This invention relates in general to a device for covering the open mouth of a container and more particularly to an apparatus which, after placing a sheet of material over the open end or mouth of a container having a lip thereon, folds the material about and beneath the lip without interrupting the movement of the container through the apparatus.

It is conventional in this art to place mient and one or more vegetables in a compartmented aluminum tray, apply a sheet of aluminum foil to the top of the tray and fold the aluminum foil about the periphery of the tray, the various steps being performed either by machine or manually.

It is an object of this invention to provide an apparatus adapted for folding a flexible, non-ribbed material about the lip of a container and tucking such material beneath the lip.

It is a further object of this invention to provide an apparatus which is capable of sequentially placing a sheet of material over the open mouth of each of a series of containers, such as aluminum trays, spaced upon a conveyor belt, and which thereafter folds portions of the sheet about trailing and leading lips of the spaced containers.

Still another object of this invention is to provide a device especially adapted for applying foil to an open container having a lip about the mouth thereof, such as an aluminum tray, and folding the foil about and beneath the portions of the lip at either end of the container and also folding the foil about and beneath the portions of the lip on either side of the container.

Ancillary objects and advantages of this invention, if not specifically set forth, will become apparent during the course of the description which follows.

In the drawings:

Figure 1 is a schematic representation of the device of this invention; and Figures 2-6 are schematic views showing the mode of operation of the roller, cam and tucking bar shown in Figure 1.

Figure 7 is an enlarged side-elevational view showing the means by which foil is tucked beneath the tray edges by the action of cooperating belts and rollers.

Figure 8 is an enlarged, fragmentary, bottom plan view of the tray and certain of the rollers and associated belt taken on the line 8--8 of Figure 7, showing the means by which the foil is tucked and folded beneath the tray.

Figures 9-13 are fragmentary sectional views on lines 9--9, 10--10, 11--11, 12--12 and 13--13, respectively, of Figure 7, showing in schematic form the mode of operation of belt 46.

Generally, this invention comprises a machine for applying a flexible, non-ribbed covering material to the open top of a container having a lip on at least one end thereof, and thereafter folding the covering material beneath that lip. The machine incorporates means for placing a sheet of the covering material over the container in a position such that a small skirt of the covering material extends beyond all container lips, which skirts are of a size suitable for subsequent folding beneath the lips. Also involved are means for conveying containers at spaced intervals from the station wherein the flexible, non-ribbed material is applied to the containers to a second station wherein the folding and tucking bar is positioned. The action of the folding and tucking bar is so synchronized with the movement of the containers therebeneath that the bar will depress the skirt of flexible, non-ribbed material and thereafter tuck it up beneath the container lip.

Referring now to the drawings, each like character refers to like parts throughout, there is seen a structure which is in large part conventional, and hence may be represented schematically. A suitable conveyor, not shown, advances aluminum trays 10, conveniently formed of 012" aluminum sheets and having a 1/4" lip about the periphery thereof. The trays are suitably spaced for reasons which will be apparent immediately hereinafter.

Rollers 11 and 12 support and drive spaced parallel belts 13 bearing upright fingers 14. Drive means for the rollers 11 and 12, not shown, cause them to turn at a speed such as to allow the fingers 14 to be moved sequentially into the mechanism at a speed corresponding to that at which aluminum foil is supplied for covering the open tops of the trays. Foil (conveniently 001" pure aluminum) is supplied from a roll 15 and passes over idler roller 16, about a dancing roll 17 and thereafter about another idler 18. The foil is pulled from the supply roll by pull rolls 20 and fed to roller 22 having a knife 24 thereon which cooperates with stationary block 25 to cut the foil into pieces about 1/4" larger, both in length and width, than each tray 16, so that, in position, the foil will extend beyond the peripheral lip for a distance of about 1/4" on each side thereof. Rollers 26 and 28, each the width of the foil, cooperate to support narrow belt 30 at one end thereof, the opposite end of the belt being supported by the narrow pulley 32. Pulley 32 must be sufficiently narrow and so placed that it will contact only the underside of the longitudinal lip of each tray 10. The belt 30 passes, as can be seen, between roller 28 and roller 34 which, with its cooperating roller 36, supports the foil hold-down belt 38. It will be observed that since the belt 30 follows an oblique angle path and since the foil passes between one surface of belt 30 and hold-down belt 38 it becomes reoriented in such a fashion that it is passed directly over the tray moving beneath roller 34. The tray, now having the foil positioned thereon, passes beneath roller 42, which is sized and synchronized so that a tucking bar, shown in greater detail in Figures 2-6, is presented to the space between adjacent aluminum trays as the row of trays passes therebeneath. The tucking bar folds the foil skirt over and beneath the trailing lip of the forward-most tray and immediately thereafter folds the foil skirt beneath the leading lip of the next tray. Thereafter, the tray passes beneath roller 44, which serves as a partial support for side skirt folding belts 46. Their opposite ends are supported by pulleys 48 each having a V-shaped groove therein for retaining the belts in position. As a given tray moves forward, and the belts strike the longitudinal edges, turning the skirts over and folding them downwardly and beneath the tray lips. Belts 46 are preferably circular in cross section (conveniently about 1/4"), since round belts, when twisted to form a figure 8, as shown, continuously turn over so as to roll the foil into the proper position, thus serving far more satisfactorily than flat belts.

Pulleys 48, sufficiently narrow to fit snugly beneath the side lips of the trays without contacting the main receptacle portions of the trays.

Figures 7-13 show the method of operation of belts...
and particularly the manner in which they fold the foil beneath the lip of the tray 10. Figures 9–13 are progressive sectional views taken from one end of the advancing tray showing various stages in the folding operation.

Preliminary crimp rolls 50 cooperate with roll 44 to assure a proper fold at the corners. The smaller crimp rolls 52 are provided in pairs and serve to complete the longitudinal edges of the package. The tray having a width of 54 emerges from the conveyer belt 56, which is advanced at the appropriate speed by drive rollers 58 and 60, in turn driven by a prime mover, not shown.

Attention is directed to Figures 2–6, wherein the roller 42 and its associated mechanism is shown in greater detail. The roller is mounted about axis 62 and may be driven in any convenient fashion, as by suitable gearing, not shown. The frictional engagement of the periphery of the roller with the upper surface of the tray being wrapped is not ordinarily sufficient to drive the roller. Also mounted about axis 62 is the stationary cam 64, Pivotedly secured to one end of the roller at point 66 is the L-shaped first class lever 68, having a cam follower 69 at one end thereof and an arc-shaped (in cross section) folding and tucking bar 70 secured at the other end thereof. The bar is of a length at least equivalent to lateral expansion of the tray lip. It is being wrapped and bent as shown in Figure 4, of a width in excess of the distance between the trays moving on conveyer 56. Cam 64 has two lobes 72 and 74 one of which serves to tilt the folding and tucking bar shown in Figure 2 so that it will pass beneath the trailing lip of one tray and thereupon rotate the bar so as to fold and tuck, and the second of which serves to withdraw the bar quickly, as shown in Figure 6, from the path of the oncoming tray on completion of the folding and tucking operation.

The roller, cam and lever, together with the accompanying folding and tucking bar are automatically timed by the action of the endless conveyer belt 56 and if the circumference of the roller corresponds to the distance between a leading edge of one tray and a leading edge of the next, allowing for the proper spacing, the operation of the structure must necessarily be as follows:

As shown in Figure 2, the first tray 10a of a pair passes beneath the roller and is gripped by the exposed surface of the roller and the endless belt 56 so as to press the foil tightly upon the top of the tray while holding both securely. As shown in Figure 2, the next tray in line, 10b, is spaced and the action of the cam 72 will be to rotate the folding and tucking bar 70 at a moderate angle and thereafter allow it to pass beneath the trailing lip of leading tray 10a, as shown in Figure 3, simultaneously forcing the aluminum foil skirts of trays 10a and 10b downwardly. As shown in Figure 4, the cam lobe 73 then allows the tucking bar 70 to be reoriented so that it drops entirely beneath the lip of the tray, and, as shown in Figure 5, the oncoming tray 10b moves directly against the trailing edge of the tucking bar, which action folds and tucks the skirt beneath the lip of the tray. Lobe 74, as shown in Figure 6, causes a rapid counterwise pivoting action of the folding and tucking bar so as to withdraw it from the path of tray 10b so that the latter may pass without further impediment.

While this invention has been described as particularly suitable for folding "dead" materials such as foil, it would be possible to use the same structure in applying paper to a preformed container having lips beneath which had been applied adhesive to which the folded skirts would stick.

Also, the device could be used to apply sheets of laminated material composed of foil and paper or it would be possible to use it for applying a heat sealable covering material, in which case the folding and tucking bar would be provided with means for heat sealing the leading and trailing skirts of heat sealable material to the underside of the tray lip. In the event of selection of this structural variation, it would be convenient to construct crimp rolls 52 so they might be heated, thus to serve as means for simultaneously crimping and heat sealing the skirts of covering material at the sides of each package.

While, in the foregoing description, the trays have been depicted with their long dimensions parallel to the belt movement, it is obvious that the trays could be rotated 90° so that their longer dimension would traverse the actuating apparatus supporting the tray. It is further possible that the machine be somewhat wider than shown here but would allow a greater throughput for a given machine speed.

Because of the possibility of reorienting the trays in this fashion, it is to be understood that such phrases as "longitudinal edge" and "width of the container" intended to refer respectively to the edge of the tray which parallels the conveyer belt movement and to the edge which lies across the conveyer belt; these phrases do not necessarily designate which dimension of the tray is the greater one.

Substantial modifications in the structure, such as the provision of a larger roller 42 having a plurality of folding and tucking bars pivoted at points therealong, the arc between bars being of a length equivalent to the distance from the leading edge of the next would, of course, be possible, though not particularly advantageous.

Obviating the necessity of tucking the lip of the tray, it may be made without departing from the spirit and scope of this invention, and therefore only such limitations should be imposed as are indicated in the appended claims.

We claim:

1. A machine for applying a sheet of flexible covering material to the open top of a container having a lip along at least one end thereof and thereafter folding the covering material over and beneath said lip comprising: means for placing a sheet of said covering material over the said container top with a skirt of covering material extending beyond said container lip; and means for conveying in a linear path at spaced intervals containers having the said covering material thereon; a pivoted lever arm mounted for circular movement about an axis positioned above and traversing said path, said arm having a tucking and folding bar on one end thereof and a cam follower on the other end thereof; and a cam fixedly mounted coaxially with said axis to permit said follower to ride thereon, said cam having a lobe so oriented that the movement of the said follower thereon causes the tucking and folding bar to swing downwardly beneath the end of said container lip so as to depress the said skirt of said flexible material and thereafter to fold said skirt beneath the said container lip.

2. A machine for applying a sheet of flexible covering material to the open top of a container having a lip along at least one end thereof and thereafter folding the covering material beneath said lip comprising: means for placing a sheet of said covering material over the said container top with a skirt of said covering material extending beyond said container lip; and means for conveying in a linear path at spaced intervals containers having the said covering material thereon with said skirt trailing; a cylinder rotatably mounted above and traversing said path and extending the entire width of the containers passing therebetween, said cylinder being so positioned that the said containers contact the said cylinder when being conveyed therebeneath; a lever arm pivoted at one side of said cylinder, said arm having a tucking and folding bar on one end thereof and a cam fixedly mounted coaxially with said cylinder to permit said follower to ride thereon, said cam having a lobe so oriented that the movement of the said follower thereon causes the tucking and folding bar to swing downwardly beneath the trailing end of the said container lip so as to depress the said skirt of said flexible material and thereafter to fold said skirt beneath the said container lip.
3. A machine for applying a sheet of flexible covering material to the open top of a container having a lip at either end thereof and thereafter folding the covering material beneath each of said lips comprising: means for placing a sheet of said covering material over the said container top with a skirt of covering material extending beyond each of said container lips; means for conveying in a linear path at spaced intervals containers having the said covering material thereon with the skirts preceding and following the container; a cylinder rotatably mounted above and traversing said path and extending the entire width of the said container, said cylinder being so positioned that the said container contacts the said cylinder when conveyed therebeneath; a pivoted lever arm mounted on one end of said cylinder, said lever arm having a tucking and folding bar on one end thereof and a cam follower on the other end thereof; and a cam fixedly mounted coaxially with said axis to permit said follower to ride thereon, said cam having a lobe so oriented that the movement of said follower thereover causes the tucking and folding bar to swing downwardly beneath the trailing end of one container and in front of the leading end of the second container whereby to depress substantially simultaneously the said skirts on the said opposite ends of the said two containers, said lobe causing said follower to thereafter fold the said skirt on the said trailing end of the said second container beneath the said container lip and thereafter force the said skirt on the said leading edge of the said second container beneath the leading container lip, the said cam having a second lobe thereon immediately following said first lobe so oriented that the movement of said follower over the second lobe causes the tucking and folding bar to swing rapidly from between the said containers whereby to allow for the unimpeded passage of the second container, the circumference of the said cylinder being equivalent to the distance between the leading end of one tray and the leading end of the tray following immediately thereafter.

4. A machine for applying a sheet of flexible covering material to the open top of a container having a lip along at least one end thereof and a lip along at least one longitudinal edge thereof and thereafter folding the covering material over and beneath said lips comprising: means for placing a sheet of said covering material over the said container top with a skirt of covering material extending beyond said container lips; means for conveying in a linear path at spaced intervals containers having the said covering material thereon; a pivoted lever arm mounted for circular movement about an axis positioned above and traversing said path, said arm having a tucking and folding bar on one end thereof and a cam follower on the other end thereof; a cam fixedly mounted coaxially with said axis to permit said follower to ride thereon, said cam having a lobe so oriented that the movement of said follower thereover causes the tucking and folding bar to swing downwardly beneath the end of the said container whereby to depress the said skirt of said flexible material and thereafter to fold said skirt beneath said container lip; a pair of pulleys mounted with the axes thereof perpendicular to said path, each of said pulleys being mounted adjacent one side of said path, the first of said pulleys being mounted slightly above said path and above the second of said pulleys and the second of said pulleys being mounted slightly below the level of a lip of a container passing along said linear path; and a belt having a round cross section mounted about said pulleys, said round belt passing sufficiently close to the said longitudinal edge of said container having a skirt of covering material extending therefrom to fold and tuck said skirt of covering material over and beneath the said lip of said longitudinal edge.

5. A machine for applying a sheet of flexible covering material to the open top of a container having a lip along at least one longitudinal edge thereof and thereafter folding the covering material over and beneath said lip comprising: means for placing a sheet of said covering material over the said container top with a skirt of covering material extending beyond said container lip; means for conveying in a linear path the container having the said covering material thereon with the said skirt extending in the same direction as the path of movement and along one edge of said container; a pair of pulleys positioned immediately adjacent said linear path, the first of said pulleys being positioned slightly above said path and above the second of said pulleys and the second of said pulleys being mounted slightly below the level of the lip of a container passing along the said linear path; a belt round in cross section joining said pulleys, the said belt being twisted in the middle whereby to form a figure 8, said round belt passing sufficiently close to the said longitudinal edge of said container having a skirt of covering material extending therefrom to fold said skirt of covering material over the said lip of said longitudinal edge.

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