

April 19, 1932.

H. S. LABOMBARDE

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AUTOMATIC FOLDING AND STITCHING SUIT BOX MACHINE

Filed Aug. 15, 1928

7 Sheets-Sheet 1

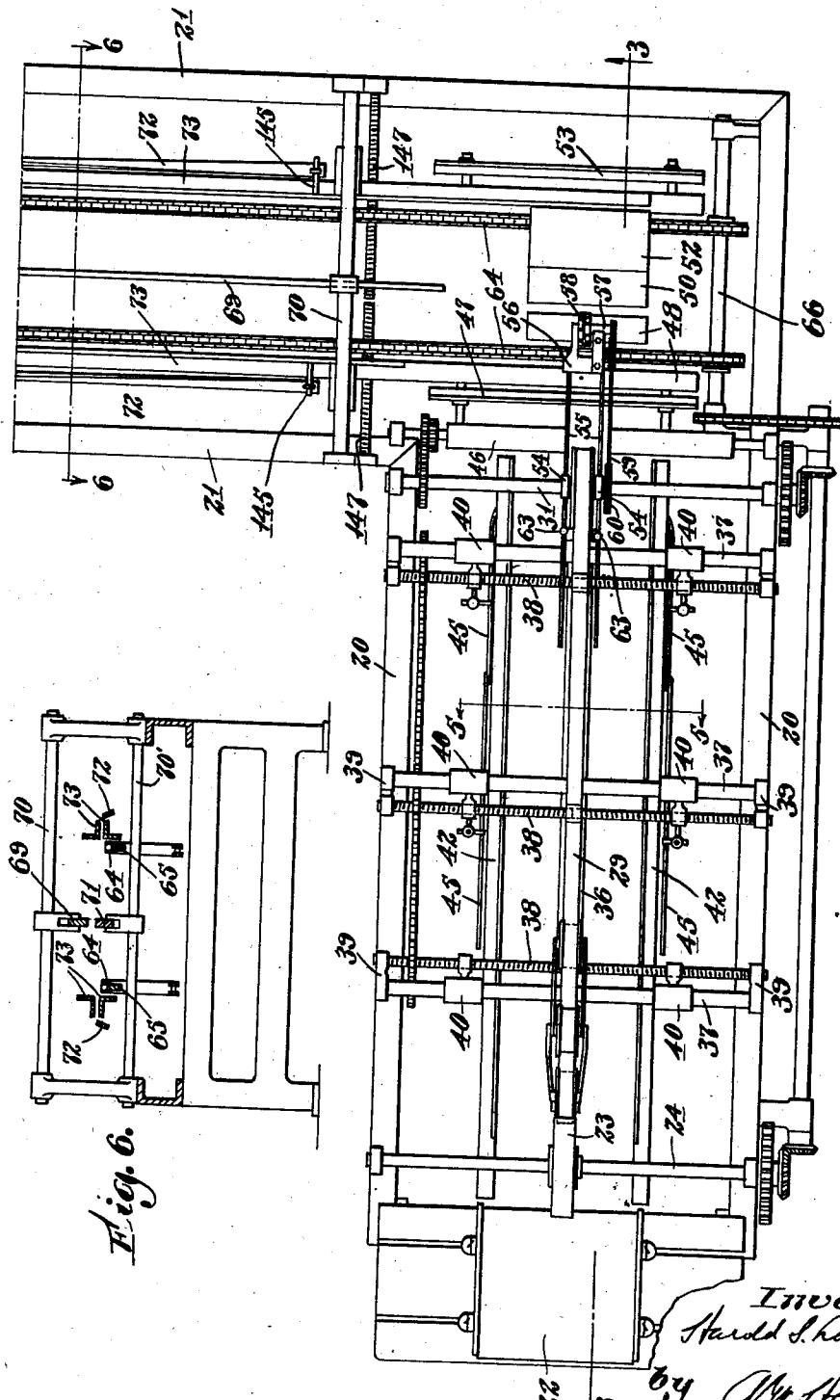


Fig. 6.

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April 19, 1932.

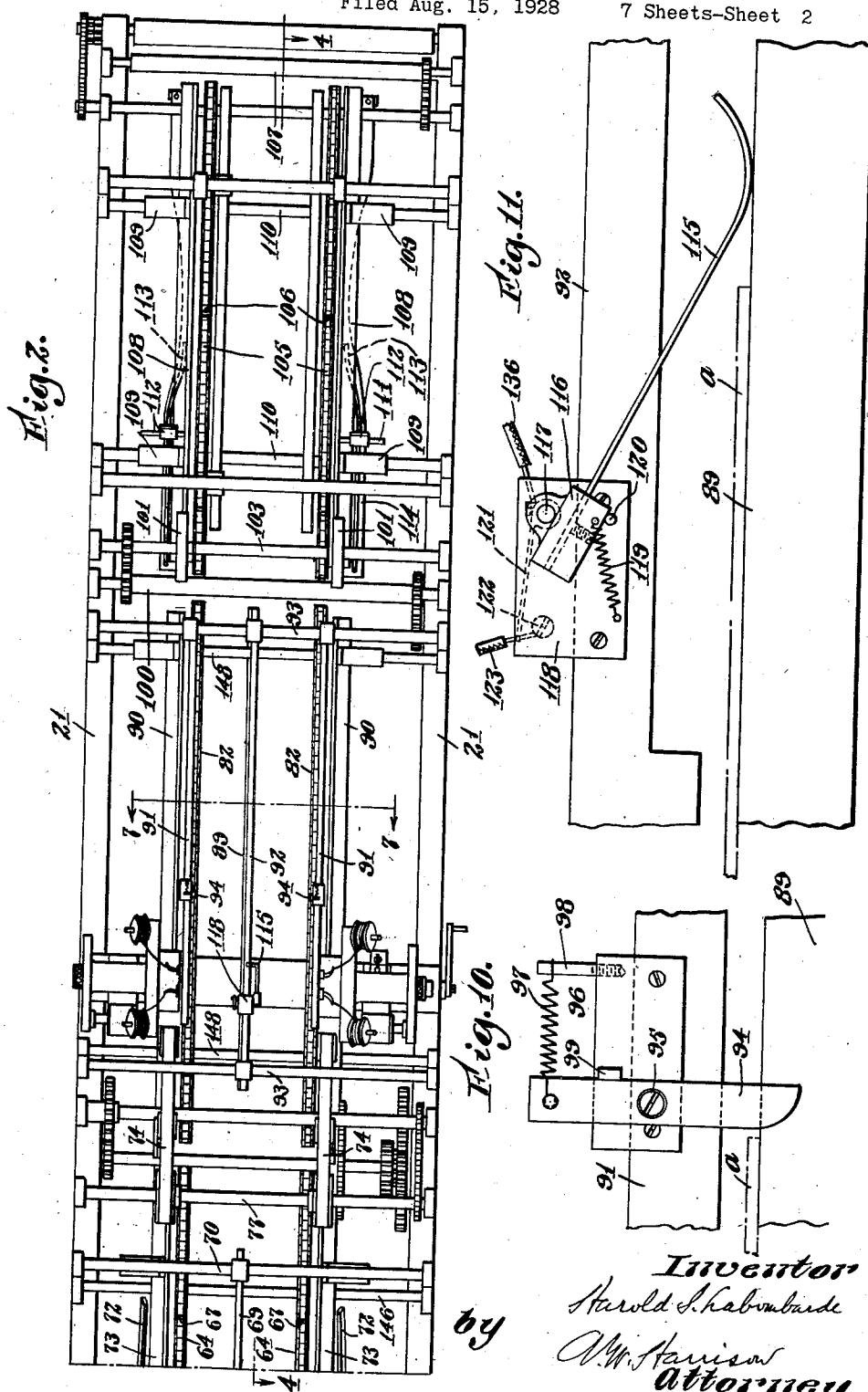
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AUTOMATIC FOLDING AND STITCHING SUIT BOX MACHINE

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7 Sheets-Sheet 2



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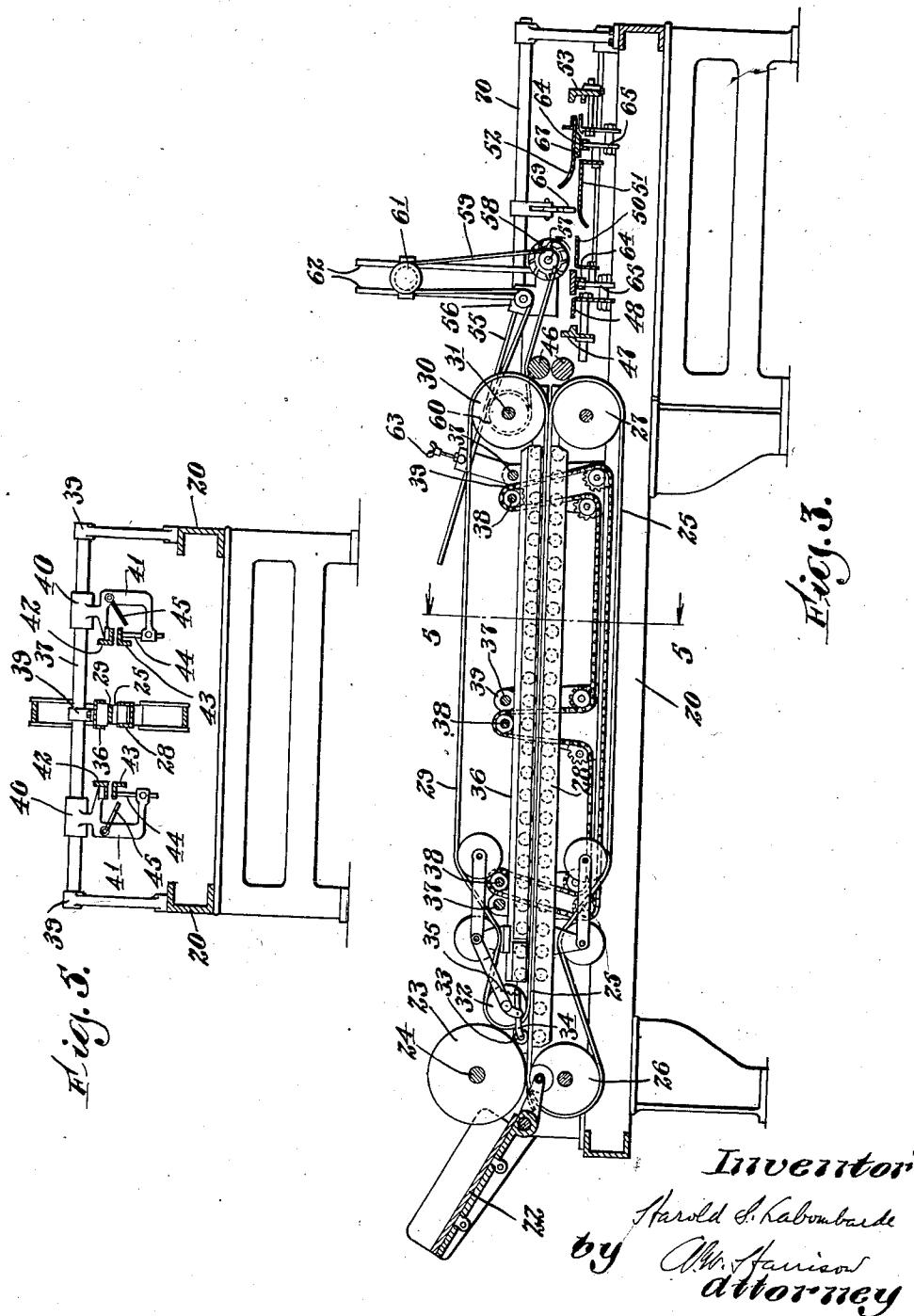
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AUTOMATIC FOLDING AND STITCHING SUIT BOX MACHINE

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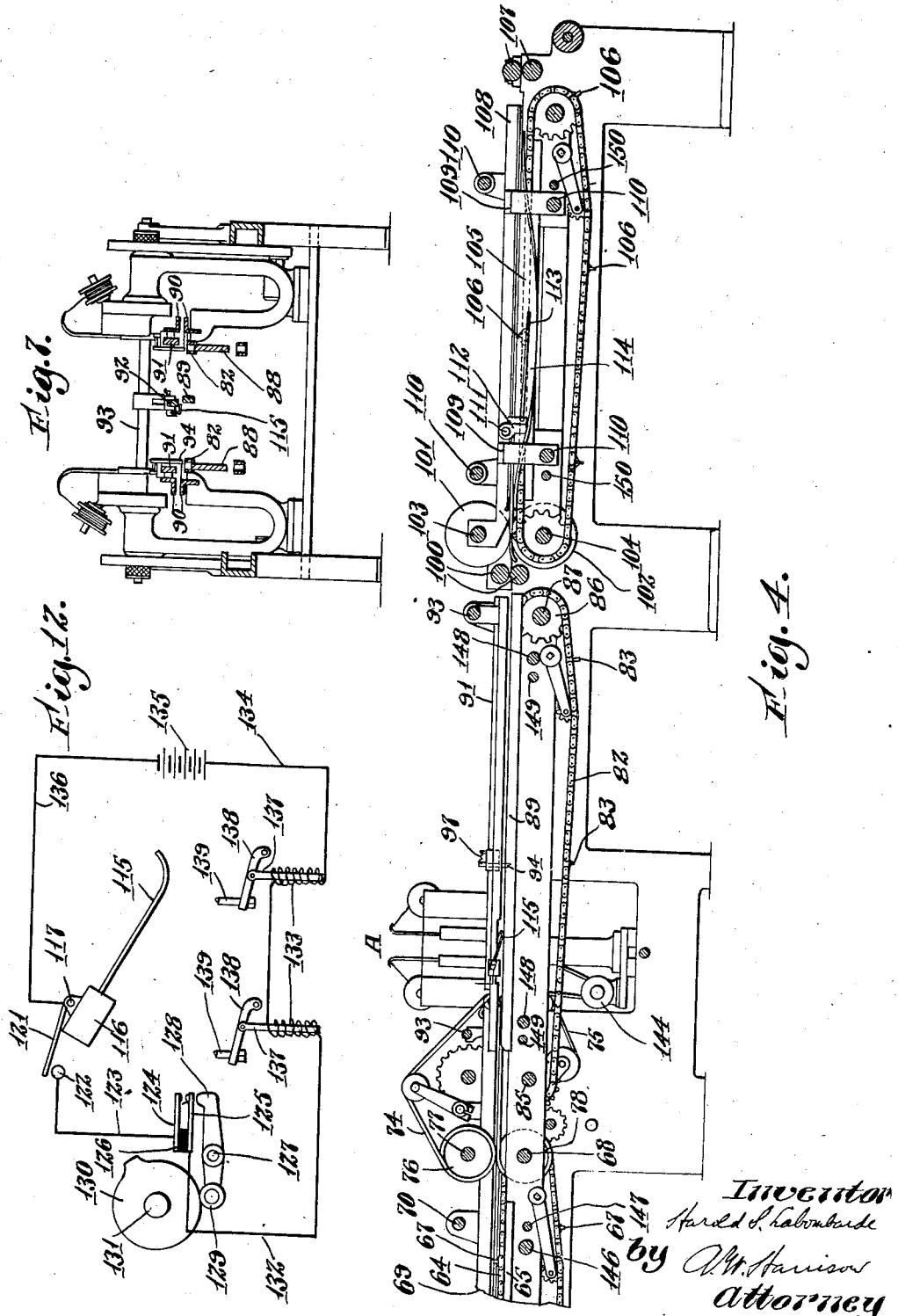
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AUTOMATIC FOLDING AND STITCHING SUIT BOX MACHINE

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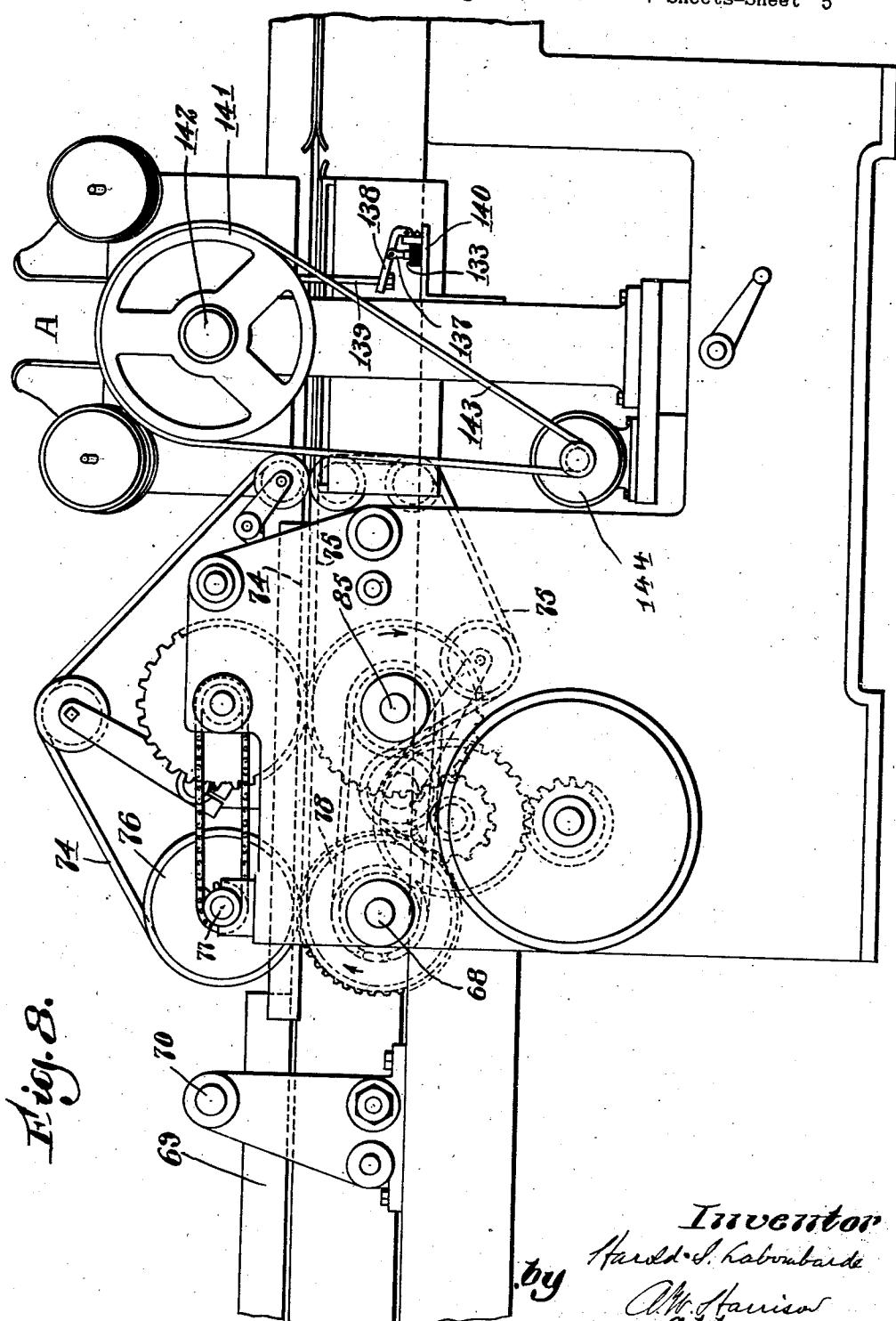
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AUTOMATIC FOLDING AND STITCHING SUIT BOX MACHINE

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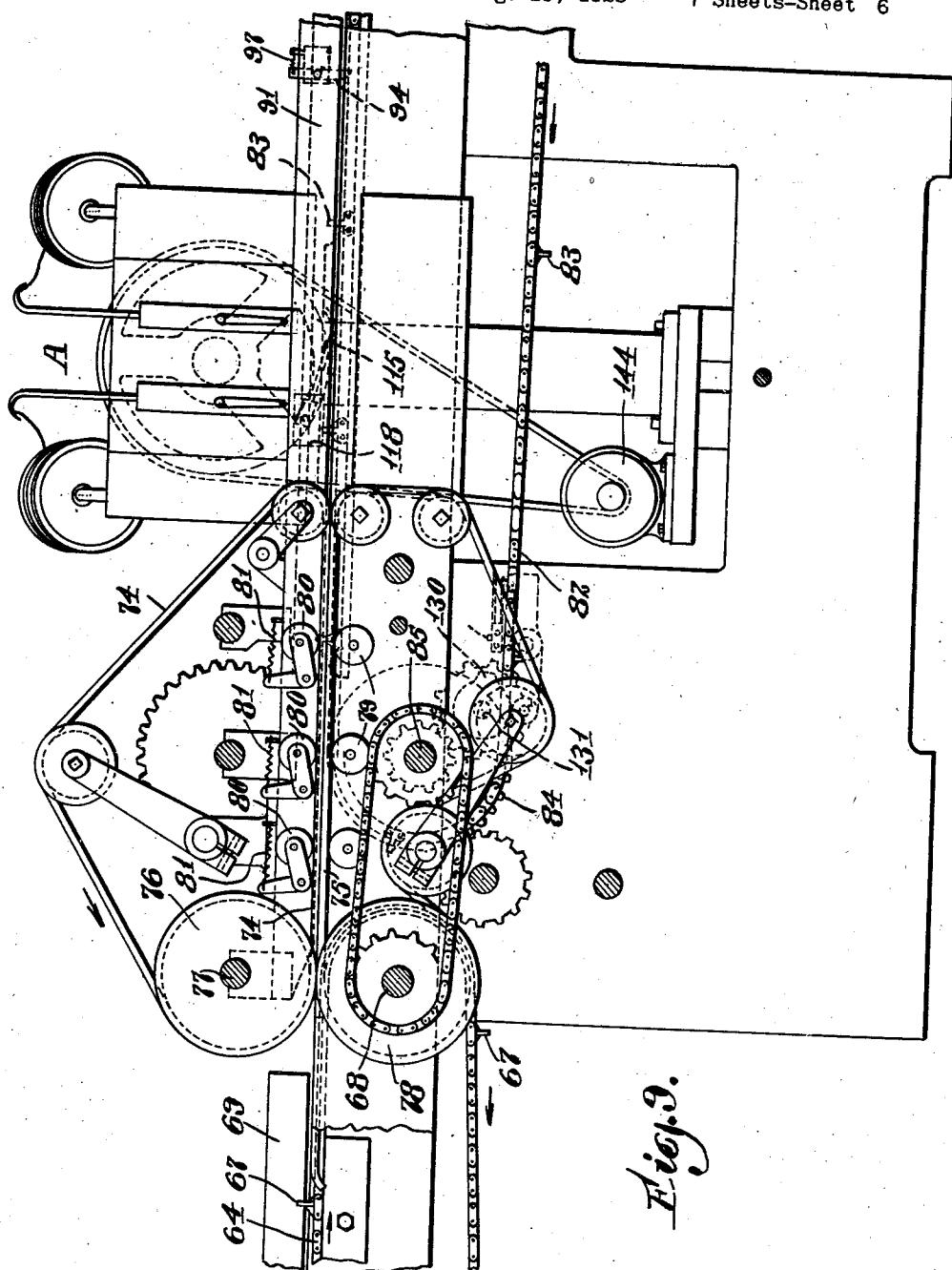
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AUTOMATIC FOLDING AND STITCHING SUIT BOX MACHINE

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AUTOMATIC FOLDING AND STITCHING SUIT BOX MACHINE

Filed Aug. 15, 1928 7 Sheets-Sheet 7

Fig. 13.

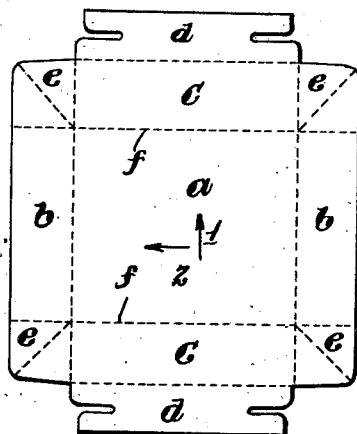


Fig. 14.

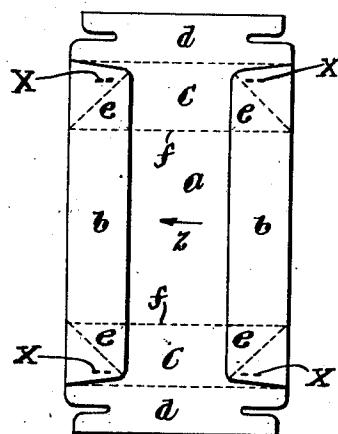


Fig. 15.

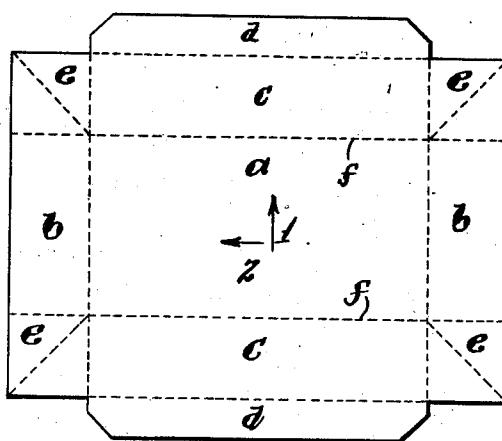
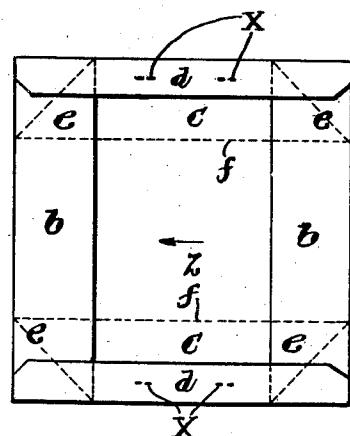


Fig. 16.



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UNITED STATES PATENT OFFICE

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AUTOMATIC FOLDING AND STITCHING SUIT BOX MACHINE

Application filed August 15, 1928. Serial No. 299,803.

This invention relates to the manufacture of paper containers, and has particular reference to the production of that type of cartons known as suit boxes each of which usually consists of two members practically alike except that one is slightly larger than the other.

There have been produced heretofore, machines which fold blanks, and stitch or staple certain portions of each blank together, and deliver them in flat folded condition; but so far as I am aware all have possessed some objections, notably lack of speed in producing the desired articles, due to the machine including reciprocating operating members.

One of the objects of the present invention is to produce an improved machine for making flat folded and stitched cartons, all of the movably operating members of which machine are rotary or otherwise continuous in movement, and which machine is, therefore, capable of a very high speed of production.

Another object of the invention is to provide a machine which, according to the presence or absence of certain stationary folder members, is capable of producing, at equal speeds, either one of two different kinds of flat folded boxes or cartons.

Another object is to provide a machine having means for effecting a very quick adjustment (known as the "set up") when a different size of blank is to be operated upon.

Another object is to provide a machine which not only converts blanks into flat folded and secured boxes or cartons but also so acts on certain transverse crease lines of the otherwise completed articles as to "break" said lines in order to facilitate later setting up of the cartons by users.

With the above and other objects in view, which will be explained, the invention consists in the construction and combination of parts substantially as hereinafter described and claimed.

Of the accompanying drawings:

Figures 1 and 2, taken together, constitute a plan view of the entire machine, omitting a few parts which need no illustration.

Figure 3 represents a section on line 3—3 of Figure 1.

Figure 4 represents a section on line 4—4 of Figure 2.

Figure 5 represents a section on line 5—5 of Figures 1 and 3, omitting some parts.

Figure 6 represents a section on line 6—6 of Figure 1.

Figure 7 represents a section on line 7—7 of Figure 2.

Figures 8 and 9 are views similar to the left-hand portion of Figure 4, on a larger scale, each of said Figures 8 and 9 omitting some parts in order to show others more clearly.

Figure 10 is an enlarged detail view of one of the pair of arresting fingers or stops and its mounting.

Figure 11 is an enlarged detail view of the finger mechanism which controls the operation of the stitchers.

Figure 12 is a diagram of the mechanism and electrical connections controlled by the finger mechanism of Figure 11.

Figure 13 is a plan view of one form of blank upon which the machine illustrated operates, said view also illustrating by dotted lines the crease lines usually made when the blanks are died out.

Figure 14 is a plan view of the same blank after it has been folded and stitched.

Figures 15 and 16 are views similar to Figures 13 and 14 but illustrating another form of blank upon which the machine will operate.

Similar reference characters indicate similar parts or features in all of the views.

The machine as a whole has primary and secondary folding mechanisms at an angle to each other.

To facilitate an understanding of the invention, the following preliminary description is given:

Assuming that blanks such as illustrated by Figure 15 are to be converted to the flat folded and stitched condition illustrated by Figure 16, said blanks travel in the direction of the arrow 1 (Fig. 15) from the feed table 22 (Fig. 1) and travel to a platform at the angle of Figure 1, and while so travelling, the flaps b b and diagonally creased corners e e are folded down and flat under the sec-

tions *a c*. Then the so partially folded blanks travel from the platform in a right-angular direction (see arrow 2, Figs. 15 and 16), and while so travelling, the narrow flaps *d d* are 5 folded down and flat under the sections *c* and *e*, and farther along are stitched at *xx*. To effect this result all folding is done while travelling to the stitchers, and no folding is done after passing the stitchers.

10 To produce another type of carton (see Figs. 13 and 14) it is only necessary to remove the folding members which before acted on the narrow flaps *d d*, and to make a few adjustments to accord with the different shape 15 of blanks and the required locations of the stitches *xx*.

Referring now to Figures 1 to 4, the frame of the primary portion of the machine is indicated at 20, and the frame of the secondary portion of the machine is indicated at 21. A suitable table for a pile of the blanks to be acted upon is illustrated at 22. From said table the blanks are fed singly and successively by a combing wheel 23 carried by 25 a shaft 24, and pass onto a carrier belt 25 mounted on pulleys 26, 27, and running over rolls mounted in a cage bar 28 which is suitably mounted in the frame of the machine in a permanent position along the mid-width of 30 the primary portion of the machine.

An upper carrier belt 29 is mounted at the far end on a pulley 30 carried by a driven shaft 31, the other end of the belt which is adjacent to the combing wheel being mounted on a small pulley 32. Between the pulley 33 and the combing wheel is a small presser roll 33 carried by pivotally supported arms 34, each arm 34 having a spring 35 connected to it to cause the roll 33 to ensure such pressure on each fed blank onto the carrier belt 25 as to enable the latter to frictionally advance the blank. The operative run of the upper belt 29 is held in contact with the lower belt by a series of rolls mounted in a cage bar 36 which is fixedly supported by tie rods 37 to occupy a permanent position along the mid-width of the primary portion of the machine (see also Fig. 5).

An important feature of the invention is 50 that although the machine is capable of operating on a wide variety of sizes of blanks, a very rapid adjustment can be made to suit a particular size. This is due to the fact that no lateral adjustment is ever required 55 for the central members including the feed wheel, carrier belts and roll cages, all of which remain permanently at the mid-width of the machine. The only adjustment required for a different size is of the carriages 60 which bear the folding devices. Said carriages are on opposite sides of the carrier belts 25, 29, and are simultaneously adjusted toward or from each other by right and left hand screws 38 rotatably mounted in frame 65 brackets 39 (Fig. 1). Said screws are pro-

vided with sprockets engaged by an endless chain as illustrated in Figures 1 and 2, and either one of the screws may be turned by a suitable crank to effect simultaneous rotation of all of the screws. Each screw passes through an internally threaded projection 70 of a sleeve 40 slidably mounted on a tie rod 37. The operation of this part of the machine will now be described.

When the screws 38 are rotated, the sleeves 75 40 are slid simultaneously toward or from the carrier belts 25, 29, and their roll cages so that the guiding and folding devices which are supported by said sleeves will be farther from or nearer to said carrier belts 80 and cages. Each of the sleeves 40 has a depending bracket 41 (Fig. 5) carrying upper and lower long guide strips 42, 43, between which side portions of the blanks pass as they travel with the carrier belts. The two 85 lower guide strips 43 are mounted on vertical pins 44 mounted, preferably adjustably, in sleeves at the lower ends of the brackets 41, so that the space between each upper and lower guide strip can be varied to suit blanks 90 of different thicknesses. Also supported by the brackets 41 of the sleeves 40 are the folder bars 45 (Figs. 1 and 5) which are so bent or inclined relatively to the guide strips as to fold the portions *b b* of the blanks 95 down and under the body *a* before the blanks reach the nipper rolls 46. As all of these parts just described and which are supported by the sleeves 40 and their brackets are controlled as to their lateral positions both 100 sides of the carrier belts, a single operation of the right and left hand screws 38 serves, as hereinbefore mentioned, to simultaneously effect all adjustments that are required 105 when a different size of blank is to be operated upon, thereby effecting very quickly what is termed a "set up" of the machine. It is important, for this purpose, that the roll cages and carrier belts shall be fixed to remain in central position, as otherwise a reliable quick adjustment or "set up" could not be effected.

Each blank, with two opposite marginal wall or flap portions *b b* folded under the body portion, is delivered by the nipper rolls 115 46, over a guide bar 47 (Figs. 1 and 3) and onto the platform which will now be described.

The platform comprises plates 48, 50, 51, past or between which chains hereinafter described travel in a direction at a right angle to the path of travel which the blanks followed during their primary folding and delivery onto the platform by the nipper rolls 46. Extending partly over the plate 51 is a plate 52 having its free edge curved upwardly to avoid liability of the arriving blank catching thereon, and to aid in guiding said arriving blank to position with its forward edge against 125 an outer stop and guide bar 53.

To aid in correctly locating each primarily folded blank on the platform, the following mechanism is provided:—

Loosely mounted on the shaft 31 (Fig. 1) are two sleeves 54 to which are secured, preferably adjustably, two rods 55 which support a block or bracket 56 in which is mounted the shaft 57 (Fig. 3) of a wheel 58 having curved yielding friction teeth or fingers, suitably of rubber. The said shaft and wheel are rotated in the direction of the arrow by a belt 59 mounted on and driven by a pulley 60 carried by the shaft 31, a tightener pulley 61 for the belt being carried by a block adjustably mounted on upright rods 62 supported by the block 56.

The height of the brushing wheel 58 above the platform may be varied to suit the character of the blanks operated upon. Such adjustment is effected by means of screws 63 carried by blocks mounted on a tie rod 37 (Fig. 3) and bearing on the rods 55. Since said rods 55 are practically pivotally supported on shaft 31, turning the screws 63 down results in raising the block 56 and the brushing wheel, and vice versa. Preferably the friction fingers of the wheel 58 are so curved as to act not only frictionally in urging the blanks against the position-arresting bar or stop 53 but to also act yieldingly as pressers on the passing blanks, for a reason which will now be described.

The blanks delivered on the platform have had their flaps or sections *b b* (Figs. 14, 16) folded in under the sections *a*, and said sections *b b* still have a tendency to spring back and interfere with proper delivery on the platform. This spring tendency varies according to the quality of the material employed for the suit boxes or cartons. The downward pressure however of the curved yielding friction fingers of the wheel ensures deposit of the preliminarily folded blanks sufficiently flat on the platform to ensure their being properly engaged by the lugs or pins of the chains 64 which will now be described.

Each preliminarily folded blank arriving on the platform and squared up thereon by the mechanism just described, is immediately transferred in a right-angular direction by the chains 64 (Figs. 1, 2, 3, 4 and 6) which ride on rails or guide bars 65 which comprises the main members of two of the carriages hereinafter referred in connection with their lateral adjustability. Said chains are mounted at one end on sprockets carried by driven shaft 66, and at the other end on sprockets carried by a shaft 68, said chains having lugs or pins 67 spaced at suitable intervals to act on the rear edge of each blank arriving on the platform and push it along under a guide bar 69 supported by tie rods 70. Said guide bar 69 is located at the mid-width of the first section of the secondary portion of the machine.

Another guide bar 71 (Fig. 6) suitably supported by tie rods 70 coacts with the bar 69 in guiding the mid-width portions of the blanks and preventing flexing or bending while the portions *d d* are being acted upon by the twisted folder bars 72, when the machine is being used in connection with articles of the form illustrated by Figures 15 and 16. Between the chains 64 and the folder bars 72 are guide strips 73 similar to the guide strips 42, 43, employed in the primary folding portion of the machine.

Each folded blank is taken from the chains 64 by upper and lower belts 74, 75 (Figs. 2, 4, 8 and 9) which are caused to travel at a higher speed than the chains 64, so that, as the front portion of each blank is taken control of by said belts, its rear edge will be drawn away from the path of the pins 67 passing down around the chain sprockets. Another reason for the higher speed of the belts is that since they carry the blanks to position where they will be briefly halted and stitched as presently described, it is important that each blank shall arrive at the stitching point sufficiently far in advance of the next following one so that said, following one will not contact with the halted one.

The two upper belts 74 are driven by pulleys 76 carried by shaft 77, and the coacting lower belts are driven by pulleys 78 carried by shaft 68. The gearing for operating said shafts and belts at the higher speed referred to, may be such as illustrated in Figures 2, 8 and 9, or other suitable gearing.

The upper runs of the lower belts are supported by idle rolls 79 (Fig. 9) and the lower runs of the upper belts are held in cooperative relationship with the lower belts by yieldingly mounted rolls 80 carried by pivoted elbows having springs 81 connected to suitable fixed points.

The belts 74, 75, bridge a slight space between the delivery ends of the chains 64 and the receiving ends of a second pair of chains 82 (Figs. 2, 4 and 9) having pins 83. Said chains are mounted on sprockets 84, 86, carried by shafts 85, 87 (Fig. 4). The upper runs of the chains are supported by rail bars 88 (Fig. 7), while the mid-width portions of the blanks that are being pushed along by the pins of the chains ride on a suitably supported strip 89.

The marginal portions of the blanks which extend out beside the chains are guided by strips 90 similar to the described strips 42, 43, 73. Just inside the strips 90 and parallel therewith are bars 91 (Figs. 2 and 7), and above the strip 89 is a bar 92 supported by tie bars 93.

By comparing Figures 2, 3 and 9, it will be seen that the belts 74, 75, extend some little distance past, or overlap, the sides of the receiving ends of the chains 82. This, in connection with the timing of operation of the

parts of the machine, is to ensure the proper delivery of each folded blank, by the belts to the chains. Such proper delivery means that each blank should arrive on the chains with its front edge just behind a pair of chain lugs or pins and with its rear edge sufficiently far in front of the next following lugs or pins to permit the blank to be momentarily arrested and stitched or stapled before said following lugs or pins reach the rear edge of the blank and commence to push it along. To permit proper and high-speed operation, the pins 83 of the chains 82 are spaced farther apart than the pins of the chains 64.

For the present the two stitching and fastening mechanisms, which are of a well-known type such as the "Bostitch", will be referred to as a whole at A (Figs. 4, 8 and 9) and will be further referred to hereinafter.

To momentarily arrest each blank in exact position for stitching, I provide a pair of yielding pivoted fingers 94 (Figs. 2, 4, 7, 9 and 10), each pivoted at 95 to a block 96 mounted on bar 91 and connected by a spring 97 to a fixed pin 98 which normally holds the finger against a stop 99 with its lower end traversing the path of the blanks which are then being frictionally carried along by portions of the chains between forward and rearward lugs or pins thereof.

The fingers 94 are sufficiently held by their springs 97 to temporarily detain each blank in position for the stitching, and when the stitching is done a pair of chain lugs 83 catches up with the rear edge of the blank, the two fingers yielding to permit the blank to be pushed past them.

After passing the fingers 94, the chain lugs deliver the blanks to nipper rolls 100 and between upper and lower disks 101, 102 (Figs. 2 and 4). The upper disks 101 are carried by shaft 103, and the lower disks by shaft 104. The shafts and nipper rolls are connected by suitable gearing, and are rotated at sufficient speed to draw each blank from the chains 82 so that the lugs of the latter, when moving down around and with the sprockets 86, will not cut into the rear edges of the blanks.

Next, the blanks are taken by a third pair of chains 105 having lugs or pins 106 which carry the folded blanks to nipper rolls 107 which deliver the completed articles to any suitable receiver, usually a wide, slowly travelling, belt.

The carriages 108 for the chains 105 and the parts which cooperate therewith, are provided with brackets 109 mounted on tie rods 110 (Figs. 2 and 4) so as to be laterally shifted independently for different sizes or characters of the cartons. Said carriages have outwardly projecting pins 111 on which brackets 112 are adjustably mounted, said brackets supporting breaker rods 113 and long bent strips or plates 114.

The object of the members just described is important for the reason that the material of which the cartons are made is usually rather stiff and therefore unless the crease lines which are to define the angles of the cartons when they are manually converted by users to the form for receptacles and covers are easily bendable, it is difficult to effect proper conversion or setting up with all angle lines straight.

This feature of the invention will become plainer when it is understood that those sections of each blank which, while passing through the machine, are folded flat under and against other portions (see Figs. 14 and 16) are easily set upright later. But there are other crease lines on which no folding is done by the machine. These are the crease lines *f* (see Figs. 13 to 16), and the purpose of the breaker rods 113 and strips 114 is to effect a weakening of the crease lines *f* without completing folding of the portions of the blank which are beyond said lines. Each folded and stitched blank being carried along by the chains 105 travels in the direction of the arrows 2 (Figs. 14 and 16) and the portions beyond the crease lines *f* at opposite sides of the machine, first pass along under the inclined rods 113 to an approximate vertical position so as to break said lines *f* to render the outer portions readily bendable later on said lines. This effect is produced not only across the sections *a c* of the folded blank but also across the inwardly folded sections *b b*. All dotted lines in Figures 13 to 16 indicate crease lines made in the blanks and on which folding either is done by the machine or are needed to later facilitate manual conversion of the flat folded cartons to condition for use. The strips or plates 114 are so bent or formed and so positioned relatively to the breaker rods 113 that the portions of the cartons beyond the crease lines *f* first pass along between the rods 113 and the outer smooth surfaces of the strips 114 until they reach the portions of the strips which are substantially vertical and then, to render it certain that said temporarily flexed portions will be returned to outward flat plane, they ride along the outer surfaces of the strips to the outer ends thereof and are thereby directed to a plane of travel that will ensure correct delivery to and between the nipper rolls 117.

Referring now to the means for controlling the operations of the stitchers A, the timing of operation is such that each folded blank drawn away from the chains 64 (Figs. 4 and 9), by the belts 74, 75, is delivered by the latter onto the chains 82 with its rear edge several inches in advance of a pair of pins 83 so that said blank, then temporarily carried along frictionally by the chains, can be arrested by the yieldable stops 94 long enough to be stitched before said pair of pins reach

its rear edge and push it along past said stops. Said blank, on its way to said stops, lifts a finger 115 (Fig. 11) carried by a block 116 connected to a short rock-shaft 117 mounted in a block 118 secured to a bar 92 and having a spring 119 acting to normally hold the rocking block 116 against a stop 120 and with the finger 115 lightly resting on the guide strip 89.

10 The rock-shaft 117 has a strip 121 to close an electric circuit when it contacts with a fixed contact 122 (Fig. 12) from which a wire 123 leads to a contact 124 below which is a spring contact 125. The two contact arms 124, 125, are carried by a fixed insulated block 126 mounted in any suitable portion of the machine. Pivoted at 127 below the contact 125 is a lever 128 one end of which acts on the contact 125 to close the circuit at 124, 125, when the roll 129 at the other end of the lever is acted upon by a cam 130 carried by shaft 131 which shaft may be any of the machine shafts that rotates once for passing blank. That is, the timing is such that if there is no interruption in the regular continuity of folded blanks being delivered by the belts 74, 75, the lever will close the circuit at 124, 125, in time for the closure to be also effected at 121, 122, by each passing blank.

20 In the circuit described, there are two gaps in series, one at 124, 125, which is continually closed and opened, and the other at 121, 122 which is only closed when a blank arrives in position to be stitched or stapled. The rest of the circuit includes wire 132, two solenoid or equivalent magnets 133, a battery or other source of electricity 135, and wire 136 to the contact strip 121.

25 The reason for there being two magnets 133 is that there are two stitchers A A to apply staples or stitches to the folded blanks in opposite portions thereof as indicated at $\alpha\alpha$ in Figures 14 and 16. When the circuit is completed at both of the gaps referred to, due to a folded blank actuating the finger 115, each magnet core 137 acts on a lever 138 to actuate a tripper 139, one for each stitcher A. As illustrated in Figure 8, the magnets and levers may be supported on brackets 140 secured to the stitcher stands. As both the stitching mechanism and its tripping device is well known and no particular structure thereof is claimed herein, detailed illustration and description thereof is omitted to avoid unnecessary prolixity. It is explained however that each stitcher is of a duplex type to simultaneously apply stitches in two places, as indicated at $\alpha\alpha$ in Figures 14 and 16, and each has a pulley 141 carried by shaft 142 driven continuously by a belt 143 from a motor 144. But no stitching operation is effected except when both of the gaps at 121, 122 and 124, 125, are closed, resulting in operation of the trippers 139.

30 It may be noticed that the spacing of the

stitches $\alpha\alpha$ from each other are not the same in Figures 14 and 16. Any desired location of the stitches relatively to each other is effected by adjustments provided for in the well known stitchers A of the type illustrated and which adjustments need no description herein.

35 When the machine is employed for acting upon and producing such articles as illustrated by Figures 15 and 16, the folders 72 are in place as illustrated in Figures 1 and 2, secured on pins 145 projecting from the carriage bars 73. Then in operation, after the portions $b\beta$ have been primarily folded by the folders 45 (Figs. 1 and 5), the blanks 80 travel along the secondary portion of the machine and the portions $d\delta$ of the blanks are turned down under by the said folders 72 before the blanks reach the stitchers. The result is that the stitches $\alpha\alpha$ connect the portions $c\delta$ together.

40 To enable the machine to be employed for acting upon and producing such articles as illustrated by Figures 13 and 14, it is only necessary to remove the folders 72 so that no 90 folding is effected while the blanks are travelling along the secondary portion of the machine, in the direction of the arrows 2, and to make such adjustments that the stitches $\alpha\alpha$ will secure the corner portions $e\epsilon$ of the 95 blanks to the portions $c\epsilon$.

45 Articles of either type are produced at high speed because the blank carriers are continuously travelling, the folding devices are, all of them, alongside some portions of the 100 travelling carriers, and the stitching mechanism is located in position to operate on the blanks while the latter are in the path of movement of said carriers.

50 While the primary portion of the machine 105 comprises a single section, the secondary portion comprises three sections the first of which includes the folders 72, when used, the second section includes the stitchers and the means for controlling the operations thereof, 110 and the third section is the one which includes the breakers 113. Portions of the mechanisms in each of said three sections are independently adjustable as will now be described:

55 It is desirable for some shapes or qualities of blanks, although not necessary for all, that in each of the three sections just referred to, the carriages for the chains and the parts which directly cooperate therewith shall be 115 independently adjustable laterally. And of course, as is customary in all machines which employ adjustable chains mounted on sprockets, the sprockets are splined on their shafts and are so connected with the carriages that when the latter are moved laterally the sprockets are moved along their shafts. In the present machine the two carriages 73 of the first section are mounted on tie rods 146 (Figs. 2 and 4), and screws 147 mounted in 120

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side portions of the frame engage said carriages to enable the one at either side to be laterally adjusted independently of the one at the other side.

5 In the second and third sections referred to, of the secondary portion of the machine, the carriages are similarly adjustable (see Fig. 4), the carriages of the second section being supported on tie rods 148 and shifted laterally 10 by screws 149, while the carriages of the third section are supported on the tie rods 110 and are shifted laterally by screws 150. In practice each pair of screws 147, or 149 or 150, are rotated in unison by chain and sprocket gearing, and a suitable crank, in the same manner 15 as illustrated in connection with the screws 38 of the primary section illustrated in Figures 1 and 3.

Many members of the gearing illustrated 20 in the drawings are left undescribed because the specific structure thereof is not claimed herein and may vary more or less without departing from the present invention.

Having now described my invention, I 25 claim:—

1. A machine for making a plurality of types of folded cartons, said machine having travelling blank-carriers, folding devices in position at different distances along the carriers, and means for securing folded portions 30 of the blanks to other portions thereof, the folding devices in one of said positions being removable and replaceable to control the type of carton produced.

35 2. A machine for making a plurality of types of folded and stitched cartons, said machine comprising primary and secondary sections at an angle to each other, blank-carriers and folding devices in each section, and stitching mechanism in the secondary section, 40 the folding devices in the secondary section being removable and replaceable to control the type of carton produced.

45 3. A machine for producing flat-folded cartons having weakened transverse lines, said machine comprising primary and secondary portions at an angle to each other, blank-carriers and folding devices in each of said portions of the machine, stitching mechanism in the second portion, and means beyond the stitching mechanism for bending the folded and stitched blanks on transverse lines.

50 4. A blank-folding machine having primary and secondary portions at an angle to each other, a platform at the angle for receiving folded blanks from said primary portion, means for arresting movement of the blanks when delivered on the platform, and 55 a rotary member having yielding friction fingers in position to urge the blanks toward said arresting means and to also press the blanks down on the platform.

5. A blank-folding machine having primary and secondary portions at an angle to

each other, a platform at the angle for receiving folded blanks from said primary portion, means for arresting movement of the blanks when delivered on the platform, and a rotary series of longitudinally curved flexible friction fingers in position to urge the blanks toward said arresting means and to also press the blanks down on the platform. 70

6. A blank-folding and stitching machine 75 having carriers provided with pins for causing the blanks to travel toward a stop, mechanism in position to apply stitches to the blanks when they reach said stop, and means for increasing the speed of travel of the blanks between said carriers and stop to draw the rear edges of the blanks away from the carrier pins. 80

7. A blank-folding and stitching machine 85 having a yieldable stop in the path of moving blanks, an endless carrier provided with pins for causing the blanks to travel toward said stop, mechanism in position to apply stitches to the blanks when they reach said stop, coating belts to take the blanks from said carrier and move them toward said stop, and means to move said belts faster than said carrier to draw the rear edges of the blanks away from the carrier pins. 90

8. A blank-folding and stitching machine 95 having two sets of endless carriers provided with pins for causing the blanks to travel, one set being in advance of the other, means for temporarily stopping each blank after its arrival on the second set of carriers, means for increasing the speed of travel of each blank passing from the first to the second set of carriers, and means for applying stitches to each blank after its arrival on the said second set. 100

9. A machine for producing flat folded and 105 stitched cartons, said machine having means for first folding the blanks, an endless carrier for causing the folded blanks to travel, stitching mechanism and a yieldable stop intermediate the ends of said carrier, and means for causing the stitching mechanism to operate when a blank reaches said stop. 110

10. A machine for producing flat folded and stitched cartons, said machine having means for first folding the blanks, an endless carrier having pins for causing the folded blanks to travel, stitching mechanism and a yieldable stop intermediate the ends of said carrier, a movable member normally in the path of travel of a blank approaching said 120 stop, and means controlled by said movable member for causing the stitching mechanism to operate when a blank reaches said stop. 125

11. A blank-folding and stitching machine 125 having two sets of endless carriers having pins for causing the blanks to travel, one set being in advance of the other, the pins of the second set being spaced at greater distances than the pins of the first set, means for temporarily stopping each blank after its ar- 130

rival on the second set of carriers, means for increasing the speed of travel of each blank passing from the first to the second set of carriers, and means for applying stitches to each blank after its arrival on the said second set.

12. A machine for producing flat folded and stitched cartons, said machine having stitching mechanism and means for causing 10 folded cartons to travel to position to be stitched, a finger in position to be displaced by a carton approaching position to be stitched, tripping mechanism for controlling the operation of the stitching mechanism, 15 electric devices for controlling said tripping mechanism, and an electric circuit having two gaps, means being provided for continually closing and opening one of said gaps, and means connected with said finger for 20 closing the other gap when a blank displaces the finger.

13. A blank-folding machine comprising primary and secondary portions at an angle to each other, the secondary portion having a 25 plurality of sections, the primary portion having laterally adjustable carriages including folding devices, and each section of the secondary portion having independent carriages including carrier chains, each of said 30 independent carriages being independently adjustable.

14. A machine for making a plurality of types of folded cartons comprising travelling blank-carriers; folding devices in position 35 at different distances along the carriers; and means for securing folded portions of the blanks to other portions thereof, the folding devices in one of said positions being operative or inoperative according to the type 40 of carton to be produced.

15. A machine for making a plurality of types of folded and secured cartons comprising primary and secondary sections at an angle to each other; blank-carriers and folding devices in each section; and securing mechanism in the secondary section, the folding devices in the secondary section being operative or inoperative according to the type 45 of carton to be produced.

50 16. A blank-folding machine having primary and secondary portions at an angle to each other, folding mechanism in said primary portion, a platform at said angle for receiving folded blanks from said primary portion, means for arresting movement of the blanks when delivered on the platform, and means for moving the blanks across said platform at a speed substantially faster than the speed at which the blanks pass said folding 55 mechanism.

55 17. A machine of the character described comprising carriers for causing the blanks to travel toward a stop, mechanism in position to apply stitches to the blanks when they 60 reach said stop, and means for increasing the

speed of travel of the blanks between said carriers and stop.

18. A machine of the character described comprising a stop in the path of moving blanks; an endless carrier for causing the 70 blanks to travel toward said stop; mechanism in position to apply stitches to the blanks when they reach said stop; elements to take the blanks from said carrier and move them toward said stop; and means for moving said elements at a speed faster than the 75 speed of said carrier.

19. A machine of the character described comprising means for folding the blanks; an endless carrier for causing the folded blanks 80 to travel; stitching mechanism; a stop intermediate the ends of said carrier; and means for causing the stitching mechanism to operate on a blank when the latter reaches said stop.

20. A machine of the character described comprising an endless carrier for conveying partly folded cartons having weakened transverse lines; means to complete the folding 90 of said cartons; securing mechanism; means for coordinating the feed of said carrier with the operation of said securing mechanism; and means for bending the blanks on said transverse lines.

In testimony whereof I have affixed my 95 signature.

HAROLD S. LABOMBARDE.

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