Feb. 20, 1945. M. E. TROLLEN 2,369,871

THIMBLE PRINTING MACHINE

Filed July 15, 1940 7 Sheets-Sheet 1

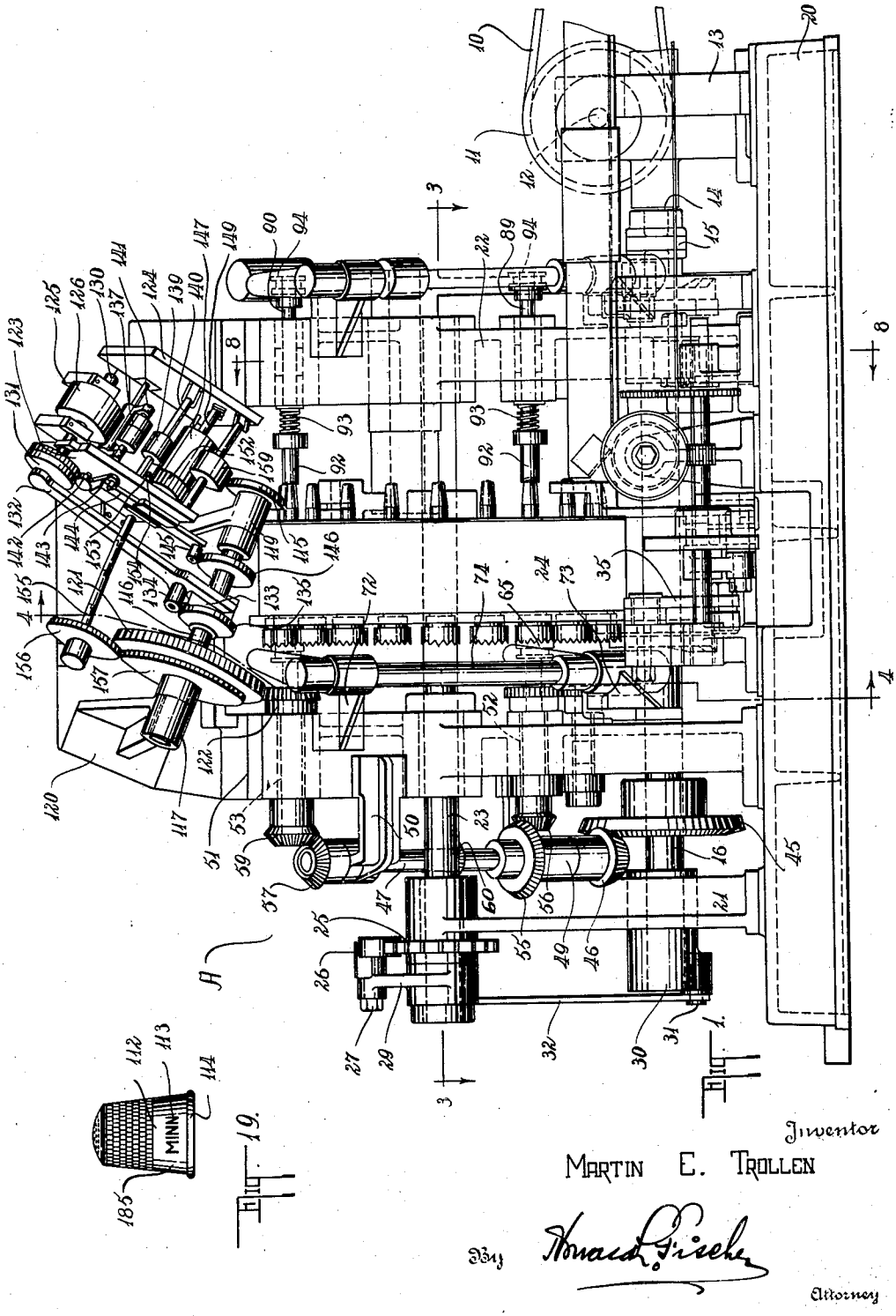


Fig. 1.

Fig. 19.

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THIMBLE PRINTING MACHINE

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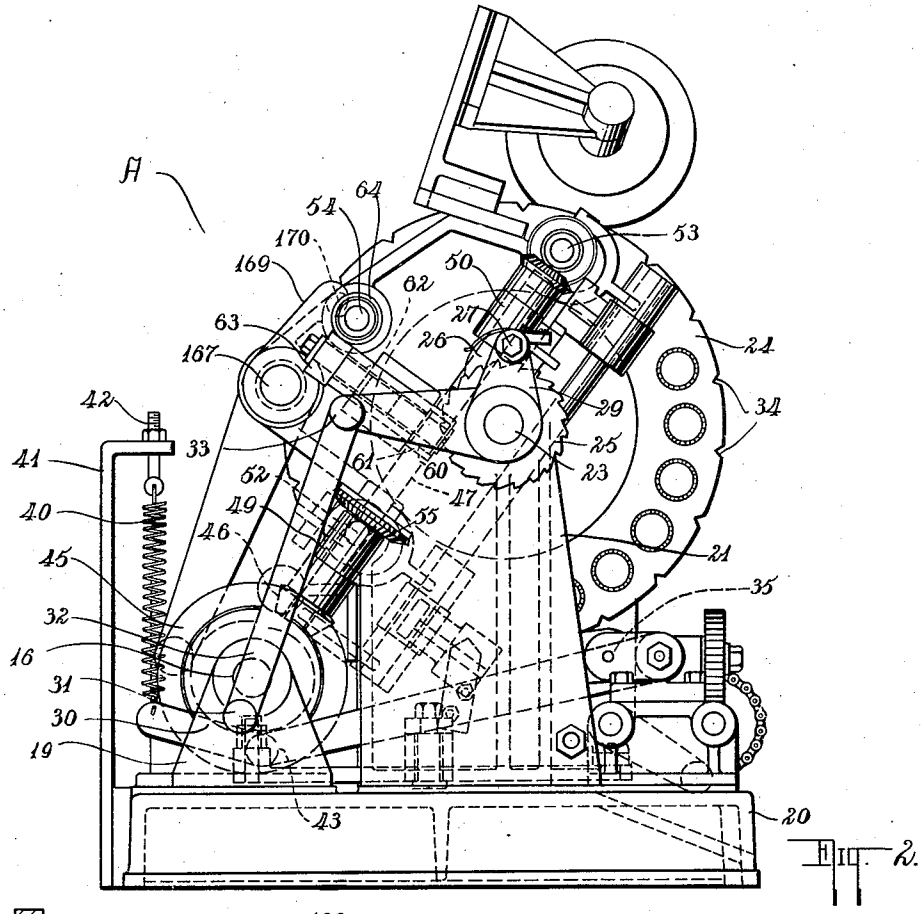


Fig. 2.

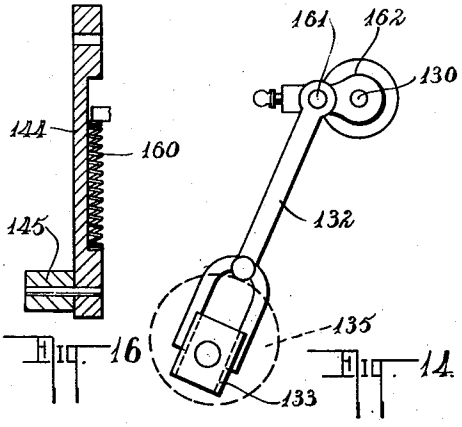


Fig. 16 Fig. 14.

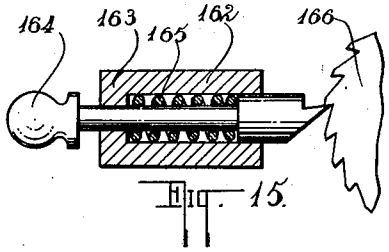


Fig. 15.

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THIMBLE PRINTING MACHINE

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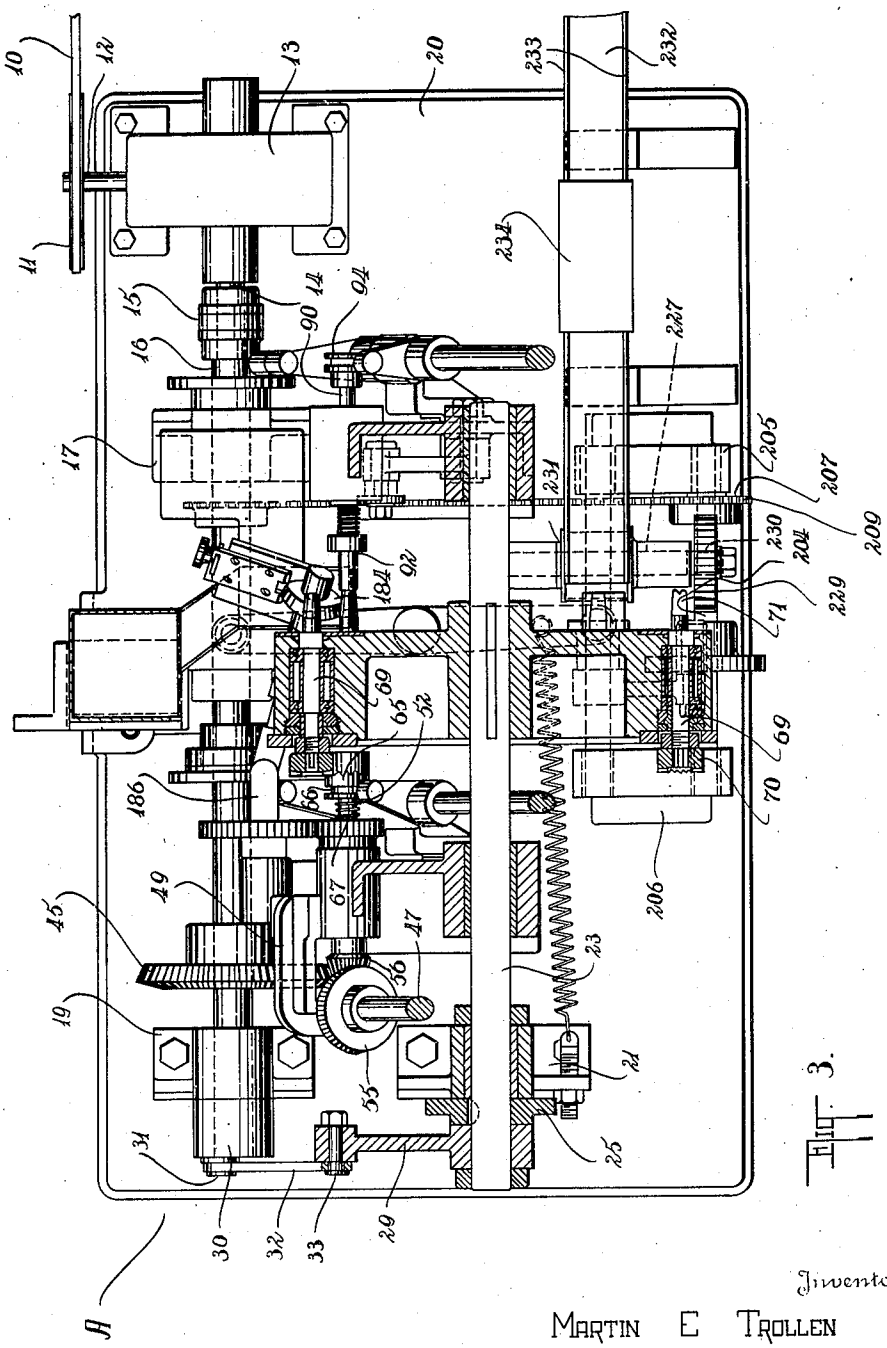


Fig. 3.

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MARTIN E TROLLEN

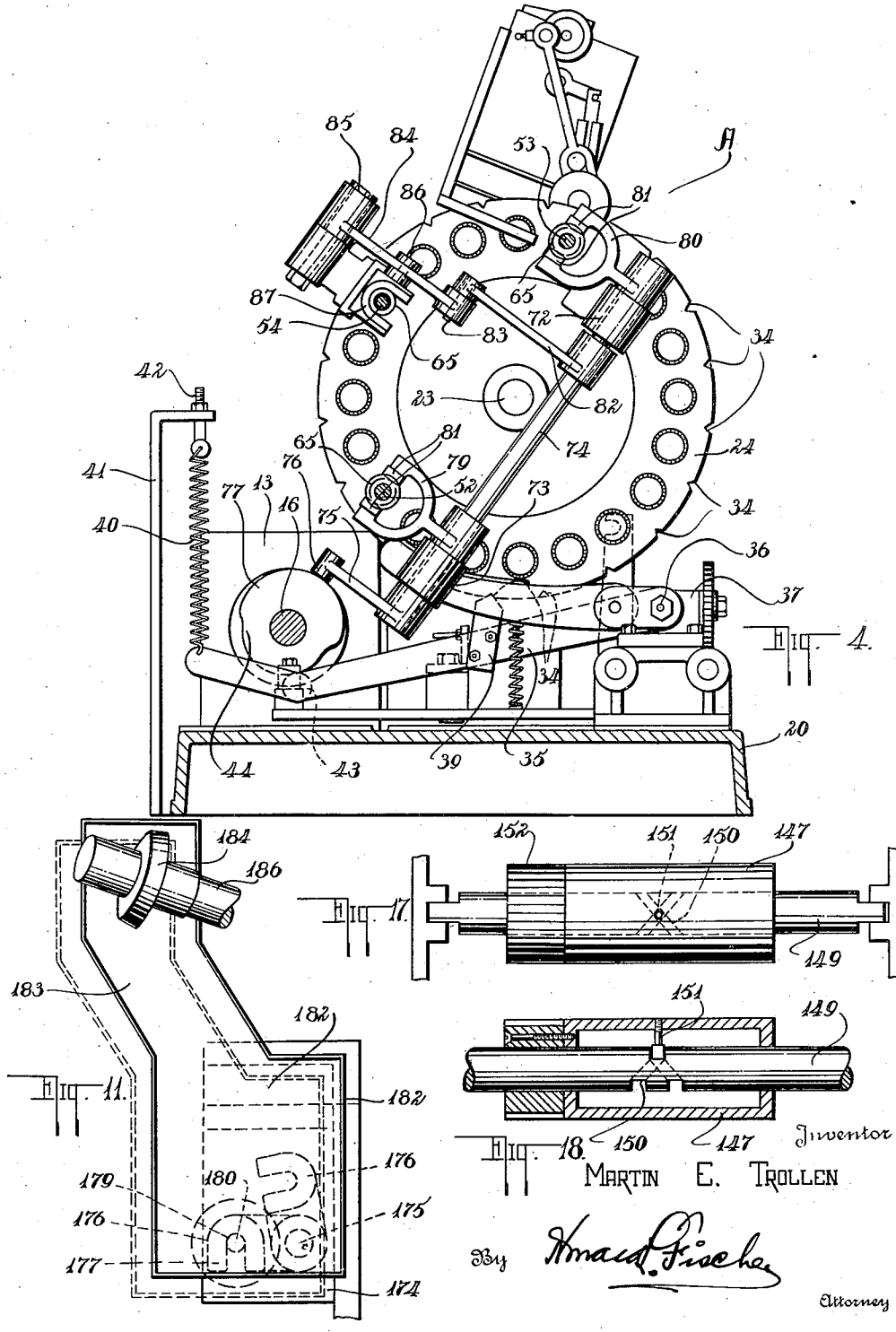
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THIMBLE PRINTING MACHINE

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THIMBLE PRINTING MACHINE

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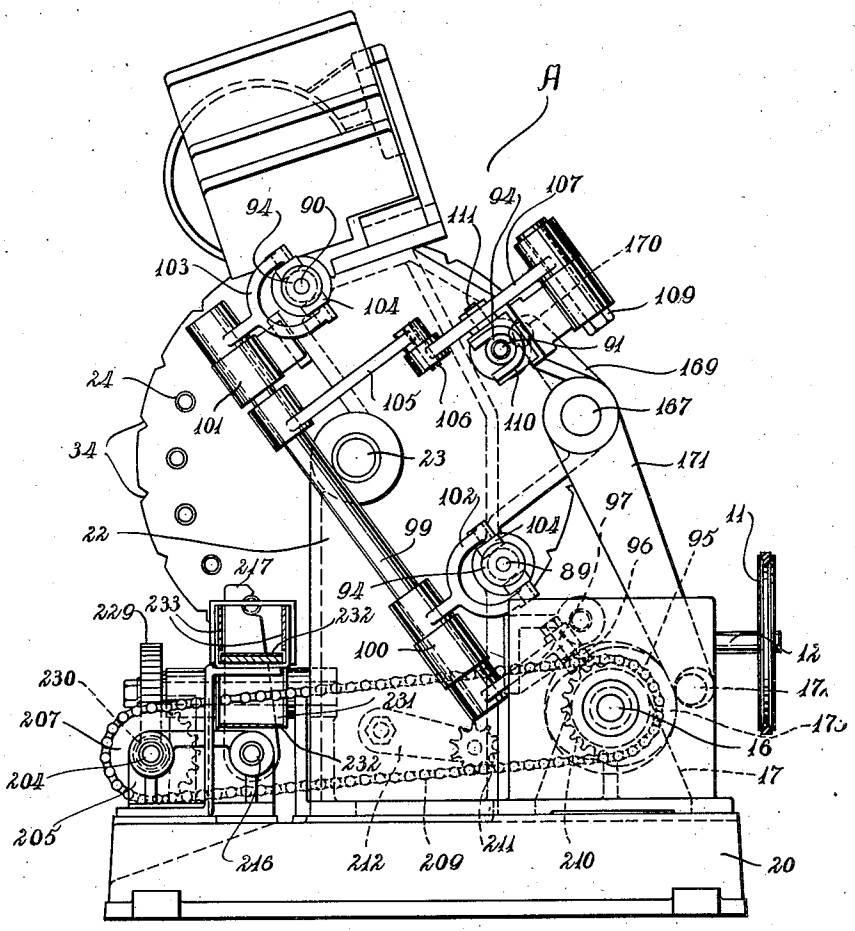


Fig. 5.

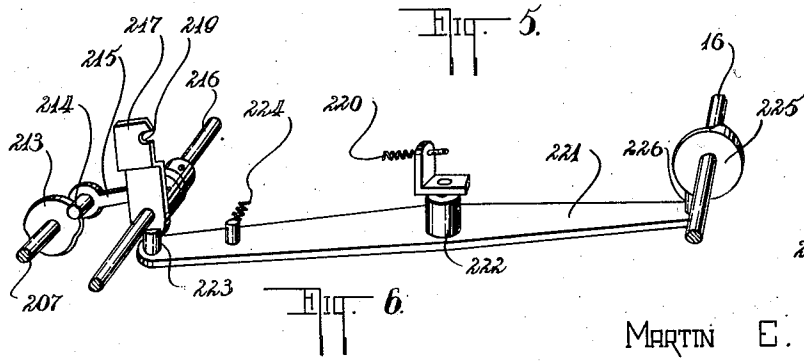


Fig. 6.

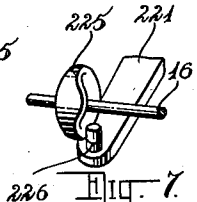


Fig. 7.

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THIMBLE PRINTING MACHINE

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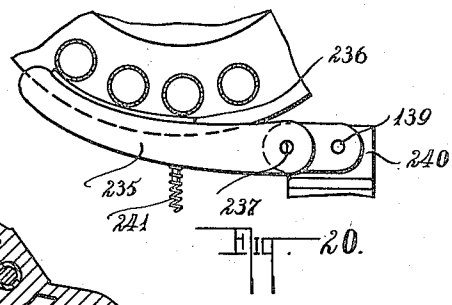


Fig. 20.

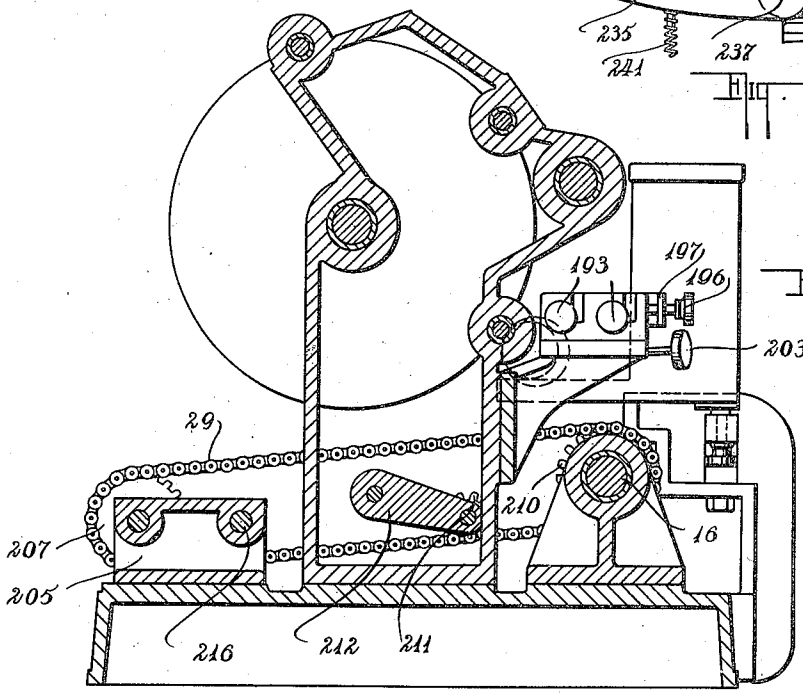


Fig. 8.

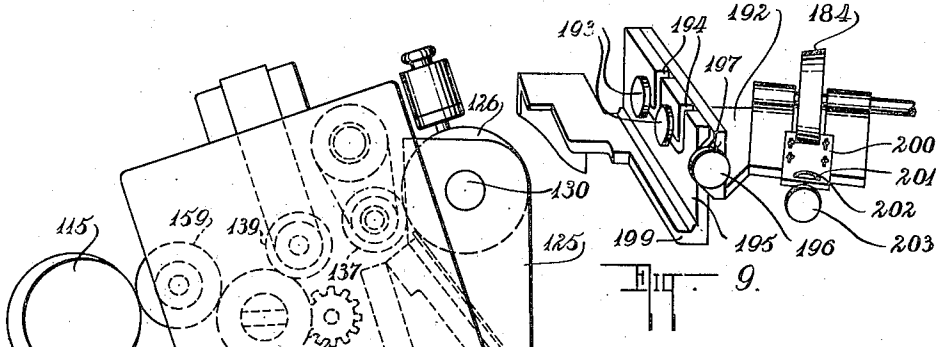


Fig. 9.

Fig. 13.

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THIMBLE PRINTING MACHINE

Filed July 15, 1940 7 Sheets-Sheet 7

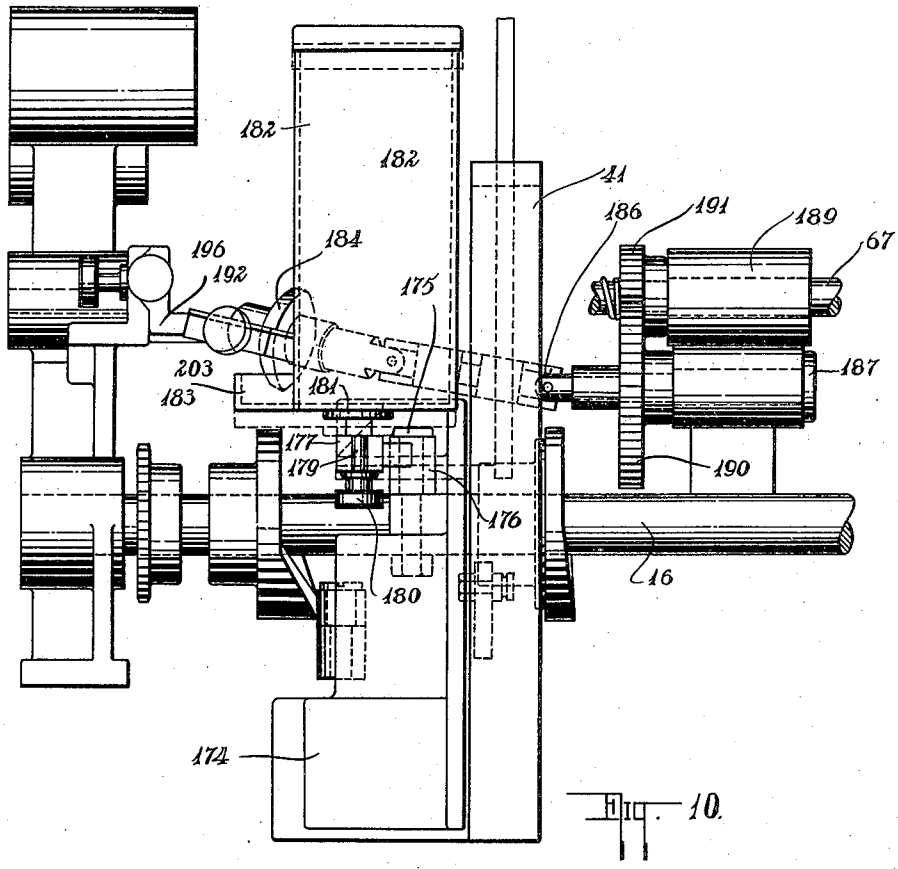


Fig. 10.

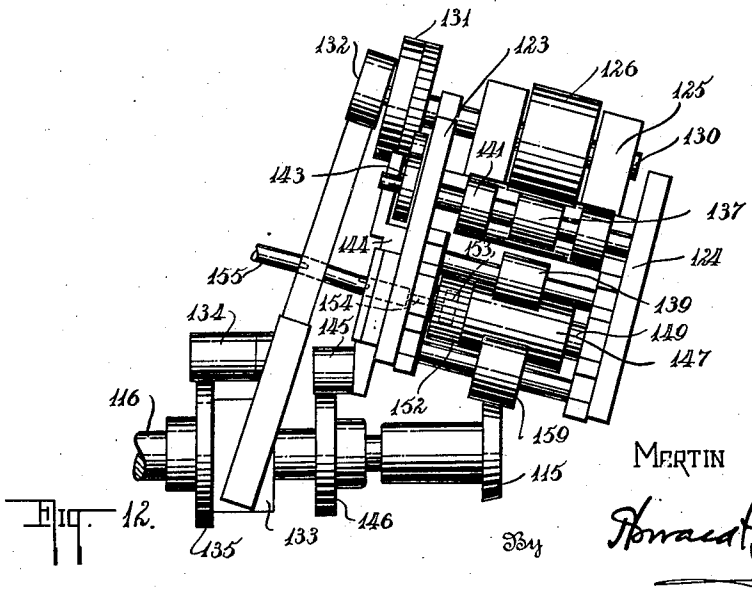


Fig. 12.

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Patented Feb. 20, 1945 2,369,871

UNITED STATES PATENT OFFICE

2,369,871

THIMBLE PRINTING MACHINE

Martin E. Trollen, St. Paul, Minn., assignor to Brown & Bigelow, St. Paul, Minn., a corporation of Minnesota

Application July 15, 1940, Serial No. 345,492

6 Claims. (Cl. 91—16)

My invention relates to a thimble printing machine, wherein it is desired to provide a means of printing any desired indicia upon the body of a thimble or the like and to cover this printing with a coating of protective material such as lacquer.

It has been common practice to form thimbles of metal by a stamping or spinning process and to stamp or otherwise impress into the body of these thimbles the name of an advertiser or the like. With the production of plastic thimbles, however, it became necessary to print the advertisement or the like onto the body of the plastic, as thimbles formed of this material were not as receptive to the stamping process previously used as were metal thimbles. Printing a name upon the thimble also presented some problems as it was found that the printing would not readily adhere to the surface of the plastic, and therefore it became necessary to coat the printed surface with a colorless lacquer or the like to protect the printing thereupon. Such a construction has been found extremely desirable as the plastic thimbles may be formed at a low cost and as the advertisement or name appearing on the thimble may be more readily changed than with the old stamping process. The cost of the dies for the thimbles prevented any name from being placed directly in the mold, as a new or different mold or portion thereof would be required for every advertiser.

It is the object of the present invention to provide a thimble printing machine which is capable of supporting a series of thimbles and which will print automatically upon the surface of the thimble the name of an advertiser or any suitable indicia. The printing means is placed upon an angle so that the printing will be properly applied to the tapered body of the thimble.

It is a further feature of my invention to provide a means for automatically knurling the lower edge of the thimble. As the gate of the mold is ordinarily attached to the lower peripheral bead of the thimble, this knurling operation acts to smooth down any irregularities in the bead at the point of severance of the gate from the thimble.

It is a further feature of my invention to provide a means for applying a coating of lacquer over the printing surface so that the surface of the printing will be protected. While the printing on the thimble body may be wiped off or otherwise injured, the lacquer over the printing prevents disfiguration thereof and acts to maintain the printing intact throughout a considerable period of time.

It is a feature of my invention to provide a means of mounting a series of thimbles on a rotating element, and to place the various printing, lacquering, and knurling means in angular spaced relation about the periphery of this rotatable support. A series of thimbles are mounted upon the support during the rotation thereof, and the rotation proceeds in steps, the support remaining stationary for a sufficient time between steps to permit the printing, knurling, and lacquering operations to take place. The printing step is first acomplished and the knurling step takes place intermediate the printing step and the lacquering operation to provide sufficient time for the printing ink to dry before the lacquering operation is initiated.

It is a further feature of my invention to provide means of automatically stripping the thimbles from the rotatable support and to deposit the same upon a carrier which will convey the thimbles to a suitable container. The stripping means is located angularly spaced with relation to the lacquering means so that the lacquer will dry sufficiently during the interim to prevent the lacquer from being injured as the thimbles drop upon the carrying means. The lacquer is applied adjacent the circumferential bead of the thimble, and the strip of lacquer is sufficiently narrow so that as the thimbles drop upon the carrier, the lacquer does not strike the carrier but is supported in spaced relation thereto by the bead and smaller end of the thimble.

It is a further feature of my invention to provide a means of rotating the thimble supports between the lacquer operation and the stripping of the thimbles from the rotatable support. This rotating means tends to move the thimbles as the lacquer sets, to prevent a thickened area of lacquer at any one point of the thimble. As the thimbles are supported with their axes horizontal, without some means of rotating the thimble supports, a thickened line of lacquer might be formed on one side of the thimble.

It is a further feature of my invention to provide a heating means adjacent the carrier to thoroughly dry the lacquer on the thimbles before the same are deposited in their container or receptacle. This insures the drying of the lacquer sufficiently to prevent marring the appearance of the thimble due to contact between various thimbles in the container.

These and other objects and novel features of

my invention will be more fully and clearly set forth in the following specification and claims.

In the drawings forming a part of my specification:

Figure 1 is a front elevation view of my thimble printing and lacquering machine in readiness for operation.

Figure 2 is an end view of my machine looking at the left end as viewed in Figure 1 of the drawings.

Figure 3 is a section taken on a horizontal plane through the machine, the position of the section being indicated by the line 3—3 of Figure 1.

Figure 4 is a sectional view through the machine, the position of the section being indicated by the line 4—4 of Figure 1.

Figure 5 is an end view of the machine looking at the same from the right end as viewed in Figure 1.

Figure 6 is a diagrammatic perspective view of certain of the operating mechanism of my machine.

Figure 7 is a perspective detail of a cam and means operated thereby.

Figure 8 is a sectional view, the position of the section being indicated by the line 8—8 of Figure 1.

Figure 9 is a perspective detail of the adjustment arrangement for the lacquer wheel.

Figure 10 is a side elevation view of the lacquering wheel and adjustment therefor.

Figure 11 is a diagrammatic view of the lacquer tank disclosing the manner of removal thereof from the machine.

Figure 12 is a view of the inking mechanism for the printing device, the view being taken at an angle with the horizontal, looking directly at the mechanism.

Figure 13 is an end view of the inking mechanism illustrated in Figure 12.

Figure 14 is a detail view of the ratchet arrangement for operating a portion of the inking mechanism.

Figure 15 is a sectional view through the ratchet device illustrated in Figure 14.

Figure 16 is a sectional detail of the reciprocating mechanism for the ink distributing roller.

Figure 17 is a detail view of a longitudinally reciprocable ink spreading roller.

Figure 18 is a sectional view through the roller illustrated in Figure 17.

Figure 19 is a side elevation view of a thimble printed upon my machine.

Figure 20 is a detail view of a spindle rotating means for rotating the spindles after the lacquering operation.

My thimble printing and lacquering machine A may be driven by any suitable means such as an electric motor or the like which will drive by the belt 10 which encircles the pulley 11 on the shaft 12. The shaft 12 extends into the gear casing 13 and actuates suitable reduction gears of any conventional type not illustrated in the drawings. These gears operate the drive shaft 14 which is connected through a flexible connection 15 to the drive shaft 16.

The drive shaft 16 is mounted in supporting brackets 17 and 19 which are supported upon the base 20. The base 20 also supports a standard 21 best illustrated in Figure 2 of the drawings and a standard 22 best illustrated in Figure 5 of the drawings. These standards 21 and 22 support a central shaft 23 upon which the rotary support 24 is mounted. The rotary support 24 is secured to the shaft 23 for rotation therewith.

A ratchet gear 25 best illustrated in Figure 2 of the drawings is also mounted on the shaft 23. The ratchet gear 25 is rotated by the ratchet dog 26 pivotally mounted at 27 on the bell crank 29. The bell crank lever 29 is pivotally mounted upon the shaft 23 and is free to rotate with respect thereto. An eccentric 30 is mounted upon the drive shaft 16 to rotate therewith. This eccentric 30 is pivotally secured at 31 to a link 32, the other end of which is pivotally secured at 33 to the bell crank lever 29. Upon rotation of the drive shaft 16 by the motor or operating means, the bell crank lever 29 will be reciprocated through one cycle of movement for each rotation of the shaft 16, thereby advancing the shaft 23 and rotary support 24 mounted thereupon one notch of the ratchet 25 for each rotation of the shaft 16. It will be further noted that the pivotal movement of the shaft 23 and support 24 is intermittent and in a constant movement.

The periphery of the rotary support 24 is provided with a series of notches 34. A lever 35 best illustrated in Figure 4 of the drawings is pivoted at 36 to a fixed bracket 37 stationary with respect to the frame 20. The lever 35 is equipped with a centering device 39, secured thereto, designed to engage in any of the notches 34. A spring 40 connects the free end of the lever 35 with an upright bracket 41 on the frame 20, and the tension of the spring 40 may be adjusted by an adjusting bolt 42 secured to one end of the spring 40. A cam roller 43 on the lever 35 engages a cam 44 on the drive shaft 16. The cam 44 allows the spring 40 to pull the lever 35 upwardly so that the centering device 39 engages in one of the notches 34 for approximately half of each revolution of the shaft 15, and moves the centering device 39 out of the notch 34 during the remaining portion of the time. Thus the rotary support 24 is firmly held from rotation during approximately one-half of each revolution of the drive shaft 16 during the return stroke of the bell crank 29, and releases the support 24 during the remainder of the rotation while the shaft 23 is being rotated by the ratchet dog 26.

As best illustrated in Figures 1 and 2 of the drawings, a bevel gear 45 is positioned on the drive shaft 16, which is in mesh with a cooperating bevel gear 46 on a diagonally extending shaft 47. The shaft 47 is supported by spaced bearings 49 and 50. The bearings 49 and 50 are secured to an upright supporting standard 51 arranged in parallel relation to the standard 22. The shaft 47 is operable to drive three parallel shafts 52, 53, and 54. A bevel gear 55 on the shaft 47 engages a bevel gear 56 on the shaft 52. A second bevel gear 57 on the shaft 47 engages a cooperating bevel gear 59 on the shaft 53. Thus both of these shafts 52 and 53 are rotated by the drive shaft 16. A spiral gear 60 on the shaft 47 engages a cooperating spiral gear 61 on a transversely extending shaft 62 and a second pair of spiral gears 63 and 64 cooperate to drive the shaft 54. The spiral gear 64 is mounted on the shaft 54. Each of the shafts 52, 53, and 54 extend through the upright support 51 and are journalled therein. These shafts extend in parallel relationship and are each provided with a toothed clutch element which is designed to engage a similar clutch element on rotary spindles supported by the rotary support 24. One of the clutch elements 65 on the shaft 52 is illustrated in Figure 3 of the drawings. The clutch elements 65 on each of the shafts 52, 53, and 54 are identical and are equipped with a clutch slot 66 by

means of which the position of the clutch heads 65 may be adjusted. A spring 67 urges each of the clutch heads 65 into engagement with a spindle on the rotary support 24.

The rotary support 24 is fitted with a series of spindles such as 69 illustrated in Figure 3 of the drawings. The spindle 69 is equipped with a clutch head 70 designed to cooperate with the clutch heads 65, and a tapered end 71 designed to support a thimble with its axis horizontal. The spindle 69 is mounted in bearings to rotate freely and is rotated by the clutch heads 65 when these spindles are moved into cooperating position axially aligned with the shafts 52, 53, and 54.

Supported by spaced journals 72 and 73 on the upright support 51, I provide a rock shaft 74. This rock shaft is best illustrated in Figure 4 of the drawings and is provided with a cam arm 75 bearing a cam roller engageable with a cam 77. The cam 77 acts to rock the shaft 74 through a predetermined angular movement. Mounted for rotation with the shaft 74, I provide a pair of yokes 79 and 80 which are provided with pivoted pins or blocks 81 engageable in the clutch groove 66 of the clutch heads 65. The cam 77 is designed to reciprocate the clutch heads 65 into engagement with their cooperating clutch heads 70 on the spindle 69 during a part of each revolution of the shaft 16, and during the remainder of the cycle the yokes 79 on the shaft 74 tend to withdraw the clutch heads 65 from engagement with their cooperating heads 70. Thus during a part of each revolution of the shaft 16, certain of the spindles 69 are rotated by the shafts 52, 53, and 54 while during the remainder of the cycle, the driving power is disengaged therefrom.

The spindles 69 are equal in number to the teeth of the ratchet cam 25. Thus each time the ratchet cam is operated to rotate the rotary support 24 through a predetermined angular distance, another spindle 69 is brought into axial alignment with each driving shaft 52, 53, and 54. These shafts are so spaced that when one shaft is axially aligned with its respective spindle, both of the other shafts are also aligned with others of the spindles.

The shaft 54 is also reciprocated by movement of the rock shaft 74. Because of the distance between the shaft 54 and the shaft 74 and in order to move each of the clutch heads 65 an equal longitudinal distance, I provide an arm 82 which is pivotally engaged at 83 to a second rock arm 84 pivoted to the fixed pivot 85. The arm 84 is also connected at 86 to the yoke 87 which engages the clutch head 65 on the shaft 54. This arrangement is such that the clutch head 65 on the shaft 64 will move longitudinally a distance equal to the movement of the clutch heads on the shafts 52 and 53 simultaneously therewith.

From this arrangement it will be noted that the rotary support 24 is intermittently rotated to move each spindle 69 successively from registrable position with respect to each of the shafts 52, 53, and 54 and to move the next adjacent spindle 69 into registering position. When in registering position, the clutch heads 65 are moved to engage the cooperating clutch head 70 on the spindle 69 and to rotate the spindles which are at the time in alignment with the shafts 52, 53, and 54.

Upon the standard 22, I provide a series of reciprocable shafts 89, 90, and 91 which are in axial alignment with the shafts 52, 53, and 54 respectively. These shafts are provided with a bearing head 92 designed to engage the closed smaller end of a thimble mounted upon a spindle 69, and the bearing head is urged into contact with the thimble by means of suitable springs 93. The shafts 89, 90, and 91 are each equipped with a grooved collar 94. These grooved collars 94 are for the purpose of enabling the shafts 89, 90, and 91 to be reciprocated longitudinally in unison with the reciprocation of the shafts 52, 53, and 54 in order to hold the thimbles in place upon their respective spindles during the printing, knurling, and lacquering operations.

A cam 95 is mounted upon the drive shaft 16 and is engageable with the cam roller 96 on a rocker arm 97 secured on a diagonally extending shaft 99 for rotation therewith. The shaft 99 is supported by spaced bearings 100 and 101 mounted upon the upright standard 22. As best illustrated in Figure 5 of the drawings, a pair of yokes 102 and 103 are mounted on the shaft 99 to rock therewith. These shafts are equipped with pivoted slide pins 104 which are engaged in the grooved collars 94 on the shafts 89 and 90. Thus as the cam 95 rotates, the shaft 99 is rocked by the arm 97 in a manner to first slide the shafts 89 and 90 in one direction for substantially half the rotation of the shaft 16 and slide these shafts in the opposite direction for the remainder of the cycle of the shaft 16.

In order to reciprocate the shaft 91 in unison with the shafts 89 and 90, I provide an arm 105 secured on the shaft 99 for reciprocation therewith. The arm 105 is pivotally and slidably connected at 106 to the arm 107 which is pivoted to the fixed pivot 109. The yoke 110 is pivotally secured at 111 to the arm 107 and engages the collar 94 on the shaft 91 to reciprocate this shaft 91 in unison with the shafts 89 and 90.

A printing mechanism is provided to print suitable indicia about the body of the thimble 112 as indicated by the numeral 113, and this indicia is positioned adjacent the bead 114 of the thimble. This mechanism includes a printing wheel 115 bearing the type to be printed upon the thimble, and the type wheel 115 rotates at the same surface speed as the thimble body to print the necessary indicia thereupon. The type wheel 115 is mounted on a shaft 116 secured between two spaced bearings 117 and 119 on a bracket 120 bridging the space between the vertical supports 51 and 22 and positioned above the rotary support 24. The shaft 116 is driven by means of a bevel gear 121 mounted thereupon which meshes with a cooperating bevel gear 122 on the shaft 53. The type wheel 115 is of proper size so that the type will be correctly imprinted on the thimble while the type wheel 115 is in contact with the thimble.

In order to provide a supply of ink or printing solution to the type wheel 115, I utilize the inking mechanism illustrated at the top of Figure 1 of the drawings. This mechanism includes a pair of spaced parallel supporting plates 123 and 124 having an ink fountain 125 mounted therebetween. A roller 126 extends into the ink fountain 125 and is mounted upon a shaft 130 extending through a notch in the side plate 123. A ratchet 131 is mounted upon the shaft 130, and this ratchet is operated by a reciprocable arm 132 which is slidably supported on a guide block 133. A cam roller 134 is mounted on the rod 132 and this roller engages a cam 135 which acts to reciprocate the rod, and thus cause rotation of the roller 126.

The roller 126 spreads ink upon the roller 137, which rocks between the roller 126 and the roller 139 on the shaft 140. A pair of brackets arms 141 are mounted upon the shaft 142, which shaft is

rocked by an arm 143 which in turn is operated by a sliding rod 144. As may be seen in Figures 1 and 16 of the drawings, a roller 145 is mounted upon the slide 144, which roller is engageable with a cam 146 on the shaft 116. Rotation of the shaft 116 thereby causes reciprocation of the slide rod 144, rocking the rocker arm 143 and causing the roller 137 to move from contact with the roller 126 to contact with the roller 139 to distribute ink upon the roller 139.

The roller 139 is in constant engagement with the roller 147 mounted upon the fixed shaft 149. The construction of this roller 147 is best illustrated in Figures 17 and 18 of the drawings. The shaft 149 is provided with a cam-shaped slot 150 therein, and the roller 147 is provided with a pin 151 which engages in the slot 150. A gear 152 is provided for rotating the roller 147. As this roller 147 rotates, the shaft 149 remains stationary, and the pin 151 travels in the slot 150 which tends to reciprocate the roller 147 longitudinally on the shaft 149.

The gear 152 meshes with a relatively narrow gear 153 mounted on a shaft 154 connected to the flexible shaft 155. The flexible shaft 155 is connected to a gear 156 which meshes with a gear 157 rotatable on shaft 116 with the gear 121. The roller 147 is thus positively driven and reciprocates longitudinally of its shaft 149.

The roller 147 engages a spreading roller 159 which contacts the ink roller 115. Thus through this series of rollers, the ink is transferred from the ink fountain 125 to the ink roller 115, which in turn prints the indicia 113 upon the surface of the thimble 112. As diagrammatically illustrated in Figure 16 of the drawings, the slide arm 144 together with its cam roller 145 normally is urged into contact with the roller 139 by means of a spring 160.

The ratchet arrangement 131 is best illustrated in Figures 14 and 15 of the drawings. The arm 132 is pivoted at 161 to the arm 162 which is pivotally mounted on the shaft 130. As shown in Figure 15 of the drawings, the arm 162 includes a rearwardly extending slide 163 through which a ratchet dog 164 is slidably mounted. The ratchet dog 164 is urged by a spring 165 into engagement with a ratchet 166 mounted upon and rotatable with the shaft 130. Thus as the arm 132 moves upwardly, the arm 162 is pivoted about the shaft 130, the ratchet dog 164 engaging the ratchet 166 to rotate the shaft 130. As the arm 132 moves downwardly, the ratchet dog 164 slides back over the ratchet teeth into a new engaging position. In Figure 14 the cam 135 is shown in dotted outline to indicate the position of this cam.

The arrangement of the knurling device is best illustrated in Figures 2 and 5 of the drawings. An arm 167 is mounted in the vertical standards 51 and 22 parallel to the central rotating shaft 123. An arm 169 is mounted on the shaft 167 to rotate therewith, and a knurling tool 170 is mounted on the arm 169. The shaft 167 is rocked by means of an arm 171 on the shaft 167 which is provided with a cam roller 172 engageable with a cam 173 on the main drive shaft 16. Thus during each rotation of the main drive shaft 16, the knurling tool 170 is moved into contact with the bead 114 of the thimble 112 to produce a knurled edge thereupon as the thimble is rotated by the rotating means which has been previously described.

A lacquer tank supporting bracket 174 is provided with a stud or bolt 175 extending upwardly therefrom, which bolt provides a pivot for an arm 176. This arm 176 is pivotal between the two dotted positions illustrated in Figure 11 of the drawings. When in the lowermost position indicated in this figure, the yoke end 177 of the arm 176 encircles the shank 179 of a thumb screw 180. This thumb screw 180 is threaded into a boss 181 at the lower end of the lacquer tank 182. When the thumb nut 180 is loosened, the arm 176 may be swung back out of contact with the thumb screw 180, permitting the lacquer tank 182 to drop sufficiently so that the trough end 183 thereof will extend beneath the level of the lacquer applying wheel 184. Thus by loosening the thumb screw 180, pivoting the arm 176 rearwardly, and lowering the tank 182, this tank may be removed from cleaning or replacement purposes. When in position, however, lacquer is maintained in the trough 183, and the lacquer applying wheel 184 picks up lacquer from this trough and applies a strip of lacquer as indicated by the numeral 185 on the surface of the thimble 112. As this lacquer is colorless, it blends with the body of the thimble, and is not readily visible when the lacquer has dried.

The lacquer wheel 184 is operated by means of a flexible shaft 186 which is connected to a shaft 187 journalled in the supporting bracket 189 and provided with a gear 190. The gear 190 meshes with a pinion 191 on the shaft 67 which rotates constantly.

The end of the flexible shaft adjacent the lacquer applying wheel 184 is supported by a bracket 192 which is adjustable laterally of the machine so as to properly apply the strip of lacquer at the desired lateral point of the thimble adjacent the bead 114 and to cause the proper contact between the wheel 184 and the surface of the thimble. The bracket 192 is provided with a pair of thumb screws 193 which extend through L-shaped slots 194 in a fixed bracket 195 secured to the frame 20. This construction best illustrated in Figure 9 is adjustable laterally of the machine by a thumb screw 196 which is threaded through a boss 197 and which engages the outer edge 199 of the bracket 195. By screwing the thumb screw 196 inwardly, the lacquer applying wheel 184 may be moved outwardly away from the thimble surface, and by threading the thumb screw 196 outwardly, the lacquer wheel 184 may be moved inwardly toward the thimble surface. After the thumb screw 196 is positioned correctly the set screws 193 are tightened to hold the bracket 192 in fixed relationship to the bracket 195.

A doctor blade 200 is slidably secured to the bracket 192 and is slotted at 201 to accommodate the flange 202 of a thumb nut 203. The thumb nut 203 is threaded into the bracket 192. By screwing the thumb nut 203 inwardly, the doctor blade 200 can be moved more closely adjacent the lacquer applying wheel 184, and by rotating the thumb nut 203 in the opposite direction, this doctor blade may be moved away from the wheel 184. A shaft 204 is supported by spaced supports 205 and 206, and a sprocket 207 is secured to this shaft. A chain 209 connects the sprocket 207 with a sprocket 210 on the drive shaft 16. Thus the shaft 204 is rotated in unison with the drive shaft 16. An idle sprocket 211 is mounted upon a pivotal arm 212 to maintain this chain 209 taut at all times.

As best illustrated in Figures 6 and 7 of the drawings, a cam 213 is secured to the shaft 207 and engages a cam roller 214 on a follower arm 215 which is secured to a rock shaft 216 likewise mounted between the brackets 205 and 206. Upon

the shaft 216 is secured a stripping arm 217 which is equipped with a notch 219 designed to encircle the spindles 69 adjacent the tapered thimble supporting end 71 thereupon. A spring 220 urges the stripper arm 217 in one direction and it is moved in the other direction by the arm 215 and its engagement with the cam 213.

A lever 221 is centrally pivoted at 222 to the base frame 20 and is provided with a pivotal yoke 223 at one end thereof which straddles the stripper arm 217. A spring 224 normally urges the lever 221 in one direction and a cam 225 is provided on the shaft 16 for operating the lever 221 in the opposite direction. A cam roller 226 engages the surface of the cam 225 and acts at intervals occurring once during each rotation of the shaft 16, to slide the stripper arm 217 longitudinally of the base.

In operation, when the rotatable support 24 comes to rest in any of its predetermined positions, the cam 213 operates the arm 215 to pivot the stripper arm 217 in position to encircle the end of one of the spindles 69 adjacent the beaded end 114 of the thimble 112. Subsequent to this movement, the cam 225 acts to pivot the lever 221 to slide the stripper plate 217 longitudinally of the spindle to strip the thimble from the spindle.

A shaft 227 is mounted on the base 20 transversely of the same, and is connected by a gear 229 to a worm gear 230 on the shaft 204. A roller 231 is mounted upon the shaft 227 to support an endless belt 232 which extends over an idle roller not illustrated at a point spaced longitudinally from the frame 20. The endless belt 232 extends between side guides 233 and is designed to receive the thimbles stripped from the spindles. A heating element 234 may be mounted above the belt 232 to heat, and therefore dry, the lacquer upon the thimbles as they pass beneath this heating element on the belt 232.

The operation of my machine is as follows: The driving motor is set into operation to drive the drive shaft 15. Thimbles are placed upon the supporting ends 71 of the spindles 69 at the right hand side of the machine as viewed in Figures 2 and 4 of the drawings. The rotatable support is rotated in a counterclockwise direction by the ratchet dog 26 and the support 24 is rotated a step at a time by this means. As each spindle moves into registry first with the shafts 53 and 91, the clutch head 65 on the shaft 53 is moved into engagement with the clutch head 70 of the spindle 69, causing rotation of the spindle and the thimble supported thereon. Simultaneously, the bearing end 92 of the shaft 90 is moved inwardly against the closed end of the thimble to hold the thimble in place. At this moment, the type on the printing wheel 115 contacts the surface of the thimble, and rotating at the same rotative speed as the thimble causes the type to be imprinted upon the thimble. Only a portion of the wheel 115 is equipped with type, as this printing wheel is relatively large with respect to the thimble, and when the thimble completes one revolution, the type wheel disengages the surface of the thimble. Upon further rotation of the drive shaft 16, the clutch head 65 on the shaft 53 is released from its clutch head 70 and the shaft 90 is retracted from engagement with the thimble. Subsequently the rotative support is again rotated another step to bring another thimble into contact with the printing wheel 146.

As the thimble moves into alignment with the shafts 54 and 90, the clutch head 65 on the shaft 54 engages the spindle clutch head 70, again causing rotation of the spindle. Simultaneously, the cam 173 moves the knurling tool 170 into engagement with the bead of the thimble and knurls this bead. When the knurling operation has been completed, the cam 173 permits the knurling tool 170 to be moved away from the thimble, and the clutch head 65 is released from engagement with the spindle clutch head 70. Simultaneously, the shaft 91 is retracted to move the bearing portion thereof out of engagement with the head of the thimble. When this action has been completed, the rotatable support 24 is pivoted by the ratchet dog 26 into a new position.

After the thimble has been printed and knurled, the subsequent intermittent rotation of the support 24 carries each thimble into axial alignment with the shafts 52 and 89. The thimble is held in this position by the centering device 39, and the clutch head 65 is moved into engagement with the cooperating clutch head 70 on the spindle 69. This causes rotation of the spindle 69. Simultaneously with the engagement of the clutch heads 52 and 70, the shaft 89 is moved longitudinally until the bearing portion 92 thereof engages the end of the thimble supported. Thus during rotation of the spindle 69 the bearing head 92 holds the thimble in its proper position. At this point of the rotation, the body of the thimble is in contact with the lacquer applying wheel 184 which is being constantly rotated by its flexible shaft 186. The rotation of this lacquer wheel applies the band of lacquer 185 to the thimble 112 over the printing or other indicia 113. After the lacquer applying operation has been completed, the clutch head 65 automatically retracts from engagement with the cooperating clutch head 70 to stop rotation of the spindle 69, and the bearing head 92 of the shaft 90 is moved longitudinally to disengage the bearing head from the thimble.

Further rotation of the rotatable support 24 moves each spindle 69 successively into proximity with the stripping device 217. The stripping arm 217 is pivoted inwardly so that the spindle 69 adjacent the thimble support 71 extends in the notch 219. The stripper arm 217 is then moved longitudinally, stripping the thimble from its support 71 and dropping the thimble onto the endless belt 272 which acts to convey the thimble to a suitable container.

I have found that if any considerable amount of lacquer is applied by the lacquer applying wheel 184, there is some chance of this lacquer running to the lowermost portion of the thimble. In other words, the thimbles are supported with their axes extending horizontally, and after the lacquer has been applied, the means rotating the spindles 69 is disengaged. Thus the spindle remains in one position and creates the likelihood of an excess of lacquer running to the lowermost portion of the thimble and creating a thickened ridge at this point. In order to cause rotation of the thimbles as the rotatable support 24 is moved from one position to another, I provide a shoe 235 equipped with a liner 236 of rubber, leather, or some composite material such as brake lining. This shoe 235 is pivoted at 237 to a link support 239 mounted on a fixed bracket 240 on the frame 20. A spring 241 is interposed between the shoe 235 and the base frame 20 to urge the shoe 235 against the clutch heads 70 on the spindle 69.

Thus as the rotatable support is rotated from one position to another, the clutch heads 78 frictionally engage the friction surface 236 and act to rotate the spindles 69, thereby causing rotation of the thimbles and preventing a thickened portion of lacquer along one edge of the thimble.

In accordance with the patent statutes, I have described the principles of construction and operation of my thimble printing and lacquering machine; and while I have endeavored to set forth the best embodiments thereof, I desire to have it understood that these are only illustrative of a means of carrying out my invention, and that obvious changes may be made within the scope of the following claims without departing from the spirit of my invention.

I claim:

1. A thimble printing machine comprising a series of rotatable tapered spindles having an end thereon designed to support a thimble, a rotatable spindle support supporting said spindles rotatable through a fixed axis, an angularly disposed printing wheel unit engaging a thimble on each of said spindles in one rotative position thereof on said spindle support, and an angularly disposed lacquer applying wheel unit engaging each said thimble in another rotative position of each spindle adapted to cover the printed area of the thimble.

2. A thimble printing machine comprising a base, a rotary support mounted on said base, a series of parallel short tapered spindles rotatably mounted in said rotary support at equal distance from the axis thereof, a printing wheel having a beveled surface engageable with each thimble in one position of rotation of each spindle with said rotary support, a lacquer applying unit means engageable with each thimble in another position of each spindle with said rotary support, to apply lacquer over the printed area of the thimble and means engaging said spindles in said positions of printing and lacquering to rotate said spindles.

3. A thimble printing machine comprising a base, a rotary support on said base, a series of angularly spaced tapered thimble supporting spindles on said rotary support, printing means and lacquering means in angularly spaced relation engageable over the same area of the thimbles on said spindles, and oscillating thimble stripping means for stripping the thimbles from said spindles operated by lever and cam means.

4. A thimble printing machine comprising a base, a rotary support mounted on said base, a series of angularly spaced thimble supporting tapered spindles pivotally mounted on said rotary support, printing means and lacquering means in angularly spaced relation engageable over the same area of the thimbles on said spindles, oscillating thimble stripping means for removing said thimbles from said spindles, and endless thimble conveying means for receiving said stripped thimbles and conveying the same from said rotary support.

5. A thimble printing machine comprising a base, a rotary support mounted on said base, a series of angularly spaced thimble supporting spindles rotatably mounted on said rotary support, a narrow band-like printing means and narrow film applying means angularly arranged about said rotary support engageable with thimbles on said spindles, oscillating thimble stripping means, thimble conveying means adapted to convey the thimbles away from said printing means and heating means over said conveying means to automatically dry said thimbles.

6. A thimble machine comprising a base, a rotary support mounted on said base, a series of equally angularly spaced thimble supporting short tapered spindles on said rotary support, a means intermittently rotating said rotary support an angular distance equal to the angular spacing of said spindles, a pair of angularly spaced spindle rotating means simultaneously engageable with a pair of said spindles during the period between intermittent movements of said rotary supports to rotate said pair of spindles, and printing means and film applying means adjacent said pair of spindles engageable simultaneously with thimbles on said pair of spindles to print, and to apply a film upon, the respective thimbles of said pair.

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