

[54] **METHOD AND MACHINE FOR PACKING SIMILAR ARTICLES INTO TUBULAR WRAPPINGS**

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[22] Filed: **May 19, 1971**

[21] Appl. No.: **144,772**

[30] **Foreign Application Priority Data**

June 3, 1970 Switzerland..... 8304/70

[52] U.S. Cl..... **53/178, 53/202**

[51] Int. Cl..... **B65b 9/06**

[58] Field of Search..... 53/28, 178, 182, 53/202

[56] **References Cited**

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[57] **ABSTRACT**

The invention provides a method and a machine for packing similar articles into tubular wrappings in which a foil band is continuously fed into and drawn through a folding box which produces at the same time from a single band of foil two lengthwise adhering parallel tubes into which the articles are introduced while the double tube is being formed. A single transverse seam forming device produces transverse seams simultaneously in both parallel tubes between the articles therein. A cutting device separates the two parallel tubes from each other by cutting along a center seam formed by the longitudinally sealed overlapping edges of the foil band. Finally, the two longitudinally separated tubes are simultaneously transversely cut along the center of their transverse seams.

7 Claims, 15 Drawing Figures

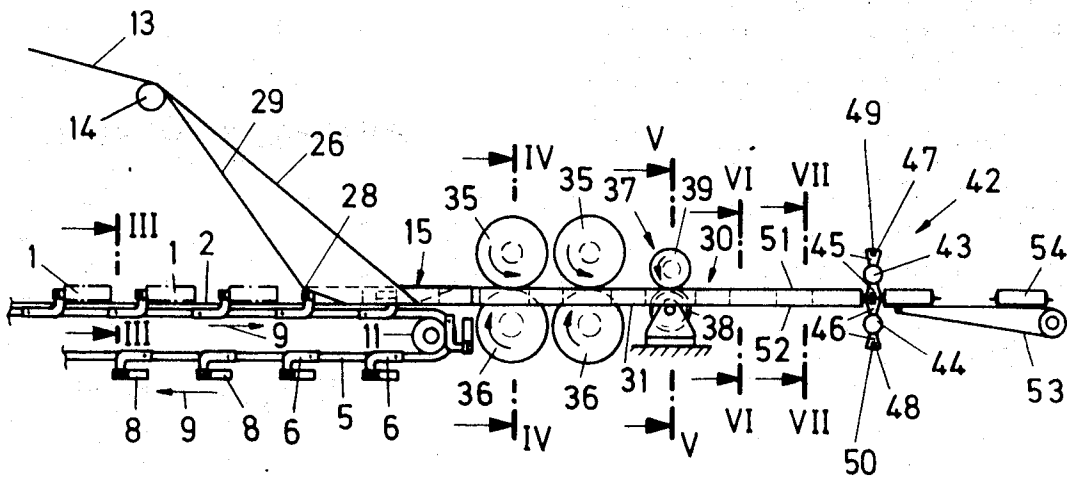


Fig. 1

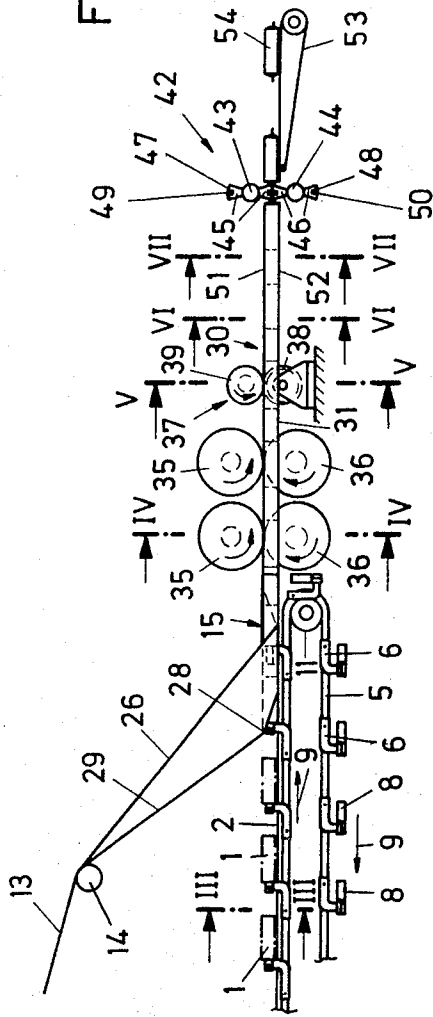
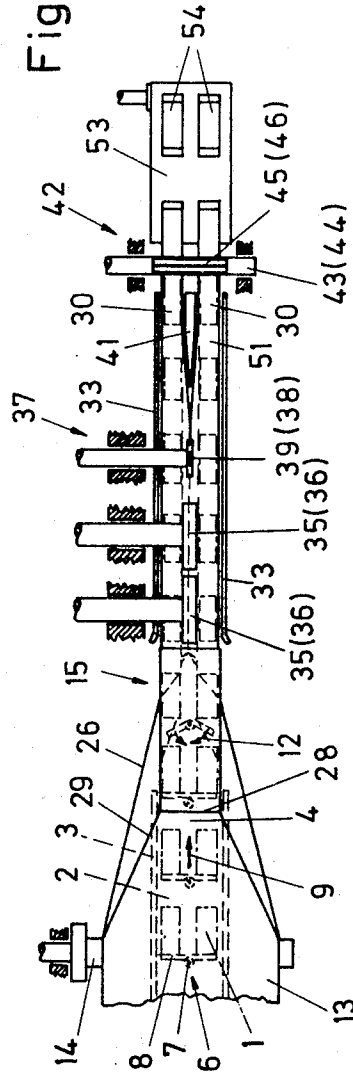
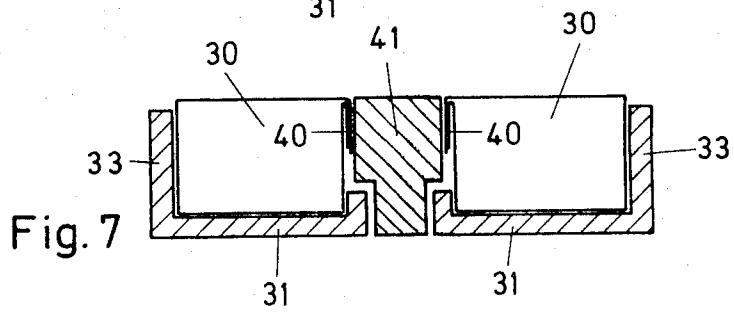
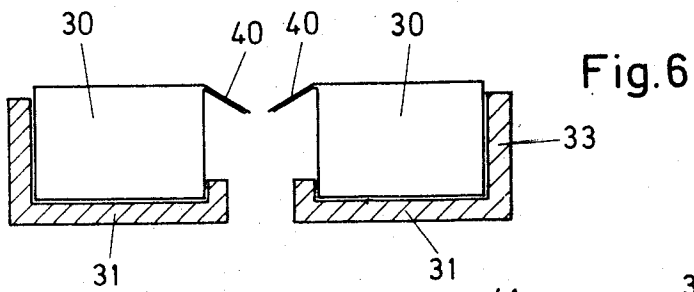
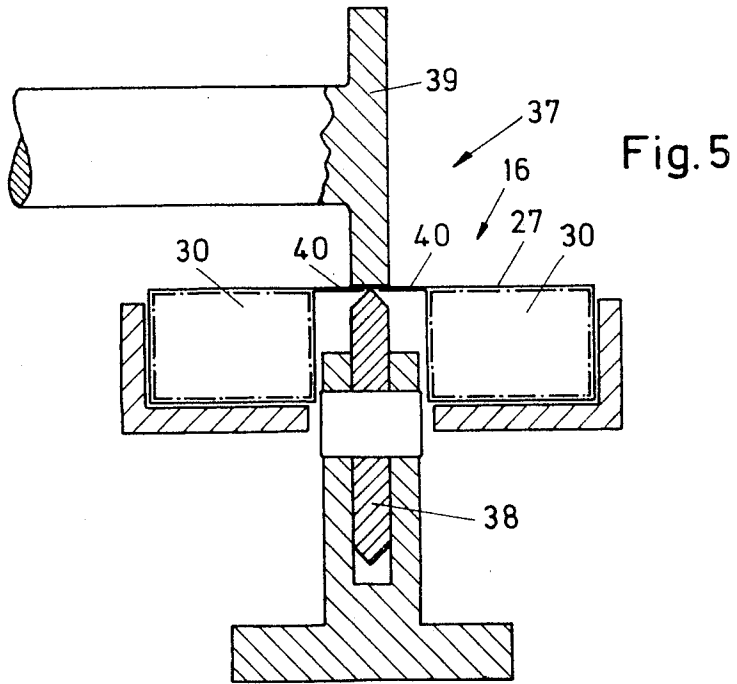


Fig. 2





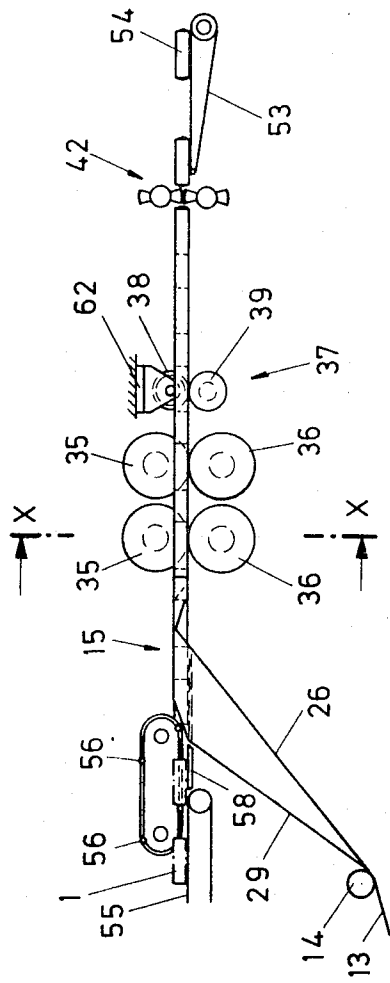


Fig. 8

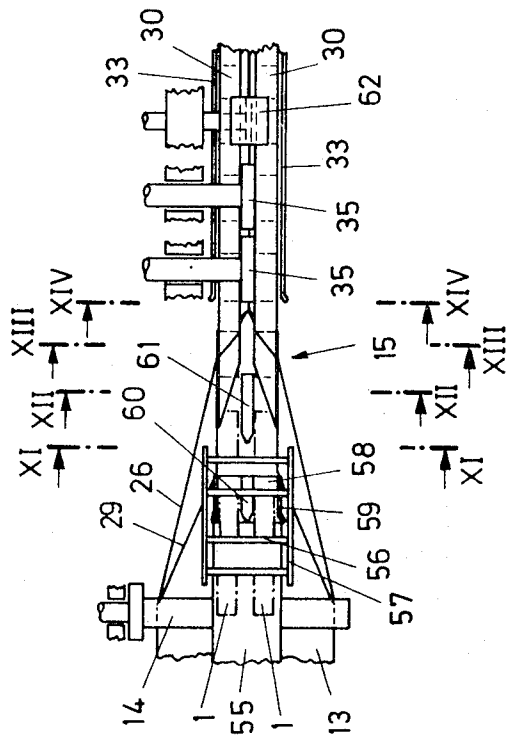


Fig. 9

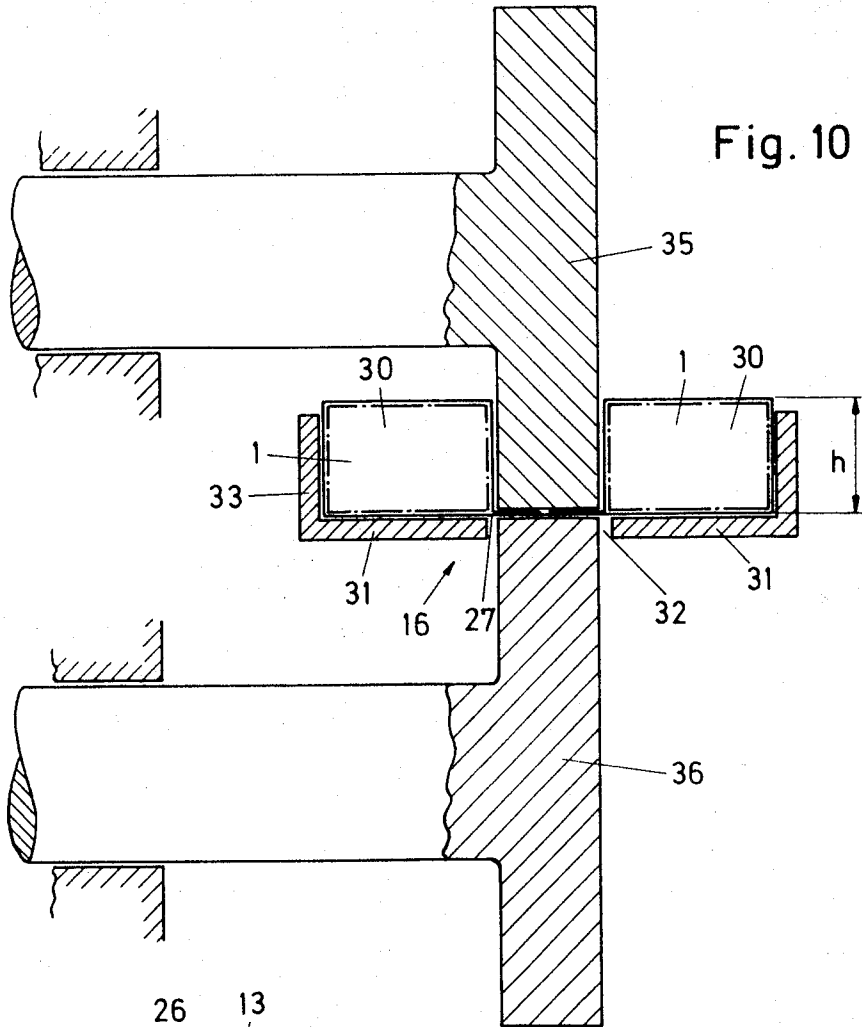


Fig. 10

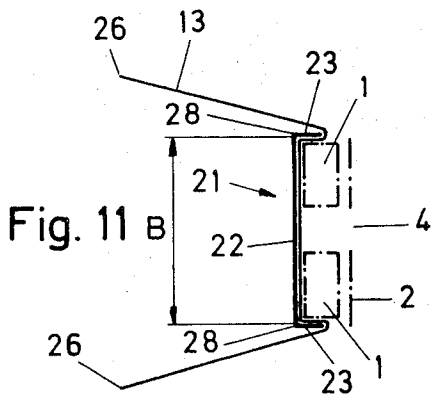


Fig. 11 B

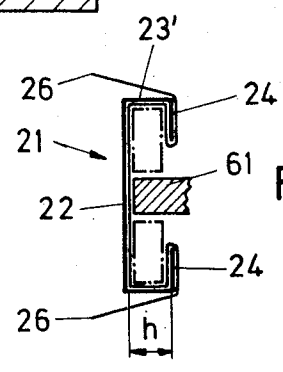


Fig. 12

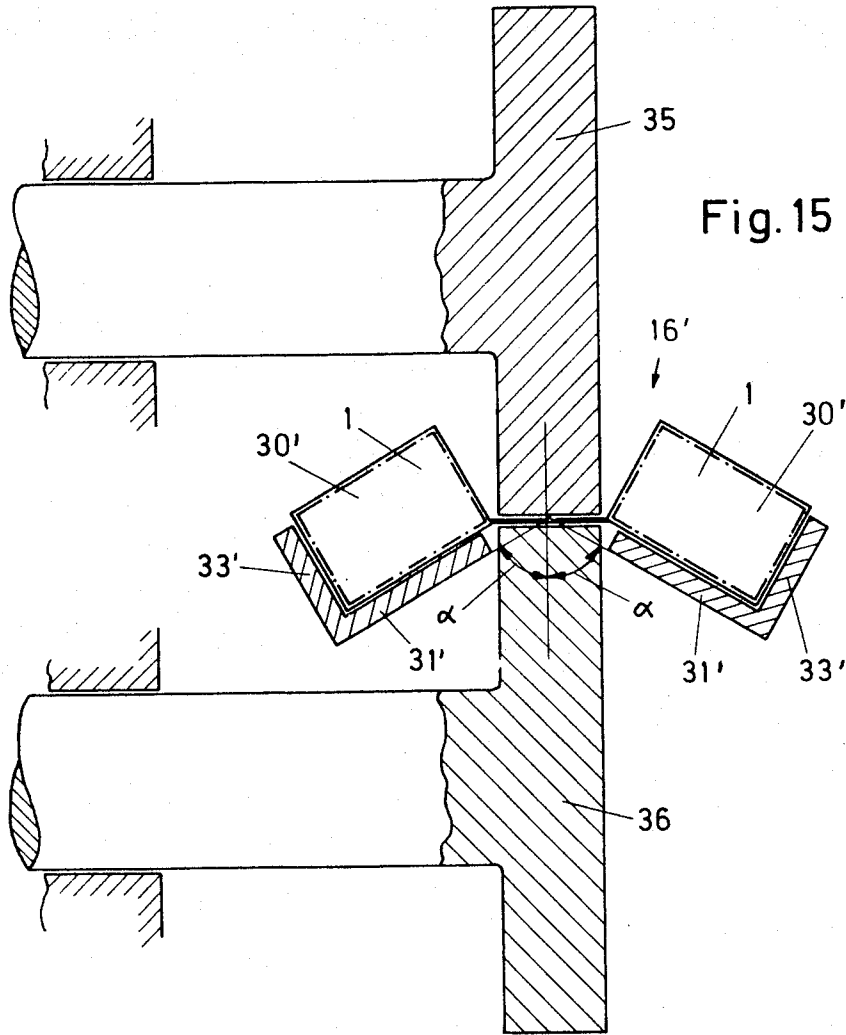


Fig. 15

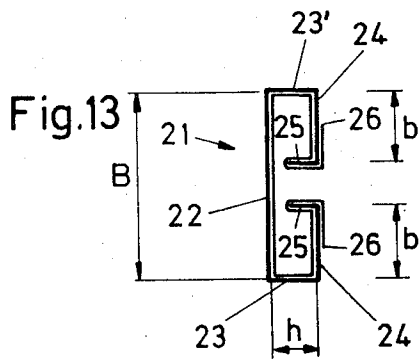


Fig. 13

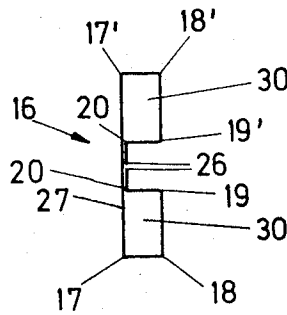


Fig. 14

METHOD AND MACHINE FOR PACKING SIMILAR ARTICLES INTO TUBULAR WRAPPINGS

The invention relates to a method for the packing of similar articles into tubular wrappings, in which a foil tape or web is drawn through a folding box, in order to form a tube from the same, into which the articles to be packed are introduced at regular spacings, whereupon the tube is divided through formation of glued or welded transverse seams into one each of the sections containing the articles.

Machines are known which operate according to this method and may supply hourly up to approximately 300 to 400 packages, each according to the type of the articles and of the foil material. For the increase in the capacity there were used previously simply two or more machines.

It is an object of providing a method which insures a doubling of the capacity without doubling the expenditure for machines. In accordance with the invention this method is distinguished thereby that the foil tape by means of the folding boxes is formed into a double tube, which has two individual tubes, and that after introduction of the articles into these individual tubes, the required transverse seams are produced simultaneously by means of a single seam-forming device. As solely one single folding box and one single transverse seam forming device must be present, there is an appreciable saving in construction expenditure and in space required. Although in principle not all steps of the method need to be carried out automatically and by machine, this however is practically the rule, and as a result further simplifications and savings are obtained.

The invention relates also to a machine for carrying out the method defined above. This machine is distinguished by at least one pair of feed rollers, which draw the foil tape automatically and continuously through the folding box, whereby these feed rollers at the same time press two edge strips of the foil tape folded into a double tube against a central area of the back of the double tube in longitudinal direction through the formation of longitudinal seams, and that a transverse seam formation device is provided, which engages the two individual tubes simultaneously between the articles, moves and compresses them for the purpose of forming the transverse seams.

The invention finally relates also to the article packed according to the method in accordance with the invention.

In the drawings are shown diagrammatically embodiments of the objects according to the invention. In the drawings:

FIG. 1 shows a side view of a first packing machine;

FIG. 2 a plan view of FIG. 1;

FIGS. 3 to 7 each show a section according to the lines III—III, or IV—IV, or V—V, respectively, or VI—VI, respectively, or VII—VII, respectively, of FIG. 1 on a larger scale;

FIG. 8 shows a side view of a second packing machine;

FIG. 9 shows a plan view of FIG. 8, with omission of an end part corresponding to FIG. 2;

FIG. 10 shows a section according to line X—X of FIG. 8;

FIGS. 11 to 14 each show a section according to the lines XI—XI, or XII—XII, respectively, or XIII—XIII, respectively, or XIV—XIV, respectively, of FIG. 9; and

FIG. 15 shows a section corresponding to FIG. 10 for a variation.

The packing machine shown in FIGS. 1 to 7, which is intended for example for the packing of chocolate bars, bars of soap or desired other similar articles 1, has a horizontal inlet track 2 fixed to the framework of the machine. The track 2 is provided with two vertical guide walls 3 which have been omitted in FIG. 1, and with a central longitudinal slot 4. Under the track 2 are arranged two endless chains 5 disposed parallel to one another, which are provided at uniform spacings with tappets 6, which extend between the two chains, of which the front one is omitted in FIG. 1 in order to show better the tappet 6. Each tappet 6 has a vertical pivot pin 7 arranged at right angles to the chains, on which two symmetrical horizontal wings 8 are pivoted. In the above disposed tappets 6, the wings 8 are positioned perpendicularly to the feed direction 9 and each slidably move an article 1 along the track 2 in front of the same. The construction of the tappets 6 is most clearly illustrated in FIG. 3 which also shows that the chains 5 slide on a stationary guide member 10. Somewhat in front of the two guide sprocket wheels 11 which are disposed below the end of the track 2, the wings 8, through stop members not shown, are pivoted back in direction of the two oppositely directed arrows 12 of FIG. 2 into the vertical central plane between the chains 5, so that they do not prevent the exit of the tappets 6 from the slot 4. In the tappets 6 located below, accordingly, the downwardly directed wings 8 lie lengthwise directly one next to the other.

As a packing material is employed a web 13 of foil-type material, for example paper. The paper web 13 unwinding from a supply roll, not shown, is conducted over a guide roller 14 arranged above the inlet track 2 to a folding box 15. During the passage of the web 13 through the folding box 15, it is folded into a "double-tube" 16 shown in outline in FIG. 14 by forming $2 \times 4 = 8$ longitudinally directed folded edges 17, 18, 19 and 20. FIG. 14 is, indeed, a section of the machine according to FIGS. 8 and 9 and with reference to the folding box 15 and the production of the double tube there is solely the difference that the folding edges 17 and 17' are located in the case of FIGS. 8 and 9 below the folding edges 18 and 18', however, in the case of FIGS. 1 and 2, by contrast, above the same.

The folding box 15 through which the paper web 13 will be drawn in a manner to be described further on in detail has a profile 21 which has in the vicinity of the inlet to the folding box the form shown in FIG. 11, and changes along the length of the box in the manner illustrated in FIGS. 12 to 14. The profile 21 has a rear part 22 having the width B, to which are attached first arms 23 and 23' angularly bent at 90° , which produce the folding edges 17. The length of these two arms 23 and 23' increases from the inlet of the folding box 15 beginning at zero to a height h, at which according to FIG. 12 second arms 24 angularly bent inwardly below at 90° begin to grow, so as to produce the folding edges 18. When the second arms 24 have attained a width $b < B/2$ there are attached to the same third arms 25 angularly bent inwardly again at 90° , which produce the folding edges 19 and attain almost the height h. Then fourth arms not shown in FIG. 14, which are angularly bent outwardly at 90° produce the folding edges 20, so that at the outlet of the folding box 15, the paper web 13 forms the desired double tube 16, with whose profile

the form of the folding box profile 21 agrees at the folding box outlet. Thereby, the edges 26 of the paper web 13 come to lie finally adjacent one another on the back 27 of the double tube 16. From the guide roller 14 to the starting points 28 of the first longitudinal edges of the folding box 15 in the paper web 13 are formed the inclined drawing folds 29 as shown in FIGS. 1 and 2, which however, disappear again in the course of the formation of the double tube in the folding box 15.

The guide sprocket wheels 11 are disposed below the folding box 15, in the vicinity of its outlet, and the slotted inlet track 2 extends also still below the same, as is indicated in FIG. 11 in dash-dotted lines. Therefore, the articles 1 are pushed in pairwise in the two individual tubes 30 (see FIG. 14) of the double tube 16 which is in the course of formation.

At the exit of the folding box 15 the double tube 16 with articles 1 filled thereinto reaches at regular distances a stationary horizontal guide track 31 (see FIG. 4), which has in the center an elongated slot 32 and is provided on the side with two vertical guide walls 33. It should be noted that the back 27 of the double tube 16 faces upwardly. The two horizontally inwardly directed edge strips 34 are located directly below the back 27 and are provided with a layer of adhesive, not shown, which becomes active under heat. These edge strips are now heated by two oppositely driven rollers 35, 36 which are heated in known manner, not shown, and are pressed against the back 27 so that not only the two individual tubes 30 are closed along the side, but at the same time a traction is exerted on the double tube 16 which effects a movement of the paper web 13 through the folding box 15. In order to amplify the adhesive and traction effect, there is arranged yet a second pair of rollers 35, 36 of the same type behind the described pair of rollers 35, 36. In many cases, in place of a paper web 13, use is made of a web of weldable synthetic material foil, in which case the rollers 35 and 36 must heat the foil to a welding temperature.

As a rule, it is desired to obtain at the machine outlet a small package containing each one article 1. It is therefore not only necessary to divide the individual tube 30 by transverse seams into individual compartments, but it is also necessary to separate these tubes 30 in longitudinal direction from one another and cut them in transverse direction. Accordingly, behind the pair of rollers 35 and 36 is first provided a longitudinal cutting device 37 (see also FIG. 5), which comprises a disc-shaped rotating knife 38 and a driven counter roller 39 made of elastic flexible material. The circular knife 38 cuts the back 27 of the double tube 16 between the two longitudinal seams 40 formed by the pair of rollers 35, 36 either by gluing or welding. Thereby, the longitudinal seams 40 are slightly bent downward, as shown in FIG. 6. The two seams 40 are then folded down through a centrally arranged separating wedge 41 against the respective side walls of the tube 30, as is illustrated in FIG. 7.

At the end of the guide track 31 is located a device 42 which serves for the formation of the transverse seams and at the same time for the cutting of the same into the individual packages. By a superimposition of a pulsating component to a constant basic speed, corresponding to that of the pair of rollers 35, 36, the speed of revolution of the rollers 43 and 44, in a manner known per se, is so controlled that the movement of the sectors 45 and 46 during their action on the tubes 30

is in harmony with the speed of advance. The device 42 contains two oppositely driven sector rollers 43 and 44, which have each two diametrically arranged sectors 45 and 46, respectively, which are provided at their periphery with each a central longitudinal groove 47 and 48, respectively. In each of the grooves 47 is positioned a slightly projecting knife 49 and in each of the grooves 48 is arranged a counter member 50 made of elastic flexible material. The sectors 45 and 46 are heated in known manner and the pressure and heat of the same are transferred to the side parts 51 and 52 of the tube 30. These side parts are disposed between the articles 1 and lie opposite one another, and are placed against one another by the movement of the sectors 46 and 45 to produce adhering or welding seams, which in each case are cut simultaneously by the knife 49 in the center.

In rear of the device 42 is arranged an endless discharge band 53, which conveys the finished packages 54, each two adjacent one another to a collection container or a further conveyor device.

In certain cases it is desired to separate the filled tubes 30 in individual packages only upon sale of the latter in a retail business. In such a case, the knives 49 are omitted; and as the case may be, one may provide at their place a comb of sharp needles, which effects a transverse perforation which permits a tearing off of the package 54 from the tube 30. Of course, it is also possible to omit the longitudinal cutting device 37, or to replace the same, respectively, by a longitudinal perforating device.

The packaging machine according to FIGS. 8 to 14 differs from the one illustrated in the FIGS. 1 to 7 principally by the fact that the foil tape 13 serving for the packaging, is fed to the folding box 15 over a guide roller 14 arranged below the horizontal track, and not from above, and that for this purpose the back 22 of the folding box profile 21 lies below, instead of above. In place of the slotted inlet track 2 and the endless chain 5 therebelow and provided with tappets 6, the modified machine employs an endless band 55 which feeds the articles 1 pairwise at regular intervals. Two endless chains 57 which are arranged above the endless band 55 are connected with one another by transverse striker rods 56 which serve for the removal of the articles 1 from the endless band 55 and for sliding the articles 1 at the same time into the folding box 15 and into the individual tubes 30 of the double tube 16. A short horizontal supporting plate 58 is arranged between the endless band 55 and the folding box 15 and is fixedly attached to the framework. This plate 58 is provided with lateral guide walls 59 and a central guide 60, which are omitted in FIG. 8, but illustrated in FIG. 9.

The folding box 15 is provided with a further central guide member 61 followed again by a guide track 31 provided with the elongated slot 32 and the guide walls 33 (see also FIG. 10), but the double tube 16 lies now with its back 27 on the guide track 31. Accordingly, the feed and heating rollers 35 and 36 now are arranged about the height of the tube h lower than in the case of the machine illustrated in the FIGS. 1 to 7. The same holds true also for the longitudinal cutting device 37 in which the position of the rotating knife 38 and the driven supporting roller 39 is exchanged, so that in FIG. 9 the knife support 62 covers the parts 38 and 39. The transverse seam formation device and cutting device 42 and the endless discharge band 53 which follow

the longitudinal cutting device 37 are the same as in the first embodiment of the machine, so that a description of the same at this place can be dispensed with.

If the articles to be packed are sensitive to heat, such as for example chocolate, it is possible that they may be damaged during the formation of the longitudinal seams 40 by the heat emanating from the heating rollers 35, 36. In such a case, it is recommended to transfer the guide track 31, 33 in front of the pair of rollers 35, 36 gradually into a guide track 31', 33', whose profile is shown in FIG. 15, in which by means of a central guide wedge, not shown, the two individual tubes 30 are urged away from the center so that they lie adjacent the guide walls 33'. It will be noted that the guide track is no longer level, but has two symmetrical halves inclined to the central vertical plane at an angle of for example about 60°, so that the articles 1 located in the tubes 30' of the deformed double tube 16' are pivoted away from the vertical end faces of the heating roller 35. Instead of deforming the guide track 31, 33 in the manner shown in FIG. 15, one may also construct the folding box, so that the double tube 16' receives already a profile shown in FIG. 15, and then the guide track 31', 33' may follow directly the same inclination.

It is obvious that the articles 1 may also comprise several individual pieces, for example, of several biscuits, and that the cross section of the individual tubes 30 in no manner requires to be absolutely rectangular as shown in the Figures by way of example.

With the described machines, the capacity of the previous packaging machines provided with a folding box forming a single tube may be doubled with relatively little expense without increasing the feed speed and the gluing or welding speed required by the characteristics of the material.

What I claim is:

1. An article wrapping machine comprising:

a folding box having an inlet end and an outlet end and shaped to gradually fold longitudinal edge portions of a moving strip inwardly towards a central longitudinal portion of said strip shaping said strip into two parallel tubular members interconnected by said central longitudinal portion of said strip with said central longitudinal portion being retained planar to the outer edges of the tubular members and with said strip edge portions being folded between the tubular members against the center of the longitudinal portion;

a pair of oppositely rotating heated feed and sealing rollers disposed at the outlet end of said folding box to pull said strip therethrough and having a width less than the space between said tubular members so that one roller passes therebetween in engagement with the longitudinal edge portions and the other roller engages the central longitudinal portion to exert a forward pull on said planar central portion;

an article supplying conveyor carrying articles into said tubular members in advance of said sealing rollers;

and transverse seam forming means downstream from said rollers for sealingly pressing together the tubular members between articles.

2. An article wrapping machine constructed in accordance with claim 1:

wherein said transverse seam forming means include two oppositely driven sector rollers with heated sectors for engaging the tubular members and forming seams.

3. An article wrapping machine in accordance with claim 2:

wherein the sectors include knives for cutting the tubular members into separate packages.

4. An article wrapping machine in accordance with claim 3:

wherein the sectors are formed of an elastic flexible material with the knife embedded therein.

5. An article wrapping machine in accordance with claim 1:

wherein means are provided for moving said tubular members apart away from said one roller so that the heat from the roller does not reach the articles.

6. An article wrapping machine in accordance with claim 1:

including means for severing said central longitudinal portion to separate the tubular members between said feed and sealing rollers and said seam forming means.

7. An article wrapping machine in accordance with claim 1:

and including a second pair of oppositely rotating heated feed and sealing rollers positioned downstream of the first pair relative to the direction of movement of the strip.

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