E. JAGENBERG.

PAPER BOX MACHINE.

APPLICATION FILED OCT. 26, 1910.

1,001,856.

Patented Aug. 29, 1911.

7 SHEETS—SHEET 1.

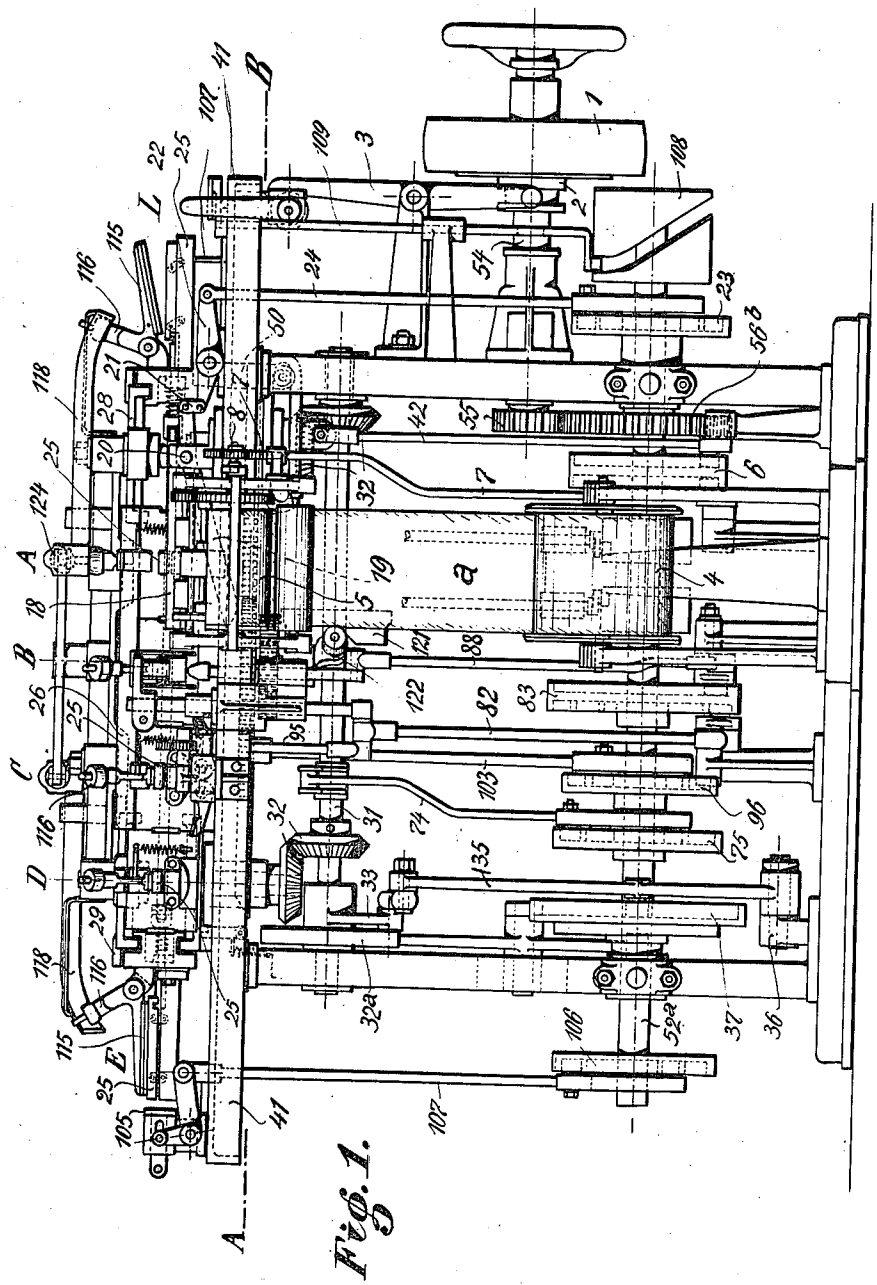

Fig. 1.

Witnesses:
Katherine Koch
Daniel Holmgren.

Inventor:
Emil Jagenberg
by his attorneys
Bacon & Thomas
per Brown & Wiese.

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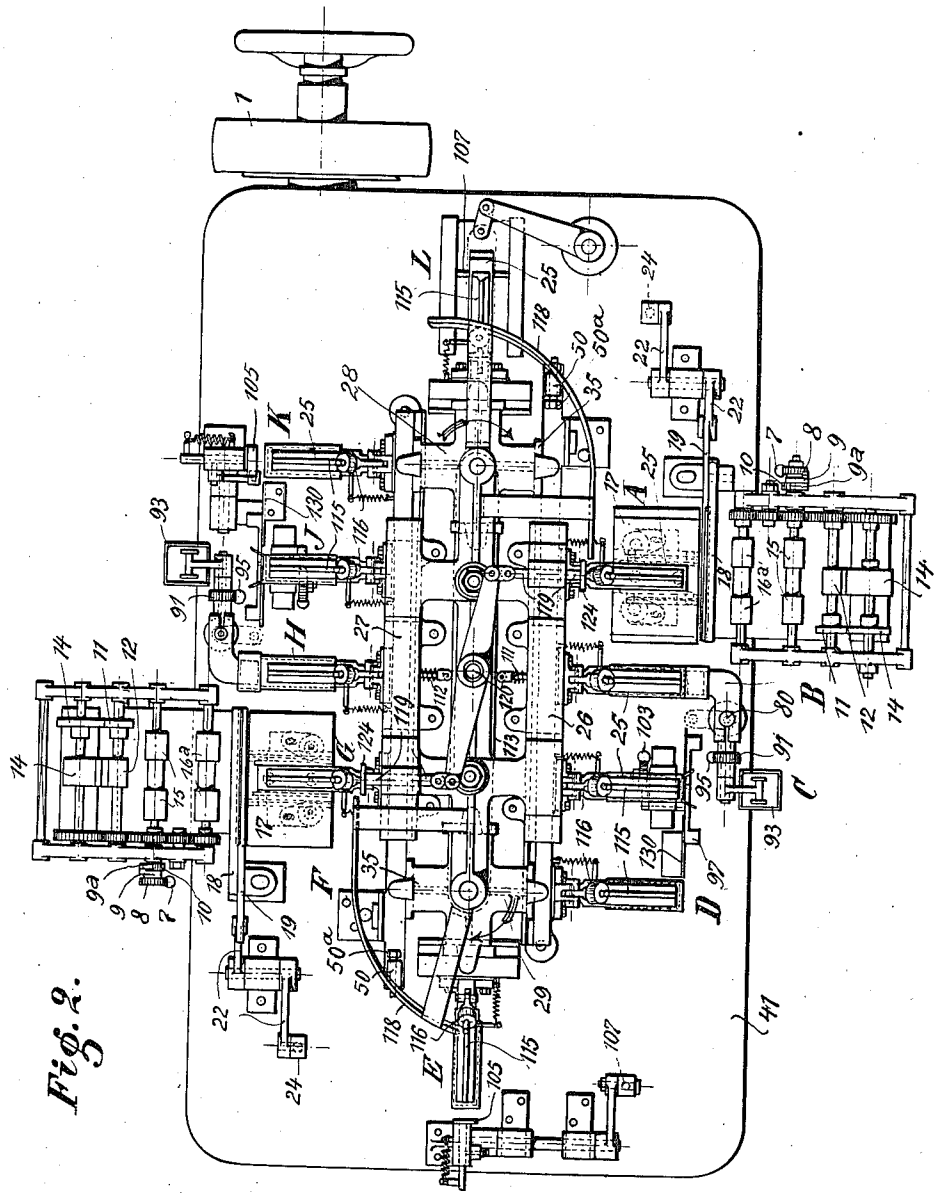

Fig. 2.

Witnesses:
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W. Frank C. Briesen

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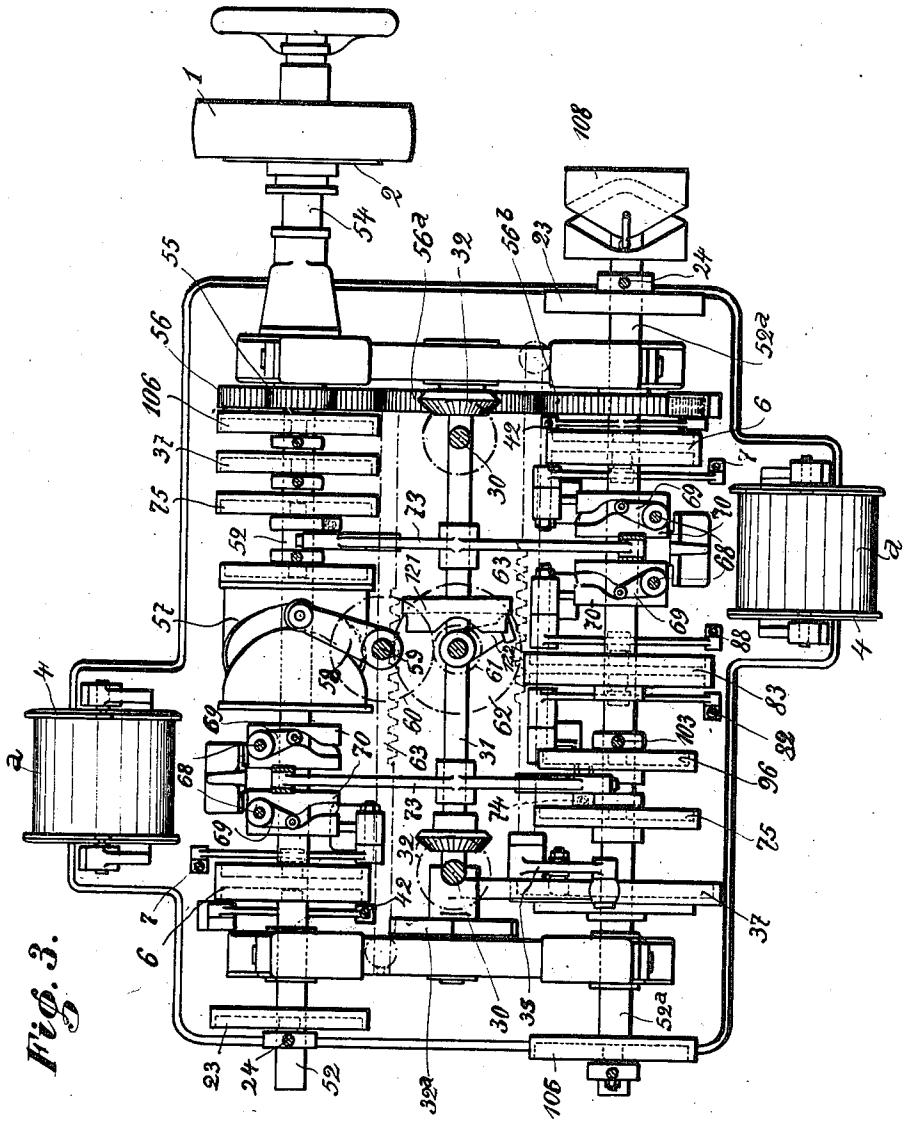

Fig. 3.

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Fig. 4.

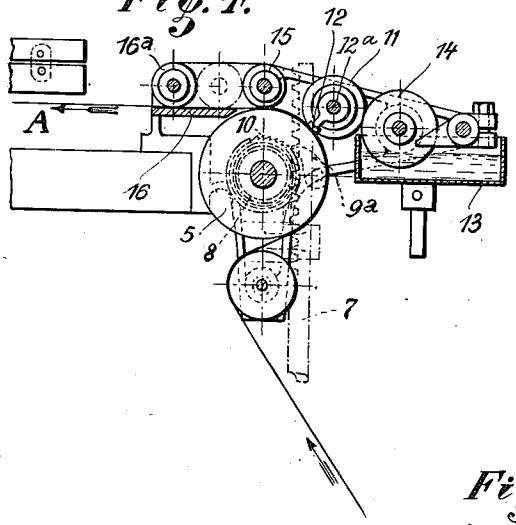


Fig. 5

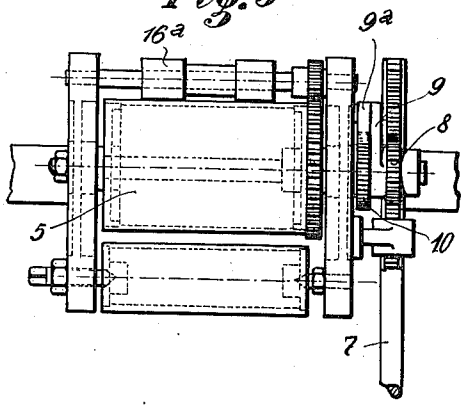


Fig. 10a.

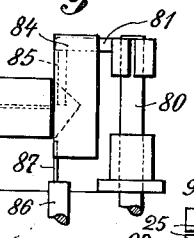


Fig. 9.

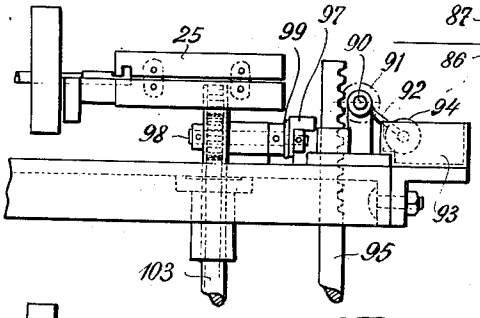


Fig. 10.

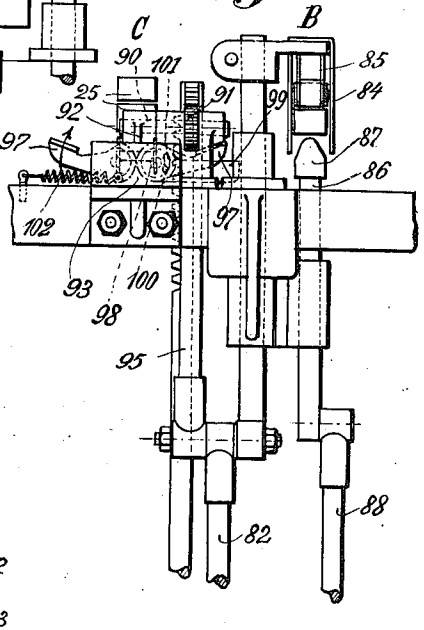
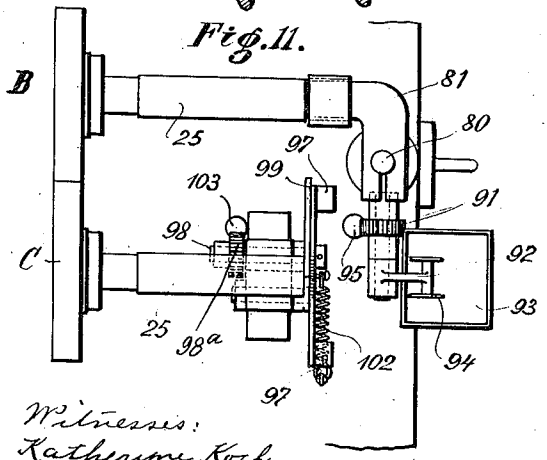


Fig. 11.



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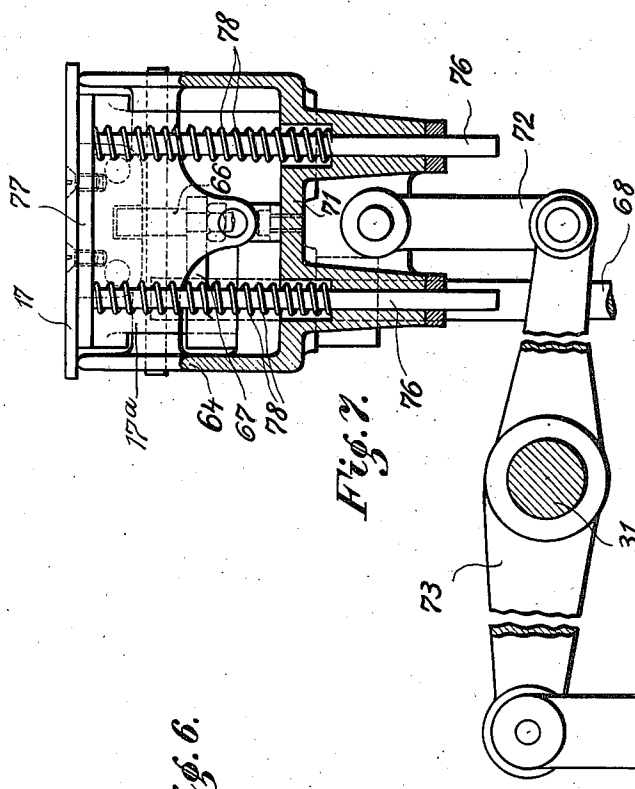

Fig. 7.

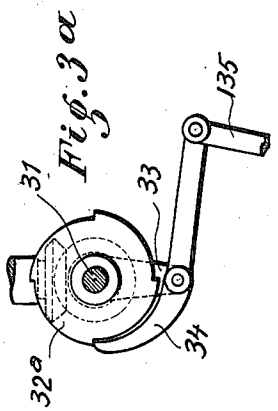

Fig. 3a.

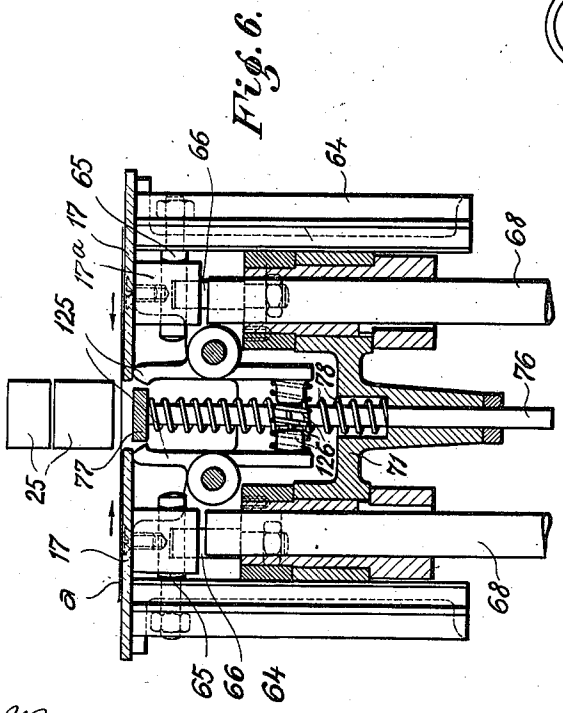

Fig. 6.

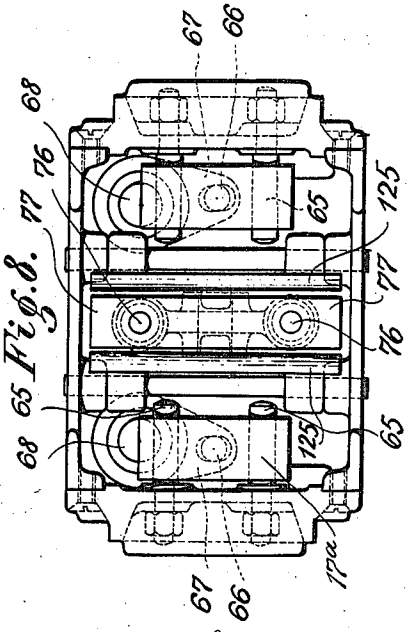

Fig. 8.

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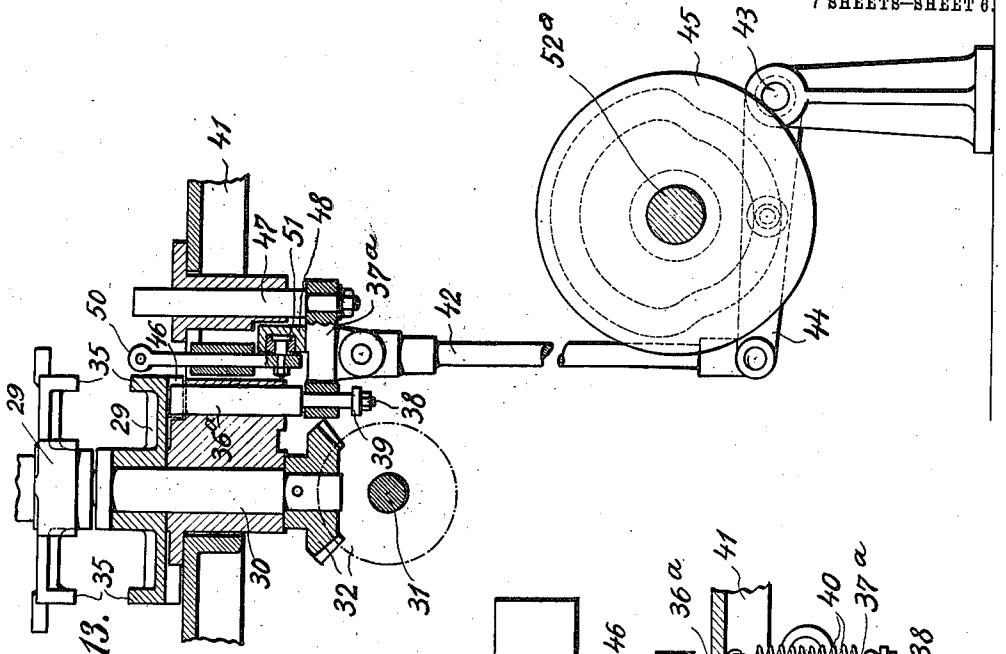

Fig. 13.

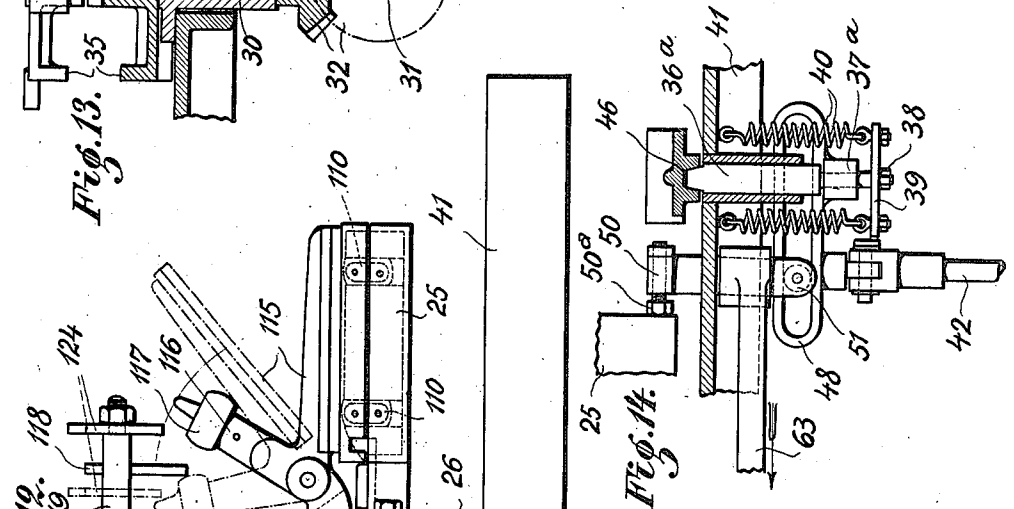

Fig. 14.

Fig. 12.

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1,001,856.

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7 SHEETS—SHEET 7.

Fig. 15.

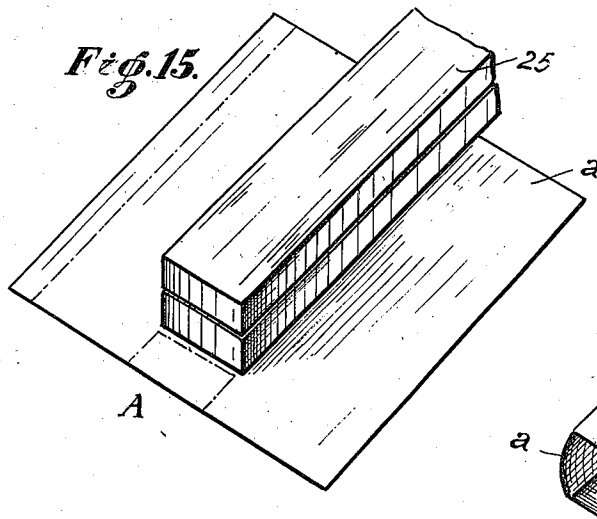


Fig. 16.

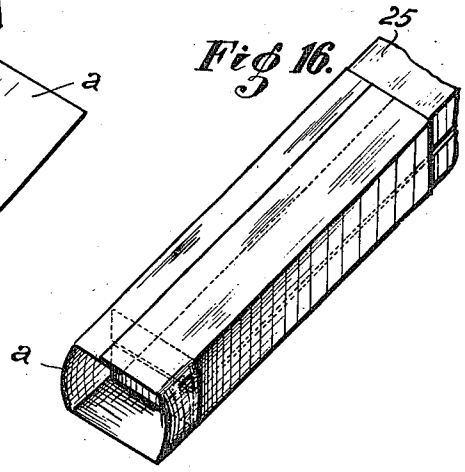


Fig. 17.

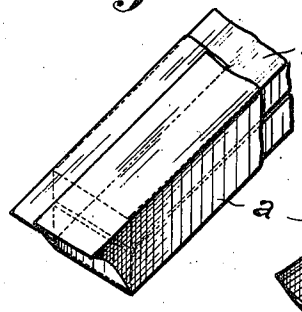


Fig. 18.

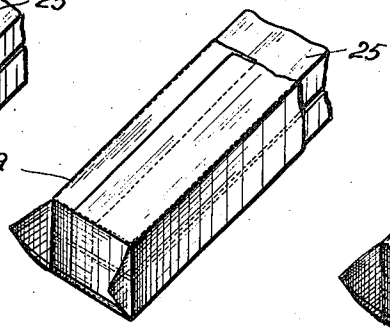


Fig. 19.

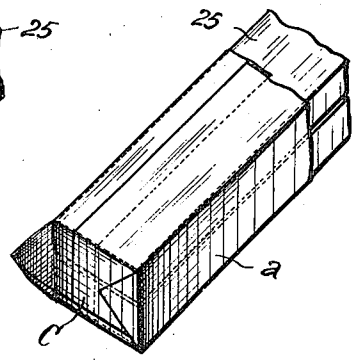


Fig. 20.

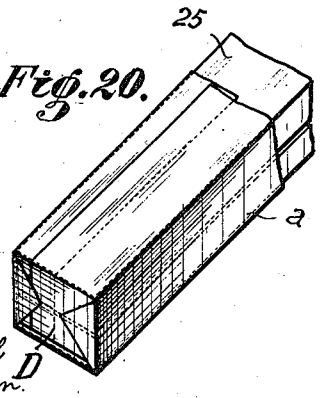
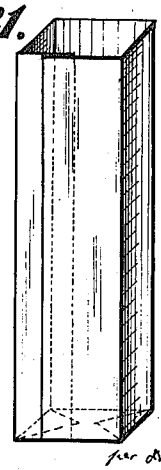


Fig. 21.



Witnesses:
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Inventor:
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UNITED STATES PATENT OFFICE.

EMIL JAGENBERG, OF DUSSELDORF, GERMANY.

PAPER-BOX MACHINE.

1,001,856. Specification of Letters Patent. Patented Aug. 29, 1911.

Application filed October 26, 1910. Serial No. 589,107.

To all whom it may concern:

Be it known that I, EMIL JAGENBERG, a citizen of Germany, residing at Dusseldorf, Germany, have invented certain new and useful Improvements in Paper-Box Machines, of which the following is a specification.

This invention relates to a machine for making paper boxes, paper bags and similar articles.

The machine comprises a pair of opposed parallel guides and a pair of rotating heads that establish communication between the ends of the guides and form with them a continuous elongated track. Means are provided for intermittently advancing a core along said track, around which core the box is formed by successive devices arranged in proximity to the track.

In the accompanying drawing: Figure 1 is a front elevation of a machine embodying my invention; Fig. 2 a plan; Fig. 3 a horizontal section on line A—B, Fig. 1; Fig. 3ª a detail of the guide head actuating mechanism; Fig. 4 a cross section of the strip feeding and gumming means; Fig. 5 a side view thereof; Fig. 6 a longitudinal section of the means for folding the blank around the core; Fig. 7 a cross section thereof; Fig. 8 a plan thereof; Fig. 9 a section of the flap gumming means; Fig. 10 a section through the flap folding means; Fig. 10ª a detail of the folders; Fig. 11 a plan of the flap folding means; Fig. 12 a section of the presser foot and adjoining parts; Fig. 13 a longitudinal section of the guide head locking and core feeding means; Fig. 14 a cross section thereof; Figs. 15–21 represent the box in consecutive stages of formation.

The machine is operated by a friction gear 1, the movable member 2 of which may be coupled or uncoupled by shipping lever 3. The friction gear transmits motion through shaft 54 and gear wheels 55, 56 to countershaft 52, while wheel 56 by wheels 56ª and 56ᵇ drives shaft 52ª.

The blanks are conveyed to the machine in the form of a strip *a* wound upon a reel 4 (Fig. 1) and passing thence upward over an intermittently rotated drum 5 above which is arranged a tension roller 15. Drum 5 receives its motion from shaft 52ª and cam 6 that intermittently reciprocates rack 7. This rack engages pinion 8, the shaft of which carries an arm 9, to which is fulcrumed a pawl 9ª. During the ascent of rack 7, pawl 9ª engages a ratchet wheel 10 which is operatively connected to drum 5, so that the latter is taken along. During the descent of rack 7, pawl 9ª passes freely over the teeth of wheel 10, so that drum 5 is not actuated. In this way the drum advances the strip at each motion of the ratchet wheel for the length of one work piece.

In proximity to drum 5 is arranged a shaft 12ª carrying a disk 11 and an arm or segment 12. During the rotation of the shaft, the parts 11, 12 contact with a disk 14, that dips into a glue box 13 (Figs. 2 and 4) so that they will transmit the adhesive to strip *a* passing over drum 5. During this operation disk 11 will provide the strip at one of its edges along its entire length with an adhesive strip, while arm 12 will apply the adhesive at the center of one of the blank-sides as indicated by dotted lines Fig. 15.

Strip *a* passes from drum 5 between table 16 and an idler 16ª to the folding means located at point A. Here the work piece is severed from the strip by means of shears having a fixed jaw 18, and a movable jaw 19. Movable jaw 19 is extended rearwardly beyond its fulcrum 20, and is by link 21, two arm lever 22, and rod 24 actuated by cam 23 of shaft 52ª, so that the jaw is with its cutting edge moved upward against fixed jaw 18.

During the cutting operation, or directly thereafter, a core 25 is slid upon the work piece while supported on folding device 17. For guiding the cores during their movement from one working device to another, there are provided two fixed parallel guide rails 26, 27 and two stellated guide heads 28, 29 arranged intermediate the ends of said rails and provided with a suitable number of core guides 35. Heads 28, 29 are intermittently rotated and convey the cores 25 from one rail to the other. The heads are mounted on vertical spindles 30, rotated by shaft 31 through bevel wheels 32. Shaft 31 carries a ratchet wheel 32ª (Figs. 1 and 3ª) having as many teeth as there are guides 35 on each head, four teeth being shown. Upon shaft 31 turns an arm 33, carrying pawl 34 and linked to a lever 135 which is fulcrumed at 36 and is operated by cam 37. In this way pawl 34 will at each motion advance ratchet wheel 32ª a quarter turn, so that heads 28, 29 are intermittently rotated in like manner. In

order to so arrest the heads that their guides 35 are held directly opposite to rails 26, 27 there is provided a bolt 36ª (Fig. 13) having a reduced end or tenon that passes through a cross piece 37ª and is connected to a bar 39 by nut 38. Bar 39 is by springs 40 yieldingly connected to a fixed plate 41 of the machine frame. To cross piece 37ª is pivoted a rod 42, which by lever 44 pivoted at 43, is operatively connected to a cam 45 of shaft 52ª, so that cross piece 37 is intermittently raised and lowered. After a head 28, 29 has been turned, cross piece 37ª is raised, to liberate rod 39, which by springs 40 is drawn upward together with bolt 36ª, so that the latter will enter a notch 46 of the head and thus lock the latter in position. To cross piece 37ª is connected a guide pin 47 movable in the machine frame, and serving to prevent a lateral deflection of the cross piece during its movement. To cross piece 37ª is further secured a slotted oblong guide or yoke 48 (Fig. 14) engaged by a roller 51 of an arm 50 having pusher 50ª. During the ascent of cross piece 37ª guide 48 will move arm 50 opposite to that guide 35 of head 28, which occupies the same plane as rail 26, so that the pusher will slide the core out of guide 35, and into the fixed guide rail 26. The movement of arm 50 is effected from shaft 52, by cam 57 and arm 58, the latter being secured to a spindle 59, carrying toothed wheel 60, that by transmission 61, 62 actuates a rack 63. To the latter is connected arm 50, which is thus intermittently reciprocated. During the motion of the arm toward the left (Fig. 2 and arrow Fig. 14) the core 25 located in guide 35 of disk 28, opposite rail 26 is pushed out of said guide and into rail 26, during which movement it will advance the cores occupying said rail, and will push the rearmost core of rail 26 into the opposed guide 35 of head 29.

The folding device located at point A, comprises a pair of platens 17 slidably supported on frame 64, and having lugs 17ª that extend over bolts 65, secured to said frame. Within lugs 17ª are formed slits engaged by pins 66 of arms 67, fast on rods 68, which are by arms 69 operatively connected to cams 70. The latter will by arms 69 impart alternate movement to rods 68, which in turn by arms 67 will horizontally reciprocate platens 17. Frame 64 is by cross piece 71 vertically movable on rods 68. Cross piece 71 is by link 72 connected to a two arm lever 73 turning on shaft 31, and actuated by rod 74 from cam 75 of shaft 52. To cross piece 71 are pivoted two arm levers 125 which by springs 126 are held in the position shown in Fig. 6. To the cross piece is further slidably secured by rod 76, a plate 77 influenced by springs 78, that tend to raise the plate. As soon as a work piece is pushed over platens 17 and is cut off from the strip, cross piece 71 with frame 64, platens 17 and arms 125, and plate 77 are raised by cam 75. Platens 17 will during this movement engage the sides of the work piece that extend laterally from core 25 and will turn the same upward. Simultaneously plate 77 is moved against the bottom of the core, and here presses the work piece against the same. Arms 125 are located directly below platens 17, and their upper ends are by springs 126 yieldingly forced against the core, to press the upturned sides of the work piece against the same. The upward movement ceases as soon as platens 17 become horizontally alined at their lower edge with the upper face of core 25. Rods 68 are now turned by cams 70, so that platens 17 are consecutively advanced over the core (arrows Fig. 6). The platens will during this movement grasp the ends of the work piece projecting above the core, and will fold the same over each other, so that the work piece assumes the shape shown in Fig. 16. The folding device is now retracted and the work piece is by presser foot 115 tightly held against the upper side of the core (Fig. 12). Foot 115 is rotatable on the core carrying slide, and is provided with an arm 116, having an upper reduced section and a collar 117. When the work piece moves toward A, foot 115 is by guide rail 118 (Fig. 2) with collar 117, held in the position indicated by dotted lines Fig. 12. At A the reduced section of the arm passes behind a disk or abutment 124 carried by rod 119 which is linked to a shaft 120. This shaft is connected to a crank arm 122 spring pressed against an eccentric 121 having an undulating operative surface and fast on an intermittently rotated shaft 31. The eccentric on turning will so advance disk 124 that it will liberate presser foot 115 (Fig. 12), which will now be spring pressed against the core, so as to force the work piece against the same. Heads 28, 29 are now turned, so that a new core is pushed into guide 26, while the old core is moved from A to B. Here a rod 80 is guided vertically movable in the machine frame. This rod is provided with an upper arm 81, and is at its lower end coupled to a rod 82 actuated by cam 83 of shaft 52ª. To arm 81 are secured two plates 84, and an upper folder 85 extending across said plates. There is further provided a vertically movable rod 86, carrying a lower folder 87 arranged in a plane with folder 85 and actuated by rod 88 from cam 83. When a core with the work piece arrives at B, cam 83 will by rods 88, 86 raise folder 87, so that the latter will turn up the bottom flap of the work piece that projects beyond the end of the core (Fig. 17). Simultaneously cam 83 will lower arm 81, so that plates 84 will be pushed over the protruding side flaps of the

work piece. When folder 87 has reached substantially its maximum elevation, folder 85 will engage the protruding top flap of the work piece, after which folder 87 is lowered. Folder 85 in descending will turn down the top flap and press the same against the upturned bottom flap which has previously been gummed. After arm 81 has again ascended, the work piece is moved toward point C where the laterally projecting flaps are gummed, and one of such flaps is turned against the previously folded flaps.

As shown in Figs. 9–11, there is journaled in the machine frame a shaft 90 provided with an arm 92 and carrying a pinion 91. To the end of arm 92 are secured a pair of disks 94 normally dipping into a gum containing tank 93. Pinion 91 engages a rack 95 actuated by rod 82 from cam 83. There are further provided a pair of pivoted jaws 97 having intermeshing toothed segments. One of these jaws turns freely on a shaft 98, an arm or folder 99 of which is provided with a pin 100, that engages a slit 101 of the jaw. Jaws 97 are influenced by a spring 102, which tends to turn the jaws in the direction of the arrow (Fig. 10) such tendency being normally opposed by pin 100. Shaft 98 carries a pinion 98^a engaging a rack 103 actuated by cam 96 of shaft 52^a. When a work piece arrives at C, cam 83 will lower rack 95 so that disks 94 will pass along the inner sides of the laterally extending flaps of the work piece. Rack 103 then descends to turn shaft 98 with arm 99 in the direction of the arrow (Fig. 10) and thus liberate jaws 97. The latter by spring 102 are turned inward to press the protruding flaps against gumming roll 94, so that the flaps are covered by an adhesive on their inner sides. As a further advance of jaws 97 is checked by disk 94, arm 99 alone will continue to advance, such advance being permitted by slit 100. The arm will thus grasp one of the laterally extending side flaps and turn it against the previously folded top and bottom flaps (Fig. 19). After the parts have been returned to their initial position, core 25 is advanced along a rail 130 which will thus fold the remaining flap against the last formed flap, Fig. 20. During this movement of the core toward point D, it is pushed into a guide 35 of head 29, which on being turned conveys the core to point E. Here there is provided a plunger 105 movable radially toward the head (Figs. 1 and 2). Plunger 105 is by rod 107 and cam 106 pressed against the end of the core and consequently against the bottom of the work piece, so that the bottom forming flaps are pasted smoothly and firmly together. Plunger 105 being retracted, head 29 again turns to carry the core to point F, where it is conveyed from the head into the fixed guide rail 27 and thence intermittently to points G, H, J and K. During this operation, the transmission from the head to the fixed guide is effected by arm 50 and abutment 52 as previously described with relation to head 28.

At the points G, H, J and K are duplicated the devices located at points A, B, C and D, which duplicate devices surround the previously formed box by an outer box. Thus the machine will form a compound box formed of two nested sections. The box is ejected from the machine at point L, by a slide or stripper 107 which by cam 108 and rod 109 is intermittently reciprocated along the core. The cores are made of uniform cross sections throughout their length, so that the finished boxes will have a corresponding shape. To permit a ready stripping of the box off the core, the latter is composed of two sections connected by pivoted links 110. The upper core section is connected to a rod 111, having roller 111^a which by spring 112 is pressed against a rail 113, arranged intermediate guides 26, 27 and parallel thereto. Rail 113 is so shaped that during the movement of the core from A to K, rod 111 is pressed outward against action of spring 112, so that the upper core section is raised off the lower section by righting links 110 (Fig. 12). At L the width of rail 113 diminishes so that rod 111 is retracted by spring 112, thereby folding links 110 and lowering the upper core section upon the lower section. In this way the height of the core is reduced, so that it fits but loosely into the box (Fig. 1). A rail 118 arranged in front of point L, is so shaped that when core 25 arrives at this point, presser foot 115 is retracted from the core, so that the box is liberated. Between points E and G there is also provided a guide rail 118, and at G is located a disk 124, so that presser foot 115 is retracted from the core, prior to the formation of the outer box section, and is advanced after the completion of said section.

In place of forming a compound box, the machine may be employed for making a separate box on each of its two sides. In that case a plunger is provided at point L, while at E is arranged a discharging device.

I claim:

1. A machine of the character described, comprising a pair of equilevel parallel guide ways, cores movable along the same, a pair of horizontally disposed rotatable heads having core-guides and adapted to convey the cores from the end of one guide way to the opposed end of the other guide way, and paper folding means adapted to cooperate with the cores.

2. A machine of the character described, comprising a pair of equilevel parallel guide ways, cores movable along the same,

a pair of horizontally disposed rotatable heads having core-guides and adapted to convey the cores from the end of one guide way to the opposed end of the other guide way, paper folding means adapted to cooperate with the cores, and means for locking the heads in position during the operation of the folding means.

3. A machine of the character described, comprising a pair of equilevel parallel guide ways, slides movable along the same, cores carried by the slides, a pair of horizontally disposed heads having slide-guides and adapted to convey the slides from the end of one guide way to the opposed end of the other guide way, a presser foot pivoted to each slide and located above the core, means for raising said foot off the core during the blank folding operation, and means for subsequently lowering the foot to hold the folded blank against the core.

4. A machine of the character described, comprising a pair of equilevel parallel guide ways, slides movable along the same, cores carried by the slides, a pair of horizontally disposed heads having slide-guides and adapted to convey the slides from the end of one guide way to the opposed end of the other guide way, a presser foot pivoted to each slide and having an arm, a curved cam rail adapted to be engaged by said arm, an abutment also adapted to be engaged by the arm, and means for reciprocating said abutment.

5. A machine of the character described, comprising a pair of equilevel parallel guide ways, heads having guides and arranged between the guide ways near the ends thereof, slides carried by the head-guides, cores on the slides, a horizontal slotted yoke arranged in proximity to each head, a pusher operatively connected to said yoke, means for raising the yoke and pusher, and means for advancing the pusher along the yoke, to convey the slide from the head guide into its coöperating guide way.

6. A machine of the character described, comprising a pair of longitudinal guides, a pair of interposed rotatable guides, a core movable along the guides, and a pair of vertically movable and laterally slidable platens adapted to fold the work piece around the sides and over the top of the core.

7. A machine of the character described, comprising a pair of longitudinal guides, a pair of interposed rotatable guides, a core movable along said guides, a pair of vertically movable and laterally slidable platens adapted to fold a blank around the sides and over the top of the core, a bottom plate adapted to press the blank against the bottom of the core, a pair of gumming disks adapted to engage the inner sides of the end flaps of the blanks, and a pair of jaws adapted to simultaneously engage the outer sides of said flaps.

8. A machine of the character described, comprising a pair of longitudinal guides, a pair of interposed rotatable guides, a core movable along the guides, means for folding a work piece around the core, means for gumming the inner side of the core-flaps, a pair of intergeared jaws adapted to engage the outer sides of said flaps, and a folder engaging one of the jaws and movable independently therefrom.

EMIL JAGENBERG.

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