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54 **Packaging machine.**

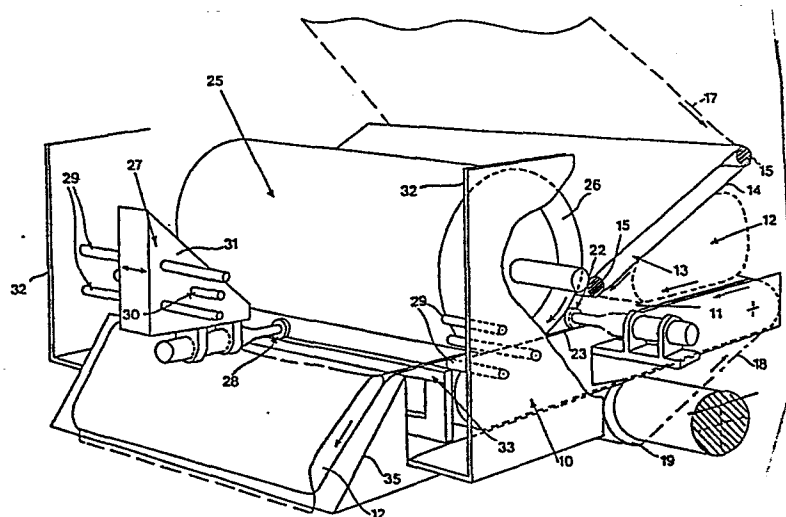
57 A packaging machine is for packaging articles in flexible sheet material, particularly articles which may be compressed to occupy less space in the resulting package.

The machine includes a support 10 for the articles and a rotatable member, preferably a roller 25, located above the support. Relative movement between the support and roller causes the article, enveloped in the sheet packaging mate-

rial, to pass between the support and the roller.

The roller has yielding means about its periphery so that the article causes compression of the yielding means during movement of the article between the support and the roller and compression of compressible articles.

As the article is discharged from under the roller the packaging material is sealed around the article.



Packaging Machine

This invention relates to packaging machines and in particular to packaging machines for packaging articles in flexible sheet material.

Hitherto packaging machines for packaging articles
5 in flexible sheet material have taken many forms and in some cases the resulting package has been sealed so that the article does not make contact with atmosphere until opened. In its simplest form the article may be placed in an open-ended bag, the
10 open end being sealed after insertion. However with this and other arrangements the article is freely movable within the sealed package and, in cases in which the article is bulky, the resultant package occupies considerable volume and contains a large
15 volume of air.

In some packaging machines there have been attempts to ensure that the packaging material closely conforms to the shape of the article, for example in U.S. Patent No. 4,244,158 in which pockets are formed in
20 cooperating rollers to receive the articles, and sheets of packaging material are sealed around each article during passage between the rollers. British Patent No. 1,481,240 discloses a packaging machine in which articles are located in pockets, the shape of
25 the article, during packaging in sheet material.

Such machines are unable to accept articles other than those which fit into the pockets and during packaging there is no requirement to reduce the bulk of the packaged articles.

30 An object of the invention is to provide an improved packaging machine capable of enveloping articles in

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flexible sheet material closely conforming to the article and with the possibility of reducing the bulk of the article.

According to the invention a packing machine comprises
5 support means for articles to be packaged, a rotatable member located above the support means, drive means for causing relative movement between the support means and the rotatable member, and sealing means, whereby the article, enveloped in packaging material,
10 is moved between the support means and the rotatable member, the rotatable member having yielding means about its periphery and the yielding means and the support means being so positioned relative to one another that the yielding means yields under
15 engagement by the article during said movement and the sealing means sealing the packaging material around the article.

Preferably the support means comprises conveyor means for conveying the article relative to the
20 rotatable member but the rotatable member may be moved relative to the support means.

Conveniently the packaged article passes over downwardly-directed support means after said movement between the support means and the
25 rotatable means. In this way after the article has been enveloped and sealed in the packaging material the package moves downwardly about a transversely-extending line adjacent the rotatable means and this places the packaging material in
30 tension. In one arrangement the downwardly-directed means is a support surface inclined downwardly from the rotatable member.

Preferably the rotatable member is in the form of a roller around which is located said yielding means, the periphery of the yielding means being in close proximity to the support means. Alternatively the
5 rotatable means may be in the form of endless belt or web about which the yielding means is located. In either case the yielding means may be in the form of a web of resilient yieldable material, the thickness of the web being selected according to the
10 nature of the article to be packaged.

The sealing means may include at least one sealing element reciprocatably transverse to the direction of said movement to seal together packaging material located above and below the article immediately after
15 the passage of the article between the rotatable member and the support member. The sealing means may also include sealing elements for sealing together the longitudinal edges of the packaging material during a packaging operation.

20 Preferably the sealing means includes ultrasonic sealing means for sealing the packaging material together and the sealing means may be in the form of a wheel and cooperating support between which the packaging material passes to seal the upper and lower
25 sheet material together at one end or both ends of the package and at the sides of the package.

The machine may include packaging material feed means for feeding sheet packaging material above and below the article prior to the passage of the article
30 between the support means and the rotatable member.

Further features of the invention appear from the

following description of an embodiment of the invention given by way of example only and with reference to the drawing which is a perspective view of a packaging machine.

5 Referring to the drawing a packaging machine is shown which is suitable for packaging articles in flexible sheet material to form packages which are sealed from atmosphere and which have minimum air content within the package. The machine is
10 intended to have particular application to the packaging of soft articles whose bulk can be reduced during the packaging operation but it may also find application in the packaging of other articles.

The machine includes a feed conveyor 10 in the form of
15 an endless belt 11 driven by drive means (not shown) to convey articles 12 towards and through a packaging station. The conveyor 10 provides a support for the article 12 during a packaging operation and for this purpose the belt 12 is either rigidly
20 constructed in its transverse direction or a support for the upper side of the belt is provided to resist downward deflection of the belt.

A compression conveyor 13 is located above the conveyor 10 and is inclined downwardly in the direction
25 of travel of the article 12 to approach the conveyor 10 at one end. The conveyor 13 is in the form of an endless belt 14 passing over rollers 15 and driven by drive means (not shown).

Sheet plastics film 17 and 18 is fed to the conveyors
30 10 and 13 to lie above and below the articles 12 and to be drawn with the article towards the packaging

station. The lower sheet 18 is fed off a film carrier 19 over the feed end of the conveyor belt 11 to be on the upper surface of the belt 11 and below the articles 12. The upper sheet 17 is fed off a
5 further film carrier (not shown) around the upper end of the conveyor 13 and along the lower surface of the belt 14 to lie on top of the article 12.

The plastics film 17 and 18 is flexible and is of the kind capable of being welded together by the
10 application of heat either by ultrasonic welding means (as described) or alternatively by electrically heated welding elements or bars.

It will be seen that when the articles to be packaged are relatively bulky, as for example with pillows,
15 blankets, clothing and the like, the conveyor 13 engages the upper sides of the articles and as the article moves along the conveyor 10 compression of the article takes place progressively over the length of the conveyor 13.

20 As the articles pass from under the leading end of the conveyor 13 the longitudinal edges of the film 17 and 18 are welded together by welding means 21 at opposite sides of the conveyor 10. As shown the welding means 21 (of which only one is seen) are in the form of
25 ultrasonic welding wheels 22, above the film, which rotate about a horizontal axis and cooperate with a fixed anvil 23 located below the film. The application of the wheels 22 to the film generates heat in the film and this causes the two sets of longitudinal edges to
30 be welded together to form longitudinal seals between the film sheets 17 and 18.

After passing under the leading end of the conveyor 13

the article passes between a gap defined by the conveyor 10 and a roller 25. The roller 25 is driven to rotate about its axis by drive means (not shown) and the periphery of the roller is formed by a layer
5 26 of yielding material which yields in the radially inwards direction of the roller. The outer surface of the roller 25 is normally in engagement with or in close proximity to the upper surface of the conveyor 10, but when an article passes between the
10 roller and the conveyor 10 the yielding material deforms to create a gap through which the article passes, at the same time applying a downward pressure on the article to compress the article, if it is compressible, to force out air between the sheets 17
15 and 18, and to cause the sheets 17 and 18 at the front and rear and sides of the article to come together.

The yielding material of the roller is generally resilient and may take several forms. It may be
20 flexible foamed or cellular plastics or rubber material, it may be an inflatable annular bag, or a plurality of axially extending inflatable bags around the roller. The roller may alternatively carry a plurality of radially-extending filaments or brushes.
25 The yielding material may be fixed to an inner cylindrical member or the material may be in the form of an annular sleeve replaceable to enable sleeves of different thicknesses to be employed for different-sized articles.

30 The axis of the roller 25 may be vertically adjustable to accommodate differently-sized sleeves and/or differently-sized articles.

Transverse seals between successive articles are

formed in the packaging material 17 and 18 after the material has emerged from under the roller 25. Sealing means 27 is provided for this purpose and in the illustrated arrangement the sealing means 27 is an ultrasonic sealing wheel 28 rotatable about a horizontal axis and reciprocable at right angles to the direction of movement of the articles 12. The sealing means 27 is mounted on rails 29 carried on supports 32 and is driven along the rails 29 by a drive arrangement including a rotatable rod 30 extending through a carrier 31 and including an archmedian screw drive (not shown) between the rod 30 and the carrier 31. The rod 30 is rotated by drive means (not shown) to move the carrier and the wheel in a film sealing operation along the rails 29. The material 17 and 18 is welded together by a transverse strip of the material being located between the wheel 28 and an anvil 33 under the material, and is heated and sealed by the generation of heat in the material by the ultrasonic wheel 28.

In one arrangement the welded strip produced is wide enough for a transverse cutting operation to be effected along the centre of the weld to separate the resulting packages from one another. Alternatively two wheels 28 may be provided which are arranged to make spaced transverse welds and the material may be cut between the welds to separate the articles from one another.

In either case the wheel 18 or wheels may effect a weld during each transverse movement or a welding movement may alternate with a return, non-operative movement.

A welding movement of the wheel 28 is initiated when

sensing means (not shown) senses that the articles 12 emerging from the roller 25 have moved past the wheel 28 and material 17 and 18 between successive articles lies between the wheel 28 and the anvil 33. Operation of the conveyors 10 and 13 and the roller 25 is temporarily interrupted to arrest the articles 12 during a transverse welding operation.

After articles 12 have passed from under the roller 25 they move onto a discharge chute 35 which is inclined at an acute angle to the horizontal, downwardly away from the roller. While on the chute 35 the articles tend to slide down the chute 35 and put the sheet material connecting the article on the chute with the next succeeding article under tension about the line of the anvil 33 or the upper edge of the chute. The tension thus generated tends to even out any unevenness in the material and ensures an even finish to the packages thus formed.

By the machine described it will be seen that a continuous succession of packaged articles is produced in which the articles may be compressed and retained in their compressed condition in the package until the package needs to be opened. Moreover the package can be sealed against atmosphere and the package can be arranged to contain a minimal amount of air. Thus the packaging machine can be of particular application to the packaging of textile articles which, if well dried before packaging, will quickly recover their original shape, if compressed, packed and maintained in their dry state, when removed from the packaging material.

The machine may also find application with incompressible articles to be sealed between the sheets of packaging

material.

Instead of using individual lengths of sheet material, as described, the articles may be packaged in plastics bags, open at one end to admit the articles, and
5 placed on the conveyor 10 so that the open end is directed upstream during movement along the conveyor 10 and under the roller 25. In this case the article may be compressed as before and much of the air removed from the bag before the bag emerges from under
10 the roller. The open end is sealed by transversely moving sealing means as described, the longitudinal sealing means being omitted.

As an alternative to the use of a cylindrical roller 25 and upper conveyor 13 a combined arrangement
15 including an endless rotatable web around which is located a yielding material may be provided. Over its operative part the web may extend obliquely downwardly towards the conveyor 10 and then around a cylindrical roller corresponding to the roller 25.

20 Instead of the transverse welding arrangement described the roller 25 may incorporate an axially-extending heated welding bar or bars cooperating with a fixed anvil to effect a transverse weld or welds during rotation of the roller without interrupting movement
25 of the articles along the conveyor 10.

The conveyor 10 may be replaced by a reciprocable table on which the articles are successively placed, the table moving under the roller to effect a packaging operation and then returning for a further article to
30 be placed thereon.

The ultrasonic welding wheels described may be replaced by an ultrasonic welding horn of known form.

Claims

1. A packing machine comprises support means (10)
for articles (12) to be packaged, a rotatable
member (25) located above the support means,
drive means for causing relative movement between
5 the support means and the rotatable member, and
sealing means (22, 28), whereby the article (12),
enveloped in packaging material (17, 18), is
moved between the support means and the rotatable
member, characterised in that the rotatable
10 member (25) has yielding means (26) about its
periphery and the yielding means and the support
means (10) being so positioned relative to one
another that the yielding means yields under
engagement by the article (12) during said
15 movement, and the sealing means (22, 28) sealing
the packaging material (17, 18) around the article.
2. A machine according to claim 1 wherein the support
means comprises conveyor means (10) for conveying
the article (12) relative to the rotatable
20 member (25).
3. A machine according to claim 1 or 2 wherein the
packaged article (12) passes over downwardly-
directed support means (35) after said movement
between the support means (10) and the rotatable
25 means (25).
4. A machine according to claim 3 wherein the
downwardly-directed means (35) is a support
surface inclined downwardly from the rotatable
member (25).
- 30 5. A machine according to any one of the previous

claims wherein the rotatable member (25) is in the form of a roller around which is located said yielding means (26), the periphery of the yielding means being in close proximity to the support means (10).

6. A machine according to any one of the preceding claims wherein the yielding means (26) is in the form of a web of resilient yieldable material, the thickness of the web being selected according to the nature of the articles (12) to be packaged.

7. A machine according to any one of the preceding claims wherein the rotatable member (25) is a cylindrical roller and the yielding means (26) is a sleeve of yielding material located about the roller.

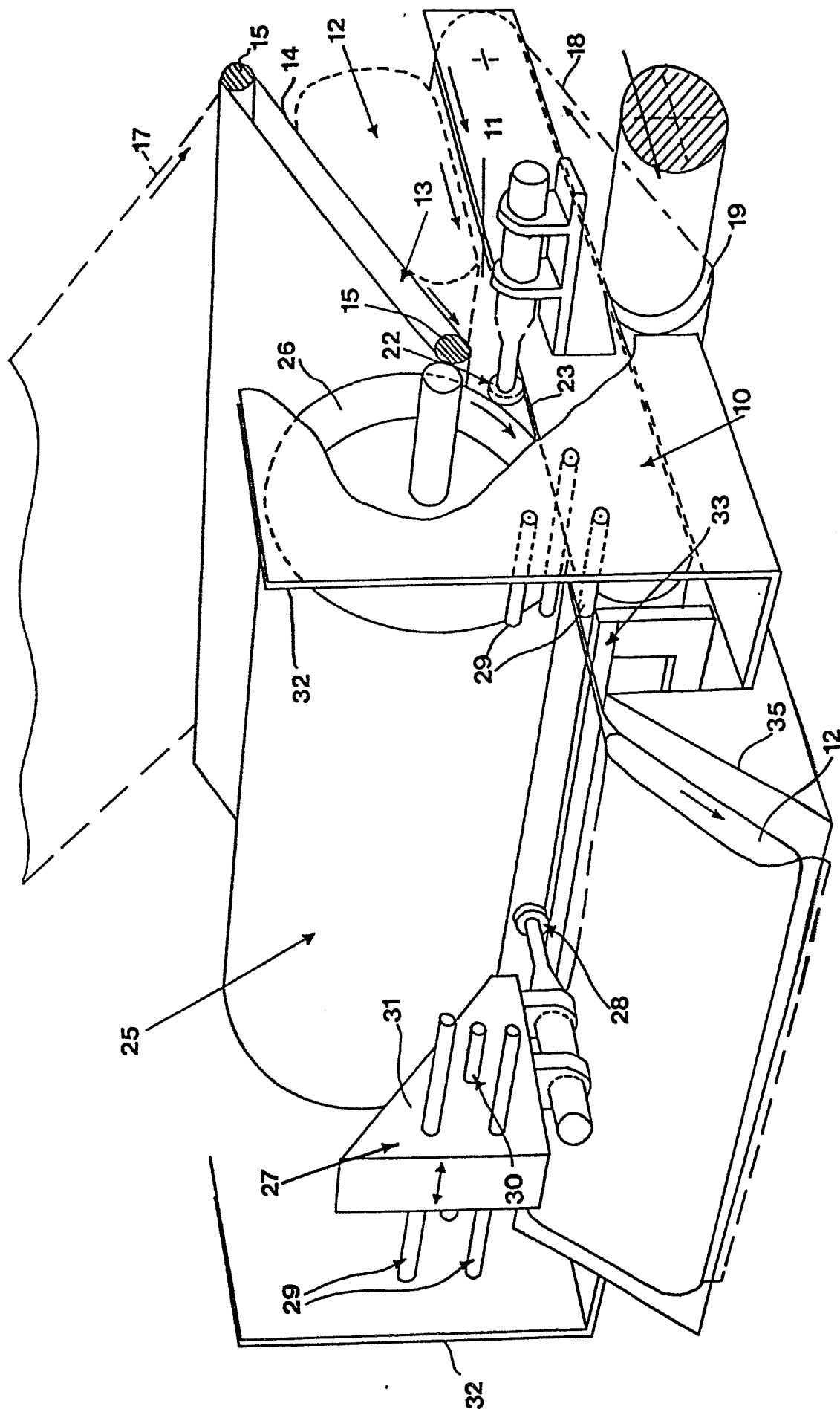
8. A machine according to any one of the preceding claims wherein the sealing means includes at least one sealing element (28) reciprocable transverse to the direction of said movement to seal together packaging material (17, 18) located above and below the article (12) immediately after the passage of the article between the rotatable member (25) and the support member (10).

9. A machine according to claim 8 wherein the sealing means (22, 28) includes ultrasonic sealing means for sealing the packaging material (17, 18) together.

10. A machine according to any one of the preceding

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claims comprising packaging material feed
means (19) for feeding sheet packaging material
(17, 18) above and below the article (12)
prior to the passage of the article between the
5 support means (10) and the rotatable member (25).





European Patent
Office

EUROPEAN SEARCH REPORT

01 19032

Application number

EP 84 30 1292

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
X	US-A-3 010 265 (McCLOSKEY) * Column 3, line 45 - column 5, line 5; figures 1,2 *	1,2,5, 7,10	B 65 B 63/02
Y		3,4,6, 8	
Y	--- US-A-3 377 776 (ARVIDSON) * Column 2, lines 48-68; figure 1 *	3,4	
Y	--- US-A-2 525 651 (CLUNAN) * Column 1, line 44 - column 2, line 1; figure 1 *	6	
Y	--- CH-A- 421 479 (EMHART) * Whole document *	8	TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
A	--- BE-A- 708 916 (EUROFOAM) * Whole document *	1	B 65 B

The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 29-05-1984	Examiner CLAEYS H.C.M.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	