March 6, 1945. C. Z. MONROE 2,370,745

STAPLING AND SEALING MECHANISM

Filed Nov. 20, 1942 2 Sheets-Sheet 1

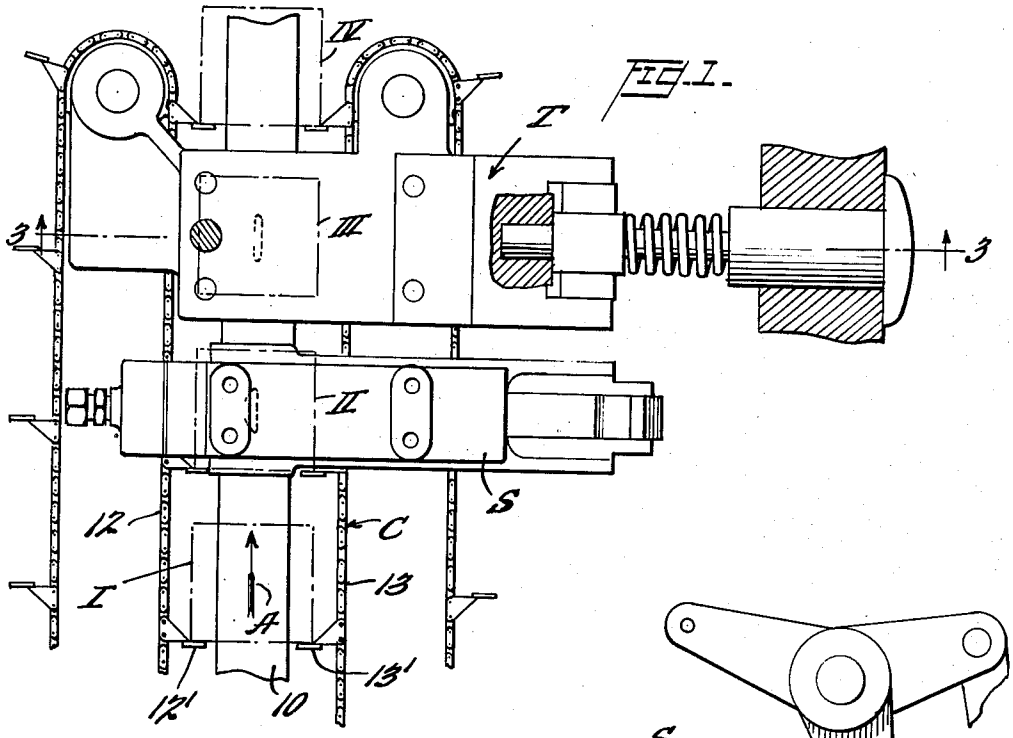


FIG. 1.

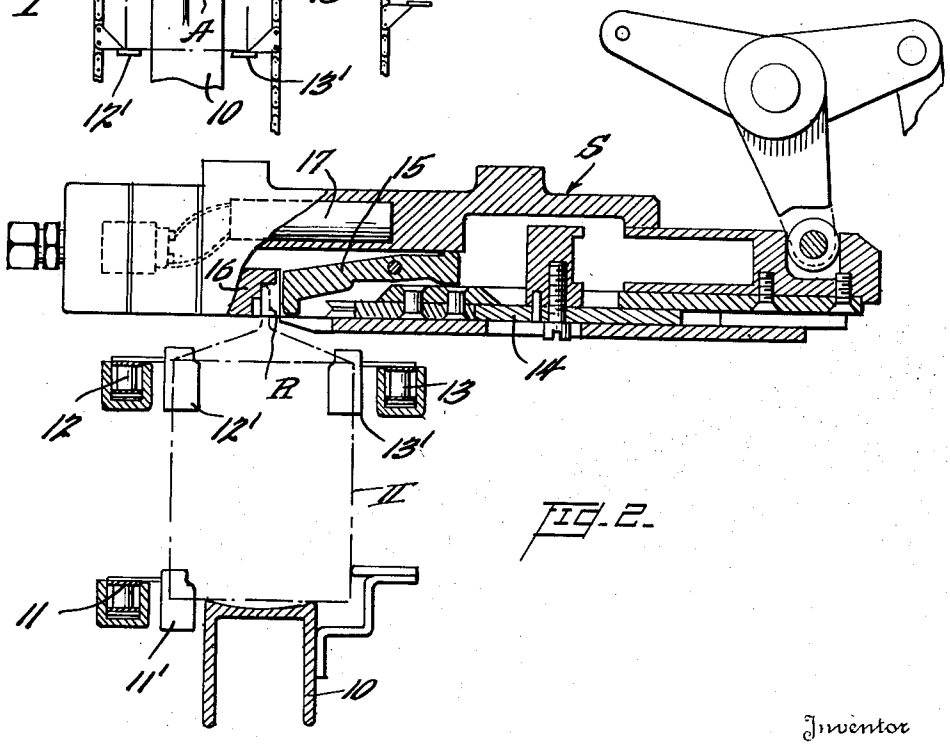


FIG. 2.

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Filed Nov. 20, 1942 2 Sheets-Sheet 2

FIG. 3.

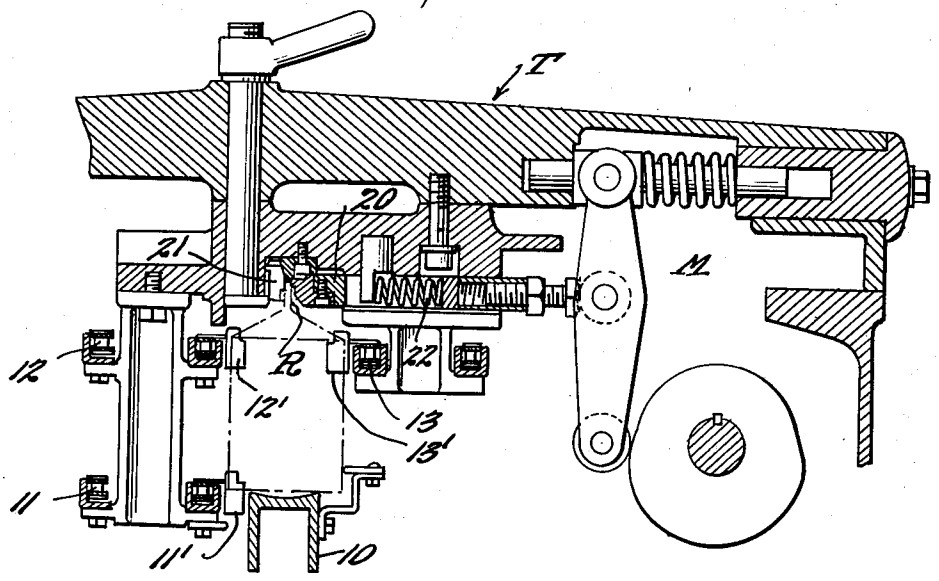


FIG. 4.

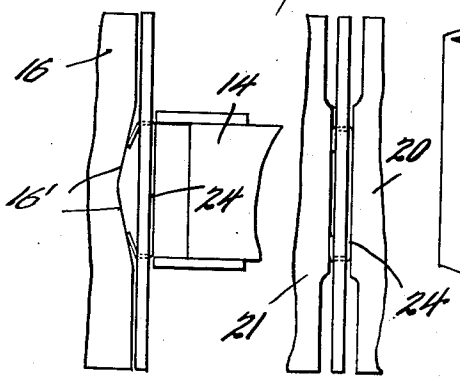
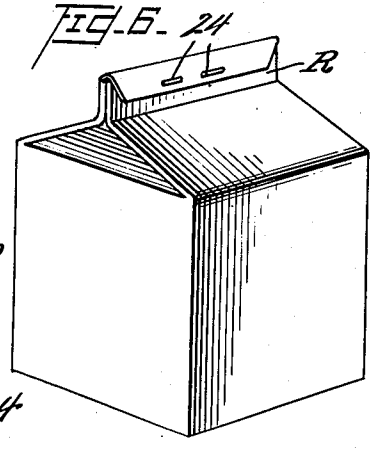


FIG. 5.

FIG. 6.



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STAPLING AND SEALING MECHANISM

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Application November 20, 1942, Serial No. 466,313

4 Claims. (Cl. 1—11)

This invention relates to apparatus for stapling and sealing the multi-ply terminal rib portions of paper containers, after such containers have been charged with measured quantities of a commodity to be transported and dispensed.

In Patent No. 2,047,891, issued July 14, 1936, in the name of Henry T. Scott, there is disclosed a paper container comprising a tubular body portion which is square in horizontal or cross section, and a folded and sealed top or upper end closure, the container comprising a single paper sheet divided by scorings into a plurality of panels, the panels being folded relatively to each other, and secured in their folded positions, in the formation of the final product, i. e., a stiff self-supporting container well suited for the packaging of liquids.

Preferably the folding of the container into final form is accomplished upon an automatically operating container fabricating machine and, where the container is to be employed in the packaging of liquids, it is exteriorly and interiorly coated with a leakproofing substance such as paraffin or a paraffin-containing material, prior to the introduction of the liquid. After the container is charged the several panels of its foldable top closure portion are folded relatively to each other so as to form a closure having a central and transversely or horizontally extending rib, such rib including a plurality of plies of paper. An eminently successful type of automatically operating container fabricating, charging, and sealing mechanism heretofore employed in the production of charged containers of the type shown in the patent referred to has included a stapling mechanism for automatically passing a staple into and through the terminal rib of each container passing through the apparatus, and a further mechanism for applying a sealing pressure to the rib after the insertion of such a staple, the several previously coated plies of paper being pressed tightly together and the coating material being caused to completely seal any interstices in the rib which might otherwise remain and through which the liquid content of the container might escape.

A stapling mechanism found suitable for use in such an automatically operating machine is disclosed in Patent No. 2,063.345, issued in the name of Henry T. Scott on December 8, 1936, and a suitable sealing mechanism for applying the final pressure to the previously formed and stapled rib is disclosed in Patent No. 2,212,449, issued in the name of C. Z. Monroe, August 20, 1940. In the Scott patent just above referred to it is pointed out that, whenever the stapling operation is practiced upon the multi-ply rib of a container the surfaces of which have been coated with a paraffin-like substance, it is highly advantageous to substantially raise the temperature of each staple just before it is caused to penetrate the container rib to which it is to be applied, so that the temperature of the staple as it enters and passes through the rib will be somewhat higher than the temperature at which the coating substance melts or becomes plastic. As a result the heated staple causes that portion of the coating substance with which it comes into contact to melt or become soft so that, at the conclusion of the stapling operation, and after the staple has cooled, the small amount of coating substance which has melted or been rendered plastic by the staple will recongeal or solidify in close association with the staple, effectively sealing the holes in the paper through which the prongs of the staple have passed and thus eliminating the possibility, which would otherwise exist, of leakage around the staple.

The sequence of operations heretofore employed in the stapling and final sealing of container ribs are, in accordance with the present invention modified, and the mechanism for accomplishing the desirable results advantageously simplified. The stapling mechanism itself has been so changed in construction that the prongs of the heated staple which actually penetrate the rib of a container to be stapled and sealed are, instead of being clinched, only partially inturned, the clinching operation being deferred and accomplished subsequently by the sealing mechanism, simultaneously with the sealing operation. A superior result is obtained and likewise it is possible to more adequately heat the staple in the stapling mechanism. Thus, due to the elimination from the stapler of the staple end-clinching means it is possible to incorporate a more effective heating element and to more advantageously position this heating element with respect to the staples which successively pass through the machine, whereby these staples are successively heated with greater certainty and efficiency. The clinching operation is effectively completed by the sealing means, the sealing means such as previously utilized, and as disclosed in the Monroe patent referred to, being provided with a staple end-clinching element. By the simple reorganization or redesign of the stapling and sealing mechanism the stapling and

sealing operations can be carried out in a superior manner and the entire mechanism itself is greatly simplified by the total elimination from the stapler of the rather complicated clinching means heretofore deemed to be essential.

The invention may be embodied in mechanisms which vary widely in the design and arrangement of their component elements and in the accompanying drawings one form of such mechanism is illustrated by way of example.

In the drawings:

Figure 1 is a plan view, partially broken away, of the container rib stapling and sealing mechanism of an automatically operating container fabricating, charging, and sealing machine;

Figure 2 shows in side elevation, partially broken away, the stapler mechanism employed, a container conveyor being shown in section;

Figure 3 is a section on line 3—3 of Figure 1;

Figures 4 and 5 show, rather diagrammatically, those elements of the stapling and sealing mechanisms which successively act upon an inserted staple to first partially inturn its free ends and to thereafter clinch these ends; and

Figure 6 is a perspective view of a container of the type embodying a central rib and upon which the stapling and sealing mechanisms are adapted to successively act.

In Figure 1 of the drawings the stapling mechanism is generally indicated by the letter S, the sealing mechanism by the letter T, and the conveyor by the letter C. The means for supporting the conveyor and the stapling and sealing mechanisms is not disclosed, but it will be understood that a suitable framework is provided. In this view a series of containers are indicated in dotted lines, the container indicated by the numeral I being supported upon the conveyor C and being shown in the position which it occupies just prior to being positioned to be operated on by the stapler, the container in position II being shown actually in position to be operated on by the stapler, the container in position III being shown in position to be acted upon by the sealing mechanism and the container shown in position IV having been discharged from the sealing mechanism.

Certain details of the conveyor mechanism are shown in Figures 1 and 2, the conveyor including an elongated stationary rail or trackway 10 upon which the bottoms of the containers rest, and three endless conveyor chains, portions of which are indicated at 11, 12, and 13, respectively, each chain being provided with a plurality of container-engaging and pushing elements, three being shown in Figure 2 and indicated at 11', 12' and 13', respectively. The conveyor functions to advance each container placed upon it in the direction of the arrow A (Figure 1), intermittently or with a step-by-step motion, and to deliver the completed, stapled and sealed containers at the end of the conveyor, or just beyond the position of that container indicated at IV in Figure 1. Any suitable conveyor may be employed to thus intermittently advance the containers. The container shown in position II is so located that its terminal rib, which is indicated at R, may be penetrated by the prongs of a heated staple when the stapler mechanism is actuated.

The details of the stapler may be modified or altered widely within the import of the invention and it is only necessary here to explain that the stapler includes a staple driving element which in this case is indicated at 14, a rocker or staple bending member indicated at 15, and a stationary abutment block which is indicated at 16. When the stapler functions a suitable length of wire is cut from an incoming length and formed substantially into the shape of a U, the free ends being directed toward the rib R, by the cooperation of the driver 14 and the rocker 15, further movement of the driver causing the ends of the staple to penetrate the container rib R, these ends of the staple, after penetrating the rib, striking the inclined deflecting surfaces 16' of the abutment block 16 and being inturned slightly, or moved substantially to the positions in which they are shown in Figure 4.

An electrical heating element is generally indicated at 17, this heating element being suitably connected to a source of electrical power and being positioned in the frame of the stapler S in the immediate vicinity of and preferably directly above the point of introduction of the wire so that it can maintain those portions of the stapler which come in contact with the wire heated to the desired and controlled temperature. By reason of the omission from the stapler illustrated of the clinching mechanism heretofore employed it is possible to more advantageously position the heating element.

After the staple has been applied and has the appearance of that which is illustrated in Figure 4 of the drawings the container is advanced from the stapling to the sealing mechanism, the sealing mechanism being shown in Figure 3 and being preferably constructed substantially in accordance with the teachings of the C. Z. Monroe patent above referred to. Its details, therefore, need not be herein described and it is only necessary to say that it includes a movable horizontally sliding jaw 20 and a stationary jaw 21, together with means generally indicated at M for advancing the jaw on its working or compression stroke, and a spring indicated at 22, for retracting the jaw at the conclusion of its working stroke. The rib R of the container is subjected to great pressure by the sealing mechanism and the inturned ends of the staple previously applied, which staple is indicated by the numeral 24 in the drawings, are completely clinched or moved to the positions in which they are indicated in Figures 4 and 5, the stapling and sealing operations being thus completed. It will be observed that the necessary and effectual stapling operation is thus accomplished by the cooperation of a stapler which is without a clinching mechanism, and the sealing mechanism, and that the heating means is most advantageously positioned with respect to the several instrumentalities and the wire to be heated.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a machine for stapling and sealing the multi-ply ribs of containers which have been coated with a paraffin-like coating substance, in combination, mechanism for forming a staple and driving the prongs thereof through such a rib, means for heating the staple before it is so driven, means for engaging and deflecting without fully clenching the free ends of the staple after such ends have been driven through a container rib by said mechanism, sealing mechanism for compressing the rib and clinching the previously deflected ends of the staple, and means for presenting container ribs first to the staple forming and driving mechanism and thereafter to the sealing mechanism.

2. In a machine for stapling and sealing the multi-ply ribs of paper containers, in combination, mechanism for forming a staple and driving the prongs thereof through such a rib, means for engaging and deflecting without fully clenching the free ends of the staple after such ends have been driven through a container rib by said mechanism, sealing mechanism for compressing the rib and clenching the previously deflected ends of the staple, and means for presenting container ribs first to the staple forming and driving mechanism and thereafter to the sealing mechanism.

3. In a machine for stapling and sealing the multi-ply ribs of paper containers, in combination, mechanism for forming a staple and driving the prongs thereof through such a rib, a stationary anvil having surfaces positioned to engage and deflect without fully clenching the free ends of the staple after such ends have been driven through a container rib by said mechanism, sealing mechanism for compressing the rib and clenching the previously deflected ends of the staple, and means for presenting container ribs first to the staple forming and driving mechanism and thereafter to the sealing mechanism.

4. The combination set forth in claim 3 in which the stationary anvil comprises a block having surfaces inclined to the direction of movement of the staple, each such surface being disposed to intercept and inwardly deflect without fully clenching the free ends of the staple after such ends have been driven through a container rib by said mechanism, sealing mechanism for compressing the rib and clenching the previously deflected ends of the staple, and means for presenting container ribs first to the staple forming and driving mechanism and thereafter to the sealing mechanism.

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