

Jan. 13, 1953

R. H. ROBERTSON
ARTICLE WRAPPING DEVICE

2,624,993

Filed April 27, 1949

5 Sheets-Sheet 1

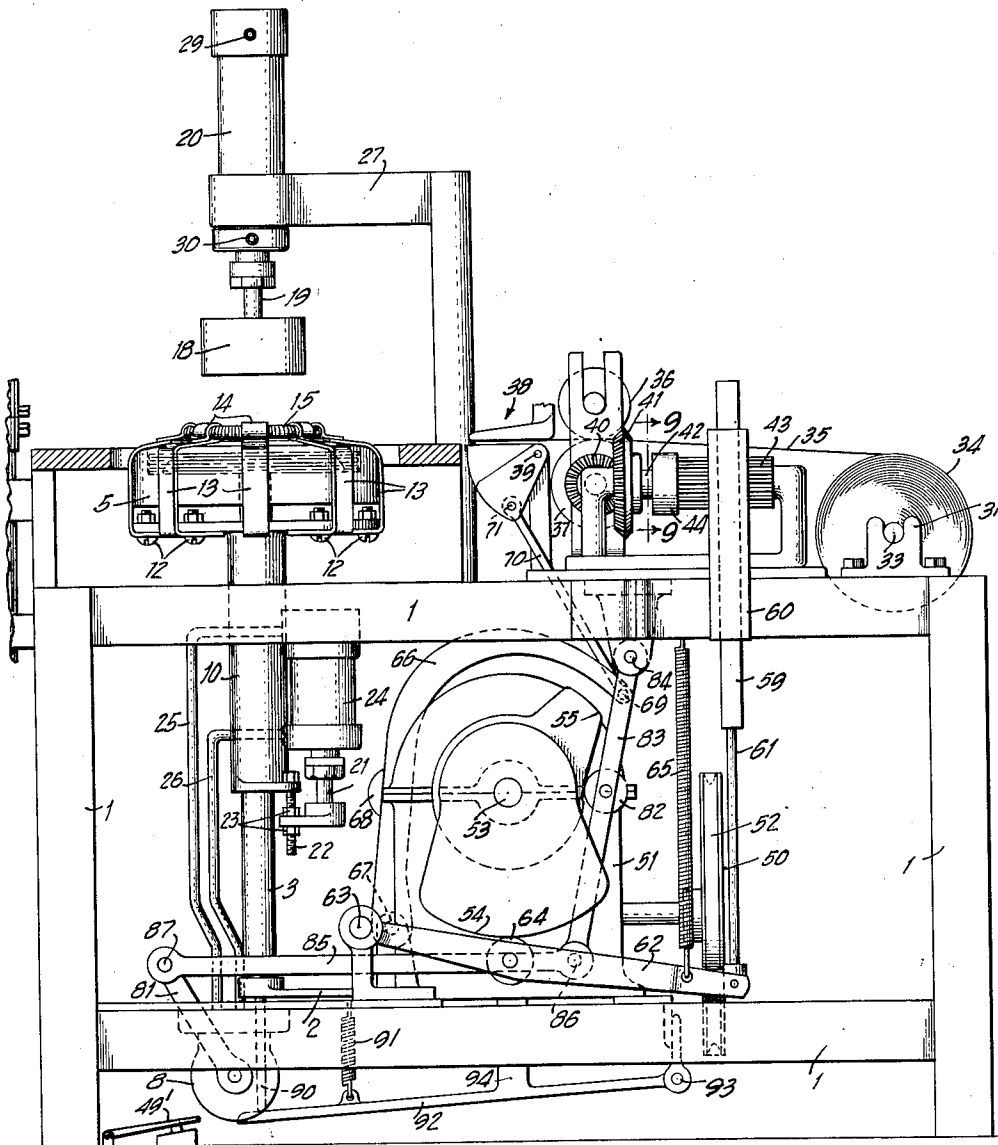


FIG. 1

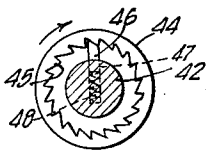


FIG. 9

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5 Sheets-Sheet 2

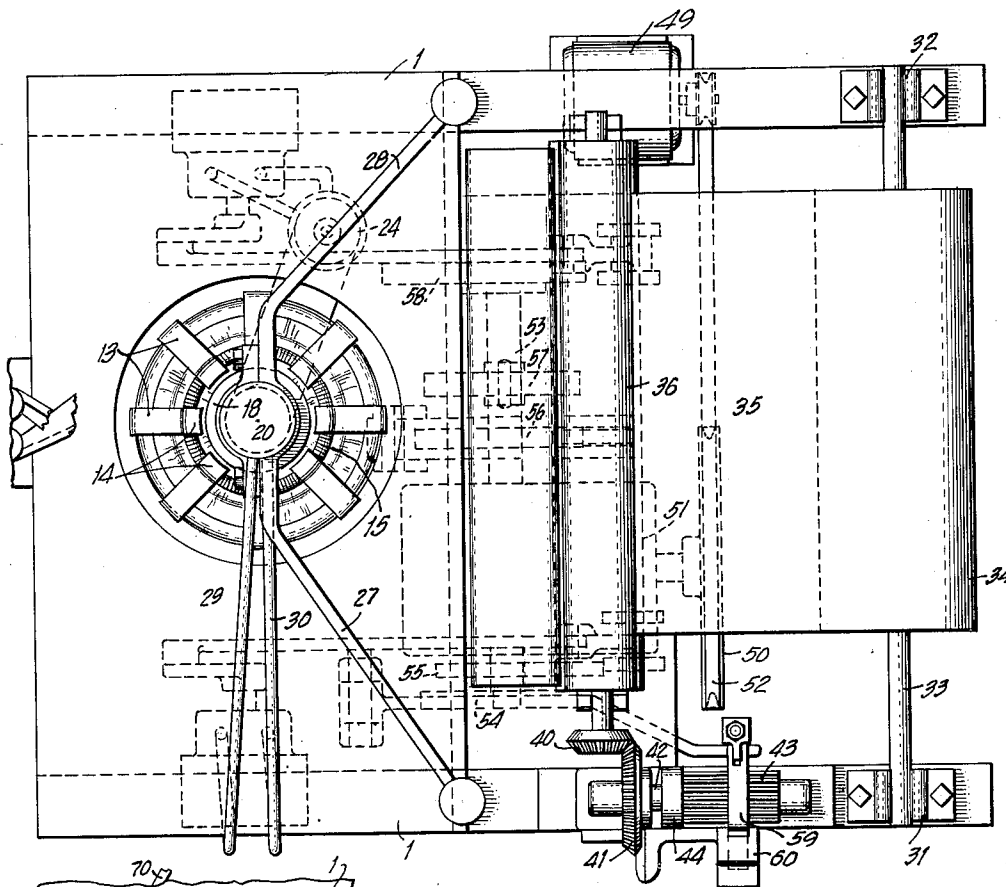


FIG. 2

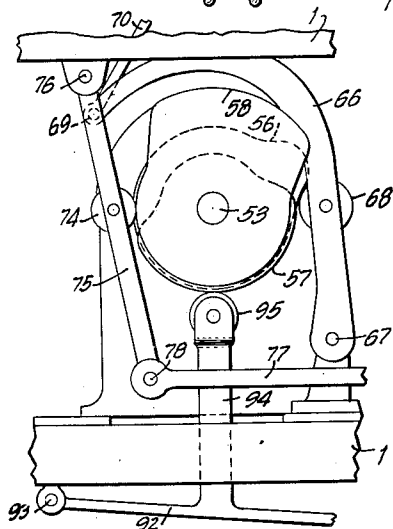


FIG. 3

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5 Sheets-Sheet 3

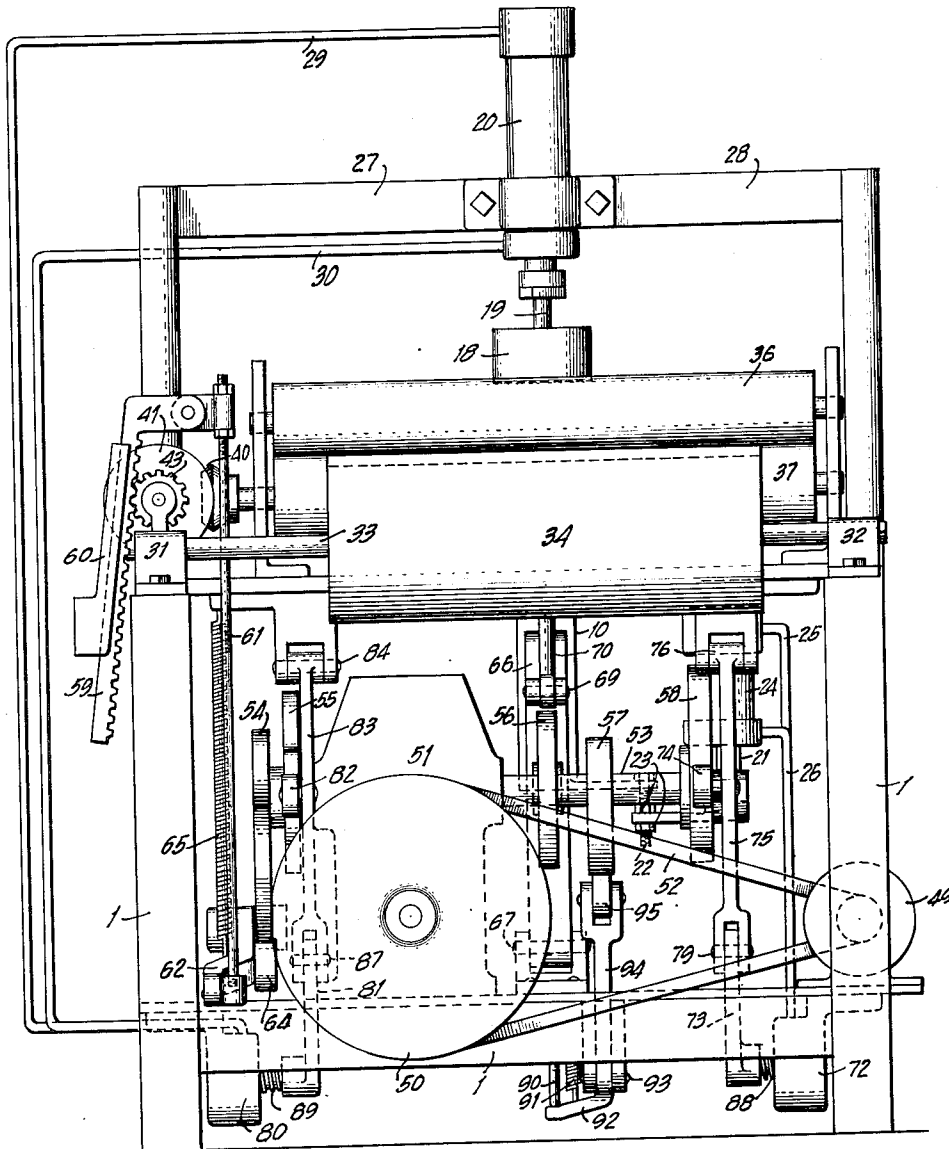


FIG. 4

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5 Sheets-Sheet 4

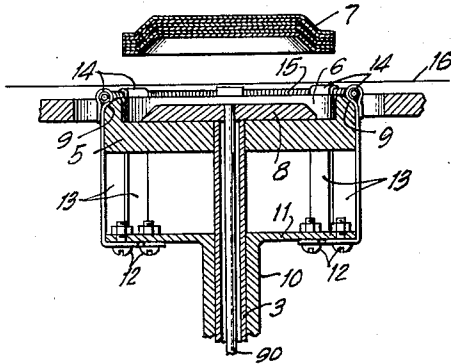


FIG. 5

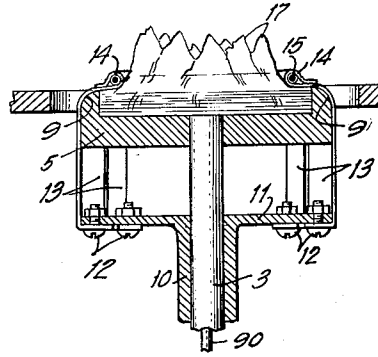


FIG. 6

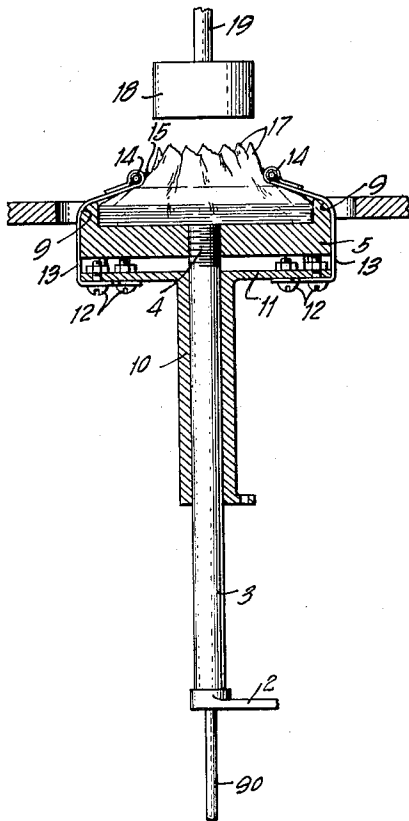


FIG. 7

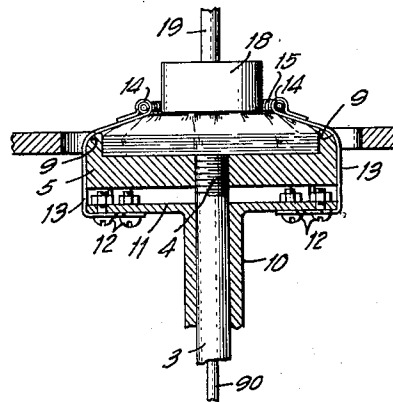


FIG. 8

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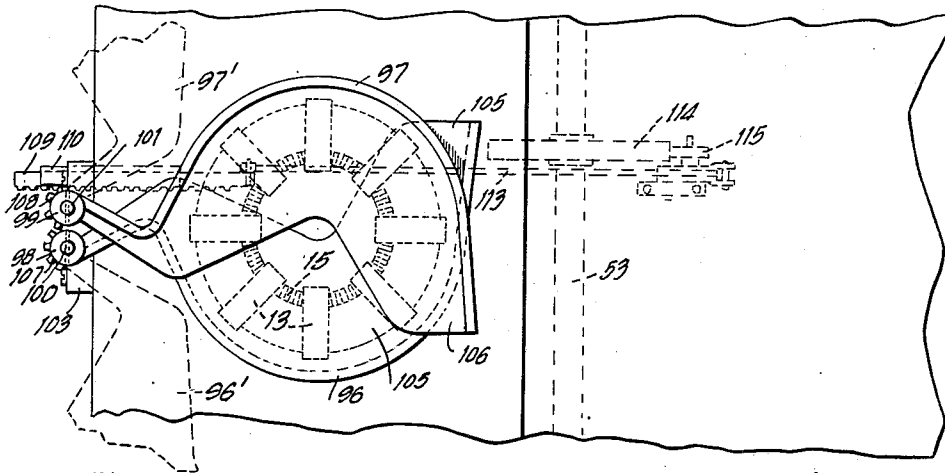


FIG. 11

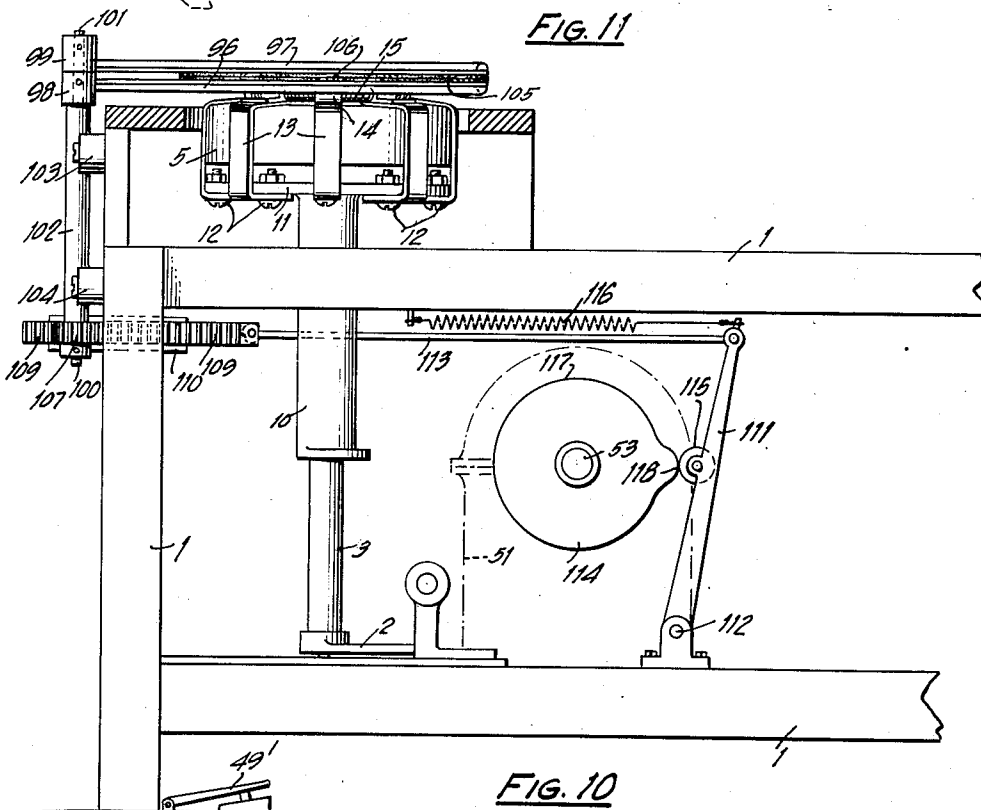


FIG. 10

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UNITED STATES PATENT OFFICE

2,624,993

ARTICLE WRAPPING DEVICE

Robert H. Robertson, Orono, Maine, assignor of
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Application April 27, 1949, Serial No. 89,853

15 Claims. (Cl. 53—127)

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My invention relates to packaging devices and particularly to a device for enclosing one or more articles such, for example, as a plurality of nested paper plates, dishes, or other items in a sheet of wrapping material.

Paper plates or dishes adapted to hold food must be kept clean until they are put in use and, therefore, it is customary to merchandise a number of these plates nested together and completely enclosed in a transparent wrapper, such as cellophane. These plates or dishes must be sold at a comparatively low price and, accordingly, any saving which can be effected either in the manufacture or the packaging thereof is very important. The cost of wrapping such plates or dishes entirely by hand is comparatively high, and the principal object of my invention is to provide a machine by means of which such plates, or other articles, may be completely enclosed and sealed in a suitable wrapper, or, partially enclosed, and thereafter completely enclosed and sealed by an operator.

I accomplish this object by means of the novel combination of elements described below and illustrated in the accompanying drawing in which—

Fig. 1 is a side elevation view of my device;

Fig. 2 is a plan view thereof;

Fig. 3 is a fragmentary, side elevation showing some of the mechanism as viewed from the side opposite the side shown in Fig. 1;

Fig. 4 is a rear view of the machine; the rear end of the machine being at the right, as viewed in Figs. 1 and 2;

Figs. 5, 6, 7 and 8 are fragmentary views of the machine illustrating the action of the packaging mechanism;

Fig. 9 is an enlarged section of Fig. 1 in the plane 9—9;

Fig. 10 is a fragmentary side elevation of the machine illustrating the application thereto of gathering arms for arranging and flattening the wrapping material after it has been pushed upwardly around the articles to be wrapped and before the sealing plunger descends; and

Fig. 11 is a side elevation view of the parts shown in Fig. 10.

Referring to the drawings—

My device comprises a frame 1 which carries all of the mechanism. Supported on the frame 1 by means of a bracket 2 is a vertically-disposed, tubular element 3 which may be threaded at the top, as shown at 4 in Figs. 7 and 8, to support an outer form 5 thereon, although it is to be understood that the form 5 may be secured to

the element 3 by any other suitable means. Where the plates, dishes or other articles to be wrapped are circular, the form 5 is cylindrical and has a cylindrical recess 6 in the top thereof adapted to receive the nested plates 7 (see Fig. 5). In the bottom of the recess is an inner form comprising a raised portion 8 over which the lowermost dish in the nest is adapted to fit, and which is adapted to prevent crushing of the plates when pressure is applied to the top thereof. The outer peripheral edge at the top of the outer form is rounded, as shown at 9.

Slidably mounted on the tubular element 3 is a sleeve 10 carrying a circular flange 11 at the top thereof which is preferably of about the same diameter as the outside of form 5. Secured to the flange 11 by means of bolts 12 is a plurality of vertically-extending, equidistantly-spaced, flexible straps 13 having loops 14 in the upper ends thereof through which an inherently contractible element, here shown as an annular, helical spring 15, extends. As shown in Fig. 5, the spring 15 is in the expanded condition; it is partially contracted in Fig. 6; and further contracted in Figs. 1, 2, 7 and 8.

It will be apparent by reference particularly to Figs. 5, 6, 7 and 8 that, when the straps 13 are pulled downwardly, as shown in Fig. 5, the spring 15 will be fully expanded and will lie on top of the form 5 around the entrance to the recess 6. However, when the downward pull on the straps 13 is relieved by sliding the flange 11 of sleeve 10 upwardly on the tubular element 3, the spring 15 will contract, as shown in Figs. 6, 7 and 8, and pull the straps radially inwardly towards the axis of the form.

Thus, it will be apparent that, if a sheet of wrapping material 16, such as cellophane, is laid over the top of the form, as shown in Fig. 5, and the nested plates 7 are then pushed down into the recess 6 with the cellophane therebetween, the upper edge of the recess will engage the marginal portions of the sheet 16 around the edges of the nested plates 7 and turn these portions of the sheet upwardly, as shown at 17 in Fig. 6. If the sleeve 10 carrying flange 11, which is slidably mounted on the tubular element 3, is then raised, as shown in Figs. 6 and 7, the loops 14 on the upper ends of the straps 13 will function as fingers and, together with the portions of the spring between the loops 14, serve to push the upturned portions 17 of the sheet 16 inwardly over the bottom of the topmost plate in the nest, as shown in Figs. 6 and 7.

In order completely to enclose the nested plates

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in sheet 16, a plunger 18, which is preferably heated by an electrical, resistance heating element (not shown), is mounted on the piston rod 19 (see Figs. 1 and 4) of a compressed air cylinder 20 which is to be understood as having a piston therein which can be moved up and down by compressed air acting on the bottom and top thereof, respectively. The application of heat and pressure to the upturned portions 17 of the sheet 16 folds these portions together against the bottom of the topmost plate, as shown in Fig. 8, and, if cellophane is employed as a wrapper, the down-pressed portions of the wrapper will adhere together so that the plates will be completely enclosed in the wrapper.

Referring now more particularly to Figs. 1, 2 and 4 of the drawings, it will be apparent that the sleeve 10, which is slidably mounted on the tube 3, is adjustably connected to the piston rod 21 of a compressed air cylinder 24 by means of the bolt 22 and nuts 23. The piston rod 21 is to be understood as connected to a piston (not shown) in the compressed air cylinder 24 so that by admitting air into the upper part of the cylinder 24 above the piston therein, the piston and piston rod 21 will be forced downwardly thus pulling the straps 13 downwardly and pulling the spring 15 into expanded position. Compressed air is admitted to and exhausted from the cylinder 24 above the piston through the pipe 25; and is admitted to and exhausted from the cylinder 24 below the piston through the pipe 26.

The compressed air cylinder 20 from which the plunger 13 depends is supported on the frame by means of the bracket members 27 and 28 and air is admitted to and exhausted from the top of the cylinder 20 above the piston therein through the pipe 29; and is admitted to and exhausted from the bottom of the cylinder 20 below the piston through the pipe 30.

Supported in bearings 31 and 32 on the top of the frame is a transversely-extending shaft 33 carrying a roll 34 of wrapping material, such as cellophane. The web 35 of wrapping material is carried between the pinch of rolls 36 and 37 and through a shear, represented generally at 38, one blade of which is pivotally connected to a standard on the frame at 39 so that the cutting edge may move upwardly and downwardly to sever a sheet 16 of the proper size for wrapping the plates from the main web 35 of wrapping material.

In order to feed the wrapping material to the wrapping mechanism, the roll 37 has a bevel gear 40 mounted on the end of the shaft thereof which meshes with a bevel gear 41 mounted on a shaft 42. Rotatably mounted on the shaft 42 is a spur gear 43 having, in the end 44 thereof, an internal ratchet gear 45 (see Fig. 9). A pawl 46 which is slidably mounted in the slot 47 in shaft 42 is normally held in engagement with the teeth of the ratchet gear 45 by means of a spring 48. Thus, it will be apparent that, when the spur gear 43 is turned in the direction of the arrow, shown in Fig. 9, the shaft 42, the gears 40 and 41, and the roll 37 will be turned, and the web 35 of wrapping material will be drawn from the roll 34. However, when the spur gear 43 is turned in the opposite direction to the arrow shown in Fig. 9, the pawl 46 will merely slip past the teeth of the ratchet gear 45 and neither shaft 42, gears 40 and 41, nor roll 37 will be turned.

In order to operate the mechanism, a motor 49, controlled by a foot switch 49' placed in any convenient location, is provided which drives the pulley 50 on the speed reducing mechanism 51 75

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(see Fig. 4) through a V belt 52; and the main drive shaft 53 of the device is driven through the speed reducing mechanism 51. Mounted on the shaft 53 are cams 54, 55, 56, 57 and 58 which cooperate with followers and levers, described below, to actuate the various elements of the machine.

Thus, the spur gear 43, which actuates the web feeding mechanism, is driven by the rack 59 (see Fig. 4) which cooperates therewith. The rack 59 slides in a guide 60, which holds it in mesh with the gear 43, and is moved downwardly by means of the rod 61 (see Figs. 1 and 4) connected to the lever 62 which is pivoted to the frame at 63 and carries the follower roller 64 normally held in contact with the cam 54 by means of the spring 65. The spring 65 also functions to return the rack 59 to its raised position after the roller 64 passes the raised dwell of cam 54. The length of the sheet of wrapping material which is pushed over the wrapping mechanism is governed by the length of travel of the rack 59 which, in turn, is controlled by the shape of the cam 54.

After the rack 59 completes its downward stroke, the rocker arm 66, which is pivoted to the frame at 67, is pushed forward by the action of the cam 56 on the roller follower 68 (see Figs. 3 and 4). Pivoted at 69, to the free end of the curved rocker arm 66, is the rod 70 which is also pivoted to the movable element of the shear 38 at 71. This movement of the rocker arm 66 by cam 56 actuates the shear 38 to cut a sheet of wrapping material of the proper length from the web 35.

With the sheet 16 of wrapping material overlying the wrapping mechanism, as shown in Fig. 5, the nested plates 7 are pushed down into form 5 carrying with them the portion of the sheet 16 which lies beneath them; the marginal portions of the sheet 16 being automatically upturned by the inner peripheral edge of the form 5. The upturned portions of the wrapping sheet are now in position to be pushed inwardly over the bottom of the topmost plate by the contraction of the spring 15.

The automatic contraction of spring 15 is accomplished by sliding the sleeve 10, carrying the flange 11 thereon, upwardly along the tubular element 3 and towards the bottom of the form 5, as shown in Figs. 6, 7 and 8. This upward movement of the flange 11 allows the straps 13 which are attached thereto to be pulled inwardly over the bottom of the topmost plate by the contraction of the spring 15, and the up and down movements of the sleeve 10 and flange 11 are controlled by a valve 72 (see Fig. 4) which, in turn, controls the flow of air through the pipes 25 and 26 communicating with cylinder 24. The movements of the valve handle 73 are timed, and effected by the cooperation of cam 58 with the roller follower 74 on lever 75 which, in turn, is pivoted to the frame at 76. The free end of the lever 75 is pivotally connected to the lever 77 at 78, and the lever 77 is pivotally connected to the valve handle 73 at 79 (see Figs. 3 and 4). Cam 58 is so shaped and keyed to the main shaft 53 that sleeve 10 carrying flange 11 is raised shortly after the sheet of cellophane is cut off and the nested plates have been pressed into the form, and lowered immediately after the sealing plunger 18 is raised. The time interval between the operation of the shear and the raising of the flange 11 gives the operator an opportunity to place the plates to be wrapped in the form as described above.

After the spring 15 has pushed the wrapping

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material over the bottom of the topmost plate, the sealing plunger 18 descends and presses and folds the upturned portions 17 of the wrapping sheet shown in Figs. 6 and 7 downwardly against the bottom of the nested plates, as shown in Fig. 8.

The movements of the plunger 18 are controlled by the admission to and exhaust from, the air cylinder 20, of compressed air. The flow of compressed air to and from the cylinder 20 through the pipes 29 and 30 is controlled by the valve 80 (see Figs. 1 and 4) having the operating handle or crank 81 thereon similar to the crank 73 on valve 72. The operation of the valve 80 is controlled by the cam 55 on main shaft 53 which cooperates with a roller follower 82 rotatably mounted on the lever 83 pivoted to the frame at 84. The free end of the lever 83 is pivoted to the lever 85 at 86, and the other end of the lever 85 is pivoted to the crank 81 at 87.

The valve 72 is normally held in such a position by the torsion spring 88 (see Fig. 4), which cooperates with the crank 73, that the upper portion of the air cylinder 24 is normally in communication with the source of air supply through the pipe 25, thus normally holding the flange 11 in its downward position and the spring 15 expanded. Similarly, the valve 80 is held in such position by the torsion spring 89 which cooperates with the crank 81 that the lower portion of the air cylinder 20 is normally in communication with the source of compressed air through the pipe 30, thus normally holding the plunger 13 in raised position.

After the plunger 18 is elevated, or as it is being elevated, the wrapped plates are ejected from the form 5 by means of the ejecting rod 90 which is pulled upwardly by tension spring 91 (see Figs. 1, 3 and 4) connected to the lever 92 which is pivoted to the frame at 93. The lever 92 has an upstanding member 94 thereon which is bifurcated at the top to receive the cam follower 95 cooperating with cam 57 which normally holds the ejecting rod 91 in the downward position, as shown in Fig. 5, but allows it to rise at the proper time under the action of spring 91.

In Figs. 10 and 11, I have shown a pair of gathering arms 96 and 97 which may be used either with or without the sealing plunger 18. These arms function to gather together and flatten the upturned portions 17 of the wrapping sheet after these portions have been pushed into the position shown in Fig. 7 by the contraction of the spring 15.

The gathering arms may be formed by bending pieces of $\frac{1}{2}$ " steel tubing to the shape shown at 96 and 97 in Fig. 11 and welding hubs 98 and 99, respectively, thereto. The hubs 98 and 99 are pinned or otherwise secured to the vertical shafts 100 and 101, respectively, which are rotatably mounted in vertical tubes, one of which is shown at 102 in Fig. 10, and which are secured to the frame of the machine by brackets 103 and 104. Secured to the bent tubular arms 96 and 97 are plates 105 and 106, respectively, of rubber or other suitable sheet material of the shape shown in Fig. 11, and one of which will lie just over the other when the arms are in the closed position shown in solid outline in Fig. 11. The arms when in open position are shown in dotted outline at 96' and 97' in Fig. 11.

In order to swing the arms between their open and closed positions, the shafts 100 and 101 are provided at the bottom with intermeshing gears 107 and 108, respectively, and a slidable driving

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rack 109 mounted in a guide 110 cooperates with the gear 108.

The rack 109 is connected to lever 111, which is pivoted at 112 to the frame of the machine, by means of a rod 113. A cam 114 is fixed to the shaft 53 and cooperates with a roller follower 115 mounted on the lever 111; the roller being held in contact with the cam by means of the tension spring 116.

In operation, the gathering arms are normally held in open position by the spring 116 which holds the cam follower against the cylindrical dwell 117 on the cam. However, the raised portion 118 on the cam is positioned to move into cooperation with the roller follower just after the spring 15 has pushed the wrapping sheet over the articles being wrapped to the position shown in Fig. 7. The contact of the raised portion of the cam with the follower 115 pulls the rack to the right, as viewed in Figs. 10 and 11, and swings the arms 96 and 97 into closed position. The arms contact the upstanding portions 17 of the wrapper (see Fig. 7) just above the spring 15 and gather and flatten them together, whereupon, as the roller rides off the raised portion of the cam, the spring 116 moves the rack 109 to the left and opens the arms.

When the gathering arms are used without the sealing plunger 18, the operator can seal the pressed down portions of the wrapper by means of a gummed seal or label as soon as the arms move to open position.

It is possible, of course, to wrap the articles without using either the gathering arms or the plunger because, after the marginal portions of the wrapper are pushed into the position shown in Fig. 7, these portions can be flattened by hand and a gummed seal applied thereto to hold them in place.

While I have described my invention as a plate wrapping machine and have illustrated it in connection with a device for wrapping round plates, it will be obvious that the device is neither limited to the wrapping of plates nor to round or circular articles but may be used to wrap other articles of various shapes without departing from the true scope and spirit of my invention.

What I claim is—

1. An article wrapping device of the character described comprising means adapted to have a sheet of wrapping material laid thereover and to support the articles to be wrapped in said sheet when said articles are positioned on said supporting means with said sheet therebetween, means for automatically upturning the marginal portions of said sheet around said articles as they are placed on said supporting means with said sheet therebetween, a plurality of flexible bands circumferentially-spaced about said supporting means, resilient means cooperating with said bands for simultaneously moving the ends thereof radially inwardly to push the upturned marginal portions of said sheet inwardly and at least partially over said articles, and means for thereafter applying pressure to said inwardly pushed portions to fold them downwardly over said articles and enclose said articles in said sheet.

2. An article wrapping device comprising a form adapted to have a sheet of wrapping material laid thereover and to support the articles to be wrapped in said sheet when said articles are positioned on said form with said sheet therebetween, means for automatically upturning the marginal portions of said sheet around

said articles as they are positioned on said form with said sheet therebetween, a plurality of flexible bands circumferentially-spaced about said form, resilient means cooperating with said bands for simultaneously moving the ends thereof radially inwardly to push the upturned marginal portions of said sheet inwardly and at least partially over said articles, and means for thereafter applying heat and pressure to said inwardly pushed portions to fold them downwardly upon said articles and enclose said articles in said sheet.

3. An article wrapping device comprising a form adapted to have a sheet of wrapping material laid thereover and to support the articles to be wrapped in said sheet when said articles are positioned on said form with said sheet therebetween, means for automatically upturning the marginal portions of said sheet around said articles as they are positioned on said form with said sheet therebetween, a radially and circumferentially expansible and contractible, resilient annulus, means for maintaining said annulus normally disposed in expanded condition around said form in laterally-spaced relation thereto, means cooperating with said last mentioned means for effecting a contraction of said annulus to engage said upturned portions of said sheet around said articles and push them inwardly at least partially over said articles, and to effect a return of said annulus to its normal expanded condition, and means for applying pressure to said marginal portions of said sheet when pushed inwardly to fold them against said articles and enclose said articles in said sheet.

4. A plate wrapping device comprising a form adapted to have a sheet of wrapping material laid thereover and to support a plurality of nested plates to be wrapped in said sheet when said plates are positioned on said form with said sheet therebetween, means for automatically upturning the marginal portions of said sheet around said plates as they are positioned on said form with said sheet therebetween, a radially and circumferentially expansible and contractible, resilient annulus, means for maintaining said annulus coaxial with and normally disposed in expanded condition around said form in radially-spaced relation thereto, means cooperating with said last mentioned means for effecting a contraction of said annulus to engage said upturned portions of said sheet around said plates and push them inwardly over said plates, and to effect a return of said annulus to its normal, expanded condition, and means for applying heat and pressure to said marginal portions of said sheet when pushed inwardly to fold them against said plates and enclose said plates therein.

5. The structure set forth in claim 3 in which said annulus is a helical spring.

6. The structure set forth in claim 4 in which said annulus is a helical spring.

7. A plate wrapping device comprising a support having a recess therein of a size and depth adapted closely to hold a plurality of nested plates to be wrapped when laid flat therein; whereby, when a sheet of material in which said plates are to be wrapped is laid over said recess and said plates are thereafter pushed into said recess, the marginal portions of said sheet will be upturned above the edges of said plates; a resilient band adapted to contract to enclose an area substantially less than the surface area of one side of said plates and to be expanded to enclose an area somewhat larger than said sur-

face area, a plurality of flexible straps connected to said band at spaced points, means for normally holding said straps under tension to hold said band in expanded condition around the entrance to said recess and around the marginal portions of said sheet when upturned including means for relieving said tension to effect an infolding of the upturned portions of said sheet over said plates by the contraction of said band, and means for thereafter pressing said infolded portions together on said plates to enclose said plates in said sheet.

8. A plate wrapping device comprising a support having a recess therein of a size and depth adapted closely to hold a plurality of nested plates to be wrapped when laid flat therein; whereby, when a sheet of material in which said plates are to be wrapped is laid over said recess and said plates are thereafter pushed into said recess, the marginal portions of said sheet will be upturned above the edges of said plates; a resilient band adapted to contract to enclose an area substantially less than the surface area of one side of said plates and to be expanded to enclose an area somewhat larger than said surface area, a plurality of flexible straps connected to said band at spaced points, means for normally holding said straps under tension to hold said band in expanded condition around the entrance to said recess and around the marginal portions of said sheet when upturned including means for relieving said tension to effect an infolding of the upturned portions of said sheet over said plates by the contraction of said band, and means for thereafter applying heat and pressure to said infolded portions to force them together on said plates and enclose said plates in said sheet.

9. The structure set forth in claim 7 together with means for ejecting said plates from said recess when wrapped.

10. The structure set forth in claim 8 together with means for ejecting said plates from said recess when wrapped.

11. In a plate wrapping machine, the combination with a form having a recess therein of a size and depth adapted to receive and closely hold a plurality of nested plates to be wrapped, and to support a sheet of wrapping material overlying said recess; whereby, when said plates are placed over said sheet and pushed into said recess, the marginal portions of said sheet will be upturned around said plates; of an inherently contractible annulus, means for normally holding said annulus in non-contracted condition about the entrance to said recess and about the marginal portions of said sheet when upturned, means for releasing said holding means to effect a pushing together of said upturned portions of said sheet over said plates by the contraction of said annulus, and also for returning said annulus to and holding it in non-contracted condition, and means for pressing said pushed together portions of said sheet against said plates to enclose said plates in said sheet.

12. In a plate wrapping machine, the combination with a form having a recess therein of a size and depth adapted to receive and closely hold a plurality of nested plates to be wrapped, and to support a sheet of wrapping material overlying said recess; whereby, when said plates are placed over said sheet and pushed into said recess, the marginal portions of said sheet will be upturned around said plates; of an inherently contractible annulus, means for normally holding

said annulus in non-contracted condition about the entrance to said recess and about the marginal portions of said sheet when upturned, means for releasing said holding means to effect a pushing together of said upturned portions of said sheet over said plates by the contraction of said annulus, and also for returning said annulus to and holding it in non-contracted condition, and means for pressing said pushed together portions of said sheet against said plates and applying heat thereto to enclose said plates in said sheet.

13. An article wrapping device comprising a support adapted to have a sheet of wrapping material laid thereover and to support the articles to be wrapped in said sheet when said articles are positioned on said support with said sheet therebetween, means for automatically and successively laying sheets of wrapping material over said support, an element surrounding said support in slightly spaced relation thereto and projecting slightly above said support, whereby it is adapted to engage and upturn the marginal portions of said sheet around said articles as said articles are laid on said support with said sheet therebetween, a plurality of fingers and an annular spring cooperating therewith for pushing the upturned portions of said sheet at least partially over said articles, and means for thereafter pressing said marginal portions of said sheet downwardly together to enclose said articles therein.

14. An article wrapping device comprising means adapted to have a sheet of wrapping material laid thereover and to support the articles to be wrapped in said sheet when said articles are positioned on said means with said sheet therebetween, means for automatically and successively laying sheets of wrapping material over said supporting means, means about said supporting means and in laterally-spaced relation thereto adapted to engage said sheet adjacent said supporting means and upturn the marginal portions thereof as said articles are placed on said supporting means with said sheet therebetween, a plurality of fingers circumferentially-spaced around said supporting means and normally in laterally-spaced relation thereto, resilient annular means cooperating with said fingers for simultaneously moving them inwardly to engage the upturned marginal portions of said sheet

around said articles and push said portions inwardly towards the center portion of said articles, and means for thereafter pressing said marginal portions downwardly together to enclose said articles in said sheet.

15. An article wrapping device comprising a support adapted to have a sheet of wrapping material laid thereover and to support the articles to be wrapped in said sheet when said articles are positioned on said support with said sheet therebetween, means for supporting a roll of said wrapping material, means for automatically and successively withdrawing material from said roll and laying it over said support, means for cutting said material into wrapping sheet size when over said support, means about said support and in laterally-spaced relation thereto adapted to engage said sheet adjacent said support and upturn the marginal portions thereof as said articles are placed on said support with said sheet therebetween, a plurality of fingers circumferentially spaced around said support and normally in laterally-spaced relation thereto, resilient annular means cooperating with said fingers for simultaneously moving them inwardly to engage the upturned marginal portions of said sheet around said articles and push said portions inwardly towards the center of said articles, and means for thereafter simultaneously applying heat and pressure to said marginal portions to fold them downwardly together to enclose said articles in said sheet.

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