Nov. 12, 1935. P. R. HEYGEL 2,021,064

METHOD OF AND MEANS FOR MAKING BOOKLETS OF CIGARETTE PAPER

Filed Jan. 12, 1933 4 Sheets-Sheet 1

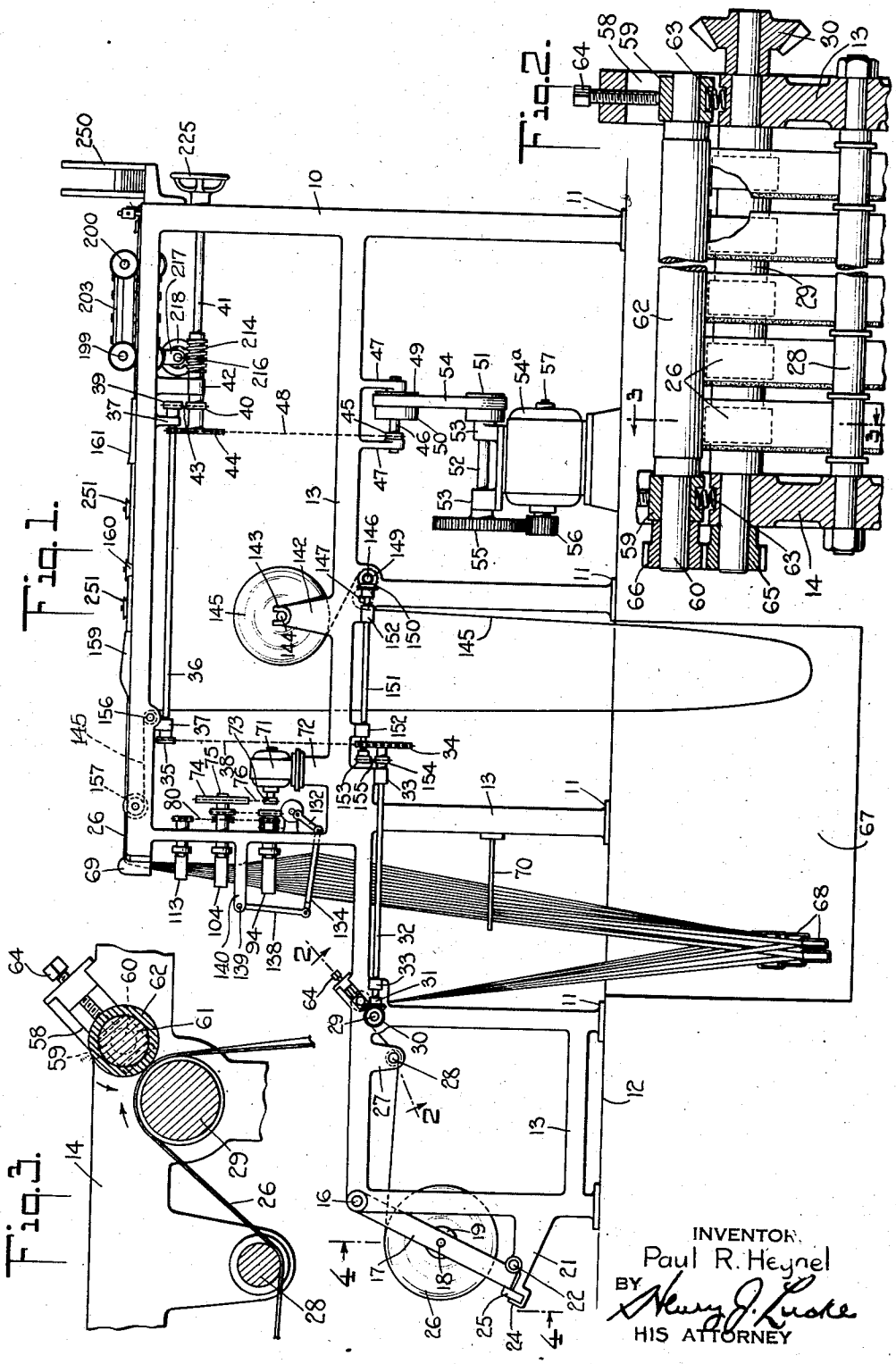


Fig. 1.

Fig. 2.

Fig. 3.

INVENTOR.
Paul R. Heygel
BY Henry J. Locke
HIS ATTORNEY

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Fig. 4.

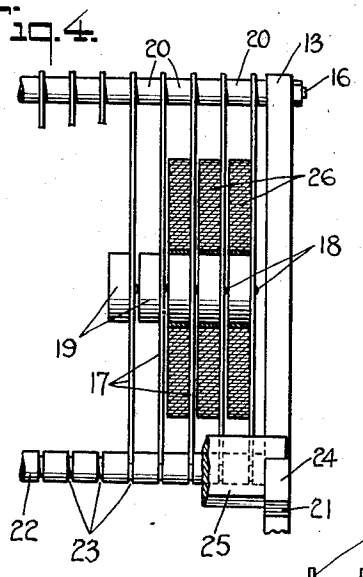


Fig. 5.

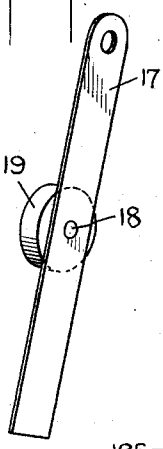


Fig. 6.

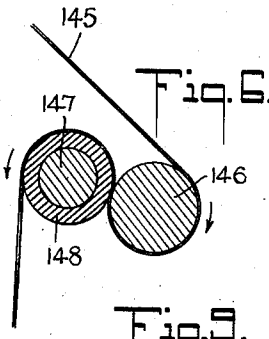


Fig. 9.

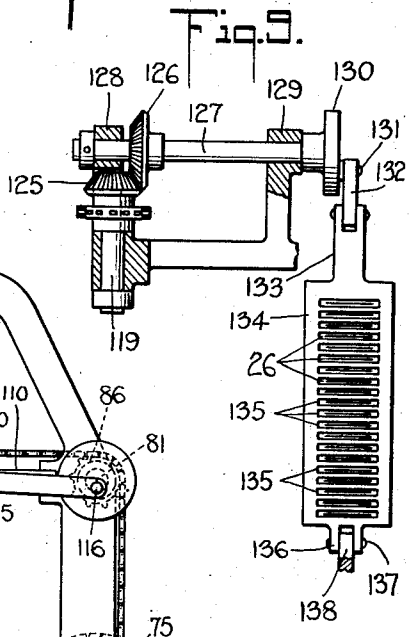
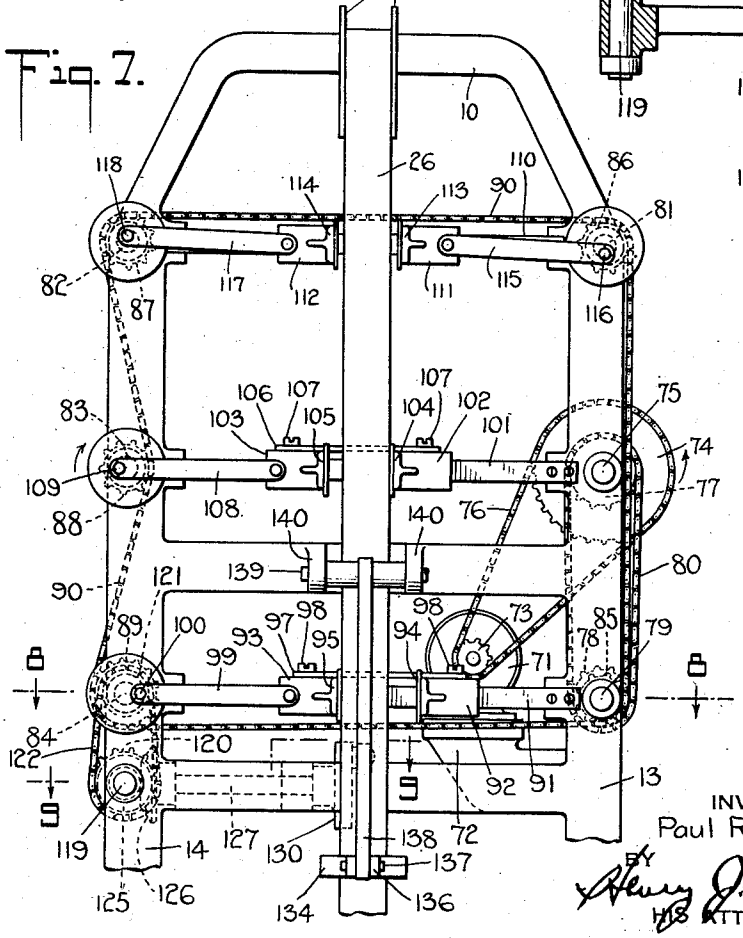


Fig. 7.



INVENTOR,
Paul R. Heygel
BY
Henry J. Lucke
HIS ATTORNEY

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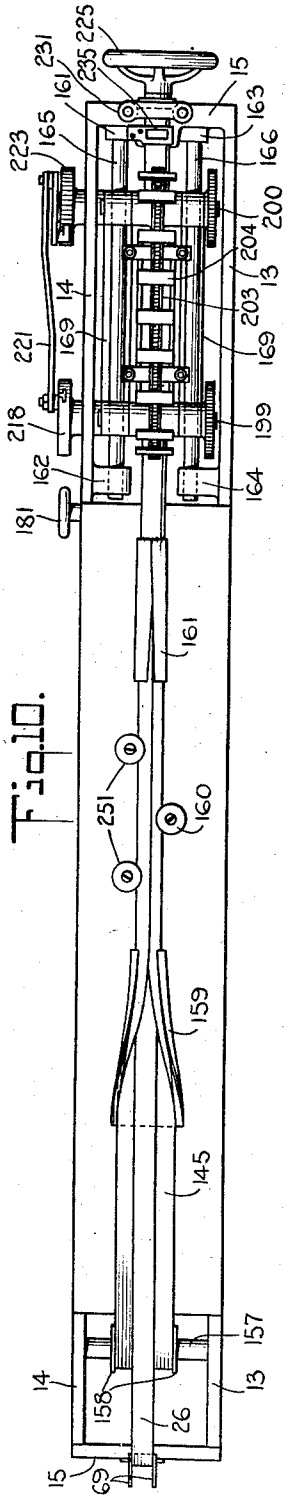


Fig. 10.

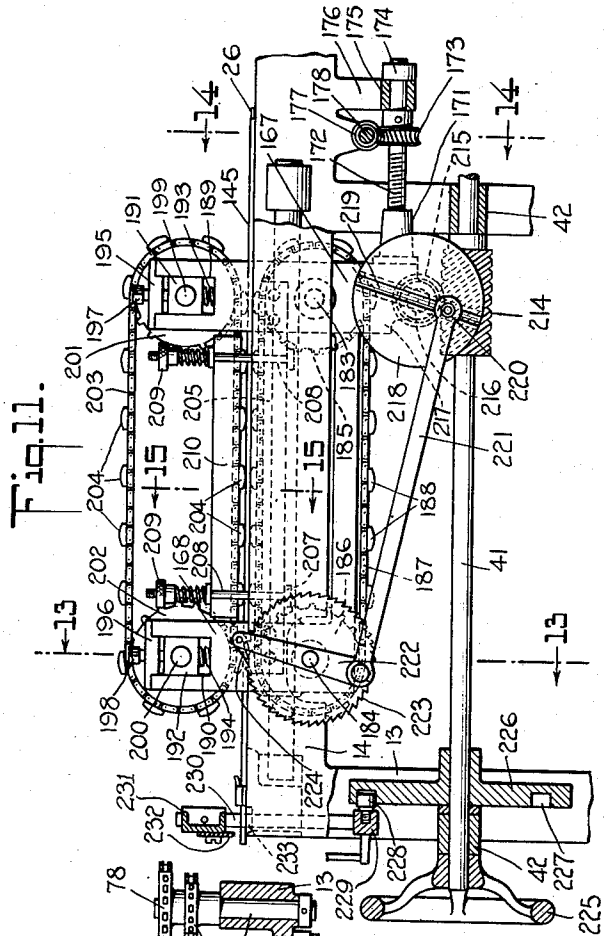


Fig. 11.

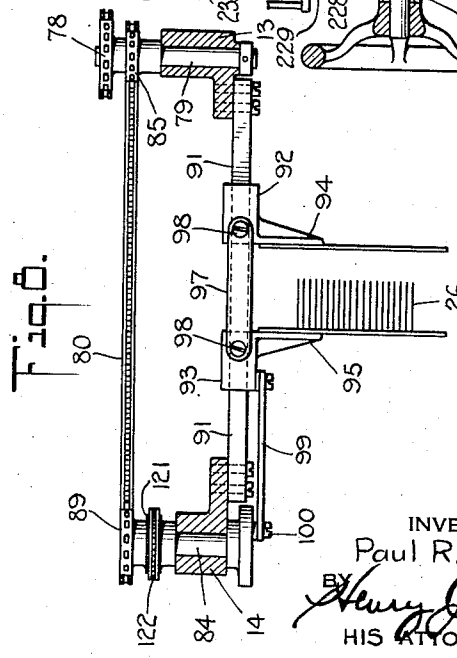


Fig. 8.

INVENTOR,
Paul R. Heygel
BY Henry J. Locke
HIS ATTORNEY

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Fig. 12.

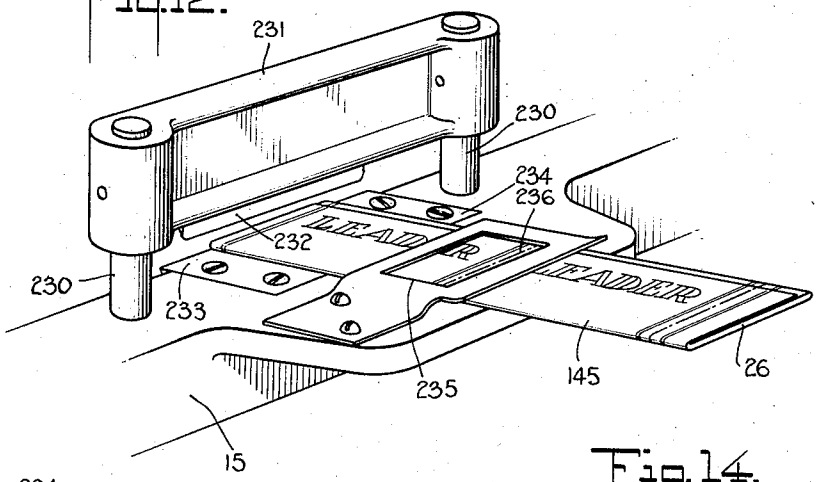


Fig. 13.

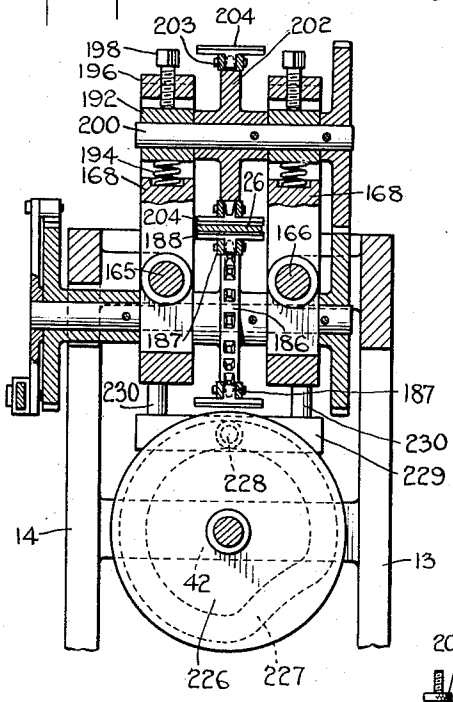


Fig. 14.

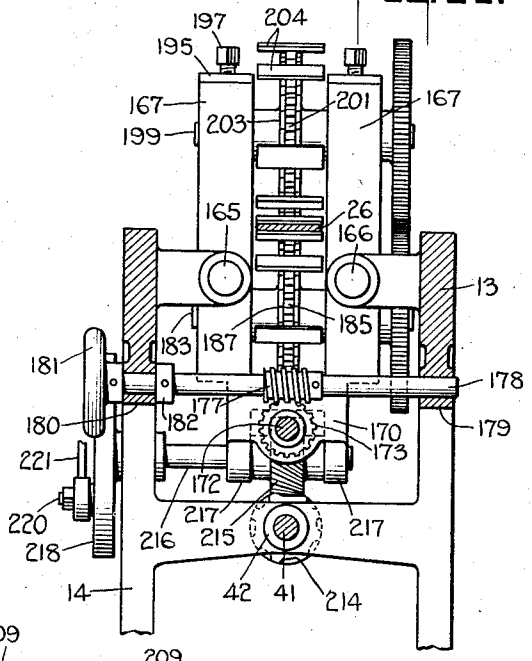
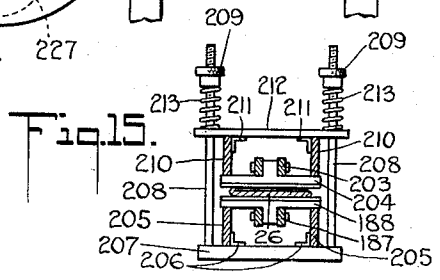


Fig. 15.



INVENTOR,
Paul R. Heygel
BY
Henry J. Lucke
HIS ATTORNEY

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UNITED STATES PATENT OFFICE

2,021,064

METHOD OF AND MEANS FOR MAKING BOOKLETS OF CIGARETTE PAPER

Paul R. Heygel, Ridgefield, N. J., assignor to Harry H. Straus, New York, N. Y.

Application January 12, 1933, Serial No. 651,310

9 Claims. (Cl. 164—49)

This invention relates to an improved method of and improved means for making booklets of cigarette paper.

Booklets of cigarette paper are usually in the form of a stack of individual sheets of gummed or plain cigarette paper of uniform dimension and enclosed in a cover of thick paper stock, the ends of the cover overlapping one another. Usually, the cover bears advertising indicia such as a trade-mark, pertaining to either the cigarette paper per se or to a particular brand or brands of tobacco which may be suitable as the filler for the cigarettes, the paper serving as the outer container tube.

Usually, the advertising or other printed matter appearing on the cover is arranged within printed outlines, the edges of the cover at the open ends of the thus formed booklet being preferably severed in symmetrically spaced relation to such marginal lines.

Heretofore, such booklets of cigarette paper have been made by practically wholly manual operations, the individual paper sheets being manually stacked and cut and placed within individual book covers.

An object of the present invention is to eliminate as far as practicable the manual operations involved.

A feature of the invention is the provision of a plurality of strips of indefinite length of cigarette paper, preferably corresponding to the number of individual sheets to be contained in a single booklet, assembling the strips in substantially superposed relationship and severing the superimposed strips of the desired number to form individual stacks of cigarette sheets.

A feature of the invention is the provision of a sheet of indefinite length bearing on its face the desired trade-mark and/or other printed matter, the same being arranged serially lengthwise of the strip, the strip having a width conforming to the desired dimensions of the cover, including the overlapping end portions, the strip being severed, as appears more fully hereinafter, to form individual covers.

A preferred form of my invention embodies suitable procedure and means for feeding the cover strip in proper relation to the superposed strips of cigarette paper, folding over the end portions of the strip to enclose the strips of cigarette paper and severing the thus combined cover strip enclosing the superposed strips of cigarette paper in the proper lines of severing to locate the printed marginal lines and/or the printed matter as an entirety in desired relationship to the edges of the resulting individual booklets of cigarette paper.

Pursuant to the preferred forms of my invention, the respective strips of cigarette paper are located at or before the stage of severing under conditions of substantially uniform tension, whereby upon severing of the superimposed strips, the resulting individual sheets are of substantially uniform dimension.

My invention contemplates suitable procedure and means whereby adjustment is afforded between the severing means, usually a knife of the guillotine type, and the cover strip and enclosed superposed strips of cigarette paper, to compensate for relative displacement, including variations arising from change of temperature, humidity, difference in character of paper stock, etc.

An object of my invention is an improved machine for arranging strips of paper of indeterminate length in superimposed relation to each other and with such strips of paper either gummed or ungummed, as desired, and the enclosing of such superimposed strips of paper in a wrapping means which forms the wrapper of the cigarette paper book to be formed from the strips of indeterminate length.

Where a plurality of strips or sheets of paper are superimposed upon each other, and particularly where such plurality of sheets after being superimposed upon each other are enclosed within a wrapper, there is a considerable amount of air trapped not only within the wrapper, but also between adjacent strips of paper. It is essential in order to produce uniform "books" from the strips of indeterminate length, that the paper as a unit be fed without serious distortion, and this is impossible where a pair of cooperating rolls are utilized as a means for acting on the superimposed strips of paper to feed the same to the cutting device. The entrapped air tends to force the strips of paper out of registry with each other and actually to cause a lateral flattening out and distortion of the enwrapped paper.

An object of my invention therefore is an improved means for so feeding the enwrapped plurality of superimposed strips of paper as to avoid any series of derangement thereof or distortion of the shape of the package or resulting book of cigarette paper.

Further features and objects of the invention will be more fully understood from the following detail description and the accompanying drawings in which

Fig. 1 is a side elevation showing a machine embodying my invention;

Fig. 2 is a sectional plan on the line 2—2 of Fig. 1, on an enlarged scale;

Fig. 3 is a detail vertical sectional view on the line 3—3 of Fig. 2;

Fig. 4 is a sectional elevation on line 4—4 of Fig. 1, on an enlarged scale;

Fig. 5 is a perspective view of one of the paper roll holding members;

Fig. 6 is a detail vertical sectional view through the feed rolls of the cover strip;

Fig. 7 is a detail vertical elevation of the straightening mechanism for effecting superposing of the cigarette paper strips;

Fig. 8 is a sectional plan view on the line 8—8 of Fig. 7;

Fig. 9 is a sectional elevation on the line 9—9 of Fig. 7, on an enlarged scale;

Fig. 10 is a top plan view showing the manner of operation and means for enveloping the cover strip about the superposed strips of cigarette paper;

Fig. 11 is a detail vertical elevation on an enlarged scale, as viewed from the side opposite to that appearing in Fig. 1, of the feed mechanism;

Fig. 12 is a perspective view of a portion of the book separating mechanism and the means for obtaining registry between the cutting means and the printed indicia on the paper books;

Fig. 13 is a sectional elevation on the line 13—13 of Fig. 11;

Fig. 14 is a sectional elevation on the line 14—14 of Fig. 11; and

Fig. 15 is a sectional elevation on the line 15—15 of Fig. 11.

Referring to the drawings, 10 designates a framework built up of angular iron, or of castings bolted together as may be preferred, and such framework at the lower ends of the uprights thereof is provided with bases 11 all preferably lying in the same horizontal plane and the framework 10 is supported by a base 12, such as a concrete base, or by any other rigid support.

The framework 10 is composed of parallel sides, as the sides 13 and 14 shown in Fig. 10 connected together by various cross members, such as the cross member 15. At one end of the framework 10, and at what may be called the entrance end of such framework, and in each of the side members 13 and 14 are bearings in alignment with each other and in which bearings is mounted a shaft 16.

On the shaft 16 is pivotally arranged a plurality of elongated strips or plates 17 of the character shown in Fig 5, such strips being of relatively thin metal and each of such plates has securely fastened thereto by riveting, or in any other suitable manner, a laterally extending stub shaft 18, and on each shaft is rotatably mounted a roller 19. The plates 17 are equally spaced apart from each other by collars 20, loosely mounted on the shaft 16, see Fig. 4.

At the extreme end of the side frame members 13 and 14 and below the shaft 16 are laterally extending arms 21, and secured to such arms and lying parallel to the shaft 16 is a shaft 22, such shaft being provided with a plurality of parallelly arranged grooves 23 of approximately the width of the thickness of the plates 17, and the space between such grooves 23 is approximately the distance between the plates 17, as defined by the collars 20 on the shaft 16. The plates 17 are therefore not only rotatably or pivotally mounted on the shaft 16, but the lower ends thereof are housed in the slots or grooves 23. To insure the plates 17 being held in the desired position with respect to the shaft 16 and shaft 22, I arrange at the end of each of the arms 21, a groove 24 in which is adapted to be placed a bar 25, preferably of wood, although any other material may be employed for such bar.

The bar 25 acts as a locking means to prevent unauthorized outward movement of the various plates 17 from the grooves 23. Fitting on each of the rotatable rollers 19 is a roll 26 of cigarette paper which has been preferably, although not necessarily, specially prepared to have a line of adhesive material extending along the length thereof and adjacent to one edge and on one face thereof, it being understood that when the strips 26 are arranged parallel to or superimposed on each other, that the adhesive edges will also be booked in like manner, that is, superimposed one on the other.

On the side frame members 13 and 14 and relatively adjacent to the shaft 16 are downwardly extending arms 27 in which are formed bearings to receive an idler shaft 28 which is arranged parallel to the shaft 16 and therefore to the axes of the rolls of cigarette paper 26. The cigarette paper 26 passes from the rolls and under the idler roll 28, as clearly shown in Figs. 1 and 3. Adjacent to the idler roll 28 and in the side frame members 13 and 14 are arranged bearings in which is rotatably mounted a roller 29 and over which the strips of cigarette paper 26 are fed, as clearly shown in Fig. 3. Secured to one end of the roller 29 is a bevel gear 30 which meshes with and is driven by a similar bevel gear 31, secured to one end of a shaft 32, such shaft being rotatably mounted in bearings 33 on the side frame member 13. On the end of the shaft 32 remote from the bevel gear 31 is secured a sprocket 34 which is in alignment with a sprocket pinion 35 secured to one end of a shaft 36 that is rotatably mounted in aligned bearings 37 on the side frame member 13 and adjacent to the top edge thereof.

Over the aligned sprockets 34 and 35 runs a sprocket chain 38 and by means of which power is transmitted from the shaft 36 to the shaft 32 and thence to the roller 29. On the end of the shaft 36 remote from the sprocket pinion 35 is a sprocket 39 which is in alignment with a sprocket 40 secured to a shaft 41 rotatably mounted in bearings 42 in the framework 10. Over the sprockets 39 and 40 runs a sprocket chain 43, by means of which power is transmitted from the shaft 41 to the shaft 36 and thence to the roller 29 in the manner above described.

On the shaft 41 adjacent to the sprocket 40 is a sprocket 44, which is in alignment with a sprocket 45 secured to a countershaft 46 rotatably mounted in bearings 47 on the side frame member 13 and over the sprockets 44 and 45 runs a sprocket chain 48 and by means of which power is transmitted from the countershaft 46 to the shaft 41. On the countershaft 46 is mounted a loose pulley 49 and a tight pulley 50, these pulleys being in alignment with a wide driving pulley 51 that is secured to a jack shaft 52 rotatably mounted in bearings 53 on a driving motor 54a. Over the wide pulley 51 and either of the loose or tight pulleys 49 and 50, as may be desired, runs a driving belt 54, suitable mechanism being provided for shifting the belt 54 from either the loose pulley 49 to the tight pulley 50, or vice versa, thus enabling power to be transmitted

to the countershaft 46 and thence to the mechanism above described, or not, as desired.

On the end of the jack shaft 52, remote from the wide pulley 51 is arranged a gear 55 which meshes with and is driven by a pinion 56 on the drive shaft 57 of the motor 54a, such motor being securely mounted on the concrete or other base 12. In the side frame members 13 and 14 and adjacent to the bearings of the roller 28 are arranged guideways 58, (see Figs. 2 and 3) in which are slidably mounted bearing members 59, and in such bearing members is rotatably mounted a shaft 60, such shaft being enlarged in its intermediate portion, as indicated by the reference numeral 61, and on the enlarged portion is arranged a tubular member 62 of relatively resilient material, such as rubber or the like.

The bearings 59 are yieldingly held in the guideways 58 by the springs 63, and means such as the bolts 64 are utilized to force the shaft 60 and therefore the resilient cover 62 of the member 61 into relatively close association with the surface of the roller 29. On the end of the roller 29 remote from the bevel gear 30 is arranged a gear 65 which meshes with and drives a gear 66 secured on the adjacent end of the shaft 60. The roller 29, and therefore the roller 62, are driven in opposite directions and at the same peripheral speed and the strips 26 of cigarette paper are fed between such rolls and downward as clearly shown in Figs. 1 and 3.

It is desirable at this point in the travel of the strips 26 of cigarette paper to provide a relatively large bight therein to facilitate subsequent operations thereon and I have therefore arranged in the concrete or other base 12 a suitable well 67 (see Fig. 1) in which such bight of the strips 26 are housed, and to insure the bight remaining in position, I have provided each bight of each strip 26 of cigarette paper with a ring or other formation of wire 68. From the ring 68 the strips 26 of cigarette paper pass upwardly of the machine until the top of such machine is reached, the strips of paper 26 which, as they pass through the rolls 29 and 62, lie parallel to each other and in substantially the same horizontal plane, and as they pass to the top of the framework 10, they are still parallel to each other, but lie in a plurality of superimposed planes, and as thus position, pass between a pair of spaced guide plates 69, as clearly shown in Fig. 10.

In the path of movement of the upwardly extending portion of the bights of cigarette paper strips 26 and on the framework 10 are arranged spaced bars 70, which act as a means for initially forcing or crowding the individual strips 26 into superimposed position with respect to each other. On the framework 10 above the bars 70 is arranged a mechanism for completing the operation of superimposing the strips 26 of cigarette paper with respect to each other, and such mechanism comprises mechanism that is illustrated in Fig. 1, and more clearly shown in enlarged form in Figs. 7, 8 and 9.

Such superimposing mechanism is relatively independent of the feeding mechanism for both the strips 26 of cigarette paper and the covering means therefor, and is therefore operated by a motor 71 mounted on a pedestal 72, formed integral with or separate from the framework 10. The drive shaft of the motor 71 has secured to one end thereof a sprocket pinion 73 which is in alignment with a sprocket wheel 74, secured to a shaft 75 that is rotatably mounted in suitable bearings formed in the framework 10 and over the sprocket pinion 73 and sprocket wheel 74 runs a sprocket chain 76 and which drives the shaft 75 at the appropriate speed and in the direction of the arrow shown in Fig. 7.

On the shaft 75 adjacent to the sprocket wheel 74 is a sprocket 77 which is in alignment with a sprocket 78 secured to a shaft 79 mounted for rotation in the framework 10 and parallel to but spaced apart from the shaft 75, as clearly shown in Fig. 7. Over the aligned sprockets 77 and 78 runs a sprocket chain 80 and which rotates the shaft 79 at the proper speed and in the direction of the arrow shown in Fig. 7.

Above the shaft 75 and in the framework 10 is rotatably mounted a shaft 81 parallel to both the shaft 75 and the shaft 79. Also in the framework 10 and parallel to the shafts 81, 75 and 79, respectively, but spaced apart therefrom and on the opposite side of the plurality of strips 26 of cigarette paper are the shafts 82, 83 and 84, and on the shafts 79, 81, 82, 83 and 84 are secured the sprockets 85, 86, 87, 88 and 89, respectively, such sprockets being equal in pitch and diameter and all in alignment with each other and over such sprockets runs the endless sprocket chain 90. By reference to Fig. 7, it will be noted that the shafts 79, 81, 82 and 84 rotate in the same direction, but because of the position of the sprocket chain 90 on the sprocket 80, the shaft 83 rotates in the opposite direction, as indicated by the arrow in Fig. 7. Also, it will be understood that these shafts rotate at the same speed.

Extending between the side frame members 13 and 14 and in alignment with the shafts 79 and 84 is a shaft 91 which may be of any shape, but preferably square, and on such shaft are slidably mounted members 92 and 93, respectively, one such member being located on either side of the plurality of strips 26 of cigarette paper, and each of these brackets 92 and 93 has extending outwardly therefrom or rearwardly or to the left, as viewed in Fig. 1, arms 94 and 95, respectively, such arms 94 and 95 being spaced apart from each other a distance considerably greater than the width of the strips 26 of cigarette paper, and such distance is maintained by means of a plate 97 extending between the members 92 and 93 and secured thereto by screws 98. Pivotally mounted to the member 93 is one end of a connecting rod 99, and the other end of this connecting rod is pivotally mounted on a crank pin 100, eccentrically arranged on the shaft 84. Rotation of the shaft 84 will therefore cause a reciprocating motion of the arms 94 and 95, so as to bring them alternately into engagement with the edges of the strips 26 of cigarette paper it is desired to superimpose on each other.

Secured to the side frame members 13 and 14 and in alignment with the shafts 75 and 83, is a non-circular and preferably square shaft 101 and on this shaft are slidably mounted the members 102 and 103, respectively, such members being provided with outwardly or rearwardly extending arms 104 and 105, respectively, such arms being similar to the arms 94 and 95, but not necessarily of such length as such arms. The distance between the arms 104 and 105 is greater than the width of a strip 26 of cigarette paper, but such distance is less than the distance between the arms 94 and 95, and similarly to such arms 94 and 95, the distance between the arms 104 and 105 is maintained by the plate 106 secured to the members 102 and 103 by the screws 107.

Pivotally mounted to the member 103 is one end of a connecting rod 108, and the other end of this

connecting rod is pivotally attached to a crank pin 109 eccentrically arranged on the shaft 83.

By referring to Fig. 7, it will be obvious that when the arm 95 on the member 93 is in engagement with the edges of the plurality of strips 26 of cigarette paper it is desired to superimpose on each other, that the arm 104 on the opposite side of the strip 26 of cigarette paper will be in engagement with the opposite edges of the plurality of strips 26 of cigarette paper, and the same is true with regard to the arms 94 and 105.

Secured to the side frame members 13 and 14 and in alignment with the shafts 81 and 82 is a non-circular and preferably square bar 110, on which are slidably mounted the members 111 and 112. These members 111 and 112 are provided with outwardly or rearwardly extending arms 113 and 114, respectively, such arms being of suitable length but not necessarily of the length of either of the arms 104 and 105 or 94 and 95.

Pivotally mounted on the member 111 is one end of a connecting rod 115, the other end of this connecting rod being pivotally mounted on a crank pin 116 eccentrically arranged on the shaft 81. Pivotally mounted on the member 112 is one end of a connecting rod 117 and the other end of this connecting rod is pivotally mounted on a crank pin 118 eccentrically mounted on the shaft 82.

The distance between the arms 113 and 114 at any time is less than the distance between the arms 104 and 105 or between the arms 94 and 95, and the connection of the driving means therefore on the shafts 81 and 82 is such that the arms 113 and 114 approach each other simultaneously and separate from each other simultaneously.

On the side frame member 14, below the shaft 84, is rotatably mounted a shaft 119, such shaft being parallel to the shaft 84 and provided adjacent one end with a sprocket wheel 120. This sprocket wheel 120 is in alignment with a sprocket wheel 121 on the shaft 84 and over these sprocket wheels runs a sprocket chain 122 and by means of which power is transmitted from the shaft 84 to the shaft 119.

Mounted on the end of the shaft 119 adjacent to sprocket wheel 120 is a bevel pinion 125 which meshes with and drives a bevel gear 126, secured to a shaft 127 rotatably mounted in bearings 128 and 129, and such shaft 127 lies at right angles to the shaft 119 and extends inwardly toward the side frame member 13. Such shaft, however, terminates approximately midway between the side frame members 13 and 14 and on its inner end has secured thereto a face plate 130.

Eccentrically mounted on the face plate 130 and extending laterally outward therefrom is a crank pin 131 and to which is pivotally attached one end of a connecting rod 132. The other end of this connecting rod is pivotally attached to the forked end of a member 133. The member 133 has formed integral therewith a plate 134, which plate is provided with a plurality of parallelly arranged slots 135, the number of such slots 135 being equal to the number of strips 26 of cigarette paper, and one strip 26 is fed through each of the slots 135.

The approximate size of the strips 26 of cigarette paper with respect to the slots 135 is clearly apparent from an inspection of Fig. 9.

At the end of the plate 134, remote from the member 133, is a pair of spaced ears or lugs 136, and to such ears by means of a pin 137 is pivotally attached one end of a link 138.

The upper end of the link 138 is pivotally mounted on a shaft 139 mounted in the spaced arms or brackets 140 formed integral with the framework 10 (see Fig. 1).

As the strips 26 of cigarette paper move upward from the bight above referred to, such strips are crowded together slightly by the arms 70 and are then passed up through the slots 135 in the plate 134, but it will be obvious that due to the length of the slots 135 as compared with the width of the strips 26 of cigarette paper that such strips 26 are not yet at this stage superimposed one on the other. The strips 26 are therefore led up from the plate 134 between the arms 94, 95, the arms 104, 105, and the arms 113 and 114, and thence through the spaced guide plates 69. After passing through the space guide 69, mechanism to be hereinafter described, carries the now superimposed strips 26 onward through the machine, but prior thereto, the motor 71 is started in operation and through the chain of sprockets and sprocket wheels, above described, reciprocatory motion is imparted to the plate 134 and from the connections 132 and 138 it is obvious that a relatively compound or complex motion is imparted to the plate 134, and this complex motion is imparted to the strips 26 of cigarette paper tending to shake out any curve or twist that may tend to be put into the strips 26 so that the strips pass upward from the plate 134 parallel to each other, but not definitely superimposed on each other.

As the strips 26 pass upward through the pair of arms 94, 95, the edges of the strips 26 are alternately struck by the arms 94 and 95 tending thus to bring the strips 26 more and more into superimposed position. Any advantage gained by the arms 94 and 95 in this direction is enhanced by the arms 104 and 105 which in turn are operated to strike alternately the opposite edges of the strips 26 and as above described, the space between the arms 104 and 105 is less than the distance between the arms 94 and 95.

After passing upward from the arms 104 and 105, the parallelly arranged strips 26 which are at this time brought nearer into superimposed position have the edges thereof engaged simultaneously by the arms 113 and 114, which arms complete the final act of bringing the strips 26 of cigarette paper into superimposed position, so that as the strips 26 pass through the guide plates 69, they are accurately superimposed on each other.

Formed on the side frame members 13 and 14 are aligned upwardly extending brackets, but one of which, the bracket 142 on the side frame member 13, being shown in Fig. 1. At the upper end of the brackets are U-shaped openings or bearings 143 in which is rotatably mounted a removable shaft 144. Rotatably mounted on the shaft 144 is a roll of cigarette paper book cover material 145, and such material is fed from the roll downward under the roller 146 and over a roller 147, which roller 147 is provided with an outer sleeve or covering 148 of relatively resilient material, as for example rubber or the like.

The rollers 146 and 147 (see Figs. 1 and 6) have their ends machined in the usual manner and such ends are rotatably mounted in suitable bearings formed in the side frame members 13 and 14. On one of the rollers, the roller 146, is secured a bevel gear 149, which meshes with and is driven by a corresponding bevel gear 150 secured to one end of a shaft 151, such shaft 151 being rotatably mounted in aligned bearings

152, secured to or formed integral with the side frame member 13. Secured to the end of the shaft 151 remote from the bevel gear 150 is a sprocket wheel 153, which is in alignment with a sprocket wheel 154 secured to the shaft 32 and over the sprockets 153 and 154 runs a sprocket chain 155, and by means of which power is transmitted from the shaft 32 to the shaft 151, and thus in turn to the roller 146. The roller 147 is driven by suitable gearing between such roller and the roller 146 in the same manner as the roller 61 is driven from the roller 29, as above described.

After passing from the roller 147, the covering material 145 passes downward in a loop or bight within the well 67 and thence upwardly and over a roller 156 rotatably mounted in aligned bearings in the side frame members 13 and 14, and then moves what may be termed rearwardly of the machine or to the left of Fig. 1, and around a roller 157, which is rotatably mounted in suitable bearings in the side frame members 13 and 14 and the roller 157 is of such a diameter as to bring the covering material 145 into a horizontal plane that lies substantially in the horizontal plane in which the superimposed strips 26 of cigarette paper lie as they pass through the guide plates 69.

The roller 157 is flanged as indicated at 158 (see Fig. 10) so that the cover material 145 is centrally located with respect to and beneath the superimposed strips 26 of cigarette material. The cover material 145 and the strips 26 of cigarette paper are thus brought into association with each other and travel onward through the machine or to the right as shown in Fig. 10, at the same speed, so that there is no relative motion between these two materials.

On the framework 10 and in the path of movement of the associated materials 145 and 26 lies a guide 159 which acts to partially fold the cover material 145 about the groups of superimposed strips 26 of cigarette paper, as will be clearly apparent in Fig. 10. After passing through the guide 159, the partially folded cover material 145 on one fold thereof comes into engagement with a rotatably mounted member 160 which acts to fold one portion of the overlapping edges of the cover material 145 under the other. The now practically enclosed superimposed strips 26 of cigarette paper pass from the member 160 and into a guide member 161, where the operation of folding the cover material 145 about the superimposed strips 26 of cigarette paper is completely performed.

The enclosed strips 26 now pass through a mechanism which feeds the same onward and cuts the same off into books of appropriate length, such feeding and cutting mechanism comprising the following instrumentalities.

Adjacent the end of the framework 10 and extending inwardly from the side frame members 13 and 14 are aligned pairs of bearings 161, 162, and 163, 164, respectively. In the pair of bearings 161, 162 is fixedly mounted a shaft 165, while in the pair of bearings 163, 164 is fixedly mounted a shaft 166. These shafts lie parallel to each other and extend lengthwise of the framework 10. Slidably mounted on the shafts 165 and 166 is a relatively elongated framework composed of spaced end members 167 and 168. The members 167 and 168 are connected together by integrally formed spaced bars 169, such bars 169 determining the distance between the pairs of members 167 and 168. The pair of members 167 are joined together at their lower ends by a cross member 170 and such cross member 170 has formed integral therewith and extending laterally outward from one side thereof a boss 171 that is internally threaded to receive the threaded screw member 172.

Secured to the screw member 172 (see Figs. 10 and 14) is a worm wheel 173, and secured to the extreme end of the screw member 172 is a collar 174. The screw member 172 is rotatably mounted in a bearing 175 formed in a bracket member 176 on the side frame member 14. The worm wheel 173 meshes with and is driven by a worm 177 secured to a shaft 178 rotatably mounted in bearings 179 and 180 formed in the side frame members 13 and 14, respectively.

Secured to the shaft 178, adjacent the side frame member 14, is a hand wheel 181 (see Fig. 10) and by means of which the shaft 178 may be rotated. A collar 182, (see Fig. 14) secured to the shaft 178 adjacent to the inner face of the bearing 180, prevents longitudinal movement of the shaft 178. Rotation of the hand wheel 181 results in the longitudinal movement of the spaced end members 167 and 168 (see Figs. 11 and 14) joined together by the members 169 along the parallelly arranged spaced shafts 165 and 166, and this ability to move the above named construction permits of an adjustment for a purpose in a manner to be hereinafter described.

In the lower end of the pair of spaced end members 167, and extending transversely of the framework 10 is a shaft 183 (see Fig. 11). In the same relative position with respect to the pair of members 168 is rotatably mounted a shaft 184. Mounted on shafts 183 and 184 are sprocket wheels 185 and 186, respectively, the sprocket wheels 185 and 186 being of the same pitch and diameter and over such sprocket wheels, which are in alignment with each other, runs a sprocket chain 187. The sprocket chain 187 has affixed thereto and extending transversely thereof, at proper spaced intervals, bars 188. The upper reach of the sprocket chain 187 with the transverse bars 188 thereon lies in a horizontal plane and in a plane coincident with the horizontal plane in which lie the strips 26 of cigarette paper enclosed in the wrapping material 145, so that the upper reach of the sprocket chain 187 forms practically a platen on which the cigarette paper may rest or is fed.

In each of the pairs of end members 167 and 168, vertically above the shaft 183, are vertical guideways 189 and 190, respectively, and in the pairs of guideways 189 and 190, respectively, are slidably mounted pairs of bearings 191 and 192, respectively, each pair of bearings 191 and 192, respectively, being yieldingly held in the guideways 189 and 190, respectively, by the helical springs 193 and 194, respectively. The top of the pairs of guideways 189 and 190, respectively, are closed by plates 195 and 196, respectively, and extending through such plates are set screws 197 and 198, respectively, to thereby adjustably position the bearings 191 and 192, respectively, in their guideways.

Rotatably mounted in the pair of bearings 191 is the shaft 199, while rotatably mounted in the bearing 192 is the shaft 200. These shafts are parallel to each other and to the shafts 183 and 184 and extend transversely of the framework 10 and lie above such framework. Secured to the shaft 199 is a sprocket wheel 201, while secured to the shaft 200 is the sprocket wheel 202. The sprocket wheels 201 and 202 are equal in pitch and diameter to each other and to the

sprockets 185 and 186, and over such sprocket runs a sprocket chain 203. The sprocket chain 203 has secured thereto along its length transversely arranged bars 204, these bars being similar in all respects to the bars 188 on the sprocket chain 187 and the spacing also of such bars 204 is identical with the spacing of the bars 188. Also, the lower reach of the sprocket chain 203 lies parallel to the upper reach of the sprocket chain 187, and the bars 188 and 204, as the sprocket chains 187 and 203 move onwardly, are in registry with each other and the lower reach of the sprocket chain 203 with the cross bars 204 thereon lies in a plane parallel to the plane in which lies the upper reach of the sprocket chain 187 with the cross bars 188 thereon, and the distance between such planes is slightly less than the thickness of the plurality of superimposed sheets 26 of cigarette paper plus the thicknesses of the folded covering material 145 and such distance may be varied as desired in the following manner.

Beneath the upper reach of the endless sprocket chain 187 and engaging the under surface of the cross bars 188 and at each end of such cross bars are vertical tracks 205. Along the lower inner edge of each of the tracks 205 is arranged and angle iron 206, and secured to the angle irons and therefore to the tracks 205, adjacent each end of the angle irons 206 is a cross bar 207, such cross bars being attached to the angle irons 206 and therefore to the vertical spaced tracks 205. The ends of the cross bar 207 extend laterally outwardly beyond the tracks 205 and such cross bars have secured thereto at each end thereof upwardly extending bolts 208, the upper ends of such bolts being threaded to receive nuts 209.

Resting on the upper face of the cross bars 204 of the lower reach of the endless sprocket chain 203 are spaced tracks 210 similar to the tracks 205, and secured to the upper inner edge of each of the tracks 210 is an angle iron 211. Secured to the angle irons 211, adjacent to the ends thereof and vertically above the cross bars 207, as above described, are cross bars 212, such cross bars being drilled to allow free passage of the threaded bolts 208.

Surrounding the upper part of the threaded bolts 208, and lying between the nuts 209 and the upper surface of the cross bars 212, are helical springs 213, and the tension of the springs may be regulated by the nuts 209 in the usual manner, thus tending to yieldingly hold the tracks 210 and tracks 205 in engagement with the cross bars 204 of the sprocket chain 203 and the under surface of the cross bars 188 of the sprocket chain 187 between which, as will be noted, is situated the strips 26 of cigarette paper enclosed in the outer wrapping 145.

The distance between successive cross bars 188 and between successive cross bars 204 is approximately equal to the length of a so-called book of cigarette papers, but this is merely for convenience and the distance between such cross bars may be anything that is desired, the object to be attained being to grasp the superimposed strips 26 of cigarette paper enveloped in the outer wrapping material 145 at a plurality of spaced points along its length to thereby feed the same through the machine rather than to have such enclosed plurality of superimposed strips 26 of cigarette paper fed through by feed rolls or equivalent, which will at all times be in engagement with the paper at the point of feed. This is essential as it has been found that the use of a roller feed tends to roll up a portion of the material back of the exit end and distorts and renders unsalable the cigarette paper booked therefrom.

Secured to the shaft 41 adjacent the innermost of the bearings 42 is a worm 214 which meshes with and drives a worm wheel 215, secured to a shaft 216 rotatably mounted in bearings 217 formed at the lower end of the member 170. Secured to one end of the shaft 216 is a face plate 218 that is provided with a diametrically arranged T-slot 219, and in which slot is adjustably mounted the crank pin 220. Pivotally mounted on the crank pin 220 is one end of a connecting rod 221 and the other end of this connecting rod is pivotally attached to one end of a lever 222, which lever is rotatably mounted on the shaft 184. Secured to the shaft 184 adjacent to the lever 222 is a ratchet wheel 223 and with the teeth of such ratchet wheel engages the spring pressed pawl 224 that is pivotally mounted on the lever 222 at the end thereof remote from the connection of the connecting rod 221.

It is obvious, therefore, that rotary movement of the shaft 216 by reason of power transmitted thereto from the motor 54a will result in an oscillatory motion of the lever 222 and therefore in an intermittent step by step rotary movement of the shaft 184, this in turn resulting in an intermittent step by step movement of the lower and upper reaches of the spring chains 203 and 187, respectively. Also, this will necessarily result in an intermittent step by step motion of the plurality of strips 26 of cigarette paper enclosed in the outer wrapping material 145.

The shaft 41 is rotated through suitable mechanism from the motor 54a as above described, but may be rotated independently thereof by means of a hand wheel 225 secured to the end of the shaft 41, adjacent to the position naturally occupied by the operator of the machine.

Adjacent to the outermost bearing 42 of the shaft 41 is a cam plate 226, provided on one face with a cam groove 227, and in which works a cam roller 228. This cam roller 228 is secured to a cross bearing 229, as clearly shown in Fig. 13. Secured to and extending upwardly from the cross bar 229, while arranged parallel to and spaced apart from each other, are shafts or rods 230, such rods or shafts passing upward through suitable vertical bearings in the framework 10. At the upper end of the shafts or rods 230 is arranged a cross head 231, carrying on its lower edge a guillotine knife 232, which extends transversely of the path of travel of the superimposed strips 26 of cigarette paper.

The guillotine knife 232 operates in association with a fixed blade or anvil 233. As the shaft 41 rotates, such rotary motion is imparted to the cam plate 226, and the roller 228, riding in the cam groove 227, imparts to the cross bar or cross head 229 a reciprocating movement in a vertical plane. Thus, through the medium of the shafts or rods 230, and cross head 231, a reciprocating movement in a vertical plane, is imparted to the guillotine knife 232. The construction and arrangement of the cam groove 227 and the cam plate 226 with respect to the construction and arrangement of the intermittent drive for the sprocket chains 187 and 203 is such that the downward movement of the guillotine knife 232 into association with the anvil or fixed blade 233 takes place during pause or stop of such

sprocket chains between successive steps thereof. On top of the framework 10, between the guillotine knife 232 and the exit end of the sprocket chains 187 and 203, is a guide plate 234 and a sight 235. The outer covering material 145 for the plurality of superimposed strips 26 of cigarette paper is ordinarily provided with indicia such as printed or other advertising matter to denote the origin and character of the goods enclosed therein, and such indicia or a particular portion thereof on the space between said indicia or a particular portion thereof may be utilized as a guide along which to sever the books of cigarette paper from the indeterminate length of enclosed cigarette paper by means of the relative position of the sight 235 with respect to the guillotine knife 232. It may be that because of weather conditions, such as will affect the physical characteristics of the paper, either of the outer covering 145 and/or the strips 26 of cigarette paper, that the feed of the enclosed cigarette paper, as determined by the intermittent step by step movement of the sprocket chains 187 and 203, will result in gradually disturbing the relative arrangement in the cut necessary to sever a book from the indeterminate length of papers, and at the proper place to position the indicia thereon properly with respect to the book to be severed.

To correct any distortion resulting from this cause, the operator by turning the hand wheel 181 in the proper direction can and will move the entire assembly constituting the sprocket chains feed 187 and 203 either toward or from the guillotine knife 232, and such distortion may be accurately measured by picking out the appropriate element of the indicia on the outer wrapping 145.

In Fig. 12, the letter "R" on the word "LEADER" is shown in the proper position to permit the guillotine knife 232 to sever a book of cigarette papers from the indeterminate length of such cigarette papers and presumably the next succeeding cut made by the guillotine knife 232 may be on the dot and dash line 236 that is visible at the right hand end of sight 235.

The intermittent step by step feed of the endless sprocket chains 187 and 203 is such as to cause an onward movement of the indeterminate lengths of covering and cigarette paper 26 in steps equal to the length of the books to be cut therefrom, and such length of feed may be accurately determined by means of the T-slot 219 and the crank pin 220, the T-slot and crank pin 220 making it possible to adjust the length of the stroke or feed of the endless sprocket chains 187 and 203 within any length required or desired within the limits of the machine.

Assuming the machine to have been constructed and assembled as above described and that it is desired to operate the same, the operator will place on the rollers 19 the reels or rolls of cigarette paper 26, the number of rolls 26 placed in position depending on the number of sheets it is desired to have in the completed book.

The operator also places on the shaft 144 the reel or roll of covering material 145. The operator then takes the end of the covering material 145, brings the same downward over the roll 146 and upward over the roller 147 forming the material 145 into a loop that hangs into the well 67 and brings the same over the roll 155 and around the roller 157 and temporarily clamps the same in position. The operator will then take the ends of the strip 26 of cigarette paper and bring the same under the roll 28 and between the rolls 29 and 61, thence downwardly into bights or loops in the well 67, weighting each bight or loop with a ring 68 and then bring each of the ends of the strips 26 upward between the spaced arms 70 and then thread each end of the strips 26 through the slots 135 in the plate 134, thus bringing the same into substantially parallelism with each other. The strips are then fed up through the pairs of arms 94, 95, 104, 105, and 113 and 114, and thence upward between the spaced plates 69, the distance between such plates, as above described, being substantially equal to the width of the strips 26 of cigarette paper.

The strips 26, as they pass between the plates 69, are now in registry with each other and in superposed position and are brought forward onto the now upper surface of the covering material 145. With the strips 126 in position on the covering material 145, such covering material and therefore the strips 26 are fed through the preliminary folding device 159, where the outer covering material is given a preliminary folding about the superimposed strips 26. From the device 159 the now partially enclosed strips 26 are moved along and one side of the outer covering material 145 is brought into engagement with the member 160 which turns down such edge into position beneath the other or opposite edge. The now substantially enclosed cigarette paper 26 is brought through the folding device 161 where the strips 26 of cigarette paper are completely enclosed in the outer covering material 145 and such material is now fed through and between the endless sprocket chains 187 and 203, such sprocket chains being operated for this purpose by the hand wheel 225.

The material after coming out through the exit end of the sprocket chains 187 and 203 is fed through the sight member 235 and the guides 234 until the proper element of the indicia on the outer covering material 145 is in proper registry with the sight 235.

To properly position such element of the indicia, the operator manipulates the hand wheel 181 to move the entire feeding mechanism toward or from the knife 232 as may be required. The machine having been properly set up, the operator will throw power into the motor 71 to operate the pairs of arms 95 and 94, 104 and 105, and 113 and 114, and the plate 134.

The motor 54a may be presumed to be in operation whereupon the operator will move the belt 54 from the loose pulley 49 over to the tight pulley 50, thus throwing power into the power transmitting mechanism, above described in detail, and the machine is in operation.

The operation is continued as long as any paper remains on the reels, and should breakage of any individual strip 26 occur, the operator may temporarily shut down the machine and either remove the broken reel of cigarette paper 26, or patch the same as may be desired.

Any form of book collecting device may be used and preferably I utilize a form which is indicated in Fig. 1 by the reference numeral 250, and wherein the pile-up of cigarette paper books is held in substantially elevated position above the line of travel of the latest book cut from the indeterminate length of book material and which latest book when positioned over the pile is added thereto by appropriate mechanism, as for example, mechanism driven from the cross-head to which is attached the lower ends of the re-

ciprocating posts 230, and which cross-head carries the cam roller 228 running in the cam groove 227. In this form of book collecting device, which is the preferred form, the weight of the superimposed books prevents the opening of the individual books which may happen because of the resiliency of the outer covering material 145.

While the form indicated and above briefly described is the preferred form, it is obvious that any other form of book collecting device may be utilized and I do not, therefore, limit myself to any particular type of book collector.

In Fig. 10, I have described the roller 160 which is utilized as a means for folding over one edge of the length of the covering material 145 to place such edge under the opposite edge, but I may and preferably do utilize also on the opposite side of the stream of covering cigarette paper a pair of idler rolls 251 which will sufficiently guide the said opposite edge of the strip 145 so as to positively guide the same into association with the folding mechanism 161.

By referring to Fig. 10, it will be noted that the so-called opposite edge, that is the edge opposite to that engaged by the roller 160, does not flow into the folding and guiding member 161, as such edge flows on the outside of such member 161, as indicated, thereby allowing a closer folding of the edges of the covering material 145.

Further, and referring to Fig. 9, there is shown the comb member 134, provided with the plurality of parallelly arranged grooves or slots 135, and such comb member 134 is closed, that is, both sides are closed and the slots 135 are rectangular slots extending vertically—as viewed in Fig. 9—therethrough. This showing, however, is for convenience only and I may and preferably do have one or the other of the lateral edges of such comb member 134 open so that the slots or grooves 135 in such case become actual slots and the comb 134 more nearly an actual comb. This construction is of advantage in that it facilitates the weaving of the strips 26 of cigarette paper into the comb and also facilitates the repair or replacement of any strip upon breaking of one or more of the strips 26.

While I have necessarily described and illustrated the preferred embodiment of my invention somewhat in detail, it is to be understood that I may vary the size, shape and arrangement of parts comprising the device within relatively wide limits without departing from the spirit of the invention.

I claim:

1. In a machine of the kind described, the combination of a base, means thereon for guiding a plurality of superimposed strips of material having an enclosing envelope therearound, a cutting device arranged on the base and in the line of travel of the superimposed strips of material, and a feeding device for feeding such superimposed strips of material to the cutting means and movable as a unit with respect to the cutting device.

2. In a machine of the kind described, the combination with a cutting device, of a material feeding means comprising a pair of endless belts having opposing faces arranged in operative relation with respect to each other, each belt being provided with a plurality of transversely extending feeding bars arranged parallel to and spaced apart from each other, the endless belts being interconnected together to successively bring the bars on each belt into operative association with each other, whereby the transverse bars on the two belts act in unison, and the transverse bars act as gripping means for gripping the material worked upon therebetween, means for imparting an intermittent step by step movement to the belts, a relatively fixed reciprocating cutting means associated with the endless belt feeding means, means for operating the cutting means in synchronism with the intermittent step by step movement of the feeding means, a gauge interposed between the exit end of the feeding means and the relatively fixed cutting means, whereby the relation of the material being fed is determined with respect to the cutting means and means for bodily moving the endless belts toward and from the cutting means at will to determine the length of material cut off by the cutting means and as determined by the gauge.

3. In a machine of the kind described, the combination of a base, a guiding means thereon for guiding a plurality of superimposed strips of fibrous material enveloped by an outer covering of fibrous material, a fixed reciprocating cutter mounted on said base, a gauge associated with the cutter, a feeding means, a mounting for said feeding means mounted for relative movement toward and from the cutter on said base, said feeding means including spaced gripping means for successively gripping the superimposed strips of fibrous material simultaneously on opposite sides and successively at a plurality of spaced points along the length thereof, means for intermittently operating the feeding means by a step by step movement to impart a corresponding step by step movement of the superimposed strips of fibrous material toward the cutter, means for operating the reciprocating cutter in synchronism with the intermittent step by step movement of the feeding means.

4. In a machine of the kind described, the combination with a fixed reciprocating cutting means, of an intermittent step by step operated feeding means for feeding to the reciprocating cutting means, material composed of a plurality of superimposed strips of fibrous material, by intermittently gripping said plurality of strips simultaneously on both faces thereof, means for operating the reciprocating cutting means in synchronism with the feeding means, means for varying the relative position of the reciprocating cutting means and feeding means with respect to each other, and a gauge associated with the reciprocating cutting means and material feeding means for visually indicating the relative position of the reciprocating cutting means with respect to the material being fed.

5. In a machine of the kind described, the combination with a fixed reciprocating cutting means having a gauge associated therewith, of an intermittent step by step operated feeding means for feeding to the reciprocating cutting means a plurality of superimposed strips of fibrous material by intermittently gripping said plurality of strips simultaneously on both sides thereof at spaced points along the length thereof, means for operating the reciprocating cutting means in synchronism with the feeding means, to thereby effect the cutting operation during the period of rest of the superimposed strips of fibrous material, and means for moving the intermittent step-by-step feeding means as a unit toward and from the reciprocating cutter, as determined by the gauge, to effect relative movement of the recip-

rocating cutter with respect to the superimposed strips of fibrous material.

6. In a machine of the kind described, the combination with a cutting device of a material feeding means comprising a pair of endless belts having opposing faces arranged in operative relation with respect to each other, each belt being provided with a plurality of transversely extending feeding bars arranged parallel to and spaced apart from each other, the endless belts being interconnected together to successively bring the bars on each belt into operative association with each other, whereby the transverse bars on the two belts act in unison and the transverse bars act as gripping means for gripping the material worked upon therebetween, a constantly rotating shaft, a lever, a connecting rod extending between and connecting the rotating shaft and lever, a shaft operatively connected to one of the pair of endless belts, a ratchet wheel mounted on said shaft, a pawl pivotally mounted on said lever and engaging with said ratchet wheel, whereby intermittent step-by-step movement of said endless belts is produced by the rotary movement of said constantly rotating shaft, a cutting device associated with said feeding means, means for operating the cutting means in synchronism with the intermittent step-by-step movement of the belts, and means for moving the belts as an entirety toward and from the cutting means at will.

7. In a machine of the kind described, the combination with a cutting device of a material feeding means comprising a pair of endless belts having opposing faces arranged in operative relation with respect to each other, and adapted to have such opposing faces moving in the same direction and at the same speed, each belt being provided with a plurality of transversely extending feeding bars arranged parallel to and spaced apart from each other, the endless belts being interconnected together to successively bring the bars on each belt into operative association with each other, whereby the transverse bars on the two belts act in unison and the transverse bars act as gripping means for gripping the material worked upon therebetween, means for moving the belts toward and from each other to vary the distance between the opposing reaches, means for imparting an intermittent step by step movement to the belts, a cutting device associated with said feeding means, means for operating the cutting means in synchronism with the intermittent step-by-step movement of the belts, and independent means for moving the belts as a unit toward and from the cutting means at will and during the intermittent movement of the endless belts.

8. In a machine of the kind described, the combination with a cutting device of a material feeding means comprising a pair of endless belts having opposing faces arranged in operative relation with respect to each other, and adapted to have such opposing faces moving in the same direction and at the same speed, each belt being provided with a plurality of transversely extending feeding bars arranged parallel to and spaced apart from each other, the endless belts being interconnected together to successively bring the bars on each belt into operative association with each other, whereby the transverse bars on the two belts act in unison and the transverse bars act as gripping means for gripping the material worked upon therebetween, means for moving the belts toward and from each other to vary the distance between the opposing reaches, means for imparting an intermittent step-by-step movement to the belts, a cutting device associated with said feeding means, means for operating the cutting means in synchronism with the intermittent step-by-step movement of the belts, and independent means for moving the belts as a unit toward and from the cutting means at will during the intermittent movement of the endless belts, and means for varying the extent of step-by-step movement.

9. In a machine of the kind described, the combination with a cutting device of a material feeding means comprising a pair of endless belts having opposing faces arranged in operative relation with respect to each other, each belt being provided with a plurality of transversely extending feeding bars arranged parallel to and spaced apart from each other, the endless belts being interconnected together to successively bring the bars on each belt into operative association with each other, whereby the transverse bars act as gripping means for gripping the material worked upon therebetween, means for imparting an intermittent step by step movement to the belts, a cutting device associated with said feeding means, means for operating the cutting means in synchronism with the pause between each step of the step-by-step movement of the belts, and means for moving the belts as an entirety toward and from the cutting means at will.

PAUL R. HEYGEL.