

G. E. LITTLEFIELD.
MACHINE FOR APPLYING METALLIC LEAF.
APPLICATION FILED MAY 9, 1917.

1,242,454.

Patented Oct. 9, 1917.

5 SHEETS—SHEET 1.

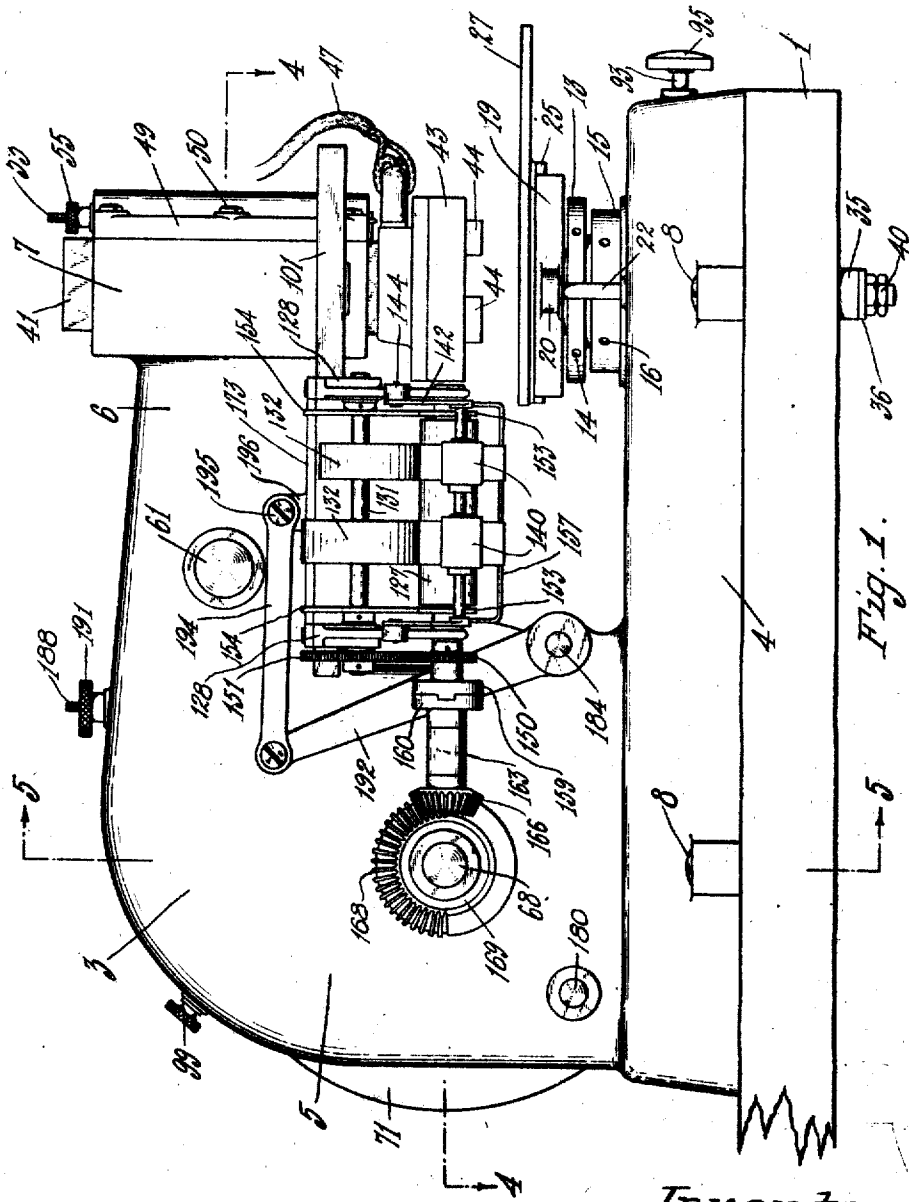


Fig. 1.

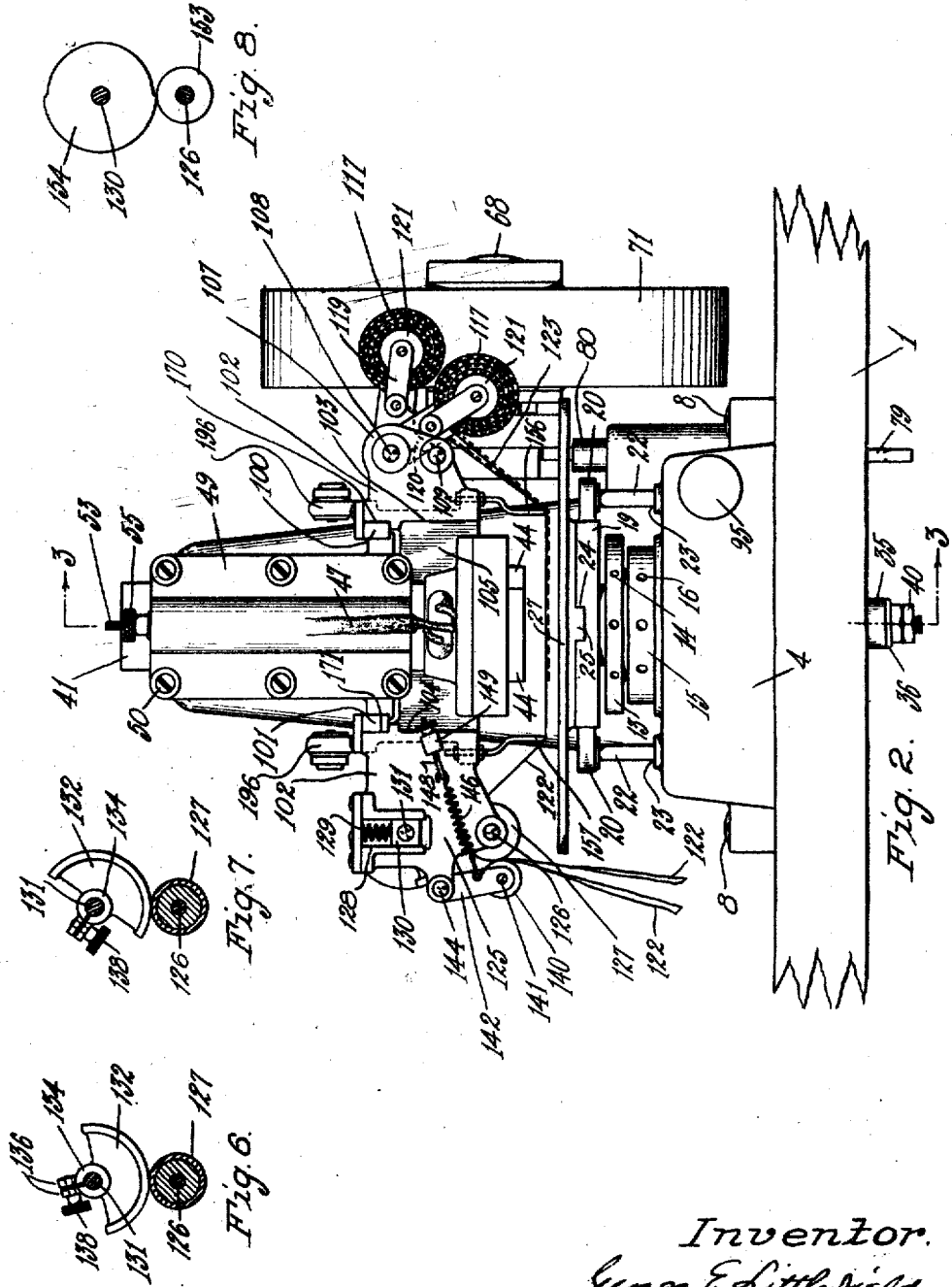
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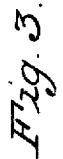
5 SHEETS—SHEET 2.



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5 SHEETS—SHEET 3.



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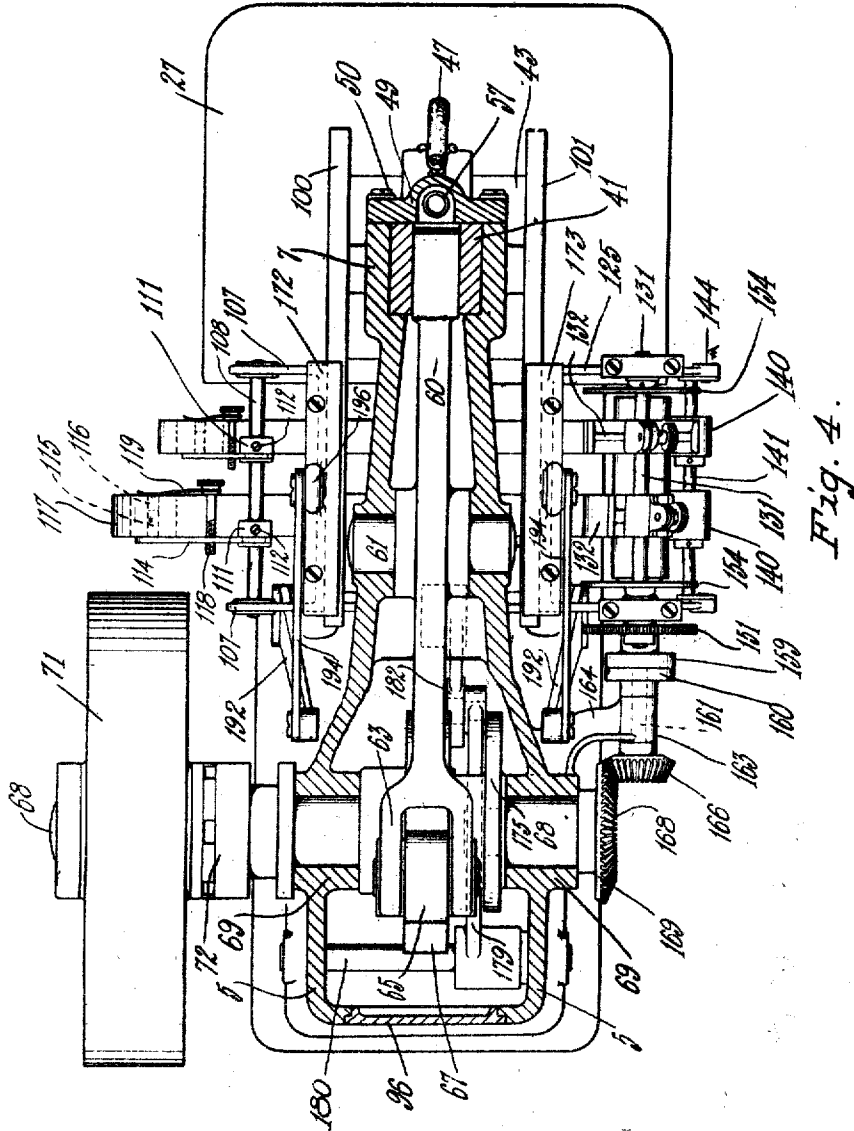


Fig. 4.

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5 SHEETS—SHEET 5.

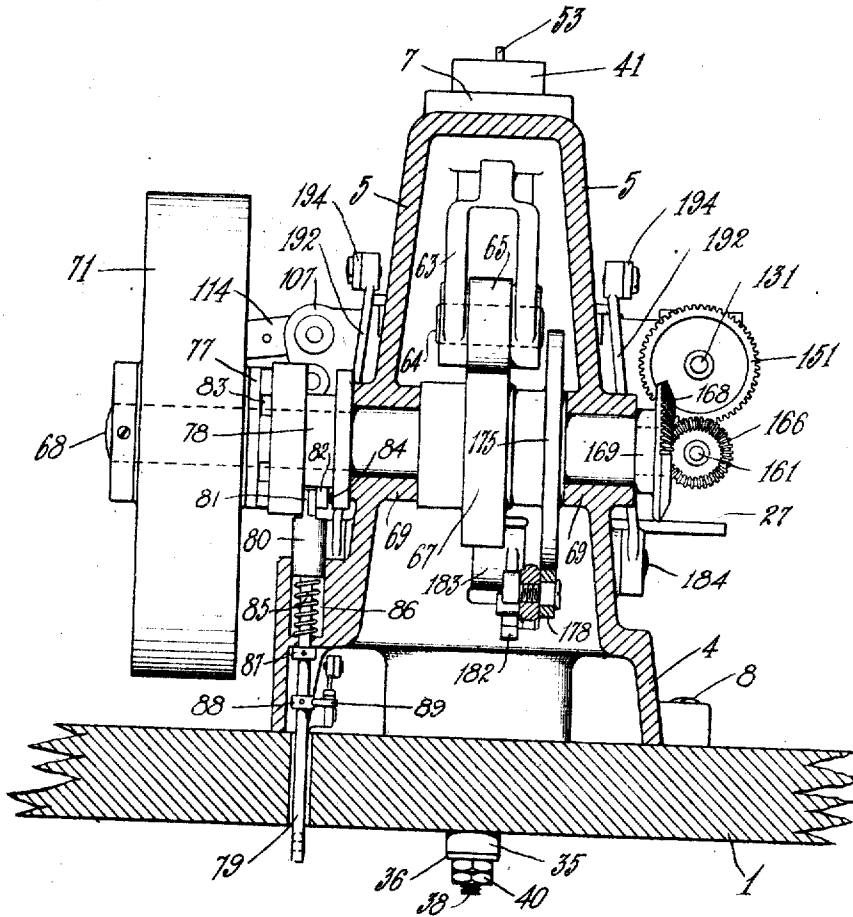


Fig. 5.

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UNITED STATES PATENT OFFICE.

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MACHINE FOR APPLYING METALLIC LEAF.

1,242,454.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, GEORGE E. LITTLEFIELD, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Machines for Applying Metallic Leaf, of which the following is a specification.

10 My invention relates to machines adapted for applying metallic leaf to leather, book-covers, and to other articles.

15 The essential objects of my invention are to automatically apply from a metallic strip ornamental pieces and to complete the application by embossing and burnishing the same upon an article to be ornamented; to apply the metallic pieces without injury to the paper backing strip upon which the metallic strip is mounted; to dispense with the necessity of applying oil to the work for holding the gold in contact therewith prior to the stamping operation; to apply the pieces with accuracy; to dispose of a supporting strip before the final action of the dies; to accommodate the mechanism to articles of different thicknesses and shapes; to apply a double stroke of the dies during a single cycle of operations of the machine parts; to vary the relative depths of the two strokes of the plunger; to afford means for applying a plurality of metallic strips simultaneously and of different lengths and relative locations; and to attain these ends in a simple and easily operable machine.

20 To the above ends essentially my invention consists in such parts and combinations of parts as fall within the scope of the appended claims.

40 In the accompanying drawings which form a part of this specification.

Figure 1 is a side elevation of the machine embodying my invention.

45 Fig. 2, a front end elevation.

Fig. 3, a section of the same on line 3—3 of Fig. 2.

Figs. 4 and 5, sections on line 4—4 and 5—5 respectively of Fig. 1.

50 Figs. 6 and 7, views partially in transverse section of the feeding members.

Fig. 8, an end elevation of a flange and cam, and

55 Fig. 9, a detail section of the adjustable cam portion.

Like reference characters indicate like parts throughout the views.

The support for my machine may be of any form best adapted to carry the parts. In the present instance a table or bench 1 supports a hollow frame or casing 3 comprising a base 4, side walls 5, and an overhanging arm 6 terminating in a head 7. The base is attached to the bench by screws 8 and is provided with a threaded opening 9 65 whose threads 10 engage the exterior threads 11 of a hollow guide 12 provided at its top with an annular flange 13 having peripheral holes 14 to receive a wrench. This guide is vertically adjustable by a nut 15, having wrench holes 16. The nut engages the threads 11 of the guide. Slidably mounted in the guide is the shank 18 of the table 19. The table is maintained against rotation by lateral ears 20 fast to vertical guide rods 22 75 slidably in openings 23 in the frame base 4. The table 19 has a groove 24 to receive a shoulder 25 upon the bottom face of a platen or slide 27 which is removably mounted upon the table, but it may be fixed thereto in any convenient manner. The table and platen may be a single member. Their purpose is to support the work.

Superior burnishing effects are secured by increasing the length of time that the burnishing die is in actual contact with the work. To attain this increased length of contact a yielding capacity is imparted to the platen and table thus. A plunger 29, 85 slidably in the guide 12 has a depending shank 30 which passes through an opening 31 in the guide and an opening 32 in the table 1. A helical spring 33 in the guide surrounds the stem and abuts against the head. Excessive upward travel of the plunger is prevented by a tubular spacing piece 35 95 whose base 36 is perforated as at 37 to receive the threaded end portion 38 of the shank 30 adapted to receive adjusting nuts 40. By means of these ends the extent of travel and length of dwell of the platen may be varied, or thereby the plunger 29 may be withdrawn completely out of contact with the portion 18, thus making the table and platen unyielding. 100

For adjusting the platen to work of varying thicknesses the nut 15 is turned. 105

Slidably mounted in the head 7 is a rectangular plunger 41 provided with an intermediate opening 42, and having fixed to its 110

lower end a die holder 43 carrying upon its bottom face a plurality of dies 44 in the present instance of different lengths. The die holder is heated in any usual convenient manner, as for instance, by an electrical conductor 47 leading from any source of electrical supply to the die holder.

The plunger 41 is supported as follows. The cap 49, attached to the head 7 by screws 50, is provided with a hole 52 to admit the threaded shank 53 of the hook 54. On the shank is an adjusting nut 55 which rests upon the cap. The hook supports the upper end 56 of the helical spring 57 whose lower ends 58 engage a pin 59 in the plunger.

The plunger is downwardly forced by a lever 60 pivotally mounted intermediate its length on a shaft 61. The lever is provided with a rounded head 62 which is loose in the opening 42 of the plunger. The spring 57 holds the plunger 41 at all times in contact with the under face of the head 62. The rear end of the lever 60 is bifurcated and in the fork or bifurcation 63 is a pin 64 carrying a cam roll 65 engaging a cam 67 fast on the main shaft 68 mounted in bearings 69 in the walls 5 of the frame. This shaft is driven from any source of power through driving wheel 71 and clutch 72.

The cam 67 is of a form to insure two vibrations of the lever 60 during each revolution of the shaft 68. In the present instance, this is attained by two, oppositely disposed operating swells 74 and 75 forming an oblong cam member. The shoulder or swell 74 is of less radius or length than that of the shoulder or swell 75, so that as the cam rotates in the direction of the arrow shown in Fig. 3, the first of the two vibrations of the arm 60 is less deep or pronounced than the second.

This difference in throw of the arm is desirable because the first descent of the plunger 41 is purposed merely to clearly outline and segregate the metallic film from the paper supporting strip to the surface of the work resting upon the table 27, and possibly very slightly embossing the separated metallic portion. The second stroke is intended to substantially emboss and highly burnish the applied metallic piece or pieces. The comparatively light first stroke, therefore, does not mutilate, destroy or weaken the paper backing strip that carries the metallic leaf as would be the result were the first stroke of sufficient strength to perform a full embossing function.

The driving clutch 72, consisting of the clutch member 77 on the pulley and the clutch member 78 on the main shaft, is operated in the present instance by the following mechanism. Slidably mounted in a side wall 5 is a rod 79 having a head 80 on its upper end upon which is a wedge shaped

cam finger 81 engaging a slidable lock pin 82 in the member 78 engageable in notches 83 in the member 77. This pin is pressed by a spring 84. A helical spring 85 in a recess 86 in the wall upwardly presses the head 80 and its finger and keeps the lock pin 82 out of engagement with the member 77 so as to put the mechanism out of operation. On the rod 79 is a stop collar 87.

The rod 79 may be depressed to throw the machine into operation in any convenient manner. In the present instance the mechanism comprises a collar 88 on the rod 79 having a lateral finger 89, upon which rests the arm 90 of a bell crank lever pivoted on a pin 91 in the side wall. Pivotally attached to the second arm 92 of the lever is a push rod 93 passing through an opening 94 in the base of the machine. On the end of this rod is a head 95. By inwardly pressing the head 95 the rod 79 is depressed and the clutch pin 82 is thrown into engagement with a clutch notch 83.

For convenience of access to the mechanism in the frame a removable door 96 is located in an opening 97 in the casing of the machine, and is locked in position by a button 99 in the door engaging the casing.

Mounted on horizontal guides 100 and 101 fixed to opposite sides of the arm 6 is a feed carriage 102 comprising vertical side walls 103 and 104, slidably engaging the guides 100 and 101 respectively, and an end wall 105. The wall 103 has on its ends lateral ears 107 fixed in which are a supporting rod 108 and a stop rod 109. On the rod 108 are two collars 111 longitudinally adjustable thereon by set screws 112. Each collar has pivotally attached thereto an arm 114 carrying a pin 115 adapted to loosely enter the axial opening 116 of a roll 117. In each arm 114 is a screw 118 carrying a tension spring 119 engaging the face of the roll. On the rear arm 114 is a depending lug 120 resting on the rod 109. The forward arm 114 rests directly on the rod. Therefore the rolls 117 are in different horizontal planes, whereby the renewal or adjustment of the rolls is facilitated. The rolls are of the usual construction in this art comprising a core 121 on which is wound a paper backing strip 122 and a metallic strip 123.

Upon the carriage wall 104, at its ends, are outwardly extending ears 125. In the lower portions of the ears is mounted the shaft 126 of a rubber covered feed roll 127. Above this in the ears are vertical guides 128 in which are springs 129 which press downwardly upon the bearing blocks 130 of a shaft 131. Upon this shaft are feeding segments 132 which when brought in contact with the roll 127 serve to advance the paper backing strips 122 therebetween a certain distance. The segments are both circum-

ferentially and longitudinally adjustable upon the shaft 131 by virtue of split bearing rings 134 integral with the segments whose free ends 136 are connected by a binding screw 138, as shown in Figs. 6 and 7. In these figures the segments are shown adjusted at different angles relatively to each other.

In order to maintain the strips 122 in place on the feed roll during any interval when the segments are not in engagement therewith rollers 140 are provided. These are loose on a shaft 141 in the lower ends of depending arms 142 pivoted at 144 to the ears at points above the feed roll. The rolls 140 are pressed against the feed roll by a spring 146 one of whose ends engage the arm 142, and whose other end is attached to an adjusting screw 148 in a block 149 on one of the ears. The shaft 126 drives the shaft 131 through gears 150 and 151 on the respective shafts. On the shaft 126 are flanges 153 contacting with cams 154 on shaft 131. By virtue of these cams and flanges the shaft 131 is movable toward and from the feed roll 127; the cams imparting an upward movement of the shaft 131 against the resilient action of the springs 129. While the high portion of each cam 154 is in contact with its corresponding flange the segments 132 are out of contact with the feed roll so that they do not feed the strip 122. These strips pass over guides or bearings 156 and 157 attached at their ends to the carriage walls 103 and 104 respectively, and are longitudinally disposed with relation thereto. They are rectangular in outline and form parallel loops depending from the walls to a plane below that of the dies 44 when the plunger is elevated. The strips in their intermittent advance pass transversely beneath and in contact with the described guides.

The shaft 126 is in this case in two parts and carries fixed thereto one clutch member 159 whose companion member 160 is fast on a shaft end 161 mounted in a bearing 163 carried by an arm 164 on the machine casing. A gear 166 on the latter shaft engages the teeth 168 of a mutilated gear 169 fixed to the main shaft 68 whereby the segments and feed roll are driven as described.

The carriage 102 is reciprocated horizontally upon the guides 100 and 101, the walls 103 and 104 being preferably grooved at their tops, as at 170 and 171, to receive the same, and provided with plates or retaining flanges or plates 172 and 173 to further engage the same. The mechanism for reciprocating the carriage is as follows:—

Fixed to the main shaft 68 within the machine frame is a cam 175 provided with opposite shoulders 176 and 177 engaging a cam roll 178 upon an intermediate portion of a lever 179 pivotally mounted at its rear end

on a shaft 180 in the walls. On the forward end of the lever is a pin 181 which moves loosely in the fork 182 of a lever 183 fast on a rock shaft 184 mounted in the walls. The lever 183 is upwardly drawn against the action of the cam by a spring 185 whose lower end engages a pin 186 on the lever, and whose upper end engages a hook 187 on a rod 188 whose threaded end passes through a perforation 190 in the casing and carries an adjusting nut 191. Fixed to each end of the shaft 184 are upwardly and rearwardly directed levers 192 to whose ends are pivotally connected horizontal links 194 whose opposite ends are pivotally connected by pins 195 to lugs 196 on plates 172 and 173. The cam 175 is so timed relatively to the cam 67 that the carriage 102 is projected forwardly to bring the strips 122 beneath the dies 44 while the plunger 41 is elevated where the carriage remains for a sufficient interval to permit the plunger to descend once and thereby deliver a part of the metallic strip 123 upon the article to be ornamented resting upon the table 27. The carriage then retreats to its original position while the plunger ascends and makes a second descent bringing its dies 44 downwardly upon the delivered metallic leaf thereby giving a final finish which is impossible to attain when the dies operate only on an intermediate backing strip of paper. It will thus be seen that the plunger includes in its cycle of operations two descents while the carriage performs but one advance.

While the carriage is in its rearmost position, the operation of advancing the backing strips is performed by virtue of the teeth upon the gear 169. When the blank portion of the gear 169 is reached the carriage advances and the gear 166 remains idle.

In the ornamentation of articles, for instance book covers, several parallel lines of printing and ornamentation of differing lengths occur, in which case there are employed as many dies 44, one or more, as there are lines of ornamentation. These dies are usually affixed to the portion 43 of the plunger by glue, but this method of attachment is not exclusive. The number of strips 122 employed correspond with the number of dies or ornaments 44. The latter usually differ in length so that it is necessary that the strips 122 individually advance varying distances. This is effected by circumferentially adjusting the segments 132 relatively to each other. When the spaces between the lines of ornamentation differ the rolls 117 are longitudinally adjusted on the rod 108, and the segments are longitudinally adjusted on the shaft 131.

While the first of the double vibrations of the plunger is the less pronounced, provision is made for varying or obviating this difference by a block 199 slidable radially

in a slot 201 in the margin of the cam swell 74, as shown in Figs. 3 and 9. A wedge 202 in the slot bearing against the tapered rear end of the block 199 is operated to advance the latter by means of a nut 203 on a threaded post 204 upon the wedge. A washer 205 is employed with the nut.

What I claim is:—

1. In a metallic leaf applying machine, the combination with the frame, of a plunger in the frame, means for actuating the plunger, guides on the frame, a reciprocating carriage slidably mounted on the guides and movable toward the plunger, a roll holder on the carriage, a feed roll on the carriage, means for actuating the feed roll, segments cooperating with the feed roll, and means for reciprocating the carriage.

2. In a metallic leaf applying machine, the combination with the frame, of a plunger mounted in the frame, means for actuating the plunger, horizontal guides on the frame spaced from the plunger, a reciprocating carriage mounted on the guides, a roll holder on the carriage at one side of the plunger, a feed roll on the carriage at the other side of the plunger, a segment on the carriage engaging the feed roll to draw a backing strip transversely of the plunger the distance required, and means for reciprocating the carriage.

3. In a metallic leaf applying machine, the combination with the frame, of a plunger mounted in the frame, means for operating the plunger, guides on the frame adjacent the plunger, a reciprocating carriage mounted on the guides, guides on the carriage extending below the plane of the plunger, means upon the carriage for drawing a backing strip transversely across the last mentioned guides, and means for reciprocating the carriage.

4. In a metallic leaf applying machine, the combination with the frame, of a plunger mounted in the frame, means for operating the plunger, guides on the frame adjacent the plunger, a reciprocating carriage mounted on the guides, means for drawing a plurality of backing strips individually different distances across the carriage below the plane of the plunger, and means for reciprocating the carriage.

5. In a metallic leaf applying machine, the combination with the frame, of a plunger mounted in the frame, means for operating the plunger, a reciprocating carriage mounted on the frame movable toward and from the plunger, a holder for a roll of metallic leaf pivotally mounted on the carriage at one side of the plunger, a roll shaft mounted in the carriage at the opposite side of the plunger, a feed roll on the shaft, a second shaft in the carriage adjacent the first shaft, a segment on the second shaft adapted to cooperate with the feed roll,

driving connections between the shafts, and means actuating the carriage for driving one of the shafts.

6. In a metallic leaf applying machine, the combination with the frame, of a plunger mounted in the frame, means for operating the plunger, a carriage independently of the plunger mounted on the frame, a rod mounted in one side of the carriage, a plurality of roll holders pivotally mounted on the rod and circumferentially adjustable independently of each other on the rod, a roll shaft mounted in the opposite side of the carriage, a feed roll on the shaft, a second shaft in the carriage adjacent the first shaft, segments on the second shaft adapted to cooperate with the feed roll, depending strip guides on opposite sides of the carriage, driving connections between the shafts, and means actuating the plunger operating means for driving one of the shafts.

7. In a metallic leaf applying machine, the combination with the frame, of a plunger mounted in the frame, means for operating the plunger, a reciprocating carriage mounted on the frame, means for reciprocating the carriage, roll holders mounted on one side of the carriage, a roll shaft mounted in the opposite side of the carriage, a feed roll on the shaft, a second shaft in the carriage, a plurality of segments on the second shaft adapted to cooperate with the feed roll, means for circumferentially adjusting the segments independently of each other, driving connections between the shafts, and means actuated by the reciprocating means for driving one of said shafts.

8. In a metallic leaf applying machine, the combination of a frame, a main shaft in the frame, a reciprocating plunger in the frame, operative connections between the shaft and plunger, a gear on the shaft, a reciprocating carriage mounted on the frame movable toward and from the main shaft, a roll holder mounted on the carriage, a shaft mounted in the carriage, a feed roll on the shaft, a second shaft in the carriage, a segment on the last mentioned shaft adapted to cooperate with the feed roll, gears connecting the roll shaft and the main shaft, a clutch on the roll shaft, and means actuated by the main shaft for operating the carriage.

9. In a metallic leaf applying machine, the combination with the frame, of a plunger mounted in the frame, means for operating the plunger, a reciprocating carriage mounted on the frame, means for reciprocating the carriage, roll holders mounted on one side of the carriage in different vertical planes, a roll shaft mounted in the opposite side of the carriage, a feed roll on the shaft, a second shaft in the carriage, a plurality of segments on the second shaft adapted to cooperate with the feed roll,

means for adjusting the individual segments longitudinally of the shaft, driving connections between the shafts, and means actuated by the reciprocating means for driving one of said shafts.

10. In a metallic leaf applying machine, the combination with the frame, of a plunger mounted in the frame, means for operating the plunger, guides upon the frame, a carriage mounted on the guides, a main shaft in the frame, a gear on the shaft, a shaft in the carriage, a gear on the second shaft cooperating with the gear on the first shaft, a feed roll in the carriage on the second shaft, a cam on the main shaft, a lever in the frame engaging the cam, a rock shaft in the frame, a lever on the rock shaft engaging the cam lever, resilient means for forcing the cam lever into continuous contact with the cam, arms upon the rock shaft, and links connecting the arms with the carriage.

11. In a metallic leaf applying machine, the combination of a frame, a main shaft in the frame, a reciprocating plunger in the frame, operative connections between the shaft and plunger, a mutilated gear on the shaft, a carriage slidably mounted on the frame, a shaft in the carriage, a feed roll on the second shaft, a clutch on the roll shaft, and a gear on the roll shaft engaging the mutilated gear.

12. In a metallic leaf applying machine, the combination with the frame, of a plunger mounted in the frame, means for operating the plunger, guides on the frame dis-

posed transversely of the plunger at each side of the plunger, a reciprocating carriage mounted on the guides, means for reciprocating the carriage, and means upon the carriage actuated by the reciprocating means for intermittently feeding backing strips transversely of the carriage.

13. In a metallic leaf applying machine, the combination with the frame, of a plunger mounted in the frame, means for operating the plunger, guides upon the frame adjacent the plunger, a reciprocating carriage mounted on the guides and movable toward the plunger, devices arranged side by side upon the carriage for feeding backing strips transversely of the carriage and of the plunger, means upon the carriage for adjusting the devices toward and from each other, and means for reciprocating the carriage.

14. In a metallic leaf applying machine, the combination with the frame of a plunger mounted in the frame, means for operating the plunger, guides upon the frame beside the plunger, a reciprocating carriage mounted on the guides, means for reciprocating the carriage, means upon the carriage for supporting a plurality of spaced backing strips, and means cooperating with supporting means for simultaneously feeding each strip a distance different from the length of feed of the other strips.

In testimony whereof I have affixed my signature.

GEORGE E. LITTLEFIELD.