May 4, 1954 E. TORUDD ET AL 2,677,318

METHOD AND MACHINE FOR MANUFACTURING CONTAINER COVERS OR LIDS OF PAPER

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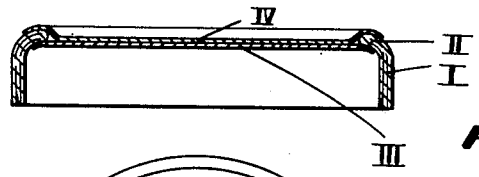


FIG. 1

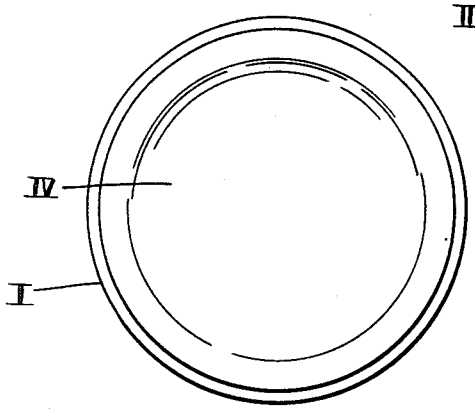


FIG. 2

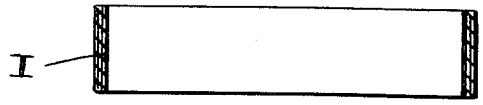


FIG. 3

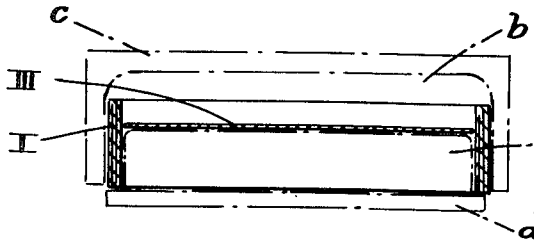


FIG. 4

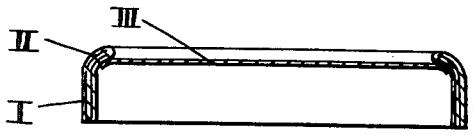


FIG. 5

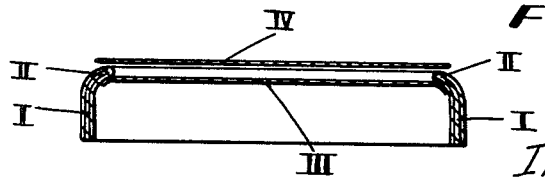


FIG. 6

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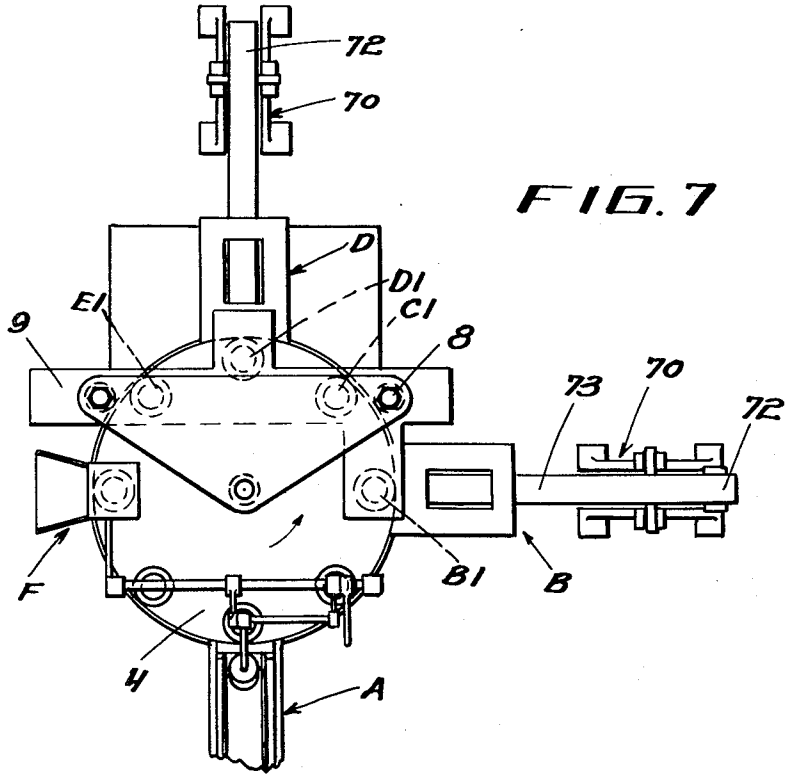


FIG. 7

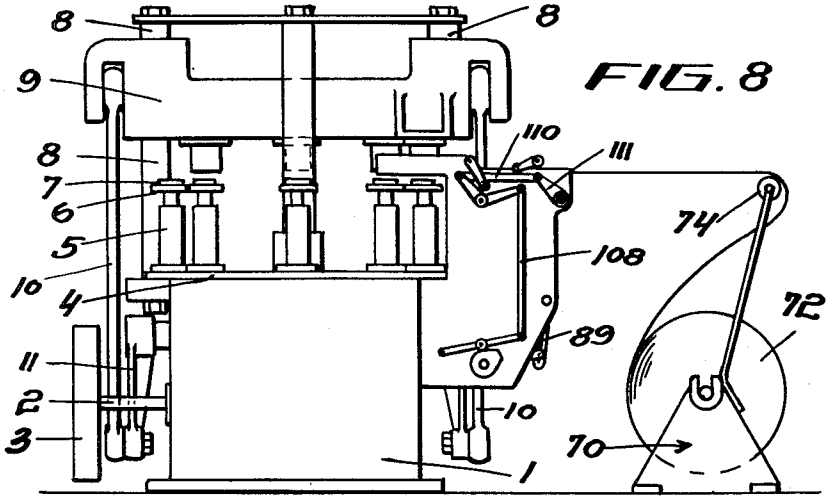


FIG. 8

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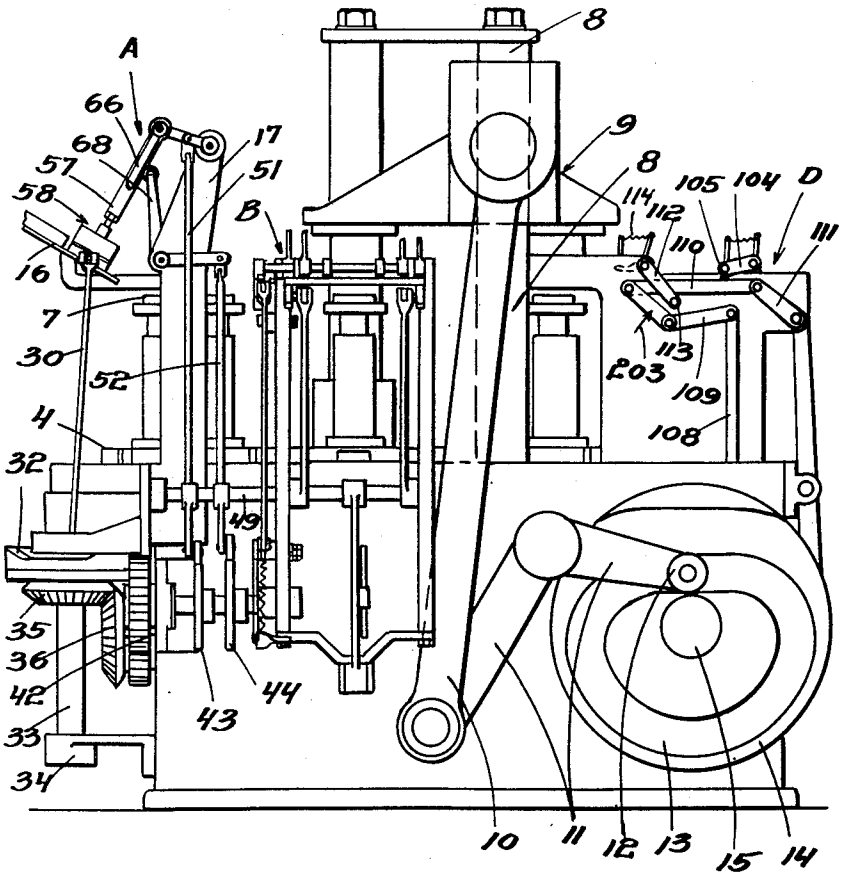


FIG. 9

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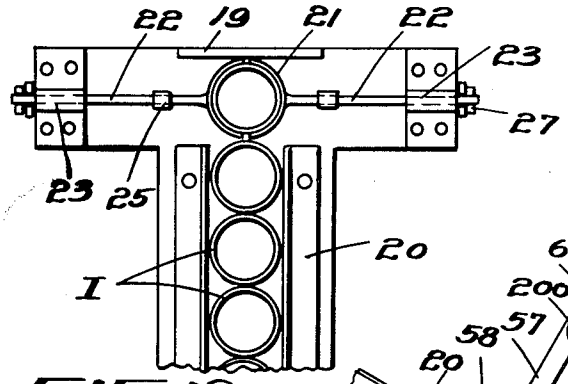


FIG. 12

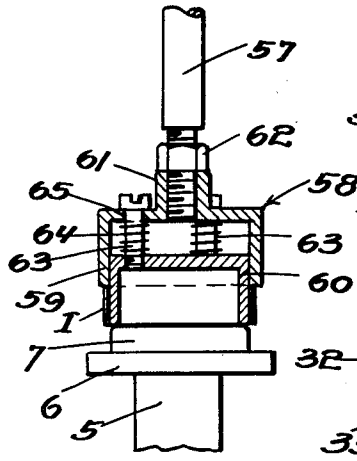


FIG. 13

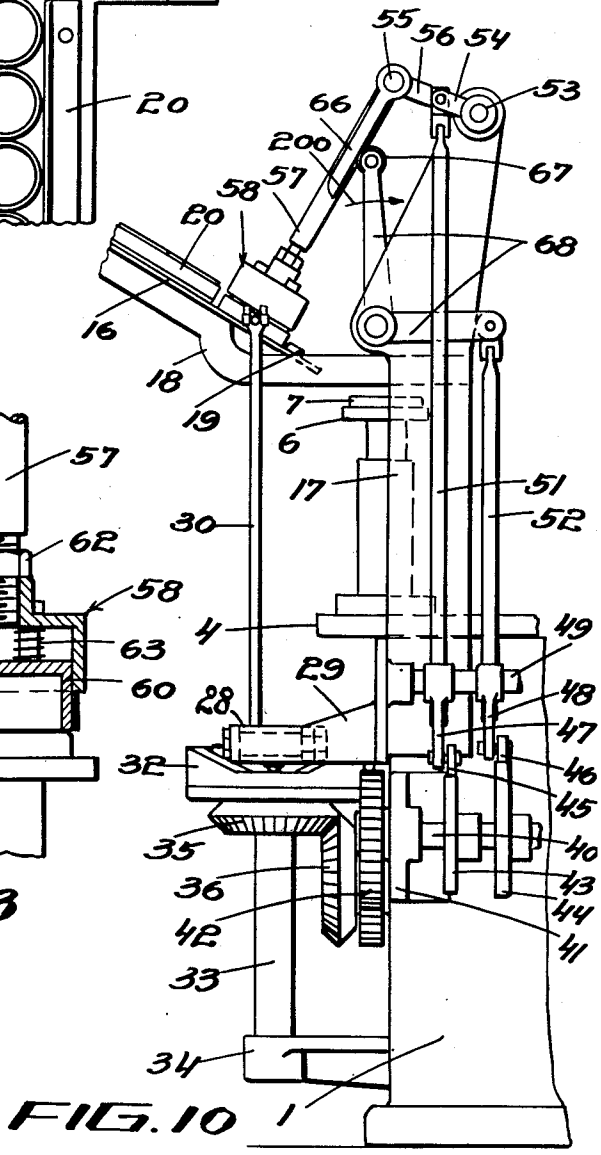


FIG. 10

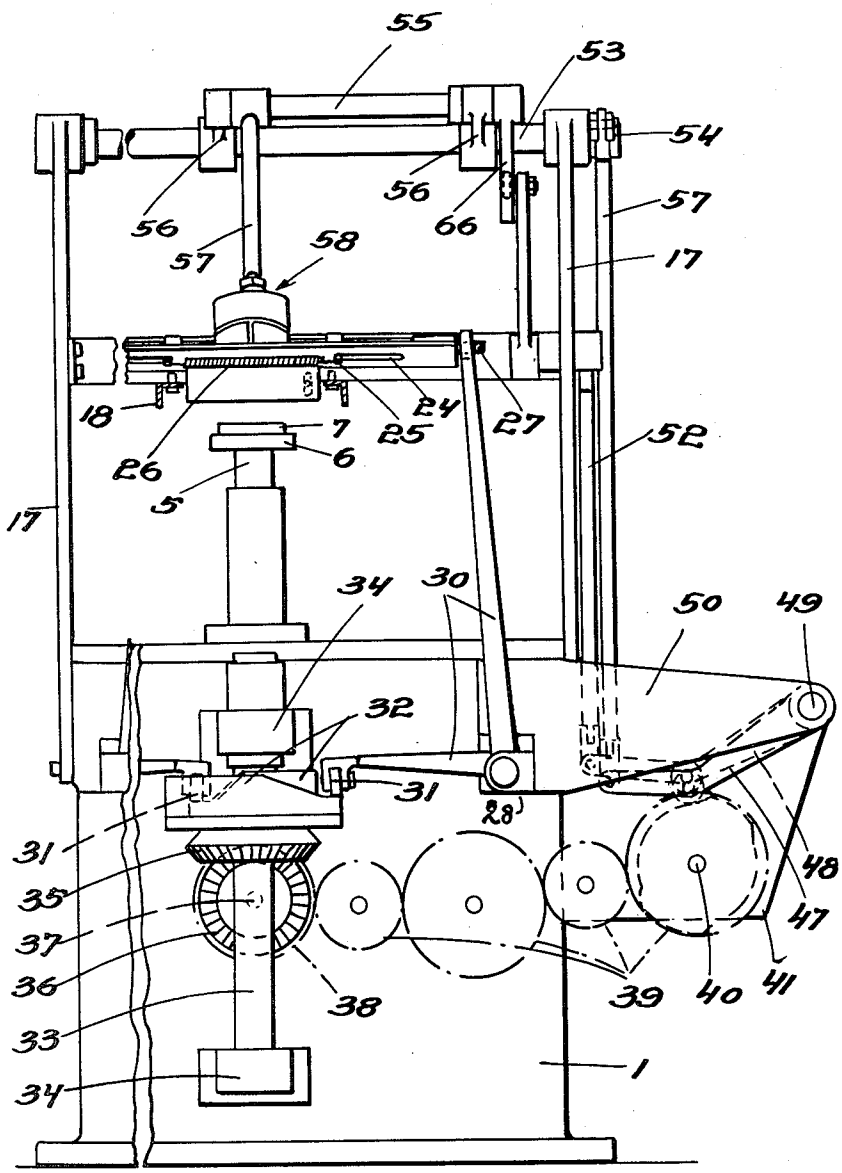
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FIG. 11



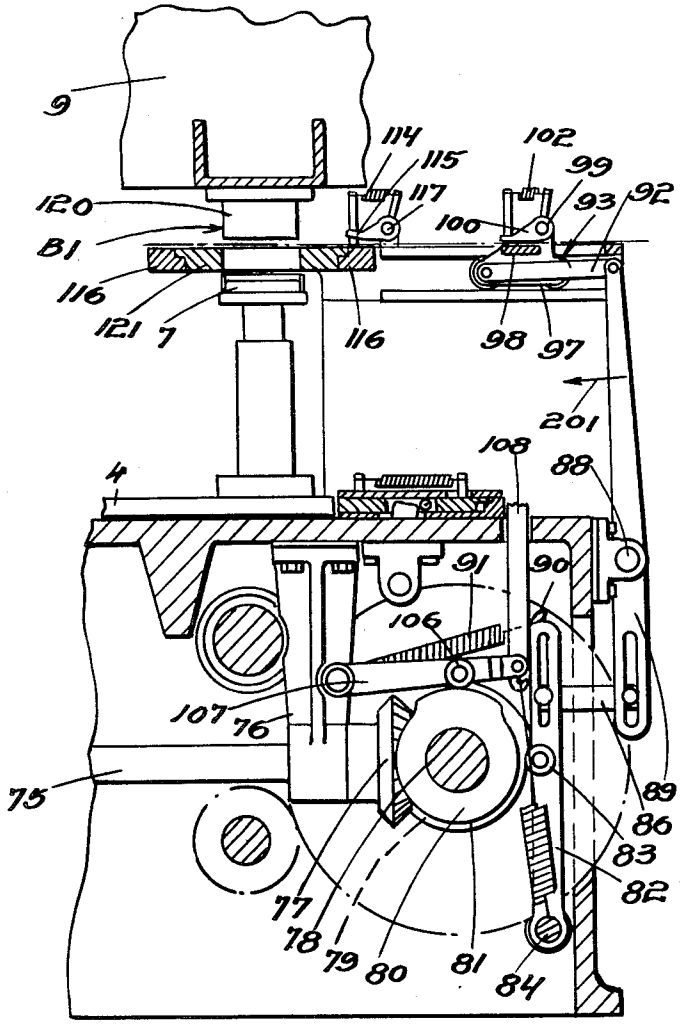
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FIG. 14



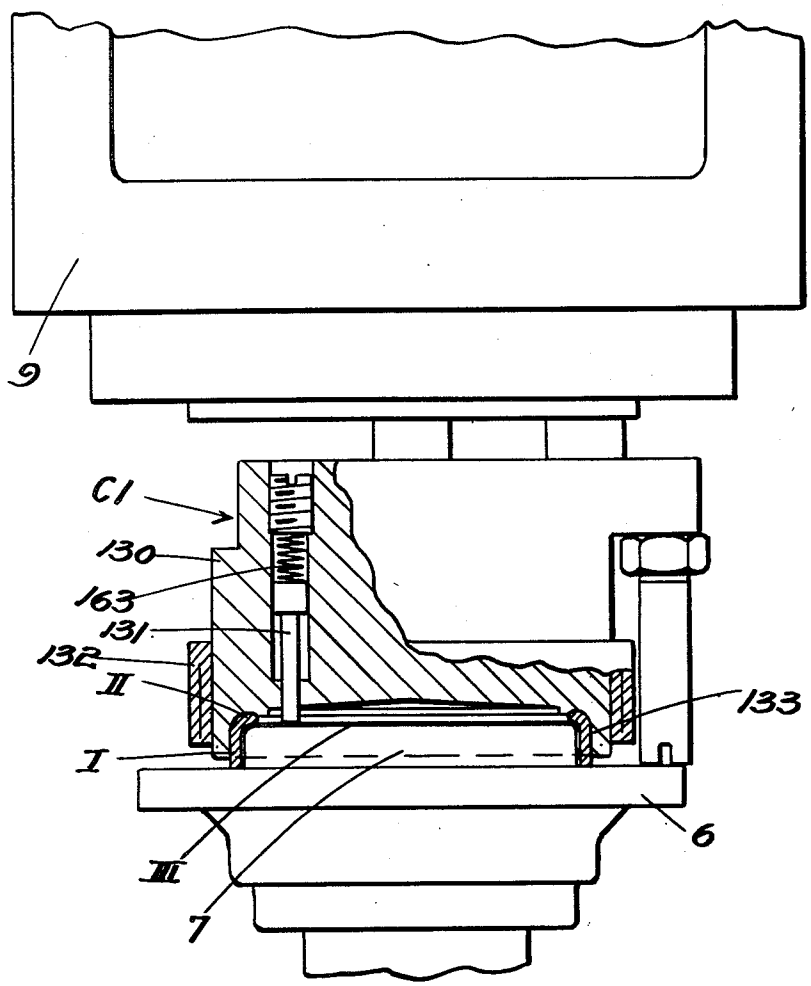
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FIG. 15



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FIG. 16

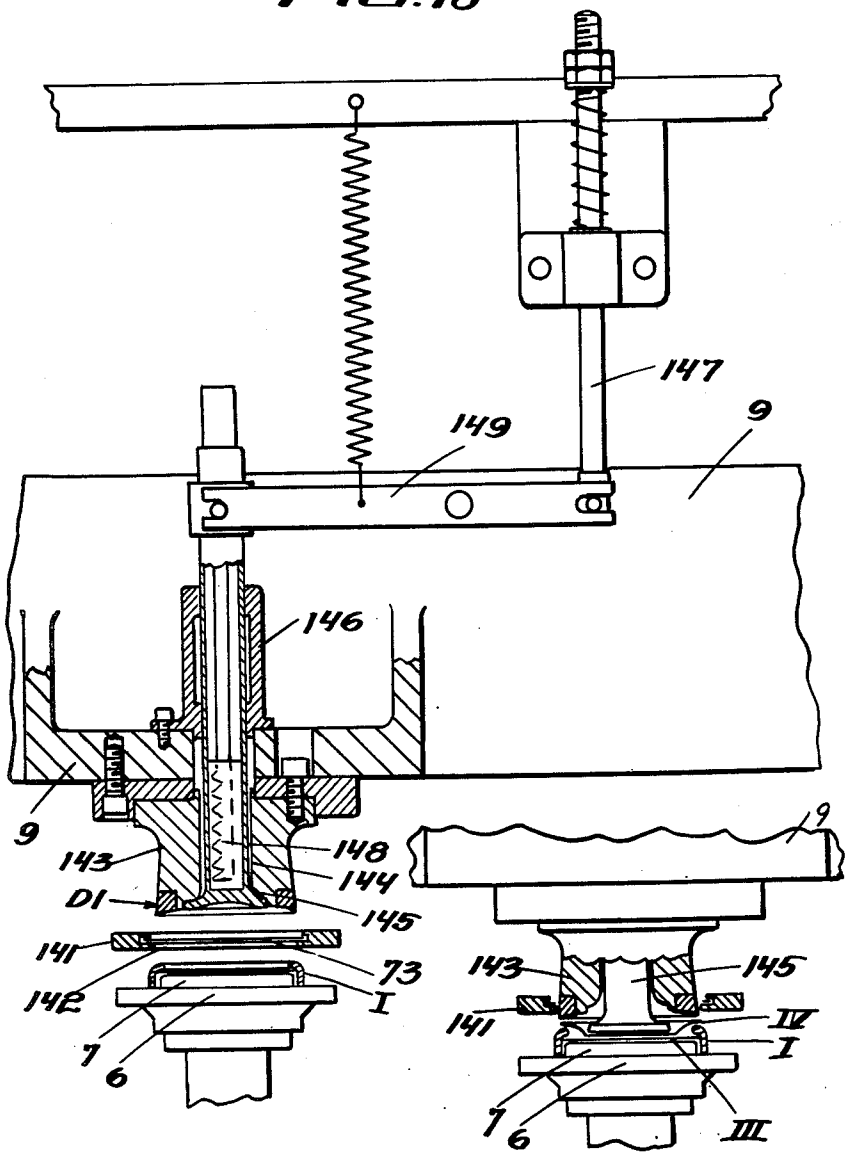


FIG. 17

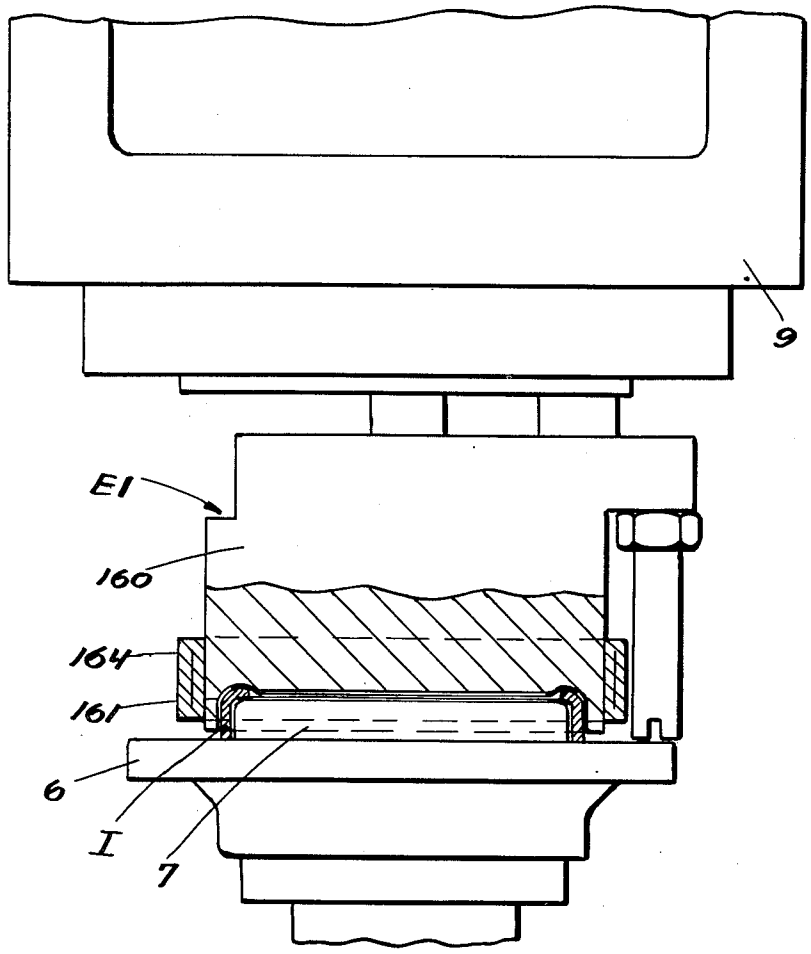
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FIG. 18



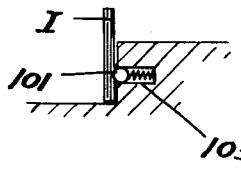
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FIG. 21



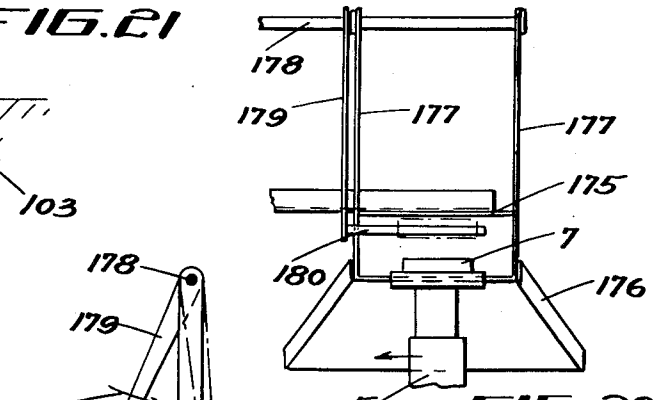


FIG. 20

FIG. 19

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2,677,318

UNITED STATES PATENT OFFICE

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METHOD AND MACHINE FOR MANUFACTURING CONTAINER COVERS OR LIDS OF PAPER

Erik Torudd and Nils Andersson, Lund, Sweden

Application January 22, 1951, Serial No. 207,104

6 Claims. (Cl. 93—1.3)

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This invention relates to container covers or lids of paper and more particularly to container covers or lids in the shape of a disk and a flange at the periphery of the disk. Such covers or lids are used to a large extent especially for cylindrical containers of paper. Hitherto the disk and the flange of the cover or lid have been formed integrally by cold or hot pressing a blank consisting of a single ply or several plies of paper. Paper covers or lids of this well-known type have the disadvantage that even if provided with a moisture-proof layer of e. g. paraffin they tend to revert more or less to the original plane shape of the blank, especially when they are exposed to moisture, whereby their appearance and fit are deteriorated.

The chief object of the invention is to provide an improved container cover or lid of paper and in the shape of a disk and a flange at the periphery of the disk, in which the above disadvantage is altogether avoided and which better fulfils the aesthetical and other demands made upon such a cover or lid. Further objects of the invention are to provide a method of manufacturing the improved cover or lid and a machine for carrying out this method.

The invention will be fully described in the following, reference being had to the accompanying drawings, in which:

Figs. 1 and 2 are a vertical section and a plan view, respectively, of a cover or lid according to a preferred form of the invention;

Figs. 3 to 6 are vertical sections illustrating different stages of the manufacture of the cover or lid shown in Figs. 1 and 2;

Figs. 7 to 21 show a preferred form of the machine for the manufacture of the cover or lid illustrated in Figs. 1–6.

A more extensive description of Figs. 7–21 illustrating the machine will follow below.

With reference to the drawings there are described in the following as examples a round cover or lid and a machine for manufacturing this round cover or lid, but it is to be understood that any other suitable form may be chosen for the cover or lid without exceeding the scope of the invention as defined in the appendant claims.

The flange of the cover or lid (Figs. 1 and 2) is made from a separate blank (Fig. 3) in the form of a cylindrical ring I composed of several superimposed or superspun and glued-together paper plies. Said ring I has its one end edge bent inwardly to form a circular flange II which constitutes the mounting for the disk-shaped portion of the cover or lid, which portion in turn is made from two separate blanks in the form

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of disks III and IV, respectively, which are secured by gluing at their edge portions to the opposite sides of the flange II and for the rest to each other, as will be clearly seen from Fig. 1.

The cover is manufactured in the following manner (Figs. 3 to 6): A ring I preferably cut from a multiply paper tube of the same type as that used for the mantle of cylindrical paper containers, is placed into a press tool or other suitable device in which one edge portion is pressed or bent into the shape of the inwardly projecting circular flange II. The press tool for shaping the flange II may consist of a press die *a* and a press head *c* having a recess *b* corresponding to the outer form of the finished cover. The press die *a* has a supporting flange *d* for the ring I which rests with its one end on the supporting flange *d* and projects with its other end above the plan top of the press die *a*. Before forming the flange II by lowering the press head *c* onto the press die *a* it is preferable to place within the ring I and on top of the press die *a* a disk III provided on its side averted from the press die *a* with a layer of glue or adhesive. The press head *c* is then lowered under pressure onto the press die *a* (Fig. 4), whereby the edge portion of the ring I projecting over the top plane of the press die *a* is bent in over the press die *a* and the disk III thereon to form the circular flange II (Fig. 5), the side of said flange II facing the disk III being united therewith by means of the glue or adhesive layer of the disk III. The press head *c* is then raised from the press die *a*, and another disk IV provided on its side facing the disk III with a glue or adhesive layer, is placed on the disk III (Fig. 6) and is firmly pressed against it, whereby the glue or adhesive layer unites the disks III and IV with each other and the marginal portion of the disk IV with the side of the flange II facing the disk IV (Fig. 1). The cover or lid can then be removed from the press die and is ready for use.

To enable a rational manufacture of covers or lids according to the above described method it is intended to use the machine exemplified in Figs. 7–21 on the accompanying drawings, which will now be described.

Figs. 7 and 8 are diagrammatic plan and side views, respectively, of the machine, certain parts thereof being omitted in Fig. 8 for the sake of clarity;

Fig. 9 is a more detailed side view of the machine, taken at right angles to the side view shown in Fig. 8;

Figs. 10 and 11 are two side views at right angles to each other;

Figs. 12 and 13 show details of a device for delivering paper rings to the machine;

Fig. 14 shows a device for advancing a paper strip and punching the disk blank designated III in Fig. 1;

Fig. 15 shows a press tool in elevation, partly in section;

Figs. 16 and 17 are side views, partly in section, of a device for punching and preliminarily securing the disk blank designated IV in Fig. 1 to the disk blank III;

Fig. 18 is a side view, partly in section of a press tool;

Figs. 19 and 20 are a vertical section and a front view, respectively, of a device for the removal of finished covers or lids from the machine;

Fig. 21 shows a detail.

Referring now to Figs. 7 to 21, the machine has a frame generally designated 1 which carries both the stationary and movable means of the machine and in which power transmission means not shown in detail and connected to the movable means of the machine are mounted. Said power transmission means are operatively connected to a power supply (not shown in detail) over a pulley 3 or the like mounted on a shaft 2 of the machine. Supported on the frame 1 is a horizontal and stepwise rotatable table 4, on the top surface of which there are mounted forming dies 7 provided with flanges 6 and supported on columns 5. In this instance eight forming dies are spaced apart the same angular distance on the table 4. To build up the covers or lids on said forming dies the ring I and the two disk blanks III and IV constituting the cover or lid are placed on said dies and formed with the aid of means and tools intended for this purpose and driven synchronously with the stepwise rotatable table.

A number of punching and pressing members B1, C1, D1, and E1 to be described in the following in the order they participate in the working cycle for manufacturing a cover or lid are secured to that side of a member 9 which faces the table 4. Said member 9 is movable towards and away from the table 4 and is displaceably mounted on columns 8 and operatively connected with a connecting rod 10 (Fig. 9) which is pivotally connected with a bell crank lever 11. One arm of said bell crank lever 11 is provided with a roller 12 and is guided in a roller track 13 provided in a disk 14 which is mounted on a shaft 15. This shaft is mounted in the frame of the machine and is operatively connected with the power transmission means not shown.

Furthermore, a number of devices A, B, D, and F are mounted in the machine which together with the punching and pressing means on the member 9 participate in the formation of the covers or lids. These devices A, B, D, and F will be described in the order they are operated for finishing a cover or lid.

The device A (Figs. 9 to 13) places the premanufactured multi-ply rings I on the forming dies 7 when the latter by the stepwise rotating table 4 are moved into axial alignment with a ring pick-up and depositing means included in the device A. The device A comprises an inclined plane 16 secured to brackets 18 mounted on columns 17. The rings I are deposited by hand or in any other suitable manner on the inclined plane on which they slide down along guides 20 and at the lower portion of the inclined plane they come into bearing contact with an abutment 19. The guides 20 do not extend fully down to the abutment 19 in order that two semicircular means 21 which are movable towards and away from each other and which are fixed to rods 22 displaceably mounted in bearings 23, may reciprocate in the space formed between the abutment 19 and the lower ends of the guides 20. Fixed to each of the rods 22 are downwardly directed pins 25 which extend through grooves 24 in the inclined plane, and to said pins there are fixed the loop-shaped ends of a tensioned screw spring 26 tending to move the means 21 towards each other. On the free ends of the rods 22 there are mounted rollers 27, against each of which the fork-shaped ends of two bell crank levers 30 are applied. Said bell crank levers 30 are mounted in lugs 28 provided on brackets 29 in the frame of the machine. The said levers which carry rollers 31 are acted upon separately by two annular cams 32 which are concentrically arranged on a shaft 33 rotatably mounted in bearings 34 in the frame of the machine. Arranged below the annular cams 32 and fixed to the same shaft 33 as said cams is a bevel gear 35 meshing with another bevel gear 36 on a shaft 37 which is operatively connected with the power transmission means of the machine. A spur gear 38 is mounted on the shaft 37 and actuates through a series of gears 39 mounted in the frame of the machine a spur gear 42 mounted on a shaft 40 which is supported by a bracket 41. Cams 43 and 44 on said shaft 40 cooperate with the rollers 45 and 46 of two bell crank levers 47 and 48, each of which is pivotally supported at one end by a shaft 49 mounted in brackets 50, while the free ends of said bell crank levers 47 and 48 are linked to two vertically movable rods 51 and 52. Linked to the rod 51 is an arm 54 having its one end secured to a shaft 53 mounted in the columns 17. Two arms 56 supporting a shaft 55 are secured to said shaft 53. A rod 57 has one end mounted on the shaft 55 and carries at its other end a device 58 which is shown more in detail in Fig. 13.

The device 58 consists of two telescopically arranged cup-shaped members 59 and 60, of which member 59 is provided with an inwardly threaded connection piece 61 for the threaded end of the rod 57 on which the device 58 may be locked in adjusted position by means of a lock nut 62. The other member 60 is adapted to be axially moved in relation to the member 59 against the action of screw springs 63 which are mounted on screws 64 fixed to the end wall of the member 60 and extending through holes 65 in the end wall of the member 59. Said screws 64 have their head-provided ends applied against the outer side of the member 59 whereby the axial movement of the member 60 in the member 59 is limited.

Mounted on the shaft 55 is an arm 66 against which a bell crank lever 68 is applied. Said bell crank lever has a roller 67, is mounted in brackets 17 and linked to the rod 52.

Paper strips from which the disk blanks designated III and IV, respectively, in Figs. 1 to 6 are punched in devices B and D and are advanced in the same manner in said devices. The following description of the device B therefore also applies to the device D. The devices B and D deposit the disk blanks punched by them on the forming dies. However, for reasons which will become apparent in the following, the punching tools B1 and D1, respectively, included in the devices and with the aid of which the punched

disk blanks are placed on the forming dies differ structurally and will therefore be described separately.

Adjacent the machine and close to the devices B and D there are arranged frames 70 for the paper strips 73 which are wound onto rolls 72. Before the respective device, rollers 74 support said paper strips. The width of the paper strips is somewhat larger than the diameter of the disk blanks III and IV, respectively, and the strips have one side provided with a layer of an adhesive of any of the kinds used for so called heat-sealing.

A bevel gear 77 is mounted on one end of a shaft 75 (Fig. 14) which is rotatably mounted in a bracket 76 on the frame of the machine. The shaft 75 forms part of the power transmission means mounted in the frame of the machine but not shown in detail. The bevel gear 77 meshes with a second bevel gear 79 arranged on a shaft 78 which is horizontally mounted in the frame of the machine and on which two cams 80 and 81 are located. A roller 83 supported on an arm 82 swingably mounted on a shaft 84 in the frame of the machine is in contact with the cam 81. A link 86 is displaceably connected with the arm 82 and with a swingable arm 89 mounted in a bearing 88, whereby the swinging angle of the latter arm will be adjustable. The free end of the arm 82 is shaped to form a hook 90 to which one end of a screw spring 91 is attached, the other end of which is attached to the bracket 76. The screw spring 91 tends to move the roller 83 of the arm 82 into contact with the cam 81. The free end of the arm 89 is hingedly connected by means of an arm 92 with a carriage 93 which is reciprocable in the frame of the machine and comprises a transverse member 98 interconnecting two lateral members 97 provided with wheels. Against the said transverse member 98 there bear members 100 which are fixed to a shaft 99 and are acted upon by springs 102. An arm 104 (Fig. 9), the free end of which is provided with a roller 105 and is applied against a link 110, is mounted on the shaft 99, as will be described more in detail below.

An arm 107 which is hingedly connected with one end of a rod 108 is applied with its roller 106 against the cam 80. The other end of the rod 108 is linked to a bell crank lever 109 mounted in the frame of the machine (Fig. 9), said lever 109 being in turn connected by means of the link 110 to an arm 111 which is swingably mounted in the frame of the machine. The roller 105 of the arm 104 is applied against one edge of the link 110, and an arm 112 provided with a roller 113 is applied against the other edge of the link 110. The arm 112 is held in contact with the link 110 by a screw spring 114 which at the same time tends to hold means 115, which are mounted on a shaft 117 in the frame of the machine, applied against a transverse member 116 also in the frame of the machine.

Provided in the portion of the transverse member 116 extending inwardly over the stepwise rotating table 4 is a hole, in which a punching ring 121 is arranged. This ring cooperates with a punching body 120 which is placed on the side of the member 9 facing the table 4. The punching body 120 and the punching ring 121 together form the punching tool B1.

The device C1 is a press tool forming the rings I deposited on the forming dies 7 and providing them with the inwardly bent circular flange II to which the disk blanks III and IV are glued.

The device C1 comprises a press head 130 arranged on the side of the member 9 facing the table 4 and on said press head 130 there is mounted an electric heating element 132 which is connected to a source of current (not shown) and which permits heating of the press head to a suitable temperature. The press head is provided with a recess 133 having substantially the same form and size as the finished cover or lid.

Axially displaceably mounted in the press head 130 is a pin 131 which is acted upon by a spring 163 and which with its end projecting from the press head is moved into contact with the disk blank III when the press head is lowered against the forming die, and retains the disk blank 3 to the forming die during the pressing operation so that the blank is not displaced.

The punching tool D1 (Figs. 16 and 17) punches the disk blank IV and attaches it preliminarily to the disk blank III by means of devices included in the tool. The paper strip 73 advanced from the roll 72 by the device D is advanced in a plate 141 secured to the frame of the machine and having guides for the paper strip. Said plate 141 is provided with a hole 142 cooperating with a punching body 143 for punching the disk blank IV. Said punching body is mounted on the side of the member 9 facing the table 4. Arranged within a bore 144 in the punching body 143 is a hollow presser foot 145 which is movable in relation to the punching body and the member 9 and which is axially displaceably mounted in a guide 146 provided in said member 9. In the lower part of the recess of the presser foot there is located an electrical heating element 148 which is connected to a source of current not shown. The upper end of the presser foot 145 is hingedly connected with one arm of a spring-actuated lever 149 which is pivotally mounted in the member 9 and the second arm of which is hingedly connected with a spring-actuated rod 147 movable in the frame 1 of the machine. When the member 9 moves towards the stepwise rotatable table 4 the punching body 143 punches the disk blank IV from the paper strip 43 by entering the hole 142 in the plate 141. The presser foot which during the movement of the member 9 is under the influence of the lever 149 connected with the presser foot and hingedly connected with the rod 147 conveys the disk blank IV out of the punching plane of the punching body for attaching the same to the disk blank III as will appear from Fig. 17. The heat generated by the element 148 in the presser foot melts the glue on the facing sides of the disk blanks III and IV and thus connects them preliminarily with each other.

The cover or lid is given its final form in the device E1 to be described in the following with reference to Fig. 18. This device consists of a press body 160 having a recess 161 and mounted on the side of the member 9 facing the stepwise rotatable table 4. Said press body 160 also has an electrical heating element 164 which is connected with a source of current not shown. A central portion projects into the recess 161 of the press body 160 and between this central portion and the wall of the recess there is provided a circular groove so that the press body may press the disk blanks against each other and against the flange of the paper ring, whereby the glue on the facing sides of the disk blanks III and IV and the sides of the flange II melts under the influence of the heat generated by the element 164, thus connecting the disk blanks with each

other and with the sides of the flange to form a cover or lid which is ready for use. The cover or lid is removed from the machine by the device F (Figs. 19 and 20) which shall now be described.

The device F comprises a fan 170 which is operatively connected with the power transmission means mounted in the frame of the machine and not shown. The fan 170 has a nozzle 171, the mouth 172 of which is situated immediately below the table 4. The columns 5 supporting the forming dies 7 are each provided with an axial bore 173 and the forming dies have channels 174. The device F furthermore comprises a horizontal plate in the form of a metal sheet 145 which is fixed to the frame of the machine, and a chute 176 arranged below the plate. In standards 177 supporting the plate 175 there is pivotally mounted on the shaft 178 an arm 179 which is provided at its free end with an angular arm 180, said last-mentioned arm being so arranged as to be moved under the plate 176 and back again when the arm 179 swings from the full line position to the chain-line position, for purposes to be described in the following in connection with the mode of operation of the machine.

The above-described machine operates as follows: By means of a power source and a transmission (not shown) the pulley 3 fixed to the shaft 2 is driven whereby the power transmission means connected with the shaft and the cover manufacturing means drivably connected therewith are set in motion. The table 4 supporting the forming dies 7 is rotated stepwise, and the vertically reciprocating member 9 is moved down the columns 8 towards the table 4 during each step thereof and up the columns 8 away from the table 4 during each standstill thereof. The tools B1, C1, D1 and E1 on the side of the member 9 facing the table 4 punch the disk blanks III and IV from the paper strips during the downward movement of the member 9 and place said blanks at the intended places and perform the formation of the cover or lid, respectively. The devices A and F and the devices B and D, respectively, cooperating with the tools B1 and D1 are moved in timed relation to the movements of the table 4 and the member 9. Each time the table 4 stops the following operations are performed: there are placed on the forming dies a premanufactured ring I (device A), a disk blank III (device B), and a disk blank IV (device D), there is formed a cover or lid blank (means C), there is finished a cover or lid (device E) and there is removed a finished cover from the machine (device S). In this manner the covers or lids are built up step by step, according as they are subjected to the action of the means for the manufacture of the covers or lids.

Premanufactured rings I are deposited on the inclined plane 16 in the device A and slide downwardly on this plane until they are stopped by the means 21. The rings are more or less unround substantially owing to the pressure they exert on each other when being collected in a row on the inclined plane serving as a supply for the rings. To enable the rings to be delivered to the machine they must however have back their round form which is restored by the means 21. Said means are reciprocated under the action of the bell crank levers 30 which have their rollers 31 applied against the cams 32, said cams being set in motion by the bevel gears 35 and 36 operatively connected with the power transmission means. When the means 21 are moved apart a ring slides in between them and comes into contact with the abutment 19. The ring is enclosed between the means 21 and its round form is restored when the means 21 are then immediately moved together. The ring is now ready to be fed into the machine.

When the ring has been enclosed between the means 21, the pick-up means 58 is moved towards the ring. The movement of said pick-up means 58 is made possible by the power transmission means and the shaft 37 drivably connected therewith and on which the gear 38 is secured, said gear actuating the shaft 40 over the gear series 39. Mounted on said shaft 40 are cams 43 and 44 against which the bell crank levers 47 and 48 bear, which levers via the rods 51 and 52, the arm 54, the shaft 53, the arms 56, the shaft 55 and the arm 66 mounted on this shaft and actuated by the bell crank lever 68 and the rod 57 which is mounted on the shaft 55 and on the free end of which the pick-up means 58 is located, give said last-mentioned means such a movement that, as already mentioned above, it moves first towards the ring enclosed by the means 21 on the inclined plane. Thereby the means 60 arranged in the pick-up means 58 (Fig. 13) is introduced into the ring, and when the pick-up means then moves away from the inclined plane it takes the ring along. The means 58 then swings in the direction indicated by the arrow 200 in Fig. 10 to a position above and in axial alignment with the forming die which is located at this moment adjacent the device A and which together with the table 4 is stopped in its stepwise rotating movement. The pick-up means 58 moves axially towards the forming die 7, the means 60 being applied against the forming die with its edge facing said die, whereby the cup-shaped member 59 is displaced against the action of the spring 64 on the means 60 when the pick-up means 58 continues its axial movement, said cup-shaped member 59 releasing the ring frictionally held by the means 60 and pushing it over the forming die 7. The ring I now rests on the forming die with its one edge in bearing contact with the flange 6 of the forming die 7 and with its other edge projecting above the top plane of the forming die.

The table 4 then rotates a step again. When the forming die 7 and the ring I supported thereby are situated beneath the tool B1 of the member 9 and adjacent the device B (Fig. 14) the device B during the movement of the table has advanced the paper strip 73. The advance of the paper strip is stopped when the table 4 stops, and the member 9 simultaneously starts its downward movement during which the tool B1 punches the disk blank III from the paper strip in cooperation with the punching ring 121 and punches the blank into the ring I, so that it will rest on the forming die 7. The punched disk blank has a layer of glue on its side averted from the forming die.

The paper strip 73 is advanced owing to the fact that the shaft 75 which is connected with the power transmission means in the frame of the machine rotates and through the bevel gears 77 and 79, the shaft 78, the cam 81, the arms 82 and 86 causes the arm 89 to swing, whereby said arm actuates the carriage with the intermediary of the arm 92 and moves it in the direction of the arrow 201 in Fig. 14. During the movement of the carriage the coupling means 100 arranged thereon and upon which the spring 102 acts, presses the paper strip 73 against the transverse

member 98 of the carriage whereby the paper strip is taken along and advanced. After having moved a distance corresponding to the size of a disk blank the movement of the carriage is reversed to make it return to normal position. At the same time as the movement of the carriage is reversed the cam 81 located on the shaft 78 has swung the bell crank levers 109 and 111 in the direction of the arrow 203 in Fig. 9 through the arm 107 and the rod 108, whereby the link 110 connecting the bell crank levers 109 and 111 and acting upon the arm 104 located on the shaft 99 lifts the means 100 out of engagement with the paper strip so that the return movement of the carriage may be effected without the paper strip being taken along. To prevent the paper strip from being taken along in the return movement of the carriage it is retained in its advanced position by the means 115 mounted on the shaft 117 and acted upon by springs 114. At a new advance of the paper strip the arm 112 which is fixed to the shaft of the means 115 and bears against the link 110 with a roller moves the said means 115 out of engagement with the paper strip. Thus the link 110 in its movement has lifted the means 100 out of engagement with the paper strip and moved the means 115 into engagement with the paper strip. When the carriage moves in the opposite direction the relation is reversed.

The ring I and the disk blank III placed therein are now situated on the forming die. The member 9 moves upwardly and the table 4 rotates one step. After the table has performed this movement, the forming die is situated beneath the tool C1 (Fig. 15). The member 9 again moves towards the table 4 whereby the press head 130 is moved down onto the forming die and encloses the same and the ring I resting on the forming die as well as the disk blank III in its recess 133. Due to the groove provided in the recess of the press head and the pressure of the latter the marginal portion of the ring located in the recess of the press head is bent inwardly to form a circular flange II to which the disk blank III is secured with its marginal portion because the heat generated by the electrical heating element melts the glue on the side of the disk blank III facing the flange II of the ring I. The member 9 is again moved upwardly into its upper end position, whereupon its movement is reversed and the member moves downwardly while the table 4 effects an angular movement and swings the forming die into a position, in which it is located beneath the tool D1 (Figs. 16 and 17).

When the means 9 moves towards the table 4 the punching body 143 in cooperation with the hole 142 punches the disk blank IV from the paper strip 73 advanced in the plate 141. During the downward movement of the member 9 and of the punching body 143 the heated presser foot 145, which is axially movable in the punching body, is moved in relation to the member 9 and the punching body 143 by the action of the lever system 149, in the same direction as said member 9 and said punching body 143 but at a somewhat higher speed so that at the same time as the disk blank IV is punched the presser foot is pushed out and past the punching plane of the punching body, whereby it presses the disk blank IV towards the disk blank III lying on the forming die. Since the presser foot 145 is heated, the glue layers on the disk blanks III and IV facing each other are melted and the blanks are thus preliminarily secured to each other.

At the angular movement of the table 4 which is started immediately after the operations described above, the forming die 7 with the ring I and the disk blanks III and IV are moved up to the electrically heated press tool E1. As appears from Fig. 18 in which the press tool is shown lowered over the forming die 7, the cover or lid is given its final form in this tool. The glue layers on and between the disk blanks III and IV are melted over the whole area of the parts by the heat from the element 164 and at the same time the disk blanks are compressed, so that the marginal portion of the disk blank IV is pressed against one side of the flange II, whereby a safe connection is obtained on one hand between the blanks forming the disk of the cover or lid and on the other between the disk and the flange of the cover or lid.

During the following angular movement of the table 4 the forming die 7 is moved up to the device F which removes the finished cover or lid from the forming die (Figs. 19 and 20). At the moment when the table 4 is stopped, air from the fan 170 flows through the bores 173 in the column 5 and in addition through the channels 174 in the forming die 7 and under the cover or lid. The air flow lifts the finished cover or lid from the forming die 7 upwards into contact with the plate 175 at the same time as the arm 179 on the shaft 178 is swung in the direction of the arrow 205, whereby the pin 180 is moved under the plate 175 and knocks against the cover or lid which is thrown out onto the chute 176 on which it slides down into a collecting container or the like.

As shown in Fig. 21, the forming dies 7 and the means 60 may be provided with spring-actuated balls 101, so arranged in bores 103 as to extend outside the surface of the means engaged with the inner side of the rings. After the bore has been provided the spring and the ball are introduced into the same, whereafter its mouth is so worked in a known manner that the width of the mouth will be smaller than the diameter of the ball, whereby the ball is retained in the bore. Three balls at the same mutual angular distance may preferably be provided in this manner in the portions of the forming dies 7 and the means 60 engaging the inner sides of the rings, whereby a safe retaining of the paper rings is obtained despite possible smaller differences between the smallest diameter of the rings and the largest diameter of the forming dies and the means 60, respectively. No difficulties are met with in the removal of the rings and of the finished cover from the means 60 and the forming dies 7, respectively.

The machine described above and shown in the drawings should be considered as an example only which can be modified within the scope of the inventive idea such as it is defined in the appendant claims.

What we claim and desire to secure by Letters Patent is:

1. The method of manufacturing a lid of the character described, which comprises cutting from a multiply cylindrical paper tube at right angles to its axis a ring, placing the ring with its axis in vertical position from above onto a die so that an upper end portion of the ring projects above the die, moving the die and thereby the ring thereon, while keeping its axis in vertical position, successively to different sta-

tions, punching from a first web of paper at one of said stations and during stay of the die there a first circular disk of a diameter equal to the inner diameter of the ring and placing said first disk from above onto the die and into the ring so as to bring said first disk into a position at right angles to the axis of the ring and at a distance below the upper end of the ring, turning during stay of the die in a later one of said stations the projecting upper end portion of the ring inwardly and downwardly into flat contact with the upper side of said first disk by pressing said end portion against, and simultaneously securing it adhesively to the peripheral portion of the upper side of said first disk, punching from a second web of paper at a still later one of said stations and during stay of the die there a second circular disk of approximately the same diameter as said first disk and placing said second disk in centered position onto said first disk and the inturned end portion of the ring, pressing said second disk against, and simultaneously securing it adhesively to, both the inturned end portion of the ring and said first disk, and finally removing the resulting lid from the die.

2. The method as claimed in claim 1, and preliminarily attaching said second disk at its central portion adhesively to said first disk during the stay of the die with the ring thereon at the station at which said second disk is punched from said second web of paper and placed from above onto said first disk, performing the pressing of said second disk against, and the securing of it adhesively to, both the inturned upper edge portion of the ring and said first disk at a still later one of said stations, and performing the removal of the resulting lid from the die at a still later one of said stations.

3. A machine for making lids of the character described from rings cut from a cylindrical multiply paper tube, comprising, in combination, a table intermittently rotatable about a vertical axis, a die having a vertical axis mounted on said table movable successively by the intermittent rotation of said table to at least six different stations located around said table, means at the first one of said stations for receiving the rings from which the lids are to be made, means at said first station for transferring during the stay of said die a ring from said ring receiving means and placing said ring endwise and from above onto said die and into a position thereon in which an upper end portion of said ring projects above said die, a flange on said die for supporting said ring in said position on said die, means at a second station for feeding thereto a first web of paper, punching means at said second station for punching during the stay of said die from said first web of paper a first circular disk of a diameter equal to the inner diameter of the said ring, and for placing said first disk from above onto said die and thus a distance down into the ring on said die, pressing tool means at a third station for turning and pressing during the stay of said die the projecting upper end of the ring inwardly and downwardly into flat contact with the peripheral portion of the upper side of said first disk, means at a fourth station for feeding thereto a second web of paper, punching means at said fourth station for punching during the stay of said die from said second web of paper a second disk of approximately the same diameter as said first disk, and for placing said second disk in centered position onto said first disk and the inturned end portion of said ring, a second pressing tool means at a fifth station for subjecting during the stay of said die said first and second disks and the intermediate inturned end portion of said ring to shaping pressure between said die and said last mentioned pressing tool means, means at a sixth station for removing the finished lid from said die during the stay thereof at said sixth station, and means for operating said various means at said stations in timed relationship to the intermittent rotation of said table.

4. A machine as claimed in claim 3, in which said means at said first station for receiving the rings from which the lids are to be made comprises an inclined chute into which the rings are placed endwise onto the bottom of the chute and in a row tending to slide down the chute, a stop at the lower end of said chute for the row of rings placed therein, and two semicircular members movable laterally away from and towards each other for shaping and centering between them the lowermost ring of the row in position for being engaged by said ring transferring means, and in which said ring transferring means comprises an arm mounted for vertically swinging movement, a rod pivotally suspended from said arm for laterally swinging movement, a cup-shaped member secured bottom up to the lower free end of said rod, and a member telescoping in said cup-shaped member and biased into a downwardly projecting position in relation thereto, so that said rod can be swung with said telescoping member into axial alignment with the centered position of the lowermost ring in said chute, then lowered for introducing said telescoping member into the ring in the centered position thereof, and then swung with said telescoping member and with the ring thereon into axial alignment with the die and lowered for pushing the ring off from said telscoping member and onto said die.

5. A machine as claimed in claim 3, in which said operating means includes a member which is disposed above said table and is movable up and down in relation thereto, and said punching and pressing tool means are connected to and driven synchronously by this movable member.

6. A machine as claimed in claim 3, in which said punching means for punching said second disk from said second web of paper comprises a punch having a central bore, and a presser foot is movable therein for pressing the central portion of said second disk, as soon as it has been punched, against said first disk.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
984,067	Bond	Feb. 14, 1911
1,133,425	Beadle	Mar. 30, 1915
1,161,544	Starr	Nov. 23, 1915
1,312,570	Palmer	Aug. 12, 1919
1,597,889	Hulbert	Aug. 31, 1926
1,791,003	Shearer	Feb. 3, 1931
2,042,851	Knowles	June 2, 1936
2,172,179	Rutledge	Sept. 5, 1939
2,368,920	Goodwin	Feb. 6, 1945
2,378,470	Di Cosmo	June 19, 1945
2,407,465	Zesbaugh	Sept. 10, 1946
2,413,449	Hatch	Dec. 31, 1946

FOREIGN PATENTS

Number	Country	Date
332,531	Great Britain	July 14, 1930