

Jan. 17, 1933.

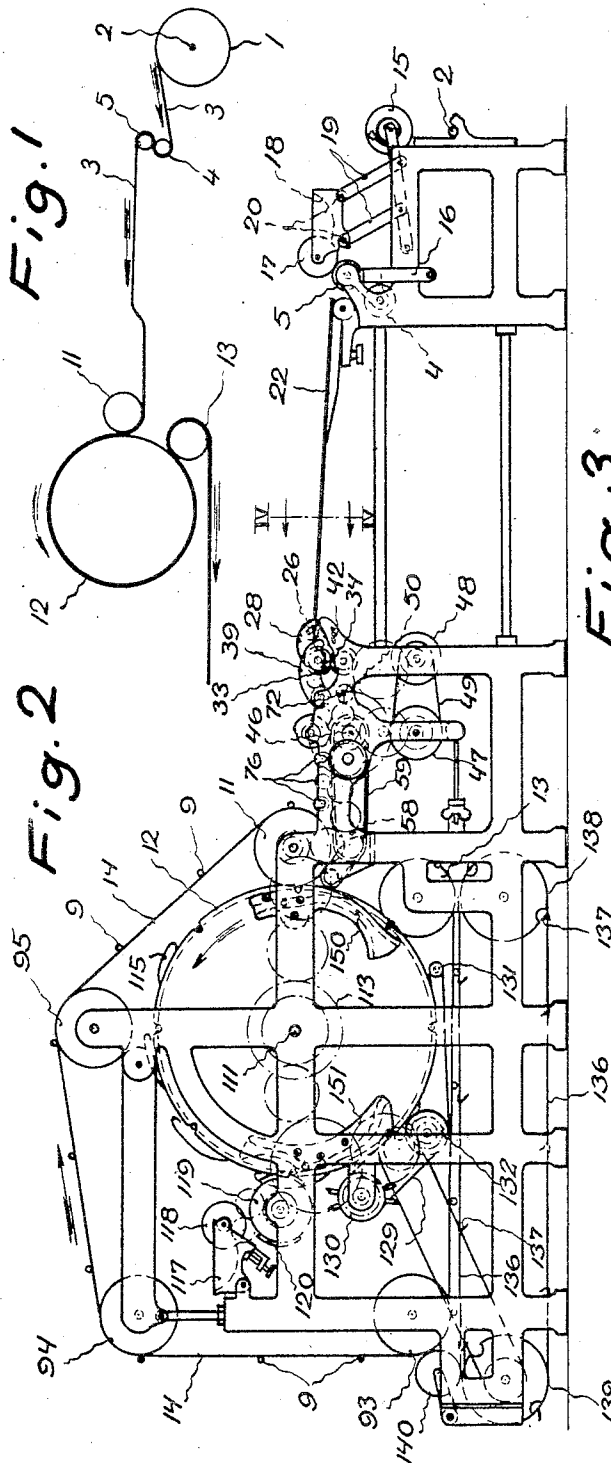
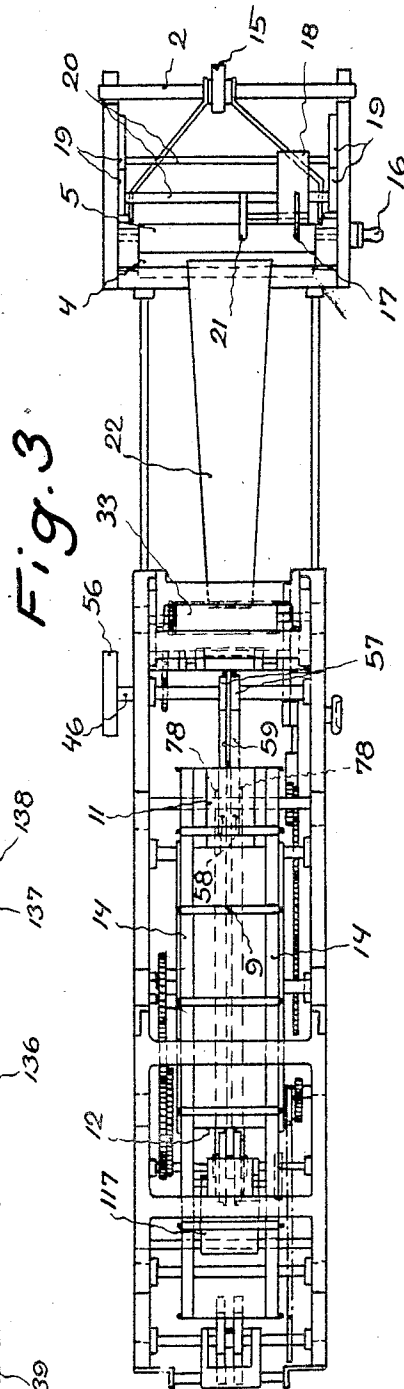
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1,894,726

ROTATING PAPER BAG MACHINE

Filed April 13, 1931

9 Sheets-Sheet 1



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1,894,726

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9 Sheets-Sheet 2

Fig. 4

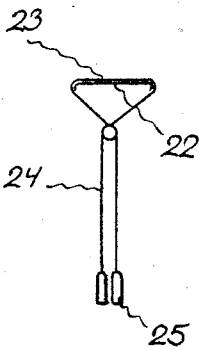


Fig. 5

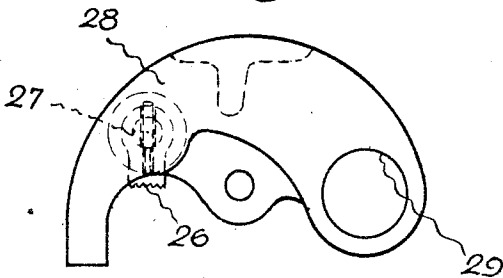


Fig. 6

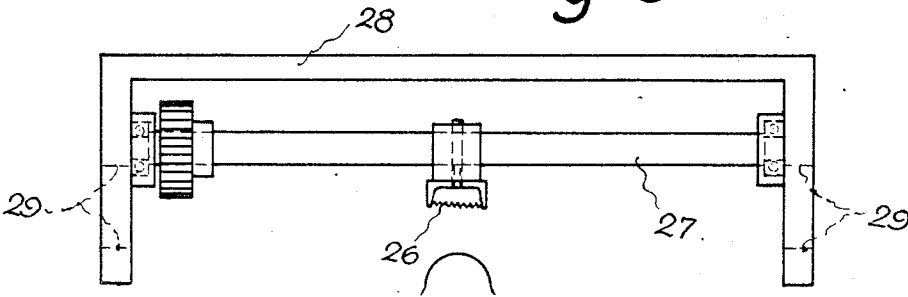
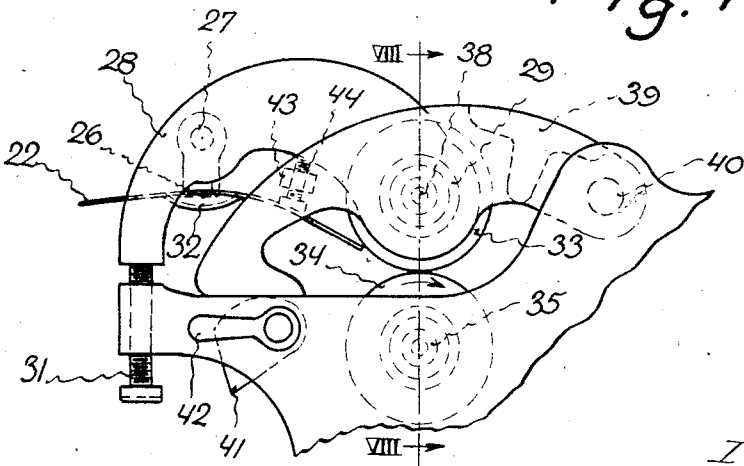


Fig. 7



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9 Sheets-Sheet 3

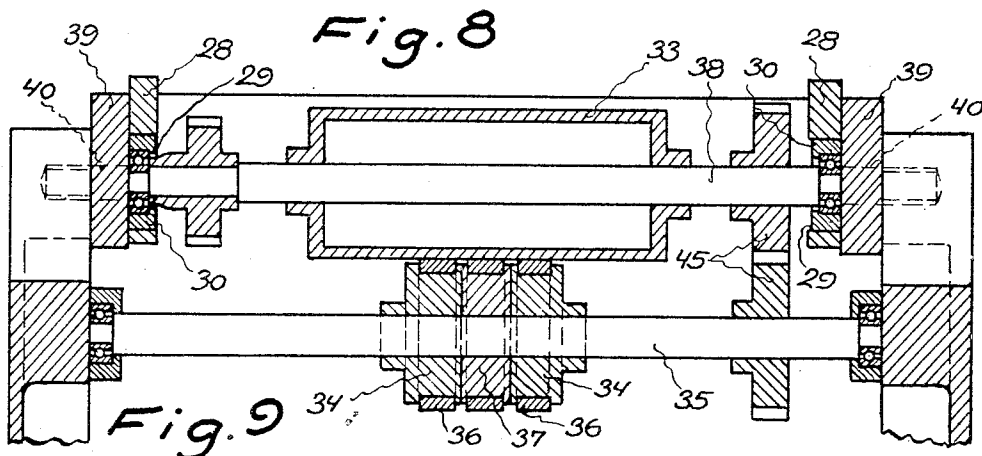
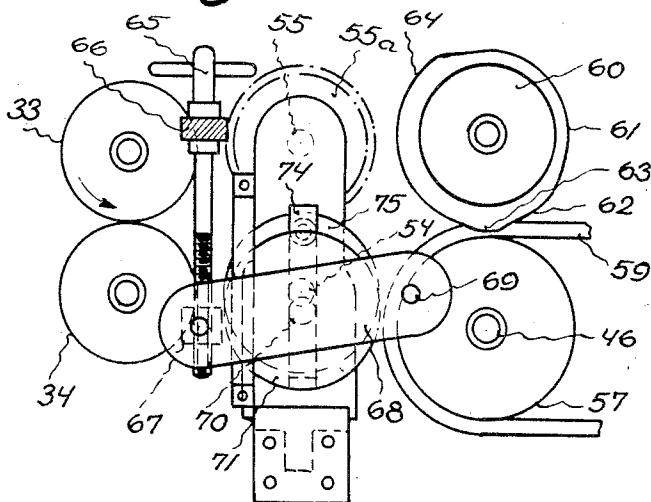
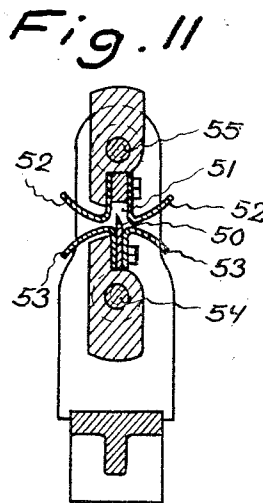


Fig. 9a

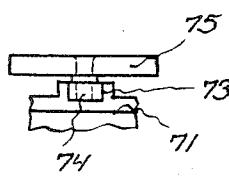
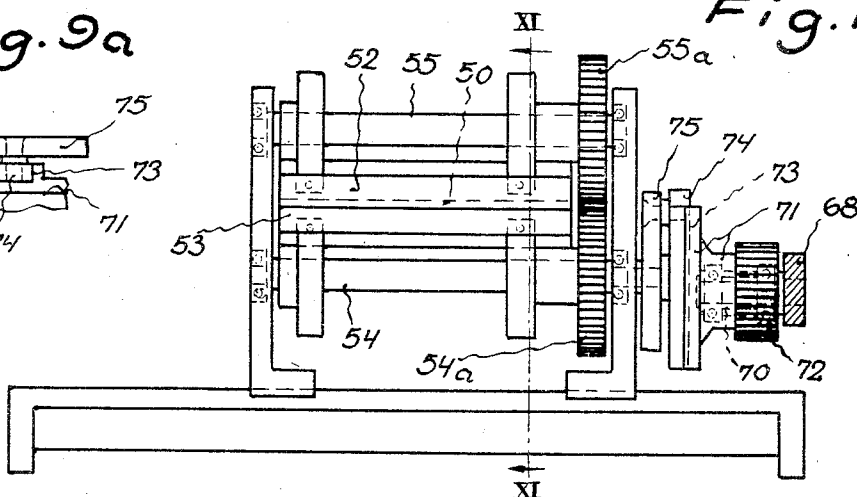


Fig. 10



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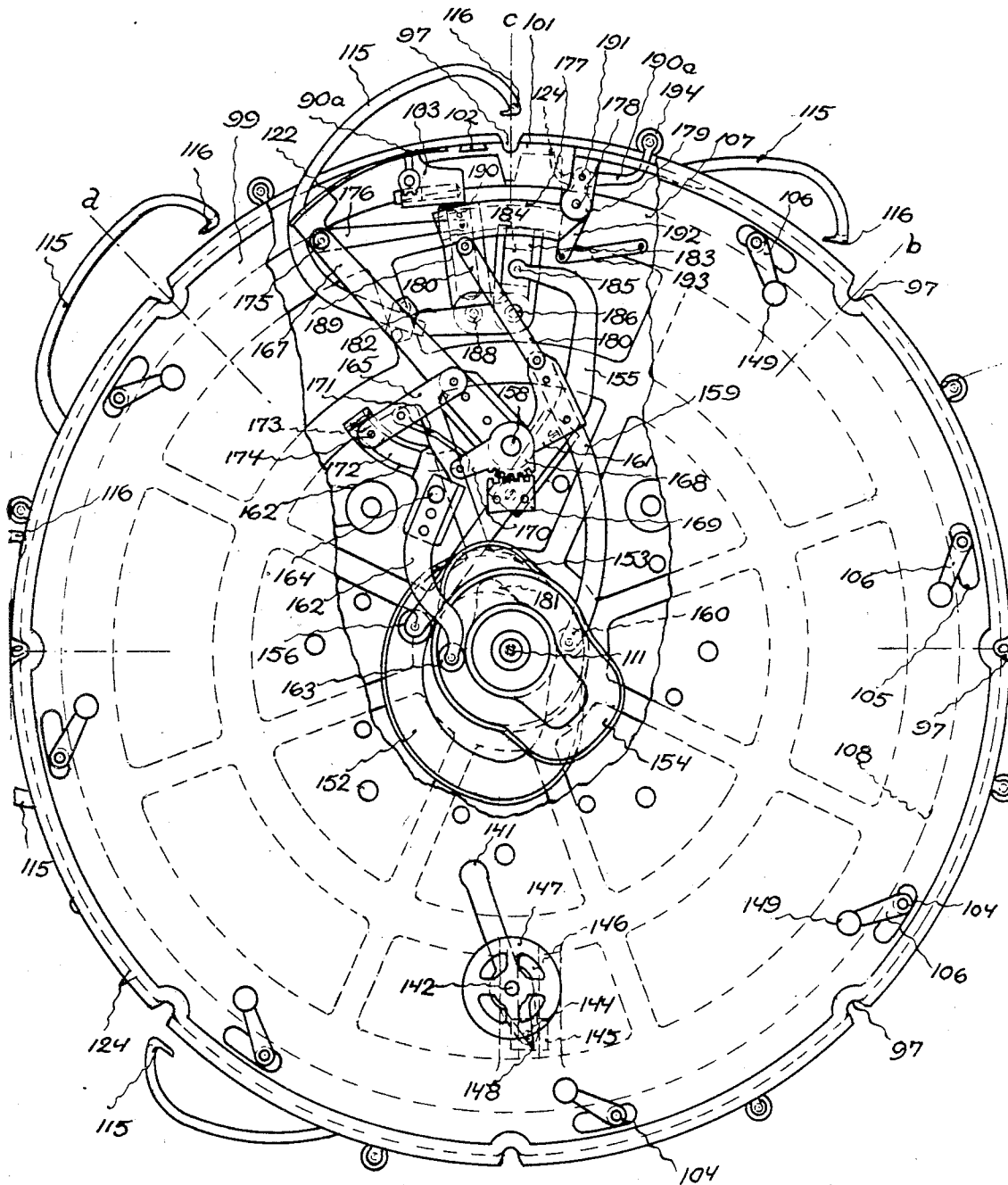
1,894,726

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9 Sheets-Sheet 4

Fig. 12



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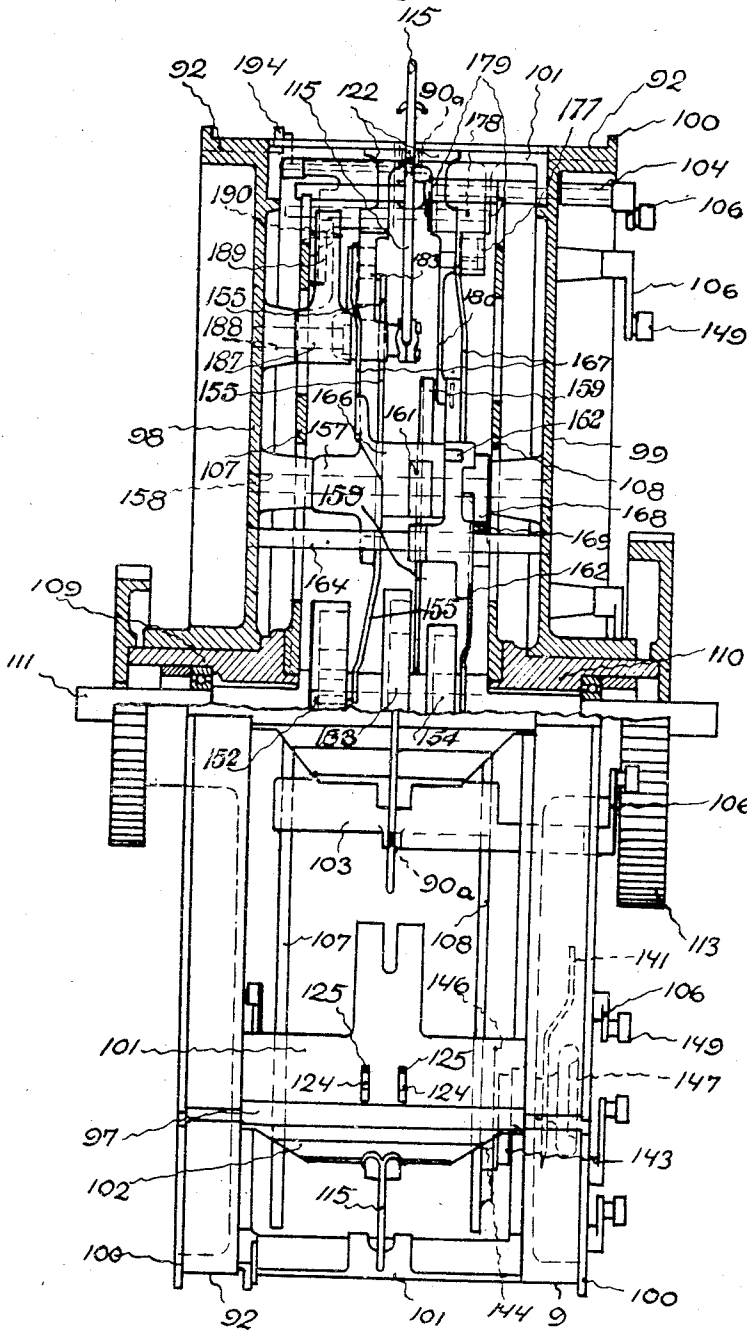
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ROTATING PAPER BAG MACHINE

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9 Sheets-Sheet 5

Fig. 13



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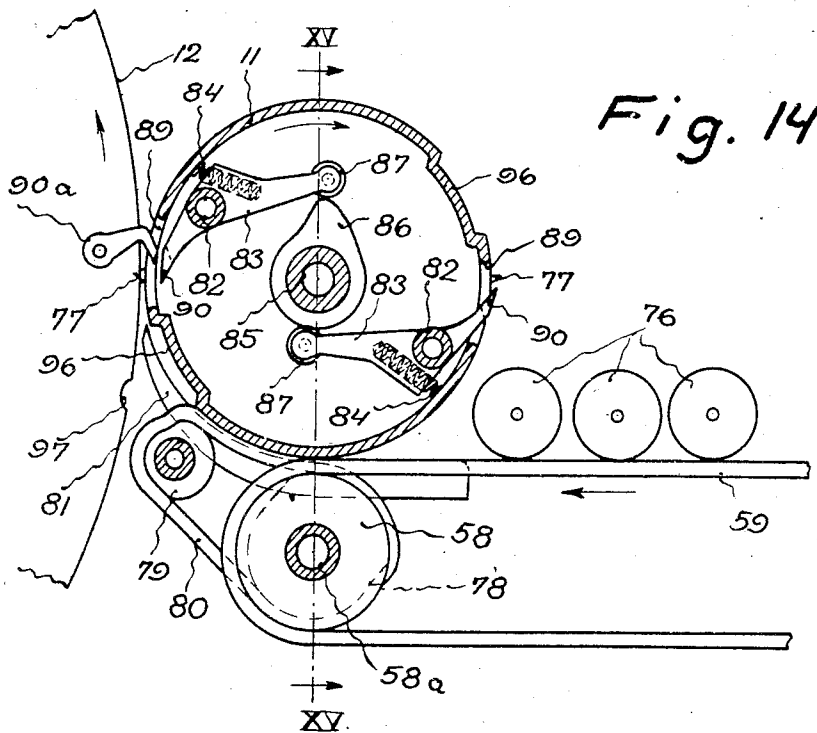
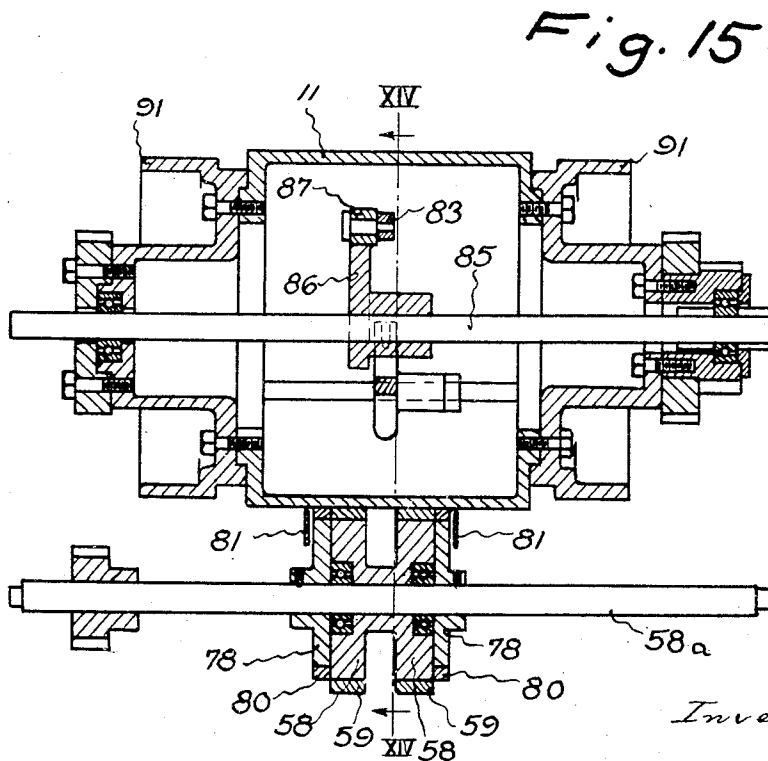
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9 Sheets-Sheet 6



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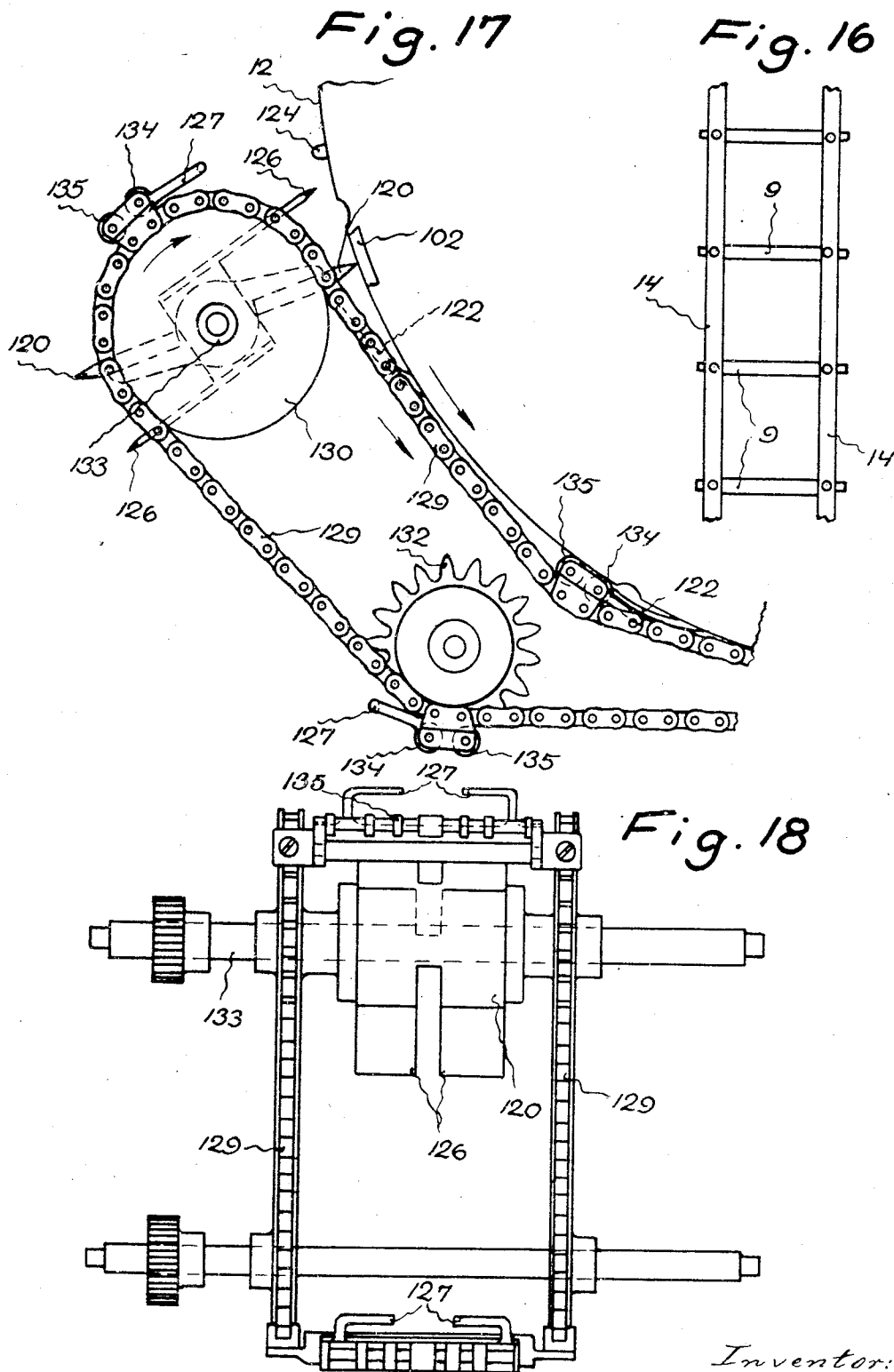
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ROTATING PAPER BAG MACHINE

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9 Sheets-Sheet 7



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ROTATING PAPER BAG MACHINE

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9 Sheets-Sheet 8

Fig. 19

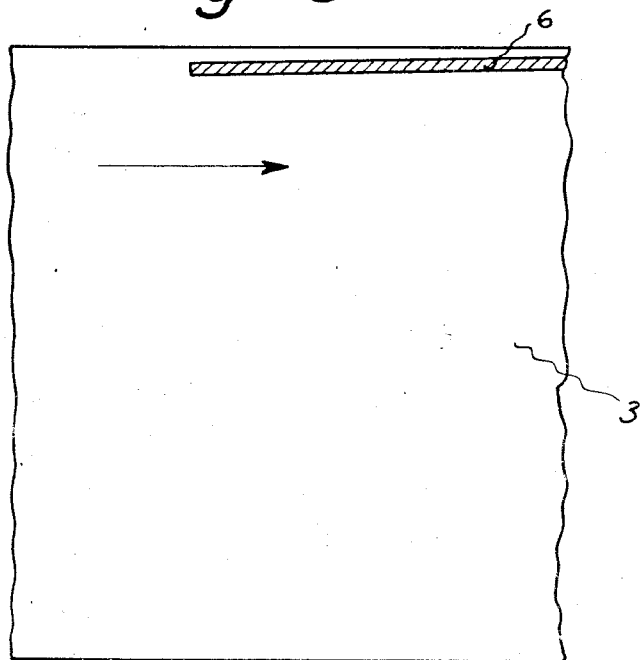


Fig. 20

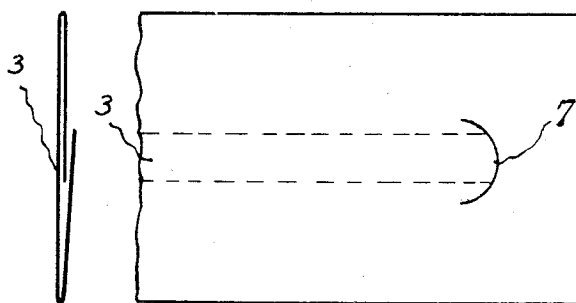
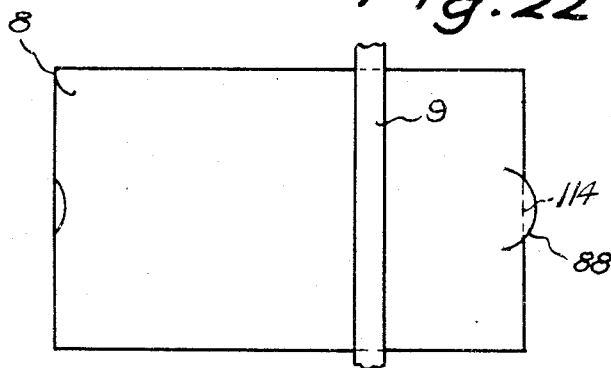


Fig. 21



Fig. 22



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ROTATING PAPER BAG MACHINE

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9 Sheets-Sheet 9

Fig. 23

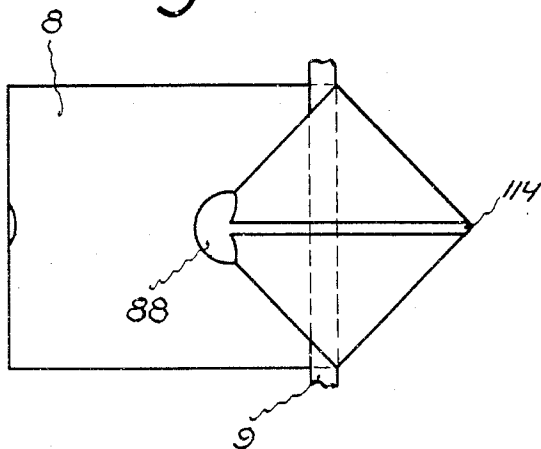


Fig. 24

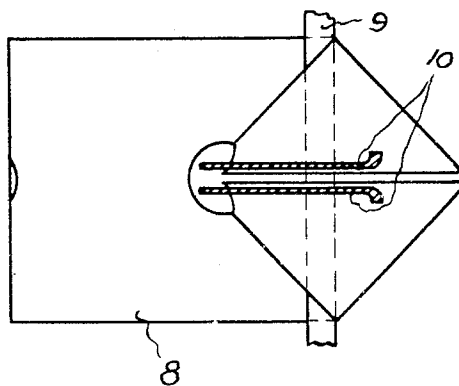


Fig. 25

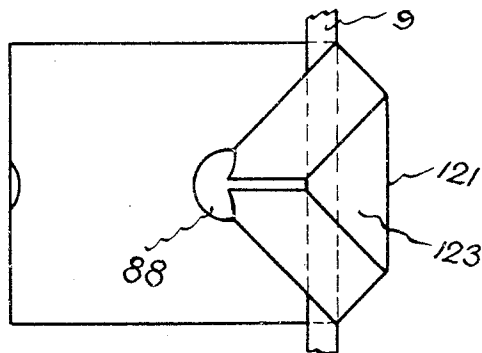


Fig. 26

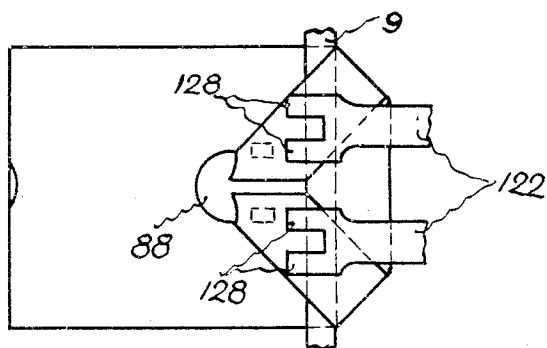
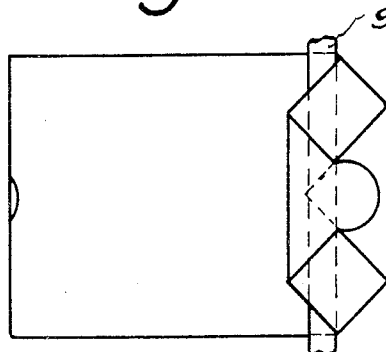


Fig. 27



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UNITED STATES PATENT OFFICE

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ROTATING PAPER BAG MACHINE

Application filed April 13, 1931, Serial No. 529,811, and in Germany April 24, 1930.

The present invention refers to a machine for the production of bags from paper and similar material and provided with cross-folded bottom, i. e. so called cross-bottom bags or paper canisters. The folding of the bottom portion of such bags is performed in more successive operations by means of a number of folding members, and therefore the output of the known machines pro unit of time has been rather limited.

In the first instance the present invention has for its object to provide a paper canister machine having a highly increased working capacity, and for this purpose the machine is provided with a continuously rotating drum coacting with suitable means for a continuous introduction of blanks cut off from a continuously advanced paper web and shaped for their purpose, such blanks being advanced towards the periphery of the drum and kept in a predetermined position thereon during less than one complete revolution. This continuously rotating drum supports a number of peripherally inter-spaced bottom folding means each comprising a number of movable folding members adapted completely or partially to perform the foldings of the blank required for forming the bottom portion of the paper canister, while said blanks are still at hand at the circumference of the continuously rotating drum. In this machine the canisters are completely produced without any interruption whatever in the advancing movement of the paper through the machine from the moment at which the paper web from a storage roll is introduced into the machine and until the ready-made canisters are delivered or fed out therefrom. All of the folding operations for forming the canister cross-bottoms are effected during the feeding movement of the separate paper blanks at the circumference of the drum carrying the folding members, which perform their action on the blanks while taking part in the rotating motion of the drum. Due to the fact that the acting folding members follow the continuous movement of the paper blanks while performing their work, they cannot cause any interruption or disturbance of the advancing movement of the paper through the machine, and they will have entirely sufficient time for performing all, or substantially all, of the folds required, so that the folding operations may be performed with a great accuracy without any risk for damaging the paper, and thereby the machine will be reliable with regard to its function. This result is also due to the construction of the machine as a whole, as all of its working members will function substantially with the same precision and reliability at the comparatively high running speed of the machine. The invention involves still another great advantage therein that it will be possible according to the same to build the machine in a manner so that it may very easily be adjusted for the production of paper canisters of different sizes in respect both of length and width.

An embodiment of the invention is illustrated in the accompanying drawings, wherein:—

Fig. 1 is a diagram for the purpose of illustrating the path of travel of the cut and shaped paper blanks through the machine.

Fig. 2 is an elevation of the machine, and

Fig. 3 is a plan view thereof, unessential parts of the driving transmissions being omitted for the sake of simplicity and clearness.

Fig. 4 is a detail section at the line IV—IV in Fig. 2.

Fig. 5 is an elevation of the means adapted for performing a thumb notch in the paper, and

Fig. 6 is a front view of the same means.

Fig. 7 is an elevation of the thumb notch means together with the adjacent feeding means for the paper, and

Fig. 8 is a section at the line VIII—VIII in Fig. 7.

Fig. 9 is an elevation of the cutting means and the adjusting means therefore, and

Fig. 9^a is a plan view of a detail thereof, whereas,

Fig. 10 shows a front view of the same means, and

Fig. 11 is a section at the line XI—XI in Fig. 10.

Fig. 12 is an elevation of the bottom folding drum, two discs of which being partially

broken away for disclosing the interior folding members.

Fig. 13 shows a rear elevation of the bottom folding drum partly in section.

Fig. 14 shows an elevation, partly in section, of the means for feeding and adjustment of the cut blanks against the circumference of the bottom folding drum, and

Fig. 15 is a section at the line XV—XV in Fig. 14.

Fig. 16 shows a portion of two belts provided with transverse ribs for clamping the paper blanks to the bottom folding drum at the movement together with the latter.

Fig. 17 is an elevation of the means for completing the bottom folding of the blanks at their movement together with the drum, and

Fig. 18 is a rear elevation of the same means.

Fig. 19 is a plan view of a portion of the paper web, and

Fig. 20 is a cross section thereof after it has been folded into a tubular shape.

Fig. 21 is a plan view of Fig. 20 and shows the tubular web after the thumb notch has been cut, and partially cut into separate blanks.

Fig. 22 shows such a blank and the rib clamping the same to the bottom folding drum, and

Figs. 23-26 show different phases of the bottom folding procedure,

Fig. 27 showing the completed cross-bottom bag or canister.

For the purpose of simplifying the description of the machine, it will be described in the following by reference to its manner of action without referring to the construction otherwise than the same is not directly understood from such manner of action. Thereby the different transmission means, most of which are omitted in the drawings for the sake of clearness, are not specifically described otherwise than needed for an explanation of the manner of action, as these means may easily be constructed in many different ways independently of the invention.

As stated above, the Fig. 1 shows diagrammatically the path of movement of the paper web in the machine, the Figs. 19-27 showing the operations needed for the production of the canisters. The roll of paper 1 is supported by a shaft 2, and the paper web 3 from the roll 1 runs over rollers 4, 5 and is pasted with glue or the like along a surface 6 (Fig. 19) for each of the canisters to be produced. Thereafter the paper web, folded into tubular shape as shown in Fig. 20, is provided with a thumb notch 7, and cut into separate blanks 8, as shown in Figs. 20 and 21, whereafter each blank 8 is brought into position beneath a clamping rib 9 (Fig. 22) and folded along the same as shown in Fig.

23, and then the blank is pasted with glue along the surfaces 10 (Fig. 24) and folded again as shown in Figs. 25-27. The severing of the different blanks is performed prior to their feeding, by means of a roller 11, on to the circumference of the bottom folding drum 12, and thereafter the blanks take part in the continuous movement of the said drum while performing the folding of the bottom, and until they arrive to pulleys 13 around which the belts 14 carrying the clamping ribs 9 are returned and convey the complete canisters to a conveyor belt 136 provided with claws 137, by means of which last mentioned belt the canisters are fed out from the machine.

In order to secure an even and smooth running of the paper web 3, it is acted upon by a friction roller 15 (Figs 2 and 3), and the resistance to the travel of the paper web offered by this roller may be controlled by means of a brake strap coacting with said roller and adjustable in respect of its tension by means of a screw or the like. From the friction roller 15 the paper web passes the guide rollers 4 and 5, of which the roller 4 is rockably mounted around the shaft of the roller 5 so that it may be raised by means of a handle lever 16 for facilitating the insertion of the paper web between the rollers when a fresh roll of paper is to be positioned in the machine. A glue roller 17 serves the purpose of applying the glue strip 6 (Fig. 19), such roller being mounted in a glue tray 18 supported by arms 19 so that it may be drawn back from the paper web. The upper ends of the arms 19 are connected by cross bars 20 on which the glue tray is mounted removably and displaceably in transverse direction, in order to make it possible to apply the glue strip 6 in its correct position according to the size of the canisters to be produced in each specific instance. The glue roller 17 is brought into rotation by means of a driving roller 21 connected therewith and mounted in contact with the roller 5.

From the roller 5 the paper web passes a shaping plate or guide 22 converging in the direction of travel of said web, and around such guide the paper web, in the direction of its length is folded into tubular shape, as stated above, a felt or other belt member 23 (Fig. 4) for this purpose being preferably arranged above the paper on the guide plate, such belt member by means of wires 24 and weights 25 being caused to sweep around the plate and to shape the paper web according to the surface of the same.

Subsequent to the shaping of the paper web as described above with regard to the plate 22, the said web at suitable intervals corresponding to the length of the canister blanks to be cut, is provided with the thumb notches 7 (Fig. 21) described above, such notches being performed by means of a knife

26 (Fig. 5-7) mounted on a shaft 27 adapted to be rotated one complete revolution for each of the canister blanks which passes the machine. The shaft 27 is mounted in a support 28 provided with bearing holes 29 for journals 30 (Fig. 8) by means of which it may be adjusted in vertical direction by the intermediary of an adjuster screw 31 (Fig. 7). The plate 22 is provided with a depression 32 (Fig. 7) within which the knife 26 moves when cutting the thumb notch in the paper. The tubular paper web shaped by the plate 22 passes from the latter between rollers 33, 34 serving the purpose of feeding the paper web forward through the machine. The lower feed roller 34, which is mounted on a shaft 35 in the machine framing, is subdivided into two separate discs mounted on the shaft and each provided with a rubber lining, or ring, 36, between which linings is loosely mounted a disc 37 also provided with a rubber lining and serving the purpose of compressing the glue seam 6 (Fig. 19). At its upper shaft 38, the feed roller 33 is journaled centrally in the bearing pins 30 for the support 28, and the said bearing pins 30 are supported by a bracket 39 pivotally mounted in the machine framing around bearing pins 40 and adapted to be raised by means of a raising cam 41 mounted in the framing and adapted to be turned by means of a handle 42 (Fig. 7). A screw 44 positioned in an ear 43 on the bracket 39 is also adapted, at the raising of the said bracket by means of the cam member 41, to carry with itself the support 28, and thereby the paper at the starting of the machine may easily be inserted between the feed rollers 33, 34.

The feed rollers 33, 34 are interconnected by means of a gear 45 (Fig. 8) and adapted to receive their rotating motion from the main driving shaft 46 (Figs. 2 and 3) of the machine by the intermediary of a speed regulating means adapted to adjust the speed of the feed rollers in conformity with the speed of the driving shaft and with the other operating means of the machine driven therefrom, so that all of the said means may be controlled according to the difference of length of the canisters to be produced. It will be understood, that in case the peripheral speed of the feed rollers is reduced or increased, and if thereby the speed of the other operating members of the machine is maintained unaltered, the length of the canisters produced may be reduced or increased, respectively. Hence, it will be possible to adjust the machine for the production of canisters of any desired length, naturally within certain limits. In the embodiment of invention shown in the drawings the means for adjustment of the speed is supposed to consist of two oppositely mounted conical belt pulleys 47, 48 and an axially displaceable belt 49 running over such pulleys (Fig. 2), but it

will be apparent to anyone skilled in the art that a plurality of other adjusting means may be used to the same effect.

The severing of the paper web into separate canister blanks is performed after said web has passed between the feed rollers, and by the intermediary of a knife 50 (Fig. 11) which, when performing the cut, passes into a slot 51 formed between guiding and counter pressure segments 52. Similar guiding rails 53 are mounted at opposite sides of the knife 50, and the latter, as well as the counter pressure segments, are supported by means of shafts 54, 55 interconnected by means of gears 54^a, 55^a positioned in mesh with one another and adapted to be rotated one complete revolution for each of the canisters to be produced (Fig. 10). The main driving shaft 46 (Figs. 3 and 9), which for instance is provided with a belt pulley 56 for application of the driving power to the machine from any suitable source of power, is also provided with two belt pulleys 57 coaxing with another pair of belt pulleys 58 (Figs. 2, 9, 14 and 15) by means of rubber belts 59 and a tensioning roller 60 the circumference of which is subdivided into a number of segments 61, 62, 63 and 64 having different radii. The paper will run freely between the belts 59 and the tensioning roller 60, in case the latter takes a position in which the segment 61 faces the paper, but when the segment 62 faces the paper it will be in contact therewith and permit a slipping movement although performing a tensioning action on the paper web between the feed rollers 33, 34 and the point of contact between the roller 60 and the discs 57, or rather the rubber belts 59 running over the latter. At the same moment in which the knife 50 takes a position for performing a cut, the segment 63 will grip the paper without any possibility for the latter to slide, and thereby a strong tensioning action is applied to the paper at the moment of the cut, whereafter the severed canister blank without any interruption of the continuously advancing movement of the paper through the machine may be fed along by means of the segment 64.

At the moment of the cut, the peripheral speed of the knife 50, or the guide rails 52, 53, shall be equal to the advance of the paper, and since the speed of the last mentioned advance is controlled according to the length of the canisters to be produced so that it consequently may be varied, suitable means are also provided for the variation and control of the peripheral speed of the knife at the moment of cutting. In the embodiment of invention shown in the drawing this last-mentioned control, or adjustment, is supposed to be effected by means of a screw 65 (Fig. 9) mounted in an ear 66 on the machine framing and penetrating a nut 67 on a lever 68 pivoted on a pin 69 extending from

the said framing. The lever 68 is provided with a member 71 pivotally mounted on a pin 70 and shaped both into a toothed gear 72 (Fig. 10) meshing with a continuously rotating driving pinion (not shown), and into a slide groove 73 (Fig. 9^a) adapted for coaction with a slide rod 74 connected with a disc 75 on the shaft 54 by means of a driving pin. It will be seen from the drawing that the centre distance between the pin 70 and the shaft 54 may be varied by adjustment of the screw 65, and that the shaft 54 will thereby be given an uneven speed which thus may be controlled by means of the screw 65 to a value desired at the moment of action of the knife 50.

Supported by the upper part of the belts 59 the severed canister blank proceeds in its travel towards the roller 11, while kept against said belts by means of discs 76 (Figs. 2 and 14), until it approaches an abutment 77 on the roller 11, and thereby the belts 59 run with a little greater speed than the peripheral speed of said roller, which has an even and continuous rotation in the direction of the arrow in Fig. 14. When the canister blank has arrived to the abutment 77, so that its speed is controlled by the latter, it will slide between the belts 59 and the discs 76. At both sides of the discs 58, which are loosely mounted on the shaft 58^a (Fig. 15), the same driven shaft 58^a carries pulleys 78 connected by means of belts 80 with the pulleys 79. The said pulleys 78 and 79 are oval in such a manner that the belts 80 will alternately be moved towards and from the roller 11, against which the canister blank, during its movement together with said roller, is kept pressed by means of ribs 81. Interiorly within the drum-shaped roller 11, clamping arms 83 are mounted on shafts 82 and acted upon by springs 84, such arms being controlled by a cam member 86 affixed to the shaft 85 for the roller 11, and the arms contact with such cam member at their inner ends by the intermediary of rollers 87. As will be seen from Fig. 14, the two clamping arms are positioned diametrically opposite each other, but it is to be understood that this positioning is a preferable embodiment only, and the roller may be provided with one single clamping arm, or more than two such ones positioned equally distributed on the circumference, a variation of this kind depending upon whether the roller is intended for each complete revolution to convey one single canister blank or more of them towards the bottom folding drum 12. In the embodiment shown in the drawing it will easily be understood that the roller 11 is adapted for each revolution to convey two canister blanks to the bottom folding drum 12.

When the canister blank travelling on the belts 59 towards the roller 11 approaches the

corresponding abutment 77, the semi-circular flap 88 (Fig. 22) on the canister blank formed due to the application of the thumb notch 7 therein will pass beneath the outer end or point 90 of the corresponding clamping arm 83, which then extends into a recess 89 in the circumference of the roller, and thereafter the said arm, when acted upon by the cam 86, will be rocked and performs a folding of the canister flap through the recess 89 in the roller, so that the side portions of the tubular canister blank, at the end of the same provided with the flap, which side portions are intended to form the bottom of the completed canister, are separated in a sufficient degree for permitting a hook 90^a provided on the bottom folding drum 12, when the canister blank approaches the drum 12, to take a grip on the front end of that side portion of the canister blank facing the drum 12 only, such blank at its front end being provided with the flap 88 at that side portion of the same facing upwardly during the travel towards the roller.

At its ends the roller 11 is provided with belt races 91 (Fig. 15) adapted for the belts 14 connected with the clamping ribs 9 (Fig. 16). As will be understood from Fig. 2, the belts pass beneath the roller 11 and from there upwardly around belt races 92 on the bottom folding drum 12, whereafter the belts pass around guide pulleys 13, and thence around other guide pulleys 93, 94, 95 back to the roller 11. At the passage over the roller 11, the ribs 9 will be introduced into recesses 96 in said roller (Fig. 14). When the hook 90^a has lost its grip on the canister blank in the manner described above, the belts 80 will contact with the roller 11 and keep the canister blank stretched taut, until the corresponding transverse clamping rib leaves its recess 96 and enters a recess 97 at the circumference of the drum 12 thereby pressing the canister blank beneath itself. Hence, the canister blank in this manner will be clamped to the circumference of the drum 12 by means of the transverse rib during the whole progress of its movement together with said drum, or during the period at which the bottom folding is performed.

The drum 12 (Figs. 12 and 13) consists of two discs 98 and 99 the circumferences of which form the belt races 92. These races are preferably confined outwardly by flanges 100 provided with recesses positioned in alignment with the recesses 97 and adapted for accommodation of rollers or the like provided at the ends of the transverse ribs 9 (Fig. 16). A series of similar means for performing the substantial operations of the bottom folding procedure is mounted between the discs 98, 99, and in the embodiment shown the drum includes eight such folding means distributed on the circumference, one of them being shown in Fig. 12 at the place, at which the

discs 99 and 108 are partially broken away. In the embodiment shown it will thus be understood that eight canister blanks are under treatment in the drum for each complete revolution of the same, and it will be apparent that one of the hooks 90^a described above belongs to each of the eight folding means. Besides thereof the circumference of the drum is also provided with a recess 97 for each of the said folding means and adapted to accommodate a transverse rib 9 for clamping the canister blank operated upon by the corresponding folding means. Each of the recesses 97 is positioned in a separate intermediate piece 101 affixed between the discs 98, 99, a rubber strap 102 being countersunk in each of said intermediate pieces. Each of the hooks 90^a is mounted in a cross piece 103, and is tiltable by means of a shaft 104 extending through a slot 105 in the disc plate 99 and provided with an arm 106 at the exterior of said plate. The cross pieces 103 connect discs 107, 108 affixed to sleeves 109, 110 rotatably mounted on the fixed drum shaft 111, the two outer discs 98, 99 being rotatably mounted on said sleeves. The rotational movement is transmitted to the drum by the intermediary of a toothed gear 113 connected with the sleeve 110.

The hook 90^a having been rocked so as to perform a grip on the canister blank, and this latter having been pressed against the circumference of the drum 12 beneath the rib 9 entering the recess 97, the folding of the canister blank is thereafter performed along the said rib into the shape shown in Fig. 23. This folding is performed by means of a hoop member 115 which at the continuous rotation of the drum, (when the recess 97 moves from the entering position *a* of the rib 9 (Fig. 12) through the positions *b*, *c* and *d* to the position *e*), moves from a position entirely within the drum under the canister flap 88 and upwardly over the rib 9, rearwardly in the direction of rotation, and thence down against the cross piece 101, so that the free end 116 of the hoop member 115 in this position *e* will press the canister flap 88 against the said cross piece 101. During this procedure the glue strips 10 (Fig. 24) are applied, in that a suitable glue from a glue tray 117 (Fig. 2) by means of a roller 118 is transferred to a segment 120 on a roller 119 and from there to the canister blank passing by. Hereafter the hoop member 115 is returned to its position within the drum 12, and when the hook 90 relieves its grip on the canister blank, a folding knife 120 presses against said blank in opposition to the rubber strap 102 (Fig. 17) for initiating the second folding operation of the canister blank into the shape indicated in Fig. 25 by the impression of a folding line 121. This last mentioned folding operation is completed by means of folding plates 122 (Figs. 12, 13 and 17) carried by the drum 12, such plates for the purpose of performing the folding move upwardly in an arch-shaped path, rearwardly in the direction of rotation, and fold down the portion of the canister blank having the reference 123 in Fig. 25 around the impression line made by the knife 120, as will be understood from Fig. 26. Simultaneously as the folding plates 122 perform the second folding operation, pins 124 (Figs. 12, 13 and 17) are moved forwardly through bores 125 in the cross piece 101, and a rib 126 touches the drum 12 whereby the flap 88 of the canister blank is raised to such an extent that arms 127 (Fig. 17) are permitted to enter beneath it for performing the last folding operation around the free end edges 128 (Fig. 26) of the folding plates 122. The arms 127 are carried by chains 129 (Figs. 2, 17 and 18) turning around wheels 130, 131 and driven by means of sprocket wheels 132 (Fig. 17) meshing therein at a speed which is somewhat higher than the peripheral speed of the drum 12. As will be seen from Figs. 2 and 17, the chains 129 run partially around the circumference of the drum 12, the knives 120 and the ribs 126 being mounted on the same shaft 133 on which the wheels 130 are loosely mounted. It is evident, that the number of knives 120 and ribs 126 on the shaft 133, and the rotational speed of the latter, shall be chosen in such a manner that the correct coaction between the folding means on the drum 12 is secured. It is also evident, that the chains 129 are to be provided with arms 127 in suitable positions for a correct coaction with the folding means on the drum 12. In each of such positions the chains also carry a slot roller 134 and a rubber roller 135, of which the slot roller 134 presses down the folded flaps of the canister blank simultaneously with the return movement of the folding plates 122, whereas the succeeding rubber roller 135 performs a compaction of the fold and the glue seams of the entire canister cross-bottom.

The canister is now complete, and it has, for instance, the shape indicated in Fig. 27, and it follows the transverse rib 9 around the roller or discs 13. The belt 136 (Fig. 2) provided with the gripping claws 137 passes over pulleys 138 and 139. The gripping claws 137, which are not shown in detail, are spring actuated and adapted to open against the spring actuation at the passage of the discs 138, 139. The finished canister follows the transverse rib or bar 9 downwards when the latter passes around the discs 13 and then parallel to and in the same direction as the upper part of the belt 136. One of the gripping claws 137 grips the canister when the latter passes down beneath the discs 13 and draws the same away from the transverse rib 9. This is due to the fact that the belt 136, the upper part of which extends directly

beneath the belts 14 on their way from the discs 13 to the discs 93, runs with a somewhat greater speed than the belts 14. Hence, the complete canister bags are fed out from the machine between the disc 139 and a roller 140.

The clamping and folding means 90^a, 115, 122 and 124 mounted on the folding drum and acting upon the canister blank, while the latter takes part in the continuous rotation of the drum, may naturally be arranged in different ways for the purpose of receiving the working movements required, and therefore the invention is not limited to the specific construction shown for the purpose of explanation in the annexed drawings. This construction, specifically shown in Figs. 12 and 13, is therefore to be considered as representing a suitable embodiment of the invention especially adapted for permitting a simple adjustment of the machine according to canisters of different size.

The distance between the hooks 90^a and the corresponding recesses or grooves 97 in which the canister blanks are clamped by means of the ribs 9 may be adjusted according to the size of the canister to be produced, by rotation of the discs 98, 99 in relation to the discs 107, 108. This adjustment, or rotation, is performed by means of a handle lever 141 rotatably mounted around a pin 142 on the disc 99 and connected with an arm 143 positioned at the inner side of said disc and provided with a pin 144 inserted in a sliding block 145 slidably mounted in a guide 146 on the disc 108. The lever 141 is lockable in the adjusted position by means of a hand wheel 147, and besides it is provided with an index pointer 148 movable over a scale on the disc 108 for facilitating an adjustment of the machine according to the desired size of the canisters to be produced. In this connection it is to be noted that the recesses 96 in the roller 11 and adapted for accommodating the ribs 9 are of a sufficient width for permitting the displacement of said ribs in relation to the roller caused by the adjustment of the discs 98, 99 in relation to the discs 107, 108. It is to be noted that the cross pieces 103 interconnecting the discs 107, 108 and supporting the hooks 90^a will always touch the roller 11 at the same distinct points. The hooks 90^a are spring-actuated and caused to open and to close at their correct positions in that the arms 106 are provided with pins or rollers 149 interposed in guides 150, 151 (Fig. 2) on the machine framing. The guide 150 is of such a shape that the hook 90^a is opened in opposition to the spring-actuation when the corresponding roller 149 passes a certain portion of the guide moving upwardly from below, and thereafter the hook begins to close when the roller passes further upwardly through the guide. The guide 151 is of such a shape that the hook

90^a opens when the roller 149 passes downwardly from an upper position through the guide for a certain distance, and thereafter it is kept open when the roller continues still another distance downwardly through the guide.

The movement to all of the folding members 115, 122 supported by the drum 12 is transmitted from three cam groove discs 152, 153 and 154 affixed to the stationary drum shaft 111. For each of the eight folding members the cam groove disc 152 by means of a roller 156 coacts with a lever 155. The lever 155 is mounted on a hub 157 supported by a shaft 158 extending between the discs 98, 99 and carried by the latter. In the same manner the cam groove disc 153 for each of the folding members by means of a roller 160 coacts with a lever 159, and said lever is also affixed to a hub 161 mounted on the shaft 158. Finally, the cam groove disc 154 is also in mesh, by means of a roller 163, with a lever 162 for each of the folding means mounted on the drum, and this lever 162 is mounted on a shaft 164 supported by the discs 98, 99. By means of a link 165 the lever 162 is connected with two arms 167 affixed to a common hub 166 mounted on the shaft 158, such arms supporting the folding plates 122. A toothed segment 168 is besides mounted on the shaft 158 such segment being positioned in mesh with a toothed segment 169 affixed to the disc 108. The segment 168 mounted on the shaft 158 is provided with an arm 170 which by means of a link 171 is connected with the link 165. This last mentioned link is connected with the lever 162 by means of a block 173 slidable in an arc-shaped slot therein and connected with the link 165 by means of a pivot 174. At the turning of the discs 98, 99 in relation to the discs 107, 108 by means of the handle lever 141 for the purpose of adjusting the machine according to the size of the canister bags to be produced, the toothed segment 168 is turned, and thereby the block 173 is slid in the slot 172, so that the rocking stroke of the arms 167 carrying the folding plates 122 is varied. The said folding plates 122 are turnably mounted around pins 175 on the ends of the arms 167, and they are connected with each other and with an arm 176 pivotally connected with a block displaceably mounted in an arc-shaped guide 177 pivotally supported by a shaft 178 in ears 179 on the cross piece 101. By means of a link 180 the guide 177 is connected with the lever 159. When the roller 160 mounted on said lever passes the outward bend 181 of the cam groove in the disc 153, the corresponding folding plates 122 will consequently be swung out around the pivots 175, and this movement takes place simultaneously as the plates 122 are swung back in relation to the direction of rotation of the drum by means

of the arms 167, such arms receiving their movement from the cam disc 154 by means of the lever 162 and the link 165. By this combined swinging movement the plates 122, while performing their working stroke, are caused to move in such a path as will be sufficiently clearly understood from Fig. 17, which shows the different successive positions of the plates 122 corresponding to the positions of the folding devices. The hoop 115 is affixed to one arm of a bell crank lever 182, the other arm of which is shaped into a guide 183 for a block 184 pivotally connected with the other end of the lever 155 by means of a pin 185. The bell crank lever 182 is pivotally mounted on a pin 186 on the one arm of another bell crank lever 187 (Fig. 13) which is pivotally mounted on a pin 188 on the disc 98, the other arm of said last mentioned bell crank lever being shaped into a guide 189 adapted to slide on a block which by means of a pin 190 is pivotally connected with the disc 107. When turning the discs 98, 99 in relation to the discs 107, 108 for the purpose of adjustment, the journal pin 186 of the bell crank lever 182 supported by the bell crank lever 187 is turned, and thereby the inter-distance between the pins 185 and 186 is varied. Thereby the stroke of the arm 182 supporting the hoop 115 is also varied, such arm receiving its movement from the cam disc 152 by the intermediary of the lever 155. The pins 124 are positioned on a lever-shaped member 190^a mounted on a pin 191 at the one end of a lever 192 which is mounted on the same shaft 178 as the guiding arm 177 and connected at its other end with the disc 107 by means of a link 193. The member 190^a is actuated by a spring (not shown) tending to keep the pins 124 in a rearwardly displaced position. Besides, the member 190^a carries a roller 194 adapted for coaction with a fixed guide (not shown), by means of which it is pressed down, and the pins 124, in opposition to the spring-actuation, will thus be advanced at the correct moment. At the turning of the discs 98, 99 in relation to the discs 107, 108 for the purpose of adjustment, the pins 124 are advanced towards, or retracted from, the corresponding recess 97. At the adjustment of the machine for production of canister bags of a predetermined size, it will thus be understood from the foregoing that the hooks 90^a and the pins 124 will not only be adjusted to the desired distance from the recess 97, in which the canister blank is clamped by the rib 9 during the progress of the bottom folding operation, but the length of stroke of the folding members 115 and 122 is also adjusted accordingly, and thereby the entire adjustment of all of these parts may be performed solely by means of a simple manipulation of the handle lever 141 and the locking hand wheel 146. Hence, it will be possible

in a simple manner rapidly to change the machine from an adjustment adapted for production of canister bags of one specific size to another one, and the dimension of length of the canisters may be chosen at will quite independently of the other dimensions thereof by a simple control of the rotational speed of the feeding rollers 33, 34 (Figs. 2 and 7) advancing the continuous paper web from the storage roll 1 (Fig. 1), as described above. This means a result which especially in connection with the great working capacity of the machine simultaneously obtained is to be considered as a substantial step of progress in the art concerned.

As already stated above, while maintaining the principal idea of invention, and by taking resort to suitable modifications in respect of the construction of the folding members only, the machine may be adapted for production of canister bags the bottom portion of which is cross-folded in another manner than that specifically shown in the drawing, and for instance also of canister bags provided with infolded side portions. Therefore the invention is not limited to machines for producing canisters of any specific kind, as the type of the canisters may be modified in case the construction of the working members is modified accordingly, without departing from the principle of invention. In the detailed description above in respect of the modification chosen for an explanation of the invention, some modifications close at hand have already been hinted at. It is evident, however, that a plurality of other modifications may also be used, and as a further example of such modifications it is only to be mentioned that the severing device may instead consist of a cutting knife mounted in the shape of a guillotine, and that the clamping hooks at hand at different places in the machine may be substituted by pneumatic gripping members, the endless chains 129 (Fig. 17) being substitutable by suitable members or wheels rotating around shafts and adapted in succession to act upon the canister blanks, etc.

What I claim and desire to secure by Letters Patent is:—

1. In a rotating paper cross-bottom bag, or paper canister, machine, a continuously rotating drum, a plurality of bottom folding members mounted in a spaced relation at the circumference of said drum, means for actuation of such folding members at the rotation of the drum, feeding means for advancing canister blanks to said drum, and means adapted to coact with the drum for clamping the said blanks to the drum during the different folding operations, the folding members being adapted to act in succession, and the folding member performing the first phase of the bottom folding being adapted to coact

with a clamping rib for folding the canister blank along said rib.

2. In a rotating paper cross-bottom bag, or paper canister, machine, a continuously rotating drum, a plurality of bottom folding members mounted in a spaced relation at the circumference of said drum, means for actuation of such folding members at the rotation of the drum, continuously running belt means adapted for coaction with the drum and passing around a rotating roller positioned so as nearly to touch the drum, clamping ribs mounted on said belts and partaking in their movement, and means for feeding in the canister blanks between said drum and roller.

3. In a rotating paper cross-bottom bag, or paper canister, machine according to claim 2, the additional features that the roller is provided with outwardly facing recesses and interior clamping arms adapted for introduction of the forward end of the canister blanks in said recesses, and that the rotating drum is provided with gripping hooks adapted for gripping of the blank ends thus introduced.

4. In a rotating paper cross-bottom bag, or paper canister, machine, a continuously rotating drum, a plurality of bottom folding members mounted in a spaced relation at the circumference of said drum, means for actuation of the said folding members at the rotation of the drum, a roller positioned so as nearly to touch the drum, abutment means for the blank ends provided on said roller, conveyor belt means adapted for advancing canister blanks towards the roller between the same and the rotating drum, such conveyor belts being adapted to run with a little greater linear speed than the peripheral speed of rotation of the roller, so that the canister blanks are forced to slide when approaching the abutments, and clamping means provided on the drum and adapted for maintaining the blanks in their correct positions during the folding operations.

5. In a rotating paper cross-bottom bag, or paper canister, machine according to claim 4, the additional feature that the roller is adapted to coact with belt members mounted beneath said roller and running over oval pulleys so as alternately to be neared to and removed from the roller, means being provided for timing these transverse movements of the belt members so that the canister blanks are pressed towards the roller by the same immediately after that the forward end of the blanks has been affixed to the drum by means of the clamping members thereon.

6. In a rotating paper cross-bottom bag, or paper canister, machine according to claim 4, the additional feature of guide means mounted beneath the roller and adapted to support the canister blanks when slidingly transmitted from the said roller to the rotating drum.

7. In a rotating paper cross-bottom bag, or paper canister, machine, a continuously ro-

tating drum, a plurality of bottom folding members mounted in a spaced relation at the circumference of said drum, means for actuation of said folding members at the rotation of the drum, a rotating roller positioned so as nearly to touch the drum, means for feeding in the canister blanks between the said drum and roller, belt means running around said roller and provided at intervals with transverse clamping ribs adapted for coaction with corresponding recesses at the circumference of the drum for the purpose of clamping the canister blanks fed in to the circumference of the drum.

8. In a rotating paper cross-bottom bag, or paper canister, machine, a continuously rotating drum, a plurality of bottom folding members mounted in spaced relation at the circumference of said drum, means for actuation of said folding members at the rotation of the drum, a bag blank clamping means for each of the bottom folding members mounted in spaced relation at the circumference of the drum and in a similar relation to the corresponding bottom folding member, means for adjustment of the circumferential distance between the bottom folding members and the clamping means, and means for feeding the bag blanks towards the circumference of the drum in a position to be acted upon by the folding members when kept affixed to the drum by the clamping means.

9. In a rotating paper cross-bottom bag, or paper canister, machine, a continuously rotating drum, a plurality of bottom folding members mounted in a spaced relation at the circumference of said drum, means for actuation of said folding members at the rotation of the drum, belt races at the ends of the drum, cross pieces positioned between said belt races and supported by end discs, means for rotational adjustment of said end discs and the cross pieces in relation to the folding members on the drum, recesses in the said cross pieces, belt means adapted for coaction at the circumference with the drum, and transverse clamping ribs mounted on said belt means and adapted for coaction with the aforesaid recesses for clamping the canister blanks to the drum in a fixed relation to the folding members thereon.

10. In a rotating paper cross-bottom bag, or paper canister, machine according to claim 9, the additional feature that the drum is provided with discs interconnected by means of cross pieces serving as supports for clamping hooks for the canister blanks, such discs and clamping hooks being rotationally adjustable in relation to the recessed cross pieces coacting with the clamping ribs.

11. In a rotating paper cross-bottom bag, or paper canister, machine, a continuously rotating drum, a plurality of bottom folding devices mounted in a spaced relation at the

circumference of said drum, each of said devices comprising a tiltable hoop member adapted for performing the initial bottom fold and folding plates adapted for performing the subsequent folding operations, means for actuation of said folding members at the rotation of the drum, feeding means for advancing canister blanks to said drum, and means mounted on the drum and adapted for clamping the advanced canister blanks to the drum in a predetermined position in relation to the aforesaid folding devices.

12. In a rotating paper cross-bottom bag, or paper canister, machine according to claim 11, the additional feature that the clamping means for positioning the canister blanks on the drum are rotationally adjustable around the axis of the drum in relation to the bottom folding devices mounted thereon.

13. In a rotating paper cross-bottom bag, or paper canister, machine, a continuously rotating drum, a plurality of bottom folding members mounted in a spaced relation at the circumference of the drum, means for actuation of said folding members at the rotation of said drum, end discs supported by the drum shaft, cross pieces mounted between said discs and provided with recesses for coaction with clamping means for positioning of the canister blanks in relation to the folding members, means for rotational adjustment of said discs and cross pieces in relation to said folding members, holes in said cross pieces, and pins slidably mounted in said holes and adapted for raising of the blanks at the last folding operation.

14. In a rotating paper cross-bottom bag, or paper canister, machine according to claim 13, additional means for adjustment of the distance between the pins and the recesses in the cross pieces.

15. In a rotating paper cross-bottom bag, or paper canister, machine according to claim 13, the additional feature that the pins are mounted on lever-shaped members adapted to coact with non-rotating cam members for control of the movements of the lifting pins.

16. In a rotating paper cross-bottom bag, or paper canister, machine, a continuously rotating drum, a plurality of bottom folding members mounted in a spaced relation at the circumference of the drum, means for actuation of said folding members at the rotation of the drum, for each of the folding members an arm mounted for rotation together with the drum, a spring actuated hook member positioned on each arm and adapted for clamping a canister blank to the drum in a predetermined position in relation to the corresponding folding member, spring means adapted for actuation of the clamping hooks, non-rotating cam members adapted for coaction with the arms carrying the hooks for the purpose of rocking the same in counteraction of the spring means, means for adjustment

of the circumferential distance between the clamping hooks and the corresponding folding members, and means for feeding the canister blanks towards the circumference of the drum in a position to be acted upon by the folding members when kept positioned by the hook members.

17. In a rotating paper cross-bottom bag, or paper canister, machine, a continuously rotating drum supporting a plurality of bottom folding devices mounted in a spaced relation at the circumference of said drum, each of said folding devices comprising a tiltable hoop member adapted for performing the initial bottom fold, means for rocking said hoop member at predetermined intervals during the rotation of the drum, folding plates adapted for performing the subsequent foldings and mounted on tiltable arms, links connected with said arms and adapted to coact with cam means for the actuation of the folding plates, for each folding device a clamping means mounted on the rotating drum in a predetermined relation to the corresponding folding device and adapted for positioning and clamping the canister blanks to the drum, means for actuation of said clamping means in a predetermined relation to the actuation of the corresponding folding device, means for adjustment of the circumferential distance between the folding devices and the corresponding clamping means, and means for feeding the canister blanks towards the circumference of the drum in a position to be acted upon by the folding devices when kept positioned by the clamping means.

18. In a rotating paper cross-bottom bag, or paper canister, machine according to claim 17, the additional feature that the folding plates are connected with a sliding block slidably mounted in a guide mounted rockably on a cross piece and connected with a lever adapted to coact with a cam disc mounted on the stationary drum shaft for the purpose of actuation of the folding plates.

19. In a rotating paper cross-bottom bag, or paper canister, machine according to claim 17, additional means for adjustment of the working stroke of the actuating means for the folding plates.

20. In a rotating paper cross-bottom bag, or paper canister, machine according to claim 17, the addition of a bell crank lever for each folding hoop, one arm of said lever supporting the hoop, the other being connected with another bell crank lever mounted for coaction with cam means on the stationary drum shaft for the purpose of actuation of the folding hoop.

21. In a rotating paper cross-bottom bag, or paper canister, machine, a continuously rotating drum, a plurality of bottom folding devices mounted in spaced relation at the circumference of said drum, a corresponding

plurality of canister blank clamping members mounted in a circumferentially spaced relation to each of the folding devices, means for actuation of the folding devices and the clamping members at predetermined intervals in a timed relation to each other, sleeves rotatably mounted at the ends of the stationary drum shaft, end discs rotatably mounted on said sleeves and adapted to support the bottom folding devices, inner discs connected with the sleeves and adapted for supporting the clamping members, means for rotational adjustment of the inner discs in relation to the end discs, and means for feeding the canister blanks towards the circumference of the drum in a position to be acted upon by the folding devices when kept positioned in relation thereto by the clamping members.

22. In a rotating paper cross-bottom bag, or paper canister, machine according to claim 21, the additional feature of means affixed to the sleeves and adapted for transmission of the rotational movement to the drum as a whole.

23. In a rotating paper cross-bottom bag, or paper canister, machine according to claim 21, the additional feature of a handle lever mounted on one of the end discs and connected with a sliding block movable in a corresponding slot in the adjacent inner disc for the purpose of performing a rotational adjustment of the discs in relation to each other, a locking means being provided for locking the handle lever after adjustment.

24. In a rotating paper cross-bottom bag, or paper canister, machine, a continuously rotating drum, a plurality of bottom folding devices mounted in a spaced relation at the circumference of the drum, means for actuation of said folding devices at the rotation of the drum, a corresponding plurality of canister blank clamping means mounted in a similar circumferentially spaced relation on the drum and in spaced relation to the corresponding bottom folding devices, means for actuation of said clamping means in a timed relation to the actuation of said bottom folding devices, means for adjustment of the circumferential distance between the bottom folding devices and the corresponding clamping means, a rotating roller positioned so as nearly to touch the rotating drum, means for feeding in the canister blanks between said drum and roller in a position so as to be caught by the clamping means on the drum, belt means running around said roller and provided at intervals with transverse clamping ribs adapted for coaction with corresponding recesses at the circumference of the drum for initial clamping of the canister blanks thereto, the roller being provided with recesses for accommodating the different positions of the transverse ribs caused by an adjustment of the distance between the bot-

tom folding devices and the corresponding clamping means mounted on the drum.

25. In a rotating paper cross-bottom bag, or paper canister, machine, a continuously rotating drum, a plurality of bottom folding devices mounted in a spaced relation at the circumference of the drum, means for actuation of said folding devices, a corresponding plurality of clamping means mounted in a similar spaced relation at the circumference of the drum and in a spaced relation to the corresponding folding devices, means for actuation of said clamping means in a timed relation to the actuation of said folding devices, a rotating roller positioned adjacent to the circumference of the drum, conveyor belt means running around said roller and guided in contact with the circumference of the drum, and clamping means on said conveyor belts and adapted for coaction with corresponding clamping means at the circumference of the drum.

26. In a rotating paper cross-bottom bag, or paper canister, machine, a continuously rotating drum, a plurality of bottom folding devices mounted in a spaced relation at the circumference of the drum, a clamping means for each bottom folding device mounted on the drum in a spaced relation to the latter, means for actuation of said folding devices and clamping means in a timed relation to each other, a rotating roller positioned adjacent to the circumference of the drum, and clamping belt means running over said roller in contact with the circumference of the drum.

27. In a rotating paper cross-bottom bag, or paper canister, machine, a continuously rotating drum, a plurality of bottom folding devices mounted in a spaced relation at the circumference of the drum and each comprising a number of folding members adapted to act in succession, the members adapted for effecting the last fold consisting of arms mounted on chains running with a somewhat greater speed than the peripheral speed of the drum and turning around pulleys mounted on shafts provided with knives for performing a linear impression in the canister blank at the fold, means for actuation of the folding devices at the rotation of the drum carrying the same, a clamping means for each of the folding devices mounted on the drum in a spaced relation to the corresponding folding device, and means for actuation of the clamping means in timed relation to the actuation of the said folding device.

In testimony whereof I have signed my name to this specification.

HILDING WILLIAM BECKMAN.