April 3, 1956 C. P. WOLD 2,740,458

COVERING MACHINES

Filed Aug. 9, 1952 6 Sheets-Sheet 1

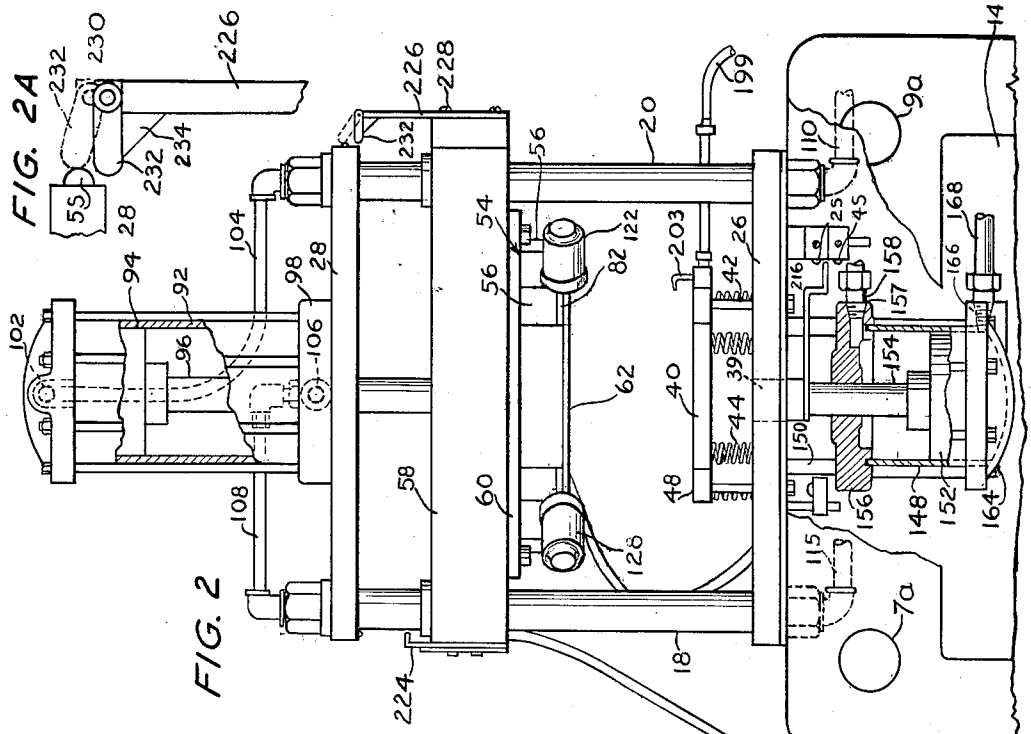


FIG. 2A

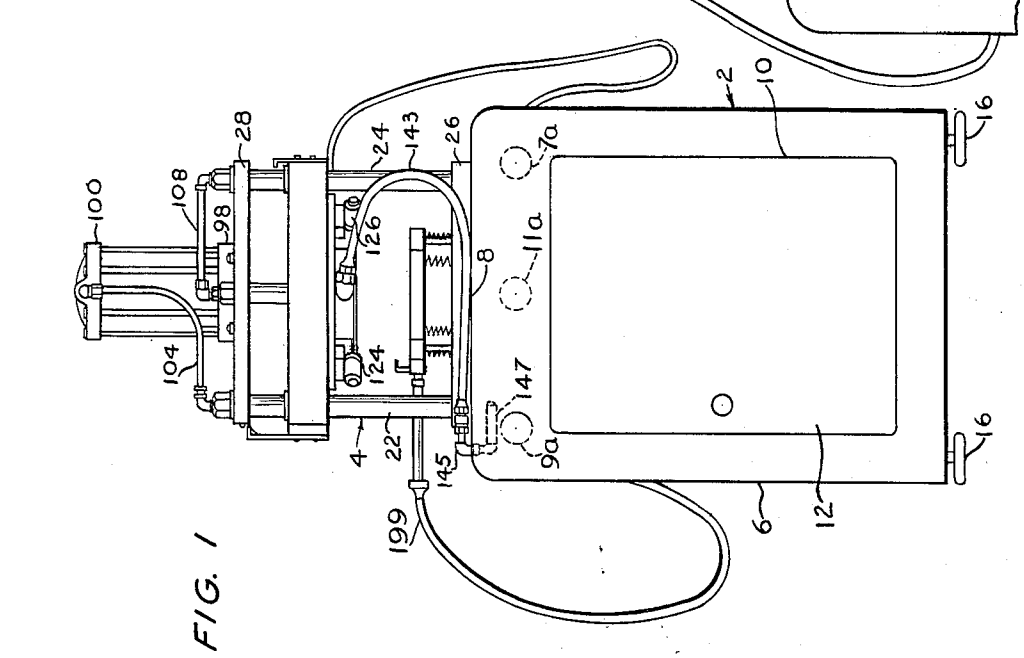


FIG. 2

FIG. 1

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April 3, 1956 C. P. WOLD 2,740,458

COVERING MACHINES

Filed Aug. 9, 1952 6 Sheets-Sheet 2

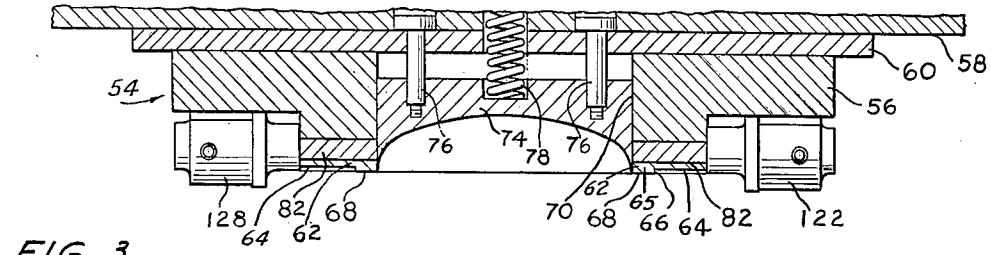
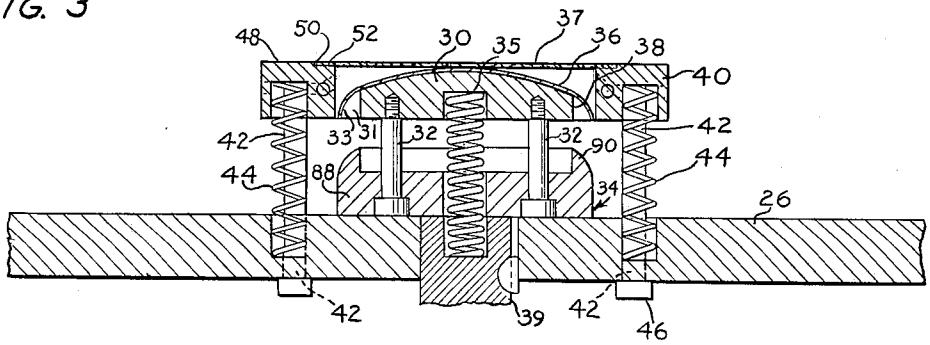


FIG. 3



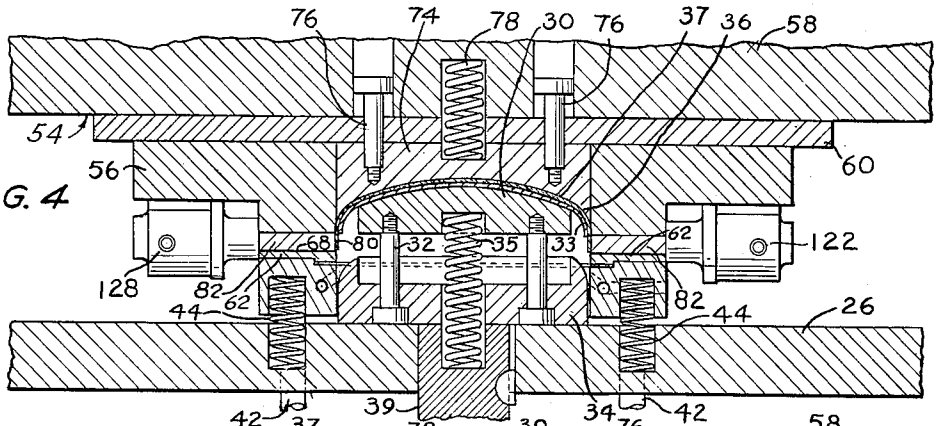


FIG. 4

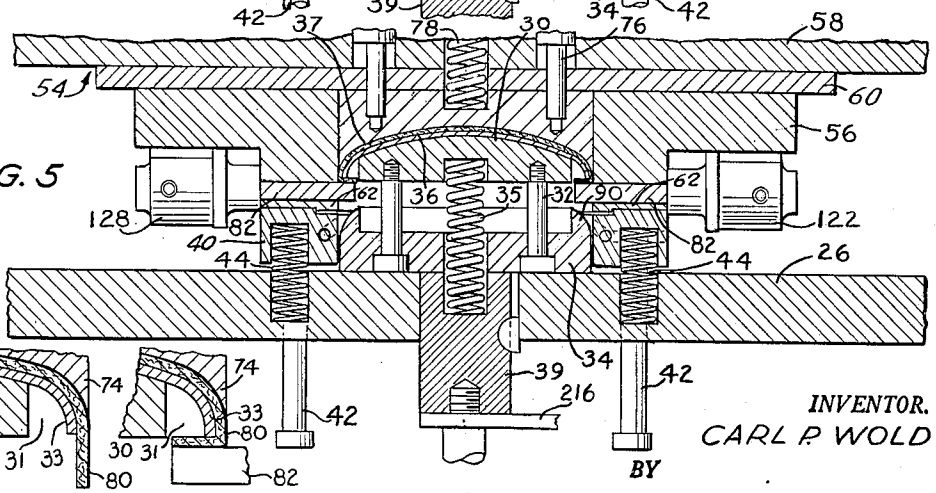


FIG. 5

FIG. 4A FIG. 5A

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COVERING MACHINES

Filed Aug. 9, 1952 6 Sheets-Sheet 3

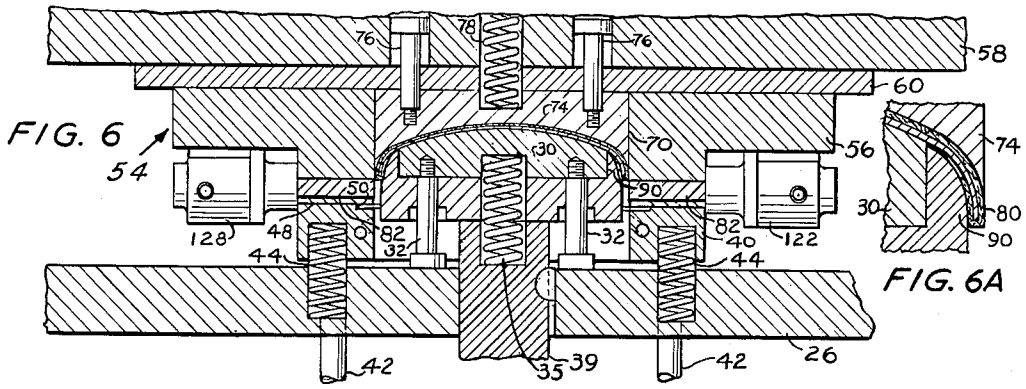


FIG. 6

FIG. 6A

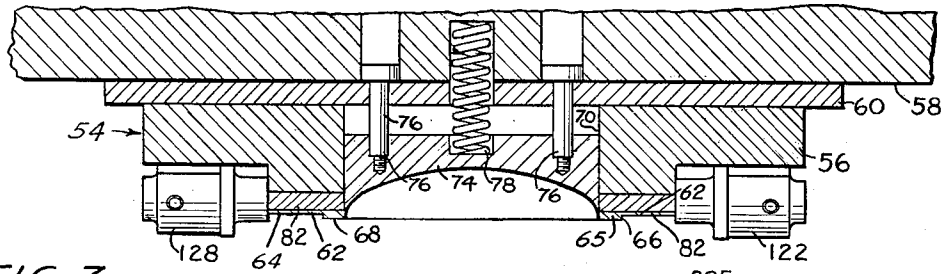


FIG. 7

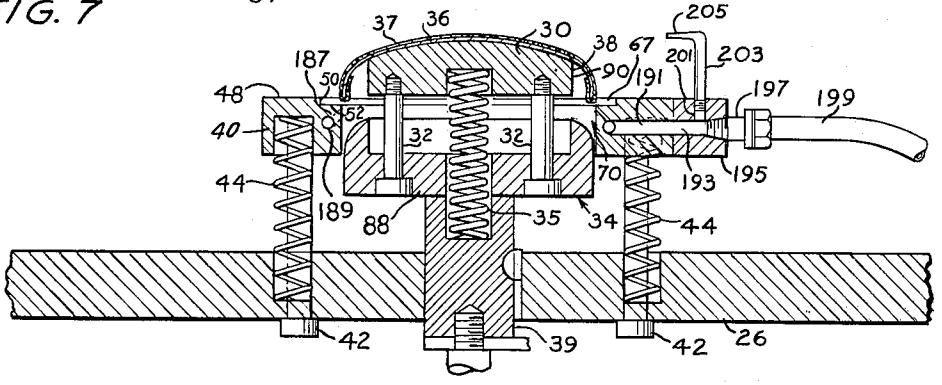
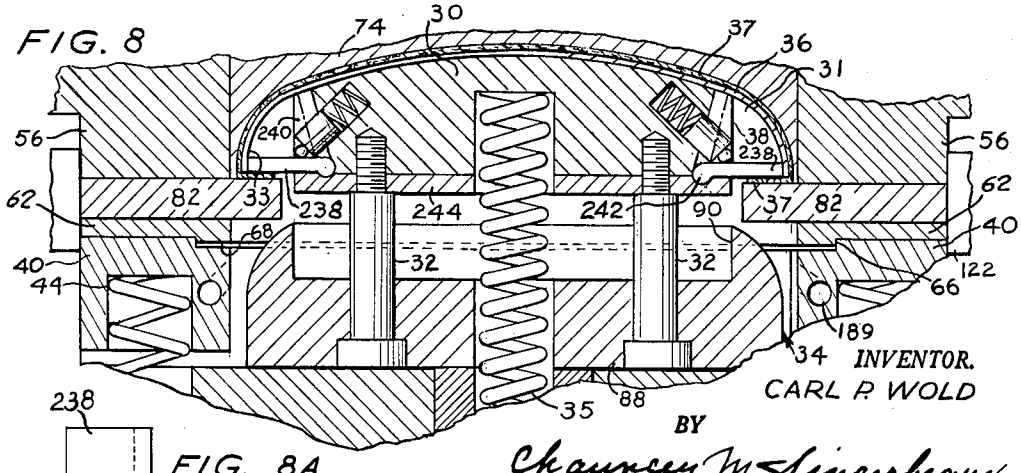


FIG. 8



238

FIG. 8A

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April 3, 1956 C. P. WOLD 2,740,458

COVERING MACHINES

Filed Aug. 9, 1952 6 Sheets-Sheet 4

FIG. 9

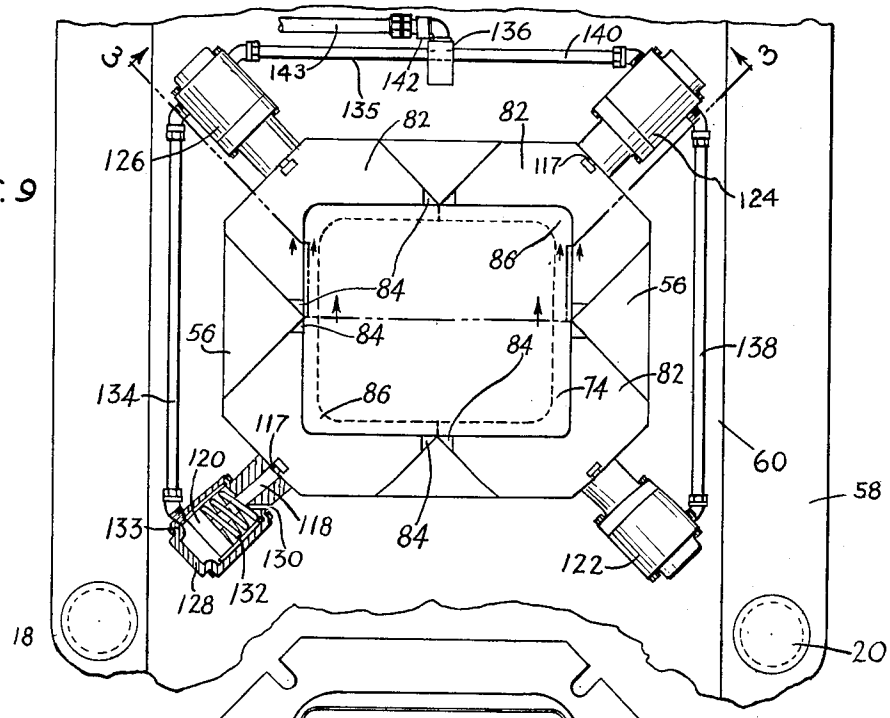


FIG. 10

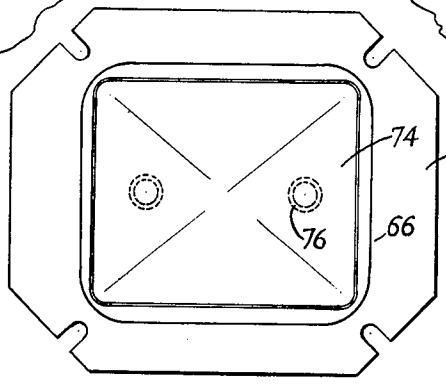
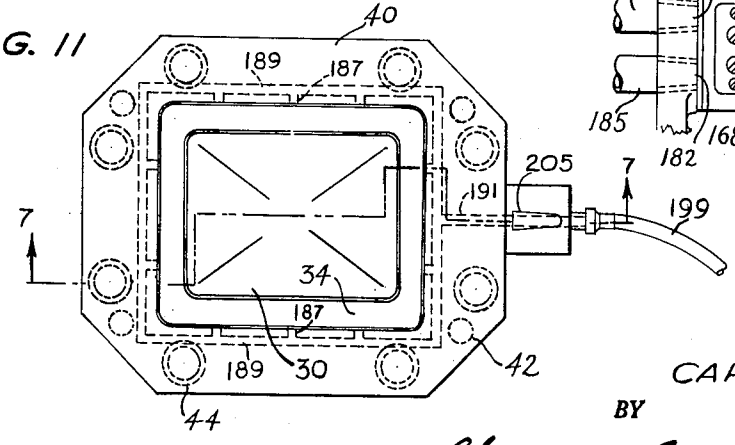


FIG. 11



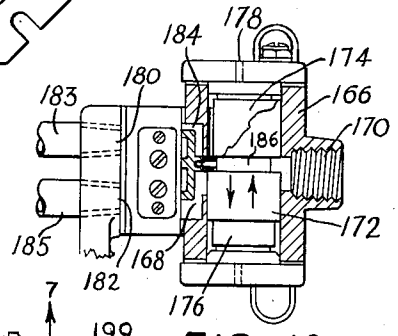


FIG. 12

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COVERING MACHINES

Filed Aug. 9, 1952 6 Sheets-Sheet 5

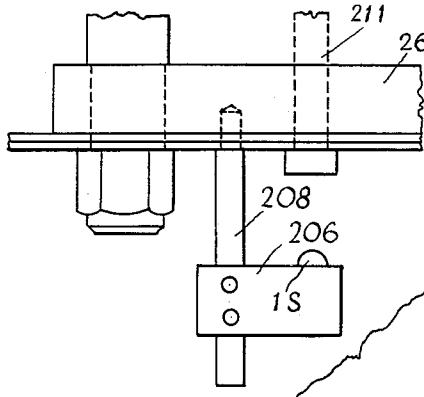


FIG. 13

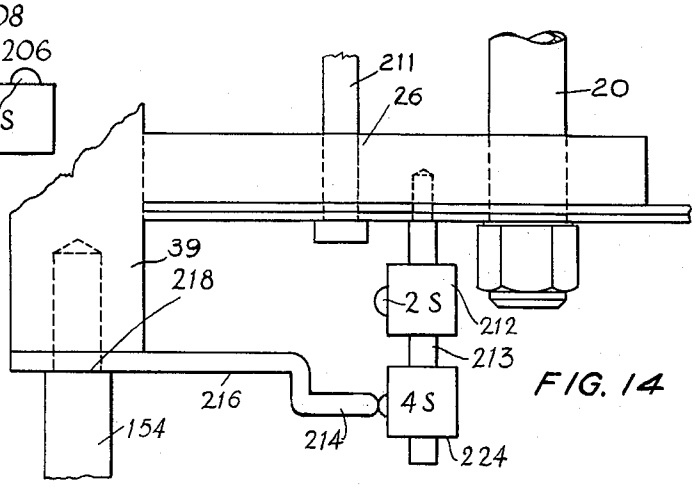


FIG. 14

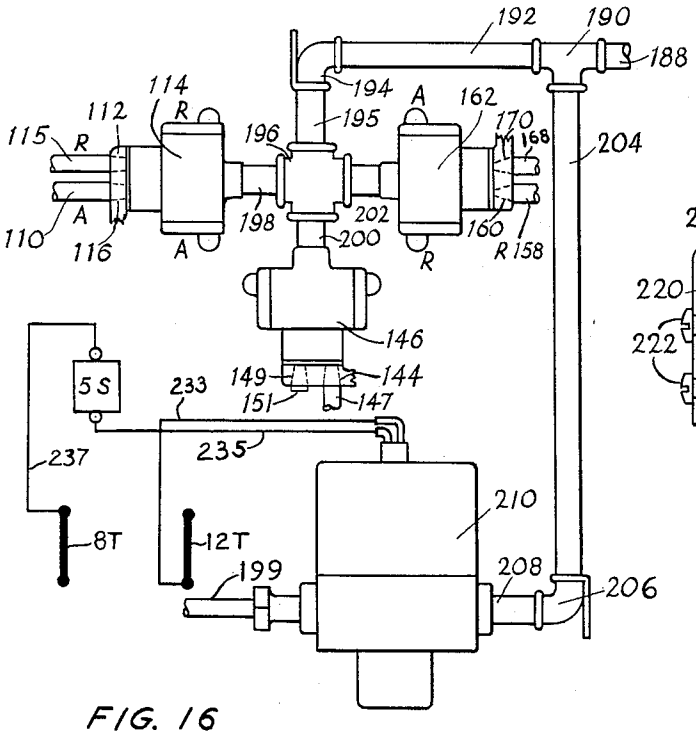


FIG. 16

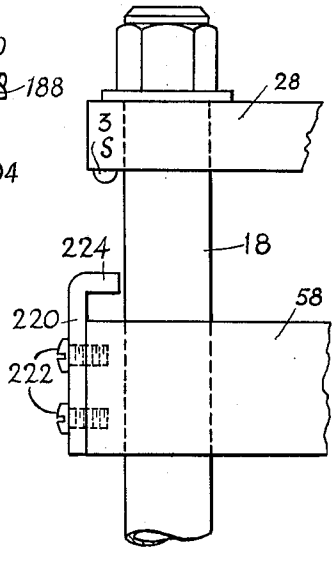


FIG. 15

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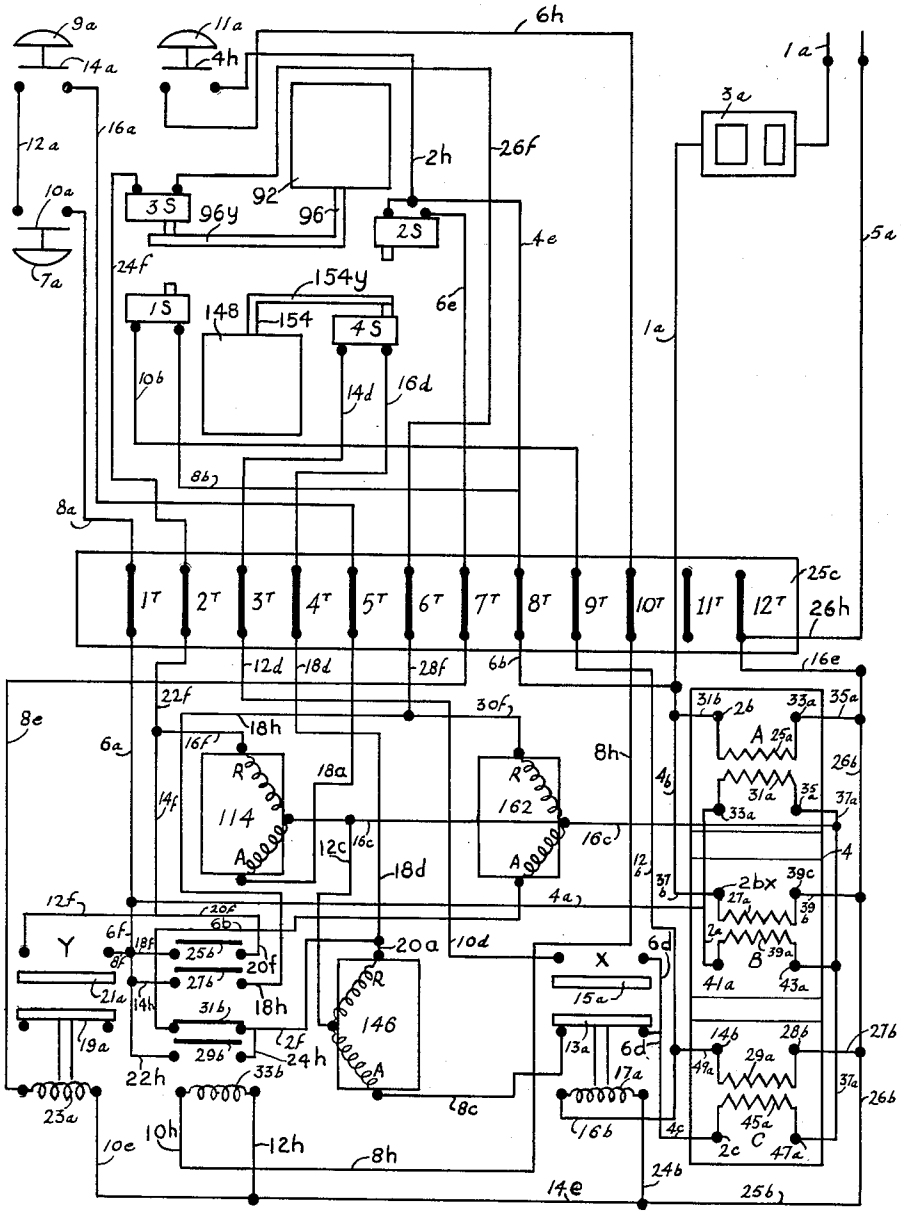
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Filed Aug. 9, 1952 6 Sheets-Sheet 6

FIG. 17



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United States Patent Office 2,740,458 Patented Apr. 3, 1956

2,740,458

COVERING MACHINES

Carl P. Wold, Danielson, Conn.

Application August 9, 1952, Serial No. 303,629

25 Claims. (Cl. 154—1.8)

This invention relates to covering machines for covering articles with relatively thin, flexible sheets of material such as cloth or leather.

The invention is illustrated in this application as embodied in a machine for applying coverings of leather to sheet metal box members. It is to be understood, however, that the invention is not limited to machines for performing this particular covering operation, but that certain features thereof may be embodied in machines for covering other articles and certain features may be embodied in machines for applying other covering materials to boxes and other articles.

The primary objects of the invention are to improve the construction and mode of operation of covering machines of the above character and to produce a machine by which sheet material may be applied to box members or other articles much more rapidly and efficiently than could be done by the covering machines heretofore produced.

Another object of the invention is to produce a covering machine by which covering sheet material may be applied to articles in a highly efficient manner and which requires less attention on the part of the operator than prior machines with a consequent saving in labor costs.

With the above and other objects in view, the invention consists in a covering machine embodying the novel and improved features, constructions and combinations of parts hereinafter described and particularly pointed out in the claims, the advantages of which will be readily understood and appreciated by those skilled in the art.

The invention will be clearly understood from the accompanying drawings illustrating a machine embodying the invention in its preferred form and the following detailed description of the construction therein shown.

In the drawings,

Fig. 1 is a view in rear elevation illustrating a machine embodying the invention.

Fig. 2 is a view in front elevation of the machine.

Fig. 2*a* is a detail view in front elevation illustrating an electrical switch mechanism of the machine.

Fig. 3 is a view in vertical section taken in the planes indicated by the line 3—3 in Fig. 9 and showing the means for supporting a box member in position to be covered, the box member in position on the supporting means, a piece or section of relatively thin, flexible sheet material resting on the box member in the position which it assumes when initially placed in the machine and the devices for operating on said material during the covering operation, the several parts being shown in the positions which they assume at the start of the covering operation.

Fig. 4 is a view similar to Fig. 3, illustrating the parts in the positions which they assume at an early stage in the covering operation.

Fig. 4*a* is a detail sectional view on an enlarged scale illustrating more clearly the positions of certain parts of the machine and the marginal portion of the box and the covering material as shown in Fig. 4.

Fig. 5 is a view similar to Fig. 4 illustrating the parts in

the positions which they assume at a later stage in a covering operation.

Fig. 5*a* is a detail sectional view similar to Fig. 4*a* illustrating the parts of the machine, the box and the covering material in the positions shown in Fig. 5.

Fig. 6 is a view similar to Fig. 5 illustrating the parts in the positions which they assume at a later stage in the covering operation.

Fig. 6*a* is a detail view similar to Figs. 4*a* and 5*a* illustrating the parts of the machine, the box member and the covering material in the positions shown in Fig. 6.

Fig. 7 is a view similar to Fig. 6, with the addition of a showing of an air blast ejector mechanism and illustrating the parts in the positions which they assume at a later stage in the covering operation.

Fig. 8 is a view in vertical section similar to Figs. 3 to 7 inclusive and illustrating the support for a box member provided with devices for supporting the marginal portion of the box member during the inward movement of the folders. Fig. 8A is an enlarged view of one of the supporting devices.

Fig. 9 is an underside plan view illustrating particularly the folders for folding inwardly the marginal portions of the covering material after said material is stretched over the box member and certain parts of the operating mechanism for the folders.

Fig. 10 is a detail underside plan view illustrating the pressure head and the ejector plate or block.

Fig. 11 is a detail plan view illustrating the punch and pressure ring and certain associated parts.

Fig. 12 is a view partly in elevation and partly in section illustrating a solenoid valve mechanism which may be employed to control the delivery of compressed air to certain of the parts.

Fig. 13 is a detail view in front elevation illustrating one of the switches of the electrical system of the machine and the means for supporting and operating the same.

Fig. 14 is a detail view in front elevation illustrating two of the other switches of said system and the means for supporting and operating the same.

Fig. 15 is a detail view in front elevation illustrating another of the switches of said system and the means for supporting and operating the same.

Fig. 16 is a view in elevation illustrating the compressed air system of the machine together with one of the electrical switches and a portion of the electrical circuit controlled by said switch, and

Fig. 17 is a view illustrating the electrical system of the machine.

In the embodiment of the invention illustrated in this application, the machine comprises a lower frame or stand indicated at **2** upon which is mounted an upper frame indicated as a whole at **4**. The lower frame or stand is preferably made of sheet metal substantially rectangular in cross section and forming a casing-like structure having side walls **6**, an upper wall **8**, an opening **10** at the rear closed by a hinged door **12**, an opening **14** at the front and a plurality of feet **16** upon which the stand rests.

The upper frame **4** comprises four tubular corner posts **18, 20, 22, 24** the shouldered lower ends of which are secured within a rectangular plate **26** resting upon and attached to the upper wall of the stand **2**. These ports extend downwardly through the plate **26** and through the upper wall of the stand and the posts and the plate **26** are secured to the upper wall of the stand to attach the upper frame to the stand by nuts threaded on the lower ends of the posts.

The shouldered upper ends of the tubular corner posts of the upper frame extend through a rectangular plate **28** and are secured to the plate by nuts threaded on the ends of the posts.

In the present machine, the tools respectively for supporting the box member during the covering operation and for operating on the section of sheet material to apply the same to the box member and secure the same in place will vary in shape with different shapes of boxes and may vary with the top member and bottom member of the same box. In the present construction the tools are constructed and arranged to support and apply a covering to the cover or top of a rectangular box indicated at 36.

The box member to be covered is supported in the machine upon a work support 30 which may be called a pressure block because of the manner in which it operates during the covering operation. This support consists of a block of relatively hard, rigid material and its upper surface is shaped to correspond with the shape of the upper inside surface of the box member. The lateral dimensions of the work support are somewhat less than the corresponding dimensions of the box members so as to leave a substantial space or recess 31 between the support and the downwardly extending marginal portion 33 of the box member for the entrance of one of the tools employed in the covering operation. In the present construction for the covering of a rectangular box the length and width of the support are substantially less than the corresponding dimensions of the cover of the box.

The support or pressure block 30 is mounted upon the upper ends of a plurality of headed studs 32 slidably engaging in suitable openings in a punch 34. The punch 34 is mounted for vertical sliding movement in the machine and normally rests on the plate 26. The heads of the studs 32 also normally rest on the plate 26 so that the support 30 is normally located in the position shown in Fig. 3.

The work support 30 is acted upon a coil spring 35 having its ends engaged respectively in recesses or sockets in the support and in the vertically movable slide block 39 upon which the punch is mounted. This spring tends constantly to move the support 30 upwardly with relation to the punch. The upward movement of the support with relation to the punch is limited by the engagement of the heads of the studs 32 with the punch.

Fig. 3 shows a box top or cover applied to the support 30 and resting on the upper surface of the support which conforms to the shape of the box top, the marginal portion of the box member extending down over the side walls of the support indicated at 38.

Surrounding the support 30 and located substantially coaxially therewith is an annular pressure pad or ring indicated at 40. This pad is mounted for vertical movement upon headed studs 42 secured at their upper ends to the ring and slidably engaging in openings in the plate 26. The ring is yieldingly held in elevated position by means of a series of coil springs 44 interposed between the ring and the plate and having their ends engaged in recesses respectively in the plate 26 and in the ring (see Fig. 7). The upward movement of the pressure ring is limited by the engagement of the heads 46 of the studs 42 with the plate 26.

The pressure ring 40 is normally supported by the cooperative action of the springs 44 and the studs 42 substantially in the position shown in Fig. 3 with the upper surface of the ring located at substantially the same height as the upper surface of the box member supported on the work support 30. The ring is formed with a substantially horizontal outer surface 48, with a shoulder 50 and with a substantially horizontal inner surface 52 located slightly lower than the surface 48. The shoulder 50 preferably extends about the ring in the manner shown in Fig. 11 and serves as a gage to locate the section of covering sheet material laterally on the work support and pressure ring.

In preparing for the covering operation, the box member 36 is placed on the support or float in the position above indicated and the piece or section of sheet material indicated at 37 to be applied to the box member is placed with its central portion engaging the box member and with its

marginal portion resting on the surface 52 of the pressure ring. The shoulder 50 constitutes a gage with which the edge of the section of sheet material may be engaged to locate the same in the desired position laterally of the machine.

Mounted for vertical movement above the support and pressure ring, in coaxial relation to the support and ring, is a pressure head or die 54. This head comprises an annular block 56 secured to the under side of a vertically movable slide 58, a plate 60 being interposed between the slide and the block. The head also comprises an annular contact plate 62 mounted on the lower side of the block 56 and arranged in opposed relation to the pressure ring 40. The contact plate 62 and the pressure ring 40 constitute cooperating gripping devices for gripping the marginal portion of the section of sheet material applied to the article to be covered which is engaged with the pressure block 30.

The contact plate 62 is provided with an outer horizontal surface 64 for engagement with the surface 48 of the pressure ring 40 with a shoulder 66 located slightly inside the shoulder 50 on said ring and with a horizontal surface 68 for engagement with the marginal portion of the section of sheet material resting on the surface 52 of said ring. The difference between the depth, vertically, of the annular projection 65 on the pressure head and the depth of the annular recess 67 on the pressure ring is less than the thickness of the sheet material.

The slide 58, upon which the pressure head is carried, is mounted for vertical movements on the tubular corner posts 18, 20, 22 and 24, the slide being provided with suitable bearings surrounding the posts. Vertical movements are imparted to the slide by compressed air operated mechanism connected therewith.

Fig. 3 shows the "tools" of the covering mechanism in the positions that they assume when the box member and the sheet material to be applied thereto are placed in the machine before the covering operation is started.

The pressure head 54, at the beginning of the covering operation is moved from its upper position shown in Fig. 3 downwardly to the position shown in Fig. 4 and is held in the latter position until the end of the covering operation. During this downward movement of the head, the surface 68 of the contact plate 62 of the head is engaged with the marginal portion of the covering material resting on the pressure ring 40 and said material is gripped between said plate and the ring. As the head continues its downward movement, the pressure ring is carried downward against the action of the springs 44 and the sheet material is stretched tightly over the box member on the support 30 and the marginal portion of said material is carried down below said support. During the latter part of the downward movement of the head, the marginal portion of the covering material is drawn from between the contact plate 62 and the pressure ring 40 and assumes substantially the position shown in Fig. 4, said marginal portion 80 then extending some distance below the lower edge of the box member.

Mounted upon the pressure head 54 within the central opening 70 in the block 56 is an ejector plate or block 74. This block may also be termed a pressure block because of the manner in which it acts in cooperation with the pressure block 30 to press the sheet material against the article being covered during the covering operation. This pressure block is mounted for sliding movement axially of the pressure head upon headed studs 76 secured at their lower ends in the block and slidably engaging in openings in the plate 60. A coil spring 78 having its ends respectively engaged in recesses in the slide and in the block 74 is interposed between these parts to hold the block yieldingly in its lower position in the pressure head. The downward movement of the block with relation to the pressure head is limited by the engagement of the heads of the studs 76 with the plate 60.

With this construction, when the pressure head is moved

downwardly from the position shown in Fig. 3, the block 74 is moved downwardly therewith until the lower surface of said block engages the covering material and forces the same into firm contact with the box member supported on the work support or pressure block 30. The pressure head then continues its downward movement independently of the block 74 to its lowermost position. During this downward movement of the pressure head independently of the block, the spring 78 is compressed to increase the pressure of the block on the covering material 37 and preferably, at a point just before the downward movement of the pressure head is completed, the plate 60 engages the block and forces the same positively against the covering material, thereby forcing the covering material positively against the box member.

With the pressure head, pressure ring and work support 30 in the positions shown in Fig. 4, that part 80 of the marginal portion of the covering material extending below the lower edge of the outer portion of the box member is folded inwardly across said edge. This folding operation is performed by a series of folders 82 mounted on the pressure head for vertical movement herewith and for movement with relation to the head toward and from the common axis of the head, the support, the pressure ring and punch, which will be hereinafter referred to as the axis of the machine.

The folders are spaced about the axis of the machine to correspond with the spacing of the corners of the box member applied to the work support.

When the pressure head is elevated as shown in Fig. 3, the folders are located some distance above the support and pressure ring as shown in said figure. When the pressure head is depressed to its limiting lower position, the folders are moved down to their operative positions below the marginal portion of the box member on the support.

Fig. 9 shows these folders in underside plan. The folders will usually be varied in shape for adapting the machine for use in applying covering material to box members having different outlines. The folders, for a machine such as the present, for applying covering material to rectangular box members preferably have substantially the shape shown in underside plan in Fig. 9 and in section in Figs. 3 to 7 inclusive. Figs. 4, 6 and 7 show the folders in retracted positions and Fig. 5 shows the folders in advanced positions with relation to the axis of the machine.

The folders 82 consist of plate-like members mounted to slide in grooves 84 in the block 56 toward and from the axis of the machine and are held in place in said grooves by the contact plate 62.

Each of the folders is formed with a re-entrant angle 86 having substantially the same shape as the corresponding angle at one of the several corners of the box member on the support. The folders are located on the pressure head so that these re-entrant angles correspond with the positions of the corners of the box member supported on the support 30. The folders are respectively mounted on the head to slide in directions substantially parallel with the bisectors of the re-entrant angles formed in said folders, which angles occupy substantially the same positions about the axis of the machine as the corners of the box supported on the work support.

When the pressure head is in depressed position and the folders are retracted, the faces of the re-entrant angles, on each folder, are positioned outside the walls of the flange at the corresponding corners of the box member a distance greater than the thickness of the covering material.

As above indicated, the downward movement of the pressure head carries the folders downwardly from the position shown in Fig. 3 to the operative position shown in Fig. 4, below the lower edge of the marginal portion of the box member 36, the corners of the box member passing relatively through the re-entrant angles 74 in the folders during this movement of the head. Following the downward movement of the head and while the head is held in depressed position, the folders 70 are moved inwardly toward the axis of the machine substantially to the positions shown in Fig. 5, thereby folding the marginal portion 80 of the covering material inwardly substantially to the position shown in the latter figure. Following the completion of their inward movements, the folders are immediately moved back outwardly to their initial position.

Immediately after the folders have completed their retracting movements, that part of the marginal portion of the covering material folded inwardly by the folders which extends inwardly beyond the lower edge of the flange on the cover is forced upwardly into the space between the outer face of the work support 30 and the marginal portion of the box member. This operation is performed by the punch 34. The punch consists of a device provided with a body 88 having a shape in horizontal cross section substantially the same as that of the box member to be covered. The punch is provided with an annular portion 90 extending upwardly from the body of the punch and having a shape and size in cross section substantially the same as the cross sectional shape and size of the annular recess between the side walls of the work support and the peripheral portion of the box member.

The punch 34 is secured to the upper end of a slide block or shaft mounted for vertical movement in the lower frame plate 26. When the folders 82 have completed their retracting movement, the punch 34 is located in lowered position in engagement with the plate 26 as shown in Fig. 5. Upon the completion of the retracting movements of the folders, the punch is moved upwardly to the position shown in Fig. 6 and is held in said position for a predetermined time interval. This movement of the punch takes place independently of the work support 30 which is held down by the engagement of the ejector block 74 with the covering material extending over the box member on the support, the coil spring 78 being much stronger than the coil spring 35. The latter spring is further compressed during the upward movement of the punch. During this movement of the punch, the annular portion 90 is projected upwardly into the annular recess 31 as shown in Fig. 6. This projecting portion 90, in its upward movement, engages the marginal portion 80 of the covering material and folds the same upwardly and forces it laterally into firm contact with the inner surface of the marginal portion 33 of the box member. The punch and the pressure head are both preferably heated by suitable electrical heating units and preferably the covering material is coated with glue upon its lower surface. The heat activates the glue and the covering material is held firmly against the surfaces of the box member by the ejector block 74 and the annular projecting portion 90 of the punch so as to form a secure bond between the box member and the covering material at the end of the predetermined interval during which the parts are held in the positions shown in Fig. 6. The covering operation is complete at the end of this interval.

Upon the completion of the covering operation, the pressure head 54 is moved upwardly to its upper position shown in Fig. 1, the punch 34 remaining in its upper position. As the pressure head is moved upwardly, the ejector block 74 is held in its lower position shown in Fig. 6 by the spring 78 until the plate 60 engages the heads of the studs 76. By this movement of the pressure head independently of the ejector block, the work support with the covered box member thereon are removed from the central opening in the pressure head. As the upward movement of the pressure head continues, the ejector block is lifted therewith and the work support is moved upwardly by the action of the spring 35, to the position shown in Fig. 7. This movement of the work support disengages the box member from the upwardly projecting portion 90 of the punch. The box member is then lifted from the work

support and blown laterally from between the pressure head and the work support by an air blast mechanism.

After the discharge of the covered box member from the machine, the punch 34 is moved back downwardly to its initial position shown in Fig. 3 and the work support is depressed therewith to the position shown in said figure. This restores the parts of the mechanism to the condition shown in Fig. 3.

The pressure head 54 is moved downwardly and upwardly, the folders 82 are moved inwardly and the punch 34 is moved upwardly and downwardly in the manner described by compressed air actuated mechanism.

The mechanism for moving the pressure head comprises a cylinder 92, a piston 94 mounted on a piston rod 96 and operating in the cylinder. The cylinder is secured at its lower end to the upper plate 28 of the upper frame and extends upwardly therefrom. The piston rod extends downwardly through the lower head 98 of the cylinder which is secured to the plate 28 and through said plate and is secured at its lower end to the vertically movable slide 58 upon which the pressure head is mounted. The upper head 100 of the cylinder is provided with a port 102 to which is connected one end of a pipe 104, the other end of which is connected to the upper end of the tubular corner post 22, which serves as a compressed air conducting tube. The lower head 98 of the cylinder is provided with a port 106 to which is connected one end of a pipe 108, the other end of which is connected to the upper end of the corner post 24, which also serves as an air conducting tube.

The lower end of the corner post 22 is connected by a pipe 110 with the port 116 of a solenoid valve 114 connected with the compressed air supply system. The lower end of the corner post 24 is connected by a pipe 115 with the port 112 of the solenoid valve 114.

The mechanism for operating the folders 82 (see Fig. 9) comprises a cylinder and piston for operating each folder. Each folder is connected by a coupling 117 with the inner end of a piston rod 118 upon the outer end of which is secured a piston 120 operating in a cylinder secured to the underside of the block 56. These cylinders are indicated respectively at 122, 124, 126 and 128.

As shown in the illustration of the cylinder 128 and associated parts, each cylinder is provided at the inner end thereof with a port 130 for the free intake and exhaust of air. A coil spring 132 mounted in each cylinder and surrounding the piston rod is interposed between the piston 120 and the inner end of the cylinder and tends constantly to move the piston toward the outer end of the cylinder.

The outer end of the cylinder 128 is provided with port 133 to which is connected one end of a pipe 134, the other end of which is connected with a port in the outer end of the cylinder 126.

The cylinder 126 is provided at its outer end with another port to which is connected one end of a pipe 135, the other end of which is connected with a union 136. The cylinder 122 is provided, at its outer end, with a port to which is connected one end of a pipe 138, the other end of which is connected with a port formed in the outer end of the cylinder 124. The cylinder 124 is provided at its outer end with another port to which is connected one end of a pipe 140, the other end of which is connected with the union 136 through which compressed air is delivered to the several cylinders.

To the union 136 is connected a pipe 142 to which is connected one end of the flexible tubing 143. The other end of this tubing is connected with a union 145 fixed in the upper wall of the lower frame 2 and extending through said wall to the inside thereof. That part of the union 145 inside said wall is connected with one end of a pipe 147, the other end of which is connected with the port 144 of the solenoid valve 146.

The mechanism for moving the punch upwardly and downwardly comprises a cylinder 148 attached at its upper end by posts 150 to the plate 26 of the upper frame in spaced relation thereto. Within the cylinder operates a piston 152 mounted on the lower end of a piston rod 154. The piston rod extends upwardly from the piston through the upper cylinder head 156 which is attached by the posts 150 to the plate 26 and the upper end of the piston rod is secured to the vertically movable slide block 39. The upper cylinder head 156 is formed with a port 157 to which is connected one end of a pipe 158, the other end of which is connected with a port 160 in a solenoid valve mechanism 162. The lower cylinder head 164 is formed with a port 166 to which is connected one end of a pipe 168, the other end of which is connected with a port 170 in the solenoid valve mechanism 162.

Any solenoid operated valve mechanism suitable to effect the desired admission of air to the compressed air operated and controlled mechanisms and the exhaust of air therefrom may be employed in the present machine.

In the machine as illustrated, solenoid valve constructions are used for the valve mechanisms 114, 146 and 162, which (except for a variation in the construction of valve 146, hereinafter described) are the same as that illustrated and described on pages 1, 2 and 3 of the circular "Form EV–5A–1–50–5M" and in "Bulletin AV300" issued by The Bellows Co., of Akron, Ohio, this circular and bulletin showing and describing products manufactured and sold by said company. This solenoid valve mechanism is known in the trade as Bellows Electroaire Valve, model EV5A. This solenoid valve mechanism, shown in Fig. 12, comprises a block 166 having a chamber 168 for receiving compressed air, through a port 170 from a supply line. Within the chamber 168 is mounted for sliding movement in the directions indicated by the arrows a piston 172. At the opposite sides of the chamber are arranged solenoids 174 and 176 the coils of which are connected with the circuits in the manner indicated in the electrical diagram, Fig. 17. Located at each end of the chamber 168 is a relatively small opening 178 controlled by a valve arranged normally to close the opening and to be moved to open position by the energization of the adjacent solenoid. When the valve is moved to open position thereby reducing the pressure on that side of the piston, the pressure of the air on the other side of the piston will move the piston in a direction toward the side of the chamber upon which the valve was opened.

The block 166 is formed with ports 180 and 182 connected with the chamber 168. To these ports may be connected one or more pipes as 183 and 185 leading to the mechanism to be operated. In the same part of the valve mechanism as that in which ports 180 and 182 there are located one or more exhaust passages or ports through which air received from a cylinder may be delivered from the valve mechanism.

The valve mechanism comprises a slide valve 184 having an arm engaging in a groove 186 in the piston 172, to connect the valve for operation by the piston 172. Fig. 12 shows the piston and valve in the positions which they assume after the valve has been shifted by the movement of the piston in the direction of the right hand arrow in Fig. 12. With the valve in this position the port 182 is connected with the chamber 168 and the port 180 is disconnected from the chamber and connected with an exhaust passage by the action of the valve. When the piston 172 is shifted in the direction of the left hand arrow, Fig. 12, the valve is shifted to a position to connect the port 180 with the chamber 168 and to disconnect the port 182 from the chamber and to connect said port with an exhaust passage.

The solenoid valve mechanism 146 differs from the corresponding mechanisms 114 and 162 in that the port 149 is closed by a plug 151. With this construction when the slide valve is shifted to the left, Fig. 16, the port 144 is open to the chamber in the block for the passage of

compressed air outwardly through the port and the exhaust passages are closed by the valve. When the slide valve is shifted to the right, Fig. 16, the port **144** is closed off from the chamber and connected with an exhaust passage and the other exhaust passage is closed by the valve.

As above indicated, when the covering operation is completed and the covered box member has been lifted from the punch and carried above the pressure ring **40**, by the upward movement of the work support **30**, as shown in Fig. 7, the box member is lifted from the work support and is then carried laterally by blasts of air from the compressed air mechanism to discharge the same from the machine. This air blast mechanism is shown particularly in Figs. 7 and 11.

The discharge mechanism comprises a series of passages **187** formed in the pressure ring **40** and inclined as shown in Fig. 7 to direct blasts of air in jets upwardly and inwardly into the space within and below the marginal portion of the covered box member while the parts are located in the positions shown in Fig. 7. These passages receive air from an annular passage **189** extending about the pressure ring. Extending outwardly from the annular passage **189** is a passage **191** in the ring connected with a passage **193** in a block **195** secured to the outer face of the pressure ring. To the outer end of the latter passage is connected a union **197** to which is attached a pipe **199** leading from the compressed air supply system.

Extending upwardly from the passage **193** in the block is a passage **201** to which is connected an upwardly extending pipe **203** provided with a flattened nozzle **205** directed laterally toward the axis of the machine.

With the parts in the positions shown in Fig. 7 at the completion of the covering operation, compressed air is turned on to the delivery pipe **199** for a brief interval. The jets of air then issuing from the passages **187** lift the covered box member from the work support **30** and the blast of air from the nozzle **205** then blows the box member laterally from the mechanism.

Compressed air is supplied to the machine by means of a supply pipe **188** leading from any suitable source. The supply pipe **188** is connected by a three-way union **190** with one end of a pipe **192** having a downwardly directed end position **194** connected by a pipe **194***a* with a four-way union **196**. The supply ports of the solenoid valve mechanism **114**, **162** and **146** are connected with the union **196** respectively by the pipes **198**, **200** and **202**. To the three-way union **190** is connected the upper end of a pipe **204**, the lower end of which is connected by a union **206** and a pipe **208** with a solenoid valve mechanism **210** for controlling the air blasts for delivering the covered article from the machine. This valve mechanism is hereinafter briefly described. The valve in this mechanism which controls the flow of air to the air blast mechanism is closed, except during a brief interval following the completion of the covering operation.

The air supply mechanism is controlled by an electrical system, the electrical circuits and switches of which are shown diagrammatically in Fig. 17. This system includes five switches, four of which are shown in Figs. 13, 14 and 15. These five switches designated respectively as **1***s*, **2***s*, **3***s*, **4***s* and **5***s* are similar to push button switches in that the corresponding circuits respectively are connected while they are held in depressed or actuated position by their actuating mechanism and are restored to circuit disconnecting or open positions by spring mechanisms when they are released by their actuating mechanisms.

The switch **1***s* is mounted on a block **207** adjustably secured to a rod or post **209** fixed at its upper end in the plate **26** of the upper frame. This switch is depressed to connect the circuit which it controls by means of headed stud **211** secured at its upper end to the pressure ring **40** and arranged to slide vertically through an opening in the plate **26**. When the pressure ring, under the action of the pressure head, approaches closely to the end of its downward movement, the head of the stud **210** engages the switch **1***s* to connect the corresponding circuit.

The switch may be adjusted vertically on the rod **208** to regulate the timing in the cycle of operations at which the switch closed and the corresponding circuit is connected.

The switch **2***s* is mounted on a block **212** secured to a rod **213** fixed at its upper end in the frame plate **26**. This switch is depressed to connect the circuit controlled thereby by means of an offset end portion **214** of an arm **216** secured to the lower end of the vertically movable slide block **39** to which the upper end of piston rod **154** is attached, the arm being secured between a shoulder **218** on the piston rod and the slide block. The offset **214** is formed with a rounded outer end for engaging the switch **2***s*. This engagement of the offset with the switch occurs when the punch is closely adjacent the end of its upward stroke.

Mounted in the portion of the plate **28** outside one of the corner posts is a switch **3***s*. This switch is operated by a presser foot **220** secured by screws **222** to the outer face of the slide **58**. The inwardly directed upper end portion **224** of the presser foot is arranged to engage the switch **3***s* when the pressure head is closely adjacent the end of its upward stroke, to press the same to close the switch circuit. The presser foot **220** is mounted on the slide **58** for vertical adjustment to vary the timing of the switch closing operation in the cycle of the machine.

The switch **4***s* is mounted on a block **224** secured to the rod **213**. This switch is engaged by the rounded end of the offset portion of the arm **216** to depress the switch to close the switch circuit. The engagement of the arm **216** with the switch occurs when the punch is closely adjacent the end of its downward stroke.

The block **212** and the block **224** are mounted for vertical adjustment on the rod **213** to vary the vertical positions of the switches **2***s* and **4***s* mounted respectively on the blocks to regulate the timing of the closing of these switches in a cycle of operations of the machine.

Fig. 17 shows a circuit diagram of the electrical mechanism for controlling the action of the machine. This mechanism receives its power from a main 110 volt line which comprises a conductor **1***a* to which is connected the main switch **3***a* and a return or ground wire **5***a*. This mechanism also comprises two starting switch buttons **7***a* and **9***a*, the depression of both of which starts the machine, a stop switch button **11***a*, the depression of which causes the stoppage of the machine and the return of the parts to starting positions.

The mechanism comprises the switches **1***s*, **2***s*, **3***s* and **4***s* indicated diagrammatically in Fig. 17. The upper compressed air cylinder and piston rod are indicated respectively at **92** and **96** as in the other figures of the drawing, and the piston rod is shown diagrammatically as provided with an extension **96***y* for operating the switches **1***s* and **3***s*, thus indicating diagrammatically the manner in which these switches are operated. The lower compressed air cylinder and piston rod are indicated respectively at **148** and **154** as in the other figures of the drawing and the piston rod is shown diagrammatically as provided with an extension **154** for operating the valves **2***s* and **4***s*.

The solenoid valve mechanisms **114**, **146** and **162** are shown diagrammatically in Fig. 17 and are indicated by these reference numerals as in the other figures.

The electrical mechanism comprises transformers A, B and C, each having primary and secondary coils and preferably constructed and arranged to develop secondary current of 8 volts.

The said mechanism also comprises a time delay relay X having switch bars **13***a* and **15***a* and energized by a coil **17***a*. When the coil **17***a* is de-energized, the switch

bar 13a is closed and the switch bar 15a is located in open position. When the coil 17a is energized, the bar 13a remains in closed position and the switch bar 15a remains in open position until the expiration of a predetermined time interval. When this time interval has passed the relay trips, and the switch bar 13a is moved to open position and the switch bar 15a is moved to closed position.

The electrical mechanism also comprises a time delay relay Y having switch bars 19a and 21a and energized by a coil 19a. When the coil is de-energized, the switch bar 21a is open. When the coil is energized, after a predetermined time interval, the switch bar 21a is moved to closed position.

The said mechanism also comprises a relay Z having switch bars 25b, 27b and 29b which are open when the relay is de-energized and are closed by the energization of the relay, a switch bar 31b which is closed when the relay is de-energized and is opened by the energization of the relay and a coil 33b for energizing the relay.

The main 110 volt circuit may be traced from switch 3a, through conductors 1a and 4b, 31b and 37b to the primary coils 25a and 27a and from said coils through the conductors 35a and 39b to the conductor 26b and thence through conductor 16e, the terminal of bus bar 12t and conductor 26h to the return line or ground 5a.

The electrical mechanism also comprises a terminal strip 25c having bus bars indicated respectively at from 1t to 12t inclusive to the terminals of which certain of the conductors are connected.

The 110 volt conductor 1a is connected with the conductor 4b and this conductor is connected by a conductor 31b with the terminal 2b of the primary coil 25a of the transformer A. The terminal 33a of this coil is connected by a conductor 35a with the conductor 26b. The conductor 4b is connected by a conductor 37b with the terminal 26x of the primary coil 27a of the transformer B. The terminal 39c of this coil is connected by a conductor 39b with the conductor 26b.

A conductor 12b forming part of a 110 volt circuit to be described later is connected by a conductor 49a with a terminal 14b of a primary coil 29a of the transformer C. The other terminal 28b of the coil is connected by a conductor 27b with the conductor 26b.

The conductor 26b is connected by a conductor 16e, with the lower terminal of bus bar 16t and this terminal is connected by a conductor 26h with the return or ground wire 5a of the 110 volt circuit.

The secondary coil of the transformer A is indicated at 31a. One terminal 33a of this coil is connected with the primary circuit conductor 2a and the other terminal 35a of the coil is connected with a conductor 37a which is the return or ground of the 8 volt circuits of the mechanism.

The secondary coil of the transformer B is indicated at 39a. One terminal 41a of this coil is connected with the conductor 2a and the other terminal 43a is connected with the conductor 37a.

The secondary coil of the transformer C is indicated at 45a. One terminal 2c of this coil is connected with the conductor 6d and the other terminal 47a of the coil is connected with the conductor 37a.

The circuit diagram will be further described by describing the several circuits in connection with the description of the mode of operation of the machine.

When the main line switch 3a is closed, the pressing of the two switch buttons 7a and 9a at the front of the machine closes an electrical circuit (8 volt) which energizes solenoid valve 114 to admit compressed air from the supply line into the upper portion of the upper cylinder 92. This circuit may be traced as follows, starting from the conductor 2a connecting the secondary coils 31a and 39a: conductor 2a, conductor 4a, conductor 6a, bus bar 1t of terminal strip, conductor 8a, switch contact bar 10a, conductor 12a, switch contact bar 14a, conductor 16a, bus bar 5t of terminal strip, conductor 18a, advance solenoid of solenoid valve 114, conductor 16c to the conductor 37a connecting the other ends of the said secondary coils.

The energization of the advance solenoid admitting air to the upper end of the upper cylinder 92 causes the downward movement of the piston 94 and the pressure head or die 54, thereby stretching the covering material over the box member supported on the work support 30. When the pressure head closely approaches or reaches the lower end of its stroke, the switch 1s is closed by the bolt or stud 211, mounted on the pressure ring 40.

This closing of the switch 1s connects a second circuit (110 volt) which energizes the time delay relay X and which may be traced as follows starting from the switch 3a: switch 3a, conductor 1a, conductor 6b, bus bar 8t of terminal strip, conductor 8b, swtich 1s, conductor 10b, bus bar 9t of terminal strip, conductor 12b, conductor 49a to primary coil 29a and from said coil through conductor 27b, to conductor 26b and thence through conductor 16e, the terminal of bus bar 12t and conductor 26h to conductor 5a of the main line. The circuit also may be traced from the conductor 12b through conductor 16b, coil 17a, conductor 24b and conductor 25b to conductor 26b and thence to line 5a.

The energizing of the time delay relay X closes an 8 volt circuit which causes the energization of the solenoid valve 146 to cause the advance of the folders 82. This circuit may be traced as follows from 2c, one terminal of the secondary coil 45a of the transformer C: terminal 2c, conductor 4c, conductor 6d, switch bar 13a of time delay relay X which is then closed, conductor 8c, advance solenoid coil of solenoid valve 146, conductor 12c, conductor 16c to conductor 37a.

The energization of the time delay relay causes, after a predetermined time interval, the opening of switch bar 13a of the relay, the closing of switch bar 15a, and the connection of a circuit through the retract solenoid of the valve 146. This circuit may be traced as follows, starting from the terminal 2c of the coil 45a: terminal 2c conductor 4c, conductor 6d, switch bar 15a, conductors 10d, 12d, bus bar 3 of terminal strip, conductor 14d, switch 4s, conductor 16d, bus bar 4t of terminal strip, conductor 18d, conductor 20a retract solenoid coil of solenoid valve 146, conductor 12c to conductor 16c and thence to conductor 37a.

With this mecchanism, following the closing of the 110 volt circuit by the closing of the switch 1s thereby energizing the time delay relay X, the circuit including the advance solenoid of the solenoid valve 146 is closed to cause the advance of the folders 82. Then, after a predetermined time interval, the relay trips, breaking the latter circuit and closing the circuit through the retract solenoid of the solenoid valve 146 to cause the retraction of the folders.

A shunt circuit may be traced from conductor 18d, conductor 2f, switch bar 31b (then closed) of relay Z, conductor 6x, to the advance solenoid coil of valve 162 and thence through conductor 16c to conductor 37a.

The folders are thus caused to retract to their normal positions and thereafter the piston of the lower cylinder forces the punch upwardly pressing the marginal portion of the covering material bent inwardly by the folders up inside the outer portion of the box member between the same and the outer wall of the work support.

Substantially as the punch reaches the upper end of its stroke the offset 214 on the end of the arm 216 secured to the piston rod 154 engages the switch 2s to close the same and thereby connect another circuit which includes the time delay relay Y. This relay is adjusted to delay the closing of the switch bar 21a to give the heat of the punch and the pressure head time to reduce the glue on the covering material or the box member to the proper condition to attach said material to the box member. This circuit (110 volt) may be traced as follows,

starting with the switch 3a in the 110 volt line 1a: switch 3a, conductor 1a, conductor 6b, bus bar 8t of terminal strip, conductor 4e, switch 2s, conductor 6e, bus bar 7t, of terminal strip, conductor 8e, coil 23a of relay Y, conductor 10e, conductor 14e, conductor 25b, conductor 26b, conductor 16e, to ground line 5a.

When, after the predetermined time interval, the switch bar 21a of the relay Y closes, a circuit (8 volt) is made energizing the retract solenoid of solenoid valve 114 causing the piston in the upper cylinder to move upwardly to carry the pressure head 54 to its upper position. This circuit may be traced as follows, starting with conductor 2a: conductor 2a, conductor 4a, conductor 6f, conductor 8f, switch bar 21a, conductors 12f, 14f 16f, retract solenoid of valve 114, conductor 16c to conductor 37a.

When the pressure head substantially reaches the limit of its upward movement, the presser foot 224 on the slide 58 closes the switch 3s. This connects a circuit which energizes the retract solenoid of the solenoid valve 162 for the lower cylinder to cause the piston to move downward to retract the punch 34 to its lowermost or starting position. This circuit may be traced as follows, starting with the conductor 2a: conductors 2a, 4a, 6f, 18f, switch bar 25b which is then closed, conductors 20f, 14f and 22f, bus bar 2t of terminal strip, conductor 24f, switch 3s, conductor 26f, bus bar 6t of terminal strip, conductors 28f and 30f, retract solenoid of solenoid valve 162, conductor 16c and thence to conductor 37a.

When the piston 152 of the lower cylinder moves downwardly to carry the punch 34 to its lowermost position, the offset 214 on the arm 216 engages the switch 4s and depresses the same. Thus at the end of the downward movement of the punch the several switches 1s, 2s, 3s and 4s and the corresponding circuits are restored to starting condition as shown diagrammatically in Fig. 17.

When the covering action of the mechanism has been completed and the parts of the machine have reached the condition shown in Fig. 7, the compressed air is turned on to the pipe 199 for a brief interval. When this occurs, blasts are delivered diagonally upwardly through the passages 187 into the space between the marginal portion of the box member 36 and the work support 30 and the box member is thereby lifted from the work support. At the same time a laterally directed blast of air is delivered by the nozzle 205 and this transfers the box member laterally from the machine.

The turning on of the compressed air to the pipe 199 is controlled by the switch 5s. This switch is mounted on the upper plate 28 of the frame of the machine. The means for depressing the switch comprises a bracket 226 secured by screws 228 to the side of the vertically movable slide 58. To the upper end of this bracket is pivoted at 230 a switch actuator lever 232 which normally is held by gravity against a stop 234 formed on the bracket 22, this stop supporting the lever substantially in the position shown in Figs. 2 and 2a.

The switch actuating lever 232 is located above the switch 5s when the slide 58 is in its limiting upper position. When the slide moves downward, the switch engages the lever 232 and swings the same in a clockwise direction about its pivot as shown in dotted lines in Fig. 2a to allow the lever to pass the switch without actuating the same. At a predetermined point in the further upward movement of the slide 58 after the work support 30, pressure ring 48 and punch 34 have reached the positions shown in Fig. 7, following the completion of the application of the covering material to the box member, the lever 232 engages the switch 5s and depresses the same to connect a compressed air control circuit.

This circuit comprises a conductor 233, connected at one end to the bus bar 12t of the terminal strip and at the other with one end of the solenoid coil of the solenoid valve mechanism 210 for controlling delivery of compressed air to the pipe 199 connected with the valve. The other end of the coil is connected by a conductor 235 with one terminal of the switch 5s. The other terminal of the switch is connected by a conductor 237 with bus bar 8t.

The solenoid valve mechanism is of an ordinary construction and comprises a valve opening to which the pipe 199 is connected, a slide valve for closing and opening, a solenoid for moving the valve to open position, and a spring for moving the valve to closed position. The slide valve is normally held yieldingly in closed position by the spring and is opened upon the energizing of the solenoid, the valve remaining open as long as the solenoid is energized and being closed by the spring when the solenoid is deenergized.

The bus bar 8t is connected by the conductor 6b with the main 110 volt line conductor 1a. The bus bar 12t of the terminal strip is connected with the main line conductor 5a.

With this mechanism, at a predetermined point in the further upward movement of the slide 58, after the parts of the covering mechanism reach the portions shown in Fig. 7, the switch 5s is closed to connect the circuit including the solenoid coil of the solenoid valve mechanism 210 and thereby cause the slide valve of said mechanism to move to open position to connect the compressed air supply devices with the air blast mechanism associated with the pressure ring 40. The interval during which the valve is held open will depend on the shape of the portion of the actuating lever 23c which engages the switch 5s. During this interval, blasts of air are delivered through the inclined passages in the pressure ring 40 to lift the covered box member 36 from the work support 30 and a blast of air is delivered from the nozzle to blow the box member laterally from the covering mechanism. When the upward movement of the slide 58 carries the lever 236 above the switch 5s, the switch is opened by its spring to disconnect the circuit of the coil of the solenoid of the valve mechanism 210 and the valve is closed by its actuating spring, thereby cutting off the air supply from the air blast mechanism.

The machine is provided with a safety stop buttom 11a. This button controls circuits which, when connected by the depression of the button, will cause the retraction of the pressure head to its upper position, the retraction of the punch to its lower position and the retraction of the folders to their outer positions. Thus when this button is depressed as may be done in an emergency at any stage in the operation of the machine, the operation is interrupted, the machine is opened up and the parts are located in the positions shown in Figs. 1, 2 and 3.

The depression of the stop button 11a which actuates a switch bar 4h closes a 110 volt circuit which may be traced as follows, starting from the main switch 3a: switch 3a, conductor 1a, conductor 6b, bus bar 8t, conductors 4e and 2h, switch bar 4h, conductor 6h, bus bar 10t, conductors 8h and 10h, coil 33b, conductors 12h, 14e, 25b, 26b, 16e, terminal of bus bar 12t, conductor 26h to conductor 5a of main 110 volt line.

The energization of the coil 23a of the relay Z by the closing of this circuit closes the switch bars 25b, 27b and 29b and opens the switch bar 31b of the relay.

Thus a circuit (8 volt) is closed including the retract solenoid of the valve mechanism 114 to cause the retraction of the pressure head 54 to its upper position. This circuit may be traced as follows, starting with the conductor 2a connecting the secondary coils 31a and 39a of the transformers A and B: conductors 2a, 4a, 6f, 18f, switch bar 25b, conductors 20f, 14f, 16f, retract solenoid of solenoid valve 114, conductor 16c to conductor 37a also connecting said secondary coils.

The depression of the safety stop button and consequent connection of the 110 volt circuit also results in the closing of a circuit (8 volt) including the retract solenoid of the solenoid valve mechanism 162 to cause the retraction of the punch to its lower position. This circuit may be traced as follows, starting with the con-

ductor 2a: conductors 2a, 4a, 6f 14h, switch bar 27b, conductors 18h, 30f, retract solenoid coil of solenoid valve mechanism 162, conductor 16c to conductor 37a.

The depression of the safety stop button 11a and the closing of the 110 volt circuit also results in the closing of a circuit (8 volt) through the retract solenoid of the solenoid valve mechanism 162 to cause the retraction of the folders 82 to their outer positions. This circuit may be traced as follows, starting with the conductor 2a: conductors 2a, 4a, 6f, 22h, switch bar 29b, conductors 24h, 2f, 20a, retract solenoid coil of solenoid valve mechanism 146, conductors 12c and 16c to conductor 37a.

Fig. 8 shows a modification of the construction illustrated in Figs. 3 to 6 inclusive. In the construction shown in Fig. 8, the work support 30, the pressure ring 40, the block 56 of the pressure head, the ejector plate or pad 74, the punch 34 and the folders 82 have substantially the same construction arrangement and mode of operation as the corresponding parts shown in Figs. 3 to 7 inclusive.

The folders 82, in moving inwardly toward the axis of the machine to fold inwardly the marginal portion 80 of the flexible covering sheet material, exerts some force against the lower edge portion 33 of the box member and sometimes will bend the said edge portion out of its proper shape. To prevent this bending of the edge portion of the box member, the work support 30 is provided with devices for supporting this portion of the box member upon the inside thereof. These devices consist of a plurality of supporting levers or flaps 238, the body of each flap having a plate-like structure. These flaps are pivotally mounted in recesses 240 in the work support. The inner portion 242 of each flap is in the form of a portion of a cylinder and fits in a similarly shaped recess formed in the body of the work support 30 and in the plate 244 secured to said body. This construction enables each flap to pivot about the axis of the partial cylinder forming the inner portion thereof from the operative position shown in full lines in Fig. 8 to the inoperative position shown in dot and dash lines in said figure.

Each flap is normally located in a substantially horizontal operative position as shown in Fig. 8 and in this position, the outer ends of the flaps are arranged to fit inside the marginal portion 33 of the box member. The flaps respectively are acted upon by springs 246, each mounted in a bore in the body of work support 30 and engaging a plunger 248 slidably mounted in the bore and engaging the corresponding flap. The downward movement of the supporting flaps under the action of the springs 246 is limited by the engagement of the flaps with the portions of the plate 244 outside the pivots of the flaps.

The supporting flaps, of which any desired number may be used, are preferably uniformly distributed about the axis of the machine.

With this construction, when the box member to be covered is placed in the machine, upon the work support 30, the marginal portion 33 of the box member will extend down over the outer ends of the flaps 238. The ends of these flaps will support the marginal portion 33 of the box member against the thrust of the folders 82 as the folders move inwardly across the lower edge of the box member to fold the marginal portion of the section of covering sheet material inwardly underneath said edge as shown in Fig. 8. The outer portions of the flaps are located above the paths of movement of the folders 82 and the marginal portion of the sheet material is folded inwardly underneath the flaps as the folders move inwardly to the positions shown in Fig. 8.

As above stated, after the folders retract, the punch 34 moves upwardly to the position shown in Fig. 6. During the upward movement of the punch, the annular portion 90 of the punch engages the flaps 238 and swings the same upwardly to the positions shown in dot and dash in Fig. 8. Thus the flaps do not interfere with the upward movement of the punch. When the work support is moved upwardly with relation to the punch into the position shown in Fig. 7, the flaps 238 swing downwardly to their limiting lower positions shown in full lines in Fig. 7 under the influence of the springs 246.

Having explained the nature and object of the invention and having specifically described a machine embodying the invention in its preferred form, what is claimed is:

1. A covering machine comprising a support upon which an article to be covered is placed and on which the article is held during the covering operation, a gripping device yieldingly supported outside of said support, for vertical movement with relation thereto and arranged to underlie the marginal portion of a section of flexible sheet material applied over the article on said support, a die mounted for vertical movement above said support and having an outer portion arranged to grip the margin of the sheet material against said device during the downward movement of the die and carry said margin and said device downwardly therewith to stretch the sheet material tightly over the article, means associated with the die and located within said outer portion thereof for pressing the portion of the sheet material within the margin thereof firmly against the article and means for moving the die toward and from the support.

2. A covering machine comprising a support upon which an article to be covered is placed and on which the article is held during the covering operation, a gripping device yieldingly supported outside of said support, for vertical movement with relation thereto and arranged to underlie the marginal portion of a section of flexible sheet material applied over the article on said support, a die mounted for vertical movement above said support and having an outer portion arranged to grip the margin of the sheet material against said device during the downward movement of the die and carry said margin and said device downwardly therewith to stretch the sheet material tightly over the article, means associated with the die and located within said outer portion thereof for pressing the portion of the sheet material within the margin thereof firmly against the article, means for moving the die toward and from the support, and means for supporting rigidly the support during the downward movement of the die and said associated means.

3. A covering machine comprising a support upon which an article to be covered is placed and on which the articles is held during the covering operation, a gripping device yieldingly supported outside of said support, for vertical movement with relation thereto and arranged to underlie the marginal portion of a section of flexible sheet material applied over the article on said support, a die mounted for vertical movement above said support and having an outer portion arranged to grip the margin of the sheet material against said device during the downward movement of the die and carry said margin and said device downwardly therewith to stretch the sheet material tightly over the article, means associated with the die and located within said outer portion thereof for pressing the portion of the sheet material within the margin thereof firmly against the article, means for moving the die toward and from the support, a plurality of folders arranged about the common axis of the support and die for movement toward and from said axis to engage, during their inward movement, the marginal portion of the sheet material extending below the article being covered and to fold said marginal portion inwardly across the edge of the article and means for moving said folders inwardly and outwardly.

4. A covering machine comprising a support upon which an article to be covered is placed, and on which the article is held during the covering operation, a gripping device yieldingly supported outside of said support, for vertical movement with relation thereto and arranged to underlie the marginal portion of a section of flexible sheet material applied over the article on said support, a

die mounted for vertical movement above said support and having an outer portion arranged to grip the margin of the sheet material against said device during the downward movement of the die and carry said margin and said device downwardly therewith to stretch the sheet material tightly over the article, means associated with the die and located within said outer portion thereof for pressing the portion of the sheet material within the margin thereof firmly against the article, means for moving the die toward and from the support, a plurality of folders arranged about the common axis of the support and die for movement toward and from said axis in directions substantially perpendicular thereto to engage, during their inward movement, the marginal portion of the sheet material extending below the article being covered and to fold said marginal portion inwardly across the edge of the article and means for moving said folders inwardly and outwardly.

5. A covering machine comprising a support upon which an article to be covered is placed and on which the article is held during the covering operation, a gripping device yieldingly supported outside of said support, for vertical movement with relation thereto and arranged to underlie the marginal portion of a section of flexible sheet material applied over the article on said support, a die mounted for vertical movement above said support and having an outer portion arranged to grip the margin of the sheet material against said device during the downward movement of the die and carry said margin and said device downwardly therewith to stretch the sheet material tightly over the article, means associated with the die and located within said outer portion thereof for pressing the portion of the sheet material within the margin thereof firmly against the article, means for moving the die toward and from the support, a plurality of folders having their inner portions shaped to correspond with the shape of the periphery of the article and arranged about the common axis of the support and die for movement toward and from said axis to engage, during their inward movement, the marginal portion of the sheet material extending below the article being covered and to fold said marginal portion inwardly across the edge of the article and means for moving said folders inwardly and outwardly.

6. A covering machine comprising a support upon which an article to be covered is placed and on which the article is held during the covering operation, a gripping device yieldingly supported outside of said support, for vertical movement with relation thereto and arranged to underlie the marginal portion of a section of flexible sheet material applied over the article on said support, a die mounted for vertical movement above said support and having an outer portion arranged to grip the margin of the sheet material against said device during the downward movement of the die and carry said margin and said device downwardly therewith to stretch the sheet material tightly over the article, means associated with the die and located within said outer portion thereof for pressing the portion of the sheet material within the margin thereof firmly against the article, means for moving the die toward and from the support, a plurality of folders mounted for vertical movement with the die and arranged about the common axis of the support and die for movement toward and from said axis to engage, during their inward movement, the marginal portion of the sheet material extending below the article being covered and to fold said marginal portion inwardly across the edge of the article and means for moving said folders inwardly and outwardly.

7. A covering machine comprising a support upon which an article to be covered is placed and on which the article is held during the covering operation, a gripping device yieldingly supported outside of said support, for vertical movement with relation thereto and arranged to underlie the marginal portion of a section of flexible sheet material applied over the article on said support, a die mounted for vertical movement above said support and having an outer portion arranged to grip the margin of the sheet material against said device during the downward movement of the die and carry said margin and said device downwardly therewith to stretch the sheet material tightly over the article, means associated with the die and located within said outer portion thereof for pressing the portion of the sheet material within the margin thereof firmly against the article, means for moving the die toward and from the support, a plurality of folders mounted for movement with the die, arranged about the common axis of the support and die for movement toward and from said axis to engage, during their inward movement, the marginal portion of the sheet material extending below the article being covered and to fold said marginal portion inwardly across the edge of the article, said folders being carried into operating position as the die is moved downwardly to its final lower position, and means for moving said folders inwardly and outwardly.

8. A covering machine comprising a support upon which an article to be covered is placed and on which the article is held during the covering operation, a gripping device yieldingly supported outside of said support, for vertical movement with relation thereto and arranged to underlie the marginal portion of a section of flexible sheet material applied over the article on said support, a die mounted for vertical movement above said support and having an outer portion arranged to grip the margin of the sheet material against said device during the downward movement of the die and carry said margin and said device downwardly therewith to stretch the sheet material tightly over the article, means associated with the die and located within said outer portion thereof for pressing the portion of the sheet material within the margin thereof firmly against the article, means for moving the die toward and from the support, a plurality of folders arranged about the common axis of the support and die for movement toward and from said axis to engage, during their inward movement, the marginal portion of the sheet material extending below the article being covered and to fold said marginal portion inwardly across the edge of the article and means for moving the folders inwardly toward the axis of the support when the die has completed its movement toward the support and is held stationary.

9. A covering machine comprising a support upon which an article to be covered is placed and on which the article is held during the covering operation, a gripping device yieldingly supported outside of said support, for vertical movement with relation thereto and arranged to underlie the marginal portion of a section of flexible sheet material applied over the article on said support, a die mounted for vertical movement above said support and having an outer portion arranged to grip the margin of the sheet material against said device during the downward movement of the die and carry said margin and said device downwardly therewith to stretch the sheet material tightly over the article, means associated with the die and located within said outer portion thereof for pressing the portion of the sheet material within the margin thereof firmly against the article, means for moving the die toward and from the support, a plurality of folders arranged about the common axis of the support and die for movement toward and from said axis to engage, during their inward movement, the marginal portion of the sheet material extending below the article being covered and to fold said marginal portion inwardly across the edge of the article, means for moving said folders inwardly and outwardly, a punch arranged substantially coaxial with the die and support and movable toward the support to force the margin of the sheet material bent inwardly by the folders upwardly into its final position and means for moving the punch toward and from the support.

10. A machine for covering box members, having a

body and a marginal flange extending at an angle to said body, comprising a support upon which the box member is placed and held during the covering operation with the flange extending downwardly from the body in spaced relation to the support, means for stretching a section of sheet material over said box member, and drawing the marginal portion downwardly along the sides of the support, means for bending the downwardly extending margin of said material inwardly across the lower edge of said flange, and means for forcing the inwardly deflected portion upwardly into the space inside of said flange.

11. A machine for covering box members, having a body and a marginal flange extending at an angle to said body, comprising a support upon which the box member is placed and held during the covering operation with the flange extending downwardly from the body in spaced relation to the support, means for stretching a section of sheet material over said box member, and drawing the marginal portion downwardly along the sides of the support, means for bending the downwardly extending margin of said material inwardly across the lower edge of said flange, and means for forcing the margin of the sheet material upwardly within said flange and to engage the same with the inner surface of the flange to secure the same in position.

12. A machine for covering the outer surfaces of box members comprising means for stretching a section of relatively thin flexible sheet material over a box member and for drawing the margins thereof beyond the marginal edges of the box member, means for folding the marginal portions of the sheet material extending beyond the edges of the box member inwardly across said edges, means for turning the inwardly folded portions of the sheet material inside the box member and securing the same to the inner wall of said member, pneumatically operated mechanism for actuating the said means and electrically operated mechanism for controlling said pneumatically operated mechanism to actuate said means in timed relation to each other.

13. A machine for covering the outer surfaces of box members comprising means for stretching a section of relatively thin flexible sheet material over a box member and for drawing the margins thereof, beyond the marginal edges of the box member, means for folding the marginal portions of the sheet material extending beyond the edges of the box member inwardly across said edges, means for turning the inwardly folded portions of the sheet material inside the box member and securing the same to the inner wall of said member, compressed air operated mechanism for actuating the said means and mechanism for controlling said compressed air mechanism to operate said means in timed relation to each other.

14. A machine for covering the outer surfaces of box members comprising a support for a box member on which the box member is placed and held during the covering operation, means for stretching a section of relatively thin flexible sheet material over a box member resting on said support and for drawing the margins thereof down below the marginal edges of the box member, means for folding the marginal portions of the sheet material extending below the edges of the box member inwardly across said edges, means for turning the inwardly folded portions of the sheet material upwardly inside the box member and securing the same to the inner wall of said member, and air blast mechanism for lifting the box member from the support upon the completion of the covering operation and for discharging the said member laterally from the machine.

15. A machine for covering the outer surfaces of box members comprising a support for a box member on which the box member is placed and held during the covering operation, means for stretching a section of relatively thin flexible sheet material over a box member resting on said support and for drawing the margins thereof down below the marginal edges of the box member, means for folding the marginal portions of the sheet material extending below the edges of the box member inwardly across said edges, means for turning the inwardly folded portions of the sheet material upwardly inside the box member and securing the same to the inner wall of said member, air blast mechanism for lifting the box member from the support upon the completion of the covering operation and for discharging the said member laterally from the machine and machine controlled mechanism for turning on and off said air blast mechanism.

16. A machine for covering box members, having a body and a marginal flange extending at an angle to said body, comprising a support upon which the box member is placed and held during the covering operation with the flange extending downwardly from the body, in spaced relation to the support, means for stretching a section of sheet material over said box member, and drawing the marginal portion downwardly along the sides of the support, means for bending the downwardly extending margin of said material inwardly across the lower edge of said flange, means for forcing the inwardly deflected portion upwardly into the space inside of said flange, devices movably mounted on the support and arranged to extend across said space to support the flange on the inside thereof against the force of said bending means and means for supporting said devices for movement out of the path of said forcing means.

17. A machine for covering box members, having a body and a marginal flange extending at an angle to said body, comprising a support upon which the box member is placed and held during the covering operation with the flange extending downwardly from the body, in spaced relation to the support, means for stretching a section of sheet material over said box member, and drawing the marginal portion downwardly along the sides of the support, means for bending the downwardly extending margin of said material inwardly across the lower edge of said flange, means for forcing the inwardly deflected portion upwardly into the space inside of said flange, devices mounted on the support in distributive relation about the axis of the machine and arranged to extend across said space to support the flange on the inside thereof against the force of said bending means, and structures for supporting said devices for pivotal movement to carry the same out of the path of said forcing means when engaged thereby during the upward movement of said forcing means.

18. A machine for covering box members, having a body and a marginal flange extending at an angle to said body, comprising a support upon which the box member is placed with the flange extending downwardly from the body in spaced relation to the support, means for stretching a section of sheet material over said box member, and drawing the marginal portion downwardly along the sides of the support, means for bending the downwardly extending margin of said material inwardly across the lower edge of said flange, a punch having an annular projection extending upwardly from the body of the punch for engaging in the space between said support and the flange on the box member and means for forcing said punch upwardly to engage said projection with the inwardly deflected portion of said material and force the same upwardly into the space inside said flange.

19. A machine for covering box members, having a body and a marginal flange extending at an angle to said body, comprising a support upon which the box member is placed with the flange extending downwardly from the body in spaced relation to the support, means for stretching a section of sheet material over said box member, and drawing the marginal portion downwardly along the sides of the support, means for bending the downwardly extending margin of said material inwardly across the lower edge of said flange, a punch having an annular projection extending upwardly from the body of the

punch for engaging in the space between said support and the flange on the box member and means for forcing said punch upwardly to engage said projection with the inwardly deflected portion of said material and force the same upwardly into the space inside said flange and outwardly into engagement with said flange.

20. A machine for covering articles with sheet material comprising a pressure block shaped to receive the article to be covered with a sheet of covering material extending over the surface to be covered, a second pressure block mounted coaxially with said first block and shaped to engage the face of the article opposite to that engaged by the sheet material, a gripping device associated with said first block for engaging the marginal portion of the sheet material, a second gripping device located substantially in alignment with the first gripping device in the direction of the common axis of the pressure blocks, and means for moving relatively said pressure blocks axially toward each other to force the article and the covering material toward the first block to conform the material to the article and press the material firmly against the article and for actuating and controlling the gripping devices to grip the margin of the sheet material during relative movement of the pressure blocks toward each other and draw said material tightly over the article engaged between said pressure blocks.

21. A machine for covering articles with sheet material comprising a pressure block shaped to receive the article to be covered with a sheet of covering material extending over the surface to be covered, a second pressure block mounted coaxially with said first block and shaped to engage the face of the article opposite to that engaged by the sheet material, a gripping device associated with said first block for engaging the marginal portion of the sheet material, a second gripping device located substantially in alignment with the first gripping device in the direction of the common axis of the pressure blocks, and means for moving relatively said pressure blocks axially toward each other to force the article and the covering material toward the first block to conform the material to the article and press the material firmly against the article, for actuating and controlling the gripping devices to grip the margin of the sheet material during relative movement of the pressure blocks toward each other and draw said material tightly over the article engaged between said pressure blocks and for moving thereafter the pressure blocks and the gripping devices with relation to each other to draw the margin of the sheet material from said gripping devices.

22. A machine for covering articles with sheet material comprising a pressure block shaped to receive the article to be covered with a sheet of covering material extending over the surface to be covered, a second pressure block mounted coaxially with said first block and shaped to engage the face of the article opposite to that engaged by the sheet material, an annular gripping device associated with the first of said blocks and located laterally outside of the same for engaging the marginal portion of the sheet material, a second annular yieldingly mounted gripping device located substantially in alignment with the first gripping device in a direction parallel with the common axis of the pressure blocks, and means for moving relatively said blocks axially toward each other to force the article and the covering material toward the first block to conform the material to the article and press the material firmly against the article and for moving relatively the gripping devices to grip yieldingly the margin of the sheet material during relative movement of the pressure blocks toward each other as said first block engages the sheet material to hold the margin of the sheet material from movement with relation to the associated block to stretch the material tightly over the article.

23. A machine for covering articles with sheet material comprising a pressure block shaped to receive the article to be covered with a sheet of covering material extending over the surface to be covered, a second pressure block mounted coaxially with said first block and shaped to engage the face of the article opposite to that engaged by the sheet material, a gripping device associated with one of said blocks for engaging the marginal portion of the sheet material, a second gripping device located substantially in alignment with the first gripping device in a direction parallel with the common axis of the pressure blocks, means for moving relatively said blocks axially toward each other to force the article and the covering material toward the first block to conform the material to the article and press the material firmly against the article and for moving relatively the gripping devices to grip the margin of the sheet material during relative movement of the pressure blocks toward each other to stretch the material tightly over the article, a plurality of folders arranged about the common axis of the pressure blocks for movement toward and from said axis to engage, during their inward movement, the marginal portion of the sheet material extending beyond the article being covered and to fold said marginal portion inwardly across the edge of the article, and means for moving said folders toward and from said axis.

24. A machine for covering articles with sheet material comprising a pressure block for engaging one face of an article to be covered during the covering operation, gripping devices for gripping the marginal portions of a section of sheet material extending over the article and projecting beyond the periphery of the same, said gripping devices gripping simultaneously the marginal portions of the material on all sides of the article, and means for moving relatively the pressure block and the gripping devices to stretch substantially the entire section of sheet material tightly over the article and to draw the marginal portions of said material on all sides of the article along the margins of the article transversely thereof beyond the same, and means for bending the marginal portions of the material inwardly across the margins of the article.

25. A machine for covering articles with sheet material comprising a pressure block for engaging one face of an article to be covered during the covering operation, gripping devices for gripping the marginal portions of a section of sheet material extending over the article and projecting beyond the periphery of the same, said gripping devices gripping simultaneously the marginal portions of the material on all sides of the article, means for moving relatively the pressure block and the gripping devices to stretch substantially the entire section of sheet material tightly over the article and to draw the marginal portions of said material on all sides of the article along the margins of the article transversely thereof beyond the same, means for bending the marginal portions of the material inwardly across the margins of the article, and means for forcing the inwardly bent marginal portions of the material against the adjacent portions of the article to secure the material in position.

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