March 29, 1932. A. G. ROSE 1,851,870

MACHINE FOR MAKING PACKAGES

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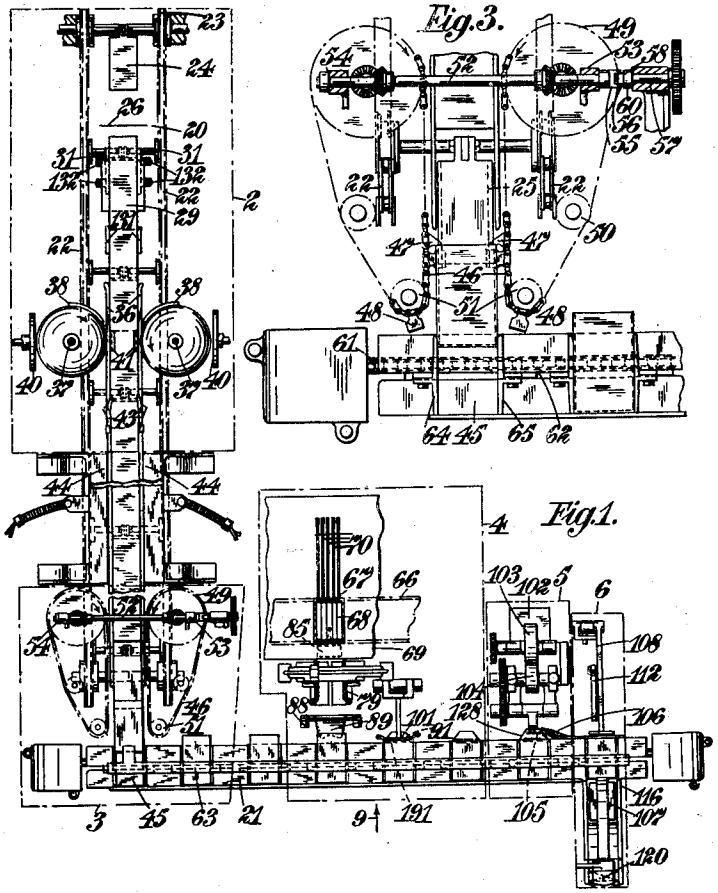

Fig. 1.



Fig. 3.

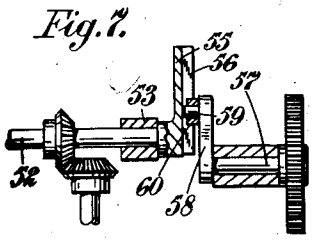

Fig. 7.

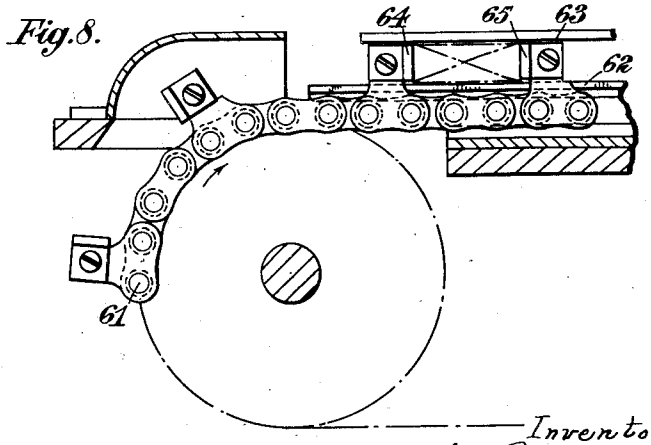

Fig. 8.

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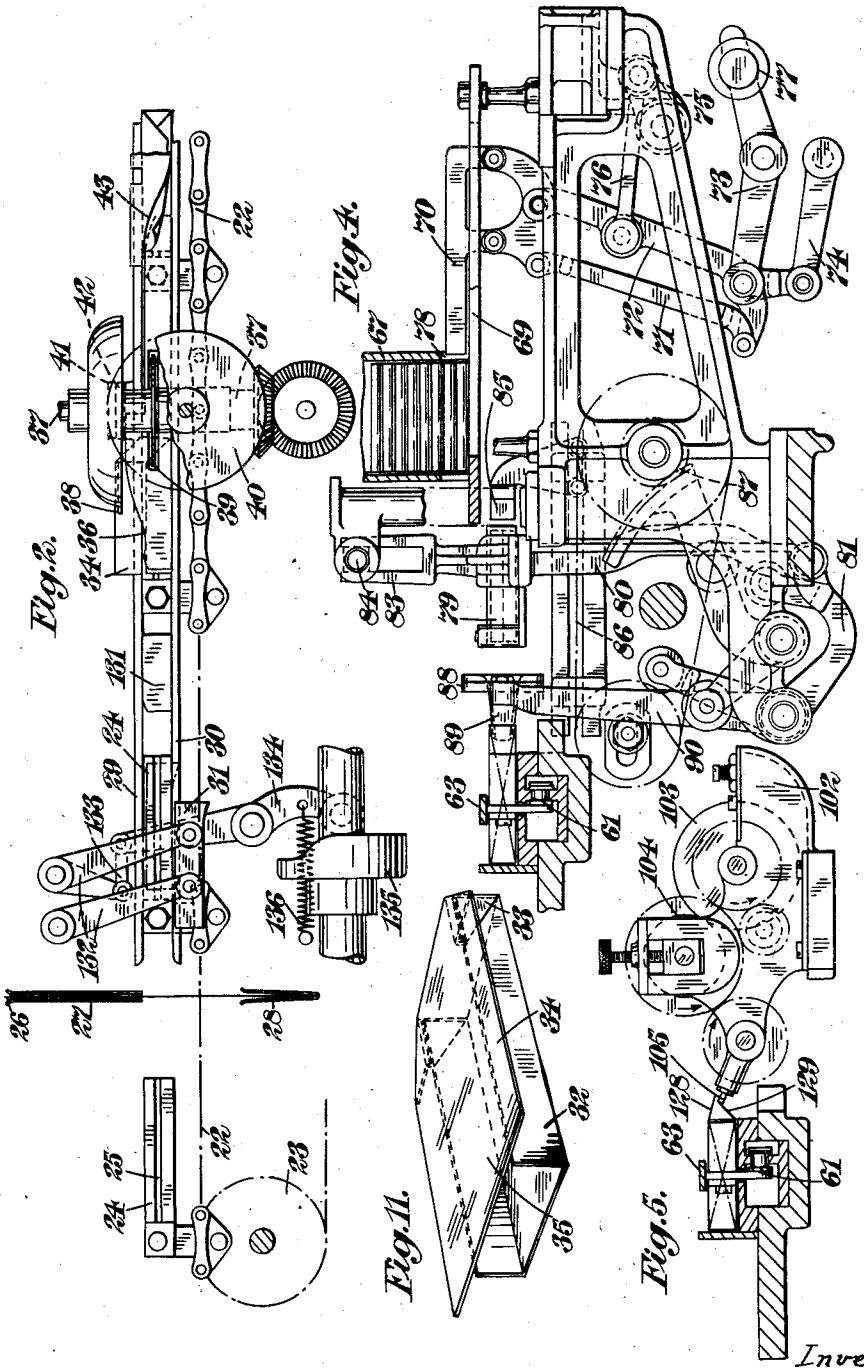

Fig. 2.

Fig. 4.

Fig. 11.

Fig. 5.

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Fig. 6.

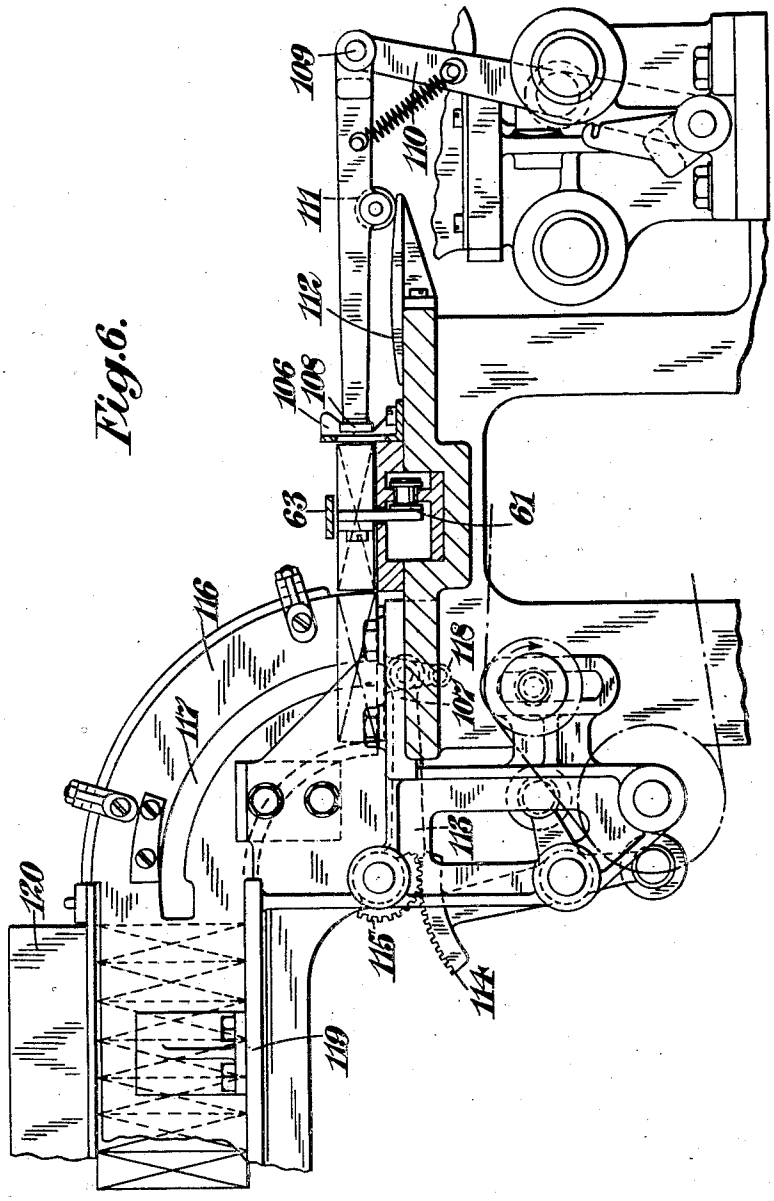


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Fig. 10.

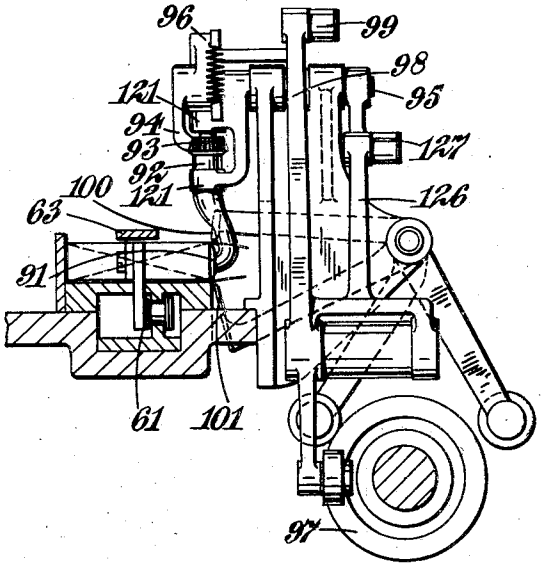
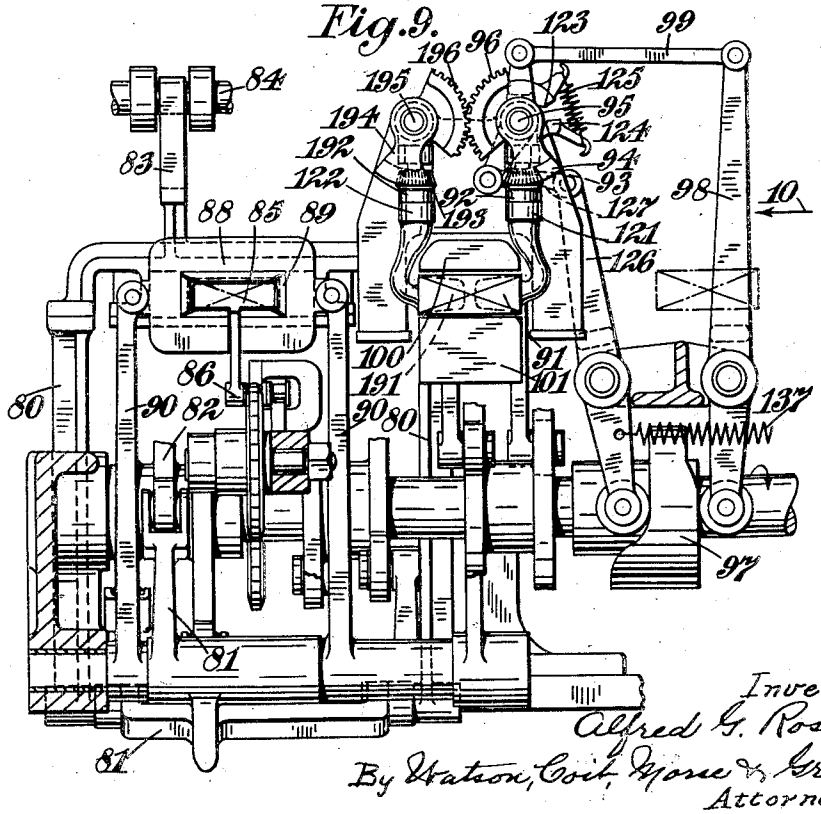



Fig. 9.

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Patented Mar. 29, 1932 1,851,870

# UNITED STATES PATENT OFFICE

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## MACHINE FOR MAKING PACKAGES

Application filed June 26, 1930, Serial No. 464,073, and in Great Britain July 13, 1929.

This invention is for improvements in or relating to machines for making packages, of the type in which a series of open-ended bags are formed from a strip of paper, which bags are subsequently filled with a material and their open ends subsequently folded to completely enclose the articles.

This invention has for one object to provide a simple straightforward machine of this type in which all operations performed upon the strip of paper and upon the bags formed from it are carried out by mechanism which is located in one horizontal plane so that all operations are clearly visible to the eye and all parts of the machine are readily accessible. Machines of the above type in which are effected all operations from the forming of the bags from a flat strip of paper down to the filling of the bags with a material (e. g. tobacco) and their final closure are known, and such machines have hitherto been extremely complicated and their parts inaccessible.

The present invention provides bag-making and filling machines having two conveyors on which the bags are formed and filled respectively and a transfer mechanism operable between the two, characterized in that the conveyors are of the endless chain type and that both conveyors and the transfer mechanism all operate in the same horizontal plane.

One construction according to this invention will now be described in detail by way of example with reference to the accompanying drawings, in which:—

Figure 1 is a plan view of a bag-forming and filling machine;

Figure 2 is a side elevation on an enlarged scale of the mechanism which lies within the area indicated by the numeral 2 in Figure 1;

Figure 3 is a plan view on an enlarged scale of the mechanism shown within the area numbered 3 in Figure 1;

Figure 4 is a side elevation on an enlarged scale of charging mechanism located within the area numbered 4 in Figure 1;

Figure 5 is a side elevation on an enlarged scale of the mechanism shown within the area numbered 5 in Figure 1;

Figure 6 is a side elevation on an enlarged scale of the mechanism shown within the area numbered 6 in Figure 1;

Figure 7 is an elevation of a portion of the mechanism shown in Figure 3;

Figure 8 is an elevation of a portion of a conveyor which is shown in Figures 1 and 3;

Figure 9 is a further enlarged view of certain of the mechanism shown within the area numbered 4 in Figure 1, looking in the direction of the arrow 9;

Figure 10 is an elevation of part of the mechanism shown in Figure 9 looking in the direction of the arrow 10;

Figure 11 is a perspective view of a partially formed bag.

Throughout this description like reference numerals indicate like parts.

Referring to Figures 1 and 2, the apparatus consists of two chain conveyors indicated generally by numbers 20 and 21. These conveyors are located in the same horizontal plane but at right angles to each other in the form of a letter L. During the traverse of the conveyor 20 a web of paper is folded into a series of open-ended bags which are then transferred to the conveyor 21 and during the traverse of the latter are filled with cigarettes and the open end of each bag is closed and sealed. Upon arriving at station 6 at the far end of the second conveyor, the closed bags are removed from this conveyor and are passed through drying apparatus in which the adhesive, by which the final folds of each bag are sealed, is dried.

The conveyor 20 consists of two endless chains 22 which are traversed over sprockets 23. These chains carry a series of formers 24 which in shape are rectangular, with grooves 25 along their longitudinal sides. During the traverse of each former along the upper lap of the conveyor 20 a strip of paper 26 is fed from a roll (not shown) between guides 27 and 28 directly in the path of the former. The strip is severed by any convenient cutting mechanism (not shown) from the roll and during the forward advance of the former is folded, by stationary ploughs

29 and 30 which are located respectively above and below the path of the conveyor into U-shaped formation on to the top and bottom surfaces of the former. Immediately afterwards, two ploughs 31 which are located one on each side of the conveyor operate to fold the bottom lateral side flaps 32 up on to the sides of the former. The ploughs 31 are mounted upon parallel links 132 which are oscillated by means of a cam 135, rocking lever 134, and connecting link 133. A roller upon the end of the lever 134 is maintained in contact with the face of the cam 135 by an extension spring 136. The ploughs 31 are by this mechanism moved forwards and upwards. The paper strip is subsequently engaged by stationary ploughs 131, 131, which form the narrow end tucks 33. It is important that the narrow end tucks should be formed subsequent to the folding of the bottom lateral side flaps otherwise if the end tucks were formed first their presence in the interior of the open ended bag would render it a matter of difficulty to insert the cigarettes without damage. Further forward advance of the partially formed bag brings the upper lateral side flaps 34, which up to this moment project in the same horizontal plane as the top surface 35 of the bag (with which they are contiguous) into contact with further stationary ploughs 36, 36, which operate to bend these lateral flaps up at right angles to the contiguous upper surface of the bag. After this operation gum is applied to the outer surfaces of the upper lateral side flaps and to the narrow end tucks by gumming mechanism as follows:—

Upon each side of the conveyor is a vertical continuously rotating shaft 37, each of which shafts carries two segmental members 38 and 39 which are spaced apart one above the other so that the members 38 will apply gum to the outer surfaces of the upper lateral side flaps 34 and the members 39 will apply gum to the outer surfaces of the narrow end tucks 33. Gum is loaded on to the operative surfaces of the segmental members 38 and 39 by gumming discs 40 which are rotatable in a horizontal plane and dip into gum baths (which are not shown). During the application of the gum to the lateral side flaps 34 these are supported by stationary abutments 41 each of which is provided with a groove 42 so placed that in the event of the wrapper feed failing, the segment 38 will move through this groove and gum will not be applied to the abutments 41. In a similar manner the lower gumming segments 39 may be arranged to coincide with the grooves 25 in the lateral sides of the formers. The primary purpose, however, of these grooves 25 is described below.

It is to be understood that those surfaces of the lateral side flaps 34, which during the gumming operation are the outer surfaces, become when the bag is completely folded, the inner surfaces. Upon moving beyond the gumming devices these lateral side flaps are engaged by further stationary ploughs 43, 43 and turned through 180° until they are folded down on to the outer surfaces of the previously folded bottom lateral side flaps 32. A bag at this stage of the bag-making operations is shown at the extreme right-hand end of Figure 2.

The mechanism above described is located within area 2 in Figure 1.

The wrapper has now been folded into an open ended bag around the former and further movement of the conveyor carries it between electric heaters 44, 44 which operate to dry the gum along the sides of the bag. From between the electric heaters the bag now passes into area 3 at which it is removed from the former about which it has been folded and transferred to one of a series of pockets (indicated generally by the number 45) upon the second conveyor 21, which is intermittently movable.

The transfer mechanism, which is shown in plan in Figure 3, comprises two endless chains 46, 46 which are located upon opposite sides respectively of the conveyor 20 with one lap of each chain parallel to the upper lap of this conveyor. The chains 46 are provided with stripping fingers 47 which are located at the same height as the grooves 25 in the formers 24 and with supporting plates 48 which are located with their upper surfaces on a level with the lower surface of the open-ended bags. The chains 46 are moved at a fluctuating linear speed around their path so that as each former 24 approaches the end of the upper lap of the conveyor 20, a pair of stripping fingers 47 is moved into engagement with the rear end of the bag on that former at a linear speed which is substantially the same as that of the conveyor and is then moved ahead of the conveyor at an increased linear speed to remove the bag from the former and to deposit it in a pocket 45 of the second conveyor 21. The support plates 48 support the bag during its transfer over the gap between the two conveyors and the inner ends of the stripping fingers move through the grooves 25, and thus do not foul the former. The mechanism by which the stripping fingers 47 are driven at a fluctuating linear speed is shown in Figure 7. The chains 46 are driven around sprockets 49, 50 and 51 from a horizontal shaft 52 through bevel gearing. The shaft 52, which is supported in bearings 53, 54 upon the frame of the machine, carries at one end a cross-head 55, in which is formed a slot 56. Parallel with, but offset from, the shaft 52 is a driving shaft 57 which carries a crank 58 having a crank-pin 59 upon which is pivoted a slipper 60, the latter engaging in the slot 56 of the

cross-head 55. Considering Figure 7 with the coupling in the position shown, it will be seen that the angular velocity of the shaft 52 will be considerably greater than that of the shaft 57. Conversely, when the shaft 57 has been rotated through 180° the angular velocity of the shaft 52 will be less than that of the shaft 57. The position of the crank and cross-head relative to the positions of the several formers 24 on the conveyor 20 is so arranged that as each former approaches the end of the upper lap of that conveyor an increase in velocity is imparted to the stripping fingers 47 and the open-ended bag removed from that former and deposited in a pocket 45 on the second conveyor.

The above mechanism is located within area 3 in Figure 1.

The second conveyor 21 comprises an endless chain 61 which is movable over a table 62 and under a guide-plate 63 (the latter is not shown in Figure 3 for the sake of clearness). The pockets 45 are each formed by two side plates 64 and 65 bolted to links on the chain 61.

A bag is placed in each pocket of the conveyor 21 by the transfer mechanism in area 3 in Figure 1 and the conveyor is moved intermittently until each bag in turn reaches charging mechanism located within station 4, by which mechanism ten cigarettes are removed from a hopper 66 and transferred into the open-ended bag. The base 67 of the hopper 66 is divided by four plates 68 into five vertical channels down which the cigarettes gravitate until they rest on a feed table 69. The width of each channel is just sufficient to accommodate one cigarette so that the cigarettes lie one above the other. British patent specification No. 276,141 describes a convenient arrangement of hopper and means whereby the cigarettes in the hopper may be so vibrated that they fall easily and without jamming into the five vertical channels in the base of the hopper. A pusher comprising five fingers 70 which are supported on parallel links 71 and 72, and 73 and 74, is actuated by a crank 75, connecting-rod 76, roller 77 and a cam, which is not shown, to move horizontally through slots 78 in the base of each vertical channel to discharge two cigarettes from each channel. At the termination of its forward motion, the pusher, while still maintaining its horizontal alignment, is lowered below the level of the feed table 69 so that cigarettes which are supported in the hopper above the batch just removed are lowered horizontally on to the feed table and no jamming occurs in the vertical channels. The pusher is now returned below the level of the feed table and then raised into the position shown in Figure 4 preparatory to making a further forward movement. The batch of cigarettes (ten in number) is discharged from the hopper into a channel-shaped receiver 79. The latter is supported upon pillars 80 which are pivoted to a bell-crank lever 81 which is oscillated by a cam 82. Above the receiver 79 is carried a forked member 83 which is engaged by a spindle 84 so that the receiver 79 is oscillated in a substantially vertical plane. The function of the receiver 79 is to lower the batch of cigarettes from the level of the feed table 69 to that of the open-ended bags upon the conveyor 21.

When the receiver 79 has been lowered to its lowest position, in which it is level with the open-ended bags on the conveyor 21, the batch of cigarettes in it is discharged by means of a pusher 85. This pusher consists of a rectangular plate, the size of which is sufficiently small to allow it to pass through the receiver 79. It is mounted on an endless chain 86 which is shown in the chain-dotted lines in Figure 4. This chain is reciprocated backwards and forwards by means of a rack 79 which is itself oscillated by a cam (not shown). The pusher 85 is moved forward through the receiver 79 (the base of which is slotted to permit of its passage) and through an oscillating gate 88 which carries a tapering mouth-piece 89. The batch of cigarettes is thus removed from the receiver and passed into the open-ended bag. The pusher 85 is then withdrawn. The gate 88 and the taper mouth-piece 89 are mounted upon a lever 90 which is oscillated by means of a cam (not shown) so that as each bag comes to a stop at the charging station, the taper mouth-piece is inserted into the open mouth of the bag to guide the cigarettes in correct alignment into the bag interior. The bag having been thus filled, the mouth-piece is withdrawn and the bag moved on one stage, at which the narrow end-tucks of the open mouth of the bag are closed down upon the ends of the cigarettes by mechanism described below.

Two swinging flap members 91 and 191 are mounted respectively upon vertical spindles 92 and 192 for oscillatory movement in a horizontal plane; the spindles being supported in carriers 121 and 122 which are themselves rotatably mounted upon horizontal shafts 95 and 195 for oscillation in a vertical plane. The spindles 92 and 192 carry bevel pinions 93 and 193 which are respectively engaged by bevel quadrants 94 and 194. The quadrant 94 is rotatably mounted upon the shaft 95 while the quadrant 194 is rotatably mounted upon the shaft 195. The bevel quadrant 94 is actuated by the right-hand face of the cam 97, through lever 98, and connecting rod 99. This movement is communicated to the bevel quadrant 194 by intermeshing quadrants 96 and 196. Integral with the bevel quadrant 94 is an abutment 123 while a second abutment 124 is integral with the carrier 121, these two abutments being linked together by an extension spring 125. The carrier 121 is actuated by means of the cam 97

through lever 126 and connecting rod 127 to swing in a vertical plane around the shaft 95; a pair of quadrants (which are not shown upon the drawings but are situated behind the quadrants 96 and 196) transmit this motion to the carrier 122 which is similarly caused to swing in a vertical plane around the shaft 195. A tension spring 137 retains a roller upon the lower end of the lever 126 in operative engagement with the left-hand face of the cam 97.

In Figure 9 the flap members 91 and 191 are shown in their closed positions upon the end of the bag. Partial rotation of the cam 97 rocks the lever 98, and the spring 125 and the mechanism associated with the lever causes the bevel quadrants 94 and 194 and bevel gears 93 and 193 to ease the flap members away from the end of the bag. At, or about, this period the lever 126 is rocked by the left-hand face of the cam 97 and the carriers 121 and 122 are thus swung in a vertical plane until they rise (carrying with them the flap members 91 and 191) into positions clear of the path of movement of the next following open-ended bag, the narrow end tucks of which have not yet been made. These flap members are now actuated to turn away from each other (that is to say the spindles 92 and 192 rotate in carriers 121 and 122) into their fully-opened positions.

The narrow end tucks upon the bag located at this station having been made and the flap members retired as above described, this bag is conveyed from the station and the next following bag moved up. The spindles 92 and 192 and carriers 121 and 122 are then caused to swing in a vertical plane to assume vertical positions and the flap members 91 and 191 are rotated in a horizontal plane to swing in towards each other to effect the folding of the narrow end tucks of this fresh bag.

Subsequent to the above operation tucking fingers 100 and 101 are moved towards each other to crease down the top and bottom flaps (128 and 129 respectively), the tucking fingers having been returned, these flaps spring open again and assume the position shown in Figure 10. The above mechanism is located within area 4 in Figure 1.

The bag is now transferred to the gumming station which is located in area 5 in Figure 1. At the gumming station is a gum bath 102 from which gum is transferred by rollers 103 and 104 to the peripheral edge of a continuously rotating gummer 105. The latter rotates in a clockwise direction (as shown in Figure 5) and thus applies gum to the under surface of the bottom flap 129 and also to the under surface of the upper flap 128. This operation having been completed, the bag is again advanced past two stationary ploughs 106 into area 6. During this latter movement these ploughs 106 operate firstly to fold up the bottom flap 129 on to the ends of the cigarettes and secondly to fold down the top flap 128 on to the surface of the previously folded bottom flap. The bag is thus completely closed.

The now closed and sealed bag is discharged from its pocket 45 in the conveyor 21 on to a horizontal platform 107 by means of a reciprocating pusher 108. The latter is pivoted at 109 to a lever 110 and carries midway along its length a roller 111 which moves over a curved guide platform 112. The lever 110 is oscillated by means of a cam and the roller 111 co-operates with the curved guide platform 112 to ensure that the plunger 108 moves in a substantially horizontal plane.

The platform 107 is carried upon the free end of a lever 113, the latter being intermittently swung through approximately 90° by rack 114, pinion 115 and a cam (not shown). The lever passes between guide plates 116 in one of which is formed a guide-track 117 which engages a pin 118 pendant from the free end of the lever 113 and thus ensures that the platform 107 as it approaches the end of its upward movement assumes a vertical position and moves approximately parallel to a vertical plane.

In this manner the filled and closed bags are lifted on to a platform 119 where they are stacked on their ends face to face with the recently sealed narrow end uppermost. As each bag is lifted on to this platform 119, those already on its are pushed forward and are thus moved along beneath an electric heater 120 where the adhesive upon the narrow end flaps is dried.

The above mechanism is located within area 6 in Figure 1.

I claim:—

1. In a bag-making and filling machine the combination of two endless chain type conveyors operable in the same horizontal plane, a series of formers on one conveyor, feeding mechanism for feeding paper blanks into the path of the formers, means for folding a paper blank about each former during its advance to form an open-ended bag, a series of pockets upon the other conveyor, transfer mechanism separate from the conveyors but operable in the same horizontal plane for transferring each open-ended bag from its former on the first-mentioned conveyor and depositing one in each pocket on the second-mentioned conveyor, charging apparatus operable to feed articles into the bags on the second conveyor, and folding mechanism for closing and sealing the open end of each bag.

2. In a bag-making and filling machine the combination of a first and second conveyor each of the endless-track type and operable in the same horizontal plane, means associated with the first conveyor for forming thereon a series of open-ended bags, transfer mechanism operable to transfer said bags to the second conveyor, a hopper for cigarettes

situated adjacent to the second conveyor, a series of vertical channels in the base of the hopper for the reception of cigarettes descending by gravitation, a pusher, means for advancing the pusher horizontally through the base of the channels to discharge a batch of cigarettes and subsequently to lower it in a horizontal position, and folding means for closing the end of the filled bags.

3. In a bag-forming and filling machine the combination of a conveyor of the endless-track type having one lap in a horizontal plane, means associated with said conveyor for forming thereon a series of open-ended bags, transfer mechanism comprising two endless bands provided with stripping fingers and located on opposite sides respectively of the conveyor with one lap of each chain parallel to the aforesaid lap of the conveyor, means operable about the period when a former carrying an open-ended bag approaches the end of said conveyor lap to move the stripping fingers into engagement with the rear end of the bag at a linear speed substantially the same as that of the conveyor and subsequently ahead of the conveyor at an increased linear speed, and a second conveyor operable in the same horizontal plane as the first and arranged to receive the bags which are stripped from the first conveyor by the transfer mechanism aforesaid.

4. In a bag-forming and filling machine the combination of an endless-track type conveyor having one lap in a horizontal plane, means associated with said conveyor for forming thereon a series of open-ended bags, transfer mechanism comprising two endless bands provided with stripping fingers and located on opposite sides respectively of the said conveyor with one lap in each chain parallel to the aforesaid lap of the conveyor, driving means therefor including two offset parallel rotatable shafts and a coupling between them comprising a crank and crank-pin upon one shaft and a cross-head upon the other, and a second conveyor operable in the same horizontal plane as the first conveyor.

5. In a bag-forming and filling machine having a conveyor for transporting a series of articles, transfer mechanism for removing the said articles therefrom comprising two endless chains one on each side of the conveyor, stripping fingers upon the chains, driving means for the transfer mechanism operable to move the stripping fingers into contact with the rear of the articles at substantially the same linear speed as the conveyor and subsequently ahead of the conveyor at an increased linear speed to remove the articles therefrom.

6 In a bag-forming and filling machine the combination of two endless chain type conveyors and transfer mechanism between them all operable in the same horizontal plane, means associated with the first conveyor for forming thereon a series of open-ended bags, charging apparatus for feeding articles into said bags while on the second conveyor, and means for closing the open mouth of each filled bag, comprising two swinging flap members which are rotatable about both vertical and horizontal axes for making the narrow end tucks on the open mouth, and stationary ploughs for folding the top and bottom flaps.

7. The combination with apparatus according to claim 6, of two tucking fingers located respectively above and below the path of the bags, and means to move said fingers towards each other to crease the top and bottom flaps prior to the operation of the stationary ploughs aforesaid.

8. In a bag-forming and filling machine, the combination of two endless chain type conveyors operable in the same horizontal plane, a series of formers on the first conveyor, feeding mechanism for feeding paper blanks into the path of the formers, stationary ploughs for folding said blanks into U-shape formation about the top and bottom of each former, gumming devices for applying gum to the upper lateral side flaps, means for folding down the lower and upper lateral side flaps to form open-ended bags, a drier for drying the aforesaid adhesive, transfer mechanism operable in the same horizontal plane as the two conveyors for removing the open-ended bags from the first conveyor and depositing them on the second conveyor, charging apparatus operable to feed articles to the bags on the second conveyor, means for closing the open mouth of each bag and sealing it with adhesive, and a drier for drying said adhesive.

9. In a bag forming and filling machine the combination of two endless chain type conveyors operable in the same horizontal plane, a series of formers on one conveyor, feeding mechanism for feeding paper blanks into the path of the formers, means for folding a paper blank about each former during its advance to form an open-ended bag, a series of pockets on the other conveyor, transfer mechanism for transferring the open-ended bags into said pockets a tapering mouth piece, means for reciprocating said mouth piece substantially horizontally to insert it into the open mouth of each bag upon the said other conveyor while at a filling station, and charging apparatus operable at the filling station to feed cigarettes through said mouth piece into the bag.

10. The combination recited in claim 1 in which the charging apparatus comprises a hopper for cigarettes, a series of vertical channels in the base of the hopper, a pusher having a series of fingers, one corresponding to each of said channels, and means for advancing said pusher horizontally and then

lowering it while maintaining the fingers in a horizontal position.

11. In a bag forming and filling machine the combination of an endless-track type conveyor, a series of formers upon the conveyor, feeding mechanism operable to feed paper blanks, one into the path of each former, stationary ploughs for holding said blanks into U-shape formation about the top and bottom of each former and for making the narrow end tucks, stationary devices for bending the upper lateral side flaps into vertical positions substantially at right angles to the contiguous upper surface of the partially formed bag, gumming segments located on each side of the conveyor and rotatable in horizontal planes above the plane of the conveyor for applying adhesive to the outer surfaces of the upper lateral side flaps when in the position aforesaid, a second conveyor operable in the same plane as the first conveyor, transfer mechanism for removing the open-ended bags from the first conveyor and placing them on the second conveyor, and means for filling said bags with cigarettes while on the second conveyor.

In testimony whereof I affix my signature.

ALFRED GERMAN ROSE.