

Dec. 28, 1954

R. E. DEUEL ET AL
PAPER STUFFING MACHINE

2,698,174

Filed Jan. 9, 1952

9 Sheets-Sheet 1

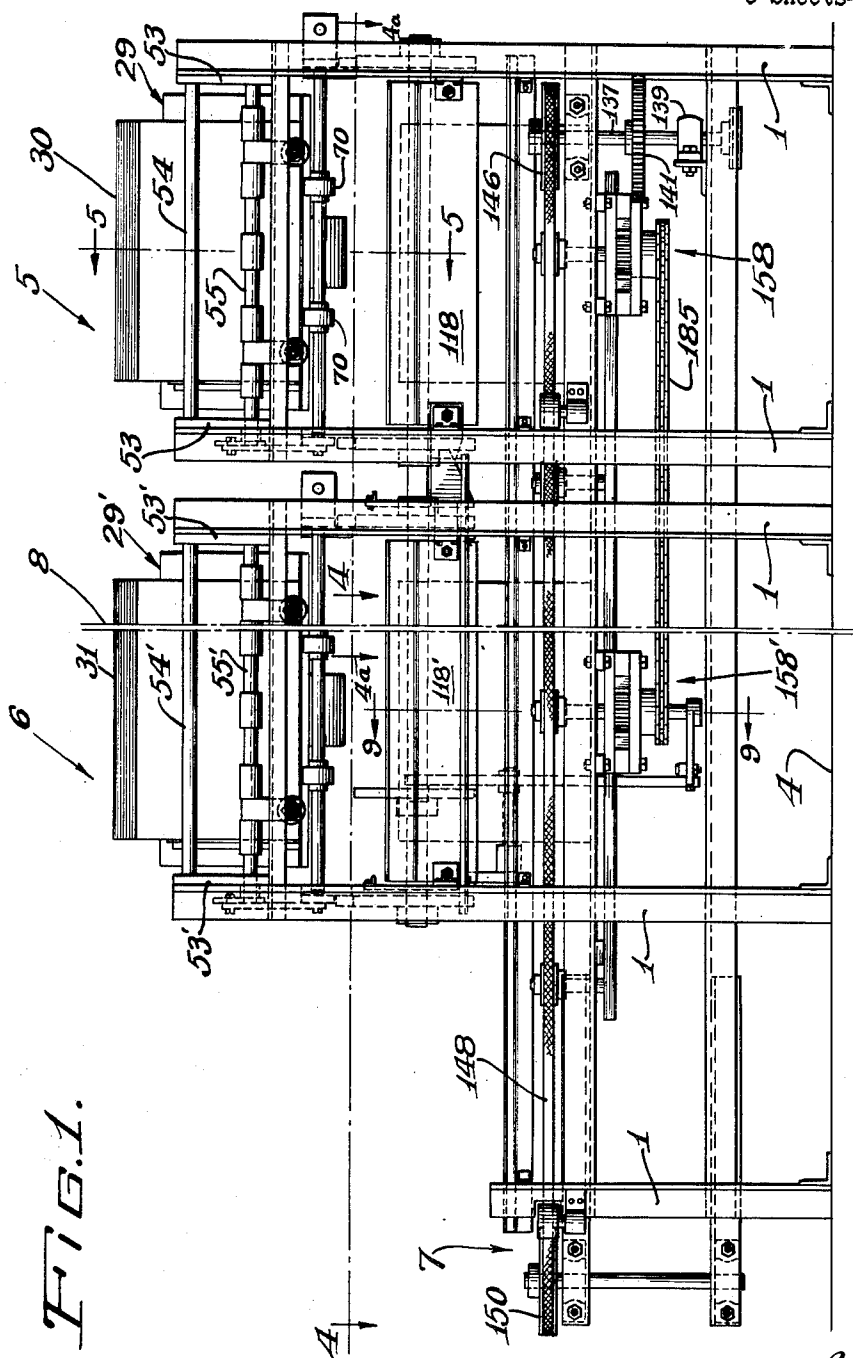


FIG. 1.

Inventors:
Robert E. Deuel
Jack R. Knoble
By Gary, Desmond & Parker Attys.

Dec. 28, 1954

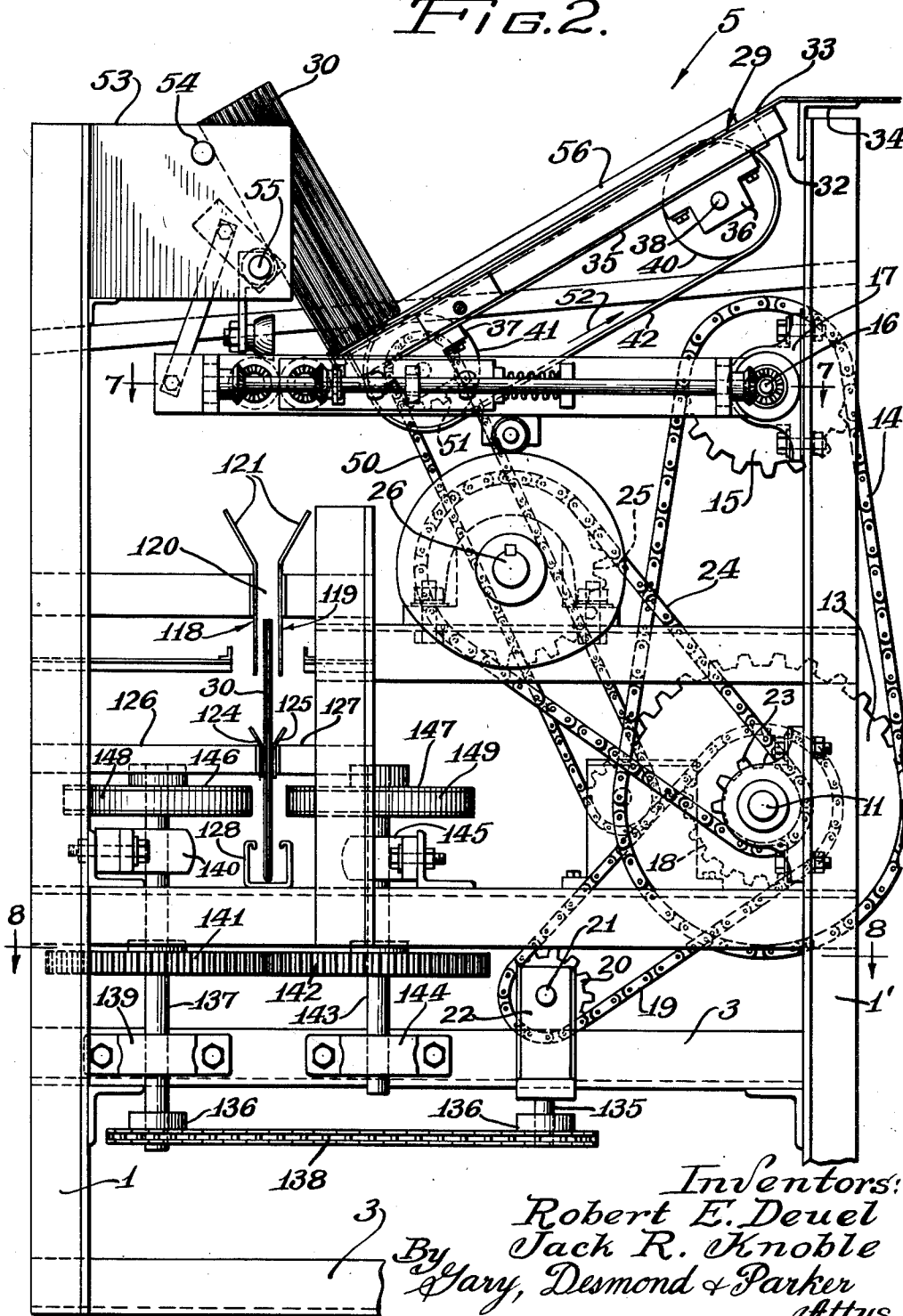
R. E. DEUEL ET AL
PAPER STUFFING MACHINE

2,698,174

Filed Jan. 9, 1952

9 Sheets-Sheet 2

FIG. 2.



Dec. 28, 1954

R. E. DEUEL ET AL
PAPER STUFFING MACHINE

2,698,174

Filed Jan. 9, 1952

9 Sheets-Sheet 4

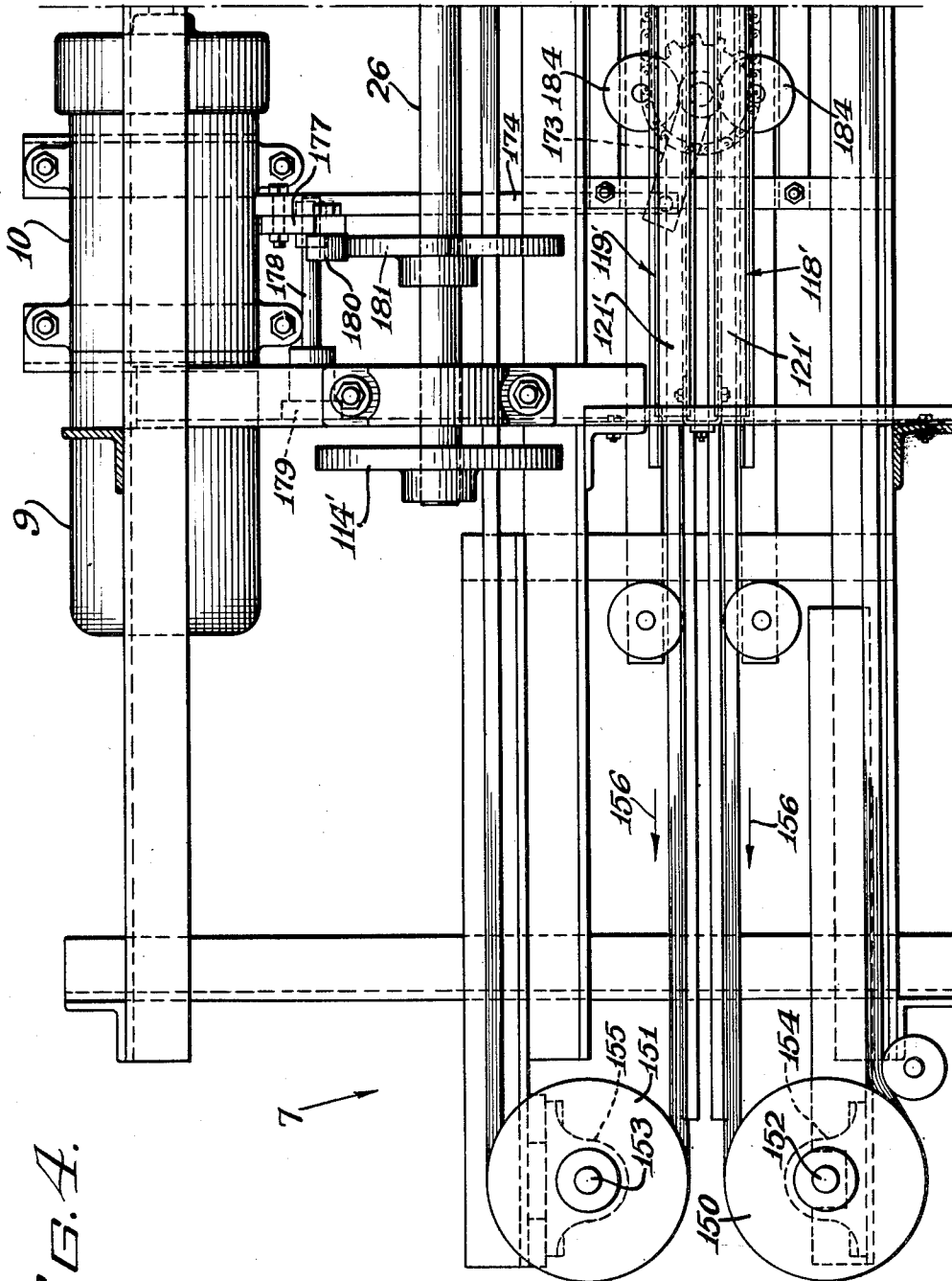


FIG. 4.

Inventors:
Robert E. Deuel
Jack R. Knoble
By Garry, Desmond & Parker Attys.

Dec. 28, 1954

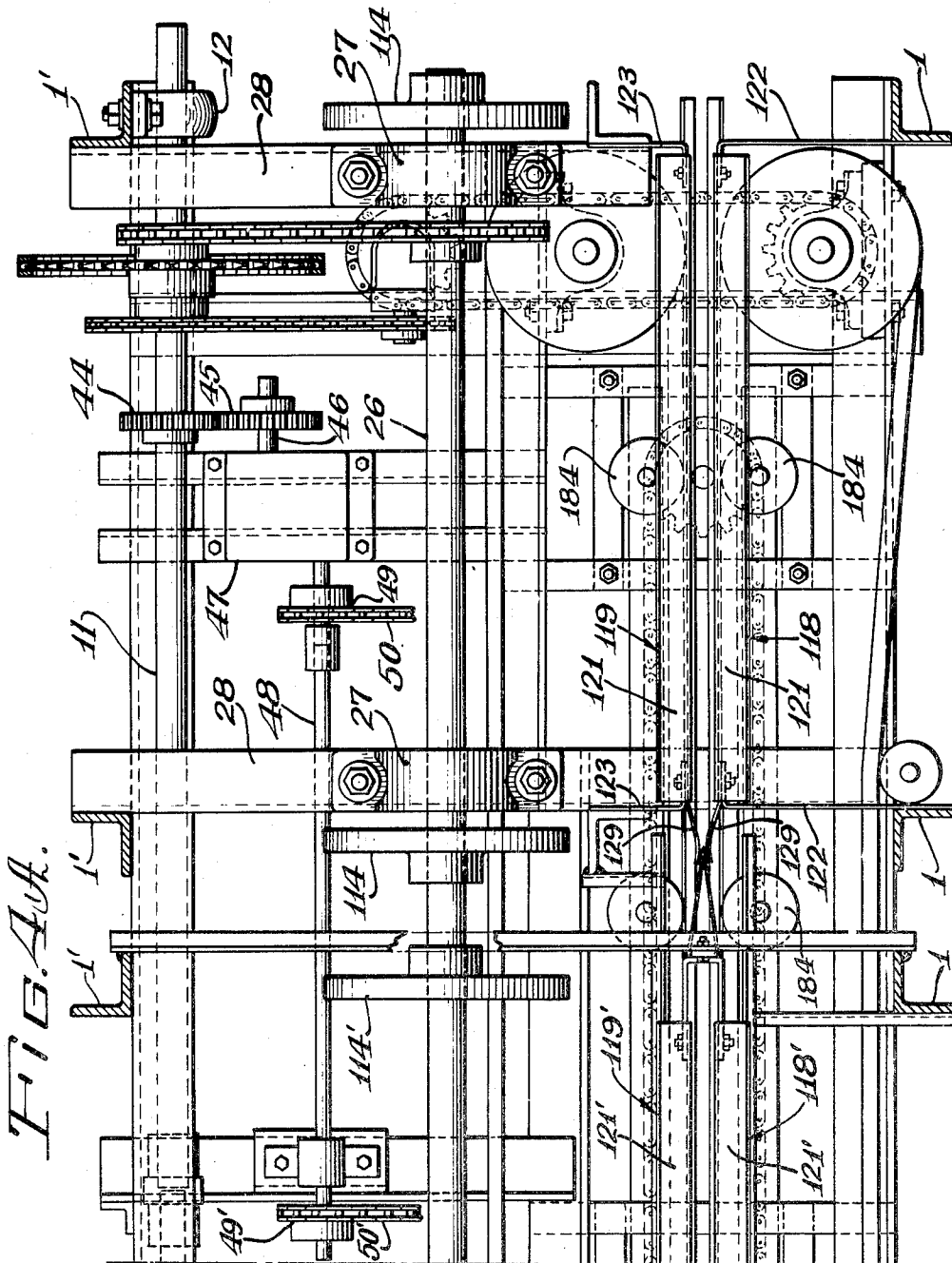
R. E. DEUEL ET AL

2,698,174

PAPER STUFFING MACHINE

Filed Jan. 9, 1952

9 Sheets-Sheet 5



Inventors:
Robert E. Deuel
Jack R. Knoble
By Gary, Desmond & Parker Attys.

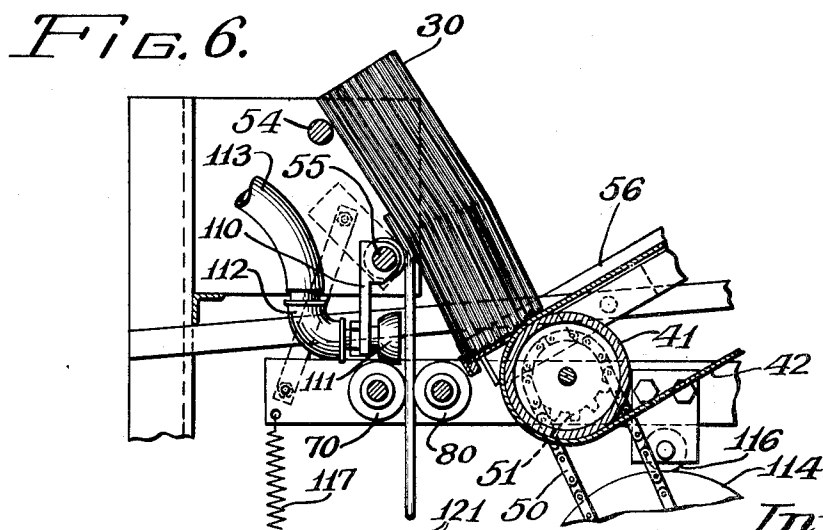
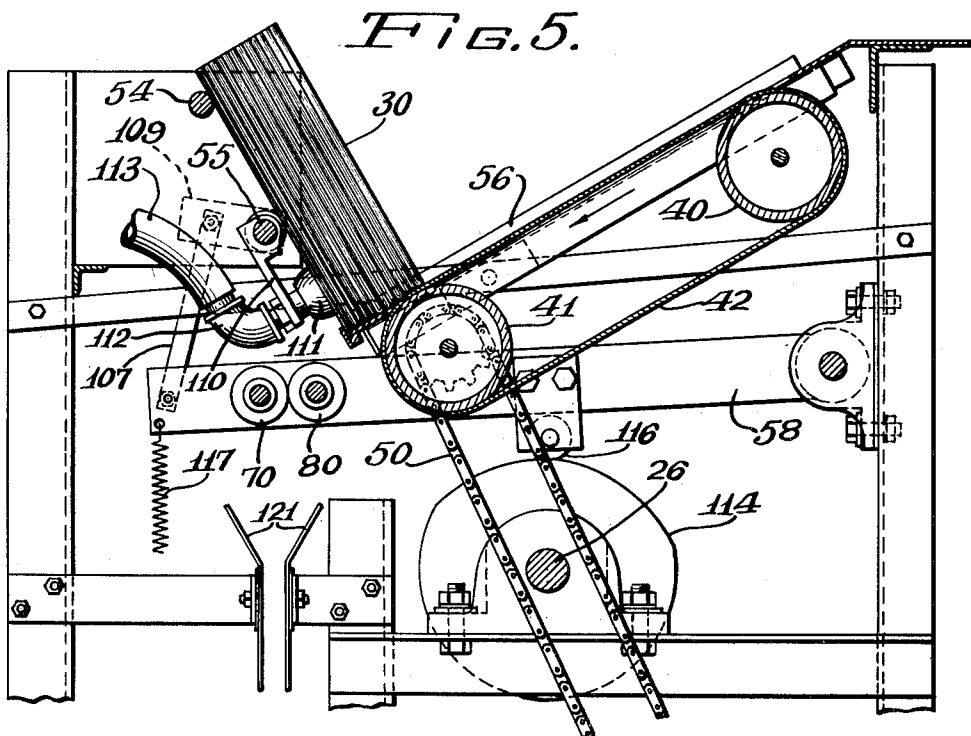
Dec. 28, 1954

R. E. DEUEL ET AL
PAPER STUFFING MACHINE

2,698,174

Filed Jan. 9, 1952

9 Sheets-Sheet 6



Inventors:
Robert E. Deuel
Jack R. Knoble
By Gary, Desmond & Parker
Attys.

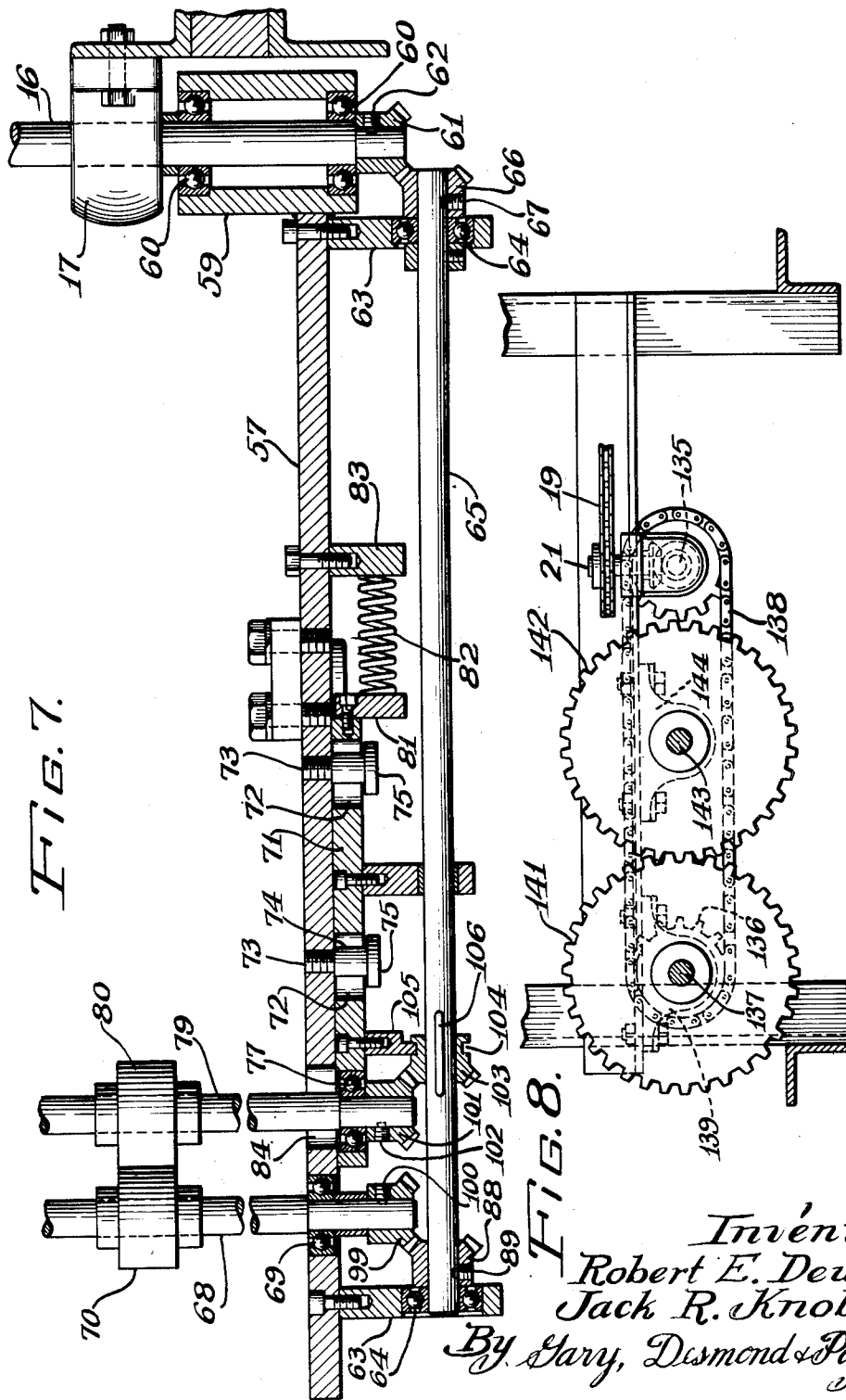
Dec. 28, 1954

R. E. DEUEL ET AL
PAPER STUFFING MACHINE

2,698,174

Filed Jan. 9, 1952

9 Sheets-Sheet 7



Inventors:
Robert E. Deuel
Jack R. Knoble
By Gary, Desmond & Parker
Attys.

Dec. 28, 1954

R. E. DEUEL ET AL
PAPER STUFFING MACHINE

2,698,174

Filed Jan. 9, 1952

9 Sheets-Sheet 9

FIG. 14.

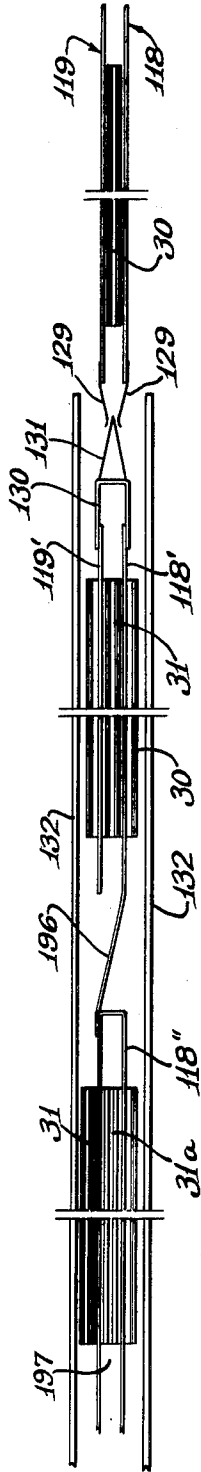


FIG. 13.

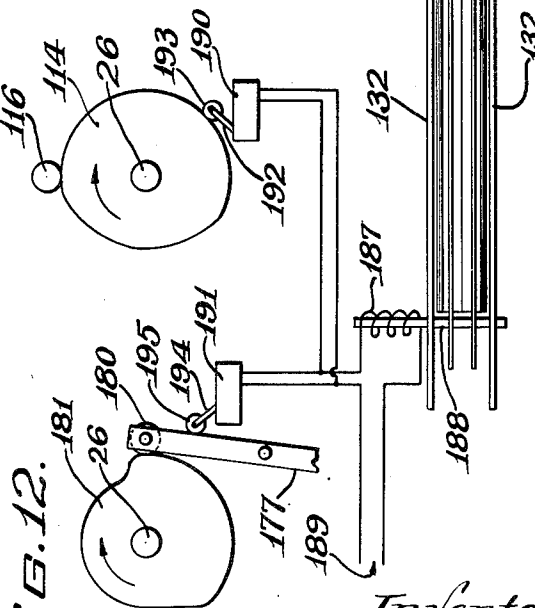
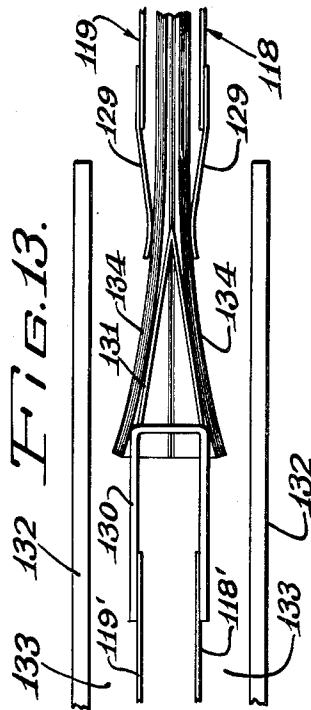


FIG. 12.

Inventors:
Robert E. Deuel
By Jack R. Knoble
Gary. Desmond & Parker
Attys.

1

2,698,174

PAPER STUFFING MACHINE

Robert E. Deuel, Oak Park, and Jack R. Knoble,
Des Plaines, Ill.

Application January 9, 1952, Serial No. 265,634

9 Claims. (Cl. 270—55)

This invention relates to improvements in paper stuffing machines and refers particularly to a machine of the class described which is simple in construction and operation and which is compact and of sufficiently light weight as to be made portable.

The machine comprising the present invention comprises two or more units, the first unit being adapted to feed a folded sheet or folded sheets, as, for instance, the outer section of a newspaper to a conveyor, the folded papers being fed in seriatim. The folded papers fed by the first unit are delivered to the conveyor with the main fold extending downwardly, whereby in being carried forwardly by the conveyor, the papers are controllably spread to receive, in timed relationship an inner section delivered from the next unit. Additional units may be employed, if desired, to feed additional folded papers to the conveyor to be likewise embraced by the outer section being carried forwardly by the conveyor; all of said units including the first unit operating in substantially the same manner.

One of the important features of the present invention resides in the provision of a feeding device wherein papers are positively fed from one unit in seriatim to a conveyor and are carried forwardly by said conveyor to receive the positively fed papers from another unit, the feeding devices and movement of the conveyor being in timed relationship.

Another important feature of the invention resides in the provision of a continuously running conveyor which can be made operative and inoperative to carry papers forwardly and stop the forward movement of the papers in timed relationship to the operation of the feed units.

Other objects and advantages of the invention will be apparent from the accompanying drawings and following detailed description.

In the drawings, Fig. 1 is a front elevational view of our stuffing machine.

Fig. 2 is an enlarged right end elevational view of the machine as viewed in Fig. 1.

Fig. 3 is an enlarged partial top plan view of the machine shown in Fig. 1.

Figs. 4 and 4A are enlarged sectional views taken respectively on lines 4—4 and 4A—4A of Fig. 1.

Fig. 5 is an enlarged detailed sectional view taken on line 5—5 of Fig. 1 showing one position of the paper feed mechanism.

Fig. 6 is a view similar to Fig. 5 showing another view of the paper feed mechanism.

Fig. 7 is an enlarged detailed sectional view taken on line 7—7 of Fig. 2.

Fig. 8 is an enlarged detailed sectional view taken on line 8—8 of Fig. 2.

Fig. 9 is an enlarged detailed sectional view taken on line 9—9 of Fig. 1.

Fig. 10 is a sectional view taken on line 10—10 of Fig. 9 showing one position of the belt-actuating mechanism.

Fig. 11 is a similar view showing another position of the belt-actuating mechanism.

Fig. 12 is a diagrammatic view of paper chute and conveyor.

Fig. 13 is an enlarged diagrammatic view of the paper chute and conveyor illustrating the spreading mechanism for diverging the paper.

Fig. 14 is a diagrammatic view showing the guide arrangement for diverting the first insert paper when a second or subsequent insert paper is to be embraced by an outer section paper.

The machine comprising the present invention may be

2

constructed in units depending upon the number of inserts to be stuffed within the outer section of the paper. For instance, if the machine is adapted to stuff newspapers, one unit will feed the outer section of the newspaper to a conveyor and this section will be carried forwardly and receive an insert fed from a second unit which is similar to the unit which fed the first section; the outer section with its first insert may then be carried forwardly and receive a second insert fed from a similar third unit, and so on for as many inserts as desired. For purposes of description two complete units together with the delivery end of the machine is shown and the drawing is divided by broken lines to indicate that as many duplicate units as desired may be employed.

The various mechanisms comprising the present invention are carried by a frame comprising upright members 1, 1' being respectively the front upright members and the rear upright members. The members 1 and 1' are spanned by transverse frame members 3 whereby a rigid frame structure is formed. The machine may be permanently mounted upon floor 4 or may be mounted on casters (not shown) in the event that the machine is to be portable.

The machine shown and to be described comprises two complete units, designated generally as 5 and 6, and a delivery end 7, the broken lines 8 intending to indicate that as many units as desired may be disposed side by side followed by the delivery end 7.

An electric motor 9 is mounted upon the frame and may be coupled with a speed reducer 10. The speed reducer output shaft comprises the main drive shaft 11 of the machine, said drive shaft being journaled in bearing 12 which is mounted upon the rear upright frame member 1'. A sprocket wheel 13 is mounted upon drive shaft 11 and by means of a sprocket chain 14 a sprocket wheel 15 is driven, said latter sprocket wheel being mounted upon a feed shaft 16 journaled in bearings 17 carried by the rear upright frame members 1'. A sprocket wheel 18 is also mounted upon drive shaft 11 and by means of sprocket chain 19 drives sprocket wheel 20 mounted upon shaft 21 journaled in a conventional right-angle drive 22. A sprocket wheel 23 is also carried upon the drive shaft 11 and by means of sprocket chain 24 drives sprocket wheel 25 carried upon cam shaft 26. The cam shaft 26 is journaled in bearings 27 mounted upon cross frame members 28.

At the upper portion of unit 5 a hopper 29 is mounted, said hopper being adapted to hold a supply of papers 30 which comprise the outer sections of the newspaper, and within which the inserts 31 carried by unit 6 and any additional unit employed are adapted to be positioned. The unit 6 is equipped with a similar hopper for carrying inserts 31 and any additional unit employed would also have a similar hopper. In view of the fact that all of said hoppers are alike, only the hopper 29 of unit 5 will be described in detail and without further detailed description the parts comprising the hopper 29' in unit 6 will be designated by primed reference numerals corresponding to like parts in unit 5.

The hopper 29 comprises a pair of spaced braced members 32 which are disposed in an inclined direction. A panel 33, preferably constructed of sheet metal, is mounted at its upper end upon an angle iron 34. The panel 33 defines an inclined plane upon which the outer sections 30 of the newspaper are adapted to be piled, said newspapers being disposed on edge in plane parallel relationship to each other.

A pair of spaced supporting members 35 are carried upon the rear face of the panel 33 and bearings 36 and 37 are mounted upon each of the members 35. A shaft 38 is journaled in the opposite bearings 36 and a similar shaft 39 is journaled in the opposite bearings 37, shaft 38 carrying, between said bearings, a roll 40 and shaft 39 similarly carrying a roll 41. A conveyor belt 42 is trained around the rolls 40 and 41. The central portion of the panel 33 is provided with an aperture 43 in which the upper pass of the belt 42 is adapted to be positioned.

Referring particularly to Fig. 4A, a spur gear 44 is mounted upon drive shaft 11, said spur gear meshing with a companion gear 45 mounted upon a shaft 46. The shaft 46 comprises the input shaft of a conventional speed

reducing mechanism 47, the output shaft thereof being shaft 48. A sprocket wheel 49 is mounted upon the output shaft 48 and by means of sprocket chain 50 drives a sprocket wheel 51 mounted upon shaft 39, that is the shaft which carries the roller 41. It can readily be seen that when the drive shaft 11 is in operation the roll 41 is driven whereby belt 42 moves through the aperture 43 and panel 33 and functions to urge the stack of papers 30 downwardly along the hopper surface. The direction of movement of the belt 42 is as indicated by the arrow 52 in Fig. 2.

A pair of spaced plates 53 are mounted upon adjacent upright frame members 1, said plates functioning to support a rod 54 which extends between said plates.

A shaft 55 which also extends between said plates is journaled in the spaced plates 53. The rod 54 and shaft 55 function as stops for the stack of papers 30 which are carried in the hopper 29, the plane of the longitudinal axes of the rod 54 and shaft 55 being substantially at right angles to the plane of the surface of the panel 33 whereby the stack of papers 30 are disposed with the papers on edge and at substantially right angles to the panel 33. An angle iron 56 is mounted upon the upper surface of the panel 33 and functions as a lateral guide for the papers 30.

It will be noted that output shaft 48 extends from unit 5 to unit 6 and in said latter unit, drives the belt 42'. If an additional number of units are contemplated, the belts, corresponding to belt 42 of unit 5, may be also driven from said shaft.

The feed mechanism for the unit 5 is identical with the feed mechanism of unit 6 or any additional unit which may be employed and without further detailed description of the feed mechanism of unit 6, the parts thereof corresponding to like parts in the feed mechanism of unit 5, which will be described in detail, will be designated by corresponding primed reference numerals.

The feed mechanism for the unit 5 comprises a pair of arms 57 and 58, said arms being disposed on opposite sides of the hopper 29. The arms 57 and 58 are substantially identical and each carries at one end a bearing housing 59 (Fig. 7). The bearing housing 59 carries a pair of ball bearing assemblies 60 which embrace shaft 16, the arrangement being such that both arms 57 and 58 are freely swingable about shaft 16.

Adjacent arm 57, shaft 16 carries a bevel gear 61 which is rigidly mounted upon the end of said shaft by means of said screw 62. Bearing supports 63 are secured to arm 57 adjacent the opposite ends of said arm, said bearing supports carrying ball bearing assemblies 64. A shaft 65 is journaled in the bearings 64 and said shaft carries at one end thereof a bevel gear 66 which is rigidly mounted upon the shaft 61 by means of said screw 67, the bevel gear 66 being adapted to mesh with the bevel gear 61. Accordingly, rotation of shaft 16 results in rotation of shaft 65 which is carried upon arm 57 as hereinbefore described.

A shaft 68 is journaled at one end in bearings 69 carried by arm 57. Arm 58 also carries similar bearings which function to journal the opposite end of shaft 68, said shaft being disposed outwardly from the delivery end of the hopper 29. Shaft 68, intermediate its length, carries a pair of rollers 70 which are preferably constructed of rubber or other resilient material having a relatively high coefficient of friction.

A slide member 71 is mounted upon arm 57, said slide member being provided with spaced slots 72. Screws 73 are threadably positioned in arm 57, said screws having a shank of relatively enlarged diameter, as shown best at 74 in Fig. 7, whereby said screws function as guides for the slide member 71, the enlarged portions 74 of the screws being positioned in the slots 72. The screws 73 carry enlarged heads 75 whereby the slide member 71 is prevented from moving laterally with respect to arm 57. A similar slide member 76 is similarly mounted upon arm 58 and is adapted for limited slidable movement upon arm 58.

The slide member 71 carries ball bearings 77 and a similar ball bearing assembly 78 is carried upon slide member 76. A shaft 79 is journaled adjacent its opposite ends in the ball bearings 77 and 78, said shaft carrying spaced rollers 80 intermediate its length, said rollers being so disposed upon shaft 79 as to be in osculating relationship to the rollers 70 carried upon shaft 68.

At one end of the slide member 71 a block 81 is carried, said block functioning as an abutment member for one

end of a coil spring 82. The opposite end of coil spring 82 abuts against a lug 83 rigidly positioned upon arm 57. Arm 57 is provided with an elongated slot 84 through which shaft 79 extends and similarly arm 58 is also provided with an identical slot through which the opposite end of shaft 79 extends. Upon arm 58 an abutment lug 85 is carried, said lug furnishing an anchorage for coil spring 86. The slide member 76 upon arm 58 carries an abutment block 87, the coil spring 86 being confined between the lug 85 and the block 87. The arrangement is such that the springs 82 and 86 resiliently bias the slide members 71 and 76 respectively tending to urge said slide members so as to bring the rolls 70 and 80 upon shaft 68 and 79 respectively into resilient contact with each other. As will be hereinafter more fully described, papers 30 are adapted to pass between the rollers 70 and 80 and consequently the passage of papers between said rollers tend to separate the rollers. This separation is accommodated by the arrangement hereinbefore described comprising the slide members 71 and 76 and springs 82 and 86.

Shaft 65 carries a bevel gear 88 which is secured to said shaft by said screw 89. A cooperating bevel gear 90 is secured to shaft 68 by means of set screw 100. A bevel gear 101 is secured to shaft 79 by means of set screw 102, said bevel gear being adapted to mesh with bevel gear 103 which is slidably but non-rotatably positioned upon shaft 65. Bevel gear 103 is provided with an annular slot 104 and a finger 105 carried upon the slide member 71, the end of said finger being loosely positioned in the slot 104. Shaft 65 is provided with a key 106 which permits the mounting of bevel gear 103 in such a manner as to permit limited slidable movement of the bevel gear upon the shaft 65.

When shaft 65 is rotated, as hereinbefore described, rotation is imparted to shafts 68 and 79. The rotation of shafts 68 and 79 is such as to have the rollers 70 and 80 at their line of contact move peripherally in the same direction. In other words, the angular rotation of shafts 68 and 79 is opposite. When a paper 30 passes between the rollers 70 and 80 and said rollers are separated by the movement of the slide members 71 and 76 against the compression of springs 82 and 86 respectively, the finger 105 carried by slide member 71 moves the bevel gear 103 so as to maintain a proper meshing relationship with the bevel gear 101 carried upon shaft 79.

Referring particularly to Figs. 5 and 6, a link 107 is pivotally connected to the end of arm 58. At the opposite end link 107 is pivotally connected to arm 109 which is, in turn, rigidly connected to shaft 55. A pair of vacuum cup holders 110 are rigidly mounted upon an intermediate portion of shaft 55, the vacuum cup holders being spaced from each other. Conventional vacuum cups 111 are mounted at the ends of the vacuum cup holders 110 and are connected by means of fittings 112 to flexible vacuum hoses 113, the hoses being connected at their opposite ends to a controlled source of vacuum (not shown).

A pair of similarly shaped cams 114 are mounted in spaced relationship upon the cam shaft 26, there being one cam 114 beneath each arm 57 and 58. A roller bracket 115 is mounted upon arm 57 and a similar bracket is mounted upon arm 58. Each of the brackets 115 carries a cam follower roller 116 which is adapted to ride upon the surface of each cam 114. A coil spring 117 is connected to each of the arms 57 and 58, the opposite ends of said coil springs being connected to the frame of the machines whereby the arms 57 and 58 are urged about shaft 16 in such fashion as to cause rollers 116 to normally ride upon the faces of the cams 114. The arrangement is such that as shaft 26 rotates the cam follower rollers 116 riding upon the faces of the cams 114 will raise and lower the arms 57 and 58. Inasmuch as both cams 114 are alike and are positioned upon shaft 26 in the same angular relationship, the arms 57 and 58 will move upwardly and downwardly in unison.

It can readily be seen from Figs. 5 and 6 that as the arms 57 and 58 move upwardly and downwardly the vacuum cup holders 10 will be rocked with shaft 55 due to the linkage connection comprising link 107 and arm 109. The dimensions of the cams 114, that is, the extreme distances of the low side of the cams and the high side of the cams is such that the vacuum cups 111 will be swung from the extreme position shown in Fig. 5 to the extreme position shown in Fig. 6. When the vacuum cups 111 are in the position shown in Fig. 5 their mouths

5

will be in contact with the face of the lowermost paper 30 in the stack carried in the hopper 29. When the vacuum cups are in this position vacuum is established in the cups causing the lowermost paper to adhere to the cups. This position of the cups occurs when the cam follower rollers 116 are on the low portions of the cams 114. As the rollers 116 ride to the upper portions of the cams 114 the free ends of arms 57 and 58 are raised and arm 109 carried by shaft 55 is swung in a clockwise direction, as viewed in Fig. 6. The clockwise movement of shaft 55 results in a clockwise movement of the vacuum cups 111 whereby the lower portion of the bottom paper 30 is carried to a substantially vertical plane. Of course, rollers 70 and 80 are continuously rotating and inasmuch as the arms 57 and 58 are raised, said rollers are so positioned as to move upwardly and engage the lower folded edge of the grasped paper. Rotation of the rollers 70 and 80 tends to move the grasped paper downwardly. However, at about the time that the rollers 70 and 80 grasp the lower edge of the paper, the vacuum in the vacuum cups is broken and consequently rollers 70 and 80 are free to move the paper downwardly between the rollers thereby removing the lowermost paper from the stack carried in the hopper 29.

The vacuum established in the cups 111 may be controlled by a suitable valve of conventional construction which may be operated in timed relationship with shaft 26 whereby the vacuum is sequentially established and broken in accordance with the movement of the vacuum cups.

It will be noted (Figs. 4 and 4A) that the cam shaft 26 extends from the unit 5 and through the unit 6. Cams 114', in the unit 6, mounted upon the shaft 26 are similar to cams 114 and, hence, when a paper 30 is being delivered from the hopper 29, an insert 31 will simultaneously be delivered from the hopper 29'. If additional units are employed all of the additional inserts would be delivered simultaneously from the respective hoppers with the delivery of the outer section 30 from the hopper 29.

Positioned beneath, and spaced downwardly from the nip of the rolls 70 and 80, is a pair of spaced guide plates 118 and 119 providing a guideway 120 therebetween. The plates 118 and 119 at their upper portions are flared outwardly, as at 121 in Fig. 2, whereby the paper 30 moved downwardly by rolls 70 and 80 may conveniently enter and fall downwardly through the guideway 120. The plates 118 and 119 are substantially coextensive with the width of unit 5 and are supported at their respective ends by straps 122 and 123, which, in turn, are secured to the frame of the machine. Similar guide plates 118' and 119' and guideway 120' are positioned beneath rolls 70' and 80' in unit 6 to guide the downward movement of the delivered inserts 31.

Disposed beneath the guide plates 118 and 119 are a pair of spaced intermediate guides 124 and 125 between which the delivered paper 30 is positioned. The guide 124 and 125 are supported by straps 126 and 127, which may be secured to the frame of the machine. Unlike guide plates 118 and 119, guides 124 and 125 are substantially coextensive with the entire machine including all of its units.

Beneath the guides 124 and 125 and spaced downwardly therefrom is a channel 128, the flanges of which extend upwardly and the opening thereof being in substantial vertical alignment with the space between the guides 124 and 125. The channel 128, similar to guides 124 and 125 is substantially coextensive with the entire machine including all of the units which may be employed. When the paper 30 is delivered from the rolls 70 and 80, the paper after leaving the nip of said rolls falls through the guideways 120 and between guides 124 and 125. The paper 30 eventually comes to rest with its folded lower edge resting in channel 128 and its intermediate portion supported by guides 124-125 so that said paper is disposed in a substantially vertical plane in the manner shown best in Fig. 2.

A pair of opposed convergent resilient fingers 129, shown diagrammatically in Figs. 12 and 13 are mounted upon the ends of the guide plates 118 and 119, that is, the vertical portion of said plates at the ends thereof adjacent the unit 6. At the adjacent end of the corresponding plates 118' and 119' of the unit 6, a bracket 130 is carried by said plates, said bracket bridging the ends of said plates and carrying a wedge 131 the apex of which extends between the convergent ends of the

6

fingers 129. In the unit 6, and any additional unit which may be employed thereafter, a pair of spaced guide bars 132 are disposed outwardly from the bottom edges of the plates 118 and 119, providing a space 133 between said plates and the guide bars.

As will be hereinafter more fully described a conveyor moves the paper 30 which rests upon channel 128 through the guides 124 and 125 and through the lower ends of the guideway toward the unit 6. As the forward edge of the paper moves into contact with the fingers 129 the paper is guided thereby toward the apex of the wedge 131 which, as the paper continues its movement, enters the space between the two halves 134 of the folded paper and spreads said halves away from each other, as the motion of the paper continues in motion longitudinally along the channel 128 said halves 134 move into space 133 between the guide bars 132 and the bottom portions of plates 118 and 119. When the paper 30 thus spread moves beneath the feed mechanism of unit 6, the timing of the machine is such as to cause the paper to stop while an insert 31 moves downwardly between plates 118' and 119'. In so dropping, the insert positions itself between the spread halves 134 of the paper 30, and the folded portion of the insert moves downwardly between said folded halves between guides 124' and 125' and eventually comes to rest with its lower fold in nested relationship with the corresponding fold of the paper 30. Simultaneously with the dropping of the insert 31 into embraced relationship with the spread paper 30, another outer section of the paper moves downwardly from the hopper 29 and the operation is repeated, the insert 31 embraced by the outer section 30 then in unit 6, moving to the next unit or moving directly to the delivery end 7 of the machine if only one insert is to be stuffed in the outer section.

As has been hereinbefore described the sprocket chain 19 drives sprocket wheel 20 which is carried upon the input shaft 21 of a conventional right angle drive device 22. The device 22 has an output shaft 135 upon which is carried a sprocket wheel 136. The device 22 is of conventional construction and comprises essentially a pair of meshing bevel gears (not shown), one carried upon shaft 21 and the other carried upon shaft 135 within the housing 22. In this fashion rotation of shaft 21 is changed to the right angle rotation of shaft 135. Sprocket wheel 135 drives a sprocket wheel 136 mounted upon the lower end of a vertical shaft 137, by means of a sprocket chain 138. Shaft 137 is journaled in spaced bearings 139 and 140 which are mounted upon the frame of the machine. Intermediate the length of shaft 137 a spur gear 141 is positioned, said spur gear being adapted to mesh with a spur gear 142 of an equal number of teeth and on the same diameter, the latter gear being mounted intermediate the length of a shaft 143. The shaft 143 is journaled in spaced bearings 144 and 145 mounted upon the frame of the machine. It can readily be seen that rotation of shaft 137 results in rotation of shaft 143 in an opposite angular direction and inasmuch as the spur gears 141 and 142 are equal in diameter the rotational speed of the shafts 137 and 143 are the same.

At the upper end of shaft 137 a grooved pulley 146 is mounted and at the upper end of shaft 143 a similar pulley 147 is carried, said pulleys being in substantially the same horizontal plane and having their peripheries spaced from each other. A conventional V-belt 148 is trained around pulley 146 and a similar belt 149 is trained around pulley 147. The belts 148 and 149 traverse the entire length of the machine and at the delivery end 7 of the machine said belts are respectively trained around grooved pulleys 150 and 151 carried upon shafts 152 and 153, respectively. Shafts 152 and 153 are journaled in suitable bearings 154 and 155 carried upon the frame of the machine. The pulleys 146, 147, 150 and 151 are so disposed with respect to each other that adjacent passes of the belts 148 and 149 are parallel to each other and are disposed parallel to the longitudinal axis of the channel 128. The belts 148 and 149 travel adjacent the path of travel of the papers and are positioned between the guides 124 and 125 and the channel 128. As will be hereinafter more fully described, mechanism is employed for moving said adjacent belts toward each other in order to grip the paper 30 between them during predetermined phases of operation of the machine. In this fashion the papers are carried forwardly with the belts in the direction indicated by the arrows 156 in Fig. 4.

The mechanism for moving the adjacent passes of the

belts toward each other in order to grip the papers carried by the channel 128 is described as follows:

A pair of angle irons 157 are mounted upon the frame of the machine in spaced relationship to each other, said angle irons being disposed parallel to each other and extending throughout substantially the length of the machine. Two or more belt-moving mechanisms 158 may be carried by the angle irons 157. If the machine comprises two units, a belt-moving mechanism 158 will be employed with each unit. If the machine comprises more than two units a larger number of belt-moving mechanisms 158 may be employed. All of the belt-moving mechanisms are the same and only one of said mechanisms will be described, it being understood that the other mechanism illustrated and all other belt moving mechanisms which may be employed, if a larger number of units is employed, will be identical with the one described.

The belt-moving mechanism 158 is carried by a pair of spaced transverse bars 159 which are mounted at their ends upon the spaced angle irons 157. Spacer bars 160 and 161 are secured to the transverse bars 159 by means of bolts 162 which also extend through a guide plate 163 which is spaced from the bars 160 and 161. A rack 164 is carried upon guide plate 163 and a similar rack 165 is carried by said guide plate in spaced relation to rack 164, the arrangement being such that said racks may be slidable between bars 160 and 161 and plate 163. Actuating arms 166 and 167 are respectively pivotally connected by means of pivot pins 168 and 169 to racks 165 and 166, whereby relative longitudinal movement of said racks results in relative lateral movement of the arms 166 and 167.

A pinion 170 is supported by plate 163, the hub 171 thereof being journaled in said plate, said pinion meshing with the teeth of the opposite racks whereby rotation of said pinion moves said racks longitudinally with respect to each other in opposite directions. A shaft 172 is keyed to said pinion and is secured at its opposite end to arm 173 which, in turn, is pivotally connected to a link 174. Link 174 is secured to an extension link 175 by bolts 176 the arrangement being such that links 174 and 175 may be adjusted lengthwise with respect to each other. The extension link 175 is pivotally connected at its end to an end of lever 177 which is fulcrumed at 178 to a standard 179 secured to the frame of the machine. The opposite end of lever 177 carries a cam-follower roller 180 which is adapted to ride upon the periphery of a cam 181 mounted upon cam shaft 26. The arrangement is such that rotation of cam 181 results in rocking of lever 177 which, in turn, rotates shaft 172 causing racks 164 and 165 to move in opposite directions thereby moving arms 166 and 167 laterally in opposite directions.

The arms 166 and 167 extend throughout a major portion of the length of the machine, said arms being parallel to the adjacent passes of belts 149 and 148. A plurality of spindles 182 and 183 are respectively carried by arms 167 and 166, said spindles being spaced along the length of said arms and being disposed in pairs. Each of said spindles carries a grooved roller 184 which engages the inner sides of the adjacent passes of the belts 148 and 149. The arrangement is such that when the arms 166 and 167 are moved laterally with respect to each other, the adjacent passes of the belts 148 and 149 are brought toward or away from each other. When the belts are brought toward each other the surfaces of said belts engage the papers 30 carried in the channel 128 and said papers are carried forwardly with said belts.

In order that the arms 166 and 167 shall remain parallel to each other through their length two or more belt-moving mechanisms 158 are employed in spaced relationship along the length of said arms. To cause said mechanism to operate in unison, the belt moving mechanisms may be driven together by sprocket chain 185 which is trained around sprocket wheels 186 carried upon the shafts 172 of said mechanisms. In this manner canting of the arms 166 and 167 with respect to each other during lateral movement of said arms is avoided.

In operation the hopper 29 is charged with a plurality of papers which will constitute the outer section of the newspaper, that is papers being piled upon the panel 33 with their respective planes at right angles to the plane of the panel, the stack of papers resting upon the rod 54 and shaft 55. Similarly a stack of inserts may be positioned in the hopper 29'.

Shaft 11 is driven by the motor 9 and said shaft in

turn drives shaft 16. Simultaneously the cam shaft 26 is driven and also the belt 42 is driven thereby tending to move the stack of papers downwardly toward the rod 54 and shaft 55. With the movement of shaft 16, shaft 65 is driven and consequently rollers 70 and 80 are driven. Starting with the position of the parts shown in Fig. 5, roller 116 will be positioned upon the "low" portion of cam 114 and hence arms 57 and 58 will be in their lowermost position. The movement of arm 58 to its lowermost position causes a counterclockwise movement of shaft 55, as viewed in Fig. 5, whereby the vacuum cups 111 are swung into contacting position with the lowermost paper 30 in the stack carried in the hopper 29. Simultaneously vacuum is established in the vacuum cups 111. As the motion proceeds rollers 116 move on to the high portions of cams 114 whereby the arms 57 and 58 are raised. With the raising of the arms 57 and 58 the vacuum cups 111 are swung in a clockwise direction whereby the lower portion of the endmost paper 30 is swung to a substantially vertical position, a position in which said lower end may be grasped by the rollers 70 and 80 which simultaneously move upwardly to grasping position. As the cam shaft 26 rotates the rollers 70 and 80 draw the grasped paper downwardly, as indicated in Fig. 6. Eventually, the paper 30 leaves the rollers 70 and 80 entering the guideway 120 and dropping between guides 124 and 125 and resting upon the channel guide 128 between belts 148 and 149.

After the paper has dropped to the position shown best in Fig. 2, cam 181 will have so moved as to rock lever 177 in a clockwise direction about pivot 178, as viewed in Fig. 9. This movement of lever 177 results in an inward movement of arms 166 and 167 toward each other which, in turn, causes the grooved pulleys 184 to move inwardly toward each other whereby belts 148 and 149 move into plane-parallel contacting relationship with the paper 30. As has been hereinbefore described, the belts 148 and 149 are also driven from the main drive shaft 11 and in this fashion the paper 30 is carried forwardly.

When the paper 30 reaches a position in the channel 128 immediately beneath the discharge of the hopper 29' of the unit 6, cam 181 will have so rotated as to again rock lever 177 so as to cause arms 166 and 167 to move outwardly away from each other whereby the belts 148 and 149 are disengaged from the paper 30 and said paper remains stationary beneath the hopper 29'. During the passage of the paper 30 from beneath hopper 29 to its position beneath hopper 29', said paper is spread by means of the wedge 131 carried by the guide plates 118' and 119'. In this fashion the upper portion of the paper positions itself outside of the guide plates 118' and 119' in substantially V fashion. While the paper remains stationary in this position a second paper 30 is being removed from the hopper 29 in the manner hereinbefore described. Simultaneously an insert 31 is being removed from the hopper 29' in the same fashion as described in conjunction with the removal of the paper 30 from the hopper 29. In this manner an insert is removed from the hopper 29' and is dropped into the spread paper 30 which remains stationary beneath the hopper 29'.

After the paper has been so dropped, it can readily be seen that it will be embraced by the outer section 30. Thereafter the belts 148 and 149 move into contacting position with both the paper 30 carrying the insert in the unit 6 and the paper 30, that is the outer section, deposited from the hopper 29. Thus an outer section will be delivered from the unit 5 to the unit 6 at the same time that an outer section plus its insert is being removed from the unit 6 to a forward position. As has been hereinbefore described the forward position may be to the discharge end of the machine 7 or may be to an additional unit whereby a second insert may be deposited in a manner similar to the disposition of the first insert.

Referring particularly to Fig. 12, a solenoid 187 is positioned adjacent guides 124 and 125 on the delivery side of unit 6, said solenoid having a core 188 which is adapted for reciprocal movement transverse to said guides whereby in extended position said core blocks the path of the paper moving through said guide and functions as an index, and in retracted position the core is removed from the guides and permits the paper to move forwardly. One terminal of the solenoid is connected to a source of current 189 and the opposite terminal is connected through a pair of limit switches 190 and 191

which are connected in parallel between the solenoid and the source of current 189. Limit switch 190 has an actuating arm 192 carrying a roller 193 which rides upon the periphery of cam 114, and switch 191 has an actuating arm 194 which carries roller 195, the latter, in turn, riding upon a side of lever 177. Switch 190 is open when roller 193 rides upon the "high" portion of cam 114 and switch 191 is open when roller 180 rides upon the "high" portion of cam 181. When core 188 is in extended position, that is, indexing position, solenoid 187 is deenergized, energization of said solenoid functioning to retract the core to its non-indexing position.

Accordingly, when arms 58 are in their uppermost position switch 190 is open and when the belts 148 and 149 are in their driving position the switch 191 is open. Conversely, when the arms 58 are in their paper-delivering position the switch 190 is open and when the belts are in their paper-driving position the switch 191 is open. Hence, during the period that the paper 30 is moving from unit 5 to unit 6 switch 191 is open but switch 190 is closed so the core 188 is in its retracted position. Just before the paper reaches the core, the roller 180 moves off the "high" portion of cam 181 the belts 148 and 149 being spaced apart and the solenoid 187 is deenergized causing core 188 to move to its indexing position. The momentum of the paper 30 causes it to slide into contact with core 188 and, hence, it is properly indexed to receive the insert 31 from hopper 39. While roller 180 moves over the "low" portion of cam 181 switch 191 is closed and remains closed before roller 180 again reaches the "high" portion of cam 181, thereby retracting core 187. Hence, when the belts again move toward each other the core is already retracted and stays retracted until the stuffed paper moves out of unit 6. The operation is then repeated, each time core 188 functioning to index the outer section paper so that the insert 31 may be properly stuffed.

Referring particularly to Fig. 14, a diagrammatic plan view of the guides is shown where more than two units are employed, that is, where more than one insert is to be embraced by the outer section paper. It is contemplated that if two or more inserts are to be positioned within the outer section 30, that the two inserts be inserted side by side within the outer section. Consequently, during the stuffing operation only the outer section 30 is spread. In order that the second insert will not fall upon the first insert, during the stuffing operation of the second insert, the guide plate 118' is terminated at the end of the second unit and the guide plate 119' is bent laterally at the end of the second unit, as at 196, and continues in substantial alignment with the guide plate 118'. A companion guide plate 119" joins with the continuation of the guide plate 119' and provides a space 197 into which a second insert paper 31a may fall while the curved portion 196 diverts the first insert paper 31 outside of the guide plate.

It is to be understood that the machine comprising the present invention may be made portable merely by mounting the same upon casters or the like and that said machine may contain as many insert units as desired, the operation of the insert units being the same as the operation of the unit 5, and all of said units operating in timed relationship with one another.

We claim as our invention:

1. A paper stuffing machine comprising a pair of adjacent units, means for feeding a folded outer section paper from one unit, receiving means for said unit to which said folded outer section paper is fed, receiving means for said second unit, a conveyor for engaging said outer section paper from said first receiving means and delivering it to said second receiving means, means adjacent said conveyor for spreading said folded outer section paper during movement thereof to said second receiving means, means for disengaging said conveyor from said outer section paper to stop said paper while said outer section paper is at said second receiving means, and means for feeding an insert paper from said second unit into embraced relationship with said spread outer section paper at said second receiving means.

2. A paper stuffing machine comprising a pair of adjacent units, means for feeding a folded outer section paper from one unit, receiving means for said unit to which said folded outer section paper is fed, receiving means for said second unit, a conveyor for engaging said outer section paper from said first receiving means

and delivering it to said second receiving means, means adjacent said conveyor for spreading said folded outer section paper during movement thereof to said second receiving means, means for disengaging said conveyor from said outer section paper to stop said paper while said outer section paper is at said second receiving means, means for feeding an insert paper from said second unit into embraced relationship with said spread outer section paper at said second receiving means and means for simultaneously feeding a folded outer section paper from said first unit to said first receiving means in timed relationship with the feeding of the insert from the second unit and repeating the stuffing operation.

3. A paper stuffing machine comprising a pair of adjacent units, means for feeding a folded outer section paper from one unit, receiving means for said unit to which said folded outer section paper is fed, receiving means for said second unit, a conveyor for engaging said outer section paper from said first receiving means and delivering it to said second receiving means, means adjacent said conveyor for spreading said folded outer section paper during movement thereof to said second receiving means, means for disengaging said conveyor from said outer section paper to stop said paper while said outer section paper is at said second receiving means, means for indexing said outer section paper at said second receiving means, and means for feeding an insert paper from said second unit into embraced relationship with said spread outer section paper at said second receiving means.

4. A stuffing machine comprising in combination a first unit and a second unit, a hopper in said first unit for holding a stack of folded outer section papers, a hopper in said second unit for holding a stack of insert papers, paper feeding means disposed adjacent each unit for simultaneously removing an outer section paper and an insert paper, respectively, from said hoppers, receiving means for said first unit to which said outer section paper is fed, receiving means for said second unit to which said insert paper is fed, a conveyor disposed adjacent said receiving means for said two sections, means for engaging said conveyor with said outer section paper at the first unit receiving means and carrying said outer section paper to said second unit receiving means, means disposed adjacent the path of travel of said conveyor for spreading said folded outer section paper while the same is carried by said conveyor, means for disengaging said spread outer section paper from the conveyor to stop the paper in said second unit receiving means, and means for guiding said fed insert paper from said second unit hopper into embraced relationship with said spread outer section paper in said second unit receiving means.

5. A conveyor mechanism for a paper stuffing machine wherein an insert paper is positioned within a folded outer section paper which comprises, a guide for holding a folded outer section paper, a pair of moving conveyor belts having spaced parallel passes coextensive with said guide, one pass being disposed on each side of the paper carried in said guide, means for moving said parallel belt passes toward and away from each other respectively to grasp said paper and release the same to move the paper in said guide and to stop the same, and means disposed adjacent the path of travel of said paper for spreading said folded outer section paper while it is moved by said belts whereby to receive an insert paper when said folded outer section paper is released by said belt.

6. A conveyor mechanism for a paper stuffing machine wherein an insert paper is positioned within a folded outer section paper which comprises, a guide for holding a folded outer section paper, a pair of moving conveyor belts having spaced parallel passes coextensive with said guide, one pass being disposed on each side of the paper carried in said guide, means for moving said parallel belt passes toward and away from each other respectively to grasp said paper and release the same to move the paper in said guide and to stop the same, said means comprising a plurality of pulleys positioned inwardly of the parallel passes of said belts, and means for moving said pulleys outwardly and inwardly relative to the paths of travel of said belts, and means disposed adjacent the path of travel of said paper for spreading said folded outer section paper while it is moved by said belts whereby to receive an insert paper when said folded outer section paper is released by said belt.

11

7. A conveyor mechanism for a paper stuffing machine wherein an insert paper is positioned within a folded outer section paper which comprises, a guide for holding a folded outer section paper, a pair of moving conveyor belts having spaced parallel passes coextensive with said guide, one pass being disposed on each side of the paper carried in said guide, means for moving said parallel belt passes toward and away from each other respectively to grasp said paper and release the same to move the paper in said guide and to stop the same, said means comprising a plurality of pulleys positioned inwardly of the parallel passes of said belts, and cam operated means for moving said pulleys outwardly and inwardly relative to the paths of travel of said belts, and means disposed adjacent the path of travel of said paper for spreading said folded outer section paper while it is moved by said belts whereby to receive an insert paper when said folded outer section paper is released by said belt.

8. A paper stuffing machine comprising a pair of units, means for feeding a folded outer section paper from one unit, means for conveying said fed outer section paper to the next adjacent unit, means intermediate said units for spreading said folded outer section paper during movement from the first unit to the second unit, means for feeding an insert paper from said second unit into embraced relationship with said spread outer section paper delivered from said first unit simultaneously with the feeding of a folded outer section paper from said first unit, and means for rendering said conveying means inoperative during feeding of papers from said units.

12

9. A paper stuffing machine comprising a pair of units, a hopper in each unit for holding a stack of folded outer section papers and insert papers respectively, means for feeding a folded outer section paper from one of said 5 hoppers, receiving means for receiving said folded outer section paper comprising a guide for holding said outer section paper, a pair of moving conveyor belts having spaced parallel passes coextensive with said guide, one pass being disposed on each side of the paper carried in said guide, means for moving said parallel belt passes toward each other to grasp said paper and carry the same forwardly, means disposed adjacent the path of travel of said paper for spreading said folded outer section paper while it is moved by said belts, receiving means 10 for said second unit, means for releasing said belts from said paper to stop said paper in said second unit securing means, and feeding means for said second unit for positioning an insert paper from said stack into embraced relationship with said stopped spread outer section paper in said second unit securing means.

References Cited in the file of this patent

UNITED STATES PATENTS

25	Number	Name	Date
	1,373,869	Currie -----	Apr. 5, 1921
	1,571,572	Craig -----	Feb. 2, 1926
	1,845,412	Hathaway -----	Feb. 16, 1932
	2,159,987	Hartmann -----	May 30, 1939
30	2,461,573	Schweizer -----	Feb. 15, 1949