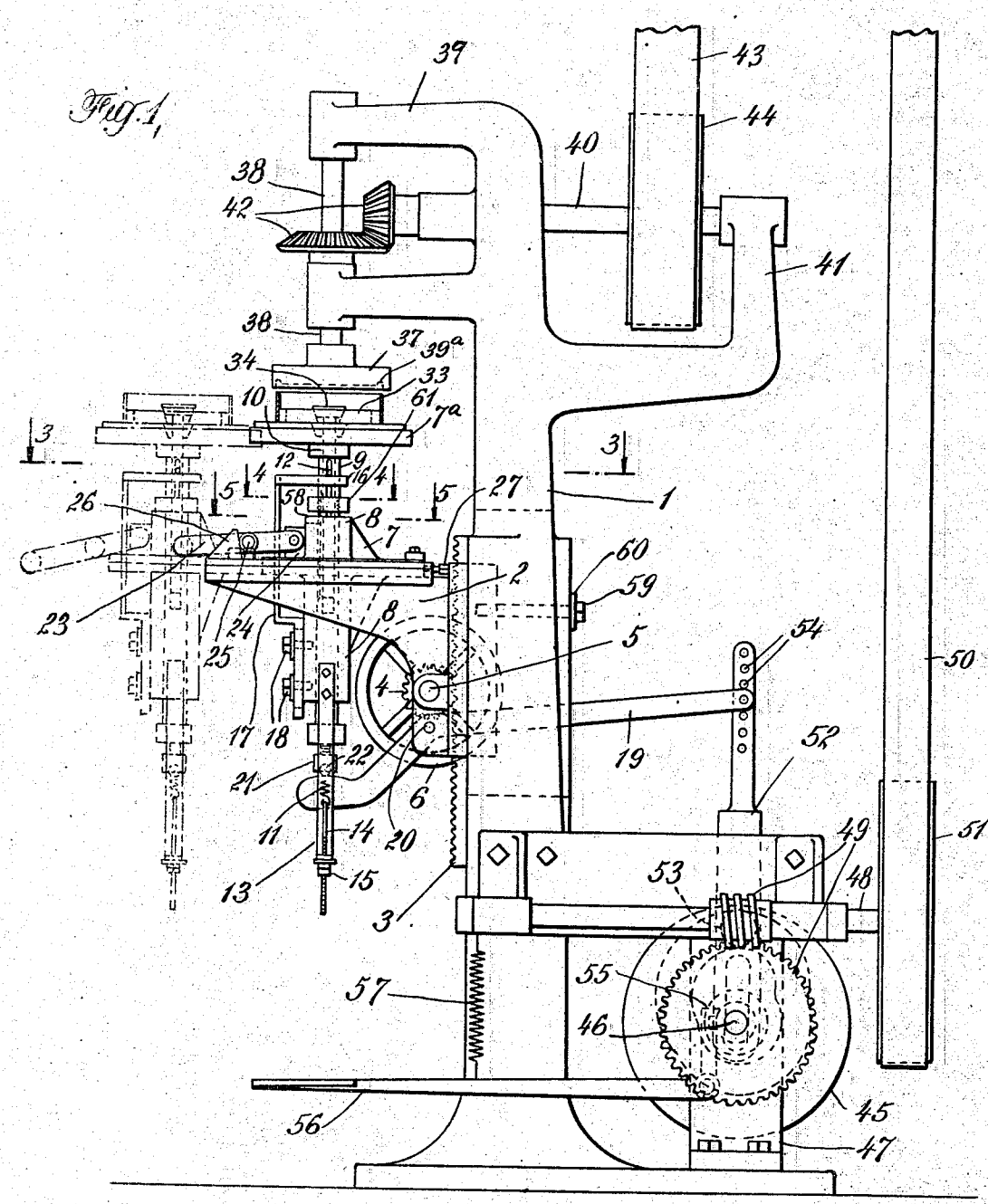
Sept. 4, 1923. 1,467,026

F. J. DOLAN

MACHINE FOR MAKING PAPER BOXES

Filed Sept. 30, 1922 3 Sheets-Sheet 1

Fig. 1.



INVENTOR

F. J. Dolan

BY Pennie Davis Marvin & Edmonds

his ATTORNEYS

Sept. 4, 1923. 1,467,026

F. J. DOLAN

MACHINE FOR MAKING PAPER BOXES

Filed Sept. 30, 1922 3 Sheets-Sheet 2

Fig. 2,

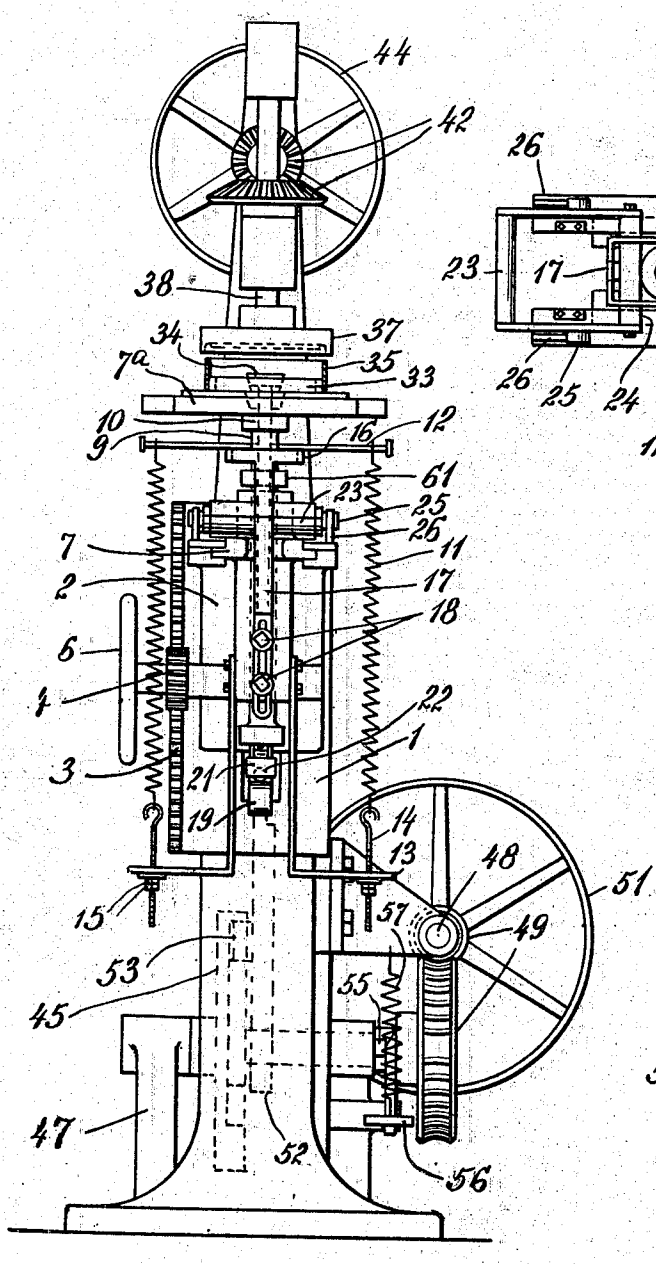


Fig. 3,

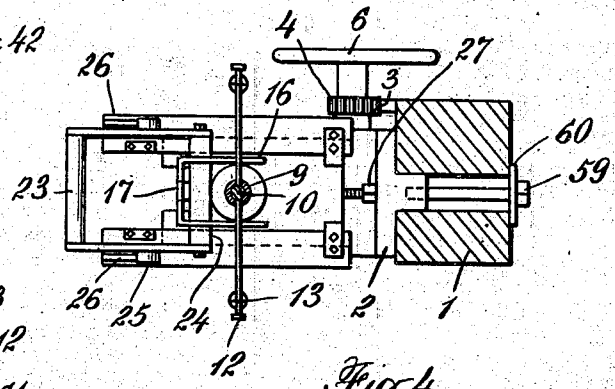


Fig. 4,

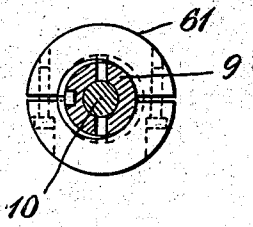
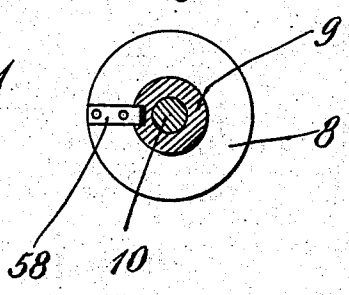


Fig. 5.



INVENTOR
F. J. Dolan
BY Pennie Davis Marvin & Edmonds
his ATTORNEYS

Sept. 4, 1923. 1,467,026

F. J. DOLAN

MACHINE FOR MAKING PAPER BOXES

Filed Sept. 30, 1922 3 Sheets-Sheet 3

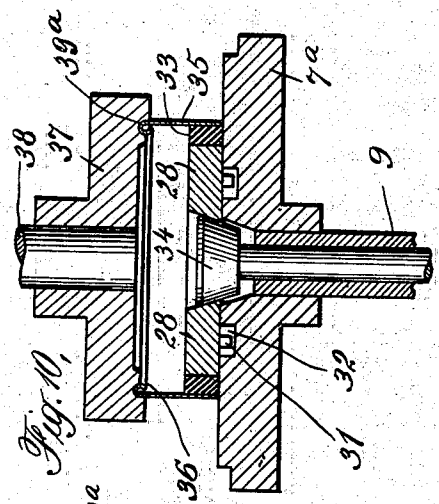


Fig. 10.

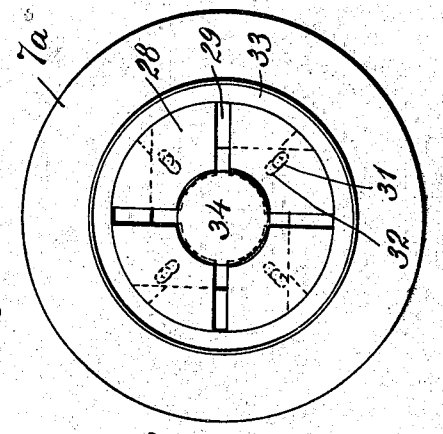


Fig. 11.

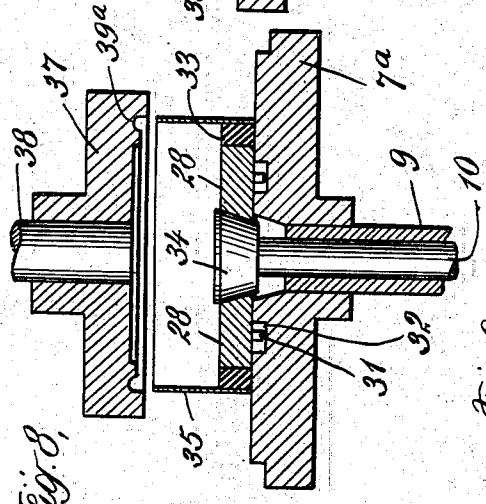


Fig. 8.

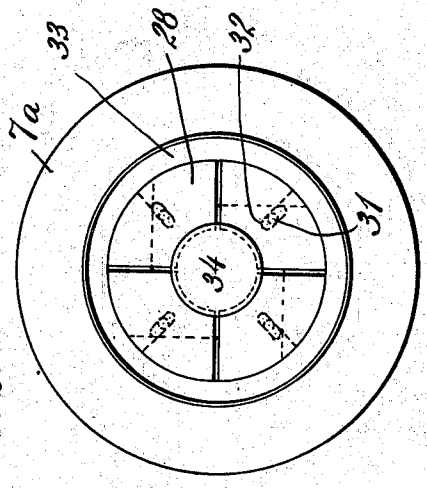


Fig. 9.

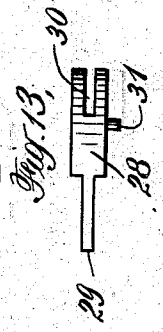


Fig. 13.

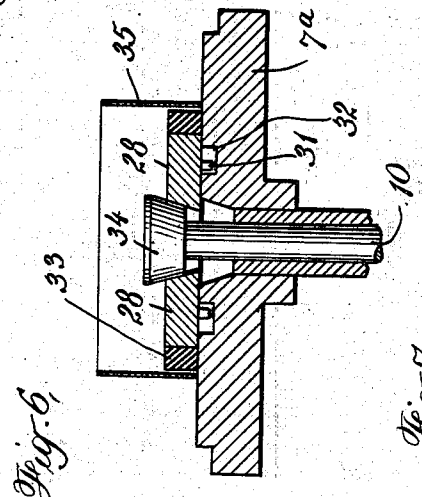


Fig. 6.

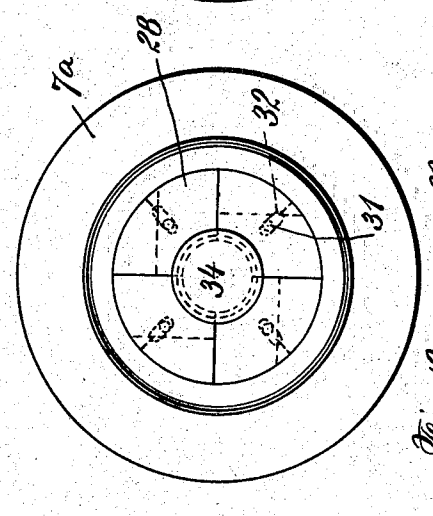


Fig. 7.

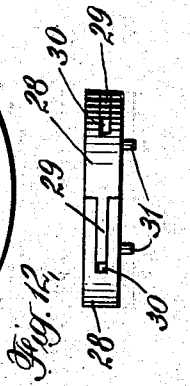


Fig. 12.

INVENTOR
F. J. Dolan
BY Pennie Davis Marvin & Edmonds
his ATTORNEYS

Patented Sept. 4, 1923. 1,467,026

UNITED STATES PATENT OFFICE.

FRANK J. DOLAN, OF BROOKLYN, NEW YORK, ASSIGNOR TO JOSEPH M. PRICE, OF NEW YORK, N. Y.

MACHINE FOR MAKING PAPER BOXES.

Application filed September 30, 1922. Serial No. 591,466.

To all whom it may concern:

Be it known that I, FRANK J. DOLAN, a citizen of the United States, residing at 1732 58th St., Brooklyn, in the county of Kings, State of New York, have invented certain new and useful Improvements in Machines for Making Paper Boxes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention is an improvement in paper box making machines, and relates particularly to machines for forming beads on the ends of tubular box elements.

In my prior applications, Serial No. 542,635, 542,636 and 549,686, I show and describe tubular box-elements, having at one or both ends inturned beads, providing abutments for engagement by other elements. Such box elements are usually cut in suitable lengths from formed tubes, composed of a plurality of spirally wound strips. Usually the strips are three in number, to provide a base or body, and inner and outer facings, and the strips are preferably so wound that the abutting edges of the several strips are in staggered relation. The entire wall of the element is turned to provide the bead, thus dispensing with binding or finishing strips.

The usual methods and machines for forming beads do not operate satisfactorily on a finished element, because the facing strip is frequently broken or defaced, and the completed element is unsightly. Furthermore, to secure a bead that will not curl or warp away from the element wall, adhesives are used, which are not desirable, because their use increases the cost of the box, and adds to the unsightly appearance.

In the present invention I provide a method and an apparatus for forming the bead, in such manner that the finishing or facing strip will not be broken or defaced, and the bead will be firmly and securely united to the element wall, without the use of an adhesive.

In the drawings:

Figure 1 is a side elevation of the improved machine,

Figure 2 is a front view,

Figures 3, 4 and 5 are sections on the lines 3—3, 4—4 and 5—5 respectively, of Figure 1,

Figures 6, 8 and 10 are detail sections showing the various steps in the formation of the bead,

Figures 7, 9 and 11 are plan views of the bead former in the several positions shown in Figures 6, 8 and 10.

Figure 12 is an edge view of the former,

Figure 13 is a similar view of one of the former elements or sections.

In the embodiment of the invention shown in the drawings, a suitable supporting frame 1 is provided, having adjustably mounted on one face thereof a bracket 2. This bracket is adjustable vertically on the frame by means of a rack 3 rigid with the frame, and engaged by a pinion 4 secured to a shaft 5 journalled in the bracket. A hand wheel 6 is secured to the shaft for operating the same, and it will be obvious that by turning the shaft 5 by means of the hand wheel, the bracket may be raised and lowered on the frame. A carriage 7 is mounted to slide on the bracket toward and from the frame, and the carriage carries a vertical bearing or hub 8, in which is held a hollow shaft or sleeve 9, and a solid shaft or rod 10, the shaft or rod being within the sleeve 9. The sleeve has secured to the upper end thereof a table 7^a, and the shaft or rod 10 extends above the table as shown in Figures 6 to 10. The rod 10 is vertically moved, but is normally pulled downward by coil-springs 11, the said springs being arranged between the ends of a rod 12 extending transversely of the rod or shaft 10, and angle brackets 13 connected with the lower end of the hub 8. The lower ends of the springs are connected with hook bolts 14, which pass through the angle brackets 13, and have nuts 15 threaded on them below the angle brackets. By means of the nuts the tension of the springs may be varied. This rod normally rests on the arms 16 of a yoke whose body 17 is adjustably connected to the hub 8 by means of screws 18 passing through a slot in the yoke body and engaging the hub. By loosening the screws,

the yoke may be adjusted vertically. The ends of the rod 12 extend through vertical slots in the sleeve 9, so that the sleeve does not interfere with the movement of the rod, and the sleeve 9 is movable vertically in the hub, whereby to raise and lower the table. This movement is obtained by a cam lever 19, which is pivoted at 20 to the bracket, and has one end extending between the angle brackets 13 and in position to engage beneath a screw 21 connecting with a head in the lower end of the sleeve. A ball 22 is journalled in the head of the screw and the ball engages the upper cam edge of the lever when the carriage is moved toward the frame, and the cam is so shaped that the table will be raised when the ball rolls upon the lever. By turning the screw 21, the extent of movement of the table may be varied. The carriage is moved by means of a yoke 23 whose arms are pivoted to the ends of a lug 24 extending transversely of the carriage, and the said arms carry locking lugs 25 on their outer faces, which are adapted to engage behind catches 26 on the brackets to lock the carriage in inward position. To move the carriage, the yoke is lifted, so that the lugs 25 slide over the catches 26. By pulling outward on the yoke, the carriage may be moved outward, and by reversing the movement, the carriage may be moved inward and locked in inward position. The outer faces of the catches 26 are bevelled as shown in Figure 1, so that the locking lugs 25 will roll up and over the catches when the carriage is moved inward. The inward movement of the carriage is limited by a set screw 27, which is threaded into the inner end thereof, and engages the frame.

A former is mounted on the table, the said former being composed of a plurality of similar sections 28. Each of these sections, in the present instance, is quadrantal in form, and each section has a tongue 29 for engaging a recess 30 in the adjacent section. Each section is also provided with a depending pin 31 engaging a radial slot in the table, and the sections are encircled by a thick band 33 of a resilient material, having a high coefficient of friction, as for instance, rubber or the like. The upper end of the shaft or rod 10 has a frusto-conical head 34, which fits in recesses at the inner corners of the former sections, the said recesses cooperating to form a frusto-conical socket for receiving the head. It will be evident that when the head is moved downward with respect to the sections the sections will be moved apart, and when the head is lifted the band 33 will collapse the sections. The box element to be beaded, indicated at 35, is placed on the former in the manner shown, and the former is of a depth such that the box wall extends well above the top of the former. The former is of such diameter that the tubular box element will fit loosely thereover, when the former is collapsed, while the former will engage the element closely when it is expanded. The band having a high coefficient of friction, prevents slipping of the band on the former, and also prevents slipping of the box element with respect to the band or former.

The bead indicated at 36 is formed on the box element, by means of a rotating head 37. This head is secured to the lower end of a shaft 38 journalled in bearings in arms 39 extended laterally from the frame 1, and the lower face of the head has an annular groove 39^a of a cross section corresponding substantially to that of the bead to be formed. The outside diameter of the annular groove 39^a is such that when the carriage 7 moves upward toward the head the outer face of the box element wall will engage the outer wall of the groove. Continued upward movement will cause the wall to be gradually turned inward and downward, as shown in Figure 10, and the heat of the head, generated by friction, will mold the bead, softening the material of the wall, so that the bead is in effect baked in the place, and there is no tendency of the formed bead to warp or curl away from the box element wall.

The head is rotated from a shaft 40 journalled in the frame, and in a bearing arm 41 extending in the opposite direction from the arms 39. This shaft is geared to the shaft 38 by a gearing 42, and the shaft 40 is driven from a suitable source of power, by means of a belt 43 engaging a pulley 44 on the shaft 40. The cam lever 19 is operated by a cam 45. This cam is secured to a shaft 46 journalled in bearings 47 on the base of the frame 1, and driven from a shaft 48 journalled in the frame and a bearing 47 through a worm gear connection 49. The shaft 48 is driven by a belt 50 from the source of power, the belt engaging a pulley 51 on the shaft 48. A bar 52 is mounted to move vertically, the lower end being forked to engage the shaft 46, and the bar carries a roller 53 which engages in a face groove in the cam 45. The upper end of the bar 52 has a series of openings 54, to any one of which the end of the cam lever 10 may be connected. When the table is adjusted vertically, the lever 19 moves with it, and it is of course necessary to change the connection between the cam lever and the bar 52. The worm wheel of the worm gear connection 49 is loose on the shaft 46, and may be connected thereto by means of a clutch indicated at 55. This clutch is operated by a treadle 56, which is normally held with the clutch in inoperative condition by means of a spring 57. When the

free end of the treadle is depressed, the clutch is operated to connect the shaft 46 with the shaft 48, thereby to cause the cam lever 19 to be operated. The clutch is a trip-clutch, being automatically disconnected at the end of a complete rotation of the shaft 46. The sleeve 9 is prevented from rotation in the hub 8 by means of a key 58 secured to the hub and engaging a key-way in the sleeve. The bracket 2 is held in adjusted position with respect to the frame 1, by means of screw bolts 59. These bolts extend through vertical slots in the frame 1, into engagement with the bracket, and when the screws are tightened the bracket is locked in adjusted position. Clamping plates 60 are arranged between the heads of the bolts and the frame.

The operation of the machine is as follows:

By means of the yoke 23, the carriage is pulled into the dotted line position of Figure 1. The former is at that time collapsed, in the position shown in Figures 6 and 7, the table 7^a being in its lowest position, as shown in Figure 6. A box element 35 may be dropped thereover. The carriage is then moved inwardly to the full line position of Figure 1. As the ball 22 rides upon the cam lever, the table is slightly lifted, moving into the position shown in Figure 8. The former is moved upward with respect to the head 34, and as a consequence the former sections are expanded, clamping the box element tightly. Meanwhile the head 37 is rotating continuously, and through previous operations it has become heated. In first starting the machine it may be advisable to heat the head, but after it has been in operation a while the friction-developed heat is sufficient. The treadle is now operated to connect the shaft 46 with the shaft 48, and the cam lever 19 is operated to move the table upwardly, that is, into the position of Figure 10. This upward movement forms the bead, and the heated head softens and molds the paper, gradually bearing the same down into the bead, so that there is no breaking or defacing of the facing of the wall. In addition the bead is firmly and securely united to the box element wall by the heat and the friction. The sleeve 9 is limited in its downward movement by means of a collar 61 adjustably connected with the sleeve above the hub 8. The sleeve is threaded externally over a portion of its length for engagement by the collar, and by means of the collar the table 7^a may be nicely regulated so far as concerns its lowermost position.

I claim:

1. In box making machines, an expansible and contractible former, means for expanding the former, and a relatively thick band of resilient material having a high coefficient of friction encircling the former to contract the same and to hold the box element from slipping on the former.

2. In box making machines, a sectional former, means for moving the former sections away from each other, and a relatively thick band of rubber encircling the sections for contracting the sections and for preventing the slipping of the box element on the former.

3. In box making machines, a former for engaging within one end of a tubular box element and a rotatable head having an annular groove of a diameter to receive the free end of the box to turn over the end of the element when the former is moved toward the head, said former being provided with means to increase its box-engaging pressure as it approaches said head.

4. In box making machines, a former for engaging within one end of a tubular box element and a rotatable head having an annular groove of a diameter to receive the free end of the box to turn over the end of the element when the former is moved toward the head, said head being of metal and adapted to be heated by the friction, said former being provided with means to increase its box-engaging pressure as it approaches said head.

5. In box making machines, an expansible and contractible former, a head above the former, said former being adapted to seat within one end of a tubular box element, and the head having an annular groove for engagement by the end of the box element, and means controlled by the movement of the former toward and from the head for expanding and contracting the former.

6. In box making machines, a former adapted to seat within one end of a tubular box element, said former being expansible and contractible, a rotating head in alignment with the former and having an annular groove for engagement by the end of the box element to bend over said end, said former being mounted to move toward and from the head, and means controlled by the movement of the former toward and from the head for expanding and contracting the former, thereby to hold and release the head of the box element.

7. In box making machines, a rotatable bead forming head, a collapsible and expansible former for engaging one end of a tubular box element and movable toward and from the head, means controlled by the movement of the former toward and from the head for expanding and collapsing the former, a fixed support below the head, and a carriage supporting the former and movable on the support into and out of alignment with the head.

8. In box making machines, a former for holding a box element, said former comprising a plurality of relatively movable ele-

ments and resilient means to hold said elements in normal position, said resilient means also providing an engaging surface to hold said box element against slipping.

9. In box making machines, a former for holding a box element, said former comprising a plurality of relatively movable elements and resilient means encircling the said elements to hold them in normal position, said means also providing a gripping surface to engage said box element.

In testimony whereof I affix my signature.

FRANK J. DOLAN.