Sept. 21, 1948. A. L. HESS 2,449,776

UNIT STRIP ASSEMBLY METHOD AND APPARATUS

Filed Feb. 24, 1944 6 Sheets-Sheet 1

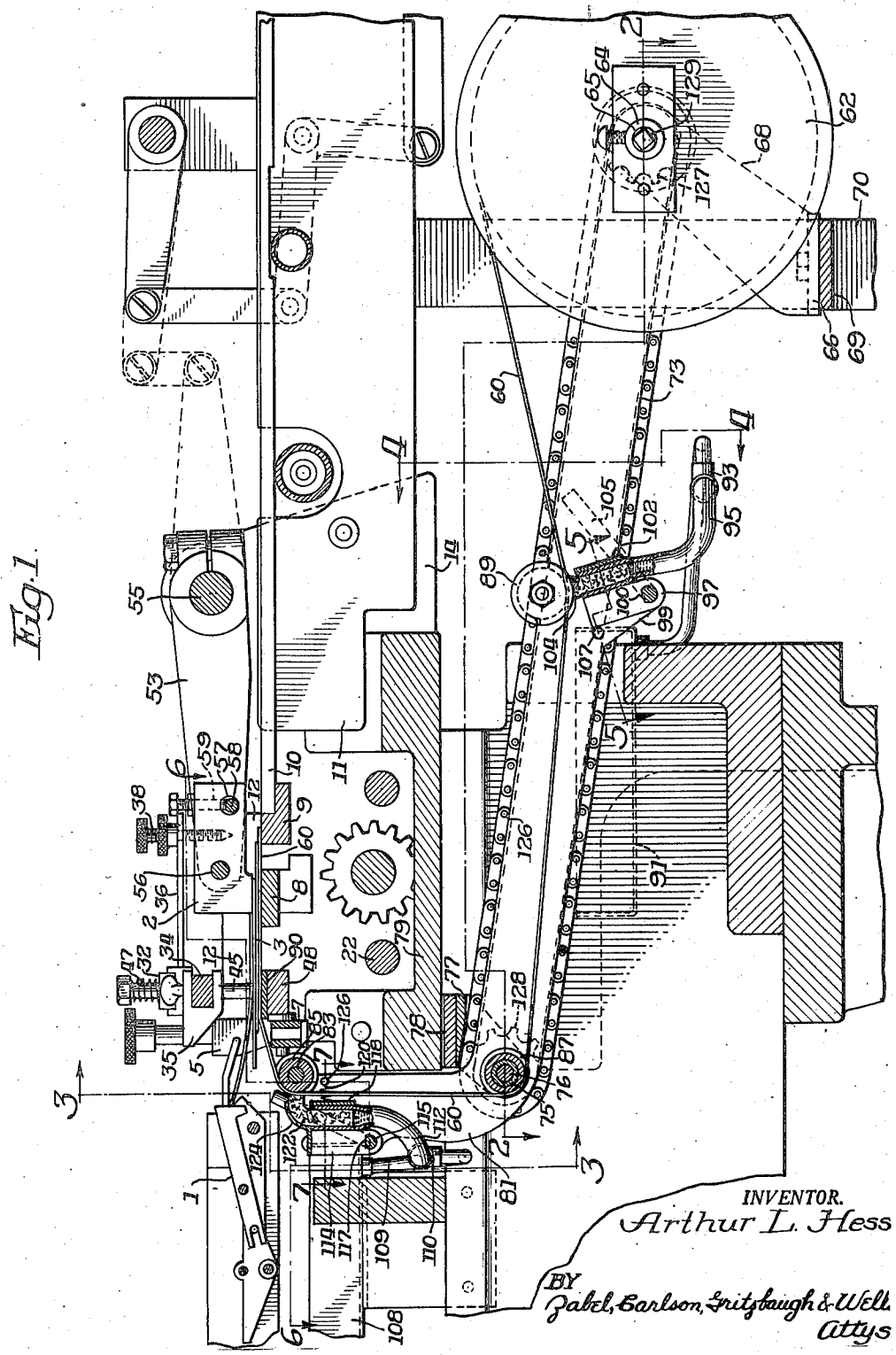


Fig. 1.

INVENTOR.
Arthur L. Hess

BY
Dabel, Carlson, Fritzbaugh & Wells
Attys

Sept. 21, 1948. A. L. HESS 2,449,776

UNIT STRIP ASSEMBLY METHOD AND APPARATUS

Filed Feb. 24, 1944 6 Sheets-Sheet 2

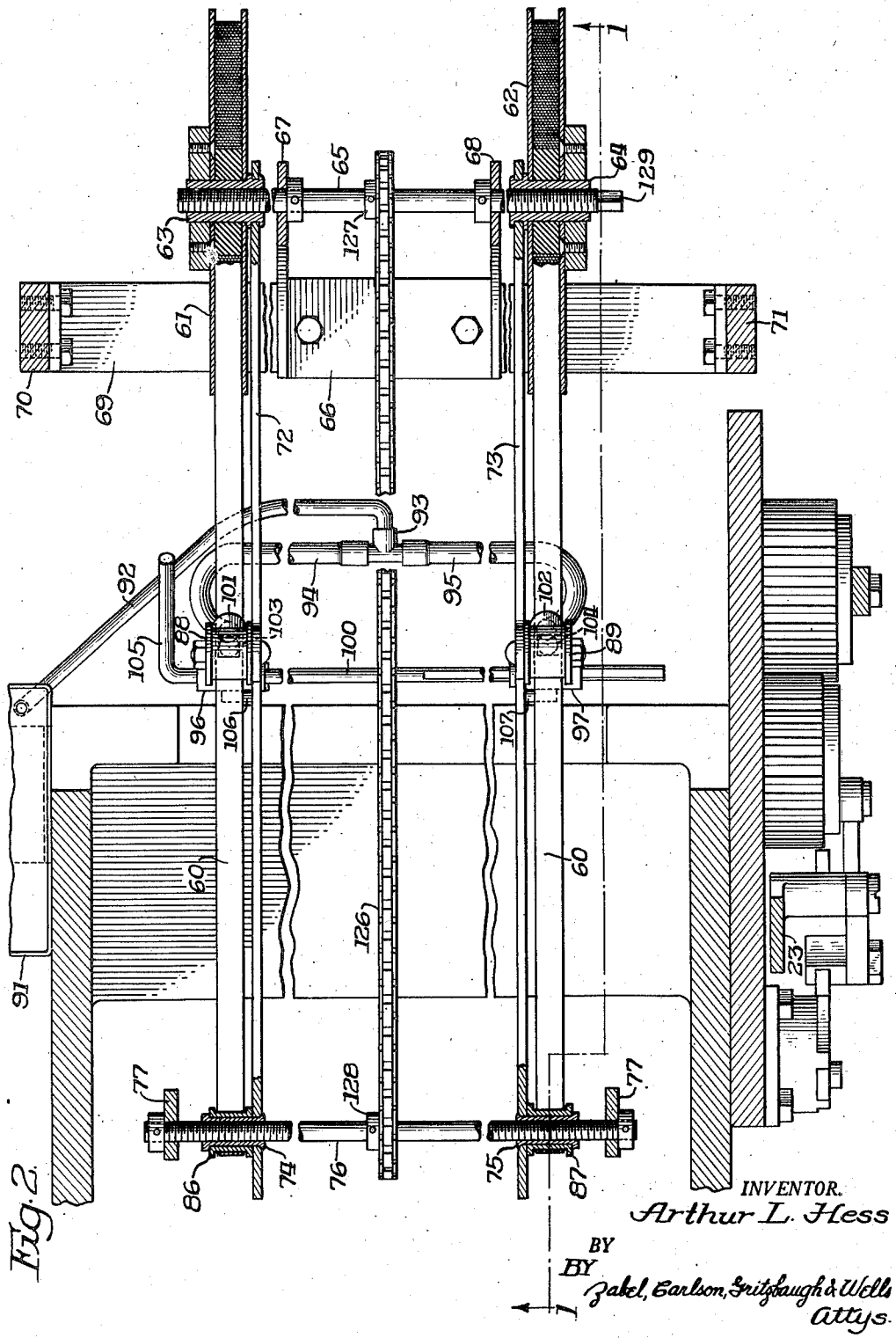


Fig. 2.

INVENTOR.
Arthur L. Hess

BY

BY Zabel, Carlson, Gritzbaugh & Wells
Attys.

Sept. 21, 1948. A. L. HESS 2,449,776

UNIT STRIP ASSEMBLY METHOD AND APPARATUS

Filed Feb. 24, 1944 6 Sheets-Sheet 3

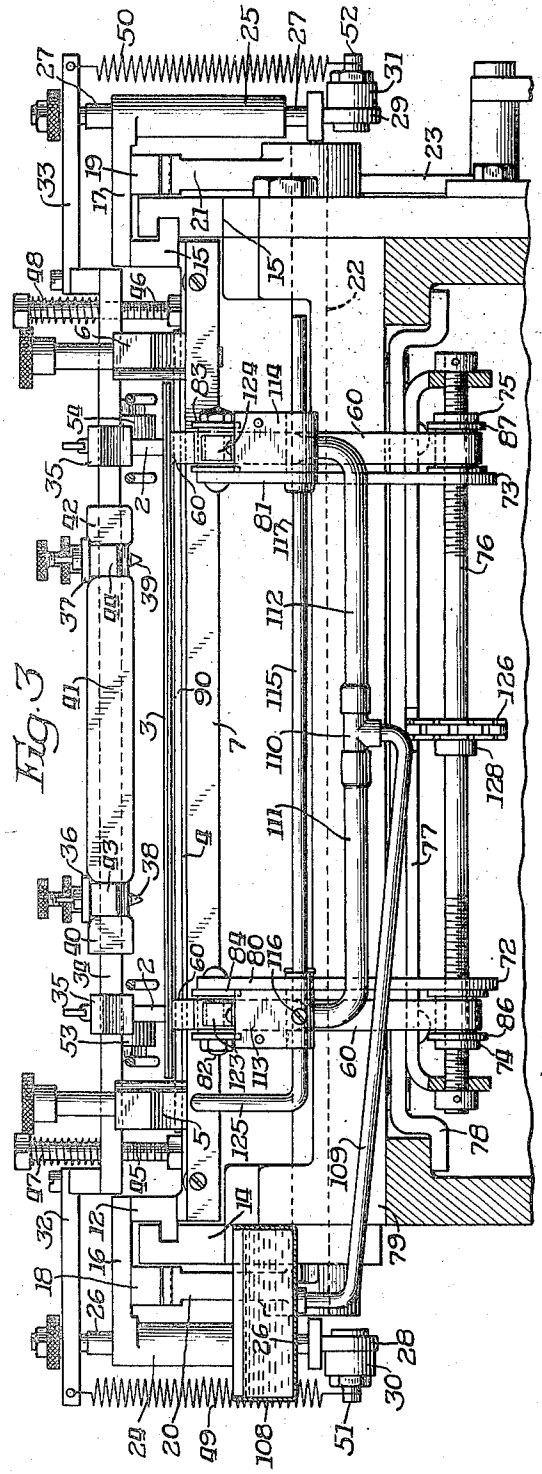


Fig. 3

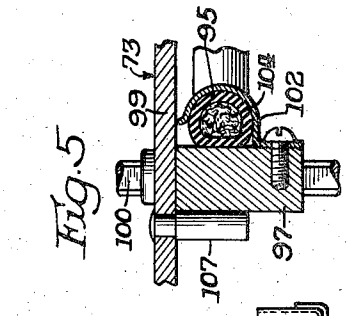


Fig. 5

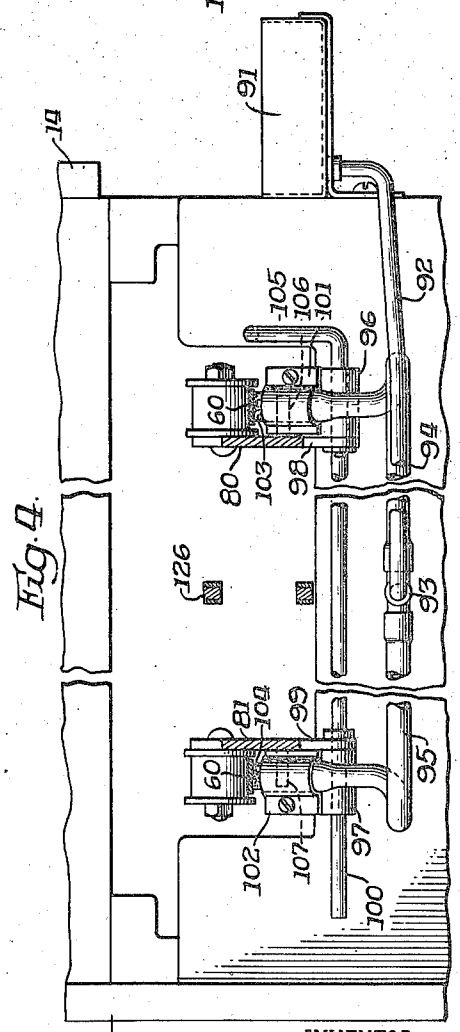


Fig. 4

INVENTOR.
Arthur L. Hess.

BY
Zabel, Carlson, Fritzsaugh & Wells
Attys

Sept. 21, 1948. A. L. HESS 2,449,776

UNIT STRIP ASSEMBLY METHOD AND APPARATUS

Filed Feb. 24, 1944 6 Sheets-Sheet 4

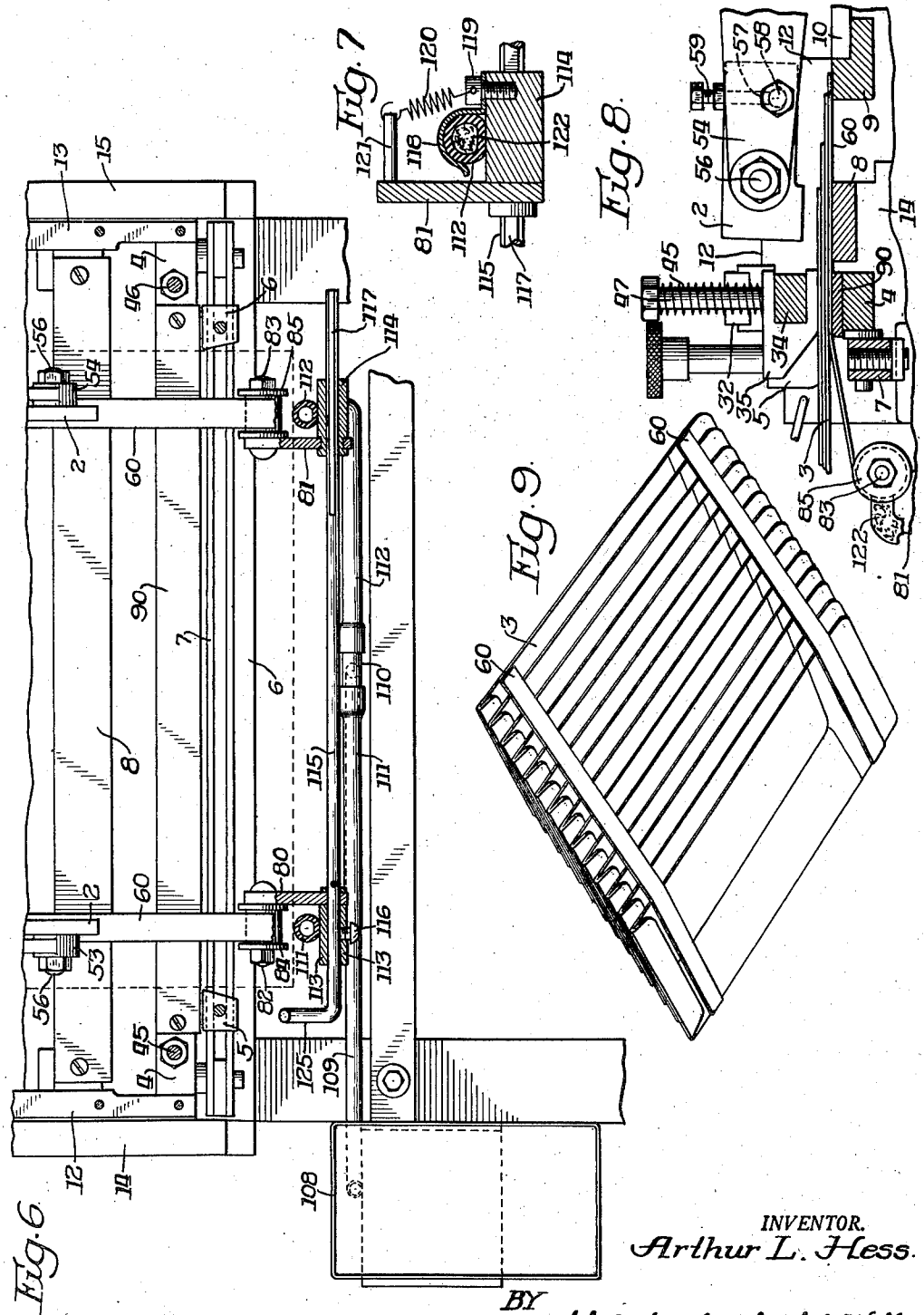


Fig. 6

Fig. 7

Fig. 8

Fig. 9

INVENTOR.
Arthur L. Hess.

BY
Jabel, Carlson, Fitzpaugh & Wells.
Attys.

Sept. 21, 1948. A. L. HESS 2,449,776

UNIT STRIP ASSEMBLY METHOD AND APPARATUS

Filed Feb. 24, 1944 6 Sheets-Sheet 5

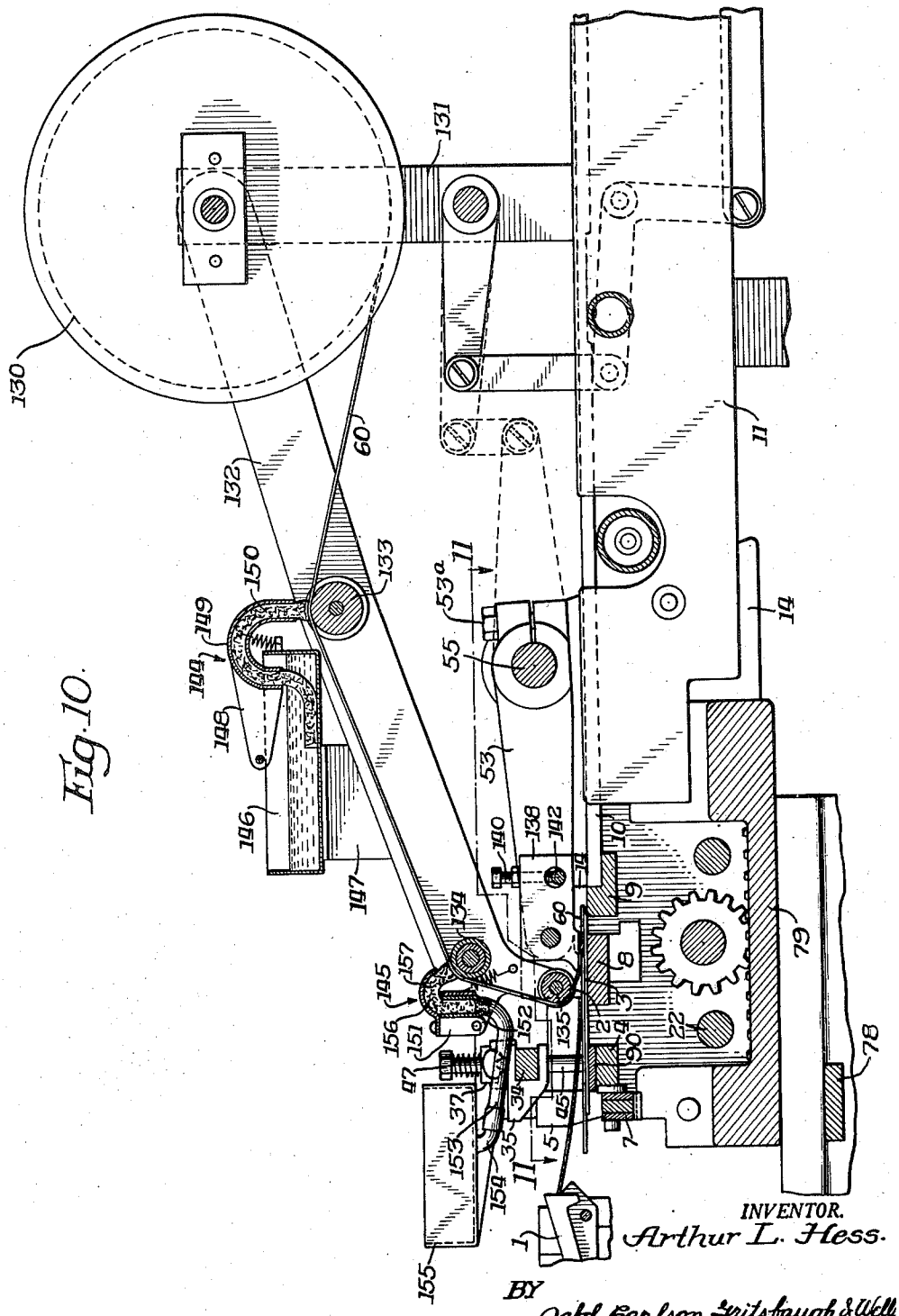


Fig. 10.

Sept. 21, 1948. A. L. HESS 2,449,776

UNIT STRIP ASSEMBLY METHOD AND APPARATUS

Filed Feb. 24, 1944 6 Sheets-Sheet 6

Fig. 12

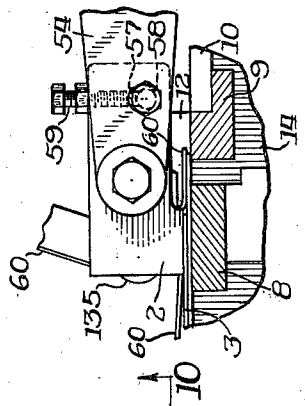
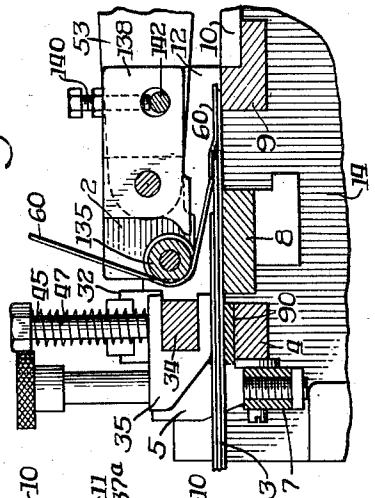


Fig. 13.



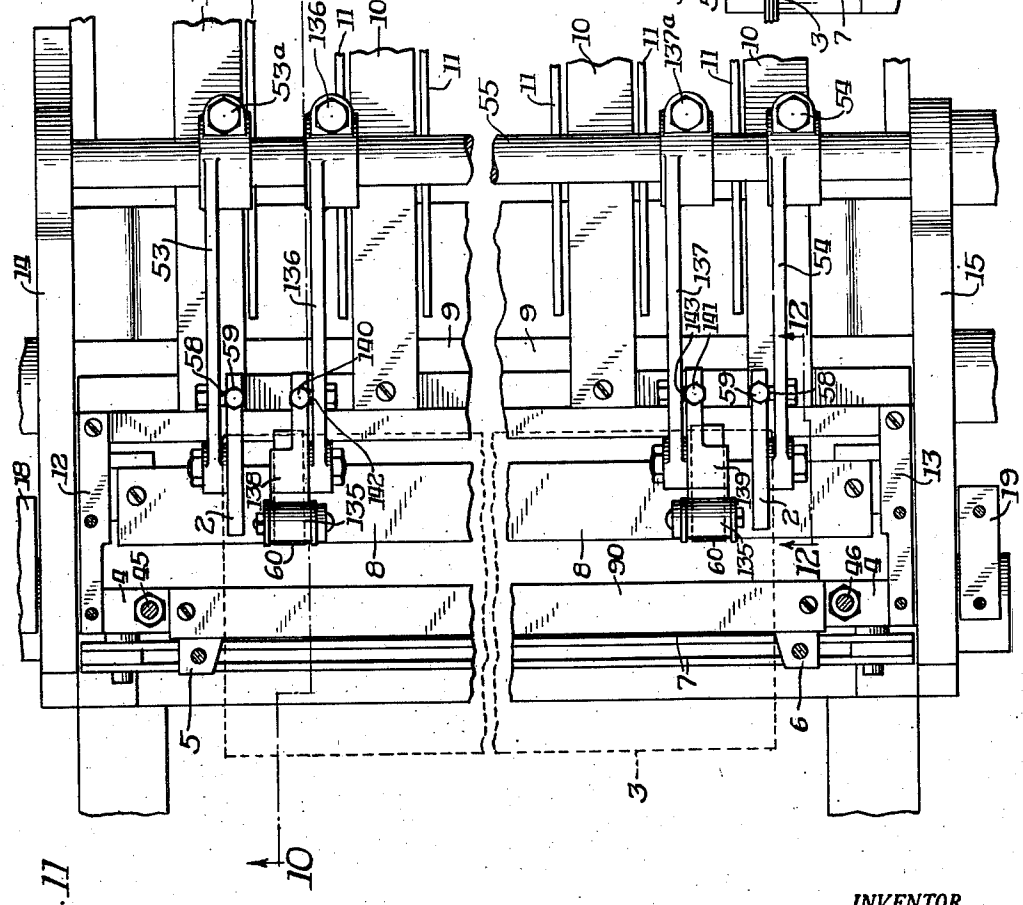


Fig. 11

INVENTOR.
Arthur L. Hess.

BY
Zabel, Carlson, Fritzbaugh & Wells
Attys.

Patented Sept. 21, 1948 2,449,776

UNITED STATES PATENT OFFICE

2,449,776

UNIT STRIP ASSEMBLY METHOD AND APPARATUS

Arthur L. Hess, Cincinnati, Ohio, assignor to Ditto, Incorporated, Chicago, Ill., a corporation of West Virginia

Application February 24, 1944, Serial No. 523,661

12 Claims. (Cl. 270—58)

1

The present invention relates to assembly apparatus adapted to assemble a plurality of units such as envelopes, sheets, cards and the like in overlapped relation and to secure these units, when assembled, in such fashion that they may be readily separated from each other after having been passed through a printing or duplicating operation, as a group. The present invention is particularly applicable to, although not limited to, the assembly of envelopes such as pay envelopes into groups by the use of gummed tape. It is the purpose of this invention to provide a method and apparatus whereby envelopes, sheets and the like are accurately positioned and then secured in position by the application thereto of one or more strips of tape. My invention contemplates the provision of a novel mechanism that insures contact with the tape of each envelope or sheet at the exposed portion thereof, and moistening means for adequately moistening the tape prior to its application to the envelopes.

The features and advantages of the present invention will appear more fully as the description proceeds, reference being had to the accompanying drawings wherein a preferred form of the invention is shown. It is to be understood however that the drawings and description are illustrative only and are not to be taken as limiting the invention except insofar as it is limited by the claims.

In the drawings:

Fig. 1 is a longitudinal sectional view through an assembling apparatus operable to assemble envelopes, sheets, cards and the like and apply a gummed tape thereto;

Fig. 2 is a plan sectional view taken substantially on the line 2—2 of Fig. 1;

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 1;

Fig. 4 is a fragmentary sectional view taken on the line 4—4 of Fig. 1;

Fig. 5 is a fragmentary sectional view taken on the line 5—5 of Fig. 1;

Fig. 6 is a sectional view taken on the line 6—6 of Fig. 1;

Fig. 7 is a fragmentary sectional view taken on the line 7—7 of Fig. 1;

Fig. 8 is a fragmentary sectional view similar to Fig. 1 but showing a changed position of parts;

Fig. 9 is a perspective view showing a series of envelopes secured together in accordance with my invention;

Fig. 10 is a sectional view similar to Fig. 1 but illustrating another form of construction wherein the tape is applied to the overlapped envelopes,

2

sheets, cards and the like from the top instead of from the bottom;

Fig. 11 is a plan sectional view taken on the line 11—11 of Fig. 10;

Fig. 12 is a fragmentary sectional view taken on the line 12—12 of Fig. 11; and

Fig. 13 is a fragmentary sectional view similar to Fig. 10 illustrating the changed position of the tape applying mechanism.

Referring now in detail to the drawings, the present invention is shown in connection with unit strip assembly apparatus which is provided with a conveyor device 1 that is adapted to advance sheet-like articles such as envelopes, sheets and cards one at a time against a registering stop 2. The details of the conveyor 1 form no part of the present invention. They are shown in the co-pending application of Christian Paulsen, Serial No. 531,855, filed April 20, 1944. This patent application also discloses in detail the registering stop 2 and the mechanism associated therewith by which the overlapped envelopes, sheets and the like, indicated at 3 in Fig. 1, are advanced. This advancing mechanism however forms an integral part of the present combination and will be described in sufficient detail to enable its operation to be understood. The drive mechanism by which the advancing is accomplished is not shown in detail herein since that is believed to be unnecessary for the understanding of the present invention.

Referring now particularly to Figs. 1, 3 and 8, it will be noted that the conveyor 1 delivers the envelopes upon a cross bar 4 and between two side guides 5 and 6 which are adjustable toward and away from each other on a supporting bar 7 that is fastened to the cross bar 4. The envelopes extend across onto a stationary cross bar 8 which lies directly beneath the registering stops 2. Beyond the stationary supporting bar 8 is another bar 9 which forms part of a conveyor made up of a series of horizontally reciprocating bars 10 and vertically reciprocating bars 11 interposed therebetween, the bars 11 being arranged to move downwardly below the top level of the bars 10 when the bars 10 are advanced to the right from the position shown in Fig. 1. Then while the bars 10 are being returned to their original position, as shown in Fig. 1, the bars 11 are raised to the position shown in Fig. 1 in order to lift any sheets, envelopes or the like riding on the bars 10 and thus hold the sheets stationary while the bars 10 return to original position.

The bar 4 is mounted for reciprocatory movement with the bar 9 and the bars 10. These sev-

eral bars are carried by two slide blocks 12 and 13 (see Fig. 3) which are slidable in corresponding grooves provided in side frames 14 and 15 of the machine. The slide blocks 12 and 13 have outwardly extending brackets 16 and 17. These brackets 16 and 17 are provided with rack segments 18 and 19 that engage segmental gears 20 and 21, the gears 20 and 21 being connected together by a common shaft 22 which is oscillated by means of a crank arm 23 from the drive source (not shown) of the apparatus. The brackets 16 and 17 also provide guides 24 and 25 for two vertically reciprocating pins 26 and 27. These pins have heads on their lower ends, which heads are adapted to be engaged by rollers 28 and 29 on the free ends of two lever arms 30 and 31 which are also actuated from said power source.

The pins 26 and 27 are the supporting means for a gripping mechanism which is adapted to grip the sheets, envelopes and the like to the bar 4 so as to advance them with the bar when the guide bars 12 and 13 are advanced. This gripping mechanism comprises two bars 32 and 33 which are mounted on the pins 26 and 27. The bars 32 and 33 carry a gripping bar 34 which in turn has a plurality of gripper members 35 adjustably mounted thereon so that they can be moved toward and away from each other. These members 35 are the actual gripping members which engage the envelopes on the bar 4.

The bar 34 also carries a pair of forwardly extending strips 36 and 37, which strips are provided at their free ends with adjustable pins 38 and 39 that are adapted to engage the forward ends of sheets resting on the bar 9 when the gripping mechanism is lowered so as to bring the members 35 into engagement with sheets on the bar 4.

The bar 34 in addition to the members 35 also has fixed gripping members 40, 41 and 42 thereon, the member 41 being between two blocks 43 and 44 that support the bars 36 and 37 on the bar 34.

The bar 34 is connected to the bar 4 by means of two posts 45 and 46. These posts are threaded into the bar 4 and locked in position by means of lock nuts. The posts have heads at the free ends thereof and carry springs 47 and 48 between the heads and the bar 34. The springs 47 and 48 are under compression so that they tend to force the bar 34 and its gripping members downwardly at all times against the upward movement communicated to the bar 34 by the pins 26 and 27 through the bars 32 and 33. The bars 32 and 33 are further provided with springs 49 and 50 at their outer ends, these springs being in tension and connected at their lower ends to pins 51 and 52 on the levers 30 and 31, respectively.

Referring now to Figs. 1, 3, 6 and 8, the stops 2 are mounted on the free ends of two levers 53 and 54, which levers are fixed on a shaft 55 which is driven in timed relation to the shaft 22 so as to lift the levers 53 and 54 and the stops 2 when the shaft 22 is being rocked in a direction to advance the bars 4 and 9. Each stop is adjustably mounted on the end of its lever in the following manner. The stop is pivoted by means of a pivot pin 56 to the free end of the lever and is provided with an aperture 57 at some distance from the pivot pin, this aperture being provided to receive a pin 58 on the corresponding lever 53 or 54. The stop 2 has an adjusting screw 59 threaded therein and extending into the aperture 57 to engage the pin 58. The end of the stop 2 carrying the aperture 57 overbalances the portion of the stop 2, that is, to the left of the pivot pin 56, as illustrated in Fig. 1, so that the stop will always bear against the lower end of the adjusting screw 59 and the adjusting screw can be moved up or down to thus vary the position of the sheet engaging end of the stop 2.

In order to secure the several envelopes or sheets together as they are arranged in overlapped relation by the successive feeding thereof against the stops 2, I provide means for supplying gummed tape 60 directly to the lower surfaces of the assembled sheets. This means comprises a pair of tape spools 61 and 62, the spools being journaled upon two bearings 63 and 64 (see Fig. 2) which are threaded onto a shaft 65 that in turn is carried by a bracket 66. The bracket 66 has two arms 67 and 68 carrying the shaft 65. This bracket is mounted upon a cross tie 69 that extends between two supporting legs 70 and 71 for the framework of the machine.

The bearings 63 and 64 also provide supporting means for two frame members 72 and 73 that extend forwardly and are supported at their forward ends by two additional bearings 74 and 75. The bearings 74 and 75 are threaded upon a shaft 76 which in turn is supported by an inverted U-shaped member 77 (see Fig. 3) that is welded or otherwise secured to a clamp plate 78 carried by a cross bar 79 of the main frame. The ends of the frame members 72 and 73 extend upwardly from the shaft 76 (see Fig. 3) to provide supporting portions 80 and 81 upon which bearings 82 and 83 are carried.

The bearings 82 and 83 have tape guide pulleys 84 and 85 thereon. Likewise the bearings 74 and 75 have tape guide pulleys 86 and 87 thereon. The members 72 and 73 also have intermediate their ends two tape guide pulleys 88 and 89 thereon (see Fig. 2). The paths of the tapes 60 extend from the spools 61 and 62 beneath the pulleys 88 and 89, then beneath the pulleys 86 and 87 and upwardly and over the pulleys 84 and 85, and then over a wear plate 90 that is provided on the bar 4. The tape is moistened by moistening mechanisms to be hereinafter described so that when it is engaged by an envelope or sheet 3 it will adhere thereto and be advanced forwardly with the envelope when the envelope is gripped on the bar 4 and the bar 4 is advanced.

I find that in order to adequately prepare the gummed tape for adherence to the envelopes or sheets it must be moistened sufficiently in advance of engagement with the envelopes to enable the adhesive thereon to absorb the moisture. It must also be remoistened just before engaging the envelope. I therefore provide two independent moistening devices spaced apart a substantial distance along the line of travel of the tape so that the first moistening device will cause initial softening of the adhesive and the second moistening device will supply the additional necessary moisture to properly condition the adhesive for adherence to the envelopes.

One of the moistening devices is located directly adjacent to the guide pulleys 88 and 89. This moistening device includes a liquid supply tank 91 mounted on the side of the machine. A pipe 92 extends downwardly from the tank 91 to a T connection 93 which is midway between the two frame members 72 and 73 and beneath them. From this T connection two flexible tubes 94 and 95 extend outwardly and upwardly to two

brackets 96 and 97 that are mounted on depending ears 98 and 99 of the frame members 72 and 73 by a rock shaft 100. The brackets 96 and 97 have clamps 101 and 102 thereon which clamp the free ends of the flexible tubes 94 and 95 in place. Wicks 103 and 104 are forced into the upper ends of the tubes 94 and 95 so as to carry the moistening liquid upward by capillary action, and these wicks engage the tape 60 as it passes beneath the guide pulleys 88 and 89. The wicks 103 and 104 are the first moistening devices. In operation they are normally held in engagement with the tape in the manner shown in Fig. 1 of the drawings. However, when it is desired to move them out of engagement with the tape the rock shaft 100 is turned in a clockwise direction from the position shown in Fig. 1 so as to swing the tubes and the wicks out of the way of the tape. The rock shaft 100 has an upturned end 105 for this purpose. The rock shaft has a flattened side where it extends through the brackets 96 and 97 so as to cause the brackets to turn with it. Stop pins 106 and 107 are provided on the frame members 72 and 73 so as to limit the counterclockwise movement of the brackets 96 and 97.

The second moistening device is adapted to moisten the tape as it passes around the guide pulleys 84 and 85. This moistening device comprises a liquid supply tank 108 (see Fig. 3) and a pipe 109 leading from the tank 108 to a T connection 110. The T connection 110 has two flexible tubes 111 and 112 secured thereto, and these flexible tubes extend outwardly and upwardly to two brackets 113 and 114 that are carried on the upwardly extending ends 80 and 81 of the frame members 72 and 73. The brackets 113 and 114 have a rock shaft 115 threaded through them (see Fig. 6). The bracket 113 is secured to the rock shaft by a set screw 116. The rock shaft has a flattened side 117 that extends through the bracket 114 which is apertured with an opening having a flat surface to engage the flat side 117 of the rock shaft. It will be noted that the bracket 114 has its own bearing in the member 81, but the bracket 113 is carried directly by the shaft 115. Fig. 7 illustrates the manner in which the flexible tubes are clamped to the brackets. A metal clip 118 extends over the tube and is fastened to the bracket by a headed screw 119. This headed screw also has a spring 120 secured thereto and the spring is hooked into a pin 121 on the member 81, the spring being under tension so as to tend to pull the bracket 114 in a clockwise direction as shown in Fig. 1. Each of the tubes 111 and 112 has a wick 122 forced into the upper end thereof and this wick is bent over toward the adjacent pulley 84 or 85 so as to engage the tape as it passes over the pulley. The bracket 113 has a curved clip 123 thereon holding the wick in a curved position, and the bracket 114 has a corresponding clip 124 thereon holding its wick 122 in a curved position. In view of the fact that the rock shaft is nonrotatably connected to the bracket 114 it is only necessary to provide one spring 120 although it is obvious that springs can be provided on both brackets if desired. The rock shaft 115 is provided with an upturned end 125 by which it can be turned to swing the brackets 113 and 114 counterclockwise, as viewed in Fig. 1, to swing the moistening wicks 122 away from engagement with the tape.

It is believed to be evident from the foregoing description that the moistening devices are so

arranged as to first moisten the tape as it passes beneath the guide pulleys 88 and 89 thus to allow the moisture delivered to the tape to be absorbed by the adhesive as the tape travels from the pulleys 88 and 89 upward to the pulleys 84 and 85. At this point the moistening wicks 122 then engage the tape so that when the tape passes over the bar 4 it is in proper condition to adhere to the envelopes or sheets positioned on the bar. Each time the gripping members 35, 40, 41 and 42 engage the envelopes and press them down on the bar 4 the envelopes are forced into intimate contact with the tape and adhered thereto. The tape is drawn forward each time the bar 4 advances so that the feed is accomplished without any drive mechanism for the tape itself.

It is necessary to adjust the position of the tapes with respect to each other, depending upon the width of the work being fed to the overlapping mechanism. In order to do this the shafts 65 and 76 are screw threaded into the bearings which carry the frame members 72 and 73, and the threads on the shafts are in opposite directions, that is, right and left-hand at the opposite ends of the shafts. The shafts are also connected by a sprocket chain 126 and two sprocket wheels 127 and 128 so that by rotating the shaft 65 both the shafts can be turned alike to spread the frame members 72 and 73 or to bring them closer together, these members being a supporting mechanism for the guide pulleys and the moistening brackets. The entire guide mechanism and the spools are thus spread apart or brought together merely by rotating the shaft 65. This shaft has a polygonal head 129 to receive a crank for rotating it.

Referring now to Figs. 10 to 13, inclusive, in these figures the tape applying mechanism has been moved from the position where it applies the tape beneath the envelopes, sheets and the like to a position where it applies the tape over them as they are arranged upon the bars 4, 8 and 9. According to this form of the invention gummed tape spools 130 are mounted upon upstanding posts 131 at opposite sides of the main frame of the machine. The framework for supporting these spools and for adjusting them toward and away from each other is essentially the same as in the main form of the invention, there being two side frames 132 mounted in the same fashion as the frames 72 and 73. The two side frames are alike and the showing in Fig. 10 is believed to suffice for both. Along each side frame there are three guide pulleys 133, 134 and 135. The guide pulley 135 is located alongside and in close proximity to the registering stops 2 so as to guide the tape downwardly over the assembled envelopes and cause it to engage the envelopes after they have been positioned by the stops 2 and gripped by the gripping members 35.

The means for forcing the gummed tape firmly into engagement with the top exposed portion of each envelope or sheet comprises two additional arms 136 and 137 mounted on the shaft 55 between the arms 53 and 54. The arms 136 and 137 carry pivoted pressing members 138 and 139, which pressing members are mounted in precisely the same fashion as the registering stops 2; that is, they are pivoted on the ends of the arms 136 and 137 and are provided with adjusting screws 140 and 141 bearing against suitable pins 142 and 143 provided on the arms 136 and 137 so that their position may be adjusted. It will be evident from an inspection of Figs. 10 and 13 that the forward ends of the pressing members