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(72) Inventors TERENCE WILLIAM JOHN PILLEY
RONALD ARTHUR SMITH
JOSEPH FRANK MIDDLETON

(19)

(54) PACKAGING AND LABELLING OF ARTICLES

(71) We, METAL BOX LIMITED, of Queens House, Forbury Road, Reading RG1 3JH, Berkshire, a British Company,

do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to the packaging or labelling of articles individually or in groups.

In accordance with the invention from one aspect there is provided a method of placing on an article or article group a packaging or labelling sleeve formed of a stretchable plastics material and open at at least one end, the method comprising: causing holding heads to engage and hold opposed portions of the sleeve at least adjacent the said end thereof and moving the holding heads apart to form an open mouth for the sleeve at the said end; causing first and second stretcher members to extend into the sleeve through the said mouth; separating the stretcher members to circumferentially stretch the sleeve at least adjacent the said mouth and in a manner not to exceed the elastic limit of the sleeve material; causing a said article or article group to move between the stretcher members to a predetermined position within the sleeve; and causing withdrawal of the stretcher members from the sleeve so as to allow the sleeve where stretched by the stretcher members to contact resiliently into engagement with the article or article group.

Preferably to form the open mouth for the sleeve the said opposed portions are engaged on their outside by separable vacuum heads.

For stretching the sleeve the stretcher members may be arranged to extend within the sleeve at least to the front end of the article or article group when in the said predetermined position thereof, or they may fall substantially short of the front end of the article or article group. The sleeve may be open-ended, or it may be in the form of a bag open only at the said end. In the latter case the stretcher members may with advantage extend substantially to the closed end of the sleeve.

In accordance with a second aspect of the invention there is provided an apparatus adapted for performing a method as defined above.

These and other aspects and features of the invention will now become apparent from the following description of an embodiment of the invention, given by way of example and with reference to the accompanying diagrammatic drawings, in which:—

Fig. 1 is a simplified side elevation of the apparatus embodying the invention, as generally seen on the line I-I of Fig. 4;

Fig. 2 is a similar view taken on the sectional line II-II of Fig. 4;

Fig. 3 is a further side elevation of the apparatus taken generally in section along the line III-III of Fig. 4;

Fig. 4 is a plan view of the apparatus;

Fig. 5 shows the plastics material employed by the apparatus;

Fig. 6 shows the plastics material in transverse cross-section along the line VI-VI of Fig. 5 and in a modification.

The apparatus of Figs. 1 to 4 is designed for use with a reel 1 of stretchable plastics sheet material such as polyethylene sheet which has been transversely welded at regular intervals along its length to form sleeves 100. To form the sleeves a single sheet of film 12 folded centrally along its length is used (Fig. 5); the sleeves are therefore in the form of pockets open at only one end, the top end as shown. The centre-fold of the sheet may be gusseted (Fig. 6) if desired, so that the closed ends of the sleeves are themselves gusseted.

In Fig. 5 the welds are shown cross-hatched and denoted by the reference 102; perforation lines 101 are formed down the centre of each weld to enable the sleeves to be separated from one another as is later to be described.

Figs. 1 to 4 show a reel 1 in position for use on the apparatus embodying the invention.

Basically the apparatus operates as follows. Collations 48 of food cans (Fig. 4) on paperboard trays are received from the left on a roller conveyor 49 and pass to a transfer station 104. From there each collation in turn is pushed by the pusher head 53 of a pneumatic ram 56 into the open end of one of the sleeves 100 on a table 18, the sleeve having previously been separated from the reel 1 and passed to the table 18, again from the left as shown in Fig. 4. After having moved fully into the sleeve stretching the latter elastically as it goes, each collation is pushed by a further pneumatic ram 62 onto an exit conveyor 69. This belt then carries it to the right of Fig. 4 past a radiant or hot air heater (not shown in Fig. 4) which heat-shrinks the overhanging open end 103 of the sleeve to close the sleeve completely and form the finished pack.

Referring now to Fig. 1 in particular, the apparatus has a frame, hereinafter to be generally referred to by the reference numeral 42, which carries the reel 1 by means of a spindle 2. To prevent reel overrun during operation the periphery of the reel is frictionally engaged by a blanket-type brake 3. From the spindle 2 the sleeved film web passes over a roller 4 to enter a generally horizontal and linear path which it takes through the machine and which extends across the bottom part of the apparatus as depicted in Fig. 4.

From the roller 4 the film web passes between a pair of horizontal rollers 5, 6 which are mounted one above the other and of which the length is greater than the width of the film web. The bottom roller (5) is arranged to be driven via a drive chain 7 from a motor 8 through a clutch-brake unit 9. The bottom roller is solid, but in a modification it is covered with a resilient lining of, for example, rubber. The top roller 6 is covered with a resilient material such as rubber and is mounted for free rotation when driven by the roller 5 both indirectly (via the film web) and by intimate contact therewith along either edge of the web. Means (not shown) are provided for adjusting the nip pressure between the rollers 5, 6 by vertical movement of bearings mounting the ends of the top roller 6.

From the pair of rollers 5, 6 the film web passes between the rollers 10, 11 of a further pair. These rollers are identical to the rollers 5, 6, the bottom one of the two rollers — the roller 10 — being likewise connected to the motor 8 via the unit 9 and chain drive 7.

The distance separating the pairs of rollers 5, 6 and 10, 11 is greater than the width of one sleeve 100 but less than the total width of two sleeves. Furthermore, the speed of rotation of the pair of rollers 10, 11 is substantially greater than, but in the same sense as, that of the rollers 5, 6, with the result that as it passes between these two pairs of rollers the web is subjected to tensional force which separates it progressively into its component sleeves by tearing it along its perforation lines 101.

The separate seeves 100 produced in this way pass individually and in spaced relation into a further pair of rollers 13, 14. The bottom one (13) of these two rollers is driven from the roller 10 by a chain drive 17, at an indentical speed to the latter roller.

From the rollers 13, 14 the sleeves pass one at a time onto a plane support surface provided by the table 18 previously mentioned.

A spindle 20 mounted beneath the table 18 carries a line of pegs 19. The spindle is rotatably biassed in the anticlockwise sense (as seen in Fig. 1), to a limiting position in which the pegs 19 project upwardly through respective slots formed in the table. The biassing of the spindle is effected by a counterweight 21 or, in a modification, by a permanent magnet arranged to co-operate magnetically with a part (not shown) of the apparatus frame 42. The biassing force generated is sufficient to enable the pegs 19 to provide a positive stop to an empty sleeve 100 emerging from the rollers 13, 14, but insufficient to later prevent the filled sleeve from continuing its forward movement through the apparatus as is later to be described. To allow the latter movement to occur the pegs 19 rock forward and downwardly until they are below the plane of the table 18, driven by the filled sleeve itself. The effective distance of the pegs 19 from the pair of rollers 13, 14 is slightly greater than the width, i.e. the dimension in the longitudinal direction of the apparatus, of each sleeve 100.

The film web is mounted on the spindle 2 so that the open ends of its sleeves 100 are located on the left hand side of the apparatus as seen looking downstream of the web movement. Two horizontal and elongate vacuum heads (15, 16) are mounted on this side of the apparatus one on each side of the web with their vacuum faces horizontal and in opposition. The heads are disposed and mutually reciprocable in a vertical plane which is orientated longitudinally of the apparatus and which is closely ad-

jacent the table 18.

When a sleeve 100 emerges from the rollers 13, 14 as has previously been described, the vacuum heads 15, 16 are separated with the head 15 below the plane of the table 18 and the head 16 someway above that plane. The table 18 and the rollers 13, 14 have approximately equal dimensions transversely of the apparatus, this dimension being smaller than the corresponding dimension of the sleeves 100. In addition, transversely of the apparatus the table 18 and rollers 13, 14 are so located in relation to the spindle 2 and the rollers 5, 6, 10, 11 that a sleeve passing through the rollers 13, 14 and onto the table 18 has a portion at its open end 103 which overhangs the rollers 13, 14 and the table 18 and which accordingly passes between the previously-opened vacuum heads 15, 16.

The vacuum heads form part of an assembly which is horizontally movable by a pneumatic ram 26 (Fig. 3) towards and away from the table 18 transversely of the apparatus. The ram has its cylinder mounted on the apparatus frame 42; its piston is bolted to a crossbar 25 having a pair of spaced vertical pillars 24 up-standing therefrom. Support and guidance for the crossbar 25 when moved by the ram is provided by two horizontal guide bars 27 which are themselves supported from the frame 42.

The bottom vacuum head 15 is rigidly attached to a horizontal cross plate 23 itself vertically slidable on spacing sleeves 35 placed over the pillars 24 and acting as guides for the crossplate. At its ends the cross plate carries vertical rods 36 on which a further horizontal crossplate 32 is slidably mounted. Like the crossplate 23 this crossplate 32 is mounted, by linear bearings 33, for vertical sliding movement on the pillars 24. The crossplate 32 is biassed upwardly away from the crossplate 23 by compression springs 34 engaging the top faces of the spacing sleeves 35 previously mentioned.

The crossplate 32 serves to mount the cylinder of a vertical ram 29. The piston of this ram extends downwardly to the upper vacuum head 16 which is attached to its free end; vertical rods 30 secured to the head 16 are a sliding fit in holes in the crossplate 32 so as to maintain the head aligned with the bottom vacuum head 15 that is to say, longitudinally of the apparatus.

The rods 36 act via rigidly attached collars 38 and compression springs 37 to couple the crossplates 32 and 23 resiliently together. In a modification, the springs are omitted and the collars are located to engage the top of the crossplate 32.

For stretching the sleeves 100 to receive the collations 48 a pair of generally horizontal stretcher plates 39, 40, for clarity only indicated in broad outline in Fig. 1, is provided.

As can be seen in particular from Fig. 2, the bottom one of these stretcher plates (39) is mounted rigidly on the machine frame 42 with its upper surface slightly elevated above the surface of the table 18. The top stretcher plate 40 is carried by a horizontal member 43 which can be lowered or raised by means of a pneumatic ram 44. Linear bearings 45 on the member 43 slidingly engage fixed guide pillars 46 to maintain the stretcher plate 40 in direct vertical alignment with the plate 39 at all times.

The particular arrangement of the stretcher plates 39, 40 together with various ancillary devices (so far not mentioned) by which the apparatus is automatically controlled will become apparent from the following detailed description of the apparatus in operation. For the sake of example it will initially be assumed that a collation 48 is moving onto the transfer platform 104 while a sleeve 100 has already been located on the table 18 as previously described, having been arrested by the pegs 19 with its open end closed but lying between the previously separated vacuum heads 15, 16.

The presence of the sleeve on the table 18 is detected by a photocell 22 (Fig. 4) which is preferably of the reflective type. Likewise the presence of a collation 48 on the transfer platform 104 is detected by a microswitch 50. When both these devices have operated a signal is generated in response to which the ram 29 is extended to lower the upper vacuum head 16 onto the underlying sleeve 100 on the table 18, whilst the brake/clutch unit 9 is operated to temporarily stop the feeding of sleeves 100 from the reel 1.

The lower and upper vacuum heads 15, 16 are formed on, respectively, their upper and lower surfaces with recesses to which a source of reduced pressure is connected by conduits (not shown). The heads are faced with a closed cell resilient material such as rubber which is apertured at the recesses.

Reduced pressures are applied to the vacuum heads 15, 16 substantially simultaneously with the operation of the ram 29, with the result that by the time the ram has extended and has actuated a microswitch (not shown), the upper periphery of the open end of the sleeve has attached to the upper vacuum head 16 whilst the lower periphery of the sleeve end has attached to the lower vacuum head. When, therefore, the operation of the microswitch mentioned above retracts the end of the ram, the sleeve is opened.

Upon the completion of retraction of the ram 29 a further micro-switch causes the ram 26, previously fully extended, to retract. This action moves the vacuum heads

horizontally away from the table 18 so as to bring the open mouth of the sleeve over the adjacent ends of the stretcher plates 39, 40; in this context it will be noted that the stretcher plate 40 is in its lowered position adjacent the plate 39, having been moved there by extension of the ram 44.

When the traversing movement of the vacuum heads is complete, a further microswitch is operated to retract the ram 44 and so raise the stretcher plate 40. The open mouth of the sleeve 100 is restrained along its bottom edge by engagement under the plate 39, so that the raising of the plate 40 stretches the plastics material of the sleeve mouth. This stretching movement, which is limited by a stop 47 (Fig. 2), is sufficient to expand the sleeve mouth to enable it to receive the adjacent end of the collation 48 at the traversing station 104, but is nevertheless insufficient to exceed the elastic limit of the sleeve material so that the latter can contract substantially fully when the stretching force is later removed.

As the stretcher plate 40 rises it lifts the upper vacuum head 16 and with it the cross plate 32. This in turn operates through the springs 37 and the rods 36 to lift the cross-plate 23 and thereby bring the lower vacuum head 15 into engagement with the underside of the lower stretcher plate 39. The lower stretcher plate is, as previously described, fixed in position, so that after the initial clearance between it and the lower vacuum head has been taken up further upward movement of the upper stretcher plate 40 progressively compresses the springs 37; the forces by which the lower stretcher plate 39 and the lower vacuum head 15 pinch the lower edge of the open mouth of the sleeve and correspondingly those by which the upper stretcher plate 40 and the upper vacuum head 16 pinch the upper edge of the sleeve mouth are therefore increased. The ability of the assembly formed of the items 15, 16, 23, 29, 30, 32, 33 and 36 to 38 to move as one by vertical sliding movement on the pillars 24 ensures that the pinching forces exerted on the edges of the sleeve mouth can at all times be equal.

When the upper stretcher plate 40 is fully raised as described above, a limit switch (not shown) is operated to progressively extend the ram 56 — which had previously been retracted — and so push the collation 48 at the transfer station 104 into the open mouth of the sleeve. During this movement the collation passes freely along the clearance between the stretcher plates 39, 40 the lower stretcher plate 39 serving to provide a support surface along which the collation slides.

After the leading end of the collation has entered the expanded open mouth of the sleeve between the stretcher plates, further extension of the ram 51 moves it beyond the ends of the stretcher plates and into contact with the unstretched part of the sleeve. The unstretched peripheral length of the sleeve is somewhat smaller than the corresponding peripheral length of the collation cross-section, so that as the collation moves into the sleeve it stretches the plastics material of the sleeve. As with the previously-described stretching of the sleeve mouth by the stretcher plates 39, 40, this stretching is again insufficient to extend the sleeve material beyond its elastic limit.

The particular arrangement adopted for the ram 56 is as follows. The ram cylinder 51 is mounted from the machine frame 42 by a vertical plate 52. The pusher head 53 previously mentioned is mounted on the free end of the ram piston 107 and has its front face profiled to conform to the ends of the collations 48 to be packaged. Horizontal plates 58 and 59 are respectively attached to the lower and upper faces of the pusher head and arranged to guide the head in relation to the stretcher plates so as to allow the head to move through and beyond the plate sufficiently for the collation to clear the stretcher plate free ends. Guidance for the pusher head and support for the rear end of the ram cylinder are provided by two rods 54 which are attached to the pusher head and from there extend backwardly in parallel relation to the ram cylinder on either side of the same. The rods are themselves suppported from the machine frame 42 by linear bearings 55 mounted by the plate 52, and by bearings in a further plate 108 located on the frame adjacent the free end of the ram cylinder. To support the cylinder 51 the rods 54 carry a support plate 109 having an aperture in which the cylinder is a sliding fit.

An abutment plate 57 (not shown in Fig. 3) extends backwardly from attachment to the pusher head 53 so as to act as a gate preventing movement of a further collation 48 into the transfer station 104 while the ram 56 is in operation.

The movement of the collation into the sleeve continues until the collation engages the closed end of the sleeve. Until that time the extension of the ram 56 is accompanied by the previously described pinching of the sleeve mouth by means of the ram 29, so that the sleeve is prevented from moving off the stretcher plates 39, 40. When, or slightly before, the collation engages the closed end of the sleeve, however, the vacuum supply to the vacuum heads 15, 16 is interrupted and the ram 29 is retracted to move the vacuum heads apart and away from the sleeve. After engaging the sleeve end the collation therefore draws the sleeve off the stretcher plates, the sleeve contracting elastically into intimate contact with the col-

lation as the stretcher plates moves across it.

In a modification of the arangement as described above the stretcher plates are sufficiently long to extend right to the closed end of the sleeve 100, the stroke of the ram 26 being chosen accordingly. Such an arrangement substantially reduces the danger of rupturing or weakening the sleeve when the collation 48 is pushed into it. Other methods of reducing this danger which may be adopted are to lubricate the leading corners of the collation 48 prior to its entry into the mouth of the sleeve 100. The lubrication may be by pads or analogous devices 61 (Fig. 4) which apply a liquid or solid (e.g. french chalk) lubricant to the front top corners of the collation as it passes. Another possibilty is to provide on the lower stretcher plate 39 protruberances (not shown) which scuff the bottom side edges of the collation tray and so reduce the danger that those edges will later cut or snag the sleeve 100 as they move along it beyond the ends of the stretcher plates. The protruberances may be integrally formed on the stretcher plate 39 or they may be inserts.

The extension of the ram 54 terminates when the sleeve 100, with the collation 48 inside, has been stripped from the stretcher plates 39, 40 as described above; further movement of the colation and sleeve transversely of the machine is then arrested by one or more members 67 carried from the machine frame 42. These members may be passive and preferably resilient, or they may be active and, for example, pneumatically energised. In the arrangement shown they are in the form of guide rails which are continued towards the machine outlet alongside the exit conveyor 69, being supported by brackets 163, 164 and 165 of which the foremost two mount the ram 62 previously mentioned.

The engagement of the sleeved collation 48 with the guide rails 67 closes a microswitch (not shown), in response to which the ram 56 retracts to allow another collation 48 to pass into the transfer station 104. The microswitch also retracts the previously extended ram 62, so that a plate 64 on the end of its piston 66 engages behind the collation and pulls the latter off the table 18 and onto the exit conveyor 69.

To support the piston 66 and plate 64 the latter is slidably mounted by a bearing 65 on a rod 110 which extends in alignment with the ram 62 above the table 18. The rod 110 is carried at its ends by the brackets 164 and 165 respectively.

As previously mentioned, the exit conveyor 69 carries the collation 48 past a radiant or hot air heater which heat-shrinks the over-hanging end portion 103 of the sleeve against the adjacent end of the collation proper. To that end the stress orientation of the film is circumferential to the portion 103, this being simply achieved by forming the film 12 from a bubble parison split along its length.

In a modification the portion 103 is mechanically secured, for example by adhesive tape, rather than heat-shrunk into position.

Upon retraction of the ram 56 as described above a microswitch associated with the ram 44 operates to cause the ram to move the stretcher plates 39, 40 together in preparation for the next packaging operation. In addition, at the end of the retracting stroke of the ram 62 an associated microswitch re-extends that ram and restarts the web feed by means of the brake/clutch unit 9. The sequence described above is then repeated to package the collation 48 newly received on the transfer table 104.

Although the described arrangement is arranged for operating with sleeves 100 formed by transversely welding a centre-folded web of a strechable plastics sheet, the invention may utilise sleeves formed from stretchable plastics sheet by other methods. The sleeves may be open at one end as particularly described, or they may be open at both ends. When in position they may serve a packaging and/or labelling function and accordingly they may have the or each open end either overhanging the article or article group or closure by heat-shrinking or taping as previously described, or extending around the article or article group on or within the confines of the same.

In the described arrangement the vacuum heads 15, 16 are deenergised and retracted from the stretcher plates when, or slightly before, the collation reaches the end of the sleeve 100 when pushed into the same by the ram 54. However, in some applications the vacuum heads may with advantage be maintained energised and in cooperation with the stretcher plates after this time, so that at least the initial part of the subsequent forward movement of the sleeve with the collation is accompanied by stretching of the sleeve material longitudinally of the sleeve. This stretching confines itself substantially to the overhanging end portion 103 of the sleeve and is continued sufficient for the elastic limit of that end portion to be exceeded so that it is permanently elongated.

Because of this elongation it is hoped that the same end closure (or percentage of end closure) can be achieved for the finished package using a corresponding smaller initial length of sleeve, so leading to reduced sleeve material requirements and that the reduction in material thickness induced by the elongation will result in reduced heat requirements for heat-shrinking

where this method of closure is used.

This method can be used for sleeves which are open at one end or at both ends, the criterion in both cases being that the vacuum heads should continue their pinching operation after the collation has reached its desired position within the sleeve and relative movement between them has ceased.

In a non-illustrated modification the described arrangement is adapted for placing the collations 48 centrally within sleeves which are open at both ends instead of only one end as described above. The sleeves are substantially longer than the collation so that equal depth overhanging end portions similar to the portion 103 of the sleeves 100 are formed at the ends of the article or group. As with the portion 103, these overhanging portions are heat-shrunk in position against the end of the pack by, for example, infra-red heaters disposed on either side of the exit conveyor 69.

The described arrangement is adapted for the new application by provision of a pneumatic cylinder having an abutment plate mounted on the end of its piston. The cylinder is supported from the machine frame in aligned opposition to the ram 56, so as to present the abutment plate to the front end of a collation 48 being pushed across the table 18 within one of the open-ended sleeves of the previous paragraph.

The pneumatic cylinder is extended at the beginning of the extension of the ram 56 as described above. As, subsequently, the collation approaches the abutment plate, the sleeve in advance of the collation is progressively drawn across the table 18 from beneath the abutment plate, and simultaneously opened. Further extension of the ram then brings the collation into engagement with the abutment plate and thereafter, as the sleeve is being stripped from the stretcher members, pushes the abutment plate backwards against resistance provided by the pneumatic cylinder. If, as in the described arrangement, the vacuum heads are used for preventing premature stripping of the sleeve from the stretcher members as the collation is being pushed into the sleeve, the vacuum heads are retracted from the sleeve at the same time as the collation first engages the abutment plate.

The stroke of the pneumatic cylinder is so chosen that the abutment plate first engages the front end of the collation when the collation has moved to its desired central position within the sleeve. Thus, during the time that the abutment plate and collation are in cooperation, the desired overhanging end portion of the sleeve at the bottom end of the latter (as seen in Fig. 4) is trapped between them. The frictional resistance thereby generated on this overhanging portion of the sleeve is substantial, and sufficient to ensure that the sleeve is stripped from the stretcher plates satisfactorily, i.e. with no movement along the collation.

In order to regulate the progressive opening of the sleeve in advance of the collation as described above, a line of knurling is advantageously made across the sleeve adjacent and parallel to the bottom edge of the same as seen in Fig. 4. This line of knurling, which may be made, for example, by a knurled wheel biassed into engagement with the film web as it passes over the roller 4, provides a temporary cold weld between the film plies. By ensuring controlled opening of the sleeve in advance of the collation as the latter moves along the sleeve it ensures that the overhanging end portion of the sleeve is correctly positioned against the front of the collation both for theoperation to strip the sleeve from the stretcher plates and afterwards.

In one arrangement in accordance with the invention the forces necessary to prevent a sleeve from being prematurely stripped from the stretcher members as a collation 48 is being moved to its desired position within the sleeve is entirely generated by frictional resistance with the stretcher members themselves, no clamping of the sleeve against the stretcher members being provided. The desired position of the collation within the sleeve is wholly determined by the position of the initial engagement of the front of the collation with an abutment plate as described. After the engagement no further movement of the collation within the sleeve occurs so that the sleeve is stripped off the stretcher plates.

WHAT WE CLAIM IS:—

1. A method of placing on an article or article group a packaging or labelling sleeve formed of a stretchable plastics material and open at at least one end, the method comprising: causing holding heads to engage and hold opposed portions of the sleeve at least adjacent the said end thereof and moving the holding heads apart to form an open mouth for the sleeve at the said end; causing first and second stretcher members to extend into the sleeve through the said mouth; separating the stretcher members to circumferentially stretch the sleeve at least adjacent the said mouth and in a manner not to exceed the elastic limit of the sleeve material; causing a said article or article group to move between the stretcher members to a predetermined position within the sleeve; and causing withdrawal of the stretcher members from the sleeve so as to allow the sleeve where stretched by the stretcher members to contract resiliently into engagement with the article or article group.

2. A method according to claim 1,

wherein the sleeve is one of a plurality of such sleeves successively received along a first generally horizontal path with their said ends disposed on one side of the path, the article or article group being likewise one of a plurality successively received along a second generally horizontal path which is perpendicular to the first path and intersects the same at the said one side thereof.

3. A method according to claim 1 or claim 2, wherein the sleeve with the article or group at the said predetermined position therein overhangs the article or group at at least one end, the method including the further step of, subsequent to the said resilient retraction of the sleeve, applying heat to the or each overhanging end portion of the sleeve to shrink it against the article or group.

4. A method according to claim 3 wherein the sleeve is in the form of a bag closed at its end opposite the said end, the said end providing a said overhanging end portion.

5. A method according to any preceding claim, including the step of pinching the sleeve material between the holding heads and the stretcher members thereby to impede relative movement between the sleeve and the stretcher members while the article or group is moved to said predetermined position.

6. A method according to claim 5, including the step of continuing to pinch the sleeve material while the sleeved article or group is moved relative to the stretcher members so as to stretch the sleeve material at the said end of the sleeve beyond its elastic limit.

7. Apparatus arranged to perform a method as claimed in claim 2, which comprises, located in the first said path, a conveyor means and a receiving table to which the conveyor means is arranged to supply said sleeves in succession, the apparatus further comprising: a pair of vertically opposed and separable sleeve material holding heads mounted alongside the receiving table within both the said paths and actuable to hold and vertically separate opposed parts of the said end of a sleeve disposed on the receiving table whereby to form an open mouth of the sleeve; a pair of vertically opposed stretcher members mounted in said second path on the side of the holding heads remote from the receiving table, the holding heads and stretcher members being movable towards and away from one another along the said second path whereby free end portions of the stretcher members may be inserted into the said open mouth previously formed by the holding heads, the stretcher members being vertically separable whereby after such insertion the sleeve material at at least the said end thereof may be peripherally stretched means being provided to limit the separation of the stretcher members to an amount such that the elastic limit of the sleeve material is not exceeded; and article insertion means operative along the second path subsequent to such stretching to move a said article or group received on the said second path to a predetermined position within the sleeve via the open mouth thereof and thereafter to move the article or group with the sleeve thereon off the stretcher members beyond the free end portions thereof so as to allow the sleeve where stretched by the stretcher members to contract resiliently into engagement with the article or group.

8. Apparatus according to Claim 7, wherein the holding heads are arranged so that by cooperation with the stretcher members on separation of the latter they pinch the sleeve material against the stretcher members and thereby impede relative movement between the sleeve and the stretcher members when the said article insertion means is subsequently operative to move the article or group to the said predetermined position within the sleeve.

9. Apparatus according to claim 8, wherein the lower one of the stretcher members is vertically fixed and the upper stretcher member is movable towards and away therefrom, the holding heads being not only mutually separable but also resiliently supported for vertical movement together whereby the pinching forces they individually generate on the sleeve material by cooperation with the stretcher members are substantially equal.

10. Apparatus according to any claim of Claims 7 to 9, wherein the holding heads are arranged and connectable for holding the sleeve material by subatmospheric pressure.

11. Apparatus according to Claim 8 or Claim 9, wherein the holding heads are arranged to pinch the sleeve material against the stretcher members not only during the movement of the article or group to its said predetermined position within the sleeve but also during an initial part of the movement of the sleeved article or group off the stretcher members, such continued pinching being effective to stretch the sleeve material at the said end of the sleeve beyond its elastic limit.

12. Apparatus according to any claim of Claims 7 to 11, wherein the stretcher members are fixed in position longitudinally of the said second path, the holding heads being movable along the second path between the stretcher members and the receiving table.

13. Apparatus according to any claim of Claims 7 to 12, arranged for receiving

successive said articles or groups at a predetermined position on the second path from a third path parallel to the first, the article insertion means comprising a pusher ram disposed in alignment with the said second path upstream of the said predetermined position thereon.

14. Apparatus according to any claim of Claims 7 to 13, including means operable, subsequent to the removal of the sleeved article or group from the stretcher members by the article insertion means, to move the sleeved article or group off the receiving table and along the said first path in the same direction as the incoming sleeves.

15. Apparatus according to claim 14, comprising heater means arranged for heating at least one end of the sleeve which overhangs the article or group as the article or group with the sleeve thereon passes along the first said path from the receiving table.

16. Apparatus according to any claim of Claims 7 to 15, wherein the conveyor means is arranged to separate the sleeves successively from the leading end of a transversely perforated web drawn from a reel, and stop means are provided to arrest each sleeve in turn on the receiving table for subsequent placement on a said article or group.

17. Apparatus according to Claim 16 when dependant from Claim 14 or Claim 15, wherein the stop means comprises a plurality of aligned pins carried by a common shaft mounted beneath the first path to extend transversely of the same, the shaft being biassed to a position in which the pins project upwardly into a path of a sleeve moving onto the receiving table from the conveyor means whereby to arrest the sleeve on the table, and being pivotable to allow the pins to retract beneath the first path so as to enable an article or group with the sleeve thereon to move along the first path after placement of the sleeve.

18. Apparatus according to Claim 17, wherein the said common shaft is biassed by a counterweight.

19. Apparatus for placing a sleeve on an article or group, substantially as hereinbefore described with reference to, and as illustrated in Figs. 1 to 4 of the accompanying drawings.

20. A method of placing a sleeve on an article or group, substantially as hereinbefore described with reference to, and as illustrated in, the accompanying drawings.

21. An article or group having a sleeve placed thereon by a method as claimed in any claim of Claims 1 to 4 and 18.

22. Apparatus according to any claim of Claims 7 to 10, including an abutment member mounted adjacent the first path and extendable across the first path to the initial position adopted by the front end of the article or group when the latter has been moved to its predetermined position within the sleeve by operation of the article insertion means, the abutment member being arranged to trap an overhanging portion of the sleeve at the end opposite the said end thereof against the article or group on engagement by the latter, and thereafter, with continued operation of the article insertion means, to move backwardly and with resistance so as to prevent movement of the sleeve on the article or group.

23. Apparatus according to Claim 22, wherein the article insertion means is operable to move the article or group to a said predetermined position which is such that the sleeve overhangs the article or group equally at either end.

24. Apparatus according to Claim 22 or Claim 23, wherein the conveyor means is arranged to separate the sleeves successively from the leading end of a transversely perforated web drawn from a reel, the apparatus comprising a knurling wheel arranged to operate on the web upstream of the sleeve separation whereby to form each sleeve with a band of knurling across the overhanging end portion at the said opposite end of the sleeve, the said band of knurling constituting a temporary cold weld to provide control for the opening of the sleeve in advance of the article or group as the latter moves along the sleeve to its predetermined position therein.

R. G. C. JENKINS & CO,
Agents for the Applicants

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1561780 COMPLETE SPECIFICATION
4 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

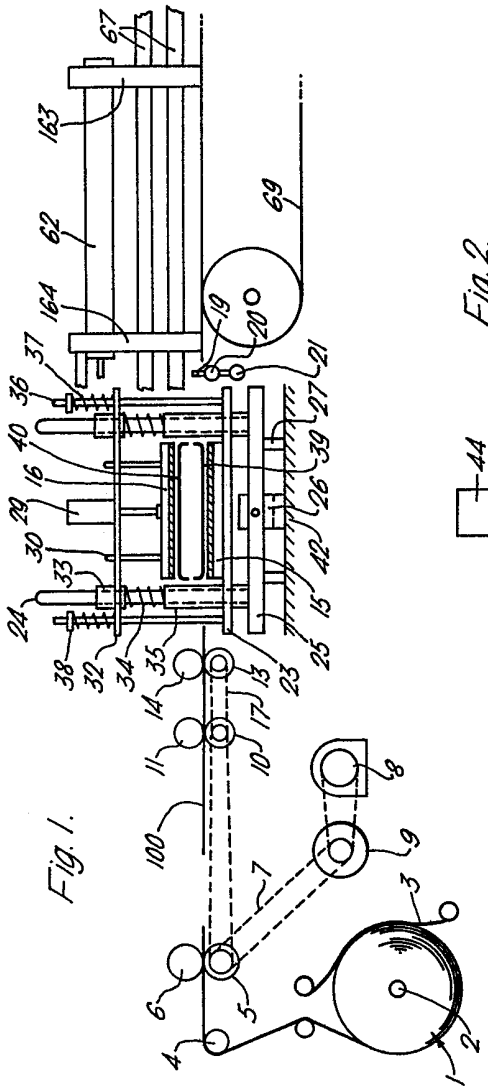

Fig. 1.

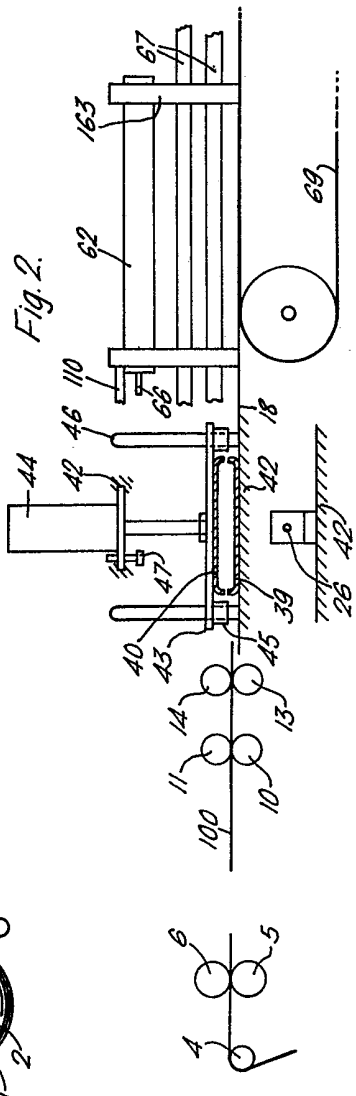

Fig. 2.

1561780 COMPLETE SPECIFICATION

4 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 2

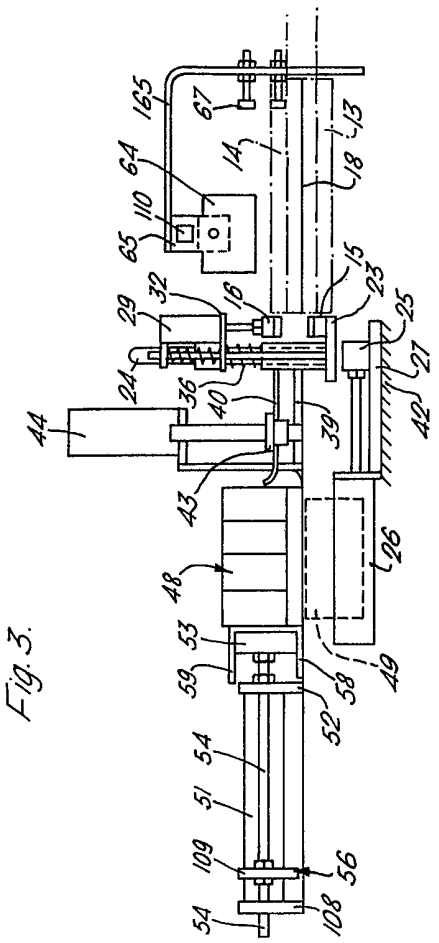

Fig. 3.

Fig. 4.

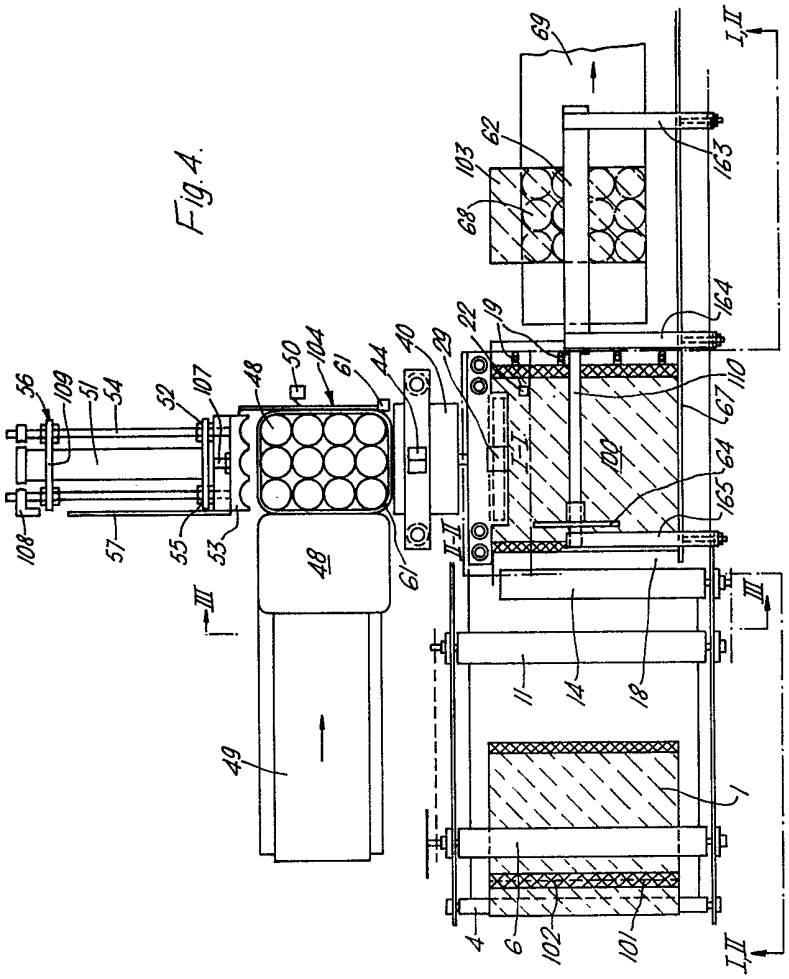
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Fig. 5.

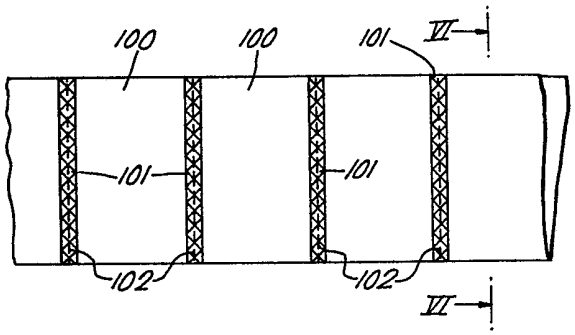

Fig. 6.