Sept. 19, 1961 S. E. DAHLEN ET AL 3,000,153

METHOD FOR PACKING PRODUCTS AND A DEVICE FOR CARRYING OUT SAID METHOD

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FIG.1

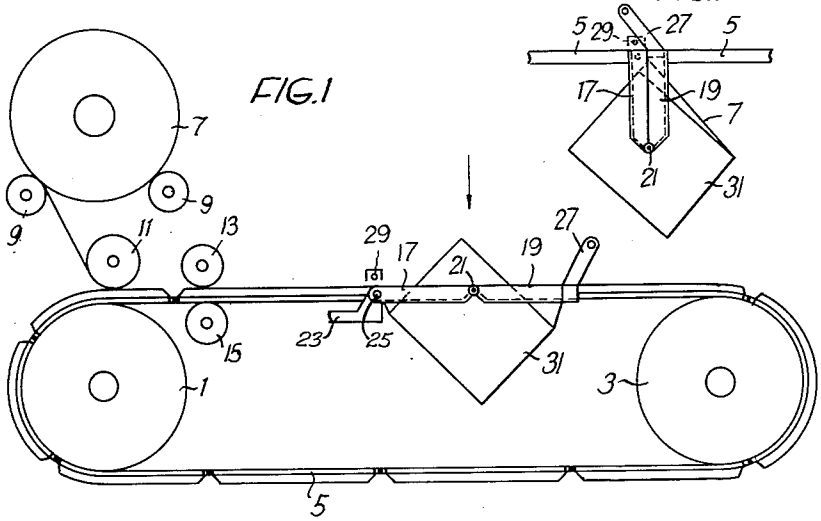


FIG.2

FIG.3

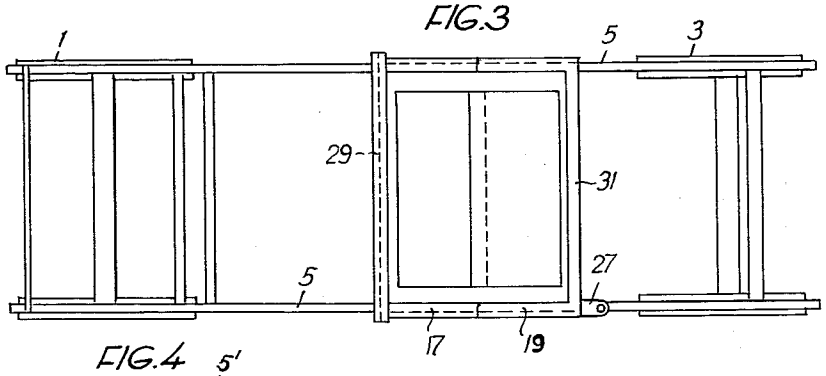


FIG.4

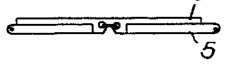
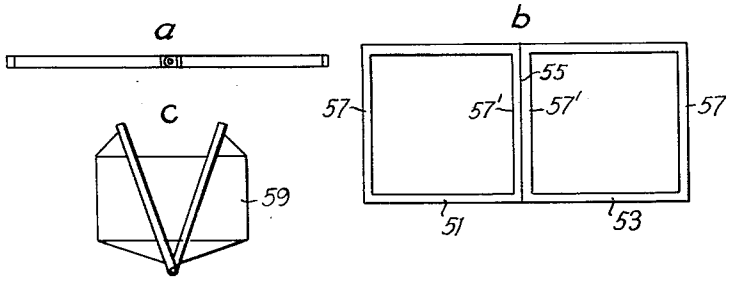


FIG.5



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FIG. 6

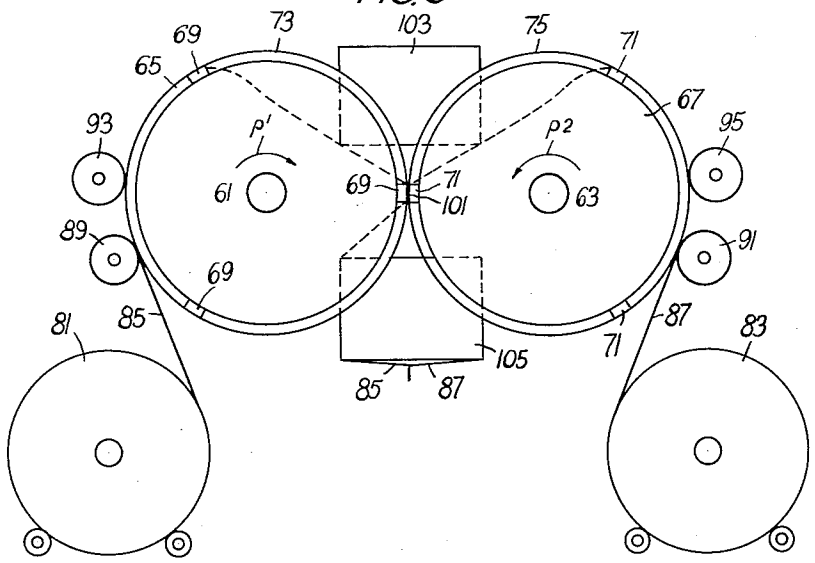
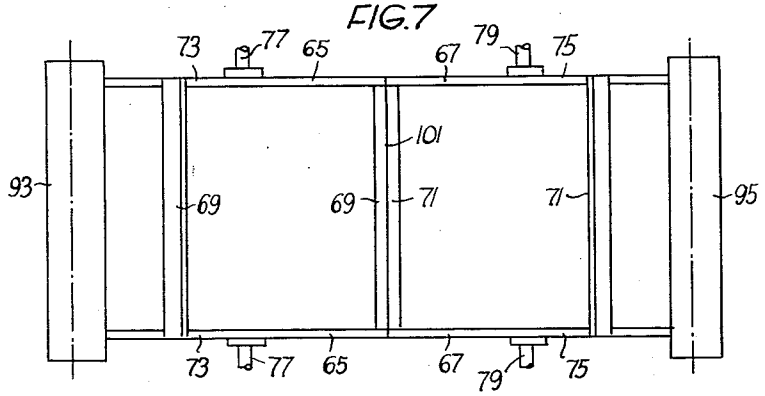


FIG. 7



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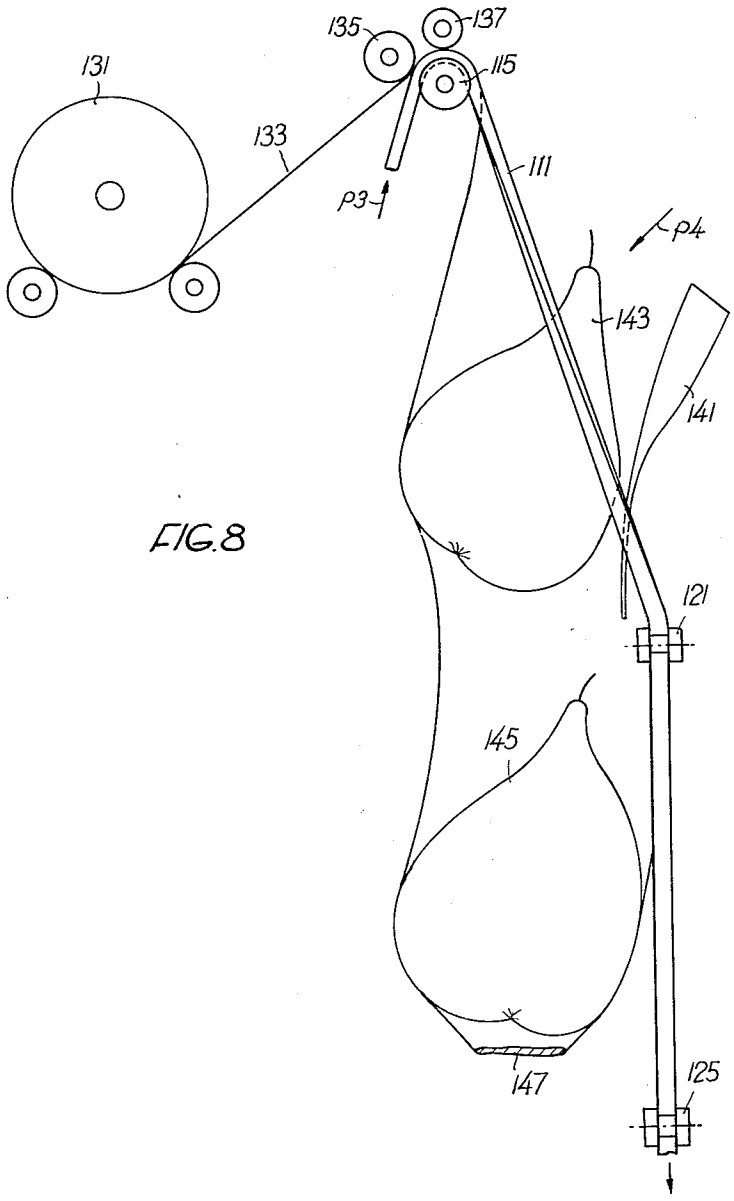


FIG. 8

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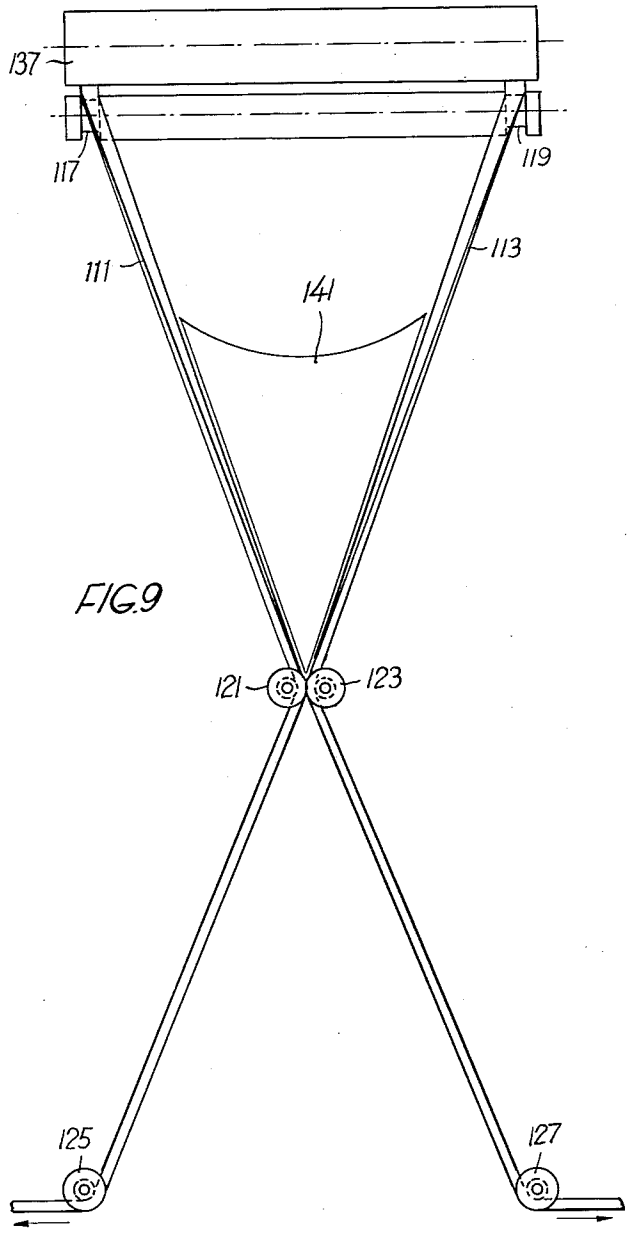


FIG.9

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METHOD FOR PACKING PRODUCTS AND A DEVICE FOR CARRYING OUT SAID METHOD

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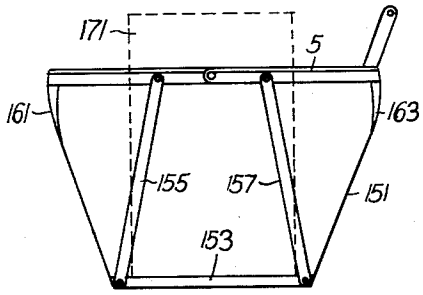


FIG. 10

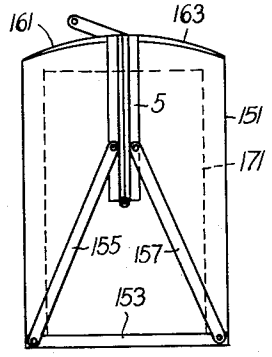


FIG. 11

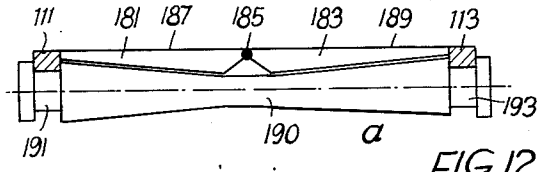
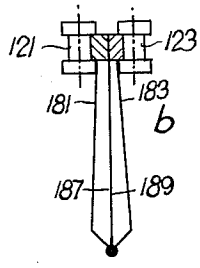


FIG. 12



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United States Patent Office 3,000,153 Patented Sept. 19, 1961

3,000,153

METHOD FOR PACKING PRODUCTS AND A DEVICE FOR CARRYING OUT SAID METHOD

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Filed Feb. 10, 1958, Ser. No. 714,331
13 Claims. (Cl. 53—33)

The present invention relates to a method for packing products in thermoplastic packing materials and a device for carrying out the said method.

It is known to pack products in packing materials of thermoplastic type, the sealing of the edges being effected by welding together the edges or other sealing parts of the packing material. Different machines are already known for packing in accordance with this method, in most cases the packing material is taken from a storage roll and is fed to the place where the packing is actually carried out. It is known to arrange special means for clamping the packing material, for instance at its edges, while the material is brought around the product to be packed and then sealed. However, these clamping means are expensive to produce and moreover it has been experienced that they involve complications and disturbances in the packing process. Furthermore it is known to pack products in a packing material with high elasticity, after heating to a certain temperature. In this condition the packing material can be brought around the product to be packed by stretching a small area of the material, while clamping its edges until the product is more or less enclosed by the packing material. The final hermetic sealing is then carried out in a known type of packing machine, by twisting the packed product, while clamping the edges of the packing material, so that the portions of the packing material near the edges of same are twisted and seal with one another as a result of the heating of the material to a sufficient temperature for welding. Apart from that the seals formed in this way are often not sufficiently reliable from the point of view of sealing and furthermore cannot obtain an attractive appearance, there is another drawback in these twisted seals, in that the portions of the packing material lying between the seal and the edges of the material which are clamped by said clamping means, will be of no use and are wasted. Furthermore, this waste represents an unnecessary cost; another drawback involved is that such waste collects and has to be removed regularly in order not to cause too serious complications during operation. The aim of the present invention is to pack by means of thermoplastic materials in such a way that such waste is eliminated and to pack by means of a packing apparatus of the simplest possible construction.

A method of packing products in a thermoplastic packing material and a packing apparatus for this purpose is characterized according to the invention in that the packing material is stuck to the underlying portion of the packing apparatus itself by applying pressure to the packing material after heating same to softening temperature. In principle there are no other means of clamping the packing material in the apparatus, according to the invention.

The packing material is thereby stuck to the base portion along marginal areas of the packing material, and, if desired, also between the margins.

The sealing of the package is carried out by pressing (welding) together the sealing portions of the packing material before the latter has been loosened from the base portion. In this connection it is essential that the adhesion of the packing material to the base portion is adapted in such a way with regard to the strength of the seal formed in this way, that its strength is less than the strength of the weld of the packing material obtained by the sealing operation. The sealed package can then be removed from the base portion without risk of breaking the packing material.

A device for carrying out the method according to the invention is characterized in that the base portion to which the packing material is fastened at its edges, consists of spaced zone areas between which there is a free space which can accommodate the product to be packed.

The base portion may for instance consist of unbroken frames, the peripheral areas of two discs spaced from each other and mounted on the same spindle, two parallel bands or the like, against which the edges of the packing material are welded together.

If the packing material is highly tensile after heating, which is the case if it consists of for example of hydrochlorinated rubber (C_5H_8HCl), which has the trade name "Pliofilm," cellulose foil or a similar material, it is possible, by pressing down the product to be packed in said free space between the zone areas along which the packing material is stuck at its edges while stretching out the pane of packing material lying over this space, to bring this material to enclose the product, whereafter the sealing can be accomplished by laying and pressing together the edge portions of the packing material, which are fastened to the said zone areas. This must be carried out before the packing material has cooled so much that its elasticity has disappeared. In the case of Pliofilm however, the elasticity does not disappear when the material cools, but only after some further minutes, whereunder the crystal structure of the material is transformed.

The base portion to which the packing material is fastened at narrow zone areas, can be of optional material, but it should be noted that the material forming the zone areas themselves must be chosen with care, because it must give a suitable, not too strong and not too weak, joint or adhesion with the heated packing material. A suitable material is rubber, but of course other materials may also be used.

Hereafter the invention will be described in more detail in connection with the accompanying drawings, of which FIG. 1 shows a side view of a first embodiment of a packing apparatus according to the invention, only the main portion being shown. FIG. 2 shows the sealing unit itself of the device according to FIG. 1, in the sealing position. FIG. 3 shows a top view of a part of the device according to FIG. 1. FIG. 4 shows a side view of a frame of the device. FIG. 5*a* shows a side view of a double frame according to another embodiment and FIG. 5*b* gives a top view of the same frame. FIG. 5*c* shows the same frame during the packing operation. FIG. 6 shows a side view of a further embodiment of a packing apparatus according to the invention, only the main portion being involved. FIG. 7 shows a top view of the device according to FIG. 6. FIG. 8 gives a side view of a sealing apparatus according to the invention, which is operatable in continuous process. FIG. 9 shows a top view of the device according to FIG. 8. FIG. 10 shows a side view of an improvement of the embodiment according to FIG. 1. FIG. 11 shows the device according to FIG. 10, as seen in the sealing position. FIG. 12*a* and 12*b* show an improvement of the apparatus according to FIGS. 8 and 9.

The embodiment of the packing apparatus according to the invention shown in FIG. 1 is intended for intermittent packing of optional articles, including liquids, in a thermoplastic material, it being assumed in the present case that this material is so-called Pliofilm (hydrochlorinated rubber) which is characteristic by its high elasticity after sufficient heating. This elasticity remains relatively long after cooling the film to room temperature. The same applies to the welding ability.

In the apparatus according to FIG. 1 there are two rolls 1 and 3 arranged parallel to and spaced from one

another. A chain of links 5 is placed around the rolls. The links are placed around a central line at right angles to the plane of the paper in FIG. 1. They consist of a frame 5, preferably of rubber, with an inner edge or strip 5', likewise of rubber, which extends somewhat above the plane of the frame 5, as appears from FIGS. 1 and 4. 7 illustrates a roll of Pliofilm, which rests upon the supporting rolls 9, from which the Pliofilm is taken and fed in between the chain of links 5 and the roll 11, the latter being heated by electrical heating means with connections to a source of current, to a sufficiently high temperature in order to soften the film by contact heating, so that the film becomes stretchable to a desired degree and moreover weldable by only applying pressure to the film. The roll 11 is made of heat resistant material, which may also not show any substantial adhesion to the softened film. It is suitable that the roll 11 lies with a certain light pressure against the rubber strips of the frames 5.

The Pliofilm passes on under the roll 13, which, under the counter pressure of roll 15 under the chain, exerts such a pressure on the edges fo the Pliofilm that these fasten against the rubber strips 5' of the frames 5. In this way the film has been fastened round the whole frame and forms a "film pane" within the frame.

17 and 19 indicate a guiding frame in which the links pass after their passage between the rolls 13 and 15. The guiding frame is pivoted on a central axis substantially at right angles to the plane of the paper in FIG. 1 and is pivotably connected at one end 25 to a stationary part 23 of the apparatus, while at the other end the said guide frame has an upwardly extending part 27, the free end of which is subjected to a force for folding the guide frame round the axis 21, either by hand or by means of a mechanism not shown. When the link supplied with the Pliofilm has come to the correct position within the guiding frame 17, 19, the product to be packed 31, is pressed down in the said "pane" of Pliofilm on the link 5, as appears from FIG. 1. The elasticity of the Pliofilm is so great, that the whole product 31 can generally be pressed down without breaking the film. Thereafter the guiding frame and with it link 5 are folded around the axis 21 to the final position, shown in FIG. 2. The edges of the Pliofilm portion of the one half of the link are thereby pressed against and welded to the edges of the Pliofilm portion of the other (similar) half of the link, whereby the so formed package is effectively sealed. This weld is considerably stronger than the adhesion obtained between the edges of the Pliofilm and the rubber strips of the link, so that the finally sealed package can in general be removed from the rubber strips simply by pulling off, without breaking the Pliofilm. In certain cases however, it may be desirable to facilitate the loosening of the edges of the Pliofilm from the rubber strips of the link by means of special equipment, so that the stresses on the film will not be too great, which is especially true when the film is very thin. This problem can be solved in accordance with different methods, which can easily be suggested by an expert. Instead of the single open frames, it is also possible to use unfoldable double frames, e.g. as shown in FIGS. 5*a*, *b* and *c*. The marginal portions 51 and 53 are of the same size and pivotably connected to each other along the line 55. The edges of the Pliofilm are fastened to the zone areas 57 surrounding the half frames by applying pressure after heating the film in a similar manner as described previously, see FIGS. 1–4. In FIG. 5*a* the frame is shown in side view and in the resting position. FIG. 5*b* shows the frame as seen from above and it appears that the parts 51 and 53 of the frame have fastening surfaces 57' also along the folding line 55.

When the frame is folded around the product to be packed 59, as shown in FIG. 5*c*, a welded seal is obtained, which is also obtained along the folding line 55. In certain cases this offers an advantage as compared with the packing method according to FIGS. 1–4, partly due to the fact that the welding seam becomes symmetrical around the whole package, partly due to the fact that difficulties will probably not arise as regards the sealing near the folding line. If the device according to FIGS. 1–4 is made with less care, such difficulties may sometimes arise, because the necessary sealing pressure is not obtained just at the fold.

In many cases it is not desirable that air is trapped in the package. In such cases the following method of expulsion can be used according to the invention. Just above the folding line of the frame 5 in the embodiment according to FIGS. 1–4 an exhaust tube is inserted, said tube being of such a shape that it will not cause the least possible disturbance in the normal folding operation. The frame 5 is folded together and is then parted a little, whereafter the film is loosened from the frame, except at the exhaust tube. The air is removed through this tube, whereafter the frame is folded together again, the tube is drawn out and the remaining small hole is sealed by pressing the rubber edges together, which were held apart by the exhaust tube. In other cases it is desirable to substitute the air by certain gases, such as carbondioxide or nitrogen. A similar method is then used. A tube is placed in the fold opposite to the exhaust tube and the gas is led in when the frame has been folded together for the first time. The exchange of gases can of course not be complete, but as a rule this is not necessary, since it is sufficient to reduce the oxygen content in the inner atmosphere to a certain degree. Thereafter the gas inlet tube is drawn out and the remaining hole is sealed, the exhaust tube is drawn out and the corresponding hole is finally sealed in a similar manner as described. In FIGS. 6 and 7 another embodiment of the invention is shown. Instead of frames specially constructed wheels are used, to the periphery of which the Pliofilm is fastened by pressure after heating. FIG. 6 shows the embodiment fundamentally and FIG. 7 shows certain parts of the device according to FIG. 6 as seen from above.

The main part of the device comprises the two rotatable "drums" 61 and 63, which consist of two flanges or plates 65 and 67 respectively together with laths 69 and 71 respectively, which hold the plates together and are secured to the periphery of same. The outer sides of the laths are in the same geometrical cylindrical coating surfaces as the peripheral zones 73 and 75 respectively of plates. The two drums 61 and 63 are mounted on parallel axes 77 and 79 respectively with a suitable distance between each other that the peripheries 73 and 75 are in general engaged with one another.

From the storage rolls 81 and 83 respectively containing Pliofilm 85 and 87 respectively, such film is taken and fed in under the heating rolls 89 and 91 respectively, of similar construction to the roll 11 in FIG. 1; said rolls heating the Pliofilm to softening temperature, whereafter the film passes in under the pressing rolls 93 and 95 respectively, which press the film against periphery zones 73 and 75 respectively, of the plates 65 and 67 respectively and against the crossed laths. When the two Pliofilms 85 and 87 meet at the line 101 between the drums, where these engage with one another, the films are welded together along said zones and laths. When this has started, or already before, the product to be packed 103, may be inserted above the central line 101 between the adjacent pairs of flanges or plates 65 and 67 respectively, and laths 69 and 71 respectively, in a manner as shown in FIG. 6, while the drums 61 and 63 are rotated in the direction of the arrows *p*1 and *p*2. In this way the product 103 is successively enclosed by the Pliofilms 85 and 87 while stretching the films, said films being held reliably at the edges at the periphery of the plates and on the laths. The sealing of the package begins at the laths 69 and 71 on the central line 101, continues along the peripheries 73 and 75 and is finished at the next laths 69 and 71, when these come to the central line 101.

This last stage is shown in FIG. 6 for another former product **105**. It is assumed that the adhesion between the Pliofilm and the zones **73**, **75** and the laths **69**, **71** is substantially weaker than the welding seal between the edges of the Pliofilm, so that the edges of the film are automatically loosened from said zones and laths, after finishing the sealing of the package, according to FIG. 6 for the product **105**, and when the drums continue to rotate in the direction of the arrows. According to the invention special means may however be used to facilitate the loosening of the film from these zones and laths. Said means are not shown in FIGS. 6 and 7 since they may be of different types, which can easily be suggested by a man skilled in the art.

A further embodiment of the packing machine according to the invention is shown in FIGS. 8 and 9. In this machine it is possible to pack goods in pieces as well as in bulk in a continuous process. In the latter case the length of the package is optional.

The device consists of two endless belts **111** and **113** of a strong material. The belts pass around an upper roll **115** in a recess or channel **117** and **119** respectively, of the roll, said grooves being spaced sufficiently from one another. The belts meet at the rolls **121** and **123**, which are held at right angles or crosswise to the roll **115** with regard to the direction of the axis, so that the belts are twisted 90° between the rolls **121**, **123** and the roll **115**. The rolls **121** and **123** are at a small distance from each other, so that the belts **111** and **113** are firmly pressed against each other when they pass between the rolls. Finally the belts are separated after the rolls **121** and **123** and pass on to the rolls **125** and **127** and, if desired, to further rolls and back to the roll **115**. The rolls **125** and **127** are at a considerable distance from each other.

From the storage roll **31** with Pliofilm **137**, such film is taken and fed over a heating roll **135**, which may be of the same type as the roll **11** in FIG. 1, where the film is brought to softening and welding temperature. From the roll **135** the heated film passes to the upper side of the belts **111** and **113**, between these and the pressing roll **137**, bringing the film to adhere to the surface thereof, the latter being made of material suitable for this purpose, e.g. rubber.

At the place indicated by the arrow *p4* in FIG. 8 the product to be packed **143**, is inserted in the packing apparatus, while, if desired, sliding same along the guide **141**, so that it is inserted between the belts **111** and 113, while stretching the film **133**. It is assumed that the belts are moving constantly by driving means not shown. As the edges of the film are brought together and pressed together between the belts at the laths **121** and 123 a welding seam is formed, whereby the packing material forms a hose in which the products **143** and **145** etc. to be packed, are enclosed. When the belts **111** and 113 separate, after passing between the rolls **121** and 123, it is possible to loosen the film from the belts either manually or by means of automatic devices, not shown.

If the product should be packed individually, there remains the problem of making the end seals between each packed product, i.e. welding seams substantially at right angles to the belts in FIG. 8. This can be accomplished in different ways, manually or by means of automatic devices. According to one embodiment of the invention the belts **111** and **113** can be connected at regular intervals by means of a pair of arms, which will be described in more detail in connection wtih FIGS. 12*a* and *b*. If bulk goods are to be packed in hose-like packages, a device according to FIGS. 8 and 9 can be used without modifications.

In a device according to the invention it is also possible to stretch the film out by means of vacuum pressure before inserting the product to be packed. FIGS. 10 and 11 show an example of this method. FIG. 10 shows the device with a frame included therein in open position, while FIG. 11 shows the same device with the frame in folded position.

The device is to be regarded as an improvement of the construction according to FIGS. 1–4, in that there are open frames or links **5** of fundamentally the same shape, according to FIG. 1. Furthermore there is a folding frame according to FIG. 1. The links must be pressed tightly against the frame when they are drawn in the folding frame in this device. At the edges of the folding frame a rubber sack **151**, is fitted in such a way that it closes tightly around the edges of the frame everywhere. The sack stretches downwards to a bottom **153**, which is kept in position because it is connected to the folding frames, for example by means of two links **155** and **157** on either side of the frame. Furthermore, the sack is held out from the frame in the folded position of the latter, by means of two guiding springs **161** and **163**, on the half of the frame.

It is also possible to use bellows instead of rubber sacks in the shown device, but since the necesary reduction of pressure is very small it is quite possible to use an elastic material as a wall of the vacuum chamber. It is assumed that a "pane" of Pliofilm has been fastened to the frame **5** in the manner described in connection with FIGS. 1–4. This film pane and the rubber sack form a closed chamber. It is also assumed that a device (not shown) is arranged to provide a vacuum pressure in this chamber. When a certain vacuum arises the Pliofilm yields at first to the outer pressure and forms a hollow, which in some cases extends as far as the bottom **153**. In this hollow the product to be packed, which may also be a liquid product, is lowered. The packing is then carried out in the following manner.

The frame is folded while the vacuum is maintained in the chamber. If a protecting gas is to be used, gas exchange is carried out according to the above method, so that the film edges seal together. The folding frame is thereafter opened slightly and the film edges are loosened by a thin lath (not shown) which is inserted in one leg of the frame. It is desirable to loosen the edges from the frame, since the welding seam of the Pliofilm may otherwise be too broad. The exhaust tube which is inserted in one fold of the frame, holds the film edges in this pisition. Not until the superfluous gas has been expelled is the frame folded together again, whereafter the exhaust tube may be removed. Thereafter the frame is completely opened, so that the final product can be removed and is then hermetically packed.

Since it may be difficult to obtain a tight joint between the links fitted to a chain, according to FIG. 1, and the folding frame, the links, which consist of rubber, may be fixed to the folding frame separately, i.e. there is one folding frame for each link, which are thus not arranged as a chain.

Instead of bellows or a sack according to the above, it is possible in the embodiment of the invention shown in FIG. 5, to provide a rigid vacuum chamber under one of the frame halves **51** and **53**. This half of the frame is then held horizontally, while the other half of the frame is put on top of the half with the vacuum chamber by a pivoted motion, after inserting the product in the vacuum chamber and after such lowering of the pressure in this chamber that the Pliofilm has sunk in the chamber. In this embodiment there do not arise any special tightening problems. The frames **51** and **53** are preferably not arranged in a chain, but are loose in a guide, so that they can be moved from one position in which heated Pliofilm or other packing material is fastened to the frame edges by a pressing operation, according to the above, to the packing position itself. When the packing process has been accomplished and the product has been removed, the frames are returned to the position for the insertion of new Pliofilm, whereafter a new product can be packed etc. etc.

Finally FIGS. 12*a* and *b* show an improvement of the

device according to FIGS. 8 and 9 which is intended to provide end seals automatically and if desired, separation of the packages obtained in said device. The belts **111** and **113**, which may be the same as in FIGS. 8 and 9, pass over a roll **190** with a groove **191** and **193** and have been connected at regular intervals to touch the frames **181** and **183** respectively, which extend at right angles to the belts and are pivotably connected to each other at **185**, the axis of the pivot being parallel with the belts. The upper surfaces **187** and **189** lie in the same plane as the upper surfaces of the belts, at least nearest to the belts, and are coated with for instance rubber.

When the belts with the frames **181** and **183** pass under the pressure roll **137**, according to FIG. 8, Pliofilm is welded to the upper surfaces of both the belts and the frames, whereafter the product to be packed is inserted, in a manner as shown in FIG. 8. When the belts then pass between the rolls **121** and **123** the Pliofilm is welded together, both along the belts and along the frames **181** and **183**. If desired, one of these frames can be fitted with a longitudinal edge or the like, which cuts the packing material in the middle of the formed welding seam, thus separating the different packages.

The invention is not limited to the shown and described embodiments, which are only examples of how the invention may be applied in practice. The packing material is stated to be Pliofilm in connection with the embodiments, it is of course possible to use any other suitable, weldable packing material. In certain cases it is also possible to use an unweldable material in an apparatus according to the invention, for example a packing material provided with a binding agent.

We claim:

1. An apparatus for packing a product in a thermoplastic material including means for fastening and holding the packing material in the apparatus during the packing process, characterized in that said means consist of a device for fastening the packing material to a base portion of the apparatus substantially only by applying heat and pressure to the packing material, the base portion to which the packing material is fastened, consisting of a pair of strong belts which are laid over rolls, said belts being guided in such manner that they are successively brought together under pressure with the surfaces, to which the packing material is fastened, facing each other, so that the packing material is welded together at these edges.

2. A method of packaging a product in a thermoplastic packaging material by means of a packaging apparatus, which comprises placing a strip of said thermoplastic material against a movable member of said packaging apparatus; heating said strip and temporarily pressing the marginal areas thereof against said movable member so as to secure, by adhesion, the marginal areas to said movable member; the portion of said strip between said marginal areas being unsupported and forming a free space to accommodate the product to be packaged; placing a product in said space; and pressing together the marginal areas of said strip adjacent said product to form a sealed package inclosing said product.

3. A method according to claim 2, in which the strength per unit area of the seal or joint formed upon securing the packaging material to said movable member is less than the strength per unit area of the seal formed by welding together two portions of the same packaging material.

4. A method of packaging a product in a transparent film of hydrochlorinated rubber, which comprises securing the film at opposite edges thereof to spaced members by applying heat and pressure to the film, said members being arranged in such manner that there is a free space between the members which can accommodate the product to be packaged, and bringing said members together under pressure, so that the edges of the film secured to one of said members are welded to the edges of the film secured to the opposite member for sealing the package thus formed.

5. In an apparatus for packaging a product in a thermoplastic material and including a movable member, means for securing and holding the packaging material in the apparatus during the packaging process, said means including heat and pressure means and being effective to secure the packaging material to the movable member of the apparatus substantially only by applying heat and pressure to the packaging material.

6. An apparatus for packaging a product in a thermoplastic film, including spaced movable members, heat and pressure means for securing the film at opposite edges thereof to said spaced, movable members between which there is a free space which can accommodate the product to be packaged, said members being movable in such manner that they can be moved from one position in which a thermoplastic film is secured thereto, to another position in which the packaging operation itself is carried out, wherein said spaced members are comprised in a frame which is provided in two parts secured together in such manner that at least one of the two parts is adapted to be moved so that corresponding parts of the frame in the two parts are pressed against each other, whereby the edges of a packaging material fastened to the frame are brought together and welded together for sealing the package thus formed.

7. An apparatus for packaging a product in a thermoplastic film, including spaced movable members, heat and pressure means for securing the film at opposite edges thereof to said spaced, movable members between which there is a free space which can accommodate the product to be packaged, said members being movable in such manner that they can be moved from one position in which a thermoplastic film is secured thereto, to another position in which the packaging operation itself is carried out, wherein a frame supports the spaced members and is provided in a chain of similar frames, at least the surface layer of the frames to which said film is secured at its edges being made of rubber, and a guide frame unit in which the frames are the frames being pliable and arranged to be plied so that corresponding parts of the frames of said chain are pressed against each other so that the edges of a packaging material fastened to said parts are brought together and welded together for sealing the package thus formed.

8. An apparatus for packaging a product in a thermoplastic film, preferably of hydrochlorinated rubber, including a frame, means for securing the film at the edges thereof to said frame substantially only by applying heat and pressure to the film, an airtight container fastened in an airtight manner to the underside of the frame, means for reducing the pressure in said container for forming a concavity of the film extending into said container and means for bringing opposite edges of said frame together under pressure for sealing the package thus formed.

9. An apparatus for packaging a product in a thermoplastic packaging film, preferably of hydrochlorinated rubber, including two, coaxial spaced wheels, means for securing opposite edges of one film to the peripheries of the wheels, substantially only by applying heat and pressure to the film, another pair of spaced wheels, means for securing opposite edges of another film to the peripheries of such other pair of spaced wheels, the latter pair of wheels being arranged in such manner that the corresponding wheels of the two pairs of wheels abut against one another at the periphery thereof, so that the edges of the films fastened to said wheels are welded together.

10. An apparatus as claimed in claim 9 including members disposed in spaced relationship and extending between the wheels of the pair of wheels, part at least of the outer surface of the members being disposed in the surface of a cylinder, the ends of which are formed by the wheels.

11. An apparatus as claimed in claim 9, in which the axes of the two pairs of wheels are parallel to each other and are disposed at a distance from each other substantially equal to the sum of radii of the two pairs of wheels, the peripheries of the wheels being provided with a layer of rubber to which the edges of the films are secured by means of heat and pressure.

12. An apparatus for packaging a product in a thermoplastic film, preferably of hydrochlorinated rubber, including a pair of belts, means for securing opposite edges of the film to said pair of belts substantially only by applying heat and pressure to the film, and guide means for guiding the belts in such manner that they are successively brought toegther under pressure with the surfaces to which the packaging film is secured facing each other, so that the edges of the film are welded together at these edges.

13. An apparatus as claimed in claim 12, including means for welding together the film along zones substantially at right angles to said belts, said means comprising

bridge members which are foldable about an axis disposed parallel to and centrally between the belts, so that the folding bridge members weld together the film edges secured to them as the belts are brought together.

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