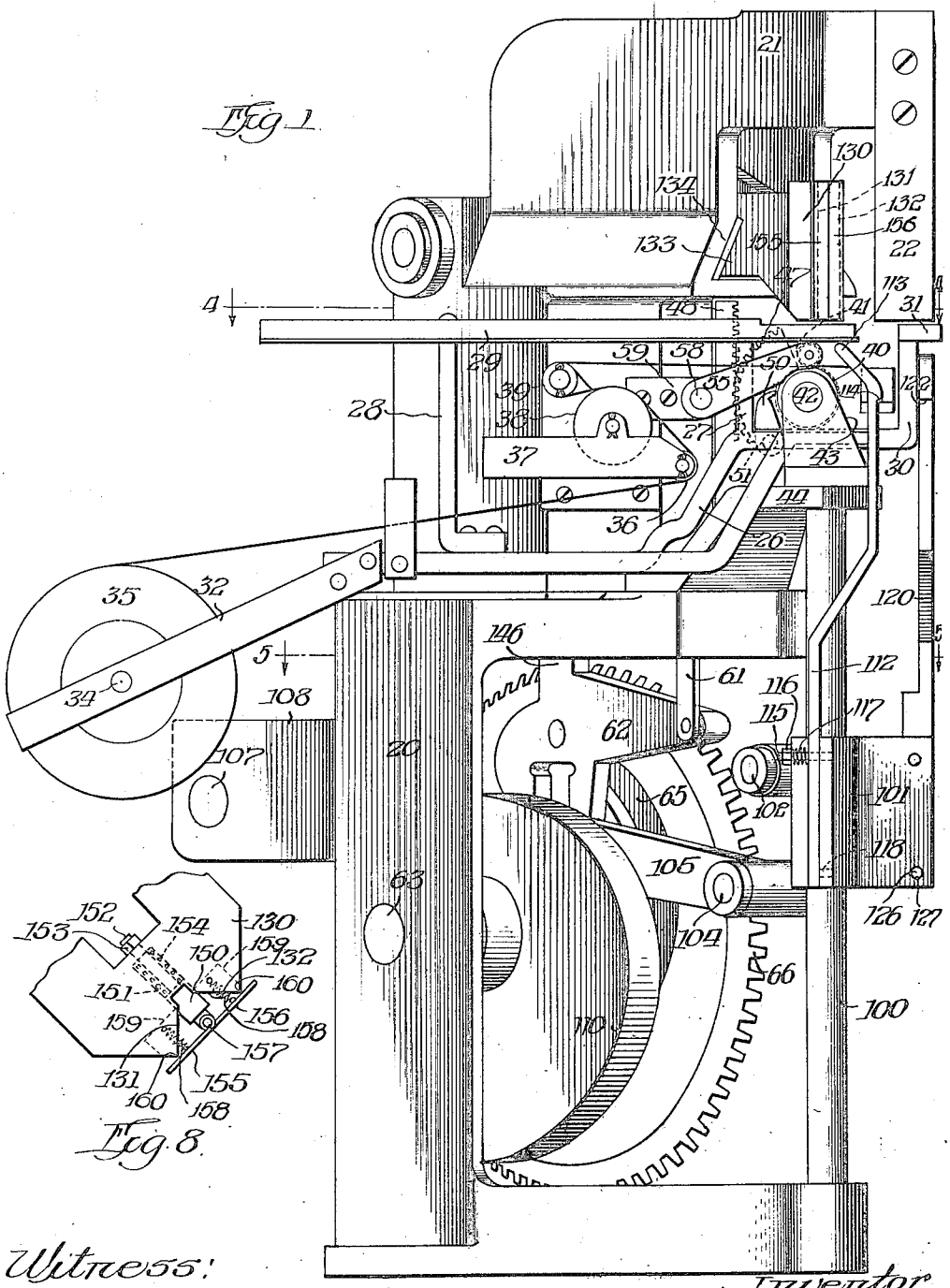
July 31, 1923. 1,463,567

A. A. ARNOLD

PASTEBOARD BOX MAKING MACHINE

Filed June 11, 1919 6 Sheets-Sheet 1



Witness:
Geo. C. Davison

Inventor
Albert A. Arnold
By Walter M. Fuller
Atty.

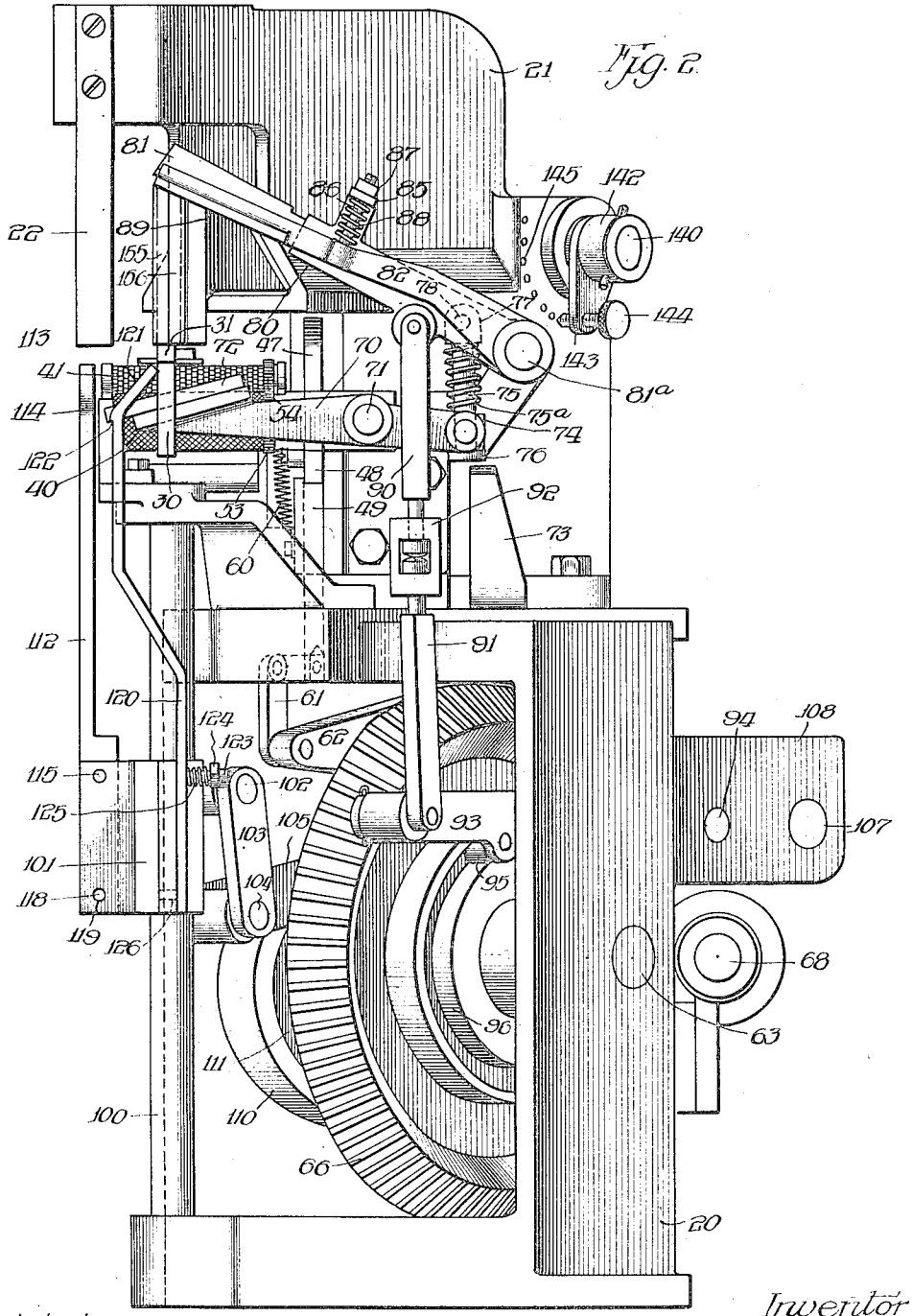
July 31, 1923. 1,463,567

A. A. ARNOLD

PASTEBOARD BOX MAKING MACHINE

Filed June 11, 1919 6 Sheets-Sheet 2

Fig. 2.



Witness:
Fred C. Dorion

Inventor:
Albert A. Arnold
By Walter M. Fuller
Atty

July 31, 1923. 1,463,567

A. A. ARNOLD

PASTEBOARD BOX MAKING MACHINE

Filed June 11, 1919 6 Sheets-Sheet 3

Fig. 3.

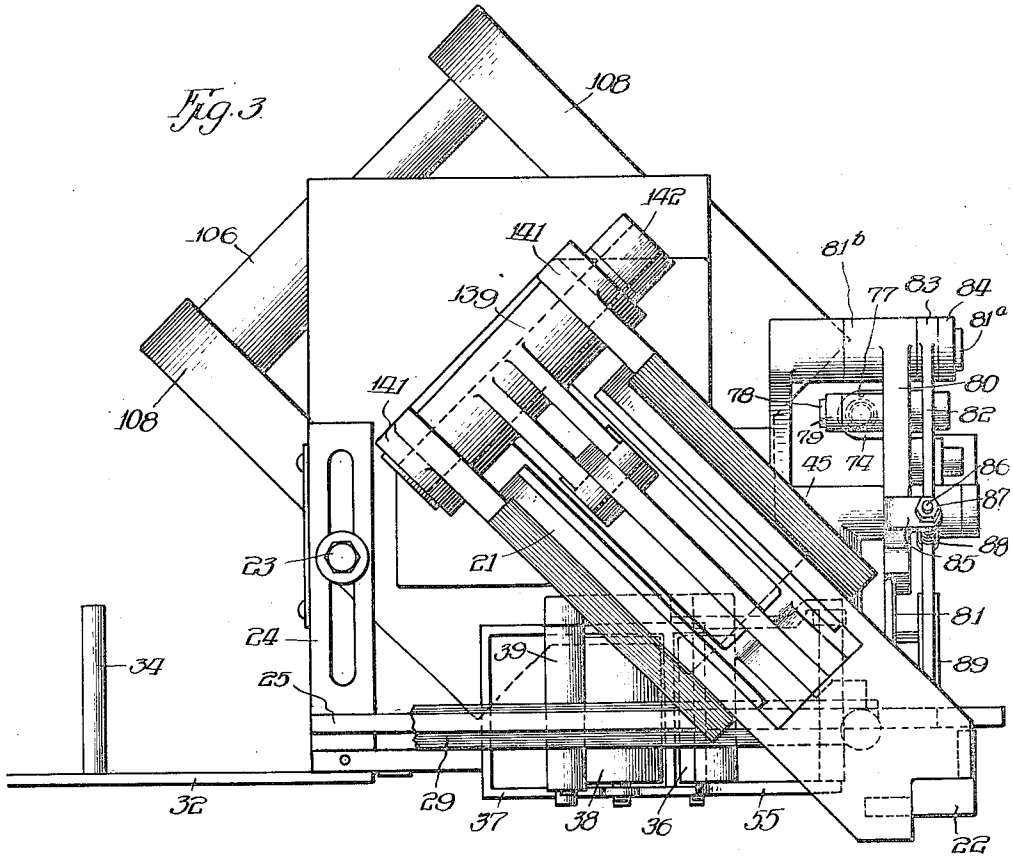
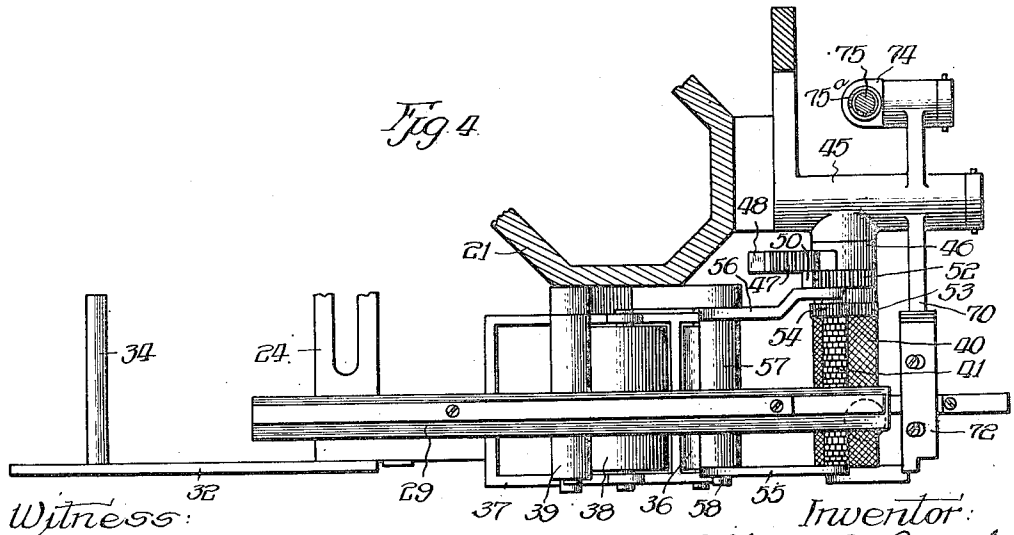


Fig. 4.



Witness:
Fred C. Dorsey

Inventor:
Albert A. Arnold
By Walter M. Fuller
Atty

July 31, 1923. 1,463,567

A. A. ARNOLD

PASTEBOARD BOX MAKING MACHINE

Filed June 11, 1919 6 Sheets-Sheet 4

Fig. 5.

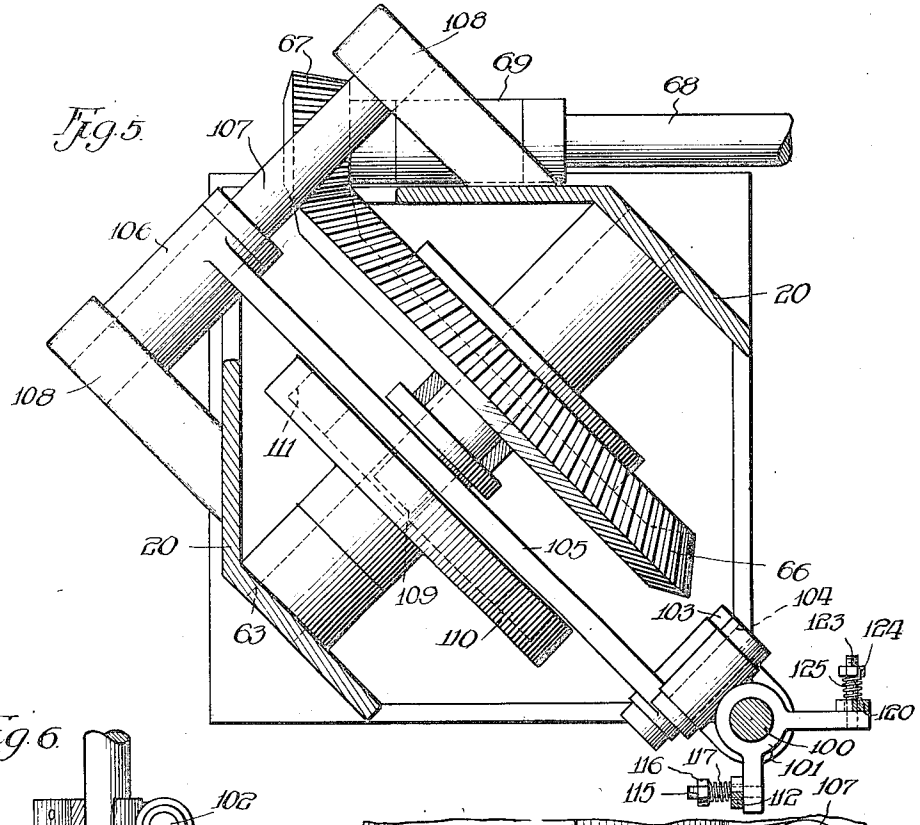
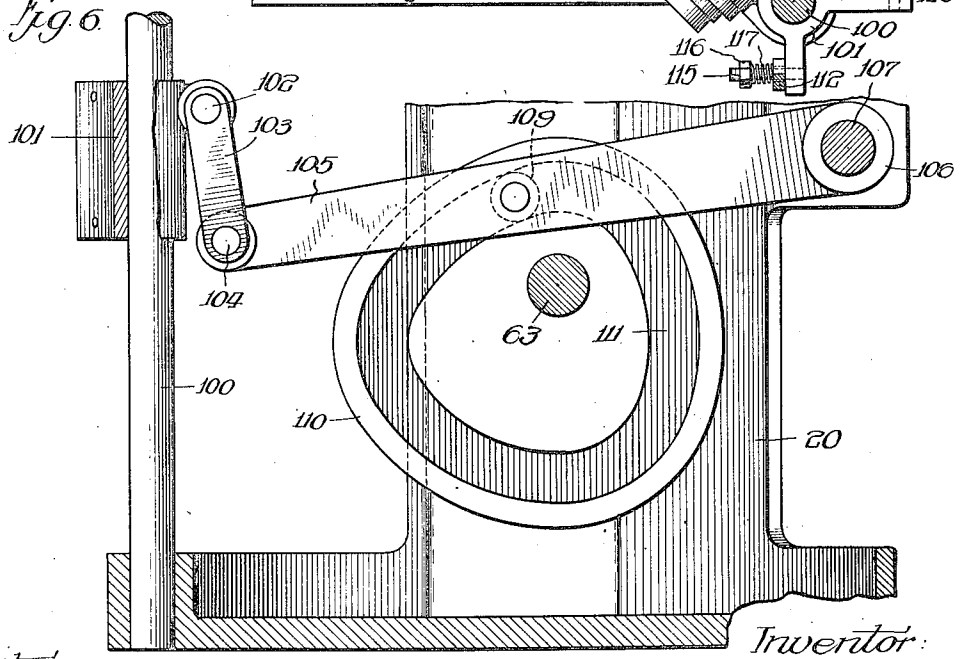


Fig. 6.



Witness:
Geo. C. Dawson

Inventor:
Albert A. Arnold
By Walter M. Fuller
Atty.

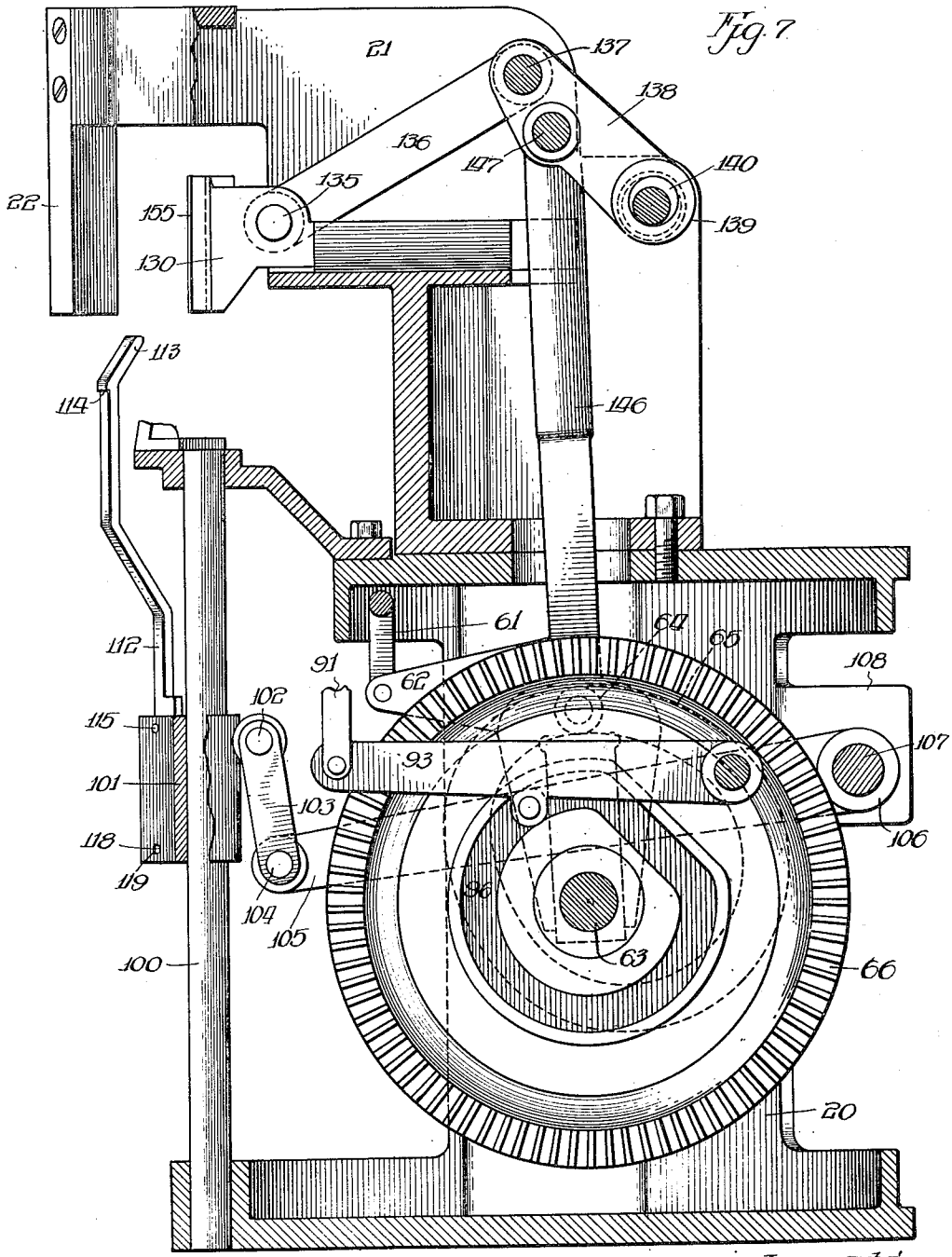
July 31, 1923. 1,463,567

A. A. ARNOLD

PASTEBOARD BOX MAKING MACHINE

Filed June 11, 1919 6 Sheets-Sheet 5

Fig. 7



Witness:
E. C. Davison

Inventor:
Albert A. Arnold
By Walter M. Fuller
Atty.

July 31, 1923. 1,463,567

A. A. ARNOLD

PASTEBOARD BOX MAKING MACHINE

Filed June 11, 1919 6 Sheets-Sheet 6

Fig. 9

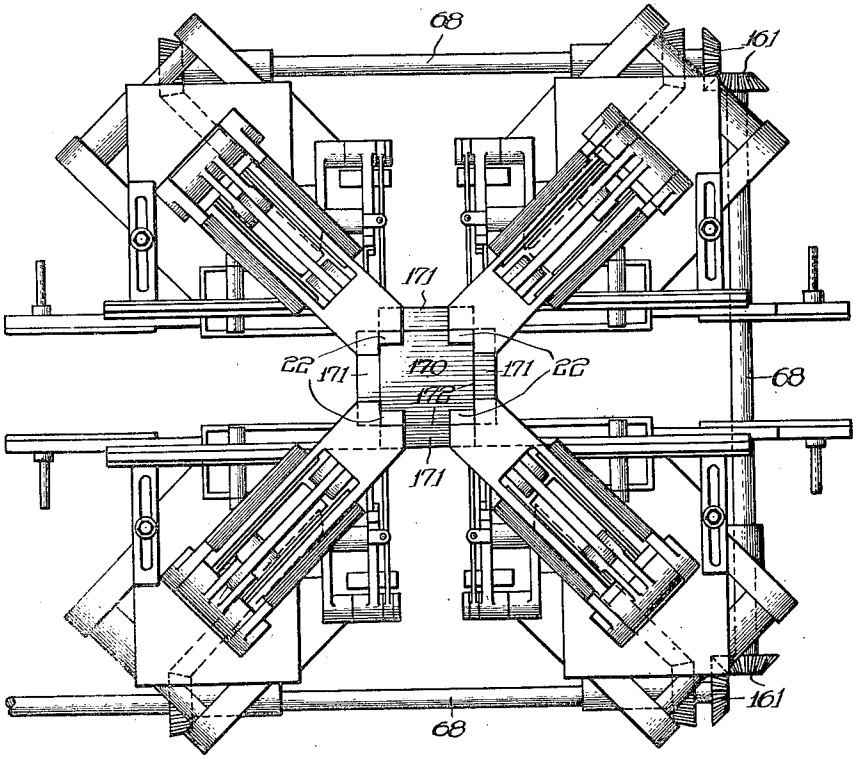


Fig. 10

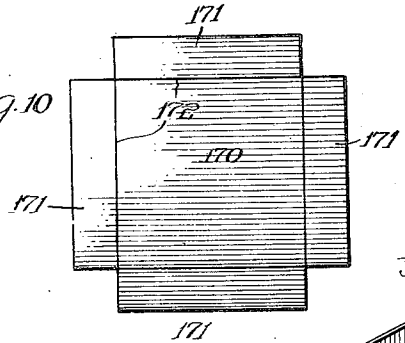


Fig. 11

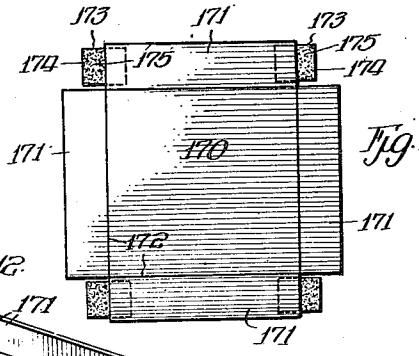
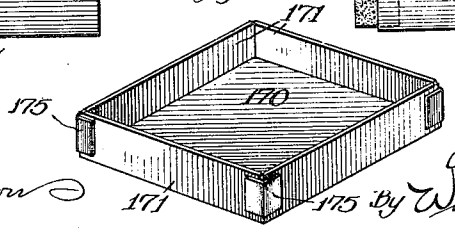


Fig. 12



Witness:
Geo. C. Purion

Inventor:
Albert A. Arnold
by Walter M. Fully Atty

Patented July 31, 1923. 1,463,567

UNITED STATES PATENT OFFICE.

ALBERT A. ARNOLD, OF OAK PARK, ILLINOIS.

PASTEBOARD-BOX-MAKING MACHINE.

Application filed June 11, 1919. Serial No. 303,376.

To all whom it may concern:

Be it known that I, ALBERT A. ARNOLD, a citizen of the United States, residing at Oak Park, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pasteboard-Box-Making Machines, of which the following is a specification.

My invention relates to box-making machines, and more particularly or especially to corner-staying mechanisms for pasteboard boxes and the like, its prime object being the provision of a machine of this type of simple construction, which will operate with dispatch and effectiveness, and which, by reason of adjustment, can be made to produce boxes of radically different sizes and proportions.

In order that the manner of attainment of these objects and other desirable aims in the improved machines may be understood by those skilled in the art, I have illustrated a preferred and desirable embodiment of the invention in the accompanying drawings forming a part of this specification and throughout the various views of which like reference characters refer tc the same parts.

In these drawings:

Figure 1 is an elevation of one corner portion of the machine;

Figure 2 is an elevation of the same part of the mechanism at right-angles to that of Figure 1;

Figure 3 is a plan view of the structure of Figures 1 and 2;

Figure 4 is a fragmentary horizontal section on line 4—4 of Figure 1;

Figure 5 is a horizontal section on line 5—5 of Figure 1;

Figure 6 is a fragmentary vertical section;

Figure 7 is a more complete vertical section taken on a different plane;

Figure 8 is a plan view of the corner pressing portion of the appliance;

Figure 9 is a plan view on a reduced scale of the entire machine; and

Figures 10, 11, and 12 illustrate the manner of producing the box structure from a flat blank.

The entire machine, as is shown in a general way in Figure 9, comprises four, similar, adjustable mechanisms, one for staying each corner of the box. A description of the construction and mode of operation of one of such corner-staying appliances, therefore, will suffice for all.

Each of such corner sections or parts of the mechanism comprises a frame structure 20 of irregular shape having at the top an overhanging arm 21 to which is secured by suitable screws, a depending, vertical, corner-form 22 rectangular in horizontal cross-section and around which the corner portion of the flat box-blank is adapted to be shaped to box form.

The means for feeding the endless strip or ribbon of corner-binding paper or cloth, providing it with an adhesive coating, and severing it into suitable sections of proper size for application to the box corners, comprises a slotted, adjustable bar 24 secured on a flat horizontal portion of the frame-structure by a screw 23, such bar at its outer end transversely supporting and carrying a smaller bar 25 having a bent upwardly-directed portion 26 with extensions 27 and 30, the former, in co-operation with another support 28, fastened to the bar 25, carrying a blank guide 29, the portion 30 being fitted with an extension 31 of such guide, by means of which the blanks are directed to proper position beneath the rectangular corner-form 22, these blanks being fed either by hand or automatically by usual and well-known means as may be convenient.

The supply-roll 35 of binding paper or cloth is demountably supported on a shaft 34 carried by an arm 32 mounted on the frame in any convenient manner. The tape or ribbon unwinding from this supply-spool passes around rollers 36, 38, and 39, to the feed-rollers 40 and 41, the roller 38 dipping into a receptacle 37 containing any suitable adhesive, such as paste or glue. In passing over the roller 38 the paper or cloth ribbon or tape is coated with the adhesive on its under side and as the strip travels around the roller 39 it is inverted so that its upper face carries the adhesive coating.

These various rollers may be rotatably supported in any approved manner, a convenient way of mounting the roller 36 being to support it between extensions or ears projecting from the walls of the receptacle 37.

The lower knurled or roughened feed-roller 40 is revoluble on a stationary shaft 42 supported in a bracket 43 mounted on a projection 44 extended outwardly from the main frame, the part 45 of the bracket affording a support for the inner end of such shaft. This binding-strip feeding-roller is actuated intermittently in a forward direction only by reason of a toothed sector 47 whose hub 46 is loose on the shaft 42, being in mesh with a vertically-slidable rack 48 guided in its reciprocations by an element 49, the rack being operated by means hereinafter described.

The roller 40 has a ratchet-wheel 52 rigid therewith intermittently turned by a pawl 50 pivoted to the gear-sector at 51, and the upper roughened feed-roller 41 is rotated by means of a gear 53 rigid with the roller 40, being in mesh with a smaller gear 54 integral with or fixed to the upper roller 41. It will be understood, therefore, that the reciprocation of rack 48 actuates the gear-sector and pawl and the latter in turn operates the ratchet-wheel, which turns the lower feed-roller, and the gearing, by reason of which the upper feed-roller is actuated.

Such upper roller and its gear are supported in a frame 55, 56, 57, hinged on a fixed stud-shaft 58 projecting from a bracket 59 mounted on the machine-frame, the upper roller frame being normally pulled down to its work by a coil contractile spring 60 shown in Figure 2.

The rack 48 is caused to reciprocate vertically by reason of a link connection 61 between its lower end and a member 62 having a bifurcated portion straddling the shaft 63, the element 62 carrying a roller 64 traveling in the cam-groove 65 cut in the face of a large bevel gear 66 mounted on shaft 63. The rotation of this gear and its cam-groove vertically reciprocates the member 62 and this in turn, by reason of the link connection, operates the rack 48, bringing about the desired, intermittent, forward feeding of the corner binder ribbon or tape. Such large bevel-gear 66 is revolved from a drive-shaft 68 by means of a pinion 67 thereon and in mesh with the gear, the shaft being supported rotatably in suitable bearings 69 (see Figure 5).

The means for severing the advance portion of such adhesive-coated strip and pressing it against and causing it to adhere to the under side of one of the wings or flaps of the flat, pasteboard box-blank adapted when bent up to form one of the side-walls of the box will now be described. A presser-lever 70 is fulcrumed on a stud-shaft 71 projecting from the bracket 45, and carries at its end a transversely-adjustable presser or shear plate 72, the main-frame of the machine being equipped with an upstanding abutment or stop-arm 73 adapted by engagement with the overlying rear portion of the lever to limit its descent, that is to say, to restrict the upward movement of the presser block or plate 72 at the other end of the lever. This lever is operated or rocked by means of a swivel-block 74 pivotally connected with its rear end, a rod 75 extending down through an aperture of such block and provided beneath it with an enlargement or head 76, the upper end of such rod having a portion 77 of larger size pivotally mounted on a shaft 78 extended laterally from a lever 80, the block being held in position on the shaft by a retaining collar 79. In order to make the connection between these two levers flexible or yielding, a coil-spring 75^a is interposed between the swivel-block 74 and the upper block 77.

This lever 80, which carries a knife-blade 81 adapted to co-operate with the edge of the presser plate or block 72 in severing the binding strip into lengths, is fulcrumed or hinged by means of its end hub 81^b (Figure 3) on a stationary shaft 81^a mounted in the bracket 45, the hub of this lever and that 83 of an associated lever 82 being maintained in position on the shaft by a retaining collar 84. Lever 80 about midway of its length has a laterally-extended ear or lug 85 through an aperture of which a rod 86, fixed to the lever 82, projects, a stop-nut 87 being threaded on the end of such rod above the lug 85, a spring 88 being interposed between the lever 82 and the abutment 85.

Lever 82 at its end is provided with a presser-bar 89 adapted to co-operate with the lower presser-bar 72 to apply and press the adhesive-coated binding-strip against the under face of a lateral wing or flap of the flat pasteboard blank which is to compose the box-body, and this squeezing action will, of course, be cushioned by reason of the use of springs 88 and 75^a.

Lever 80, and consequently the associated or connected levers 82 and 70, is actuated or rocked on its fulcrum by a link composed of the two parts 90 and 91 connected together by the coupling 92, this link being pivoted to the lever 80 and to an arm 93 fulcrumed on a shaft 94 supported in brackets of the main-frame and equipped with a roller 95 positioned in the cam-groove 96 cut in the side of the bevel-gear 66. It will be readily understood that when the wall of the cam-groove rocks the lever 93 downwardly, levers 80 and 82 will swing down, and the lever 70 will rock upwardly, the blade 81 severing the advance portion of the binding-strip from the main supply and the two

parts 89 and 72 squeezing the severed corner binder onto the under side of the flat pasteboard blank.

Turning now to the mechanism for folding the side wings or flaps of the pasteboard blank upwardly, it will be observed that the appliance includes an upright cylindrical rod 100 supported by the main-frame, and slidable on this is a block 101 of general right-angle shape in cross-section having at 102 (Figure 2) a pivotal connection with a link 103 hinged at 104 to an operating arm 105 fulcrumed on a suitably-supported shaft 107 by means of its hub 106, the shaft being mounted in extensions 108, 108 of the main-frame. Arm 105 is rocked by means of its roller 109 traveling in the cam-groove 111 of a cam 110 mounted on and revolved by shaft 63.

The reciprocatory block or support 101 carries a bent folding bar 112 having a top flared end 113 and equipped with a box stripping shoulder 114, the bar being yieldingly supported on a stud 115 screwed into the block 101 and extended through an aperture of the bar and provided with a nut 116 between which and the adjacent face of the bar a cushioning coil-spring 117 is accommodated encircling the stud. To guide the lower end of the bar it is provided with a pin 118 slidable in an aperture 119 in the part 101.

In similar manner another bent blank-folding bar 120 is carried by the support 101 and located at right-angles to the bent bar 112 and it, as is the case with the other bar, has a beveled, flared, upper end 121 and a box-stripping or discharging shoulder 122, the bar being yieldingly pressed toward the part 101 by reason of a spring 125 encircling a screw-threaded stud 123 mounted on the block 101 and provided with a nut 124 between which and the bar 120 a coil-spring 125 is positioned. Bar 120 is also guided in its yielding movement by a pin 126 projecting therefrom and slidingly received in an aperture 127 of corresponding caliber in the block 101.

These two blank-folders 112 and 120 during their upward travel are adapted to bend or fold upwardly the side flaps or side wings of the cut-out corner pasteboard-blanks around the two adjacent sides of the depending form block 22.

To fold or bend the unattached part of the adhesive-coated corner-stay around the corner of the box and affix it in place, the following instrumentalities are provided.

A sliding block 130 with two vertical surfaces 131 and 132 at right-angles to one another has a dove-tail base 133 slidingly accommodated in the similarly-shaped undercut bearing 134 in the main-frame. To reciprocate this recessed member diagonally toward and from the corner of the rectangular form 22, it is pivotally connected at 135 to a toggle-link 136 having a hinge or knuckle connection at 137 with a companion bifurcated toggle element 138 whose hinged hub 139 is rockingly mounted on a stationary, eccentrically-adjustable shaft 140 supported in bearings 141, 141. The protruding end of this shaft has a collar 142 pinned thereto and provided with an outstanding or radial arm 143 fitted with a screw 144, the conical end of which is adapted to take into any one of a curved series of depressions 145 in the adjacent wall of the main-frame.

By changing the position of arm 143 the adjustment of the relatively-stationary eccentric shaft may be varied so as to modify the range of travel of the sliding-block 130, thus permitting it to act upon boxes of different thicknesses bent around the form 22. The element 138 of the toggle connection is actuated or rocked by means of an upward projection 146 of the cam-actuated sliding member 62, such extension having a pivotal connection 147 with the toggle element.

In order to fold the paper or cloth corner-stay around the corner of the box, the reciprocatory block 130 is provided with a plunger 150 accommodated in a recess 151 at the junction or intersection of the two right-angle surfaces 131 and 132, the plunger having a stem 152 extended through an aperture in the wall of the block and provided with a limiting or stop-nut 153. In order to normally press the plunger outwardly, that is, toward the form, the cavity or recess 151 houses a coil expansion spring 154 of substantial capacity which at one end bears against the end of the recess and at its other end against the plunger. At its outer end such plunger has two wings or folding plates 155, 156, hinged thereon at its center at 157 and pulled rearwardly by coil contractile springs 158, 158, located in cavities 159, 159, in the block. These springs are of less strength than spring 154 and act to hold the plates at all times in contact with the shoulders 160, 160, of the block 130 during the movements of the supporting plunger 150. It will be clear that as the member 130 approaches the form, the two plates while originally in the same plane, turn into a right-angle relation during the inward travel of the plunger brought about by engagement with the corner of the form, and in so doing, these plates fold the paper or cloth tab or binder around the corner of the box on the form and press it firmly in place.

As has been explained above, four of these corner appliances are grouped or associated together in rectangular relation as indicated in Figure 9, to simultaneously act on all four corners of the box under construction. In this combined machine the three driving shafts 68, 68, 68, are extensible and operatively connected together at the corners of

the appliance by intermeshing bevel gears 161, 161, one of such shafts such as the lower one in Figure 9, being extended and connected to any source of power, such as an electric-motor, not shown. These four corner mechanisms are connected together in an adjustable manner whereby they may be shifted to work on blanks of different sizes and dimensions and accordingly, it is necessary to connect such four mechanisms together by screw-threaded shafts or otherwise to obtain the proper and preferably simultaneous adjustment of all of the parts, and this is done in substantial accordance with the adjusting means shown and described in United States Patent No. 1,257,988, Arthur J. Evers, pasteboard box making machines, issued March 5, 1918. In view of the disclosure in this earlier patent, I have not deemed it necessary to make mention of this phase of the mechanism in detail nor to illustrate it, but will merely state that the connecting shafts are made extensible so that the four parts of the machine may be contracted and expanded in unison with ease and dispatch.

Assuming that a square box is to be produced by this machine, a blank 170 of the cut-out corner type is employed of the style or form illustrated in Figure 10, such blank having four wings or flaps 171 adapted to be bent up along the scored folding lines 172 to constitute the four side-walls of the box. This blank is brought under the four corner forms 22 (see Figure 9) the edges of which are in register or coincident with the folding or bending lines 172. Then the four strips of corner-staying or binding paper or cloth are advanced beneath the blank by their roughened feed-rollers 40 and 41 with their adhesive-coated faces uppermost and the front ends of such strips are brought beneath the flaps or wings 171, as shown in Figure 11, and applied thereto by the co-operating presser plates or bars 89 and 72 which yieldingly press together the superposed pasteboard wings and paper strips. Soon afterward these sections of the binding tape 173 are severed or cut from their supply strips on the lines 174, leaving projecting tabs 175, as illustrated. Then the folders 112 and 120 ascend, bending the wings or flaps up at right-angles to the body of the blank and against the sides of the four forms, and soon afterward the members 130 slide inwardly and the bending plates 155 and 156 fold the protruding tabs 175 around the corners of the box and cause them to adhere to the other adjacent bent up wings, thus completing the corner-staying operation. The element 130 begins to retreat, the folders 112 and 120 descend, stripping or delivering the box from the form by reason of their shoulders 114 and 122 which during the ascent have passed upwardly beyond the upper edges of the side-walls, and during the latter portion of the box-discharging operation the feeding of the paper strips begins ready for attachment to the next or succeeding blank.

To those skilled in this industry it will be clear that this invention is susceptible of a variety of embodiments and that the one presented is merely by way of example. It will also be appreciated that many minor mechanical changes or modifications may be made in the details of the construction presented without departure from the substance and essence of the invention and without the sacrifice of any of its substantial benefits and advantages.

I claim:

1. In a box-making machine of the character described, the combination of a plurality of corner-forms stationary during the operation of the machine, means to simultaneously apply corner-staying strips to wings of a flat pasteboard box blank while the latter is in register with said forms leaving projecting tabs of such strips, means to simultaneously bend said wings about said forms to constitute the side-walls of the box, and means to simultaneously bend said tabs about the corners of the box and affix them in place, substantially as described.

2. In a box-making machine of the character described, the combination of a main-frame, a plurality of depending corner-forms mounted on said main-frame and stationary during the operation of the machine, means to simultaneously feed the advance portions of adhesive-coated corner-staying strips beneath wings of a flat pasteboard box blank beneath said forms, means to affix such advance portions to said wings, means to sever the affixed sections of the strips from the main-body of the strips leaving projecting tabs, means to simultaneously bend said blank wings upwardly about said stationary forms, and means to simultaneously bend said tabs around the corners of the box and affix them in place, substantially as described.

3. In a machine of the character described, the combination of a main-frame, a plurality of depending corner-forms mounted on said main-frame, means to simultaneously feed the advance portions of adhesive-coated corner-staying strips beneath wings of a flat pasteboard box blank beneath said forms, means to affix such advance portions to said wings, means to sever the affixed sections of the strips from the main-bodies of the strips leaving projecting tabs, means to simultaneously bend said blank wings upwardly about said forms, and means slidable diagonally of the box to simultaneously bend said tabs around the corners of the box and affix them in place, substantially as described.

4. In an appliance of the character described the combination of a corner-form stationary during the operation of the machine, means to apply an adhesive-coated corner-stay to a wing of a flat pasteboard blank beneath the form leaving a projecting tab, means to bend said wing and an adjacent wing of the blank adapted to constitute side-walls of the box upwardly against adjoining surfaces of the stationary form, and means to bend said corner-stay tab around the corner of the box and affix it to the second wing, substantially as described.

5. In an appliance of the character described, the combination of a corner-form stationary during the operation of the machine, means to feed a strip of adhesive-coated corner-stay material, means to affix the advance part of said strip to a wing of a flat pasteboard box blank beneath said form, means to sever said advance part of the strip from the main-supply strip leaving an unadhered tab projecting from the wing, means to bend said wing and an adjacent wing against adjoining surfaces of said form, and means to bend the unattached tab of the stay around the corner of the box and affix it in place, substantially as described.

6. In an appliance of the character described, the combination of a corner-form stationary during the operation of the machine, means to feed a strip of adhesive-coated corner-stay material, means to affix the advance part of said strip to a wing of a flat pasteboard box blank in register with said form, means to sever said advance part of the strip from the main supply strip leaving an unadhered tab projecting from the wing, means to bend said wing and an adjacent wing against adjoining surfaces of the form, and means reciprocating diagonally of said corner-form to bend the unattached tab of the stay around the corner of the box and affix it in place, substantially as described.

7. In an appliance of the character described, the combination of a corner-form, means to feed a strip of corner-stay material, means to affix the advance part of said strip to a wing of a flat pasteboard box blank, means to sever said advance part of the strip from the main supply strip leaving an unadhered tab projecting from the wing, means to bend said wing and an adjacent wing against adjoining surfaces of said form, a reciprocating member, and a pair of hinged folders carried by said member and adapted to bend the unattached tab of the stay around the corner of the box and affix it in place, substantially as described.

8. In an appliance of the character described, the combination of a corner-form, means to feed a strip of adhesive-coated corner-stay material, means to affix the advance part of said strip to a wing of a flat pasteboard box blank, means to sever said advance part of the strip from the main supply strip leaving an unadhered tab projecting from the wing, means to bend said wing and an adjacent wing against adjoining surfaces of said form, a member reciprocating diagonally of said corner-form, and a pair of folders hinged co-axially on said member and adapted to bend the unattached tab of the stay around the corner of the box and affix it in place, substantially as described.

9. In an appliance of the character described, the combination of a corner-form, means to feed a strip of corner-stay material, means to affix the advance part of said strip to a wing of a flat pasteboard box blank, means to sever said advance part of the strip from the main supply strip leaving an unadhered tab projecting from the wing, means to bend said wing and an adjacent wing against adjoining surfaces of said form, a member reciprocating diagonally of the corner form, means to actuate said member, a spring-pressed plunger mounted in said member, and a pair of spring-pulled folders hinged co-axially on said plunger and normally held against parts of said reciprocating member by their springs, said folders being adapted during the advance of said member toward the corner of the form to bend the unattached tab of the stay around the corner of the box and affix it in place, substantially as described.

10. In an appliance of the character described, the combination of a main-frame, a depending corner-form mounted fixedly on said main-frame, means to feed a strip of adhesive-coated corner-stay material beneath the wing of a flat pasteboard box blank below said corner form, means to affix the advance part of said strip to the underside of said wing, means to sever said advance part of the strip from the main supply strip leaving an unadhered tab projecting from the wing, means to bend said wing and an adjacent wing upwardly against adjoining surfaces of said stationary form, and means to bend the unattached tab of the stay around the corner of the box and affix it in place, substantially as described.

11. In a machine of the character described, the combination of a main-frame, a plurality of depending corner-forms mounted on said main-frame, means to simultaneously feed the advance portions of adhesive-coated corner-staying strips beneath wings of a flat pasteboard box blank beneath said forms, means to simultaneously affix such advance portions to said wings, means to sever the affixed sections of the strips from the main bodies of the strips leaving projecting tabs, means to simultaneously bend said blank wings upwardly about said forms, a plurality of members reciprocatory

diagonally of said corner-forms, means to actuate said members, a spring-pressed plunger mounted in each of said members, and a pair of spring-pulled folders hinged co-axially on each of said plungers and normally held against parts of such member by their springs said folders being adapted during the simultaneous advance of said reciprocatory members toward the corners of the forms to bend the unattached tabs of the corner-stays around the corners of the box and affix them in place, substantially as described.

ALBERT A. ARNOLD.