roll 11 by means of draw rollers 12 and cut to a length greater than the length of the roll 1 by a guillotine 13. The ply of kraft paper 8 is wider than the ply of cellulose film 10 and one exposed edge of the kraft paper 8 is coated with an adhesive such as a pressure sensitive adhesive by an applicator 14.

The support 6 then descends to a position designated as 6' and the guides comprising the bars 7 which are forced apart either by the weight of the roll 1 or by a suitable positively driven mechanism (not shown) follow the contours of the roll 1 and envelop roll 1 in the sheet 5. The overlapping longitudinal edges of the sheet 5 are bonded together by means of the adhesive previously applied to one edge so that the roll 1 is enveloped in a cylinder of wrapping material having end portions 15 overlapping the ends of the roll 1.

The roll 1 is then transferred to a support 16 placed between a pair of opposed wrapping heads 17 which are caused to move simultaneously towards each end of the roll 1 by hydraulic means 18 and to fold and seal the overlapping end portions 15 of the sheet 5 against the ends of the roll 1 by the method described below.

Referring to FIGURES 2 and 3, each wrapping head 17 comprises a cylindrical member 19 fixed at one end by a rod 20 to a hydraulic cylinder 18 (FIGURE 1) and open at the other end. Over the open end of the cylindrical member 19 is fixed a compression plate 21 having a central aperture 22 corresponding in size with the open end of the member 19 and having eight radial slots 23 through which protrude eight arms 24 mounted on a ring member 25. The ring member 25 is freely slidable upon the cylindrical member 19 and is urged against the compression plate 21 by a spring 26.

Fingers 27 are pivoted to each of the arms 24 and, in a position of rest, are splayed outwardly with respect to the longitudinal axis of the cylindrical member 19. Each finger 27 is attached by a spring 28 to the ring member 25 so that movement of the finger 27 to a more splayed out position is opposed by spring pressure.

Within the cylindrical member 19 is fitted a ram 29 operated when required by compressed air supplied through a pipe 30 to a space 31 behind a piston 32.

A plug 33, which may conveniently consist of a cylindrical ring of cardboard, may be introduced into the cylindrical member 19 in front of the ram 29 through openings 34, 35 in the ring 25 and the member 19 from a magazine (not shown).

Each wrapping head 17 operates as follows with reference to FIGURES 3 to 7.

The wrapping head 17 with the fingers 27 in the position shown in FIGURE 3 is moved by the hydraulic means 18 (shown in FIGURE 1) towards the end of the roll 1. Each finger finger 27 presses against the end portion 15 of the sheet 5 and forms a fold line 36 (FIGURE 4). As the advance of the wrapping head 17 continues, the edges of the fingers 27 come into contact with the end of the roll 1 when they are caused to splay outwardly against the pressure of the springs 28 until the heel portions 37 on each of the fingers 27 press the portions of the sheet 5 immediately beneath the fingers 27 firmly into contact with the end of the roll 1 thus forming radial fold lines with upstanding portions 38 of the sheet 5 between the fingers 27 as shown diagrammatically in FIGURE 8.

On further advancement of the wrapping head 17 (FIGURE 6) the ring 25 and fingers 27 are held stationary by the resistance of the end of the roll 1 and the cylindrical member 19 and compression plate 21 move forward against the pressure of the spring 26. The compression plate 21 flattens the upstanding portions 38 of the sheet 5 to form radial pleats 39, as shown diagrammatically in FIGURE 9, and holds the marginal portions 40 of the sheet 5 over the mouth of the hollow core 2 of the roll 1.

The ram 29 is then caused to move forward (FIGURE 7) on the introduction of compressed air into the space 31 so as to force the plug 33 together with the portions 40 of the sheet 5 into the end of the hollow core 2 so that the portions 40 are firmly sealed within the core 2 by the plug 33.

As shown in FIGURE 10, the material wound on the roll 1 is now securely sealed in the sheet 5 of the wrapping material and the ends have eight radial pleats 39 which serve to cushion the ends of the roll 1 against shock during handling.

The wrapping heads 17 are then retracted and fingers and other mechanisms return to the position shown in FIGURE 3 in preparation for a further cycle of operations in respect of a new roll 1 delivered to the support 16.

I claim:

1. A device for applying a cylindrical envelope of wrapping material around a cylindrical roll, an end face of said roll having a recess capable of receiving a plug, said wrapping material extending beyond the end face of said roll a distance approximating the radius of said end face, said device adapted to fold the extending end portions of said wrapper against said end face and to force said plug into said recess to seal therein those parts of the said end portion of the envelope which overlie the said recess, which device comprises in combination:

(1) means for folding inwardly the said end portion of the cylindrical envelope, whereby a plurality of radially disposed folds are formed in the said end portion of the envelope, and the said end portion of the envelope at the said folds is brought into contact with the end face of the roll by pressure exerted on the said end portion of the envelope at the said folds,

(2) a compressing member capable of movement towards the end face of the roll whereby those portions of the envelope between the folds which are upstanding relative to the end face of the roll may be flattened against the said end face of the roll, and,

(3) a ram arranged for movement axially relative to the roll, driving means for sequentially effecting the forward operative movement of said compressing member and of said ram whereby the ram is moved forwardly toward the roll only after operation of the folding means and compressing member and while the latter is in its forward position aganist the end face of said roll and whereby the plug may be forced against the said parts of the end portion of the envelope which overlie the recess and forced into the said recess so as to seal the said parts of the end portion of the envelope in the recess.

2. A device for applying a cylindrical envelope of wrapping material around a cylindrical roll, said wrapping material extending beyond the end face of said roll, said device adapted to fold the extending end portions of said wrapper against said end face, which device comprises, in combination:

(1) means for folding inwardly the said end portion of the cylindrical envelope, whereby a plurality of radially disposed folds are formed in the said end portion of the envelope, and the said end portion of the envelope at the said folds is brought into contact with the end face of the roll by pressure exerted on the said end portion of the envelope at the said folds,

(2) a compressing member capable of movement towards the end face of the roll whereby those portions of the envelope between the folds which are

upstanding relative to the end face of the roll may be flattened against the said end face of the roll, said folding means comprising a body member capable of relative movement axially towards the end of the roll and having a ring of fingers projecting forwardly and outwardly from the face of the body member for engaging and folding the said end portion of the cylindrical envelope of wrapping material, the said fingers being pivoted to the body member and being capable of being splayed outwardly against a return spring and the fingers having heel portions which press the portion of wrapping material beneath each finger firmly into contact with the end face of the roll when the fingers are caused to splay outwardly when making contact with the end of the roll.

3. A device as claimed in claim 2 wherein the said compressing member consisting essentially of a slotted plate whereby the plate can move forward past the pivoted ends of the fingers while the heel portions hold the wrapping material at the folds against the end of the roll.

4. A device as claimed in claim 3 wherein the said body member is mounted on a rod, the said rod being movable towards or away from the end face of the roll by hydraulic means.

5. A device as claimed in claim 1 wherein said device provides an open-ended cylinder axially of said compressing member, and means are provided for mounting said ram for sliding movement in said cylinder to force the plug into said recess.

6. A device as claimed in claim 5 wherein a feed opening communicating with the interior of the cylinder is provided through which plugs may be fed in front of the ram.

7. A device for folding those end portions of a cylindrical envelope of wrapping material formed around a cylindrical roll which extend beyond the roll against the corersponding end face of the roll, said end face having a recess capable of receiving a plug, and for sealing in said recess those parts of the said end portion of the envelope which overlie the said recess:

(1) a means for folding inwardly the said end portion of the cylindrical envelope whereby a plurality of radially disposed folds are formed in the said end portion of the envelope, and the said end portion of the envelope at the said folds is brought into contact with the end face of the roll by pressure exerted on the said end portion of the envelope at the said folds, said means comprising a body member mounted on a rod, said rod being movable axially relative to the roll towards or away from the end face of the roll by hydraulic means, and having a ring of fingers projecting forwardly and outwardly from the face of the body member for engaging and folding the said end portion of the cylindrical envelope of wrapping material, the said fingers being pivoted to the body member and being capable of being splayed outwardly against a return spring and the fingers having heel portions which press the portion of wrapping material beneath each finger firmly into contact with the end face of the roll when the fingers are caused to splay outwardly when making contact with the end of the roll,

(2) a compressing member capable of movement towards the end face of the roll whereby those portions of the envelope between the folds which are upstanding relative to the end face of the roll may be flattened against the said end face of the roll, said compressing member consisting essentially of a slotted plate whereby the plate can move forward past the pivoted ends of the fingers while the heel portions hold the wrapping material at the folds against the end of the roll,

(3) a ram arranged for movement axially relative to the roll whereby the plug may be forced against the said parts of the end portion of the envelope which overlie the recess and forced into the said recess so as to seal the said parts of the end portion of the envelope in the recess, said ram being mounted in an open ended cylindrical member capable of being forced forward through a central aperture in the said compressing member to force a plug into the said recess, the said cylindrical member being provided with a feed opening communicating with the interior of said cylindrical member through which plugs may be fed to the point of the ram.

8. The device as set forth in claim 1 in which the end folding and plug inserting portions of the device are duplicated at the opposite ends of the roll.

References Cited by the Examiner

UNITED STATES PATENTS

1,629,525	5/1927	Parsons	53—214 X
2,246,525	6/1941	Matter	53—216 X
2,746,224	5/1956	Wollett	53—380 X

TRAVIS S. McGEHEE, *Primary Examiner.*