Sept. 16, 1969 J. N. LEDBETTER 3,466,846

FLAT COIL PACKAGING MACHINE

Filed June 5, 1967 2 Sheets-Sheet 1

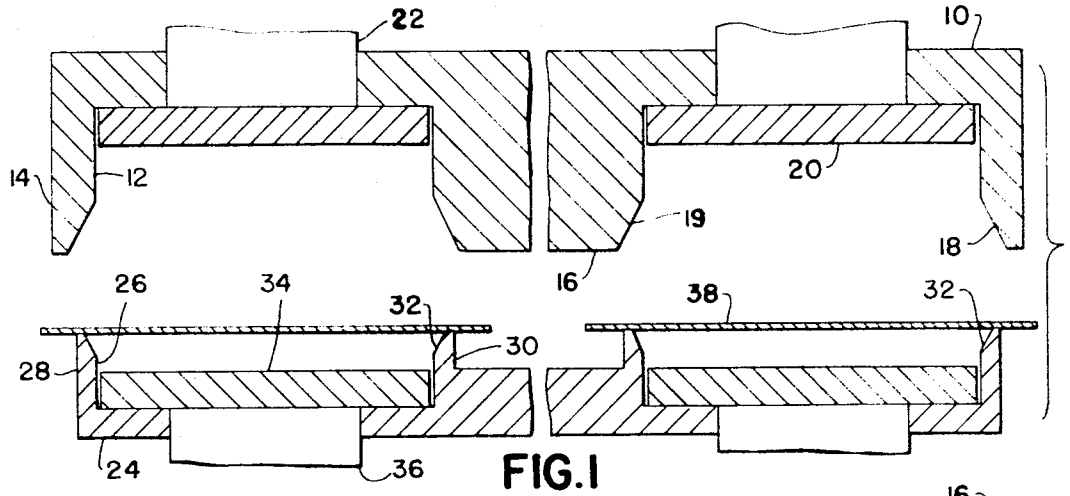


FIG.1

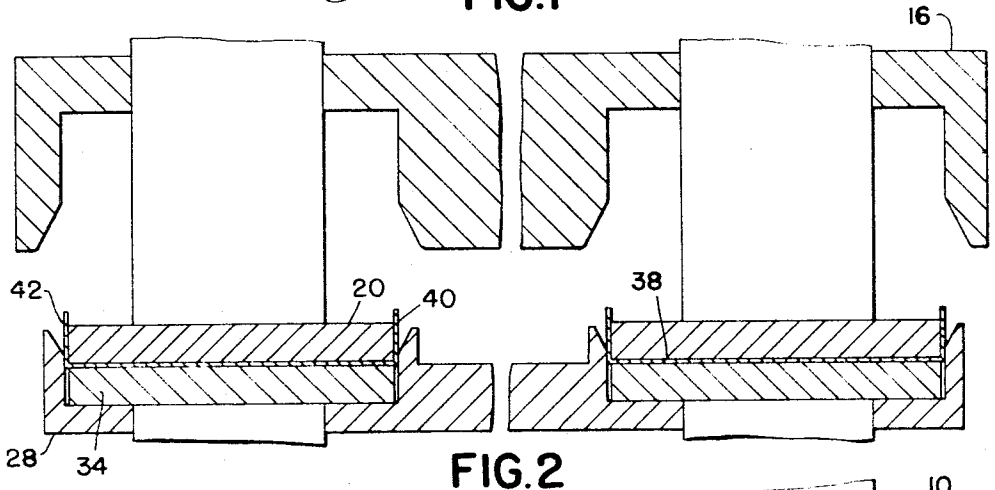


FIG.2

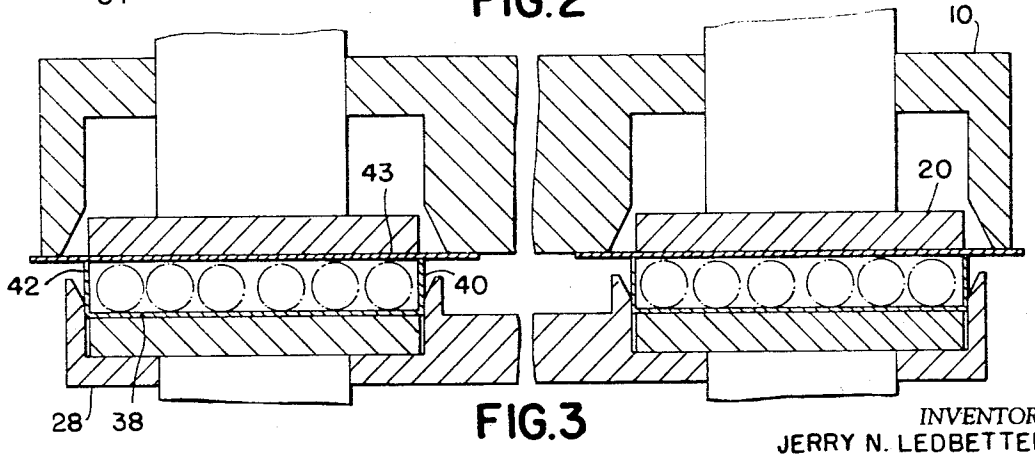


FIG.3

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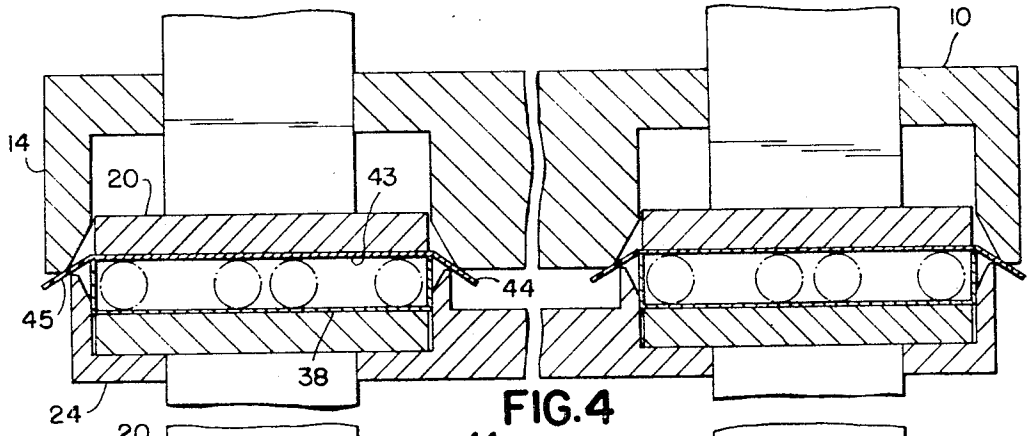


FIG.4

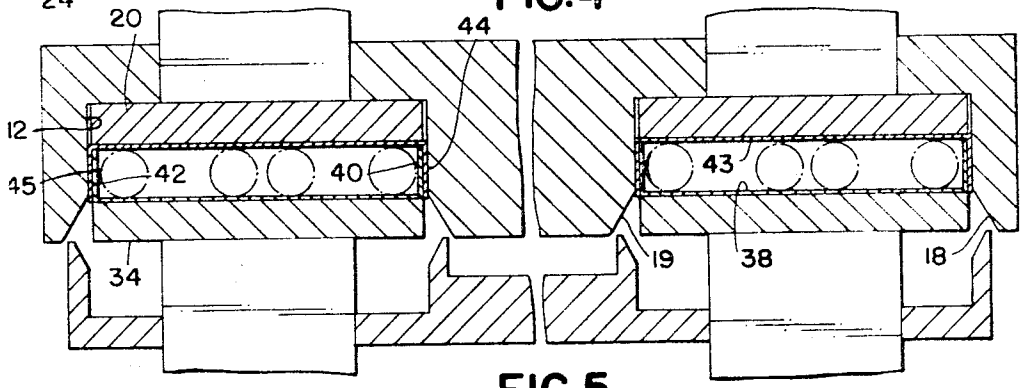


FIG.5

FIG.6

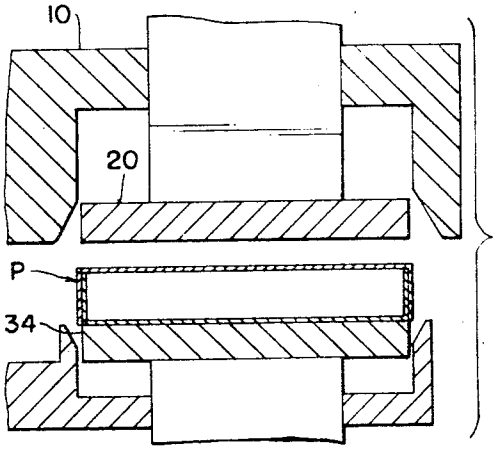
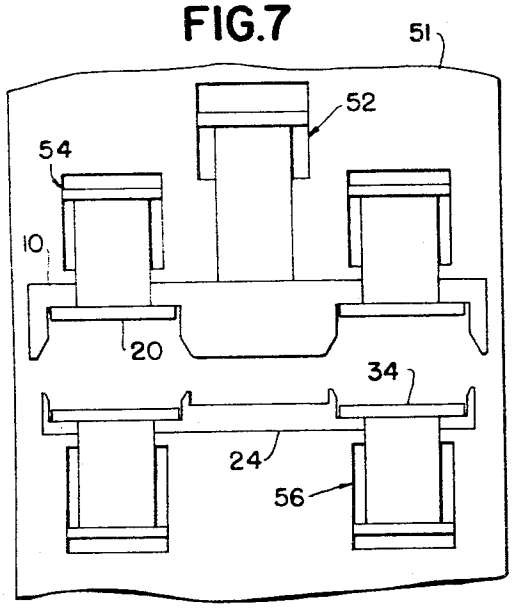


FIG.7



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FLAT COIL PACKAGING MACHINE

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U.S. Cl. 53—194 9 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus for forming a flat annular member into upwardly open U-shaped cross-section adapted to receive a flat coil, and thereafter to form a second flat annular member into inverted U-shaped cross-section while forming the inner and outer edges thereof into overlying relation to the inner and outer edges of the first member.

Background of the invention

The invention is directed to solving the problem of packaging flat coils such for example as formed of metal tubing in a manner characterized by the use of inexpensive materials, rapidity of operation, and overall economy.

Summary of the invention

Essentially, the machine comprises a pair of bodies relatively movable toward and away from each other, each of the bodies at the side confronting the other body being provided with an annular recess. Located in each of the annular recesses is a flat annular plate movable into and out of the recess. Conveniently, the bodies may be disposed one above the other, one of the bodies being fixed and the other vertically movable toward and away from the first body.

In operation a flat annular member such as cardboard or the like, is placed over the upwardly facing recess in the lower body, and the flat annular plate of the upper body is moved downwardly to form the member into the upwardly opening annular recess while shaping its inner and outer edges into substantially vertically extending flanges. Thereafter, the bodies are separated and the annular plate withdrawn from the formed cardboard member to expose the annular chamber provided thereby. At this time the contents are placed in the upwardly opening annular cavity and a second flat cardboard member is placed over the top of the annular chamber.

Thereafter, the lower flat annular plate is moved upwardly to transfer the carton or package into the downwardly open recess of the upper body, and at the same time fold the inner and outer edges of the upper member downwardly to overlie the inner and outer edges of the lower cardboard member.

The abutting surfaces of the inner and outer edge flanges of the upper and lower cardboard members are suitably secured together as for example by means of a pressure sensitive adhesive, or a cold or a hot melt adhesive, or the like.

From the foregoing it will be observed that the complete carton or package comprising the upper and lower members, is formed from simple flat annular packaging material such as cardboard and the operation is extremely rapid, calling only for timed relative vertical movement between the machine components.

Details and features of the invention will become apparent as the description proceeds, especially when taken in conjunction with the accompanying drawings, illustrating preferred embodiments of the invention.

Brief description of the drawings

FIGURE 1 is a diagrammatic sectional view showing the machine components in starting position.

FIGURES 2–6 are similar views, showing the machine components in the successive positions occupied thereby.

FIGURE 7 is a diagrammatic elevational view showing actuating means.

Description of the preferred embodiments

Referring now to the drawings there are illustrated the operating components of the machine, the conventional power actuated mechanism being omitted for purposes of clarity. In practice, it will be understood that the relatively movable body may be part of a press and the vertically movable annular plates may be connected to independently operable piston and cylinder devices or the like.

In FIGURE 1 there is shown an upper body **10** which in this instance may be assumed to be movable. The body **10** is provided with a downwardly open annular recess **12** formed by outer flanges **14** and an inner portion **16**. The flange **14** is beveled as indicated at **18** and the body portion **16** is beveled as indicated at **19**, for a purpose which will presently appear. Located in the annular recess **12** is a flat annular plate **20** shaped to fit reasonably closely therein. The plate **20** is vertically movable into and out of the recess **12** by suitable means including rods **22** which may extend to piston and cylinder devices as previously noted.

The machine includes the lower body **24** provided with an upwardly facing recess **26** which is illustrated substantially congruent to recess **12**, the recess being surrounded by the outer upwardly extending circular flange **28** and the inner circular flange **30**. The flanges **28** and **30** are beveled as indicated at **32** for a purpose which will presently appear. Located within the annular recess **26** is a flat annular plate **34** which is vertically movable into and out of the recess **26** by power means such for example as the rods **36** which may be connected to suitable piston and cylinder devices.

It is to be understood that in the illustrated embodiment where the upper body **10** is vertically movable, the vertical movement of the flat annular plate **20** may be provided to cause the flat annular plate to move into and out of the recess **12** as required, or to provide for vertical movement of the flat annular plate in conjunction with the upper body **10**.

In operation a flat annular package member **38** of suitable material such for example as cardboard, is placed over the recess **26** as illustrated in FIGURE 1. The next step in the operation of the machine is a downward movement of the flat annular plate **20** from the position shown in FIGURE 1 to the position shown in FIGURE 2 in which it is illustrated as having forced the annular cardboard member **38** partially into the recess **26** and into engagement with the upper surface of the flat annular plate **34**. The beveled or inclined surfaces **32** cooperate with the upper plate **20** during this action to fold the inner and outer edges of the cardboard member **38** into an upwardly extending inner flange portion **40** and an upwardly extending outer flange portion **42**.

Thereafter, the upper flat annular plate **20** is retracted and the material to be packaged is placed in the interior of the partially shaped carton or package formed by the cardboard member **38**. This condition is illustrated in FIGURE 3 which also illustrates the next succeeding step which is the placement of the second flat annular cardboard member **43** over the partially formed cardboard member **38** and the downward movement of the body **10** and flat annular plate **20** into the illustrated position in contact with the upper cardboard member **43**.

In FIGURE 4 the next step of the operation is illustrated in which the upper body 10 and the lower body 24 have been moved into proximity, thus causing an initial downward bending of flange portions 44 and 45 of the upper cardboard member 43 while the upper annular plate 20 remains in contact with the upper cardboard member 43.

The next step is upward movement of the lower annular plate 34 to the position shown in FIGURE 5, this movement being accompanied by retraction of the upper plate 20 into the recess 12. During this operation the flange portions 44 and 45 of the upper cardboard member or cover 43 are wiped by the inclined surfaces 18 and 19 into engagement with the outer surfaces of the upturned inner and outer flanges 40 and 42 of the lower cardboard member 38.

The operation is finally completed by elevating body 10, leaving the completed package designated P in FIGURE 6 on the lower plate 34, from which it may be readily removed.

In FIGURE 7 there is diagrammatically illustrated a frame 51 which the upper body 10 is vertically movable by a piston and cylinder device 52. Plate 20 is movable by piston and cylinder devices 54 carried by body 10. Stationary body 24 carries piston and cylinder devices 56 to move the lower plate 34.

In operation the required relative movements of the bodies 10 and 24 and of the annular plates 20 and 34 may be automatically sequenced so that the operator is required only to give the appropriate signal to initiate relative movement of the parts to the several positions illustrated in the drawings.

Depending upon the nature and characteristics of the package material, the portions of the flat annular members 20 and 34 which are formed into the generally vertically extending inner and outer flange portions 40, 42, 44 and 45, may be radially slotted. However, if the material is such that it forms naturally into folds during the above described operation, it is unnecessary to form radial slots or grooves therein.

The drawings and the foregoing specification constitute a description of the improved flat coil packaging machine in such full, clear, concise and exact terms as to enable any person skilled in the art to practice the invention, the scope of which is indicated by the appended claims.

What I claim as my invention is:

1. Flat packaging apparatus comprising a pair of bodies having transverse dimensions greater than a package to be produced thereby, means for relatively moving said bodies toward and away from each other, said bodies having at their confronting surfaces substantially congruent recesses having the transverse shape of the package, a plate in each of said recesses shaped to conform to the recess, and means connected to each of said plates to move said plates outwardly from a position at the bottom of the recess in which said plate is received to a position spaced outwardly of such recess and return, at least one of said plates being movable from its recess to a position at least partly within the confronting recess.

2. Apparatus as defined in claim 1 in which said apparatus is for packaging flat coils, such as coils of tubing, and in which said recesses are annular and shaped to conform closely to a coil of tubing.

3. Apparatus as defined in claim 1 in which said recesses have side walls the inner portions of which are parallel to the direction of movement of said bodies and plates, the outer portions of said side walls being laterally inclined to guide the edge portions of packaging material such as cardboard into formation to constitute side walls of the package.

4. Apparatus as defined in claim 2 in which said recesses have side walls the inner portions of which are parallel to the direction of movement of said bodies and plates, the outer portions of said side walls being laterally inclined to guide the edge portions of packaging material such as cardboard into formation to constitute side walls of the package.

5. Apparatus as defined in claim 1 in which said bodies are vertically spaced, one of said bodies being stationary and the other body being vertically movable.

6. Flat packaging apparatus comprising a lower body having in its upper surface a first annular recess, the side walls of said recess being vertical adjacent the bottom of the recess and being inclined outwardly at the top of the recess, the upper portion of said body surrounding said recess comprising a support to receive a flat annular sheet of packaging material such as cardboard in position to overlie said recess and to provide side wall forming portions extending laterally inwardly and outwardly therefrom, a first annular plate conforming to said recess and initially positioned in the bottom of said recess, an upper body having in its lower surface a second annular recess conforming substantially to and confronting the first annular recess, the side walls of said second recess being vertical adjacent the inner wall thereof and being inclined outwardly adjacent the outer portion of said second recess, means for moving said second annular plate in said second recess, means for moving said second annular plate into said first recess to fold the packaging material into an annular recessed configuration with the side wall forming portions thereof extending upwardly, means for thereafter retracting said second annular plate upwardly out of and away from the recessed sheet of packaging material to provide for placement of a flat coil therein and placement of a flat annular cover sheet of packaging material over the lower recessed packaging material, means for thereafter moving said lower annular plate upwardly to displace both sheets of packaging material and the flat coil into said second recess to fold the lateral inner and outer edges of the cover sheet downwardly over the upwardly extending side walls of the recessed sheet, and means for thereafter moving said first annular plate and the completed package downwardly to separate the package from the second recess.

7. Apparatus as defined in claim 6 which comprises means for moving one of said bodies vertically toward the other prior to moving said first plate to position the package in said second recess.

8. Apparatus as defined in claim 6, said apparatus comprising a frame, said lower body being fixed to said frame, said upper body being vertically movable on said frame, the means for moving one of said bodies comprising a piston and cylinder device connected between said frame and said upper body.

9. Apparatus as defined in claim 8, the means for moving said plates relative to the bodies with which they are associated comprising piston and cylinder devices connected between each of said plates and the associated body.

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