

July 24, 1962

W. F. STREMKE ETAL

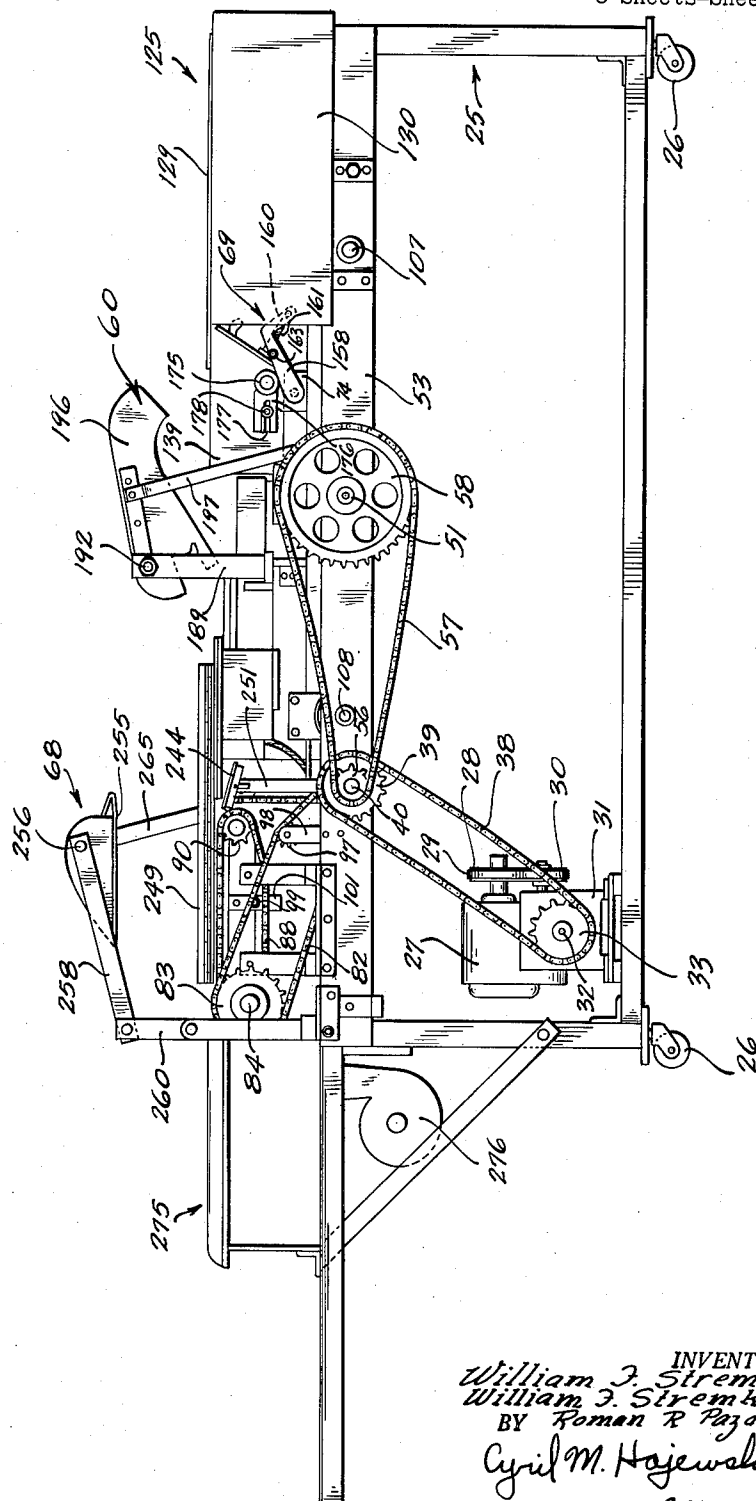
3,045,406

SEMI-AUTOMATIC WRAPPING MACHINE

Filed Jan. 27, 1958

6 Sheets-Sheet 1

Fig. 1



INVENTORS
 William J. Stremke, Jr.
 William J. Stremke, Jr.
 BY Roman R. Pazderski.
 Cyril M. Hajewski
 Attorney

July 24, 1962

W. F. STREMKE ETAL

3,045,406

SEMI-AUTOMATIC WRAPPING MACHINE

Filed Jan. 27, 1958

6 Sheets-Sheet 2

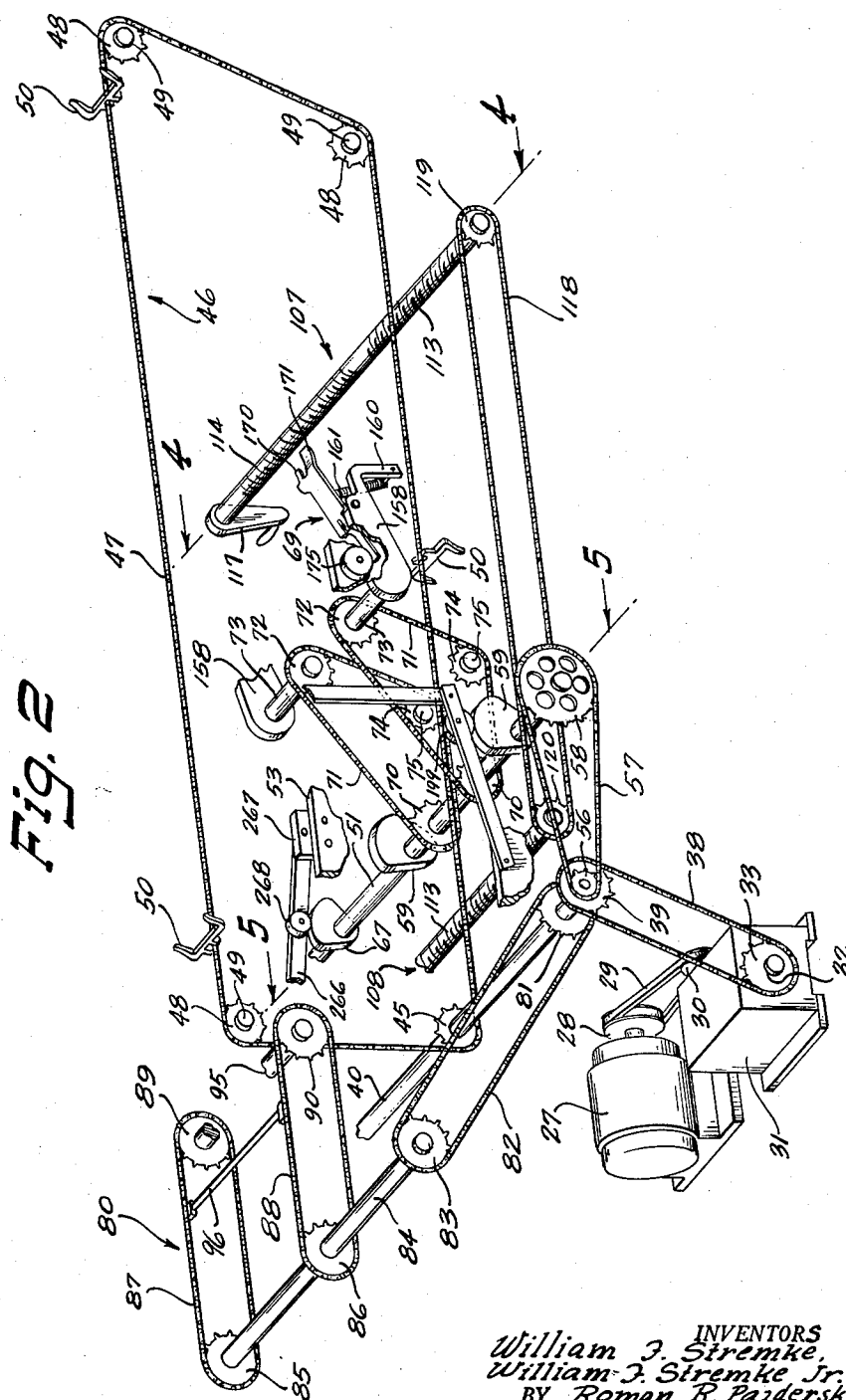


Fig. 2

INVENTORS
William J. Stremke,
William J. Stremke Jr.
BY Roman R. Pazderski
Cyril M. Hajewski
Attorney

July 24, 1962

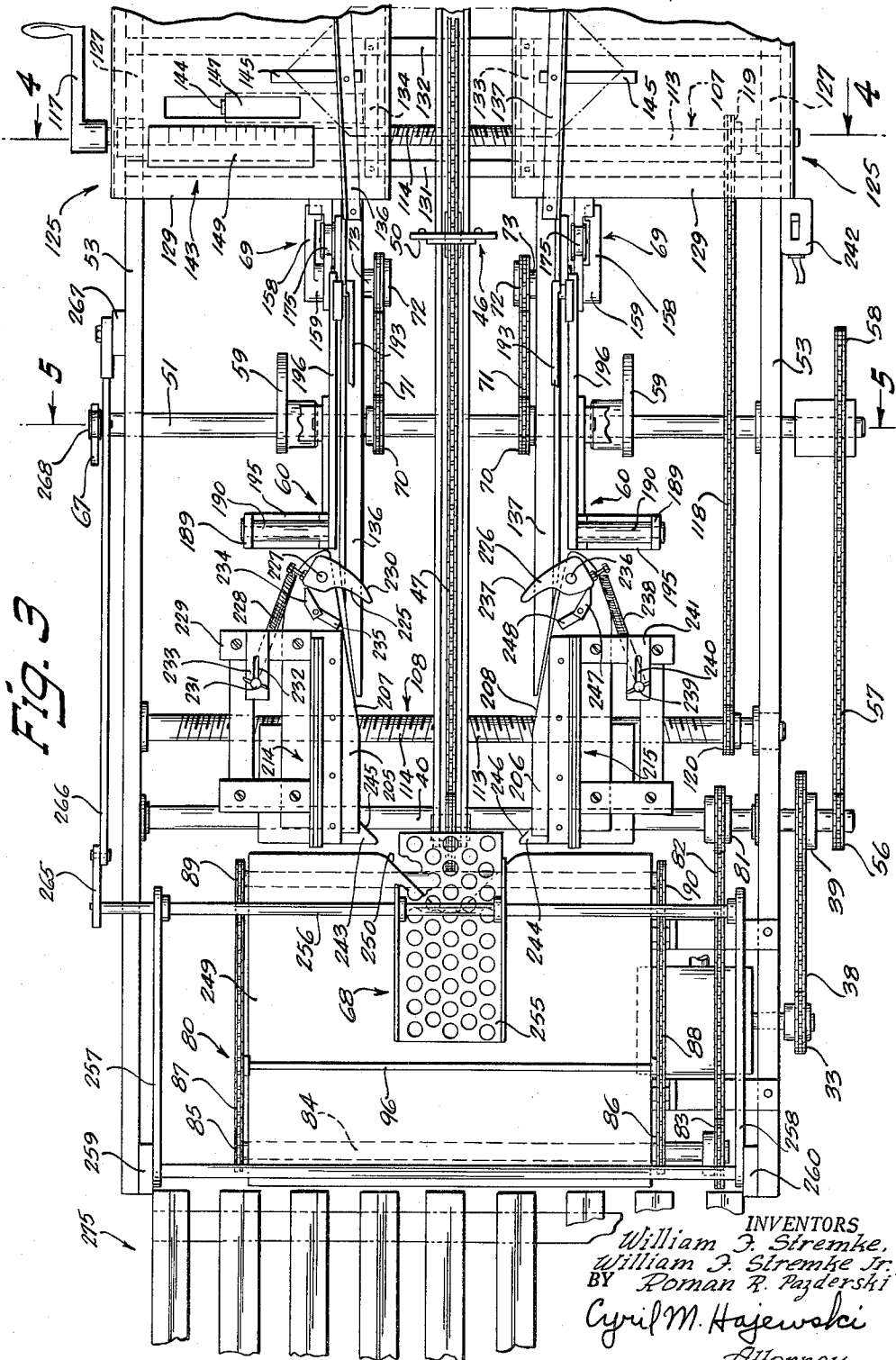
W. F. STREMKE ETAL

3,045,406

SEMI-AUTOMATIC WRAPPING MACHINE

Filed Jan. 27, 1958

6 Sheets-Sheet 3



July 24, 1962

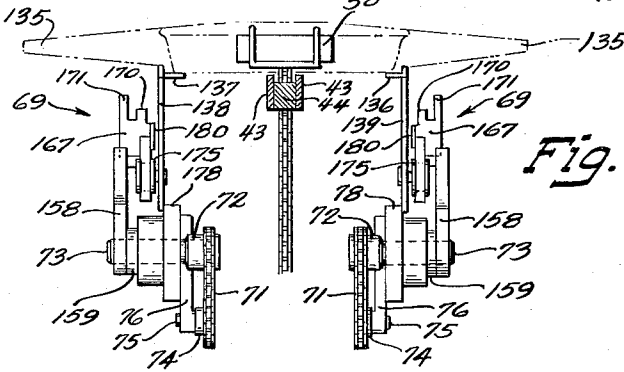
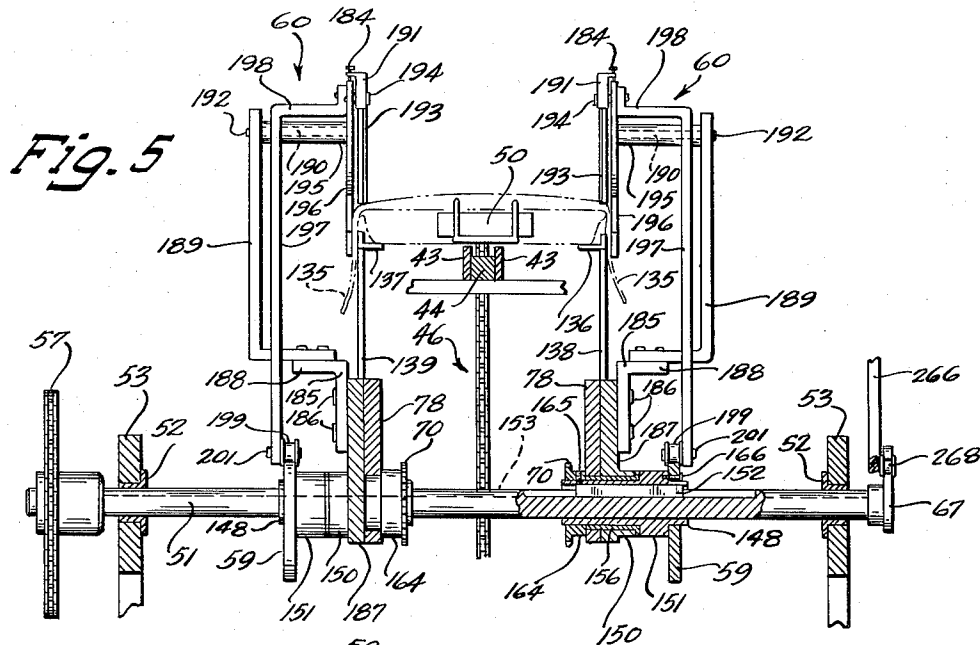
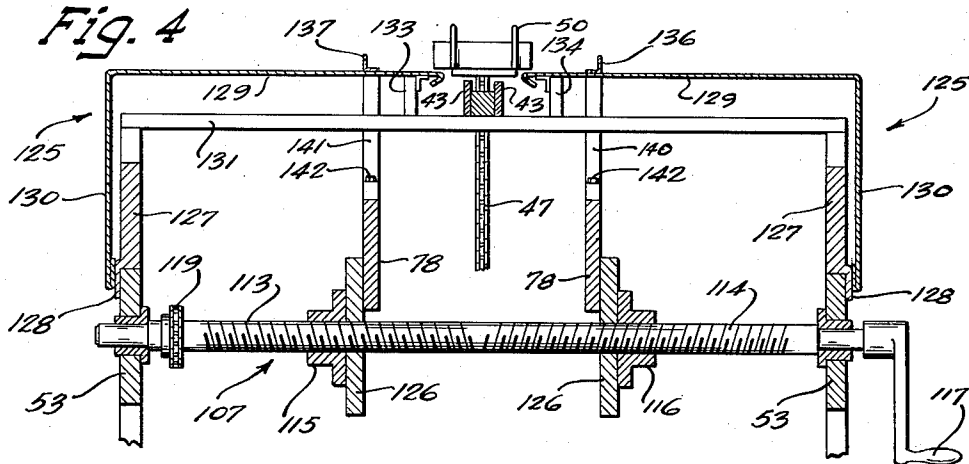
W. F. STREMKE ET AL

3,045,406

SEMI-AUTOMATIC WRAPPING MACHINE

Filed Jan. 27, 1958

6 Sheets-Sheet 4



July 24, 1962

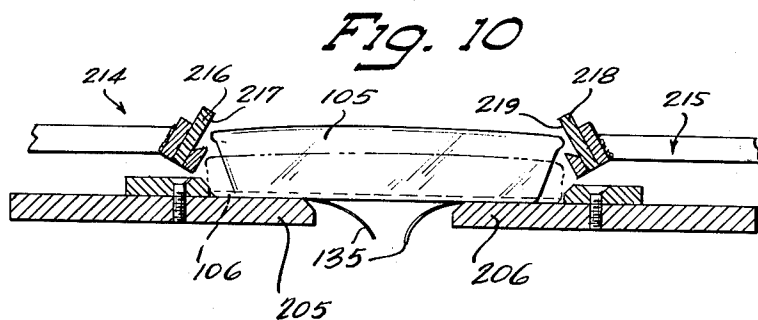
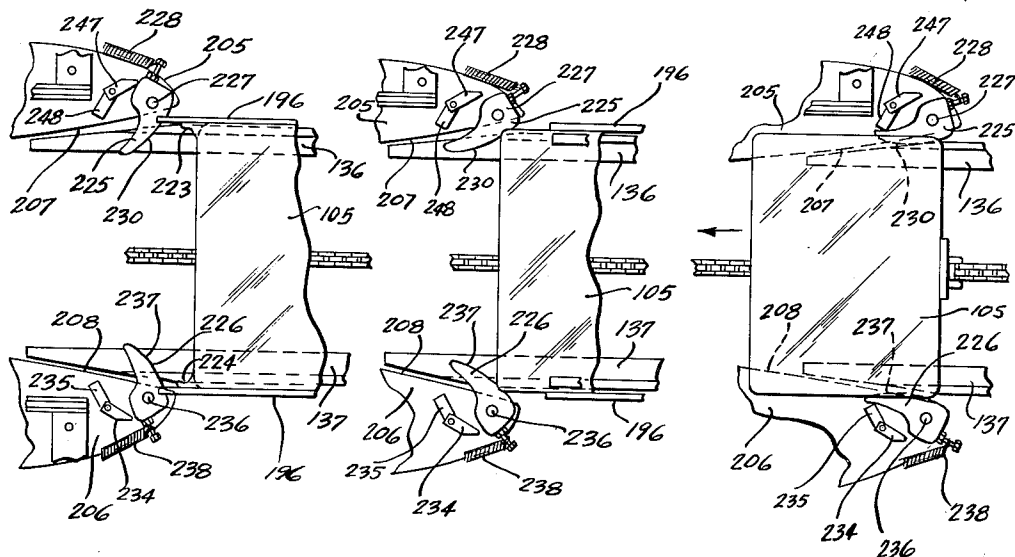
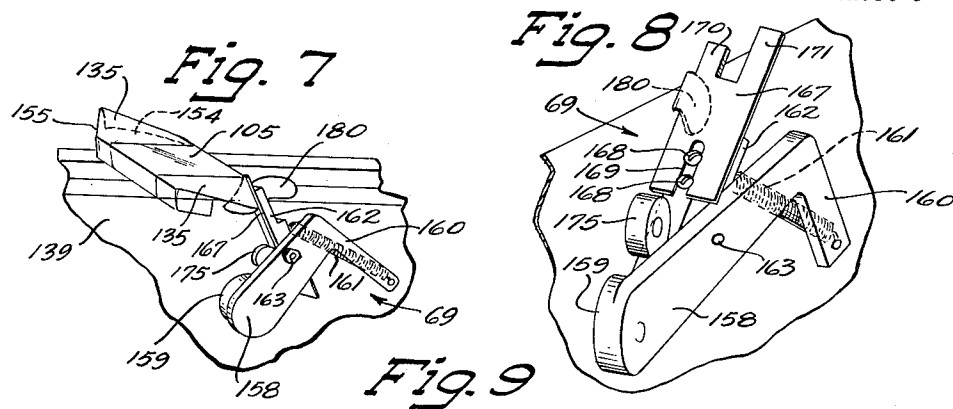
W. F. STREMKE ETAL

3,045,406

SEMI-AUTOMATIC WRAPPING MACHINE

Filed Jan. 27, 1958

6 Sheets-Sheet 5



INVENTORS
 William J. Stremke,
 William J. Stremke Jr.
 BY Roman R. Pazderski
 Cyril M. Hajewski
 Attorney

July 24, 1962

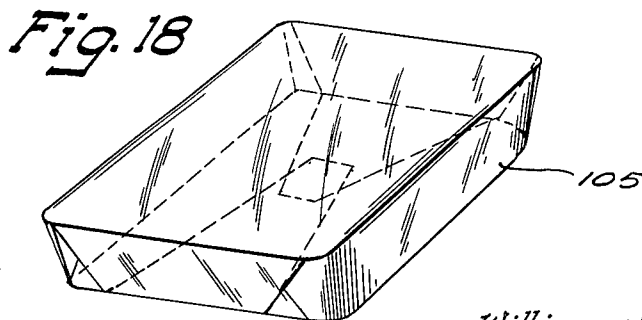
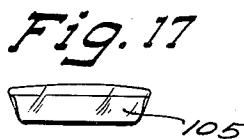
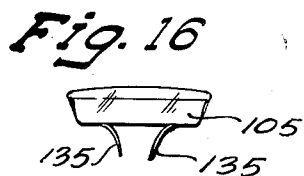
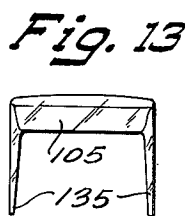
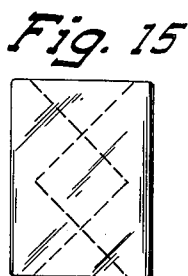
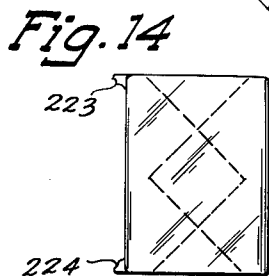
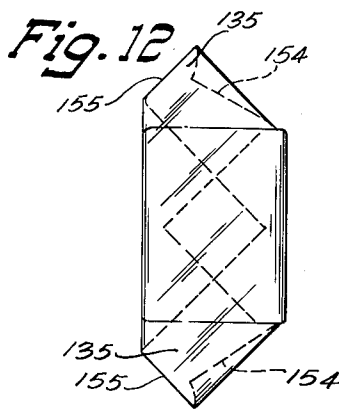
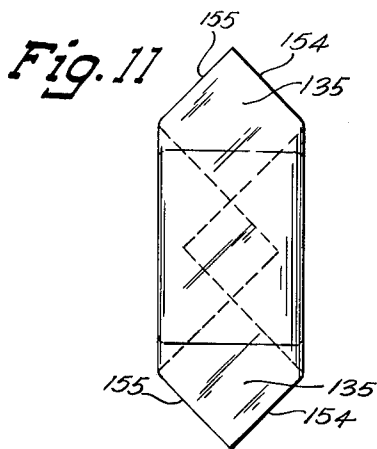
W. F. STREMKE ETAL

3,045,406

SEMI-AUTOMATIC WRAPPING MACHINE

Filed Jan. 27, 1958

6 Sheets-Sheet 6



INVENTORS
William F. Stremke,
William F. Stremke Jr.,
BY Roman R. Pazderski.
Cyril M. Hajewski
Attorney

1

3,045,406

SEMI-AUTOMATIC WRAPPING MACHINE

William F. Stremke, Greenfield, Wis. (8031 W. Holmes Ave., Milwaukee 19, Wis.); William F. Stremke, Jr., 3329 S. Springfield Ave., Milwaukee 7, Wis.; and Roman R. Pazderski, 3844 S. 15th Place, Milwaukee 15, Wis.

Filed Jan. 27, 1958, Ser. No. 711,308

23 Claims. (Cl. 53—209)

This invention relates generally to a wrapping machine and more particularly to an improved machine for wrapping food and other bulk merchandise that is placed in an open container or on a flat board, with the machine functioning to wrap the container with its contents in a sheet of transparent, heat sensitive wrapping material and also operating to effectively seal the package to protect its contents from the atmosphere.

It is a general object of the present invention to provide an improved machine for wrapping merchandise in a sheet of wrapping material.

Another object is to provide an improved wrapping machine especially adapted for wrapping bulk food or other merchandise in a sheet of transparent wrapping material and to form a particularly neat package that is suitable for display in self-service food markets.

Another object is to provide an improved wrapping machine for wrapping merchandise in a sheet of wrapping material that very efficiently seals the interior of the package from the atmosphere for the protection of its contents.

Another object is to provide an improved wrapping machine that will complete a diamond wrap in wrapping a sheet of wrapping material about a quantity of bulk merchandise.

Another object is to provide an improved machine which will automatically complete the wrapping of merchandise in a sheet of wrapping material after the sheet of wrapping material has been manually placed about the merchandise with a pair of diagonally opposite corners of the sheet secured together at the underside of the package.

Another object is to provide an improved wrapping machine for wrapping merchandise in a sheet of wrapping material with the entire wrapping operation being performed while the package is moving uninterruptedly through the machine at a single level until the wrapping operation has been completed.

A further object is to provide an improved wrapping machine that will wrap a variety of sizes of packages with equal efficiency and with a minimum adjustment of the machine to accommodate the different sizes.

A further object is to provide an improved wrapping machine of relatively simple and inexpensive but sturdy construction and efficient in operation.

According to this invention the improved semi-automatic wrapping machine is adapted to complete the wrapping operation after the wrapping material has been manually placed about the merchandise, preferably with two diagonally opposite corners of the sheet of wrapping material being fused together at the underside of the package so that the machine may complete what is known in the trade as the diamond wrap. With the sheet of wrapping material thus placed about the merchandise, a corner of the wrapping material will extend from each end of the package and it is the function of the machine to neatly fold these extending ends of the wrapping material downwardly and to the underside of the package and apply heat to the heat sensitive wrapping material for effectively sealing the package to protect its contents from the atmosphere.

The package is moved through the machine by a single conveyor without interruption while the wrapping opera-

2

tion is being performed, and when completed, a transfer mechanism moves the package off of a hot plate which fuses the folds of the wrapping material at the underside of the package, the transfer mechanism functioning to transfer the completed package from the hot plate to a cooling grid.

The package to be wrapped, with the sheet of wrapping material placed about it as described, is set on a reception table by the operator. The conveyor engages the package on the table and moves it through the machine. As the package is moving, the trailing sides of the extending ends of the wrapping material are engaged by a pair of rear tuckers which draw the wrapping material tightly about the rear corners of the package. The extending ends are then moved downward by a pair of down folders and before the latter release the extending ends, the package moves onto a pair of heated under folders which move the extending ends to the underside of the package and fuse the folds of wrapping material together along this area.

As the package moves onto the under folders, its front corners are engaged by a pair of heated front tuckers which press the wrapping material tightly about the front corners of the package. From the under folders the package is moved onto a hot plate which completes the folding and fusing of the folds of wrapping material at the underside of the package to effectively seal the package. After the conveyor moves the package onto the hot plate it releases the package and the transfer mechanism shifts the package off of the hot plate onto a cooling grid where it may be removed from the machine and is ready to be displayed.

The foregoing and other objects of the invention, which will become apparent from the following detailed description setting forth an illustrative embodiment, may be achieved by the particular apparatus depicted in and described in connection with the accompanying drawings, in which:

FIGURE 1 is a side elevational view of a semi-automatic wrapping machine embodying the features of the present invention, with panels being omitted to reveal the operating mechanism;

FIGURE 2 is a perspective view of the power train for transmitting power to the operating mechanisms of the machine illustrated in FIG. 1;

FIGURE 3 is a plan view of the machine depicted in FIG. 1 with the end extremities of the machine being broken away;

FIGURE 4 is a view substantially in vertical section taken along the plane represented by the line 4—4 in FIG. 3;

FIGURE 5 is a view partly in rear elevation and partly in vertical section taken along the plane represented by the line 5—5 in FIG. 3;

FIGURE 6 is a detail view in front elevation illustrating the rear tucker mechanisms of the machine;

FIGURE 7 is a perspective view of one of the rear tucker mechanisms operating to tuck the trailing side of the wrapping material downwardly;

FIGURE 8 is an enlarged detail perspective view of one of the rear tucker mechanisms;

FIGURE 9 is a series of three plan views illustrating the front tucker mechanisms and depicting three stages of their operation as a package passes between them during its path of travel through the machine;

FIGURE 10 is an enlarged detail view in vertical section of the under folders with a package shown in broken lines resting upon the folders to illustrate the operation of the under folders in moving the extending ends of the wrapping material to the underside of the package;

FIGURES 11 to 17 inclusive are a series of plan and front elevational views of a package showing the wrapping

3

material in the several stages of folds as formed by the folding mechanism of the machine illustrated in FIG. 1; and

FIGURE 18 is an enlarged perspective view of a package with the wrapping material completely folded about the package as performed by the machine.

Reference is now made more particularly to the drawings and specifically to FIG. 1 thereof illustrating a semi-automatic wrapping machine incorporating the features of the present invention. The machine shown is especially adapted to wrap a tray or container of food or similar merchandise in a sheet of heat sensitive wrapping material and seal the wrapping material about the merchandise to form a neat air tight package which may be placed on display. The operating mechanism of the machine is supported by a frame generally identified by the reference numeral 25 and comprising a plurality of structural members arranged to form a box like structure. The frame 25 is carried by four casters 26, each of which is disposed at one of the bottom corners of the frame to render the machine readily movable from one location to another.

Power for operating the machine is obtained from an electric motor 27 that is mounted on the lower portion of the frame 25. An expansible pulley 28 is keyed to the output shaft of the motor 27 and is engaged by a V belt 29 which is also in engagement with a pulley 30 keyed to the input shaft of a gear reducer 31. The expansible pulley 28 may be adjusted to vary its pitch in well known manner to provide for an infinitely variable adjustment of the rate of operation of the machine. The gear reducer 31 includes an output shaft 32 disposed at 90° to its input shaft and having a sprocket 33 keyed to it. The sprocket 33 is in meshing engagement with a chain 38 which extends upwardly therefrom into meshing engagement with a cooperating sprocket 39. The sprocket 39 is keyed to a drive shaft 40, which is rotatably supported by the frame 25, so that the power from the motor 27 is transmitted by the chain 38 to drive the shaft 40, and the power for driving the several operating mechanisms of the machine is taken from the drive shaft 40 in a manner to be described.

A sprocket 45 is keyed to the drive shaft 40 to rotate with it for driving a conveyor generally identified by the reference numeral 46. The conveyor 46 extends longitudinally along the center of the machine for the purpose of moving a container of food with a sheet of wrapping material about it through the several operating mechanisms of the machine for completing the wrapping operation. As best shown in FIG. 2, the conveyor 46 comprises a chain 47 in meshing engagement with the sprocket 45 as well as with three idler sprockets 48 that are disposed in spaced relationship to guide the chain 47 in a closed loop. Each of the idler sprockets 48 is keyed to one of three shafts 49 that are rotatably supported by the frame 25. Thus, the chain 47 is driven by the drive sprocket 45 about the three idler sprockets 48. Three pushers 50 are secured to the chain 47 and equally spaced along the chain for the purpose of engaging the package placed on the machine and pushing it along the machine as the wrapping operation is being performed.

In order to provide support for the chain 47 and guide it as it operates through the top length of its loop the chain travels in a channel formed between the upper portion of two plates 43, each of which is attached to one side of a support bar 44 with the upper portion of the plates 43 extending above the support bar 44 to form the side walls of the channel and the top surface of the support bar 44 forming the base of the channel. The support bar 44 is centrally located and extends longitudinally of the machine, being carried by the frame 25.

The drive shaft 40 is also connected to rotate a cam shaft 51 which extends across the width of the frame 25 and is journaled in two bearings 52 as clearly shown in FIG. 5. The bearings 52 are mounted in two spaced horizontal members 53 of the frame 25, each of the mem-

4

bers 53 being disposed on one side of the frame 25 and extending along its length at its upper portion. In order to effect the driving connection from the drive shaft 40 to the cam shaft 51, a sprocket 56 is fixed to one extremity of the drive shaft 40 and is in meshing engagement with a chain 57 that is also in engagement with a sprocket 58 which is keyed to an end of the cam shaft 51 to rotate it.

A pair of down folder cams 59 are fixed to the cam shaft 51 to rotate with it for operating a pair of down folders that are generally identified by the reference numeral 60 in FIGS. 1 and 5 and which will be subsequently described. A pressure plate cam 67 is likewise fixed to the cam shaft 51 to rotate with it and serves to operate a pressure plate mechanism generally identified by the reference numeral 68 in FIGS. 1 and 3 and which will also be later described.

The cam shaft 51 further functions to drive a pair of rear tuckers generally identified by the reference numeral 69. To this end, a pair of sprockets 70 are mounted to rotate with the cam shaft 51 for driving a pair of cooperating sprockets 72. Each of the sprockets 72 are fixed to one of two stub shafts 73 that are journaled in two brackets 78 respectively as shown in FIG. 6 and which carry the several portions of the folding mechanism which will be subsequently described. The rear tuckers 69 are fixed to rotate with the shaft 73 to perform their function. An idler sprocket 74 is also in engagement with each of the two chains 71 and each sprocket is journaled on a stub shaft 75 which is carried by a support 76 that is adjustably carried by the bracket 78. Each of the supports depends from one of the brackets 78 and by moving the support 76 and its associated idler sprocket 74 downwardly, the tension on its associated chain 71 will be increased to provide the proper tension on the chain.

The rotation of the drive shaft 40 further serves to drive a transfer mechanism generally identified by the reference numeral 80 and which functions to move the completed package for removal from the machine. The power for driving the transfer mechanism 80 is taken from the drive shaft 40 through a sprocket 81 which is keyed to the shaft 40 to rotate with it as illustrated in FIGS. 2 and 3. The sprocket 81 is in meshing engagement with a drive chain 82 that extends upwardly into meshing engagement with a cooperating sprocket 83. The sprocket 83 in turn is keyed to a shaft 84 which is rotatably supported by the frame 25 and also carries a pair of sprockets 85 and 86 to rotate with it.

The sprockets 85 and 86 are a part of the transfer mechanism 80 that includes a pair of drive chains 87 and 88 which are in meshing engagement with the sprockets 85 and 86 respectively. The chains 87 and 88 also engage a pair of cooperating sprockets 89 and 90 respectively, which are keyed to a shaft 95 that is rotatably supported by the frame 25. A pusher bar 96 is secured at one end to the chain 87 and at its opposite end to the chain 88. The chains 87 and 88 form identical loops and are driven simultaneously at the same rate of travel. Since the pusher bar 96 is fixed to both chains 87 and 88 it will move with them in the loop defined by the chains and as it does so it functions to move a completed package toward the rear of the machine.

An idler sprocket 97, shown in FIG. 1, is provided for adjusting the tension of the chain 82. The idler sprocket 97 is rotatably supported by an upstanding bar 98 that is carried by the horizontal member 53 of the frame 25 and is adjustable vertically for varying the height of the idler sprocket 97. It is apparent that by moving the bar 98 upwardly, the tension on the chain 82 may be increased to the desired degree. In like manner, each of the chains 87 and 88 is in meshing engagement with one of two idler sprockets 99, each of which is rotatably supported by a vertically disposed bar 101. The tension on the chains 87 and 88 may be increased by moving the cooperating bar 101 downwardly until the desired degree of tightness is obtained.

The food which is to be wrapped is placed in containers or trays 105 as shown in FIG. 18 or flat boards as shown in broken lines in FIG. 10, depending upon the type of food that is being wrapped. These containers and boards vary appreciably in size for containing different quantities of food. As the size of the containers or boards varies, their length will vary accordingly and the folding mechanism which operates to fold the sheet of paper about the containers or boards must be varied in its spacing as will be subsequently seen in order to accommodate the different lengths of the containers and boards that will be operated upon. To this end, the various portions of the folding mechanism are supported by the two brackets 78 which are adjustably carried by the frame 25 for the purpose of varying their spacing relative to each other to change the spacing of the portions of the folding mechanism accordingly, in order to accommodate the containers and flat boards of different lengths.

The two brackets 78 extend along the length of the machine with one bracket 78 being located on each side of the conveyor 46 which likewise extends along the length of the machine but is centrally located thereon. In order to render the spacing of the two brackets 78 adjustable they are carried by two screws generally identified by the reference numeral 107 and 108 respectively, as clearly shown in FIGS. 3 and 4.

The screws 107 and 108 extend across the width of the machine and each is provided with a right hand thread 113 on the right half of its length as viewed from the top in FIG. 3 and with a left hand thread 114 on the left half of its length. As clearly shown in FIG. 4, the right hand thread 113 of the screw 107 is in threaded engagement with a complementary right hand threaded nut 115 while the left hand thread 114 of the screw 107 is in threaded engagement with a left hand threaded nut 116. The nut 115 is secured to a depending plate 126 that is attached to one of the brackets 78 with the screw 107 extending through a suitable hole in the plate, and the left hand threaded nut 116 is likewise secured to a second depending plate 126 that is attached to the other bracket 78 so that rotation of the screw 107 will cause a movement of the nuts 115 and 116 and their associated brackets 78 toward or away from each other depending upon the direction of rotation of the screw 107. The threads 113 and 114 of the screw 108 are likewise in threaded engagement with identical nuts 115 and 116 respectively which are also carried by the brackets 78 in the identical manner illustrated in FIG. 4 for the screw 107.

Rotation of the screw 107 is accomplished by revolving a hand crank 117 which is secured to an end of the screw 107 that extends outwardly of one of the horizontal members 53. Since the brackets 78 are supported by the screws 107 and 108, it is essential that the screws 107 and 108 rotate simultaneously for effecting the adjustment of the spacing of the two brackets 78. To this end, the screws 107 and 108 are connected together for simultaneous rotation by a chain 118 which is in meshing engagement with a sprocket 119 keyed to the screw 107 for rotation with it and with a cooperating sprocket 120 keyed to the screw 108 for rotation with it as clearly shown in FIG. 3. Therefore, when the hand crank 117 is manipulated to rotate the screw 107, the screw 108 will rotate with it at the same rate by reason of its connection with the screw 107 through the chain 118. Thus, each of the brackets 78 is supported at both ends by the two screws 107 and 108 which operate to effect an adjustment of the spacing of the two brackets 78 toward and away from each other by reason of their threaded engagement with the nuts 115 and 116 mounted on the two brackets 78 respectively.

The package to be wrapped by the machine is placed upon a pair of reception tables located at the extreme forward portion of the machine and generally identified by the reference numeral 125. The tables 125 are spaced from each other to form a central gap for operation of

the conveyor 46. They are each formed of a piece of sheet metal bent at a right angle to form a horizontal table top 129 and a vertical apron 130 depending from the table top 129. Both of the tables 125 are rigidly supported by the frame 25. To this end, as best seen in FIGS. 3 and 4, a plate 127 is secured at its bottom end to each of the horizontal members 53 and extends upwardly therefrom. A pair of cross bars 131 and 132 extend across the width of the machine in spaced relationship to rest upon the tops of the plates 127 and are secured thereto. The cross bars 131 and 132, in turn, carry a pair of table supports 133 and 134 that extend transversely of the cross bars 131 and 132 and are fixed thereto in spaced relationship with the table supports 133 and 134 resting on top of the cross bars 131 and 132.

The upwardly extending plates 127, the cross bars 131 and 132, with the table supports 133 and 134 form a frame for firmly supporting the tables 125. The tables are secured to this frame by attaching the bottom ends of the aprons 130 to an overhanging lip 128 that extends from the bottom of each of the plates 127, and fixing the inner ends of their horizontal tops to the supports 133 and 134 respectively. With this arrangement, the extremities of the two tables 125 are rigidly secured to firmly support the table on the frame 25.

Although the wrapping machine of the present invention is not confined to a particular wrapping operation, it is especially intended for use in self-service food markets to wrap bulk food in a transparent wrapping material. It is particularly well adapted to perform what is known in the trade as a diamond wrap, in which the wrapping material is cut into square sheets and is wrapped around the merchandise so that diagonally opposite corners of the sheet are brought together, preferably at the underside of the package. Furthermore, since packages of this nature must be sealed, the machine is intended to be used with a heat sensitive wrapping material which will fuse upon the application of heat to efficiently seal the package. In view of the fact that the wrapping material is preferably transparent as well, it has been found that cellophane is an ideal wrapping material by virtue of its transparency and the fact that it may be effectively sealed by the application of heat.

The wrapping machine of the present invention is not completely automatic since the initial operation of the wrapping procedure is performed manually. This manual operation comprises placing the sheet of wrapping material about the width of the article to be wrapped with a pair of diagonally opposite corners being brought together at the underside of the article. The two diagonally opposite corners of the sheet of wrapping material that are brought to the underside of the package will overlap, and heat is applied thereto to fuse these two corners together for securing the sheet of wrapping material about the container. The container with the sheet of wrapping material about it will therefore appear as illustrated in FIG. 11 with a substantially triangular shaped end or wing 135 extending from each end of the container. This initial manual operation may be best performed on a prewrap table constructed in accordance with the wrapping table described in our co-pending patent application, Serial No. 433,664, filed June 1, 1954 which has matured into Patent No. 2,840,962, issued on July 1, 1958.

When the sheet of wrapping material has been placed about the container and its contents as illustrated in FIG. 11, the package is placed upon a pair of guide rails 136 and 137 across the gap between the two tables 125 where it will be engaged by one of the pushers 50 of the conveyor 46 which functions to move the package through the machine for the performance of the folding operation. The guide rails 136 and 137 serve to support and guide the package as it is moved by the conveyor 46 in its path of travel while the folding operation is being completed.

Each of the rails 136 and 137 overlies the table tops

7

129 and extends from the forward edge of the tables 125 toward the rear of the machine, being disposed parallel to each other except for their forward portions which overlie the table tops. Since the operator places the package upon those portions of the guide rails 136 and 137 that overlie the table tops 129, these portions are angled outwardly, away from each other to increase their spacing for the convenience of the operator so that the operator will not be required to carefully fit the package between the two guide rails but will rather be provided with appreciable latitude in positioning the package between the guide rails by virtue of their increased spacing at this point.

As clearly shown in FIG. 5, the guide rails 136 and 137 are formed of angles having a horizontal leg for receiving the edges of the container to support it, and each having a vertical leg that acts as a guide for guiding the package as it is moved in its path of travel by the conveyor 46. Since the spacing of the guide rails 136 and 137 must be adjusted for the purpose of accommodating packages of different sizes, they are each carried by one of the adjustable brackets 78 for movement therewith. The portions of the guide rails 136 and 137 that extend rearwardly of the tables 125 are attached to the tops of a pair of plates 138 and 139, which in turn, are secured to the brackets 78 to extend upwardly therefrom.

As best seen in FIGS. 3 and 4, the forward portion of the guide rails 136 and 137 are supported by a pair of uprights 140 and 141 respectively, which are secured at their bottom ends to the brackets 78 by screws 142 and extend upwardly therefrom through slots 145 formed in the table tops 129. The guide rails 136 and 137 are secured to the tops of the uprights 140 and 141 so that the guide rails are firmly anchored to the brackets 78 for movement therewith by means of the plates 138 and 139, and the uprights 140 and 141. The slots 145 are provided in the table tops 129 to accommodate the movement of the uprights 140 and 141 with the movement of the brackets 78 when they are adjusted to vary their spacing.

As previously mentioned, the spacing of the brackets 78 must be varied to accommodate the different size containers or boards which contain the food that is to be wrapped so that the spacing of the rails 136 and 137 will conform to the length of the container or board, and so that the other portions of the folding mechanism will be properly spaced for the particular size container or board that is being wrapped. For the convenience of the operator, a gauge, generally identified by the reference numeral 143 in FIG. 3, is provided to visually indicate the proper setting of the brackets 78 and their associated mechanism for the particular size container or board that is being wrapped.

The gauge 143 comprises an indicator 144 that is attached to the left bracket 78 as viewed in FIG. 3, so that as the brackets 78 are moved, the indicator 144 will move with them. The indicator 144 extends upwardly through a slot 147 formed in the table top 129 for co-operation with a graduated scale 149 which is formed on the table top 129 adjacent to the slot 147. The food containers and flat boards 105 and 106 are furnished in a variety of standard sizes, each size being assigned a particular number by means of which it may be identified. These numbers are indicated on the scale 149 for co-operation with the indicator 144 to indicate the proper setting of the brackets 78 for the particular size container or board being wrapped. Thus, to establish the proper setting, the operator need only determine the number of the size container or flat board being employed and then manipulate the hand crank 117 to move the brackets 78 toward or away from each other until the indicator 144 is located opposite the graduation mark which bears the particular size number of the tray. The brackets 78 and their associated mechanism will then be properly spaced to accommodate this size tray. In the

8

event that a standard container is not being employed, the operator may set the spacing of the brackets 78 by placing the container that is being wrapped between the guide rails 136 and 137 and then revolve the hand crank 117 until the guide rails are properly spaced for receiving the particular container being used. The folding mechanism carried by the brackets 78 will then be likewise properly spaced.

As previously mentioned, the operator places the container with the sheet of wrapping material placed about it as described, on the table tops 129 between the two guide rails 136 and 137. Since the guide rails 136 and 137 have been spaced to conform to the size of the tray being wrapped, the tray will fit between the rails and the extending ends 135 of the wrapping material will extend over the top and beyond the rails 136 and 137 in the manner shown in FIG. 6. It is the function of the machine to fold these two extending ends 135 downwardly and underneath the tray in a neat manner and fuse the wrapping material together by the application of heat to seal the package for the protection of its contents.

It will be observed in FIG. 4, that the top edge of the path of travel of the conveyor chain 47 is level with or slightly below the surface of the table tops 129. The pushers 50 carried by the chain 47 will therefore extend above the level of the surface of the table top 129 and engage a package resting thereupon to move it along the guide rails 136 and 137 through the folding mechanism of the machine. The conveyor 46 operates continually at a constant rate so that the folding operation on the extending ends 135 is performed while the package is moving through the machine. The three pushers 50 move with the chain 47, and, as each of them engages a package resting upon the table top 129 between the guide rails 136 and 137 it moves the package with it off of the table top where it is supported solely by the horizontal legs of the guide rails 136 and 137.

As the package leaves the table tops 129, the first operation is performed on the extending ends 135 by the rear tuckers 69. Each of the extending ends 135 of the wrapping material has a trailing edge 154 and a leading edge 155 with the latter moving forwardly toward the rear of the machine ahead of the trailing edges 154. The function of the rear tuckers 69 is to move the trailing edges 154 of the extending ends 135 downwardly to draw the wrapping material tightly about the two trailing corners of the tray before the extending ends 135 are folded downwardly by the down folders 69. The appearance of the trailing edges 154 after they are tucked downwardly and inwardly by the rear tuckers 69 is clearly shown in the plan view of the package in FIG. 12 where the trailing edges 154 are shown in dotted lines to represent their position to the underside of the extending ends 135.

Since the spacing of the two tuckers 69 relative to each other must be adjusted in accordance with the size of the tray 105 or the flat board 106 that is being utilized, they are carried by the brackets 78 for movement therewith as clearly shown in FIG. 6. To this end, they are carried by the two shafts 73, each of which is rotatably carried by one of the brackets 78 and are rotated by the chains 71 in the manner previously described.

Since the sprockets 72 are carried by the brackets 78 for movement therewith it follows that the sprockets 70 which drive the sprockets 72 must move in unison therewith to remain in alignment. In like manner, it will become apparent that the downfolder cams 59 must likewise move with the brackets 78 when the spacing of the latter is adjusted. Since the downfolder cams 59 and the sprockets 70 are both driven by the cam shaft 51 they are mounted together for rotation with the shaft 51 as well as for movement along the length of the shaft 51 with the brackets 78.

As shown in FIG. 5 each of the sprockets 70 and the downfolder cams 59 is carried by one of the brackets 78

through a depending plate 187 that is secured to the bracket 78 by means of screws 186. The plate is provided with a hub 150 having a central bore for receiving the reduced diameter portion of a sleeve 151. The sleeve 151 is fixed to rotate with the shaft 51 by a key 152 that engages a suitable slot in the sleeve 151 as well as an elongated keyway 153 that extends through the entire length of the shaft 51 to permit movement of the sleeve 151 and its associated mechanism along the length of the shaft 51.

The reduced diameter portion of the sleeve 151 is smaller than the bore of the hub 150 to provide space for a bearing 156 that is disposed within the bore and encompasses the reduced diameter portion of the sleeve 151. The bearing 156 is provided with a shoulder 157 at its end to abut against the face of the hub 150 and the shoulder formed by the enlarged diameter portion of the sleeve 151 abuts against the opposite face of the hub 150. The reduced end portion of the sleeve 151 extends beyond the limits of the hub 150 for receiving the sprocket 70 which is provided with an annular flange 164. A screw 165 is threaded through the flange 164 and into engagement with the reduced diameter portion of the sleeve 151 to secure the sprocket 70 to the sleeve 151. The flange 164 abuts the shoulder 157 of the bearing 156 to lock the bearing on the reduced diameter portion of the sleeve 151 while the shoulder formed by the enlarged diameter portion of the sleeve 151 and the shoulder 157 of the bearing 156 bear against opposite faces of the hub 150 to prevent lateral displacement of the unit relative to the hub. The down folder cam 59 is secured to the sleeve 151 to rotate with it by suitable screws 166, being located on a reduced annular portion 148 extending axially from the end of the sleeve 151. Since the sprocket 70 and the down folder cam 59 are both attached to the sleeve 151 they will rotate in unison therewith, as the shaft 51 revolves, and since the sleeve 151 is carried by the bracket 78 for movement therewith, the down folder cam 59 and the sprocket 70 will likewise move laterally with the bracket 78 without interrupting their connection for rotation with the shaft 51 through the sleeve 151.

Each of the rear tuckers 69 is identical in construction and operation although oppositely disposed on either side of the conveyor 46 so it will only be necessary to refer to one of the rear tuckers 69 in describing them. As best seen in FIGS. 7 and 8, each of the rear tuckers 69 comprises an arm 158 having a hub 159 at one end which is secured to the shaft 73 so that the arm 158 will rotate with the shaft. The opposite end of the arm 158 is provided with a laterally extending leg 160 to which is attached one end of a spring 161. The opposite end of the spring 161 is attached to a pivot bar 162 which is rotatably supported by a pin 163 that is carried by the arm 158 so that the pivot bar 162 may pivot relative to the bar 158. The spring 161 being attached to the pivot bar 162 above its fulcrum, tends to urge the bar 162 in a clockwise direction as viewed in FIGS. 7 and 8.

A tucker plate 167 is secured to the pivot bar 162, being attached thereto by two screws 168 which extend through a slot 169 formed in the tucker plate 167 and into threaded engagement with the pivot bar 162. The purpose of the slot 169 is to provide a longitudinal adjustment of the tucker plate 167 so that it may be located in the proper position for operation upon the trailing edges 154 of the extending ends 135 of the wrapping material. The tucker plate 167 is of sufficient width to extend into the vertical plane in which the arm 158 is located. As a result, the upper edge of the arm 158 serves as a stop for limiting the pivotal movement of the pivot bar 162 and its associated plate 167 in a clockwise direction as viewed in FIG. 8 and as urged by the spring 161. The tucker plate 167 is provided with two longitudinally extending fingers 170 and 171 which engage the trailing edges 154 to perform the tucking operation. The finger 170 is of shorter length to operate upon

the trailing edges 154 when the wrapping material is placed about a flat board, while the finger 171 operates in the same manner upon the trailing edges 154 of the wrapping material when placed about a tray 105.

The reason for the difference in length of the fingers 170 and 171 lies in the variation in heights of the packages that may be wrapped. Thus, in FIG. 10, a board 105 is illustrated in broken lines superimposed upon the elevational view of a container 105 and supporting merchandise which forms a package of relatively low height as compared to the package utilizing the container 105. The board 105 may form a part of a package comparable in height to the height of a package formed in conjunction with a container 105 if sufficient merchandise is placed upon it, but on the other hand, the board 106 may carry a few thin slices of meat or the like to form a package of minimum height. The extending ends 135 of the wrapping material will be located somewhat higher with respect to the rear tuckers 69 when the wrapping material is placed about a package of appreciable height than when it is placed about a package of relatively low height. In order to accommodate for this difference in height, the two fingers 170 and 171 are provided on the tucker plate 167, with the shorter finger 170 being especially adapted to operate upon the trailing edge 154 of the extending end 135 when the wrapping material is placed about a thin package, and the longer finger 171 being provided for operating upon the trailing edge 154 of the extending end 135 when the wrapping material is placed about a package having appreciable height.

In operation, the several members of the tucker mechanism 69 will rotate in unison with the shaft 73. The rate of rotation of the tucker mechanism 69 must be coordinated with the rate of travel of the conveyor 46 so that the fingers 170 and 171 are in the proper position to operate upon each package as it moves along the rails 136 and 137 past the tucker mechanism 69. However, the tucking operation is performed on the extending end 135 while the package is being moved by the conveyor 46 so the arcuate movement of the fingers 170 and 171 must be accelerated relative to the rate of rotation of the arm 158 in order to properly perform the operation while the package is moving. To this end, the pivot bar 162 and its associated tucker plate 167 and fingers 170 and 171 are actuated in a pivotal movement relative to the arm 158 while the latter is rotating by a roller 175 which is carried by the plate 139 in a manner best shown in FIGS. 1 and 6. Of course, it is to be understood that another roller 175 is carried on the opposite side of the machine by the plate 138 for cooperation with the other of the two rear tuckers 69.

Since the roller 175 must be adjusted to be properly located with respect to the pivot bar 162, it is mounted on a roller support 176, shown in FIG. 1, and which is provided with a slot 177 for receiving a bolt 178 which is in threaded engagement with the plate 139. With the bolt 178 loosened, the slot 177 permits the roller support 176 and its associated roller 175 to be moved to the desired position, and the roller will be retained in this position by tightening the bolt 178. The roller 175 is disposed in position to be engaged by the pivot bar 162 at a point below its fulcrum as viewed in FIG. 8, while the pivot bar 162 and its associated mechanism are rotating bodily with the arm 158. When the lower end of the pivot bar 162 strikes the roller 175 it will be caused to pivot about the pin 163 relative to the arm 158 since it is moving bodily with the arm 158 as the latter is rotating, and the rate of travel of the fingers 170 and 171 will be increased to move in an arc relative to the arm 158 while the latter is rotating. The path of travel of the fingers 170 and 171 is likewise changed by the pivotal movement of the bar 162, causing them to move in a more pronounced downward path to better perform the tucking operation.

The rear tucker mechanism 69 is shown in FIG. 8

11

with the arm 158 rotated to a position where the pivot bar 162 first engages the roller 175. As the arm 158 continues to rotate in a counterclockwise direction, the roller 175 interferes with the bodily movement of the pivot bar 162 with the arm 158 and causes it to pivot about the pin 163 in a counterclockwise direction relative to the arm 158 and against the force of the spring 161 which tends to urge it in a clockwise direction. The fingers 170 and 171, of course, participate in the pivotal movement of the bar 162 relative to the arm 158 so that their rate of travel is increased, and one or the other engages the trailing edge 154 of the extending end 135 of the sheet of wrapping material in the manner shown in FIG. 7. As the finger 170 or 171 continues in its path of travel as established by the combined rotating movement of the arm 158 and the pivotal movement of the pivot bar 162, it moves the trailing edge 154 of the extending end 135 of the wrapping material downwardly and draws the wrapping material tightly about the trailing corners of the container 105 or board 106 as shown in FIG. 12. When a thin package of relatively little height is being wrapped, the short finger 170 engages the trailing edge 154 and moves it downwardly and inwardly out of the path of travel of the long finger 171 so that the latter does not interfere with the tucking operation. When a thicker package of greater height is being wrapped, the short finger 170 travels underneath the extending end 135 so that it does not interfere with the tucking operation and the long finger 171 engages the trailing edge 154 and moves it downwardly to the position shown in FIG. 12.

The tuck formed by the finger 170 or 171 is maintained by a tab 180 which is fixed to the edge of the tucker plate 167 and extends rearwardly therefrom to trail the tucker plate 167 as it moves to perform its tucking operation. The tab 180 moves along the edge of the tray 105 and along the exterior surface of the plate 139 to maintain the downwardly extending position of the trailing edge 154 of the extending end 135 and also to maintain the wrapping material tightly about the trailing corners of the container 105 so that the wrapping material will neatly enclose the tray when the wrapping operation is completed.

This completes the operation of the rear tucker mechanism 69, and as the arm 158 continues to rotate in a counter-clockwise direction as viewed in FIGS. 7 and 8, the pivot bar 162 moves over the roller 175 out of engagement with it, and the spring 161 then functions to pivot the bar 162 and its associated mechanism back to its starting position with the tucker plate 167 resting against the top edge of the arm 158. The arm 158 then continues to rotate at a constant rate and brings the fingers 170 and 171 into operating position again at the time that the conveyor 46 moves the succeeding package into position adjacent to the tuckers 69. Thus, the tucker mechanisms 69 perform their function on each package that is transported through the machine by the conveyor 46.

Immediately after the rear tuckers 69 have performed their operation, and while the tucks in the trailing edges 154 are being maintained by the tabs 180, the down folders 60 engage the two extending ends 135 to move them downwardly to the position illustrated in FIG. 13. The downward movement of the extending ends 135, of course, will prevent the release of the tucks formed in the trailing edges 154, and the tabs 180 therefore then move out of contact with the wrapping material as they continue in their path of travel with the rotational movement of the arms 158. In view of the fact that the wrapping material extends from both ends of the container 105 or board 106 to create two extending ends 135, both of which must be folded to the underside of the tray, two oppositely disposed downfolders 60 are provided, with each operating on one of the two extending ends 135 of each of the packages moving through the

12

machine. Since the spacing between the two downfolders 60 must conform to the length of the tray 105 or flat board 106 that is being wrapped, each of the downfolders 60 is carried by one of the two brackets 78 so that their spacing is readily established by adjusting the spacing of the brackets 78 by revolving the screw 107 as described until the proper setting is indicated on the indicator 143.

Each of the two downfolders 60 is identical in construction and operation and it will therefore be necessary to refer to one of them only in this description. The construction of the down folders 60 is best illustrated in FIGS. 1 and 5 where they are shown carried by the brackets 78 on a right angle support 185 that is secured to the bracket 78 by the screws 186 which extend through the vertical leg of the bracket 185 and the depending plate 187 into threaded engagement with the bracket 78, the depending plates 187 being provided to support the cam shaft 51 as previously described. The bracket 185 includes an outwardly extending horizontal leg 188 at its upper edge for receiving the horizontal leg of an L-shaped bracket 189. An upwardly extending vertical leg of the L-shaped bracket 189 carries an inwardly extending sleeve 195 at its upper end as best shown in FIGS. 3 and 5. The sleeve 195 rotatably supports a pin 190 which extends through the sleeve 195 and is secured at one end to a down folder plate 196. A shoulder bolt 192 extends freely through a suitable hole in the bracket 189 into threaded engagement with the pin 190, the bolt 192 having its shoulder (not shown) bearing against the end of the pin to prevent lateral displacement of the pin 190 relative to the sleeve 195 without interfering with the rotational movement of the pin 190 relative to the sleeve 195 and the bracket 189. The downfolder plate 196 is therefore pivotally supported by the sleeve 195 through the pin 190 and pivots thereabout to perform its function of folding the extending ends 135 of the wrapping material downwardly to the position shown in FIG. 13.

The down folder plates 196 are actuated in their pivotal movement by the cams 59 which are connected to rotate with the cam shaft 51 as previously described, the shaft 51 being driven by the motor 27 through the transmission which has also been previously described. The action of the cam 59 is transmitted to the down folder plate 196 by a link 197 that has a horizontal leg 198 extending inwardly from its uppermost end. The extending end of the leg 198 is pivotally attached to the down folder plate 196 at a point spaced from the pin 190 as best shown in FIG. 1, so that movement of the link 197 as effected by the cam 59 will cause a pivotal movement of the down folder plate 196 for performing the folding operation. The lowermost end of the link 197 is provided with a roller 199 that is rotatably supported by a pin 201 which is fixed to the end of the link 197. The roller 199 is supported in position to engage the peripheral cam surface of the cam 59. Therefore, as the cam 59 rotates, its configuration causes an upward and downward movement of the roller 199 and its associated link 197 and horizontal leg 198 to produce a pivotal movement of the down folder plate 196 about the axis of the pin 190.

After the down folder plates 196 have completed their function of folding the extending ends 135 downwardly and retaining them in that position, the cams 59 pivot the plates 196 upwardly to the inoperative position shown in FIG. 1. The downward pivotal movement is initiated while the rear tuckers 69 are performing their function, and when the tucks formed by the rear tuckers 69 are completed but while the tabs 180 are still maintaining the tucks the down folder plates 196 engage the laterally extending ends 135 of the wrapping material directly adjacent to the edge of the container 105 as clearly shown in FIG. 5. Continued downward movement of the down folder plates 196 serves to move the extend-

13

ing ends 135 downwardly against the plates 138 and 139. It will be observed from the view in FIG. 5 that the down folder plates 196 travel in a path directly adjacent to the plates 138 and 139 so that one of the extending ends 135 after being folded downwardly is disposed between one of the down folder plates 196 and the plate 138 while the oppositely extending end 135 is likewise disposed between one of the down folder plates 196 and the plate 139. This location of the downwardly extending ends 135 between the plates 196 and the two plates 138 and 139 serves to retain the extending ends 135 in their downwardly extending position.

The width and the length of a board 106 is comparable in size to the base of the container 105 but it does not have the upwardly extending and outwardly inclined sides of the container 105 which form the recess for receiving the contents. As a result, the overall dimensions of the container 105 may be somewhat greater than for the same size board 106. A board 106 may therefore be shorter than a container 105 of the same size number and the down folder plates 196 would then operate a slight distance from the ends of the board 106 rather than directly adjacent to the ends.

In order to accommodate these shorter packages, the down folder plates are provided with supplemental down folder bars 193 as shown in FIG. 5. Each of the bars 193 is provided with an end bracket 191 that is secured to the end of the supplemental down folder bar 193 and is pivotally carried by a pin 194 that is secured to the associated down folder plate 196 to render the bar 193 pivotable relative to the plate 196. Each of the brackets 191 is provided with a screw 184 that abuts the edge of the down folder plate 196 to serve as an adjustable stop for limiting the downward pivotal movement of the supplemental down folder bar 193.

In operation, when a package of normal length is being wrapped, the down folder plates 196 will pass downwardly directly adjacent to the ends of the package to perform their function and the supplemental down folder bars 193 will rest on top of the package, pivoting relative to the down folder plates 196 while the latter are moving downwardly. When the package is shorter than normal for the particular size setting of the machine, the supplemental down folder bars 193 will not strike the top of the package, but will move downwardly adjacent to the edge, to engage the extending ends 135 and draw them downwardly, the weight of the bars 135 being sufficient to perform this operation without being pivoted upwardly. The down folder bars 193 therefore serve to reduce the spacing between the two down folder plates 196 for operation upon packages that are shorter than normal for a particular size setting of the brackets 78 without interfering with the usual operation of the down folder plates 196 when operating upon packages of normal length.

It should be understood that as the down folders 60 are operating upon the extending ends 135, the package continues to travel along the length of the machine by reason of the operation of the conveyor 46. The now downwardly extending ends 135 are therefore moving toward the rear of the machine between the plates 196 and the two plates 138 and 139 as described. The two down folder plates 196 remain in this lower position to retain the extending ends 135 downwardly until the ends are engaged by a pair of under folder or in folder plates 205 and 206 which may be best seen in FIGS. 3 and 10. The under folder plates 205 and 206 serve to fold the now downwardly extending ends 135 to the underside of the package to the position shown in FIGS. 10 and 16, and each is carried by one of the brackets 78 for movement therewith so that their spacing will be adjusted to accommodate the particular size container or board being wrapped.

It will be observed from the view in FIG. 3 that the under folder plate 205 is provided with an inclined edge

14

207 while the under folder plate 206 is provided with a similar inclined edge 208. The edges 207 and 208 taper inwardly toward each other toward the rear of the machine for the purpose of progressively forming the under folding of the extending ends 135. The inclined edges 207 and 208 are located adjacent to the termination of the rails 136 and 137, and as the conveyor 46 moves the package off of the rails 136 and 137 onto the under folder plates 205 and 206, the now downwardly extending ends 135 are engaged by the inclined edges 207 and 208. As the conveyor continues to move the package onto the under folder plates 205 and 206, the inclined edges 207 and 208 operate to fold the extending ends 135 inwardly toward the center and to the underside of the package to the position shown in FIG. 10. The under folder plates 205 and 206 are both heated by suitable heating coils (not shown) to apply heat to the wrapping material for fusing its several folds together at the underside of the package.

As the inclined edges 207 and 208 move the extending ends 135 inwardly and upwardly to the underside of the package, there is a slight tendency for the package to rise. In order to avoid such rising of the package and to assure that the bottom of the tray has a firm contact with the surface of the plates 205 and 206, a pair of hold-downs 214 and 215 are provided as shown in FIG. 10. The hold-down 214 is mounted on the under folder plate 205 while the hold-down 215 is supported by the under folder plate 206 so that the hold-downs 214 and 215 move with the in folder plates 205 and 206 respectively for adjustment therewith to accommodate various size packages.

The hold-down plate 214 includes a plate 216 which presents an inclined surface 217. In like manner, the hold-down 215 is provided with a plate 218 that presents an inclined surface 219. As clearly shown in FIG. 10, the surfaces 217 and 219 of the hold-downs 214 and 215 respectively are upwardly inclined toward each other to overlie the edges of the container that is being wrapped as it is passing over the under folder plates 205 and 206. Therefore, any upward movement of the package resulting from the operation of the under folder plates 205 and 206 would cause the edges of the package to contact the inclined surfaces 217 and 218 which would interfere with the upward movement of the package.

Since the rear tuckers 69 tucked the trailing edges 154 of the extending ends 135 of the wrapping material inwardly, the wrapping material has been drawn tightly about the trailing corners of the tray prior to the operation of the down folders 60. However, no such tucking operation was performed on the leading edges 155 of the extending ends 135 prior to the operation of the down folders. Therefore, as the extending ends 135 are folded downwardly by the down folders 60, the wrapping material folds outwardly and forwardly of the tray at the leading corners of the tray to form two points 223 and 224 which lead the tray as it moves toward the rear of the machine. These two points 223 and 224, clearly shown in FIG. 14, would seriously detract from the appearance of the package and are therefore folded against the sides of the tray by a pair of front tuckers 225 and 226.

The front tuckers 225 and 226 perform their function as the package is being moved onto the in folder plates 205 and 206 and are therefore carried by these plates at their forward portion. The construction and operation of the front tuckers 225 and 226 is clearly depicted in FIG. 9 where three stages of the operation of the front tuckers are illustrated. The front tucker 225 is disposed on one side of the package to operate upon the point 223 of the wrapping material, while the front tucker 226 is disposed on the opposite side of the package to operate upon the point 224. The front tucker 225 is pivotally supported by a pin 227 that extends upwardly from the forward end of the under folder plate 205. A spring 228

is connected at one end to the front tucker 225 and is secured at its opposite end to a bolt that is carried by a bracket 229 which is also carried by the under folder plate 205.

The bolt 231 extends through a slot 232 formed in a support 233 that is carried by the bracket 229 and into threaded engagement with a suitable movable nut (not shown) at the underside of the support 233. The bolt 231 may be moved to either end of the slot 232, and when in the position shown in FIG. 3, extends the spring 228 to pivot the front tucker 225 in a counterclockwise direction as viewed in FIG. 3, against an abutment 234 to render the tucker operative. When thin packages are being wrapped, it may be desirable to render the front tucker inoperative by moving the bolt 231 to the opposite end of the slot 232 for removing the tension from the spring 228 and thereby permitting the front tucker 225 to pivot in a clockwise direction and remain in its inoperative position against an abutment 235.

With the bolt 231 in the position shown in FIG. 3, the front tucker 225 is disposed to normally lie in the path of travel of the package as it is being moved by the conveyor 46. The spring 228 yieldably opposes clockwise pivotal movement of the front tucker 225 as it is engaged by a moving package, and a front edge 230 of the front tucker 225 engages the point 223 of the wrapping material on the package and presses it inwardly against the container as the package moves past the front tucker.

The other front tucker 226 is identical in operation to the front tucker 225 but is disposed on the opposite side of the package for operation upon the point 224. The front tucker 226 is pivotally supported on a pin 236 that is secured to the in folder plate 206 and extends upwardly therefrom. A front edge 237 of the front tucker 226 normally lies in the path of movement of the package, and a spring 238 opposes counterclockwise pivotal movement of the front tucker 226 but yields when the front edge 237 is engaged by a package moving toward the rear of the machine.

The spring 238 is connected at one end to the front tucker 226 and at its opposite end to a bolt 239 which is identical to the bolt 231 of the other front tucker. The bolt 239 extends through a slot 240 formed in a support 241 and into threaded engagement with a movable nut (not shown) at the underside of the support 241. The bolt 239 may also be moved to either end of the slot 240, and when in the position shown in FIG. 3, extends the spring 238 to pivot the front tucker 226 in a clockwise direction as viewed in FIG. 3, against an abutment 247 to render the tucker operative. The tucker is rendered inoperative by moving the bolt 239 to the opposite end of the slot 240 for removing the tension from the spring 238 and thereby permitting the front tucker 226 to pivot in a counterclockwise direction and remain in its inoperative position against an abutment 248.

The operation of the front tuckers 225 and 226 is clearly shown in the three views of FIG. 9. In the first view on the left side of FIG. 9, the package is shown just before the points 223 and 224 move into contact with the front tuckers 225 and 226 respectively. It will be noted in this view that the down folder plates 196 are still in position along the downwardly extending ends 135 to retain them in their downward position. As the package moves towards the rear of the machine, the downwardly extending ends 135 move between the down folder plates 196 and the plates 138 and 139 as previously described. The points 223 and 224 of the wrapping material then move into contact with the front edges 230 and 237 of the front tuckers 225 and 226 respectively.

As the package moves towards the rear of the machine it causes a pivotal movement of the front tuckers 225 and 226 out of the path of travel of the package, with this pivotal movement of the front tuckers being effected against the force of the springs 228 and 238. The action

of the springs 228 and 238 causes the front tuckers 225 and 226 respectively to be firmly held against the leading corners and the outer sides of the container as the package is being moved. The points 223 and 224 of the wrapping material are therefore forced against the sides of the container so that the latter is neatly enclosed as illustrated in FIG. 15.

The mere movement of the points 223 and 224 against the side of the tray would not be sufficient to hold the fold after they pass the front tuckers 225 and 226. It is therefore necessary to bind the folds of wrapping material, and to this end, the front tuckers 225 and 226 are each heated by induction, receiving their heat from the hot under folder plates 205 and 206 upon which they are mounted. This serves to heat the tuckers to a degree sufficient to cause fusion of the folds of wrapping material that come in contact with them. If desired, separate heating coils may be furnished for heating the front tuckers 225 and 226 although this has been found to be unnecessary as sufficient heat will be supplied to them by the plates 205 and 206.

After the points 223 and 224 are tucked against the leading corners of the sides of the tray as shown in the central view in FIG. 9, the sides of the tray slide along the front edges 230 and 237 as shown in the right view of FIG. 9. These heated front edges 230 and 237 are forced against the sides of the tray by the action of the springs 228 and 238 to force the wrapping material against the sides of the tray and apply heat to the folds of wrapping material at this point to fuse the wrapping material together for binding the wrapping material and effecting a seal. Thus, the folds of wrapping material are fused together along the leading corners of the tray as well as along the sides of the tray.

A switch 242, shown in FIG. 3 controls the flow of electrical energy to the heating elements (not shown) disposed within the under folder plates 205 and 206 to heat the surfaces of the plates for the purpose of fusing the folds of wrapping material along the edges of the bottom of the tray which ride upon the in folder plates 205 and 206. Therefore, the heat of the front tuckers 225 and 226 and of the in folder plates 205 and 206 serves to fuse the wrapping material and bind the folds of it together along the outer sides of the tray as well as the edges of the bottom surface of the tray.

Since the in folder plates 205 and 206 must be spaced from each other in order to permit the operation of the conveyor 46, the extremities of the extending ends 135 of the wrapping material will still be extending downwardly in the manner shown in FIG. 10. In order to further move the extending ends toward the underside and center of the tray, a pair of angular plates 243 and 244 are supported by an upright 251 in spaced relationship, the upright 251 being mounted on the frame 25. The angular plate 243 presents an inclined surface 245 while the angular plate 244 presents an inclined surface 246 as clearly shown in FIG. 3. The inclined surfaces 245 and 246 are inclined toward each other to the rear of the machine and as the extending ends 135 of the wrapping material move over the inclined surfaces 245 and 246 the latter function to move these extending ends toward the center and to the underside of the tray.

The conveyor 46 continues to move the package off of the under folder plates 205 and 206 onto a hot plate 249 which is heated by a suitable heating element (not shown) energized by electrical current controlled by the switch 242. As the package is moved off of the under folder plates 205 and 206, the extending ends 135 are bound to the wrapping material along the outer edges of the bottom of the tray but the extremities of the extending ends 135 are still extending downwardly toward the center of the container as shown in FIG. 16. The movement of these extending ends 135 toward the underside and center of the container is continued by the operation of the angular plates 243 and 244 as described.

Further movement of the extending ends 135 to the underside and center of the container is performed by the edges of a triangular notch 250 formed in the hot plate 249 as clearly shown in FIG. 3. As the extending ends 135 move toward the apex of the triangular notch 250, the extending ends are moved inwardly and to the underside of the container by the inclined edges of the notch. The conveyor 46 moves the package through the notch 250 onto the flat surface of the hot plate 249 where the heat from the hot plate 249 serves to fuse the various folds of the wrapping material at the underside of the container together to securely bind and seal the package.

An effective seal of the folds of the wrapping material at the underside of the container is assured by the operation of the pressure plate 68 which drops downwardly upon the top of the package after it is positioned on the hot plate 249 to apply a light pressure upon it for forcing the bottom of the container into firm engagement with the top surface of the hot plate 249. This pressure upon the package causes the folds of the wrapping material at the underside of the container to be firmly pressed together when heat is being applied to them to fuse them together.

The construction of the pressure plates mechanism 68 may be best seen in FIGS. 1 and 3. The mechanism is actuated by the cam 67 which is keyed to rotate with the cam shaft 51 as previously described. As a package is moved onto the hot plate 249 by the conveyor 46, it is contacted by a foraminated plate 255 which is permitted to rest upon the package for a moment to apply the pressure. After the pressure is applied, the configuration of the cam surface of the cam 67 is such as to raise the plate off of the package and permit the transfer mechanism 80 to move the package off of the hot plate 249. When the succeeding package is placed upon the hot plate 249 by the conveyor 46, the cam 67 permits the foraminated plate 255 to drop by gravity to rest upon the top of the package to again apply pressure to it.

The plate 255 is carried by a bar 256 so that it is in alignment with the center of the machine in position to contact the packages moved onto the hot plate 249 by the conveyor 46. The bar 256 is supported by two pivot bars 257 and 258, each of which is connected at one end to the support bar 256 and extends rearwardly therefrom. The pivot bar 257 has its opposite end pivotally connected to an upstanding support 259 while the pivot bar 258 is pivotally connected at its rearward end to a similar upstanding support 260. The supports 259 and 260 are secured to the frame 25 and extend upwardly therefrom with the pivot bars 257 and 258 being connected to the upper ends of the supports 259 and 260 respectively as clearly shown in FIG. 1.

The pressure plate support bar 256 extends past the edge of the frame 25 as shown in FIG. 3, beyond the horizontal member 53, where its end is pivotally connected to one end of a connector bar 265 which extends downwardly from the support bar 256 for pivotal connection with a link 266. The link 266 is pivotally connected at its end opposite its pivotal connection with the connector 265 to a plate 267 which is mounted on the horizontal member 53 and extends upwardly therefrom. It is therefore apparent that the link 266 is pivotally connected at one end to the plate 267 and at its opposite end to the connector 265.

The link 266 is provided with a roller 268 which is rotatably supported by the link 266 in position to be engaged by the cam surface of the cam 67. As the larger radius of the cam 67 contacts the roller 268 it causes the link 266 to pivot upwardly about its connection with the plate 267. Such pivotal movement of the link 266 moves the support bar 256 upwardly by reason of its connection therewith through the connector 265. As the bar 256 moves upwardly, the foraminated plate 255 moves with it out of contact with the package on the hot plate 249 and the pivot bars 257 and 258 are also pivoted up-

wardly about their pivotal connections with the supports 259 and 260 respectively. As a succeeding package is moved onto the hot plate 249, the smaller radius of the cam 67 engages the roller 268 to permit the plate 255 to drop by gravity onto the package located on the hot plate 249 to apply pressure to it.

The position of the cam 67 on the cam shaft 51 is timed for coordination with the operation of the conveyor 46 so that the plate 255 drops onto each package that is placed upon the hot plate 249. After the pressure has been applied to a package by the pressure plate mechanism 68, and the plate 255 has been raised off of the package, the transfer mechanism 80 functions to move the completed package off of the hot plate 249 onto a cooling grid 275. As previously described, and as shown in FIG. 2, the pusher bar 96 is connected at one end to the chain 87 and at its opposite end to the chain 88 of the transfer mechanism. The loops of the chains 87 and 88 are located so that the pusher bar travels underneath the hot plate 249 when traveling through the lower length of the loop and then moves upwardly to pass over the top of the hot plate 249 as it moves in a direction toward the rear of the machine.

As the pusher bar 96 is moving over the top of the hot plate 249 it engages the completed package thereon to move it off of the hot plate 249 onto the cooling grid 275. Although sufficient heat must be applied to the underside of the package to fuse the folds of wrapping paper, it is imperative that this heat be dissipated in a minimum of time to prevent its transfer to the contents of the container that is being wrapped. Therefore, a fan 276 is located directly underneath the cooling grid 275 and operates to blow air to the underside of the package resting upon the grid 275 as clearly shown in FIG. 1. With this arrangement, the underside of the package is rapidly cooled so that the contents of the container are not heated. The operator may then remove the completed package off of the cooling grid 275 and place it on display for merchandising purposes.

Summarizing a cycle of operation, the operator places a container 105 with a sheet of wrapping material placed about it as described, upon the reception tables 125 between the rails 136 and 137. One of the pushers 50 of the conveyor 46 engages the package and moves it toward the rear of the machine and as the package is moving, the rear tuckers 69 operate to tuck the trailing edges 154 of the extending ends 135 of the sheet of wrapping material. After the rear tuckers have completed their operation, the down folders 60 move downwardly to engage the outwardly extending ends 135 and move them downwardly. While the down folders 60 are holding the extending ends 135 downwardly the conveyor 46 moves the package onto the under folder plates 205 and 206 for moving the extending ends inwardly and to the underside of the package.

As the package is moving onto the under folder plates 205 and 206, the front tuckers 225 and 226 operate to tuck the points 223 and 224 of the wrapping material against the sides of the container, and as the package moves along the front tuckers 225 and 226 the sides of the containers slide along the hot front tuckers 225 and 226 to fuse the paper that may be folded along the sides of the container. Heat is likewise applied to the outer edges of the bottom of the container by the hot under folder plates 205 and 206 to fuse the wrapping material together along these areas. Final movement of the extending ends 135 inwardly and to the underside of the container is performed by the angular plates 243 and 244 and the triangular notch 250.

As the pusher 50 of the conveyor 46 reaches the end of the top portion of its loop it pushes the package onto the hot plate 249 and the pusher then moves downwardly to return to the front of the machine along the lower length of its loop to engage another package. After the package is placed upon the hot plate 249, the pressure plate mechanism operates to allow the plate 255 to move down-

wardly to rest on the top of the package momentarily for applying pressure to it. The cam 67 then operates to lift the plate 255 and the transfer mechanism 80 functions to move the completed package off of the hot plate 249 onto the grid 275 where its bottom side is rapidly cooled by the operation of the grid in cooperation with the cooling fan 276. The operator then removes the completed package from the cooling grid 275 for display or storage purposes.

From the foregoing detailed description of the structure and operation of the illustrative embodiment of the present invention, it will be apparent that there has been provided a new and improved semi-automatic wrapping machine which is especially adapted to wrap a sheet of heat sensitive wrapping material about food or other merchandise which has been placed in containers or on flat boards to form a neat and efficiently sealed package which is particularly well suited to be placed on display in self-service food markets where the customers may conveniently select the desired package.

Although the illustrative embodiment of the invention has been described in considerable detail for the purpose of making a full disclosure of a practical operative structure by means of which the invention may be practised, it is to be understood that various novel features of the invention may be incorporated in other structural forms without departing from the spirit and scope of the invention as defined in the subjoined claims.

The principles of the invention having now been fully explained in connection with the foregoing description of the illustrative embodiment, the invention is hereby claimed as follows:

1. In an apparatus for wrapping an article in a sheet of heat sensitive wrapping material; a reception table for receiving the article to be wrapped with a sheet of wrapping material secured about the article, the wrapping material having two ends extending from two respective sides of the article; a source of power; a frame; a pair of brackets movably carried by said frame; actuating means operably connected to effect simultaneous movement of said brackets toward and away from each other for accommodating packages of different sizes; a conveyor supported by said frame centrally between said brackets and connected to be actuated by said source of power, said conveyor operating to engage the article on said reception table and move it through the machine for the completion of the wrapping operation; a pair of rear tuckers, each rotatably supported by one of said brackets and connected to be continuously rotated in a single direction by said source of power for tucking the trailing sides of the extending ends of the wrapping material inwardly to draw the wrapping material about the trailing corners of the package as the latter is being moved by said conveyor; a pair of down folders, each of said down folders being pivotally carried by one of said brackets and connected to be actuated in its pivotal movement by said source of power for moving the extending ends of the wrapping material downwardly; a pair of front tuckers, each of said front tuckers being pivotally supported by one of said brackets; a spring connected to each of said front tuckers to yieldably urge it in the path of travel of the package as the latter is being moved by the conveyor so that said front tuckers engage the two leading corners of the package to force the wrapping material against the two leading corners of the package; a pair of under folders, each of said under folders being carried by one of said brackets in position to receive the package as it is being moved by said conveyor so that the package is supported by said under folders with its underside in engagement therewith and as the package moves onto the under folders the latter function to move the downwardly extending ends of the wrapping material to the underside of the package; and a hot plate supported by said frame in position to receive the package as it is moved off of said under folders by the conveyor to complete the

folding of the wrapping material at the underside of the package and apply heat thereto for fusing the folds of wrapping material together and seal the package.

2. In an apparatus for wrapping an article in a sheet of heat sensitive wrapping material; a frame; a source of power; a conveyor supported by said frame and connected to be actuated by said source of power for moving the article to be wrapped through the machine for completion of the wrapping operation, said conveyor being adapted to receive the article to be wrapped with a sheet of wrapping material secured about it and having two ends of the wrapping material extending from two respective sides of the article; a pair of brackets movably carried by said frame with one of said brackets being located on each side of said conveyor; actuating means operably connected to effect simultaneous movement of said brackets toward and away from each other for accommodating packages of various sizes; a pair of rear tuckers, each of said rear tuckers being rotatably supported by one of said brackets and connected to be continuously rotated in the same direction by said source of power for tucking the trailing sides of the extending ends of the wrapping material inwardly and downwardly to draw the wrapping material about the trailing corners of the package; a pair of down folders, each of said down folders being pivotally carried by one of said brackets and connected to be actuated in its pivotal movement by said source of power for moving the extending ends of the wrapping material downwardly; a pair of front tuckers, each of said front tuckers being supported by one of said brackets for pivotal movement in a horizontal plane; a spring operatively connected to each of said front tuckers to yieldably urge it in its pivotal movement in the path of travel of the package as the latter is being moved by the conveyor so that said two front tuckers engage the two leading corners of the package to force the wrapping material against the two leading corners of the package; a pair of under folders, each of said under folders being carried by one of said brackets in position to receive the package as it is being moved by said conveyor so that the package is supported by said under folders with its underside in engagement therewith and as the package moves onto the under folders the latter function to move the downwardly extending ends of the wrapping material to the underside of the package; a hot plate supported by said frame in position to receive the package as it is moved off of said under folders by said conveyor to complete the folding of the wrapping material at the underside of the package and apply heat thereto for fusing the folds of wrapping material together and seal the package; and a pressure plate connected to be actuated by said source of power to apply pressure upon the package as it rests upon said hot plate to firmly press the folds at the underside of the package and form a tight seal.

3. In an apparatus for wrapping an article in a sheet of heat sensitive wrapping material; a frame; a source of power; a conveyor supported by said frame and connected to be actuated by said source of power for moving the article to be wrapped through the machine for completion of the wrapping operation, said conveyor being adapted to receive the article to be wrapped with a sheet of wrapping material secured about it and having two diagonally opposite corners extending from two respective sides of the article; a pair of brackets movably carried by said frame with one of said brackets being located on each side of said conveyor; actuating means operably connected to effect simultaneous movement of said bracket toward and away from each other for accommodating packages of various sizes; a pair of rear tuckers, each of said rear tuckers being rotatably supported by one of said brackets and connected to be continuously rotated in a single direction by said source of power for tucking the trailing sides of the extending ends of the wrapping material downwardly and inwardly to draw the wrapping

material about the trailing corners of the package; a pair of down folders, each of said down folders being pivotably carried by one of said brackets and connected to be actuated in its pivotal movement by said source of power for moving the extending ends of the wrapping material downwardly; a pair of front tuckers, each of said front tuckers being pivotably supported by one of said brackets; a spring connected to each of said front tuckers to yieldably urge it in the path of travel of the package as the latter is being moved by the conveyor so that the two front tuckers engage the two leading corners of the package to force the wrapping material against the two leading corners of the package; a pair of under folders, each of said under folders being carried by one of said brackets in position to receive the package as it is being moved by said conveyor so that the package is supported by said under folders with its underside in engagement therewith and as the package moves on to the under folders the latter function to move the downwardly extending ends of the wrapping material to the underside of the package; a hot plate supported by said frame in position to receive the package as it is moved off of said under folders by the conveyor to complete the folding of the wrapping material at the underside of the package and apply heat thereto for fusing the folds of wrapping material together and seal the package; a pressure plate connected to be actuated by said source of power to apply pressure upon the package as it rests upon said hot plate to firmly press the folds at the underside of the package and form a tight seal; a cooling grid supported by said frame adjacent to said hot plate for receiving the completed package from said hot plate to accelerate the cooling of the underside of the package; and a transfer mechanism operatively connected to be actuated by said source of power for transferring the completed package from said hot plate to said cooling grid.

4. In an apparatus for wrapping an article in a sheet of heat sensitive wrapping material; a frame; a source of power; a conveyor supported by said frame and connected to be actuated by said source of power for moving the article to be wrapped through the machine for completion of the wrapping operation, said conveyor being adapted to receive the article to be wrapped with a sheet of wrapping material secured about it and having two ends of the wrapping material extending from two respective sides of the article; a pair of rear tuckers carried by said frame in spaced relationship with their spacing being adjustable for accommodating packages of various sizes, said rear tuckers being connected to be continuously rotated in the same direction by said source of power for tucking the trailing sides of the extending ends of the wrapping material downwardly and inwardly to draw the wrapping material about the trailing corners of the package as the package is being moved by said conveyor; and a pair of folding means carried by said frame in spaced relationship with one folding means on each side of said conveyor so that each may operate on one of the extending ends of the wrapping material, the spacing of said folding means being adjustable to accommodate packages of various sizes, said folding means being operative to fold the extending ends of the wrapping material downwardly and to the underside of the package while the package is being moved by said conveyor.

5. In an apparatus for wrapping an article in a sheet of heat sensitive wrapping material; a frame; a source of power; a conveyor supported by said frame and connected to be actuated by said source of power for moving the article to be wrapped through the machine for completion of the wrapping operation, said conveyor being adapted to receive the article to be wrapped with a sheet of wrapping material secured about it and having two ends of the wrapping material extending from two respective sides of the article; a pair of rear tuckers carried by said frame in spaced relationship with their

spacing being adjustable for accommodating packages of various sizes, said rear tuckers being connected to be continuously rotated in the same direction by said source of power for tucking the trailing sides of the extending ends of the wrapping material downwardly and inwardly to draw the wrapping material about the trailing corners of the package as the package is being moved by said conveyor; a pair of folding means carried by said frame in spaced relationship with one folding means on each side of said conveyor so that each may operate on one of the extending ends of the wrapping material, the spacing of said folding means being adjustable to accommodate packages of various sizes, said folding means being operative to fold the extending ends of the wrapping material downwardly and to the underside of the package while the package is being moved by said conveyor; a hot plate supported by said frame in position to receive the package from said conveyor after said folding means have completed their operation on the wrapping material, said hot plate functioning to apply heat to the underside of the package for fusing the folds of wrapping material together at the underside of the package to seal the package; a cooling grid supported by said frame adjacent to said hot plate for receiving the completed package from said hot plate to accelerate the cooling of the underside of the package; and a transfer mechanism operatively connected to be actuated by said source of power for transferring the completed package from said hot plate to said cooling grid.

6. In an apparatus for wrapping an article in a sheet of heat sensitive wrapping material; a frame; a source of power; a conveyor supported by said frame and connected to be actuated by said source of power for moving the article to be wrapped through the machine for completion of the wrapping operation, said conveyor being adapted to receive the article to be wrapped with a sheet of wrapping material secured about it and having two ends of the wrapping material extending from two respective sides of the article; a pair of brackets movably carried by said frame with one of said brackets being located on each side of said conveyor; actuating means operably connected to effect simultaneous movement of said brackets toward and away from each other for accommodating packages of various sizes; a pair of rear tuckers, each of said rear tuckers being supported by one of said brackets and being connected to be continuously rotated in the same direction by said source of power for tucking the trailing sides of the extending ends of the wrapping material inwardly and downwardly to draw the wrapping material about the trailing corners of the package as the package is being moved by said conveyor; folding means carried by said brackets and operative to fold the extending ends of the wrapping material downwardly and to the underside of the package while the package is being moved by said conveyor; and a hot plate supported by said frame in position to receive the package from said conveyor after said folding means have completed their operation on the wrapping material, said hot plate functioning to apply heat to the underside of the package for fusing the folds of wrapping material together at the underside of the package to seal the package.

7. In an apparatus for wrapping an article in a sheet of heat sensitive wrapping material; a frame; a source of power; a conveyor supported by said frame and connected to be actuated by said source of power for moving the article to be wrapped through said machine for completion of the wrapping operation, said conveyor being adapted to receive the article to be wrapped with a sheet of wrapping material secured about it and having two ends of the wrapping material extending from two respective sides of the article; a pair of brackets movably carried by said frame with one of said brackets being located on each side of said conveyor; actuating means operably connected to effect simultaneous movement of said brackets toward and away from each other for accom-

modating packages of various sizes; a pair of rear tuckers, each of said rear tuckers being supported by one of said brackets and being connected to be continuously rotated in a single direction by said source of power for tucking the trailing sides of the extending ends of the wrapping material inwardly and downwardly to draw the wrapping material about the trailing corners of the package as the package is being moved by said conveyor; folding means carried by said brackets and operative to fold the extending ends of the wrapping material downwardly and to the underside of the package while the package is being moved by said conveyor; a hot plate supported by said frame in position to receive the package from said conveyor after said folding means have completed their operation on the wrapping material, said hot plate functioning to apply heat to the underside of the package for fusing the folds of the wrapping material together at the underside of the package; and a pressure plate supported by said frame and operatively connected to be actuated by said source of power in a reciprocatory movement to engage the top of the package on said hot plate when said pressure plate is moved downwardly for applying pressure to the package against said hot plate to press the folds at the underside of the package firmly together and effectively seal the package.

8. In an apparatus for wrapping an article in a sheet of heat sensitive wrapping material; a frame; a source of power; a conveyor supported by said frame and connected to be actuated by said source of power for moving the article to be wrapped through said machine for completion of the wrapping operation, said conveyor being adapted to receive the article to be wrapped with a sheet of wrapping material secured about it and having two ends of the wrapping material extending from two respective sides of the article; a pair of brackets movably carried by said frame with one of said brackets being located on each side of said conveyor; actuating means operatively connected to effect simultaneous movement of said brackets toward and away from each other for accommodating packages of various sizes; a pair of rear tuckers, each of said rear tuckers being supported by one of said brackets and being connected to be continuously rotated in the same direction by said source of power for tucking the trailing sides of the extending ends of the wrapping material inwardly and downwardly to draw the wrapping material about the trailing corners of the package as the package is being moved by said conveyor; folding means carried by said brackets and operative to fold the extending ends of the wrapping material downwardly and to the underside of the package while the package is being moved by said conveyor; a hot plate supported by said frame in position to receive the package from said conveyor after said folding means have completed their operation on the wrapping material, said hot plate functioning to apply heat to the underside of the package for fusing the folds of the wrapping material together at the underside of the package; a pressure plate supported by said frame and operatively connected to be actuated by said source of power in a reciprocatory movement to engage the top of the package on said hot plate as said pressure plate moves downwardly to apply pressure to the package against said hot plate for pressing the folds of wrapping material at the underside of the package firmly together and effectively seal the package; a cooling grid supported by said frame adjacent to said hot plate in position to receive the completed package from said hot plate for rapidly dissipating the heat received from said hot plate at the underside of the package; and a transfer mechanism connected to be actuated by said source of power for transferring the completed package from said hot plate to said cooling grid.

9. In an apparatus for wrapping an article in a sheet of heat sensitive wrapping material; a frame; a source of power; a pair of brackets movably carried by said frame; actuating means operably connected to effect simulta-

neous movement of said brackets toward and away from each other for accommodating packages of different sizes; a conveyor supported by said frame centrally between said brackets and connected to be actuated by said source of power for moving the article to be wrapped through the machine for completion of the wrapping operation, said conveyor being adapted to receive the article to be wrapped with a sheet of wrapping material secured about it and having two ends of the wrapping material extending from two respective sides of the article; a pair of arms connected to be rotated in the same direction simultaneously by said source of power, each of said arms being rotatably supported by one of said brackets so that their spacing may be adjusted by varying the spacing of said brackets, the two arms being in alignment with each other transversely of the machine; a tucker plate pivotably supported by each of said arms for movement with said arms as the latter rotate and for pivotal movement relative to said arms in a plane parallel to the plane of rotation of said arms; an abutment roller carried by each of said brackets adjacent to each of said tucker plates in position to be contacted by said tucker plates as the latter move with said rotating arms to cause said tucker plates to pivot relative to said arms in the direction of rotation of said arms to accelerate the movement of the upper extremities of said tucker plates so that the upper extremities of said tucker plates will engage the trailing sides of the extending ends of the wrapping material and move them inwardly and downwardly to draw the wrapping material about the trailing corners of the package as the latter is being moved by said conveyor; and folding means carried by said brackets and operative to fold the extending ends of the wrapping material downwardly and to the underside of the package while the package is being moved by said conveyor.

10. In an apparatus for wrapping an article in a sheet of heat sensitive wrapping material; a frame; a source of power; a pair of brackets movably carried by said frame; actuating means operably connected to effect simultaneous movement of said brackets toward and away from each other for accommodating packages of different sizes; a conveyor supported by said frame centrally between said brackets and connected to be actuated by said source of power for moving the article to be wrapped through the machine for completion of the wrapping operation, said conveyor being adapted to receive the article to be wrapped with a sheet of wrapping material secured about it and having two ends of the wrapping material extending from two respective sides of the article; a pair of arms connected to be rotated in the same direction simultaneously at a uniform rate by said source of power, each of said arms being rotatably supported by one of said brackets so that their spacing may be adjusted by varying the spacing of said brackets, the two arms being in alignment with each other transversely of the machine; a tucker plate pivotably supported by each of said arms for movement with said arms as the latter rotate and for pivotal movement relative to said arms in a plane parallel to the plane of rotation of said arms; an abutment roller carried by each of said brackets adjacent to each of said tucker plates in a position to be contacted by said tucker plates as the latter move with said rotating arms to cause said tucker plates to pivot relative to said arms in the direction of rotation of said arms to accelerate the movement of the upper extremities of said tucker plates so that the upper extremities of said tucker plates will engage the trailing sides of the extending ends of the wrapping material and move them inwardly and downwardly to draw the wrapping material about the trailing corners of the package as the latter is being moved by said conveyor; folding means carried by said brackets and operative to fold the extending ends of the wrapping material downwardly and to the underside of the package while the package is being moved by said conveyor; a hot plate supported by said frame in position to

receive the package from said conveyor after said folding means have completed their operation on the wrapping material, said hot plate functioning to apply heat to the underside of the package for fusing the folds of the wrapping material together at the underside of the package; and a pressure plate supported by said frame and operatively connected to be actuated by said source of power in a reciprocatory movement to engage the top of the package on said hot plate as said pressure plate moves downwardly to apply pressure to the package against said hot plate for pressing the folds at the underside of the package firmly together and effectively seal the package.

11. In an apparatus for wrapping an article in a sheet of heat sensitive wrapping material; a frame; a source of power; a pair of brackets movably carried by said frame; actuating means operatively connected to effect simultaneous movement of said brackets toward and away from each other for accommodating packages of different sizes; a conveyor supported by said frame centrally between said brackets and connected to be actuated by said source of power for moving the article to be wrapped through the machine for completion of the wrapping operation, said conveyor being adapted to receive the article to be wrapped with a sheet of wrapping material secured about it and having two ends of the wrapping material extending from two respective sides of the article; a pair of arms connected to be rotated in one direction simultaneously at a uniform rate by said source of power, each of said arms being rotatably supported by one of said brackets so that their spacing may be adjusted by varying the spacing of said brackets, the two arms being in alignment with each other transversely of the machine; a tucker plate pivotably supported by each of said arms for movement with said arms as the latter rotate and for pivotal movement relative to said arms in a plane parallel to the plane of rotation of said arms; an abutment roller carried by each of said brackets adjacent to each of said tucker plates in position to be contacted by said tucker plates as the latter rotate bodily with said rotating arms to cause said tucker plates to pivot relative to said arms in the direction of rotation of said arms to accelerate the movement of the upper extremities of said tucker plates so that the upper extremities of said tucker plates will engage the trailing sides of the extending ends of the wrapping material and move them inwardly and downwardly to draw the wrapping material about the trailing corners of the package as the latter is being moved by said conveyor; folding means carried by said brackets and operative to fold the extending ends of the wrapping material downwardly and to the underside of the package while the package is being moved by said conveyor; a hot plate supported by said frame in position to receive the package from said conveyor after said folding means have completed their operation on the wrapping material, said hot plate functioning to apply the heat to the underside of the package for fusing the folds of wrapping material together at the underside of the package; a pressure plate supported by said frame and operatively connected to be actuated by said source of power in a reciprocatory movement to engage the top of the package on said hot plate as said pressure plate moves downwardly to apply pressure to the package against said hot plate for pressing the folds at the underside of the package firmly together and effectively seal the package; a cooling grid supported by said frame adjacent to said hot plate in position to receive the completed package from said hot plate for rapidly dissipating the heat received from said hot plate at the underside of the package; and a transfer mechanism connected to be actuated by said source of power for engaging the completed package after it has been released by said pressure plate and transferring the completed package from said hot plate to said cooling grid.

12. In an apparatus for wrapping an article in a sheet of heat sensitive wrapping material; a frame; a source of

power; a conveyor supported by said frame and connected to be actuated by said source of power for moving the article to be wrapped through the machine for completion of the wrapping operation, said conveyor being adapted to receive the article to be wrapped with a sheet of wrapping material secured about it and having two ends of the wrapping material extending from two respective sides of the article; a pair of rear tuckers; each of said rear tuckers being rotatably supported by said frame in spaced relationship so that each may operate on one of the extending ends of the wrapping material, each of said rear tuckers being connected to be continuously rotated in the same direction by said source of power in position to engage the trailing sides of the extending ends of the wrapping material as they rotate to move such trailing sides downwardly and inwardly to thereby draw the wrapping material about the trailing corners of the package; a pair of down folders pivotably carried by said frame in spaced relationship so that each may operate on one of the extending ends of the wrapping material, said down folders being connected to be actuated in their pivotal movement by said source of power to engage the extending ends of the wrapping material and move them downwardly; a pair of front tuckers, each of said front tuckers being supported by said frame for pivotal movement in a horizontal plane and in spaced relationship for location on either side of the package as it is moved in its path of travel by said conveyor, a spring operatively connected to each of said front tuckers to yieldably urge said front tuckers in their pivotal movement in the path of travel of the package as the latter is being moved by the conveyor so that said two front tuckers engage the two leading corners of the package to force the wrapping material against the two leading corners of the package; a pair of under folders carried by said frame in spaced relationship to receive the package as it is being moved by said conveyor so that each of the two side edges of the underside of the package rest upon one of the under folders and as the package moves onto the under folders the latter function to move the downwardly extending ends of the wrapping material to the underside of the package; and a hot plate supported by said frame in position to receive the package as it is moved off of said under folders by said conveyor to complete the folding of the wrapping material at the underside of the package and apply heat thereto for fusing the folds of wrapping material together to seal the package.

13. In an apparatus for wrapping an article in a sheet of wrapping material; a frame; a source of power; a rectilinear conveyor supported by said frame and connected to be actuated by said source of power for continuously moving the article to be wrapped through the machine for completion of the wrapping operation, said conveyor comprising laterally spaced tracks which slidably support opposite side margins of the article and between which portions of the underside of the article intermediate said side margins are exposed, said conveyor being adapted to receive the article to be wrapped with a sheet of wrapping material secured about it and having two ends of the wrapping material extending substantially horizontally from two opposite sides of the article; a pair of down folders, each of said down folders being pivotably carried by said frame in position to engage one of the extending ends of the wrapping material when actuated in their pivotal movement to move the extending ends of the wrapping material downwardly into substantially vertical planes while the article is being moved by said conveyor, said down folders being connected to be actuated in their pivotal movement by said source of power; and a pair of under folders rigidly supported by said frame on either side of said conveyor in position to be engaged by the article as it is being moved by said conveyor after said down folders have moved the extending ends of the wrapping material downwardly, said under folders being located in the path of travel of the downwardly ex-

tending ends to force them against the said exposed portions of the article being wrapped as the conveyor moves the article past said under folders; whereby the extending ends of the wrapping material are folded against the exposed underside of the article to form a neat package.

14. In an apparatus for wrapping an article in a sheet of wrapping material; a frame; a source of power; a conveyor supported by said frame and connected to be actuated by said source of power for moving the article to be wrapped through the machine for completion of the wrapping operation, said conveyor being adapted to receive the article to be wrapped with a sheet of wrapping material secured about it and having two ends of the wrapping material extending substantially horizontally from two opposite sides of the article; a pair of rear tuckers movably carried by said frame in spaced relationship and connected to be actuated by said source of power in an arcuate movement to engage the trailing sides of the extending ends of the wrapping material and move the trailing sides downwardly and inwardly to draw the wrapping material about the trailing corners of the package as the latter is being moved by said conveyor; a pair of down folders, each of said down folders being pivotably carried by said frame in position to engage one of the extending ends of the wrapping material when actuated in their pivotal movement to move the extending ends of the wrapping material downwardly into substantially vertical planes, said down folders being connected to be actuated in their pivotal movement by said source of power; a pair of front tuckers pivotally supported by said frame in spaced relationship with each front tucker being located on one side of the path of travel of the article being wrapped as it is being moved by said conveyor, said front tuckers being yieldably urged in their pivotal movement into the path of travel of the article being wrapped so that they are pivoted out of the path of travel of the article by the article as it is moved by said conveyor, said front tuckers thereby engaging the leading corners of the article to force the wrapping material against the two leading corners of the package; and a pair of under folders rigidly supported by said frame on either side of said conveyor in position to be engaged by the article as it is being moved by said conveyor after said down folders have moved the extending ends of the wrapping material downwardly, said under folders being located in the path of travel of the downwardly extending ends to force them to the underside of the article being wrapped as the conveyor moves the article past said under folders; whereby the extending ends of the wrapping material are folded to the underside of the article and the wrapping material is drawn firmly about the four corners of the article being wrapped to form a neat package.

15. In an apparatus for wrapping an article in a sheet of heat sensitive wrapping material; a frame; a source of power; a conveyor supported by said frame and connected to be actuated by said source of power for moving the article to be wrapped from the forward end of the machine toward the rear of the machine for completion of the wrapping operation, said conveyor being adapted to receive the article to be wrapped with a sheet of wrapping material secured about it and having two ends of the wrapping material extending substantially horizontally from two opposite sides of the article; a pair of guide rails mounted on said frame in spaced relationship with each guide rail being located on one side of said conveyor in position to support the article being wrapped and guide it in its path of travel as it is being moved by said conveyor; a pair of down folders, each of said down folders being pivotably carried by said frame in position to engage one of the extending ends of the wrapping material when actuated in their pivotal movement to move the extending ends of the wrapping material downwardly into substantially vertical planes along the outer edge of said guide rails; said down folders being connected to be actuated in their pivotal movement by said

source of power; and a pair of heated under folders rigidly supported by said frame with each of said under folders being in longitudinal alignment with one of said guide rails with a space between the rear ends of said guide rails and the forward ends of said under folders, the forward ends of said under folders adjacent to the rear ends of said guide rails being inclined inwardly toward each other and in the path of travel of the downwardly extending ends of the wrapping material so that as said conveyor moves the article off of the rear end of said guide rails the downwardly extending ends of the wrapping material engage the inclined ends of said under folders and are progressively forced inwardly to the underside of the article from their location outside of said guide rails as established by said down folders, the extending ends of the wrapping material passing through the space between the rear end of said guide rails and the inclined end of said under folders while the latter are moving the extending ends to the underside of the article; whereby the extending ends of the wrapping material are folded to the underside of the article to form a neat package.

16. In an apparatus for wrapping an article in a sheet of heat sensitive wrapping material; a frame; a source of power; a conveyor supported by said frame and connected to be actuated by said source of power for moving the article to be wrapped through the machine for completion of the wrapping operation, said conveyor being adapted to receive the article to be wrapped with a sheet of wrapping material extending from two respective sides of the article; a pair of folding means connected to be actuated by said source of power and carried by said frame in spaced relationship with one folding means on each side of said conveyor so that each may operate on one of the extending ends of the wrapping material, the spacing of said folding means being adjustable to accommodate packages of various sizes, said folding means being operative to fold the extending ends of the wrapping material downwardly and to the underside of the package while the package is being moved by said conveyor; a hot plate supported by said frame in position to receive the package from said conveyor after said folding means have completed their operation on the wrapping material, said hot plate functioning to apply heat to the underside of the package for fusing the folds of the wrapping material together at the underside of the package; a pressure plate supported by said frame and operatively connected to be actuated by said source of power in a reciprocatory movement to engage the top of the package on said hot plate as said pressure plate moves downwardly to apply pressure to the package against said hot plate for pressing the folds of wrapping material at the underside of the package firmly together and effectively seal the package; and a transfer mechanism connected to be actuated by said source of power for transferring the completed package from said hot plate after said pressure plate has applied pressure to the package.

17. A semi-automatic wrapping machine comprising a conveyor adapted to receive a partially wrapped package from the ends of which partially folded wing portions of wrapping film extend horizontally and laterally, paired folding blades, means on which said blades are guided for movement in vertical planes past the ends of said package to fold said wing portions to extend substantially vertically, and converging blades between which said conveyor passes said wing portions for folding said wing portions against the bottom of the package and into overlapping relation.

18. The device of claim 17 in which said conveyor includes laterally spaced, laterally adjustable tracks on which oppositely disposed margins of the package are slidably supported, said folding blades moving in planes disposed exteriorly of said tracks whereby the tracks intervene between the package ends and the vertically folded wing portions, said tracks having converging end portions complementary to the converging blades aforesaid and

29

spaced therefrom whereby said wing portions pass through said spaces in the course of being folded by said converging blades into intimate relation to the ends of the package.

19. A package conveyor for a wrapping machine having means for folding a wrapping film about a package on the conveyor, said conveyor including tracks laterally spaced to slidably support opposed package margins, said tracks being longitudinally discontinuous to provide inwardly converging passage ways through which wrapping film portions folded partially around the package and against the outside edges of the tracks will pass to the inside of said tracks for intimate contact with the package.

20. The device of claim 19 in combination with means beyond said passage ways for folding said wrapping film portions against the bottom of said package.

21. A wrapping machine comprising a continuously moving conveyor for a series of partially wrapped packages from the ends of which partially folded wing portions of wrapping film extend horizontally and laterally, paired rear tucking means at opposite sides of said conveyor for tucking the rear ends of said wings as the conveyor carries the packages past said rear tucking means, paired folding means at opposite sides of the conveyor for folding the wing portions downwardly past the ends of said package, paired front tucking means at opposite sides of the conveyor for tucking the forward edges of said

30

wings, and underfolding means disposed at opposite sides of said conveyor for folding up against the bottom of the packages the downwardly extending wing portions, the respective means aforesaid being disposed in longitudinally spaced relation along said conveyor for successive coaction with the package wings aforesaid.

22. The device of claim 21 in further combination with a heat sealing plate at the end of said conveyor and over which the conveyor discharges said package.

23. The device of claim 22 in further combination with a second conveyor adjacent the heat sealing plate for discharging said package from the heat sealing plate.

References Cited in the file of this patent

UNITED STATES PATENTS

1,187,696	Armstrong	June 20, 1916
1,646,497	Sandberg	Oct. 25, 1927
1,851,295	Schmitt	Mar. 29, 1932
1,965,324	Tindal et al.	July 3, 1934
2,050,818	Van Buren	Aug. 11, 1936
2,336,795	Malhiot	Dec. 14, 1943
2,605,597	Schieb	Aug. 5, 1952
2,723,516	Malhiot	Nov. 15, 1955
2,760,317	Cornock et al.	Aug. 28, 1956
2,783,600	Olson	Mar. 5, 1957
2,926,473	Byland	Mar. 1, 1960