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Nordqvist

[11] **3,769,778**

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[54] **APPARATUS FOR FORMING A FOIL ENVELOPE AROUND A NUMBER OF BODIES ASSEMBLED INTO A UNIT**

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[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** **53/182**

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

[58] **Field of Search** 53/182

[56] **References Cited**

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Primary Examiner—Travis S. McGehee
Attorney—Holman & Stern

[57] **ABSTRACT**

A manner of forming a number of bodies into a parallelepipedic unit suitable for handling and transporting, and applies a wrapping to an assembled unit in a weldable foil, which by a movement of the unit in the horizontal plane is first wrapped around three sides of the unit, then welded along the fourth side thereof and finally welded along the fifth and sixth sides to form a closed cover, which possibly may be heat shrunk. The foil originally has a breadth greater than that of the unit, which means that during a preliminary step of the wrapping operation portions of the foil will protrude outside opposite sides of the unit, transversely to the direction of movement thereof. The top parts of these protruding portions must not prematurely fold down along the fifth and the sixth sides, respectively, of the unit because that would block the final steps of the wrapping operation. The aim of the invention is to design the means transporting the unit from one station to an other within the wrapping apparatus in such a manner that parts of the foil are supported, which will facilitate the introduction of expandible fork members required to spread the protruding parts of the foil and prepare same for the final welding operation.

4 Claims, 8 Drawing Figures

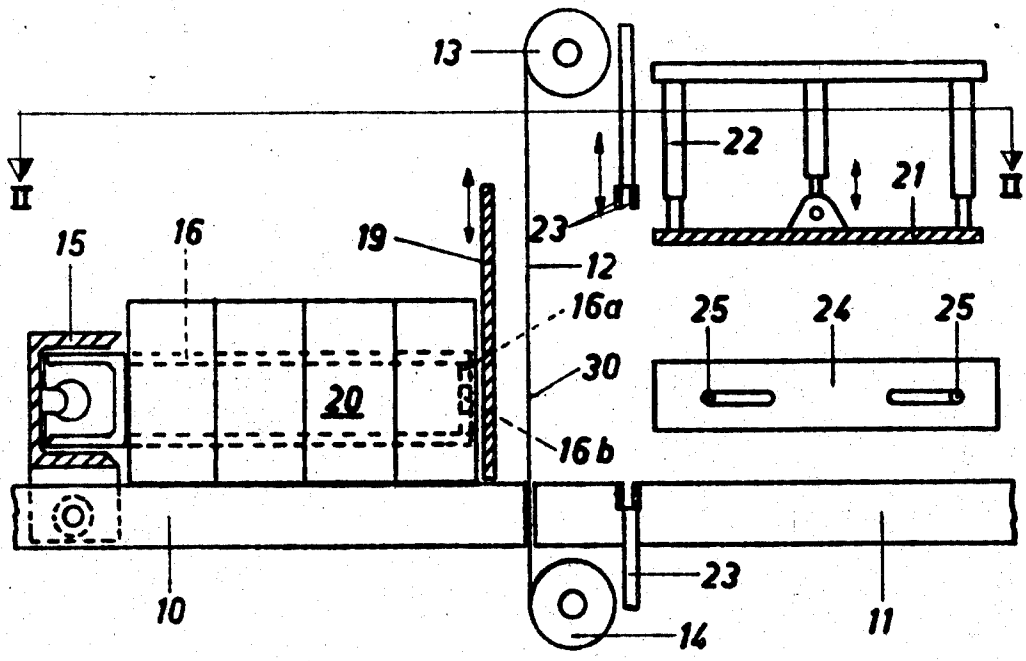

FIG.1

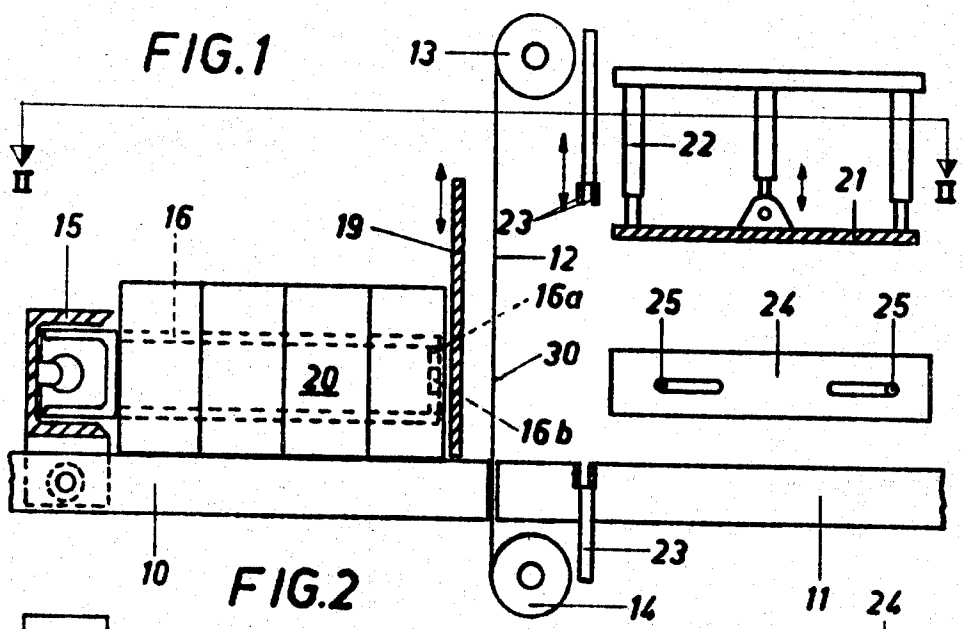
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FIG.2

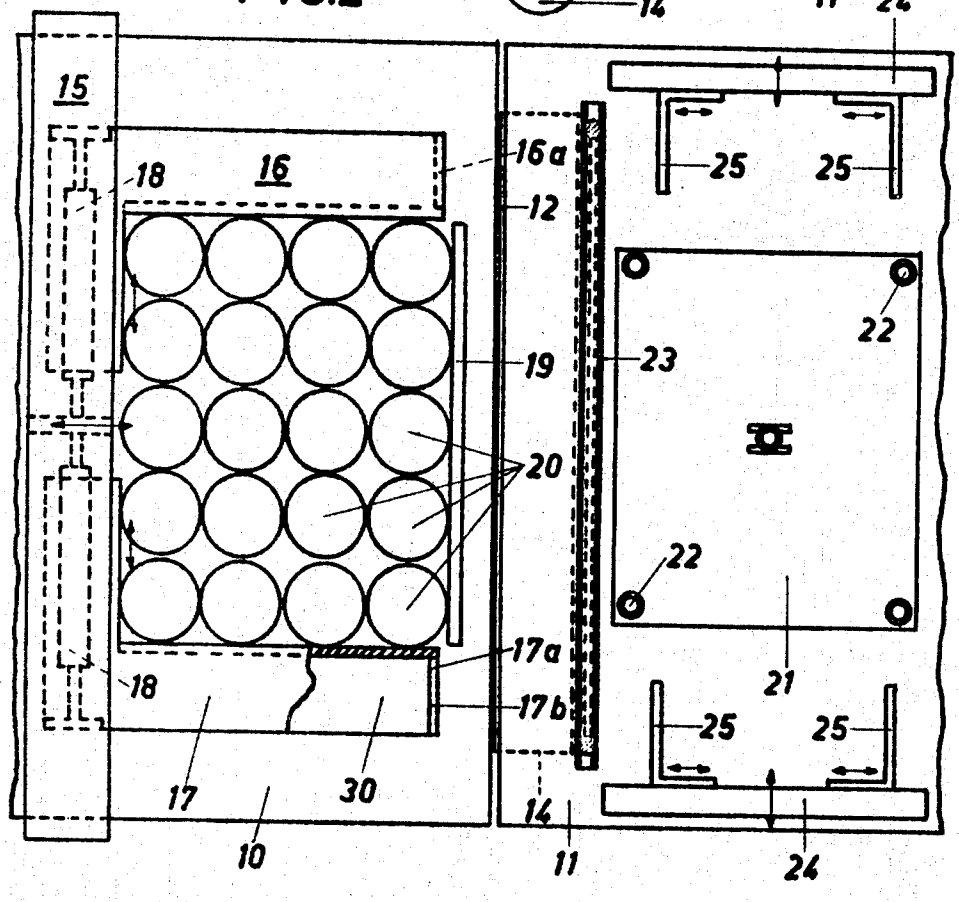
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FIG. 3

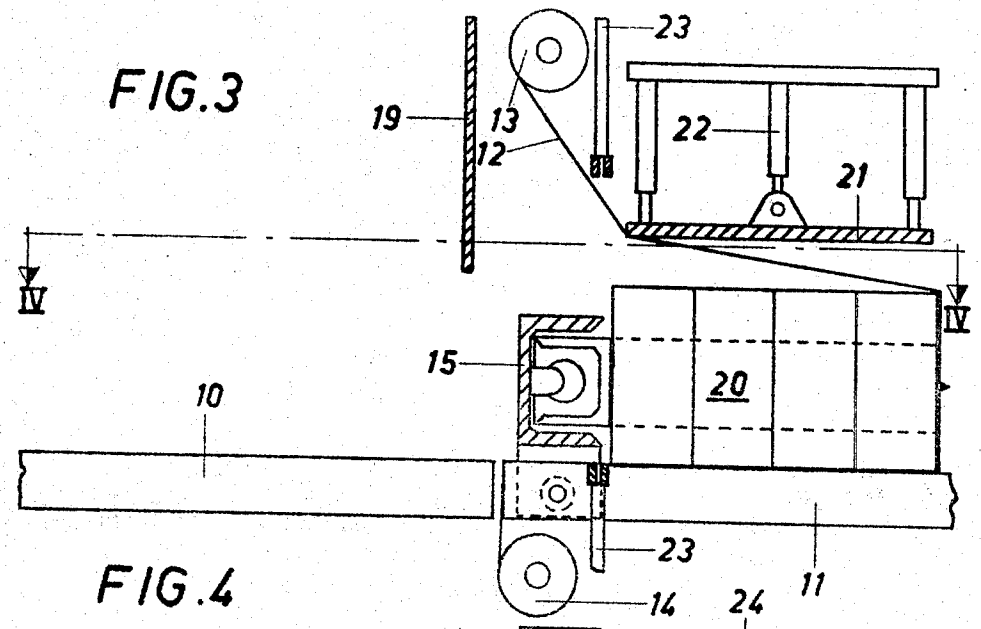

FIG. 4

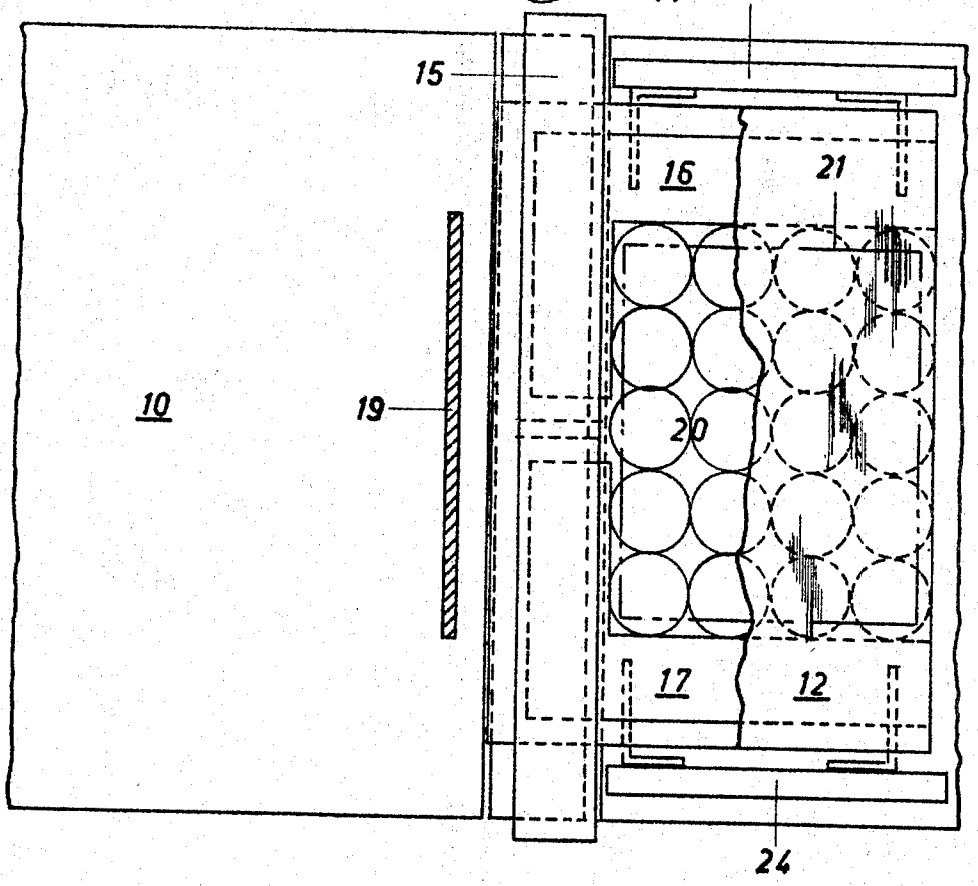

FIG.5

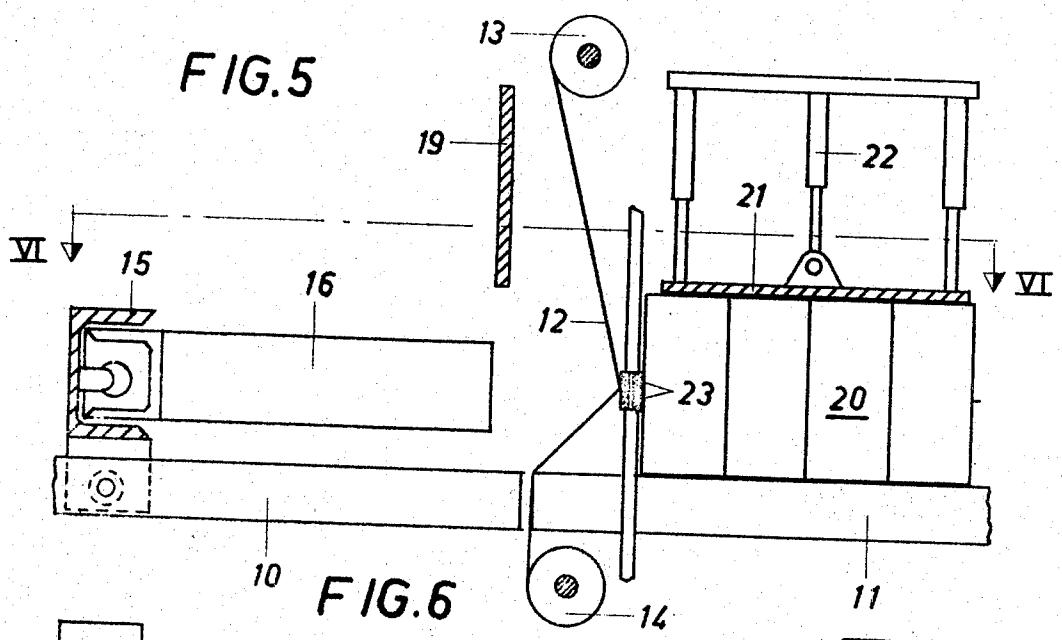
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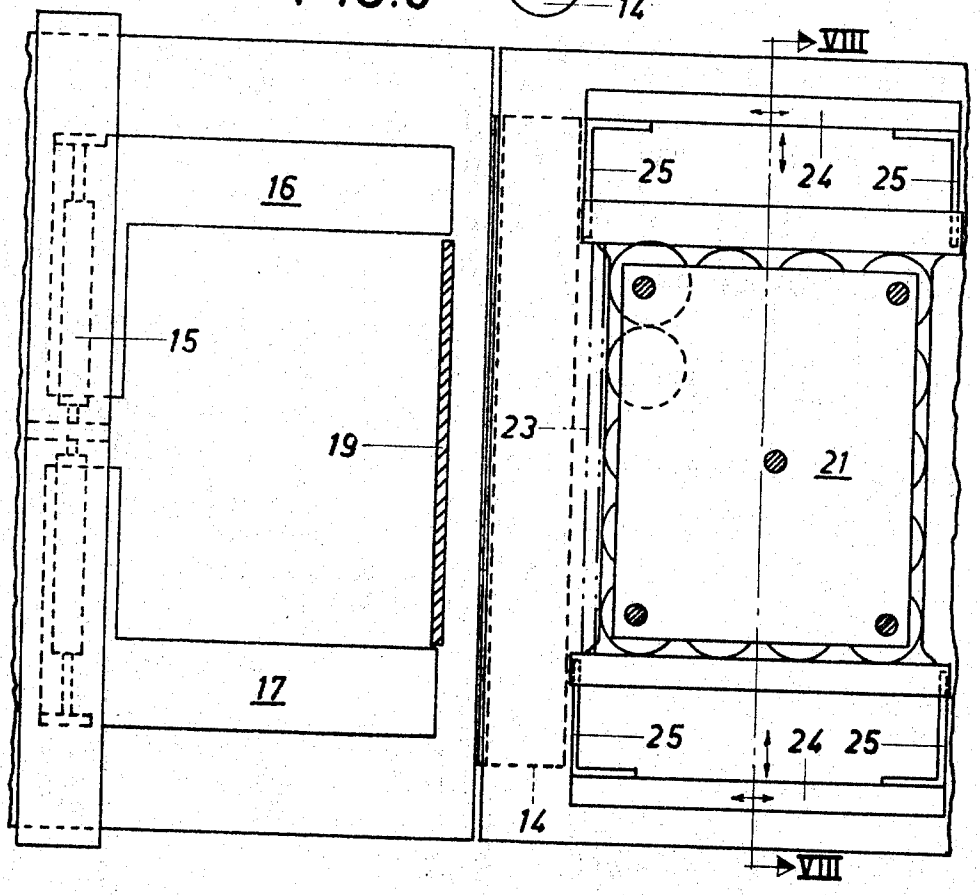
FIG.6


VIII
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VIII

FIG. 7

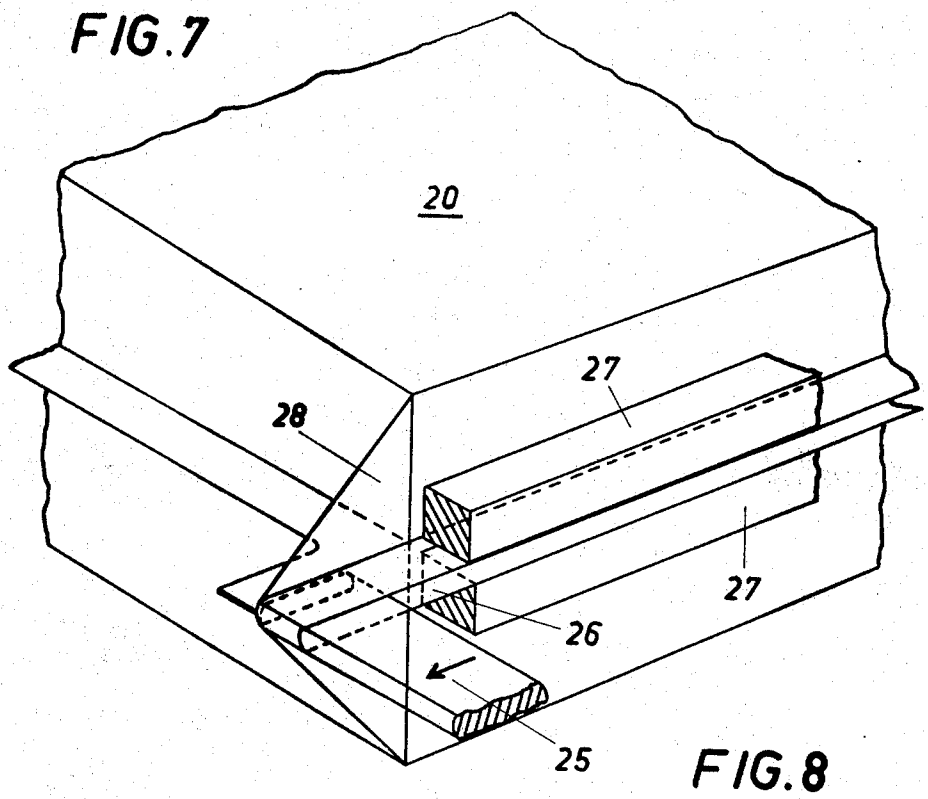
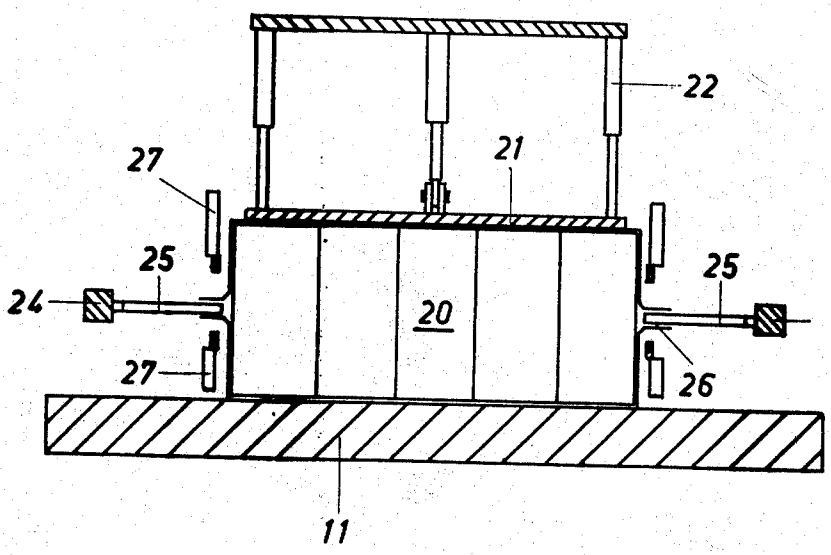


FIG. 8



APPARATUS FOR FORMING A FOIL ENVELOPE AROUND A NUMBER OF BODIES ASSEMBLED INTO A UNIT

BACKGROUND OF THE INVENTION

The enclosing a number of bodies, assembled into a unit of substantial parallelepipedic shape, in an envelope of weldable plastics foil may in a convenient manner be performed in an apparatus comprising two platforms arranged in the same horizontal plane, means for supporting the foil vertically between the two platforms, the foil primarily having a greater breadth than that of the unit, means for transferring the unit assembled upon the first platform onto the second platform in such a manner that the foil will be wrapped around three sides of the unit being perpendicular to the direction of movement, first welding means to bring the foil to contact the fourth side of the unit and to weld the ends of the foil together, second welding means to work along the fifth and the sixth sides, respectively, of the unit to close the ends of the cover protruding therefrom, and an expandible fork member mounted at the second platform being designed, prior to the last welding steps, to be introduced into each of the protruding portions of the cover to stretch said portions to narrow slots suited for closure by welding.

SUMMARY OF THE INVENTION

The aim of the invention is to design the apparatus in such a manner that the protruding portions of the foil cover will be supported during an intermediate step of the procedure to facilitate the introduction of the fork members. The invention is characterized in that the transferring means includes an open, three sided frame member turned with its open end in the direction of movement and having arms parallel thereto, said arms being designed to carry part of the protruding portions of the foil when the partly wrapped unit has been transferred to the second platform, that a pressure plate mounted above the second platform, having substantially the same dimensions as the unit, is displaceable towards and away from the second platform to temporarily exert a pressure upon the unit, when the same has been transferred to the second platform, that the expandible fork members are designed to be moved to working position while the frame member is still enclosing the unit upon the second platform, and that the arms of the frame member are formed to permit retraction from the second platform while the fork members remain in working position.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevation of the apparatus at a first step during the operation,

FIG. 2 is a horizontal section on the plane of line II—II of FIG. 1;

FIGS. 3 is a view similar to FIG. 1, where the unit has been transferred from a first to a second platform

FIG. 4 is a horizontal section on the plane of line IV—IV of FIG. 3;

FIGS. 5 is similar to FIGS. 1 and 3 showing the apparatus during the step where the cover is welded together,

FIG. 6 is a horizontal section on the plane of line VI—VI of FIG. 5;

FIG. 7 is a perspective view of a corner of the unit during a following step of the operation; and

FIG. 8 shows a vertical section taken on the second platform.

DESCRIPTION OF A PREFERRED EMBODIMENT

The apparatus shown in the drawings includes two platforms **10** and **11**, respectively, which are arranged at the same level and separated by a small clearance through which a sheet **12** of plastics foil extends and is wound upon two storage rolls, **13** and **14** respectively. The platforms may form parts of conveyors transporting the bodies to the apparatus and the wrapped units away therefrom, respectively.

The first platform **10** has a size suited to receive the required number of bodies and to form a unit thereon. On the present occasion the unit is intended to consist of rolls of toilet paper, the unit having a base surface defined by 4 × 5 rolls, and with an arbitrary number of such rolls on top of each other. The rolls are placed on the first platform and are formed to a transport unit by means of a frame consisting of a base member **15** and two arms **16** and **17** mounted thereon. These arms are movable towards and away from each other with respect to the base portion **15** by means of pressure fluid operated rams **18**, mounted on the base portion and provided with control means not shown here. A wall member **19** is arranged at the end of the first platform, adjacent to the second platform and is movable in a vertical plane in such a manner that it, when brought down onto the platform, will form a fourth side defining the unit. The frame is displacable in the horizontal plane, parallel to the platforms and as a first step in the operation the base portion is pushed in the direction of the wall member **19**, while simultaneously the arms **16** and **17** are moved towards each other. Hereby the rolls are arranged to form a compact, basically parallelepipedic unit **20**, which is to be enclosed in the plastics foil **12**. The force exerted on the individual bodies during these arranging movements must of course not be so high that the bodies will be deformed. The stroke of the parts of the frame, as well as the force exerted thereby may be varied in suitable manner.

The frame is displacable further in the horizontal plane, sufficient to bring the formed unit **20**, after removal of wall member **19**, onto the second platform **11**. During this displacement the unit will pull along a portion of the plastics foil **12** in such a manner that this portion at first will enclose the unit **20** along three sides thereof. A pressure plate **21** is mounted above the second platform **11**, and is by means of pressure fluid rams **22**, controlled in any suitable manner, displacable towards and away from the unit. The size of the pressure plate substantially corresponds to that of the unit, and when it is forced downwards it will bring along the sheet of foil to stretch it over the top of the unit.

The pressure plate **21** will retain the bodies within the unit with respect to the second platform **11**, to permit the frame **15,16,17** to be withdrawn to the first platform **10**, in order that a package can be formed as follows: as is shown in FIG. **5**, two welding electrodes **23**, displaceble towards and away from each other, are arranged between the sheet of plastics foil **12** and the unit **20**, when transferred to the second platform **11**. These electrodes are designed in such a manner that they will bring the foil downwards along the fourth side of the unit, facing towards platform **10**, and to unite the meeting edges of the foil and complete a tubular cover open at its sides. The welding electrodes will sever the cover

thus obtained from the sheet of foil, and will simultaneously weld together the adjacent ends of the foil extending from the rolls in such a manner that an unbroken sheet, having a transverse joint **30** shown in FIG. **1**, will be formed, ready to recieve the following unit.

The foil originally has a breadth or width which is greater than that of the desired unit, preferably about twice the thickness of the unit, and the cover now obtained will thus have open end portions protruding from opposite sides of the unit. With respect to the following operations it is important, that the upper parts of these protruding portions do not inadvertidly fold down along the fifth and sixth sides of the unit.

FIG. **2** shows how fork members **24**, each provided with two arms **25**, movable towards and away from each other, are mounted adjacent to the second platform **11** in a position not to prevent a displacement of the unit **20** from the first to the second platform. These fork members are, in the manner shown in FIG. **4**, brought into the protruding end portions of the cover during the step shown in FIG. **3**. Each arm **16, 17** of the frame includes a U-beam, which is turned with the open side away from the unit. The flanges of the U-beam will keep the portions of the protruding end parts separate, whereby the arms **25** of the fork members may be freely moved towards the unit. When thus the pressure plate **21** has been forced against the unit and retains the same against the second platform, the fork members **24** may be brought to an operating position, and the frame arms **16, 17** can be withdrawn without any hindrance from the fork members. The free ends of the arms **16, 17** are provided with endportions **16*a*** and **17*a***, respectively, designed to prevent the ends of the arms from cutting through the foil **12**. In order to permit the fork member **24, 25** at platform **11** to pass through the end portion **16*a*, 17*a*** the latter are provided with slots **16*b*** and **17*b***, respectively.

The welding along the fourth side of the unit can be performed in one step after the retraction of the frame members **16, 17** or in two or more steps, for instance primarily between the arms of the frame member and at the corners of the sheet to leave openings permitting the retraction of the arms.

When thereafter the arms **25** of the fork members **24** are moved apart the end portions of the cover will be stretched to be broader that the unit, whereby the opening of the protruding portion will be formed to a narrow slot **26** in the manner best shown in FIG. **7**, while simultaneously the material in these portions is brought in close to the sides of the unit. The slots may thereupon be closed by means of two further welding electrodes **27** at each side of the unit, said electrodes being movable towards and away from each other in a vertical plane and forced against the sides of the cover and towards each side of the unit parallel to the direction of displacement whereby the cover will envelop the unit along all sides thereof. The welding seams along the fifth and the sixth side of the unit are preferably located at the same level as the welding seam along the fourth side, i.e. about midway of the heigth of the unit. Together with the seam **30** connecting the severed ends of the foil a reinforcing band will be formed around the unit. The triangular portions **28**, which hereby are obtained at each corner may, either manually or by further mechanical means, not shown on the drawing, be folded inwards against one adjacent side of the unit and be bonded or welded thereto.

The size of the components, as well the shape of the arms of the frame and of the forks will have to be chosen with consideration to the bodies to be handled and to the size of the unit desired. The arrangement shown and described thus is one example only of the invention the details of which may be modified in many ways within the frame of the accompanying claims. The foil envelope may advantagously be heat shrunk when the welding operations have been concluded.

I claim:

1. An apparatus for enclosing a number of bodies, assembled into a unit of substantially parallel-epipedic shape, into an envelope of weldable foil comprising,

first and second platforms arranged in substantially the same horizontal plane and means for supporting a sheet of foil vertically between the two platforms, the foil primarily having a breadth bigger than that of the unit,

means including an open, three sided frame member turned with its open side in the direction of movement and having arms parallel thereto for transferring a unit assembled upon the first platform onto the second platform in such a manner that the foil will be wrapped around three sides of the unit being perpendicular to the direction of movement, said arms being provided with at least one outwardly directed flange designed to carry part of the protruding portions of the foil when the partly wrapped unit has been transferred to the second platform,

a pressure plate of substantially the same dimension as the unit mounted above the second platform and cooperating with means to move the plate towards and away from the second platform to temporarily exert a sufficient pressure upon the unit to retain it upon the second platform,

first welding means to tighten the foil along a fourth side of the unit and to weld the ends of the foil together,

second welding means to work along the fifth and the sixth sides of the unit, respectively, to close the ends of the cover protruding therefrom, and

two expandible fork members mounted at opposite sides of the second platform and designed to be introduced into the protruding portions of the foil while the frame member is still enclosing the unit upon the second platform and before the first welding operation along the fourth side of the unit is terminated, the arms of the frame member being designed to permit retraction from the second platform, while the fork members remain in working position to thereafter stretch the protruding portions of the foil to narrow slots suited for closure by welding.

2. The apparatus according to claim **1**, in which the arms of the frame member is each formed as a beam having a basically U-shaped cross section and being turned with its open side away from the unit, the cooperating fork member being designed to operate between the legs of the U, when brought to working position.

3. The apparatus according to claim **2** in which each U-shaped beam, in order to prevent damage to the foil during the movement of the frame member towards the second platform, at its free end, is provided with an end plate having a slot for permitting the passage of a form member.

4. The apparatus according to claim **1** in which the arms of the frame member include means for moving them in direction towards and away from each other in order to permit compression of the unit to be enclosed in the foil.

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