

Jan. 7, 1969

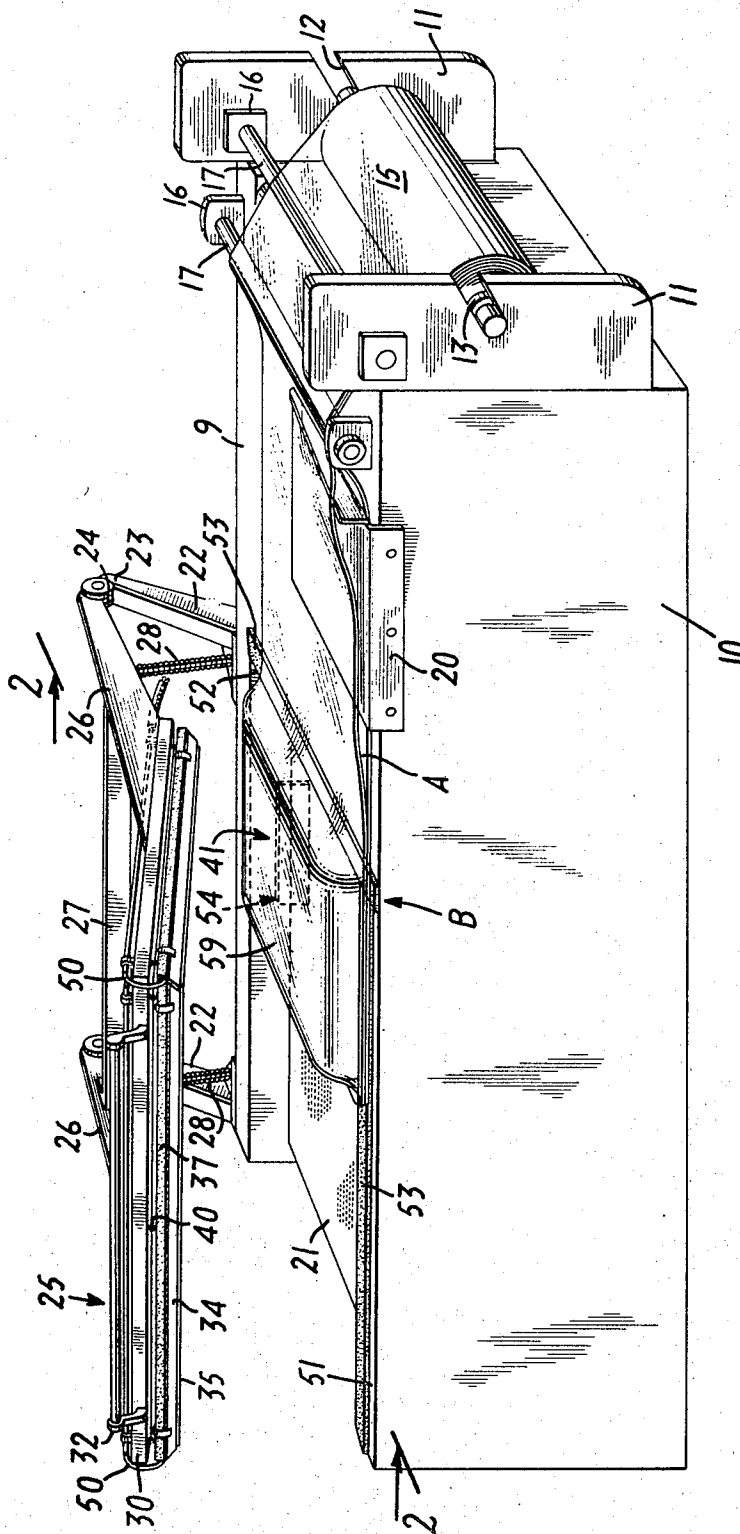
A. B. SARAISKY ET AL

3,420,034

WRAPPING MACHINE

Filed June 25, 1965

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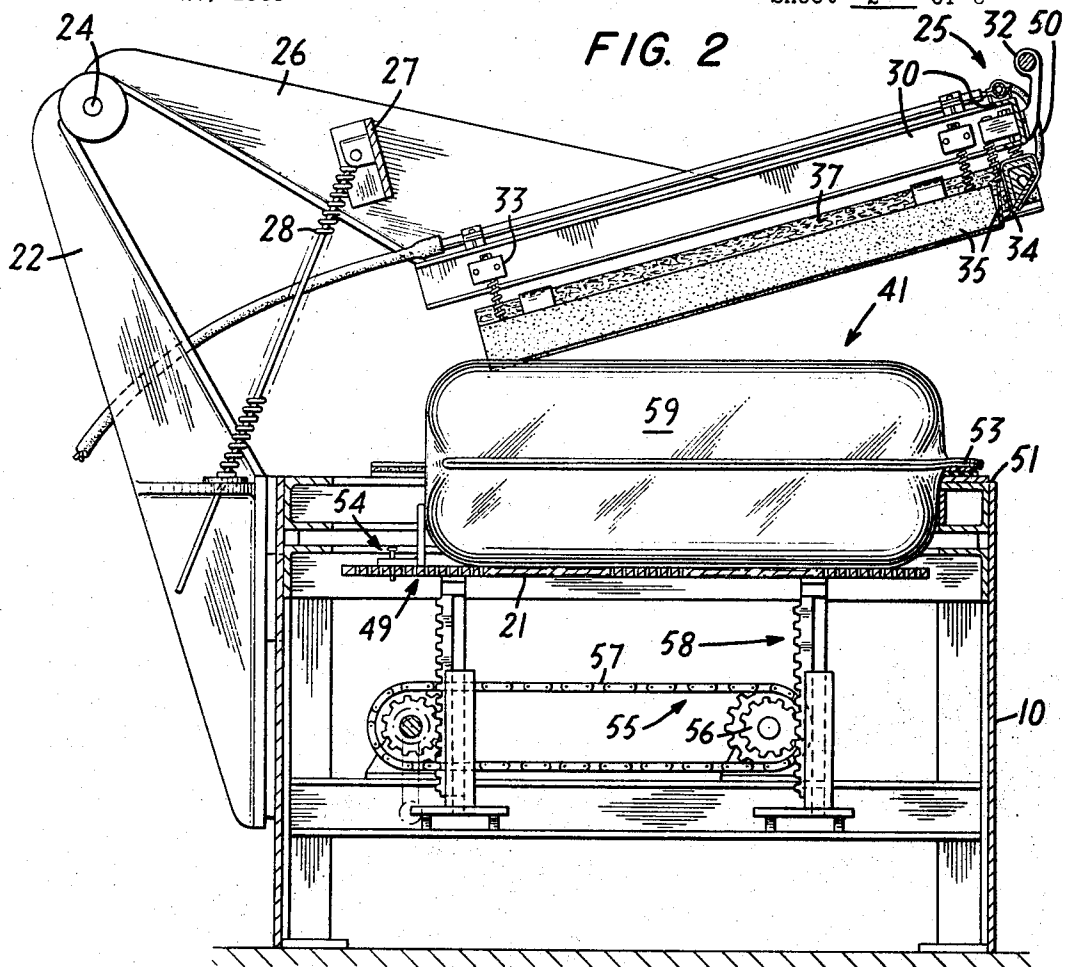
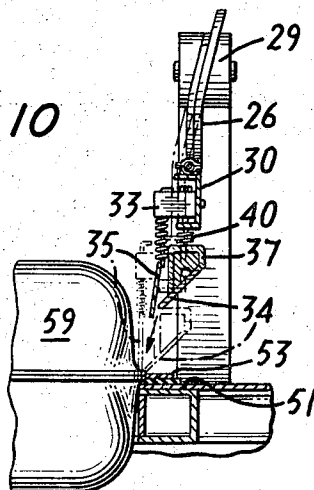


FIG. 10



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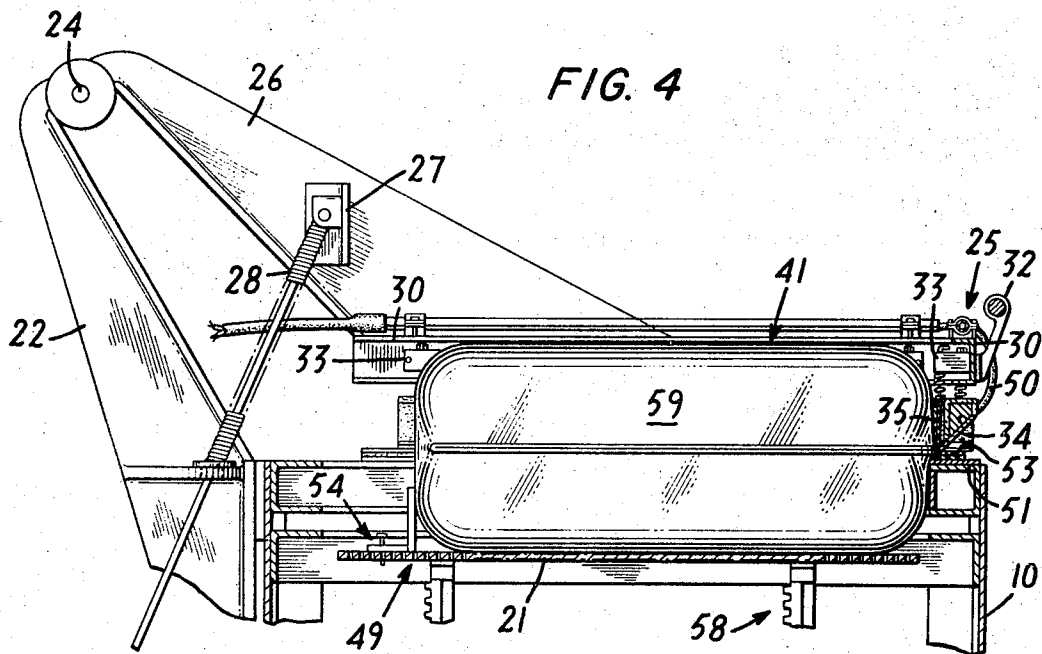
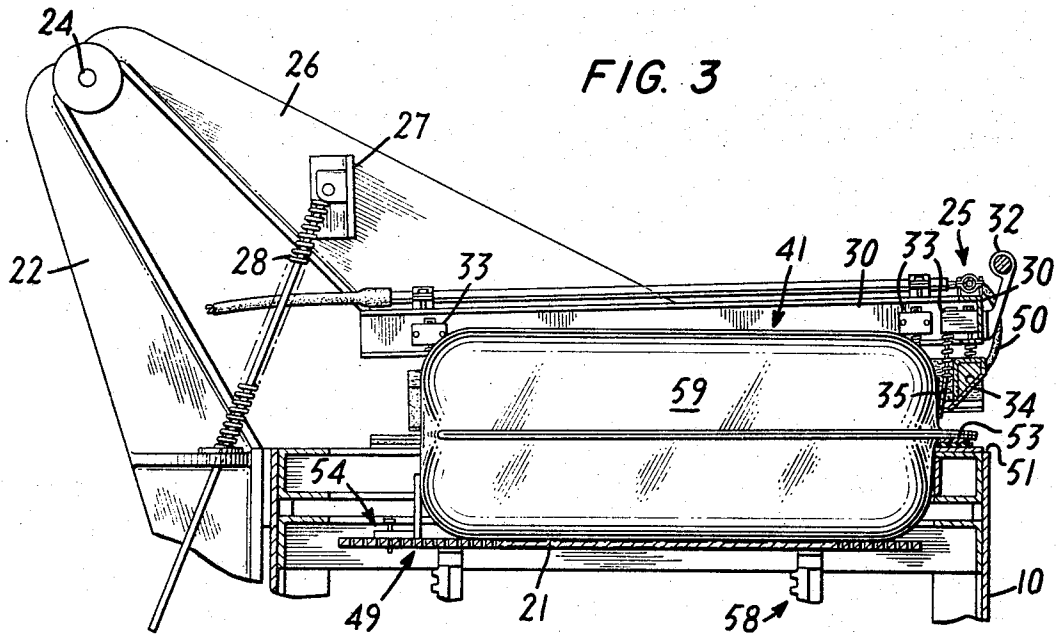
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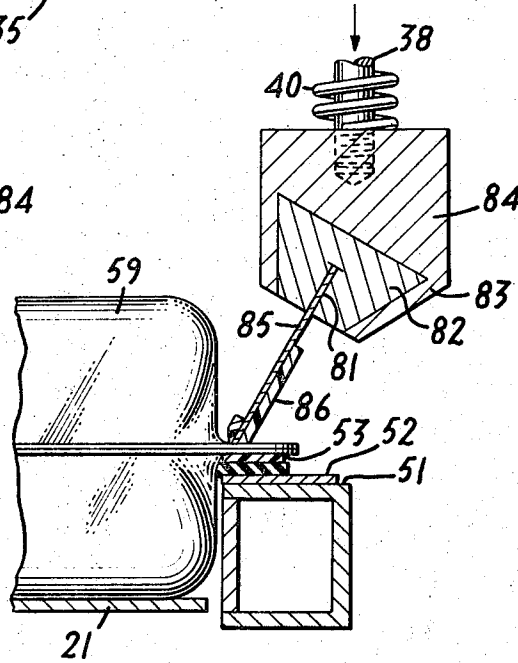
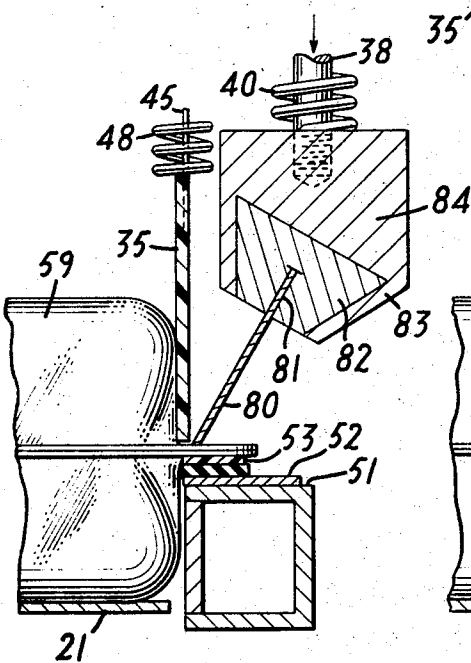
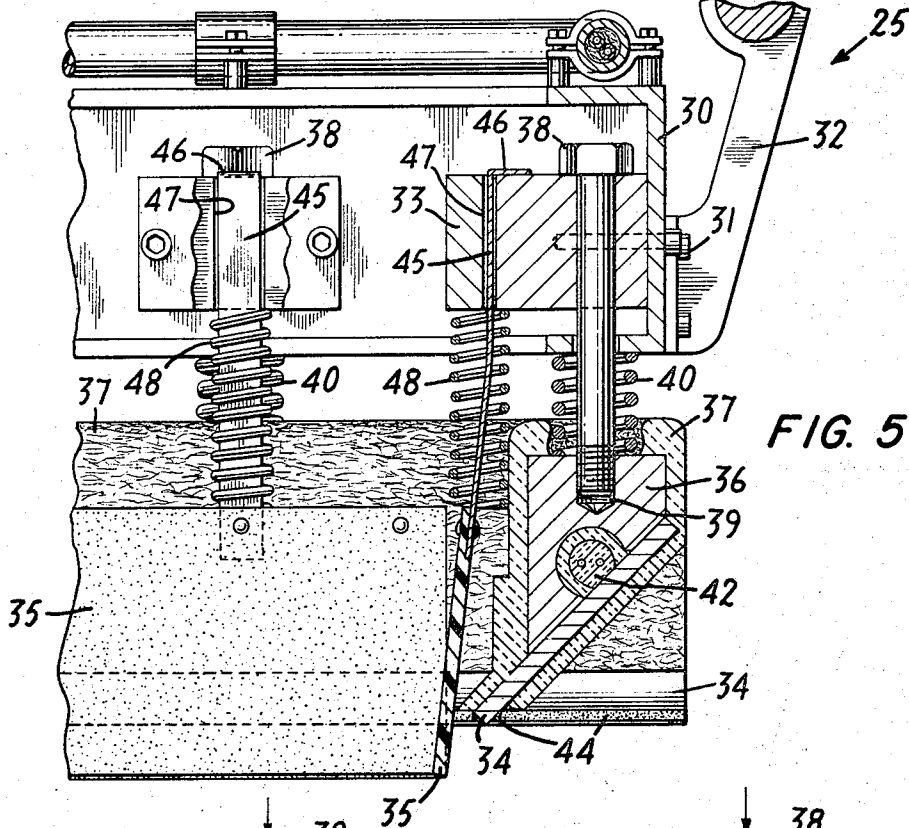
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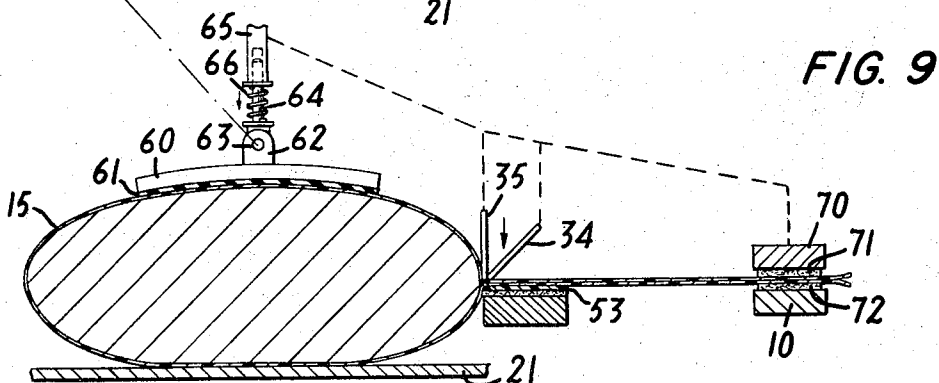
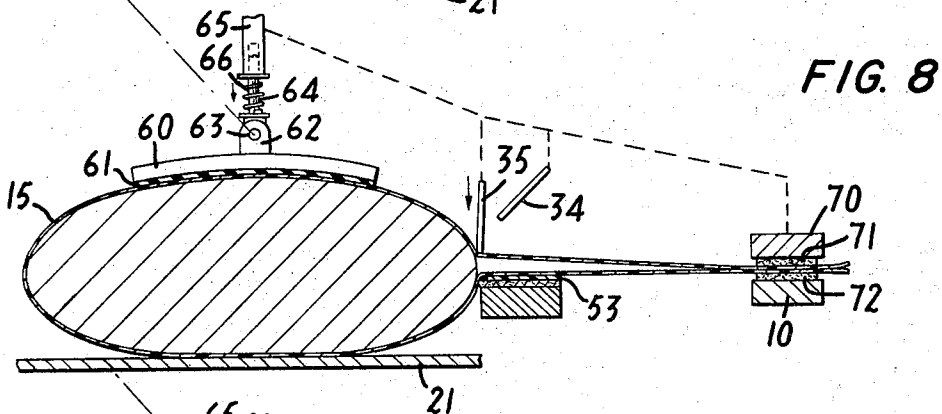
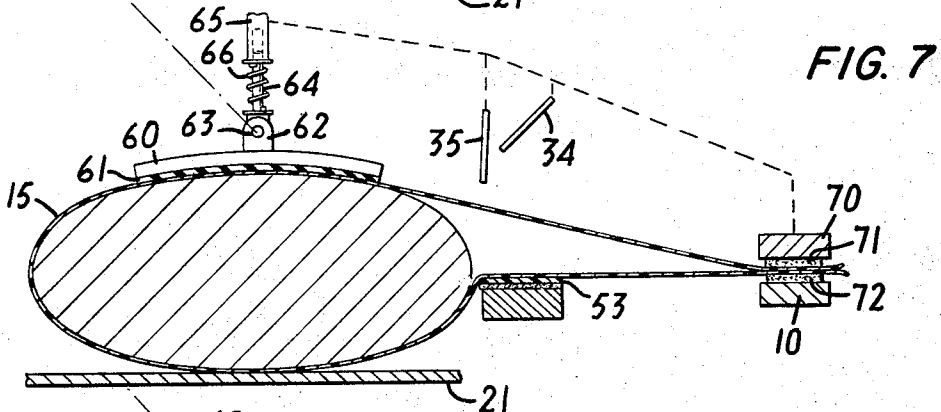
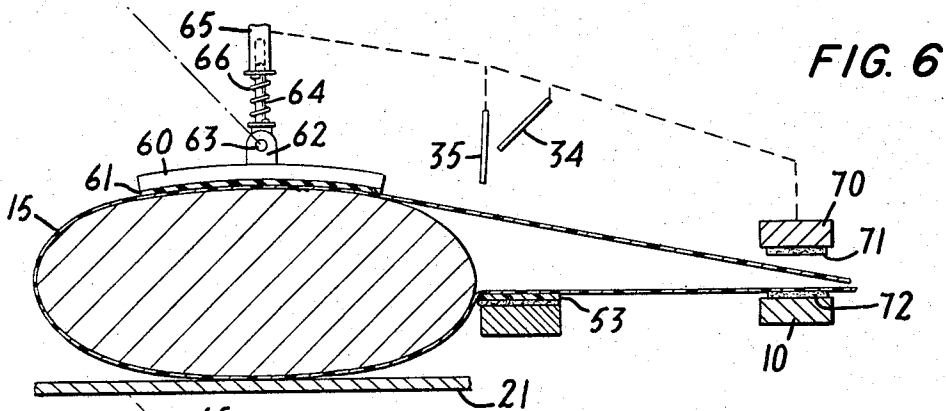
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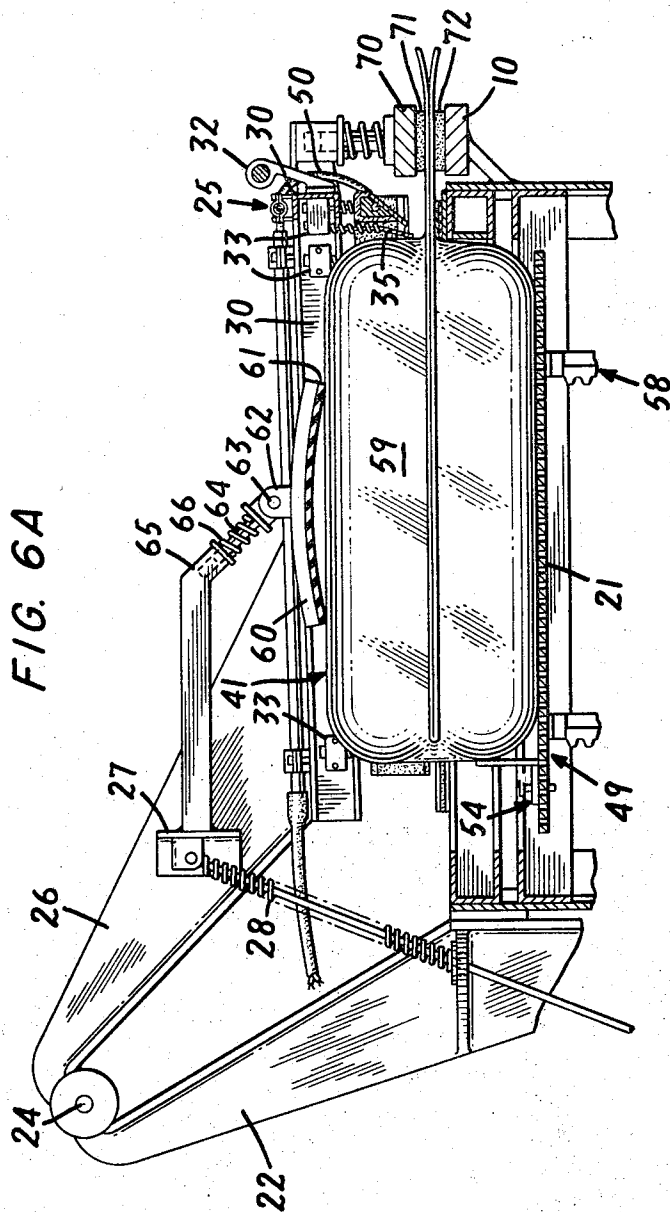
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WRAPPING MACHINE

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U.S. Cl. 53—182

18 Claims

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ABSTRACT OF THE DISCLOSURE

The invention provides apparatus for packaging articles without the necessity of shrinking the wrapper or expanding the article after sealing the wrapper, and still provide a close-fitting package. This is accomplished by incorporating with the heat-sealing means a heat-shielding sheet material-fitting means arranged to draw the wrapping material towards and tightly against substantially all of the exterior surface of the article being wrapped, including the surfaces immediately adjacent to the seal, while shielding the sheet material and the article from the heat arising from the heat-sealing means except at the point where the seal is being applied. The seal accordingly directly about the article, and there is no loose wrapping material in the package.

This invention relates to apparatus for packaging articles and materials neatly in wrappers of heat-sealable material, and more particularly, to apparatus for forming packages from heat-sealable sheet material of determinate or continuous length, featuring specially designed means for forming close-fitting and even tight-fitting packages about the articles to be packaged without the necessity of heat-shrinking.

Packaging apparatus for wrapping individual articles in thermoplastic sheet material has come into wide use in the packaging industry in recent years. Such apparatus, in general, includes a platform upon which the article to be wrapped is kept, with means for supplying a length of heat-sealable sheet material to the article, enclosing the article in the material, and then heat-sealing the sheet material about the edges of the article to form a package. Since it is rather difficult to enclose an article within a tight-fitting wrapper, using current L-sealing equipment, such apparatus is designed to wrap the article loosely, and then, if a close- or tight-fitting wrapper is required, to heat-shrink the sheet material about the article, so as to tightly enclose it within the package.

Thus, it is necessary in using such equipment, when neat and close-fitting packages are required, to provide a heater or oven for heat-shrinking the plastic material, and it is also necessary to use a heat-shrinkable plastic material, which is normally more costly than the nonheat-shrinkable material, since it must be specially processed to impart to it the heat-shrinking characteristic. Furthermore, the use of heat-shrinkable material entails a certain wastage in the amounts of wrapping materials used, since the amount of material lost in the shrinking cannot of course be recovered, and consequently, more material is required to make a close- or tight-fitting package than would be necessary if it were possible to tightly enclose the article in the wrapper in the first instance. Of course, not all thermoplastic materials can be treated to impart a heat-shrinkable characteristic, which further limits the types of wrapping materials to which this sort of packaging procedure is applicable.

A typical packaging apparatus of this type is described in U.S. Patents Nos. 3,047,991, dated Aug. 7, 1962, and 3,135,077, dated June 2, 1964. This apparatus includes a frame with a roller attached thereto for supporting a

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supply of packaging sheet material folded double, so as to form an envelope of a V-cross-sectional configuration. The article to be packaged is slipped into the open side of the envelope, and the length of material required for the package is then sealed and cut by the member 22, which not only seals and cuts the envelope portion from the length of wrapping material, but also closes off and seals the open top of the V. The end of the sheet material has previously been sealed off in the preceding packaging step, and thus an L-shaped heat-sealing member is all that is required to complete the package. The result, as shown in the patent drawing, is a wrapped article in which the packaging sheet material rather loosely encloses the article. If a neat, close- or tight-fitting package is required, it is necessary to heat-shrink the packaging material, so as to tightly enclose the wrapped article.

In accordance with the instant invention, wrapping apparatus is provided for neatly packaging articles within heat-sealable sheet material without the necessity for heat-shrinking the material about the article to form a close-fitting package. Thus, use of the apparatus of the invention permits one to dispense with the heat-shrinking equipment that is normally required in the formation of neat packages, although the apparatus is compatible with heat-shrinking equipment, if heat-shrinking be desired. The apparatus of the invention makes it possible to use heat-sealable material of any type, including material that is not heat-shrinkable. Whether or not heat-shrinking is done, the quantity of wrapping material required is reduced, since only the amount of material necessary to form a close-fitting or tight package is consumed in the packaging operation.

Accordingly, the invention provides packaging apparatus for wrapping articles in neat, close- or tight-fitting packages of heat-sealable flexible sheet material, comprising, in combination, means for supporting an article to be wrapped, means for supplying heat-sealable flexible sheet material to enclose an article to be wrapped on all sides thereof while so supported, heat-sealing means arranged to engage sheet material enclosing the article peripherally of the article, at least one of the heat-sealing means and supporting means being movable towards and away from the other, the heat-sealing means including sheet material-fitting means arranged to draw the wrapping material towards and against the exterior surface of the article to be draped, and to bring the inner surfaces of the wrapping sheet material on opposite sides of the article into heat-sealable contact, and also including a member for heat-sealing the sheet material layers while in contact therewith to complete the package. In this way, the sheet material is drawn against the article being wrapped, so at the time the heat seal is formed it is as close to the article as possible, with the result that the article is wrapped as closely and even as tightly as possible in the minimum amount of wrapping material.

As a further feature, the heat-sealing member can be directed at an angle to the side of the article to be wrapped of from about 5° to about 85°, so as to ensure that it will clear the top and side of the article and draw the wrapping material against the side of the article, to seal the wrapping material as close to the exterior surface of the article as possible.

The sheet material-fitting means and the heat-sealing member can be separate, mounted for joint simultaneous or sequential action in effecting the heat-seal. In this case, the fitting means is mounted resiliently, so that it can ride along the side of the article and draw the wrapping sheet material closely against it. The heat-sealing member need not contact the wrapper until the fitting member has drawn the wrapper closely against the article, and is holding it firmly in place, and the heat-sealing member then

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contacts the wrapper and completes the heat-seal, and if desired, the cutting of the wrapper at the seal. Thereafter, when the seal is set, the fitting means can be lifted away therefrom.

The sheet material-fitting means and the heat-sealing member can be combined, in which case the combined means is mounted resiliently, and provided with means for controlling application of heat by the sealing means. In this case, the member can take the form of a sheathed or sandwich structure, in which the outermost portion contacting the wrapper along the side of the article to be wrapped is the fitting-means, and this desirably insulates the heat-sealing element which is spaced from the article and wrapper at the side by the fitting-means. This type of combined means is mounted to engage the wrapper as before, but the heat-sealing element does not usually engage the wrapper until the entire means has fitted the wrapper closely to the article and is in place for effecting the seal. The heat-sealing element is then actuated, the heat-seal completed and set, and the wrapper cut at the seal, if desired, and the means then withdrawn.

A preferred heat sealer has a metal bar or core terminating in a V-edge presenting a wedge, or edge to the wrapper at the point of sealing. The sides of the wedge or edge are at an angle within the range from about 5° to about 90° to the wrapping material, with the sides just inwardly of the V-edge being provided with a layer of resilient non-thermoplastic material. This layer has a bottom surface which extends substantially in the same plane as the sheet material, and the layer thus serves as a stop, limiting the depth to which the knife edge can deform the sheet material during heat-sealing and cutting. Preferably, this layer of non-thermoplastic material is a heat insulator as well, so that it also serves to limit the area of sheet material that is heated during the heat-sealing operation, and thus determines the width of the heat-seal, and acts as a dam to limit the flow of heat-molten material during heat-sealing. The wedge or edge will serve not only as a heat-sealer, but also as a heat-cutter, to sever the sheet material along the apex of the edge, and thereby separates the formed package from the supply of sheet material, and trims off excess sheet material. A preferred non-thermoplastic material for this purpose is a silicone resin.

Another form of heat-sealer is of the impulse-heated type and includes a high electrical resistance heat-sealing and cutting element, made for instance of nickel-chromium alloy steel, as is nichrome. This type of element is especially useful in the combined type of heat-sealing means, incorporating the fitting-means as a sheath or sandwich outer layer. The outer layer can be, for instance, a high-temperature resistant silicone rubber, Viton A, polytetrafluoroethylene.

The apparatus of the invention is illustrated in the drawings, which show preferred embodiments of the invention.

FIGURE 1 represents a plan view of an apparatus in accordance with the invention, seen from the top and to one side.

FIGURE 2 represents a cross-sectional side view of the apparatus of FIGURE 1, taken along the lines 2—2 and looking in the direction of the arrows, with the heat-sealing assembly in raised position and with an article to be wrapped enclosed within a V-folded envelope of wrapping material.

FIGURE 3 is another view of the apparatus shown in FIGURE 2, with the heat-sealing assembly partially lowered into a position where heat-sealing is about to be effected.

FIGURE 4 is another view of the apparatus of FIGURES 1 and 2, with the heat-sealing assembly lowered in position to effect the heat-sealing operation.

FIGURE 5 is an enlarged and detailed view of the heat-sealing assembly of the apparatus of FIGURES 1 and 2.

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FIGURES 6A and 6 to 9 are schematic views of another form of heat-sealing assembly in accordance with the invention, wherein the heat-sealing assembly is provided with means for holding, positioning, and compressing an article to be wrapped and tensioning the wrapping material during the wrapping operation, so as to ensure a tight-fit, and of which

FIGURE 6A show the supports for means for holding, positioning and compressing an article in FIGURES 6 to 9.

FIGURE 6 represents the initial step in this sequence of operations, showing the press plate means in position, compressing and holding the article in position;

FIGURE 7 represents the second step in this sequence, showing the wrapper sheet holding means, holding the wrapping material for tensioning during the operation;

FIGURE 8 represents the third step in the sequence, showing the sheet material fitting means in position engaging the sheet material tightly against the exterior surface of the article to be wrapped; and

FIGURE 9 shows the final step of the sequence, with the heat-sealing means in position, effecting the heat-seal.

FIGURE 10 represents a side view of another embodiment of the invention, in which the heat-sealing assembly is pivotally mounted on a special hinge to give inward bias to the heat-sealing means, for a tight fit at the side seal as well as at the front.

FIGURE 11 represents schematically another embodiment of heat-sealing means in accordance with the invention, of the impulse-heated type.

FIGURE 12 represents schematically an embodiment of combined heat sealer and fitting means of the invention.

Throughout the drawings, like numbers are used to refer to like parts.

The apparatus of FIGURES 1 to 5, inclusive, includes a pair of laterally spaced frame members 9, 10 to which is attached a pair of brackets 11 provided with a downwardly extending slot 12 in which is supported the roller 13, on which is mounted a supply of heat-sealable, flexible wrapping sheet material 15.

Supported between members 11 is another pair of bracket members 16 supporting a rotatable tension bar 17 over which is passed the wrapping material 15.

This type of apparatus is designed to employ longitudinally folded or center fold heat-sealable flexible sheet material, such as polyethylene film, polyvinyl chloride film, polypropylene film, nylon film, polyvinyl butyral film, polymers of ethylene glycol and terephthalic acid film, and polyvinylidene chloride film, open at one side, in this case the front edge, and in order to spread apart the fold of the material for insertion of the article to be wrapped, there is supplied on the front lateral frame member 10 an L-spreader 20, extending between the folds of the wrapping material. This facilitates the insertion of the article, since the wrapping operator need only to insert a finger in the fold opened at 20 to spread it apart sufficiently to receive the article, as shown at A.

Also supported between the frame members 9, 10 is an adjustable elevating table 21. The table serves as a working stage on which the wrapping operations are carried out, adjustable to present the equator of the article to be wrapped. An article to be wrapped after insertion between the folds of the sheet material is placed on the table 21 by the wrapping operator, in the position seen in FIGURES 1 to 5, inclusive, with the front and side squarely against the front frame member 10 and side bar 52, respectively, and with the other sides squarely against the sealed and folded side and back edges of the wrapper.

At the back of the rear frame member 9 is mounted a pair of rear hinge supporting members 22, each terminating in an eye-bracket 23, in which is supported a hinge pin 24. These parts constitute a hinge assembly for pivotal support of the heat-sealing assembly, shown generally

at 25, which is thereby pivotally mounted on the supports 22.

The heat-sealing assembly, a cross-section of which is seen in FIGURES 2 to 4, inclusive, and a detailed sectional view of which is seen in FIGURE 5, is composed of a pair of upper hinge supporting members 26, thereby pivotally mounted on the brackets 24, and provided with a rigidifying cross support bar 27. The arms 26 carry a spring-mounted glide rod 28 which serves to hold the heat-sealing assembly in the normally up or open position, as shown in FIGURE 2.

The arms 26 support the heat-sealing assembly 25, which will now be described with particular reference to FIGURE 5. The assembly comprises an angle bar frame 30, to the front face of which is attached by screw bolts 31 a handle bar 32 for manual lowering by the operator of the heat-sealing assembly, into contact with the wrapping material in forming the heat-seal of the package. The assembly can also be arranged to be operated mechanically, such as hydraulically, or electrically or pneumatically, as will be apparent to those skilled in the art. Also fastened to the frame 30 are a plurality of block guide supports 33, which support the heat-sealing elements 34 and the sheet-material fitting means 35.

A heat-sealing element 34 extends the length of the right side of frame 30 and the front side of frame 30, and the two side elements meet at the front right hand corner B of the frame 30, so as to form a continuous line in the shape of an L, so as to form a continuous line seal on the edge of the package.

Each heat-sealing element 34 comprises a block 36 of cast or extruded aluminum, enclosed within a batt of insulating material 37, such as Kaowool. A cap bolt 38 passing through a ore in the support block 33 and the angle bar 30 is threadably mounted in a socket 39 of the block 36 of elements 34. A coil spring 40, one end of which is seated against the block 36, and one end of which is seated against the lower face of the bar 30, holds the block 36 at a position spaced from the bar 30. Since, however, the bolt 38 is free to move with respect to the support 33 and the bar 30, the heating elements 34 accordingly are resiliently mounted on the supporting bar 30.

Encased in the block 36 is a heating element 42 which is disposed in heat-conducting contact to the knife edge heating element 34, which is accordingly heated for heat-sealing and cutting purposes.

The heat-sealing element 34 terminates in a V-edge which is at an angle of 45° to the wrapping material. The sides of the V-edge are faced with a layer 44 of heat-insulating silicone resin. This layer accordingly restricts the width of the heat-seal formed by the heat-sealing element to the distance across the base of the V. It also serves to provide a dwell region and to maintain contact between the layers of wrapping material during the sealing-cutting-and-hardening operation.

The sheet material-fitting means 35 is in the form of a silicone-impregnated fiber glass sheet, the upper edge of which is mounted to a plurality of leaf springs 45, the top end 46 of which is bent flat against the top of the support 33. The leaf springs pass through the support 33 rather loosely in a slot 47. A plurality of coil springs 48 are seated against the lower face of the support 33, and the top surface of the fitting means 35, and serve to space the fitting means resiliently from the support. Because of the leaf spring support, the fitting means can be moved backward and forward, and because of the coil springs 48, up and down, so that a considerable amount of resiliency is imparted to its positioning.

The heating element 42 is provided with electrical connections 50, best seen in FIGURES 2 to 4. These are led across the top of the angle bar 30, and thence away from the apparatus to a source of electric current (not shown).

The back top edge 51 of the front lateral support 10

serves as the heat-sealing platen, against which the heat-sealing assembly 25 presses, holds and heat-seals the open end of the folded wrapping material 15. A cross support 52 between the lateral supports 10 serves as a heat-sealing platen and both platens are provided with a strip 53 of resilient, non-thermoplastic material against which the heat-seal can be made, as seen in FIGURE 1. Preferably, the strip 53 as shown is flush with edge 51 of the front frame member 10 and the cross support 52 between the members 9, 10.

It is important that the article to be wrapped be so mounted on the table 21 and the level and angle of the table be so adjusted that the equator of the article can be brought flush with the level of the top of the platen strip 53. In order to adjust the table in height and level, according to this requirement, there is provided an adjusting mechanism 55 comprising a pair of gears 56 operated by a chain 57 in a geared track 58. It will be apparent that rotation of the chain in one or the other direction will raise and lower the track 58 and in this way adjust the level of the table 21. The operating mechanism for this drive is not shown, but any type of mechanism can be used, either electrical or mechanical, or hand-operated, as may be desired.

To bring and hold the article to be wrapped against the rear edge 51 of the frame member 10, a positioning assembly is provided comprising an L-bar 41 movably mounted on the table 21, which has a series of perforations 49 in which can be inserted a pin 54 for fixing the L-bar in any desired position.

The operation of the wrapping apparatus of FIGURES 1 to 5, inclusive, is as follows. The operator first places a roll of center-folded wrapping material as shown, so that the open edge of the fold faces the operator, with the spreader 20 inserted between the folds. The article 59 to be wrapped is inserted in the folds, and then placed on the table with one side against the bar 52, and the front side as close as possible to the inside edge 51 of the front lateral support 10, and fixed in this position by adjustment of L-bar 41, with the lapped edges of the wrapper resting on the resilient platen strip 53. The operator then grasps the handle 32, and draws the heat-sealing assembly 25 downwardly. The sequence of operations as he does so is shown in FIGURES 3 and 4.

As is seen in FIGURE 3, the sheet material-fitting element 35 engages the front and side of the article 59 and the wrapping material 15, and draws the sheet material towards and against the exterior surface of the article, pulling it closely against the article as it does so. As the heat-sealing assembly 25 pivots closer to the platen strip 53 of the lateral support 10, the bottom edge of the fitting element 35 finally engages the platen strip 53 and can move no further, whereupon the springs 48 are compressed, and the leaf spring 46 moves upwardly in slot 47. The knife-sealing edge 34 continues to approach the strip 53 and, due to the arc it describes about the pivot support, is brought inwardly against the bottom edge of the fitting member 35, and downwardly at the same time against the sheet of wrapping material 15. The element 34 is now in contact with the material, and heats it to the softening and heat-sealing point. Continued pressure by the operator of the element 34 against the platen 53 results in the formation of a heat-seal and the melting and cutting through of the wrapping material at this point. In this way, the seal is formed at the closest possible proximity to the article 59.

The same operation occurs simultaneously at the side of the package along the cross support 52. The angle of the position of the heat-sealing assembly on the hinge support arms 26 is such that the knife-sealing edge 34 along the side is brought into contact with the wrapper material at the same time as at the front, and in the same manner, so that the heat-sealing of the side edge takes place at the same time, and the cutting operation also takes place, severing the package from the supply of

wrapper material. The left-hand edge of the wrapper material had previously been sealed in the preceding packaging operation, so that with sealing of the wrapper at the front and right side, the formation of the package is complete.

The packaged article can accordingly be removed from the table 21, automatically, if desired, and the sheet of wrapping material 15 brought forward for another packaging operation manually or by automatic advancing means. Again, the article to be packaged is slipped into the envelope, tightly against the sealed edge at the left-hand side, and tightly against the front right-hand corner of the table on the other side. The article is now ready to be sealed, exactly in the manner described above.

The apparatus of FIGURES 6 to 9, inclusive, is provided with an additional means for compressing the article to be wrapped, and thus ensuring a tighter fit, in combination with a wrapper supply feed stop means to limit the amount of wrapping material supplied, and thus further ensure a tight fit.

The compressing means comprises a press plate 60 faced with a resilient non-thermoplastic material such as a silicone resin 61. At the back of the plate 60 is a bracket 62 to which is pivotally mounted at 63 a supporting shaft 64. The shaft 64 is actually the piston of a cylinder 65, with the piston 64 adapted to telescope into the cylinder 65 against the action of a compression spring 66. The combined action of the pivot mounting and the spring-mounted piston and cylinder arrangement makes it possible for the press plate assembly to adjust itself to any configuration of top surface of the article to be packaged.

The press plate assembly is attached to the frame 30 of the heat-sealing assembly, details of which are shown in FIGURES 1 to 5, inclusive, and of which the sheet material-fitting element 35 and the knife sealer 34 are shown only schematically in FIGURES 6 to 9. The mode of attachment of the assembly is shown in FIGURE 6A.

Also attached to the heat-sealing assembly support bar 30 is a wrapper sheet holding means 70, the lower surface of which is faced with a nonslip material 71, such as sponge rubber. Opposite the holding means 70 is a nonslip strip 72, which is positioned on the top surface of the lateral support 10. The mode of attachment to the holding means to the frame is shown in FIGURE 6A.

Operation of this assembly is seen in the sequence shown in FIGURES 6 to 9. First, the wrapping operator places the article to be wrapped in the folded sheet 15 in exactly the manner shown in FIGURE 1, with the article brought as close as possible to the bar 52, and the front support 10, and tightly against the heat-sealed edge and back fold of the wrapper 15. The heat-sealing assembly is then brought down by the wrapping operator so that the press plate 60 engages the article to be wrapped, as shown in FIGURE 6. The operator continues to bring the assembly downwardly, and under this pressure the article to be wrapped is gradually compressed until the holding member 70 engages the wrapper material 15. The holding member then holds the wrapper in position, during the remainder of the operation.

The operator continues to draw the heat-sealing assembly downwardly, and next, the sheet material-fitting means 35 engages the sheet material 15. As the operator continues to draw the assembly downwardly, this member rides along the exterior surface of the article to be wrapped, and at the same time, stretches the sheet material so that it is forced into a V-configuration as shown in FIGURE 8. Gradually, the top wrapper fold is brought against the bottom fold, which is already held tightly against the heat-sealing support 53, and finally, the knife-seal 34 is brought downwardly and inwardly so as to engage the surface of the fitting means 34, as shown in FIGURE 9. Further downward movement then results in a sealing and cutting of the wrapper material along the periphery of the fitting member 35. The sealing operation severs the packaging material from the supply.

Upon withdrawal of the heat-sealing assembly, the members 34, 35, 70 and 60, in that sequence, are withdrawn from the article being wrapped, and upon withdrawal of the press plate 60, the article being wrapped can resume its normal configuration. It then swells to its normal size, and in doing so, stretches the wrapping material. The result is a very tight fit of the wrapping material about the article, and a package which is practically indistinguishable in appearance from a heat-shrunk package. The finished packaged article can now be removed from the apparatus.

FIGURE 10 shows an embodiment of the apparatus of FIGURES 1 to 5, in which the heat-sealing assembly 25 is mounted on an eccentric hinge 29, so as to ensure that the knife edge 34 and fitting member 35 bring the edge of the wrapper material at the bar 52 tightly against the article, and somewhat inwardly, in the same manner as the elements 34 and 35 do at the front of the wrapper.

Operation of this apparatus is exactly in the same manner as that described previously in connection with FIGURES 1 to 5, the only difference being in the inward bias imparted to the sealing knife edge assembly due to the eccentric hinge.

FIGURE 11 shows a heat-sealing element of the impulse-heated type which can be substituted for that shown in FIGURES 1 to 5, inclusive. This heat-sealing and cutting member comprises a heat-sealing and cutting element 80, spring-tensioned into a sintered heat- and electrically-insulating ceramic bead material 82, with clearance for expansion of the element allowed for in the fit at 81. The material 82 is held in a dove-tailed slot 83 in the bar support 84, which is mounted in exactly the same manner as the heat-sealing element of FIGURES 1 to 5, to the heat-sealing assembly support bar 30. The remaining portions of this assembly are set up in exactly the same manner as those of FIGURES 1 to 5, and consequently, no further description of this is required.

In operation, the electric current required for heating the element 80 is applied manually only on contact of the element with the wrapper material 15 at the time of heat-sealing and cutting. The element heats up very rapidly, and gives a quick seal and a quick cutting action.

The heat-sealing element shown schematically in FIGURES 12, combines the action of a heat sealer and wrapper fitting means in one element. The heat-sealing element includes a nichrome ribbon 85 which constitutes the inner layer of a sandwich, the outer layers 86 of which are of heat-insulating resilient material, such as high temperature-resistant silicone resin or rubber. The leading face of the element is parallel to the wrapper material and platen 53 at the point of sealing and the element is mounted to the heat-sealing assembly frame 25 in the same manner and position as the fitting means shown in FIGURE 5, so that the outer faces of the sandwich engage the wrapper and ride along the side of the article being wrapped to closely draw the wrapper against the article until it reaches the platen 53, at which point the element is still as close to the article as possible. The faces of the layers 86 now hold the wrapper securely against the platen 53. The heat-sealing element 85 is now heated, and forms the heat-seal within the confines of the layers 86, and at the same time cuts through the wrapper material. In other respects, operation is as shown in FIGURES 1 to 5.

Although the invention has been described with particular reference to the exemplary embodiment thereof shown in the drawings, it is to be understood that applicants do not intend thereby to limit this application to those particular means. For instance, the heat sealing assembly 25, can be mounted on a suitably positioned piston-means instead of supporting members 22 and hinge assembly 23 and 24. The sheet material fitting and tensioning means and heat sealing member can be separately mounted and operable, and can also be combined for unitary operation. Other and similar applications of this

invention are possible and the embodiments disclosed therein may be subject to various changes, modifications and substitution of parts, each still falling within the scope of this invention as claimed.

Having regard to the foregoing disclosure, the following is claimed as the inventive and patentable embodiments thereof:

1. Packaging apparatus for wrapping articles in close-fitting packages of heat-sealable, flexible sheet material without shrinking the wrapper after sealing the wrapper, or molding the article to fill the wrapper, comprising, in combination, means for supporting an article to be wrapped, means for supplying flexible heat-sealable sheet material to enclose an article to be wrapped on all sides thereof while supported thereon, a heat-sealing assembly arranged to engage flexible sheet material enclosing the article peripherally of the article, at least one of the heat-sealing assembly and supporting means being movable towards and away from the other, the heat-sealing assembly including heat-shielding sheet material-fitting means arranged to engage and to draw the wrapping material towards and tightly against substantially all of the exterior surface of the article being wrapped, including the surfaces immediately adjacent to the seal, while shielding the sheet material and the article adjacent the seal from the heat arising from the heat-sealing means and while maintaining without permanent distortion the normal external configuration of the article, and at the same time to bring the inner surfaces of the wrapping sheet material on opposite sides of the article into heat-sealable contact, and also including means to give an inward bias to the heat-sealing assembly to ensure a close fit of the wrapper against the article at the time of heat-sealing, and a member for heat-sealing the sheet material layers while in contact therewith to complete the package, and while the wrapping material is held against the exterior surface of the article, whereby the article is wrapped tightly in the sheet material without shrinking the sheet material upon release from the packaging apparatus or permanently changing the shape of the article.

2. Packaging apparatus for wrapping articles in close-fitting packages of heat-sealable, flexible sheet material without shrinking the wrapper after sealing the wrapper, or molding the article to fill the wrapper, comprising, in combination, means for supporting an article to be wrapped, means for supplying flexible heat-sealable sheet material to enclose an article to be wrapped on all sides thereof while supported thereon, a heat-sealing assembly arranged to engage flexible sheet material enclosing the article peripherally of the article, at least one of the heat-sealing assembly and supporting means being movable towards and away from the other, the heat-sealing assembly including heat-sealing sheet material-fitting means arranged to engage and to draw the wrapping material towards and tightly against substantially all of the exterior surface of the article being wrapped, including the surfaces immediately adjacent to the seal, while shielding the sheet material and the article adjacent the seal from the heat arising from the heat-sealing means and while maintaining without permanent distortion the normal external configuration of the article, and at the same time to bring the inner surfaces of the wrapping sheet material on opposite sides of the article into heat-sealable contact, and also including a member for heat-sealing the sheet material layers while in contact therewith to complete the package, and while the wrapping material is held against the exterior surface of the article, the heat-sealing member being directed towards the side of the article to be wrapped at an angle from about 5 to about 85°, to clear the top and side of the article, and draw the wrapping material against the side of the article, to seal the wrapping material at a point close to the article, whereby the article is wrapped tightly in the sheet material without shrinking the sheet material upon release from the pack-

aging apparatus or permanently changing the shape of the article.

3. Packaging apparatus for wrapping articles in close-fitting packages of heat-sealable, flexible sheet material without shrinking the wrapper after sealing the wrapper, or molding the article to fill the wrapper, comprising, in combination, means for supporting an article to be wrapped, means for supplying flexible heat-sealable sheet material to enclose an article to be wrapped on all sides thereof while supported thereon, a heat-sealing assembly arranged to engage flexible sheet material enclosing the article peripherally of the article, at least one of the heat-sealing assembly and supporting means being movable towards and away from the other, the heat-sealing assembly including heat-shielding sheet material-fitting means mounted resiliently for sidewise and vertical movement to ensure a close fit of the wrapping material against the surface of the article being wrapped, and arranged to engage and to draw the wrapping material towards and tightly against substantially all of the exterior surface of the article being wrapped, including the surfaces immediately adjacent to the seal, while shielding the sheet material and the article adjacent the seal from the heat arising from the heat-sealing means and while maintaining without permanent distortion the normal external configuration of the article, and at the same time to bring the inner surfaces of the wrapping sheet material on opposite sides of the article into heat-sealable contact, and also including a member for heat-sealing the sheet material layers while in contact therewith to complete the package, and while the wrapping material is held against the exterior surface of the article, whereby the article is wrapped tightly in the sheet material without shrinking the sheet material upon release from the packaging apparatus or permanently changing the shape of the article.

4. Packaging apparatus in accordance with claim 1, wherein the sheet material-fitting means and heat-sealing member are combined and mounted together.

5. Packaging apparatus for wrapping articles in close-fitting packages of heat-sealable, flexible sheet material without shrinking the wrapper after sealing the wrapper, or molding the article to fill the wrapper, comprising, in combination, means for supporting an article to be wrapped, means for supplying flexible heat-sealable sheet material to enclose an article to be wrapped on all sides thereof while supported thereon, a heat-sealing assembly arranged to engage flexible sheet material enclosing the article peripherally of the article, at least one of the heat-sealing assembly and supporting means being movable towards and away from the other, the heat-sealing assembly including heat-shielding sheet material-fitting means arranged to engage and to draw the wrapping material towards and tightly against substantially all of the exterior surface of the article being wrapped, including the surfaces immediately adjacent to the seal, while shielding the sheet material and the article adjacent the seal from the heat arising from the heat-sealing means and while maintaining without permanent distortion the normal external configuration of the article, and at the same time to bring the inner surfaces of the wrapping sheet material on opposite sides of the article into heat-sealable contact, and also including a member for heat-sealing the sheet material layers while in contact therewith to complete the package, and while the wrapping material is held against the exterior surface of the article, the sheet material-fitting means and the heat-sealing member being separate members, mounted separately, whereby the article is wrapped tightly in the sheet material without shrinking the sheet material upon release from the packaging apparatus or permanently changing the shape of the article.

6. Packaging apparatus in accordance with claim 1, comprising in addition, wrapping material holding means for tensioning the sheet material during the heat-sealing operation.

7. Packaging apparatus in accordance with claim 1,

in which the means for heat-sealing the sheet material also is capable of cutting the wrapping material simultaneously with or subsequent to the heat-sealing.

8. Packaging apparatus in accordance with claim 1, arranged to employ as the wrapping material a center-folded sheet material.

9. Packaging apparatus in accordance with claim 1, in which the means for heat-sealing the sheet material is impulse-heated.

10. Packaging apparatus in accordance with claim 1, in which the means for heat-sealing is provided with a knife edge for engaging the wrapping material during heat-sealing.

11. Packaging apparatus for wrapping articles in close-fitting packages of heat-sealable, flexible sheet material without shrinking the wrapper after sealing the wrapper, or molding the article to fill the wrapper, comprising, in combination, means for supporting an article to be wrapped, means for supplying flexible heat-sealable sheet material to enclose an article to be wrapped on all sides thereof while supported thereon, a heat-sealing assembly arranged to engage flexible sheet material enclosing the article peripherally of the article, at least one of the heat-sealing assembly and supporting means being movable towards and away from the other, the heat-sealing assembly including heat-shielding sheet material-fitting means arranged to engage and to draw the wrapping material towards and tightly against substantially all of the exterior surface of the article being wrapped, including the surfaces immediately adjacent to the seal, while shielding the sheet material and the article adjacent the seal from the heat arising from the heat-sealing means and while maintaining without permanent distortion the normal external configuration of the article, and at the same time to bring the inner surfaces of the wrapping sheet material on opposite sides of the article into heat-sealable contact, and also including a member provided with a knife edge for engaging the sheet material layers and for heat-sealing the sheet material layers while in contact therewith to complete the package, and while the wrapping material is held against the exterior surface of the article, the edge portions of the knife member being provided with an insulating layer for restricting the width of the heat-seal, whereby the article is wrapped tightly in the sheet material without shrinking the sheet material upon release from the packaging apparatus or permanently changing the shape of the article.

12. Packaging apparatus for wrapping articles in close-fitting packages of heat-sealable, flexible sheet material without shrinking the wrapper after sealing the wrapper, or molding the article to fill the wrapper, comprising, in combination, means for supporting an article to be wrapped, means for supplying flexible heat-sealable sheet material to enclose an article to be wrapped on all sides thereof while supported thereon, a heat-sealing assembly arranged to engage flexible sheet material enclosing the article peripherally of the article, at least one of the heat-sealing assembly and supporting means being movable towards and away from the other, the heat-sealing assembly including heat-shielding sheet material-fitting means, comprising an elongated bar mounted on at least one leaf-spring, and arranged to engage the wrapping material along a peripheral edge thereof, and to draw the wrapping material towards and tightly against substantially all of the exterior surface of the article being wrapped, including the surfaces immediately adjacent to the seal, while shielding the sheet material and the article adjacent the seal from the heat arising from the heat-sealing means and while maintaining without permanent dis-

tortion the normal external configuration of the article, and at the same time to bring the inner surfaces of the wrapping sheet material on opposite sides of the article into heat-sealable contact, and also including a member for heat-sealing the sheet material layers while in contact therewith to complete the package, and while the wrapping material is held against the exterior surface of the article, whereby the article is wrapped tightly in the sheet material without shrinking the sheet material upon release from the packaging apparatus or permanently changing the shape of the article.

13. Apparatus in accordance with claim 12, in which the leaf spring is slidably mounted in a support.

14. Packaging apparatus in accordance with claim 14, including bias means spacing the fitting means from the support.

15. Heat-sealing assembly for packaging apparatus, for wrapping articles in close-fitting packages of heat-sealable flexible sheet material without shrinking the wrapper after sealing, or molding the article to fill the wrapper, comprising, in combination, heat-shielding sheet material-fitting means arranged to engage and to draw wrapping material towards and tightly against substantially all of the exterior surface of an article being wrapped, including the surfaces immediately adjacent to the seal, while shielding the adjacent sheet material and the article from the heat arising from the heat-sealing means, and while maintaining without permanent distortion the normal external configuration of the article, and at the same time to bring the inner surfaces of the wrapping sheet material on opposite sides of the article into heat-sealable contact, and a member for heat-sealing the sheet material layers while in contact therewith to complete the package, and while the wrapping material is held against the exterior surface of the article, the heat-sealing means being directed towards the sheet material fitting means at an angle of from about 5 to about 85°, whereby the article is wrapped tightly in the sheet material without shrinking the material or permanently changing the shape of the article upon release from the packaging apparatus.

16. Heat-sealing assembly in accordance with claim 15, in which the sheet material-fitting means is mounted resiliently for sidewise and vertical movement.

17. Heat-sealing assembly in accordance with claim 15, wherein the sheet material-fitting means and heat-sealing member are combined and mounted together.

18. Heat-sealing means in accordance with claim 15, wherein the sheet material-fitting means and heat-sealing member are separate members, mounted separately.

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U.S. Cl. X.R.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,420,034

January 7, 1969

Alfred B. Saraisky et al.

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 24, "abut" should read -- abuts --. Column 2, line 46, "drapped" should read -- wrapped --. Column 4, line 8, "show" should read -- shows --; line 8, "for means" should read -- for the means --. Column 5, line 34, "ore" should read -- bore --. Column 8, lines 43 and 44, "FIGURES" should read -- FIGURE --. Column 9, line 44, "modling" should read -- molding --; line 53, "heat-sealing" should read -- heat-shielding --. Column 12, line 14, the claim reference numeral "14" should read -- 13 --.

Signed and sealed this 7th day of April 1970.

(SEAL)

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