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APPARATUS FOR PACKAGING ANNULAR ARTICLES

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This invention relates to the packaging of articles of generally annular shape, such as a length of tube in coiled form. More particularly, the invention relates to an improved apparatus for packing such articles.

In my copending application S.N. 8,265, filed February 12, 1960, for "Packaging of Coiled Tubes," there is disclosed a carton for packaging an annular article, and the apparatus of the present invention is particularly suited for effecting certain operations involved in packaging the annular article in such a carton.

The carton disclosed in my aforementioned copending application comprises a pair of opposed sheet-like members, such as sheets of cardboard, each having a central opening and inner and outer peripheral portions. The inner peripheral portion of each member has cuts defining a series of inner tabs which, before folding, define a central polygonal opening, this inner portion also having fold lines forming a polygonal figure at the corners of which the cuts terminate. These inner tabs of each member are folded on the corresponding fold lines toward the opposing member and overlap the inner tabs thereof, and means are provided for securing each inner tab of each member in overlapping relation to a corresponding inner tab of the opposing member and with the intersecured tabs extending in opposite directions from their respective sheet-like members, such securing means being preferably an adhesive applied to the tabs. The outer peripheral portion of each sheet-like member has cuts defining a series of outer tabs and also has outer fold lines forming a generally circular figure at which these last cuts terminate. The outer tabs of each sheet-like member are folded on the respective outer fold lines toward the opposing member, and the outer periphery of the carton comprises a tape engaging the outer tabs of at least one of the sheet-like members, so as to hold the outer tabs in position to form a generally annular retaining wall surrounding the packaged article which, in turn, surrounds the polygonal closure formed by the inner tabs.

With this construction, the carton can be readily assembled around a coil tube by placing the coil between the two opposed sheet-like members, folding the inner tabs and securing them as described, and applying the tape to the outer tabs after folding them to form the annular retaining wall. The resulting carton not only has an attractive appearance but also can be handled and transported easily. That is, the circular outer periphery of the carton allows it to be rolled smoothly along a floor, and by reason of the polygonal shape of the closure formed by the tabs at the inner periphery of the carton, the latter may be easily gripped and held manually from within the central opening of the carton.

A principal object of the present invention is to provide an apparatus for use in packaging generally annular-shaped articles in a carton as described above.

A further object is to provide an apparatus by which such articles can be packaged rapidly and with a minimum of manual effort.

An apparatus made according to the invention comprises a support engageable with one of the sheet-like carton members and adapted to support this member with the annular article to be packaged resting on the member, this support having an opening for passage of tab-folding elements from below the support into engagement with

the inner tabs of the sheet-like member. A head is mounted above the support for reciprocating movements relative to the support and carries pressing and folding means operable in response to movement of the head toward the support to press the other or upper of the sheet-like members against the annular article and fold the inner tabs of this upper member toward the support opening. A second head is mounted below the support for reciprocating movements relative thereto and carries folding elements movable by the head through the support opening to fold the inner tabs of the first or lower sheet-like member toward the first head, whereby these members are partially assembled around the article with the folded inner tabs of the respective members in overlapping relation and defining a central polygonal opening substantially larger than the polygonal openings defined by the unfolded tabs. The apparatus also comprises a rotary table for supporting this partial assembly of sheet-like members around the article and to which the partial assembly may be transferred from the previously described support. An outer tab-folding station and a tape applicator station are located in adjacent relation opposite the peripheral portion of the table, and a hub on the table is engageable closely in the enlarged polygonal opening in the partial assembly to locate it on the table in relation to these stations. Means are provided for driving the table in the direction to move the outer tabs of the partial assembly first through the folding station and then through the tape applicator station, whereby the tape forming the periphery of the carton is applied to the outer tabs when each pair of opposed outer tabs on the respective members have been folded towards each other substantially perpendicularly to the planes of the members by passage through the folding station.

In the preferred form of the apparatus for folding the inner tabs of the sheet-like members, a polygonal locating hub is adapted to fit closely in the polygonal openings defined by these inner tabs before they are folded, this hub being in a fixed angular position relative to the folding elements for the inner tabs of the lower member and relative to the folding means for the inner tabs of the upper member. Thus, by placing the sheet-like members on the table so that the polygonal hub fits into the polygonal holes formed by the unfolded inner tabs, the assembly is automatically positioned for engagement of the inner tabs by the respective folding elements for the lower tabs and the respective folding means for the upper tabs. The locating hub may be mounted for movement through the supporting opening, thereby permitting retraction of the hub to a position below the support to facilitate removal of the carton members and annular article from the support when the inner tab-forming operations are completed, and permitting advance of the hub to a position above the support where it can locate and hold the sheet-like members in the proper angular positions for the inner tab-folding operations. The folding elements for the inner tabs of the lower sheet-like member are arranged to surround the locating hub and to move upwardly through the support opening independently of the locating hub. The pressing and tab-folding means operable on the upper sheet-like member preferably comprise a yielding presser plate carried by the first head and engageable with the upper sheet-like member around its central polygonal opening, this plate being yieldable relative to the first head upon advance movement thereof toward the support when the sheet-like members and annular article are compacted between the support and the presser plate, such means also including fingers pivotally mounted on the first head and having parts engageable with the presser plate to swing the fingers outwardly against the inner tabs of the upper sheet-like member in response to this advance movement of the first head.