

Oct. 7, 1952

W. W. HARPER ET AL

2,612,976

FORM ISSUING APPARATUS

Filed Dec. 24, 1948

6 Sheets-Sheet 1

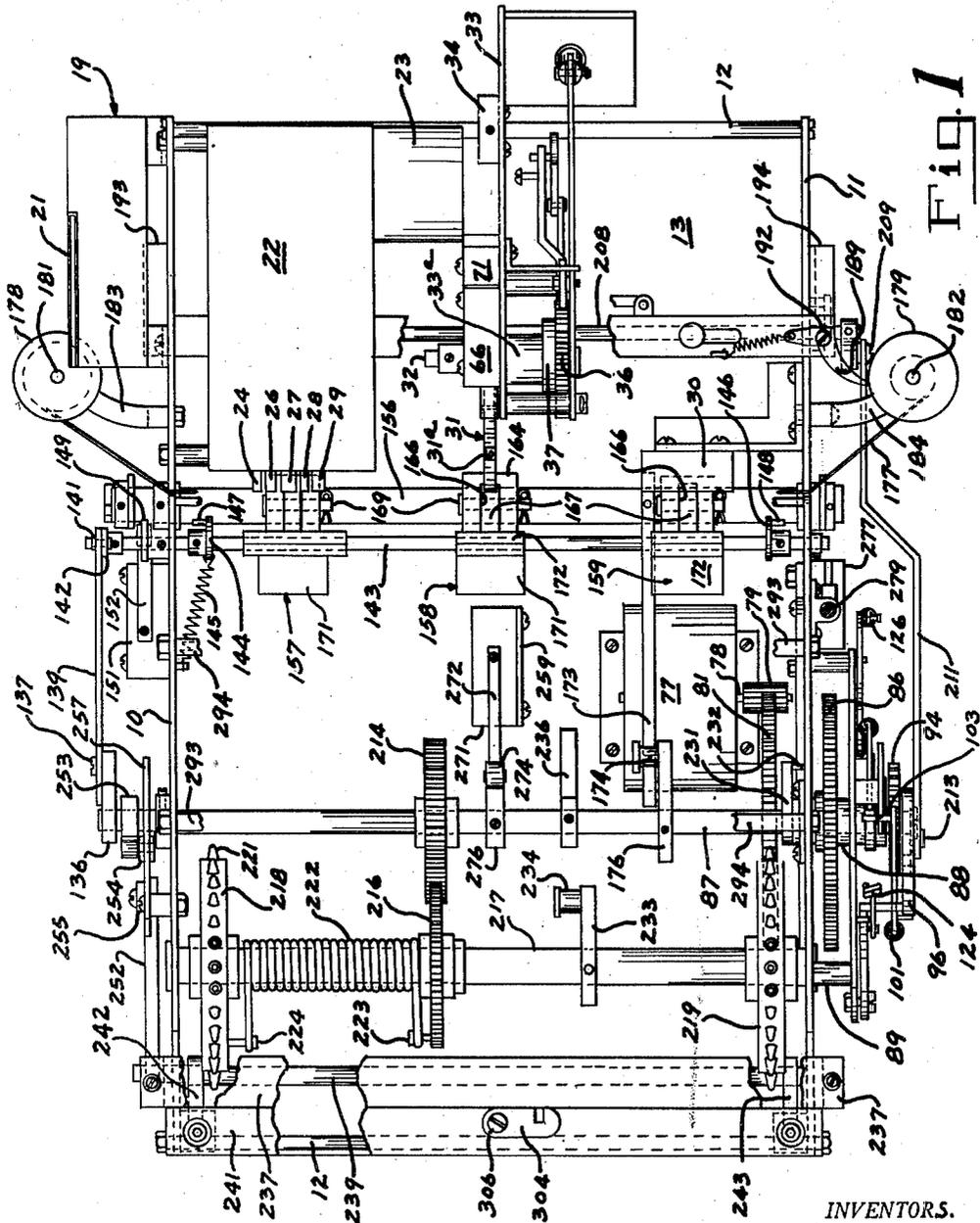


Fig. 1

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6 Sheets-Sheet 2

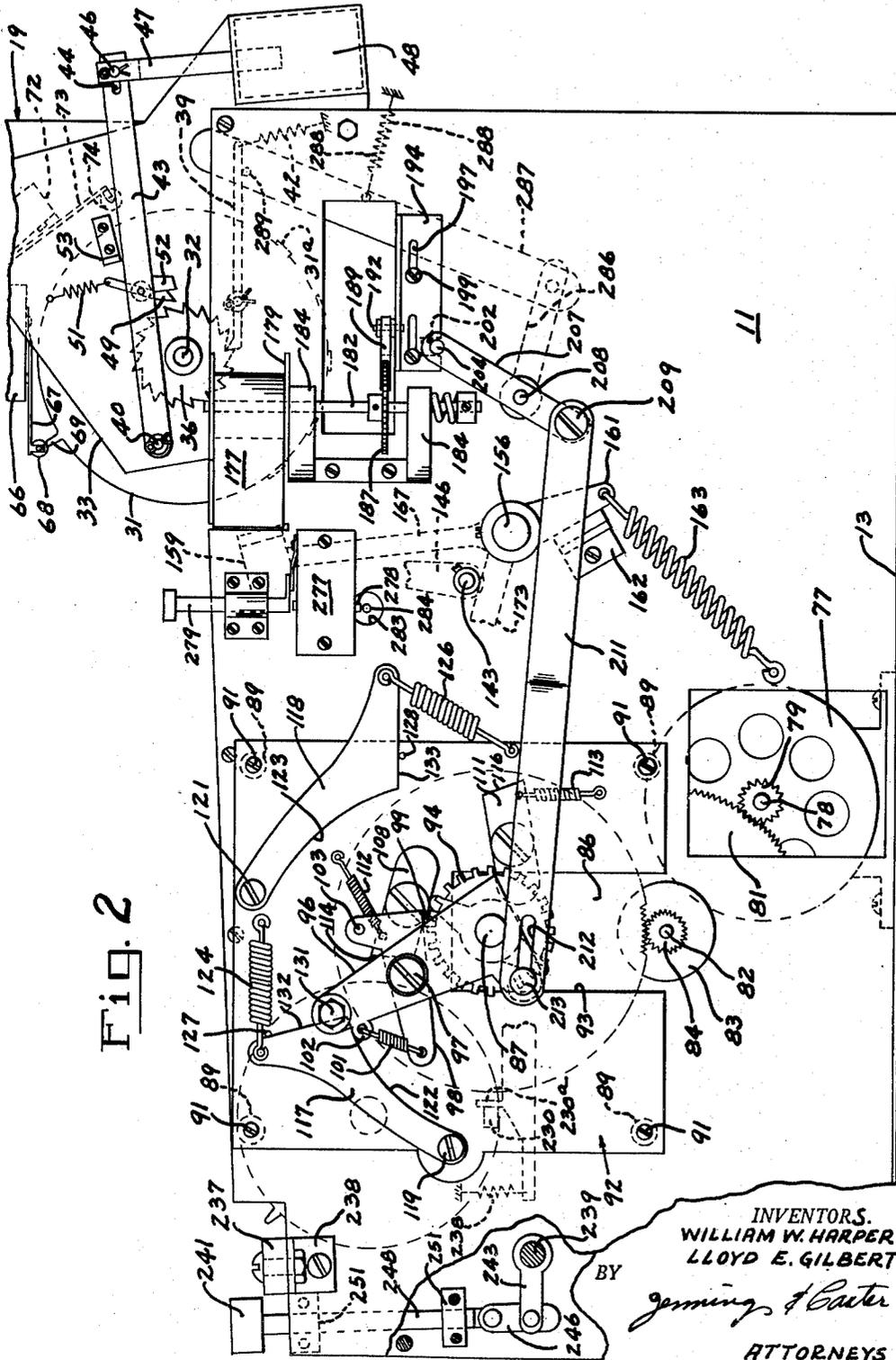


FIG. 2

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6 Sheets-Sheet 4

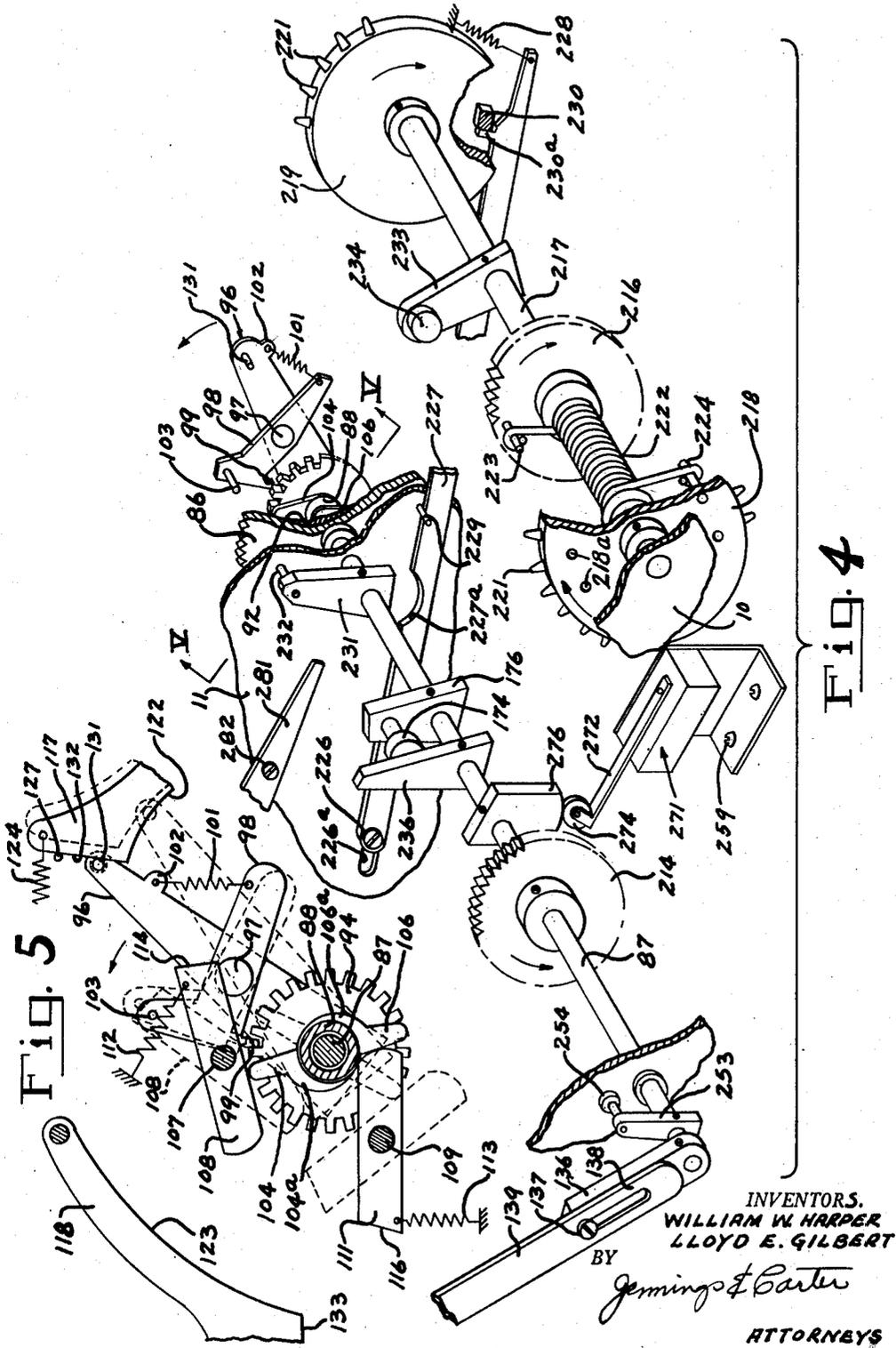


Fig. 4

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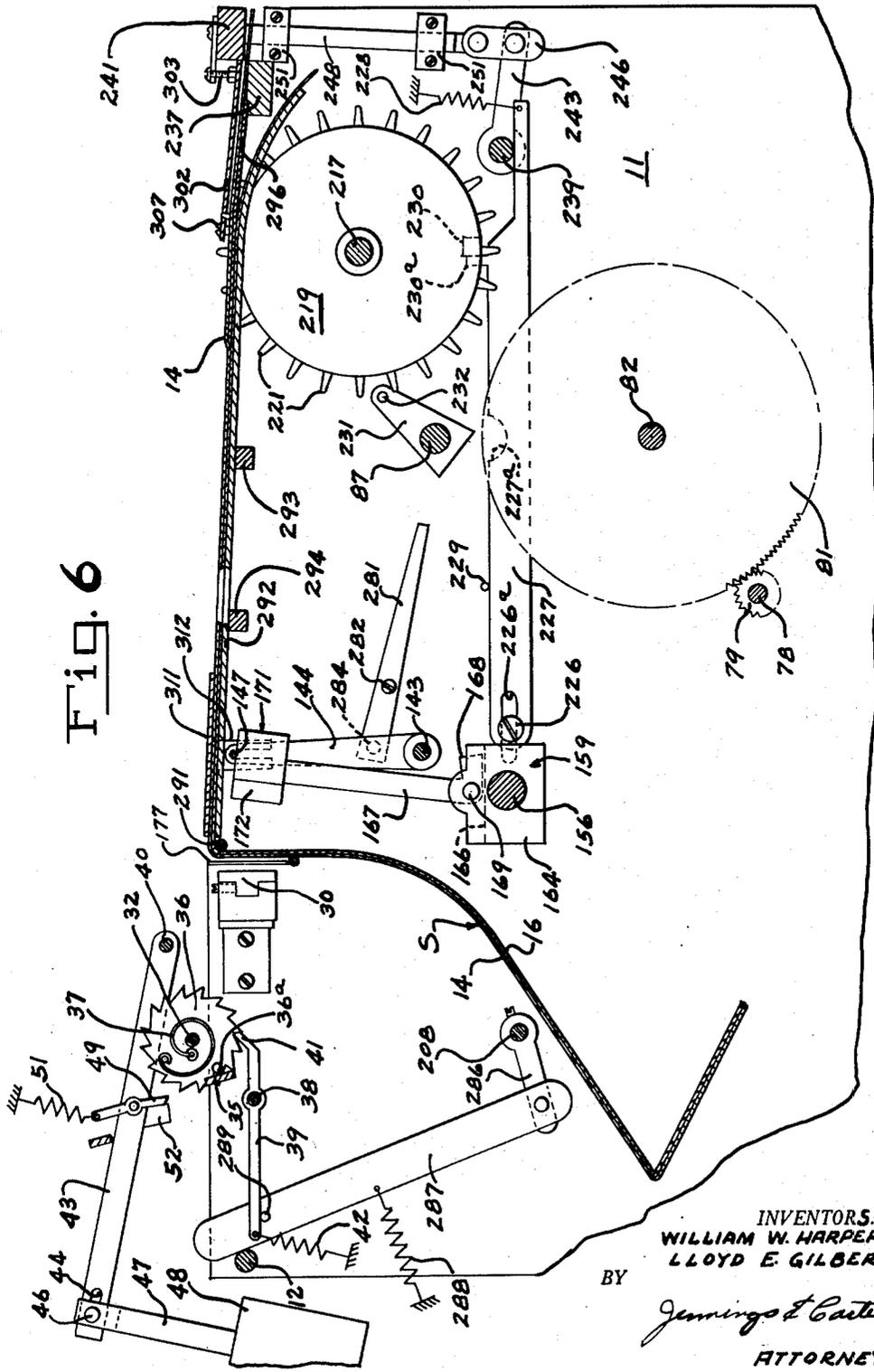
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6 Sheets-Sheet 5



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6 Sheets-Sheet 6

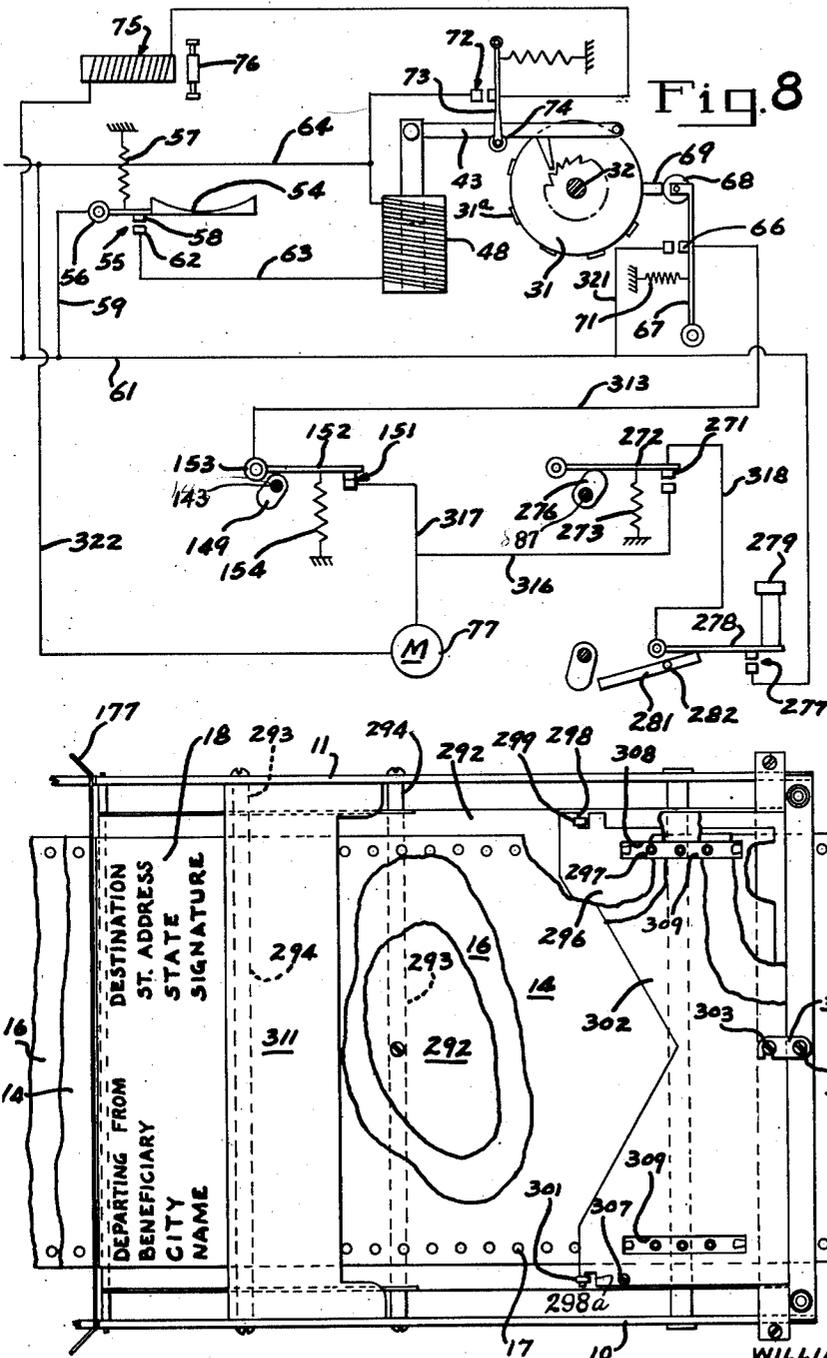


Fig. 8

Fig. 7

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UNITED STATES PATENT OFFICE

2,612,976

FORM ISSUING APPARATUS

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Application December 24, 1948, Serial No. 67,207

15 Claims. (Cl. 194—10)

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Our present invention relates to form issuing apparatus, and while not limited thereto, relates more particularly to apparatus especially constructed and arranged to issue policies of insurance to customers responsive to the insertion of a coin in a suitable coin mechanism.

One object of our invention is to provide a device of the character designated embodying mechanism for feeding collated original and duplicate, continuous sheets on which the contracts of insurance are printed, and which shall be effective to feed the paper principally through a resilient drive mechanism thus minimizing the danger of damaging the sheets upon actuation of the feed and providing a smooth, even feeding of the sheets.

Another object is to provide apparatus of the character designated in which there is associated with the resilient drive means a positive drive means therefor which comes into operation at the end of a policy feeding operation, thus to positively position the upper, original, copy of the policy between the blades of a shear, whereby the original copy is cut at a predetermined point along the length of the continuous sheet and delivered from the apparatus.

Another object is to provide apparatus of the character designated in which the paper feed mechanism embodies a spring for effecting the major portion of the paper feed movement, a small electric motor for winding the spring when required, together with a ratchet type clutch and engaging mechanism therefor operable to permit the motor to gain speed before the clutch is engaged; thereby permitting the use of a motor having very low starting torque.

Another object is to provide, in apparatus of the character designated, mechanism for printing certain data on the policies immediately before being delivered, which mechanism embodies a set of spring actuated, trip released printing hammers, the hammers being drawn rearwardly by the motor through the clutch before mentioned in such manner that the springs therefor are stretched only after the motor has attained speed, thus further reducing the required starting torque of the motor.

A further object is to provide a form issuing machine in which the sequential operation of the component parts is attained and maintained for the most part through the medium of simple, reliable, mechanical means as distinguished from more complicated and less reliable electrical means such as solenoids, relays and the like, thus providing a machine which is simple of construc-

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tion, trouble free in operation, and rugged enough to withstand the hard usage to which such apparatus is subjected when placed for use in public places.

Apparatus illustrating the features of our invention is shown in the accompanying drawing forming a part of this application in which—

Fig. 1 is a plan view, partly broken away, and with certain of the plates for supporting and dividing the forms omitted for the sake of clarity;

Fig. 2 is a fragmental elevational view of one side of the apparatus; ;

Fig. 3 is a fragmental elevational view of the opposite side of the apparatus;

Fig. 4 is a perspective view with some of the parts separated for the sake of clarity, and with parts broken away and in section, of the main shaft and the paper feeding wheels;

Fig. 5 is a detail sectional view taken generally along line V—V of Fig. 4, with certain parts broken away and illustrating the action of the clutch;

Fig. 6 is a somewhat diagrammatic longitudinal sectional view illustrating the paper feed and amount indexing mechanism;

Fig. 7 is a diagrammatic plan view of the apparatus, illustrating the paper in position to be fed therethrough, and with certain parts broken away; and

Fig. 8 is a wiring diagram.

Referring now more particularly to Fig. 1 of the drawings, our improved apparatus comprises a frame embodying side plates 10 and 11, held in spaced relation by means of a number of cross members 12. The side members 10 and 11 are joined together at their lower edges by a plate 13, thus providing a frame generally channel shaped as viewed in transverse section, and with the legs thereof braced by the cross members 12.

As shown more particularly in Figs. 6 and 7, our improved apparatus is adapted to issue individual forms, one at a time, from a continuous strip of the same. In practice, it is desirable to issue one of the forms to the customer, and for the machine to maintain for the issuing party a duplicate copy of the same. To this end, we provide a sheet S which comprises an upper or original sheet 14 and a lower or duplicate sheet 16. The sheets are similarly printed on their upper surfaces, pass through the major portion of the apparatus in collated relation, and are fed by pin wheels which engage in rows of marginally disposed openings 17. The original and duplicate sheets may be provided with a heading 18 in which the customer enters the data required, and

in the manner to be later explained. In order to make the duplicate copy on the sheet 16, we may coat or "saddle back" the rear surface of the sheet 14 immediately behind the heading 13 with carbon in the manner well understood. Or, if desired, a separate sheet of carbon paper may be interposed between the sheets 14 and 16 although as will later appear we prefer to use the coating of carbon in order to eliminate the necessity of providing means for disposing of the separate carbon sheet. A given length of the sheet S therefore constitutes an original and a copy of the insurance policy to be issued, and the customer receives the original which is cut from the upper sheet 16 in the manner to be described. The duplicates remain together in sheet form and fold into a suitable space provided therefor in the lower part of a cabinet for the apparatus, not shown.

We provide our machine with a coin mechanism 19 which may be of any one of several well known makes, the construction of which is readily understood by those skilled in the art. The coin mechanism 19 comprises a coin chute 21 accessible from the outside of the machine. Our apparatus also has associated therewith a time and date clock indicated at 22, operated by a synchronous electric motor 23. In the manner understood, the clock 22 comprises an hour wheel 24, a minute wheel 26, a month wheel 27, a day of the month wheel 28, and a year wheel 29. Mounted on a suitable bracket is a stamp 30 carrying the name of the agent on whose behalf the policies are issued.

Our machine preferably is capable of issuing policies in different amounts, depending upon the number of coins deposited in the coin mechanism. To this end, we provide a wheel 31, hereinafter referred to as the "amount wheel," and at different positions on the periphery of the wheel 31 we provide pads of raised type 31a, which may bear the numerals 5, 10, 15, 20 and 25, indicating the amount of the policy, and printed thereon as will be explained. The amount wheel 31 is mounted on a shaft 32 suitably journaled for rotation in a boss 33a in turn secured to the side of a mounting plate 33. The mounting plate 33 is secured by a boss 34 to one of the cross members 12.

On the end of the shaft 32 adjacent the boss 33a, we secure a ratchet wheel 36. The ratchet wheel and shaft, and consequently the amount wheel 31 are biased by a coil spring 37 in a clockwise direction as viewed in Fig. 6, the inner end of the spring being secured to the boss 33a and the outer end being secured to the ratchet wheel 36. A stop 35 is engaged by a pin 36a mounted on the ratchet wheel 36 at the beginning of a cycle of operation of the apparatus whereby the lowest figure on the amount wheel is rotated to printing position responsive to insertion of a single coin.

Mounted on a pin 38 projecting from the side of the mounting plate 33 is a pawl arm 39. The arm 39 carries at one end a pawl 41 disposed to engage the ratchet gear 36 and prevent reverse rotation thereof. The pawl is biased into engagement with the gear by means of a spring 42.

Pivotaly mounted to the plate 33 as at 40 is one end of an arm 43. The opposite end of the arm 43 is slotted as at 44 to receive a pin 46 which passes through the upper end of an armature 47 of a solenoid 48, likewise mounted on the plate 33. Pivotaly mounted to the arm 43 is an actuating pawl 49 for engaging the ratchet gear

36 thereby to rotate the same clockwise as viewed in Fig. 2, counterclockwise as viewed in Fig. 6, upon downward movement of the arm 43. The pawl 49 has one end of a spring 51 fastened to its upper end, and the opposite end of the spring is anchored to the plate 33. A limit stop 52 is carried by the arm 43 and engages the rear side of the pawl 49 to hold the same in position for engagement with the gear 36. The spring 51 also serves to raise the entire arm 43 and armature 47, and a stop 53 secured to the plate 33 limits the upward movement thereof.

The coin mechanism 19 embodies a coin actuated lever 54 as shown in Fig. 8, pivotaly mounted as at 56. The member 54 is biased upwardly by a spring 57, and carries the movable contact member 58 of a switch 55. The movable contact 58 is connected by a line 59 to one line 61 of a power source. The fixed contact 62 of the switch is connected by a circuit 63 to the solenoid 48, and the opposite side of the solenoid is connected to the other line 64 of the power source. As will be apparent, from the description so far given, for each coin dropped through the chute 21 and onto the member 54, the solenoid 48 is energized for an instant, thereby pivoting the arm 43 downwardly, causing the amount wheel 31 to rotate counterclockwise as viewed in Figs. 6 and 8, clockwise as viewed in Fig. 2. This action positions one of the pads of type 31a of the wheel 31 in position for printing in the manner to be explained later. The pad 31a on the periphery of the wheel so positioned for printing is the one selected by the number of coins deposited in the chute 21 of the coin mechanism, it being understood that the pad bearing the numeral 5 is positioned first and the others sequentially upon downward movements of arm 43.

Referring again more particularly to Fig. 2, we show a switch 66 mounted on the plate 33 and having a switch arm 67 on the bottom thereof over the amount wheel 31. The end of the arm 67 carries a small roller 68. The amount wheel 31 carries a lug 69 disposed to engage beneath the roller 68, thereby to raise the arm 67 and open the switch 66. The switch 66 is biased by means of a spring 71 toward closed position as shown more clearly in Fig. 8.

Also mounted on the plate 33 is another switch 72 having an arm 73 carrying on the end thereof a roller 74, likewise disposed to be struck by the lug 69 after the wheel 31 has rotated a predetermined amount responsive to a given number of downward motions of the arm 43. As shown in Fig. 8, the switch 72 is in circuit with an electromagnet 75 mounted in the coin mechanism 19. Disposed to be attracted upon energization of the magnet 75 is an armature 76 pivotaly mounted to swing in the path of a coin inserted in the chute 21, thereby to cause the coin to be returned to the customer through a side delivery chute therefor. The arrangement of the magnet 75 and its armature 76, and their operation in returning excess coins are well understood, and no detailed description is believed necessary. After a predetermined number of coins have tripped the member 54, the lug 69 will have moved to the position to close the switch 72. When switch 72 is closed, magnet 75 is energized, attracting its armature 76, whereupon any further coins dropped into the chute 21 are returned to the customer. The apparatus thus retains only a predetermined number of coins, whereby a customer, through mistake, will not overpay for the policy to be issued.

Mounted on the base plate 13 is a small electric motor 77. On the shaft 78 of the motor is a pinion 79 in mesh with a gear 81 mounted on a shaft 82, suitably journaled in bearings 83 on the side plates 10 and 11. The shaft 82 projects through the side plate 11 and has mounted thereon a pinion 84. The pinion 84 meshes with a large gear 86, rotatably mounted on a shaft 87, hereinafter referred to as the "main" shaft. The gear 86 has formed integrally therewith an outwardly projecting boss 88.

Disposed in spaced relation to the plate 11 by means of spacers 89 and screws 91 is a mounting plate 92. The plate 92 is notched at 93 to permit the same to be moved downwardly over the boss 88 of the gear 86 when assembling the apparatus.

Disposed on the outer side of the mounting plate 92, and preferably formed integrally with the boss 88 of the gear 86, is a ratchet gear 94. The ratchet gear 94 is thus also freely mounted on the shaft 87, and turns with the gear 86.

Fixed to the outer end of the main shaft 87 is an arm 96. Pivotaly mounted as at 97 on the arm 96 is a pawl arm 98 having on one end a pawl 99 disposed to engage the teeth of the ratchet gear 94. The end of the arm 98 opposite the pawl 99 is biased in a clockwise direction as viewed in Fig. 2 by means of a spring 101 anchored thereto and to a lug 102 on the arm 96. As shown in Fig. 2, the pawl arm 98 is L-shaped and in the end of the leg portion thereof opposite the pawl 99 is an inwardly projecting pin 103.

Carried on the connecting boss 88 between the gear 86 and the ratchet gear 94 are a pair of axially displaced, substantially diametrically opposed cams 104 and 106. Pivotaly mounted at 107 to the mounting plate 92 is an arm 108 disposed to be positioned by the cam 104 to disengage the pawl 99 from the ratchet gear 94 after a predetermined rotation of the large and ratchet gears and consequently the cam 104. Likewise mounted as at 109 to the mounting plate 92 is a second arm 111. The arm 111 is disposed to be positioned by the cam 106 whereby the pin 103 of the pawl arm 98 engages the same, thus to again disengage the pawl 99 after a further and predetermined rotation of the ratchet gear 94. On the outer ends of the arms 108 and 111 are springs 112 and 113, respectively, anchored at their other ends to the mounting plate 92, and adapted to hold the rounded inner ends of the arms 108 and 111 in position to be engaged by the cams 104 and 106. The outer end of each arm 108 and 111 is beveled as indicated at 114 and 116 to aid the pin 103 in riding upwardly on the ends of the arms, thus to rock the pawl arm 98 and disengage the pawl 99.

In order to prevent counter rotation of the shaft 87 and the arm 96 responsive to certain spring loads imposed thereon as will be explained, we provide holding cams 117 and 118, pivoted to the mounting plate 92 as at 119 and 121, respectively. The underside of each cam is rounded as shown at 122 and 123, and the free ends thereof are biased by springs 124 and 126 against stop pins 127 and 128, respectively. The outer end of the arm 96 carries a pin 131 disposed to ride under the rounded surfaces 122 and 123, and then to engage behind shoulders 132 and 133 on the cams 117 and 118, thus to prevent counter rotation of the arm 96 and its shaft 87.

Referring more particularly to Figs. 3 and 4, on the end of the main shaft 87 opposite arm 96,

is fixed an arm 136. Adjacent the outer end of the arm we provide a screw 137. Slidably fitting about the screw 137 is the slotted end 138 of a link 139. The link 139 extends forwardly and is pivotally connected by means of a screw 141 to the end of a crank arm 142. The crank arm 142 is mounted on a cross shaft 143, journaled in bearings in the side plates 10 and 11. Mounted fast on the shaft 143 adjacent the inner walls of the side plates are upstanding arms 144 and 146. The upper ends of the arms 144 and 146 carry outwardly projecting pins 147 and 148, see Fig. 1. The purpose of these arms and pins will be later described. The arms 144 and 146 are biased in a clockwise direction as viewed in Fig. 3 by a spring 145 anchored at either end to the arm 142 and the adjacent side plate.

Also mounted on the shaft 143 on the outside of the side plate 10 is a cam 149. Fixed to the side plate 10 is a switch 151 having an operating arm 152, carrying on its outer end a small roller 153. The switch 151 is biased toward closed position by means of a spring 154. The cam 149 is disposed to strike the roller 153, thereby to open switch 151 at the proper time in the cycle of operation.

Mounted forwardly and slightly below shaft 143 is another cross shaft 156 carrying printing hammer assemblies 157, 158, and 159 disposed to cooperate with the printing wheels of the clock 22, the amount wheel 31 and the agents' stamp 30, respectively, thereby to print on the original and duplicate copies of the policy the indicia on the several wheels and stamp. On each end of the hammer shaft 156 is fixed a crank arm 161. The arms 161 are biased against resilient stops 162 on the plates 10 and 11 by means of springs 163.

As best shown in Fig. 6, each of the hammer assemblies 157, 158 and 159 comprises a mounting block 164 secured non-rotatably to the shaft 156. The upper side of each of the blocks 164 is grooved as indicated at 166 to receive the lower end of a hammer arm 167. The lower end of the hammer arm is provided with a rearwardly extending lug 168, disposed to engage in the bottom of the groove 166 upon counterclockwise movement of the shaft 156 as viewed in Fig. 6, thereby to propel the upper end of the hammer arm forwardly. As shown, the lower ends of the hammer arms are pivotaly mounted to the blocks on a pin 169. The hammers or platens proper comprise a weighted head 171 and a striking face 172, formed of relatively hard but resilient material such as hard rubber or the like.

Intermediate the ends of the hammer shaft 156 is a trip arm 173. A roller 174 is mounted on the outer end of an arm 176, in turn mounted fast on the shaft 87. The roller 174 is disposed, upon rotation of the shaft 87, to engage the arm 173 thereby rotating shaft 156 and stretching the springs 163. Continued rotation of shaft 87 causes the roller to ride off the end of the arm 173, thereby suddenly releasing the shaft 156 for rotation by the springs 163, causing the hammers to be snapped forwardly. It is to be noted that the lugs 168 engage in the bottom of the grooves 166 thus to propel the hammers on their striking stroke, but that otherwise the hammers are freely pivoted on their pins 169. Likewise, when the hammers are at rest, that is, in the positions shown in Fig. 6 of the drawings, gravity moves the weighted heads thereof slightly to the rear, thus to assume a position clear of the sheet S. Mounted to travel intermittently between the original form 14 and the printing wheels and

stamp 30 is an inked ribbon 177. As best shown in Figs. 1 and 2, the ribbon 177 is wound on spools 178 and 179. The spools are carried on vertically disposed shafts 181 and 182 rotatable in forked bearings 183 and 184, suitably secured to the side plates 10 and 11. On each shaft 181 and 182 are ratchet wheels 186 and 187. Disposed to selectively coact with the respective wheels 186 and 187 are pawls 188 and 189, pivotally mounted as at 191 and 192 on L-shaped brackets 193 and 194, slotted as indicated at 196 and 197, and slidably secured to the plates 10 and 11 by means of screws 198 and 199.

The lower edges of the brackets 193 and 194 are notched as indicated at 201 and 202. Slidably disposed in the notches are pins 203 and 204, carried in the ends of arms 206 and 207 rigidly fixed to a shaft 208. The arm 207 adjacent side plate 11 extends downwardly past the shaft 208 and is pivotally connected by means of a screw 209 to one end of a link 211. The opposite end of the link 211 is slotted as indicated at 212. Passing slidably through the slot 212 is a pin 213 secured to the arm 96, which as will be remembered is fast to the shaft 87. The pin 213 is offset with respect to the shaft 87, whereby upon rotation of the arm 96, link 211 reciprocates back and forth, a certain amount of lost motion being provided by the slot 212.

The tape feed mechanism just described is effective to feed the ribbon across the apparatus thereby to present a new surface of the ribbon for printing each time the hammers come forwardly. Likewise, the usual and standard means for obtaining reverse movement of the tape, may, if desired be provided. Suffice it to say, however, that sliding motion is imparted to the brackets 193 and 194 through the crank arms 206 and 207, thus causing either the pawl 188 or 189 to rotate its respective ratchet wheel 186 or 187, thus turning either the spool 178 or 179, thereby to feed the ribbon.

The mechanism for feeding the sheet S embodying the original and duplicate forms 14 and 16 will now be described. As before stated, we preferably employ a composite sheet S. The sheet may be folded upon itself in lapped relation, whereby a large number of forms may be stored in a cabinet which as will be understood is provided to house the mechanism being described. The sheet S is fed through the apparatus solely by the engagement of pin wheels with the rows of marginally disposed openings 17.

As shown more clearly in Figs. 1 and 4, we secure to the main shaft 87 a gear 214. Meshing with the gear 214 is a gear 216 loosely mounted on a cross shaft 217, journaled in bearings in the side plates 10 and 11. Adjacent the inner side of the plates 10 and 11, and fast to the shaft 217, we secure pin wheels 218 and 219, each of which has a plurality of pins 221 disposed to engage in the openings 17 and pull the sheet S through the apparatus. Between the gear 216 and the pin wheel 218 and coiled about the shaft 217 is a coil spring 222. One end of the coil spring is fixed to the gear 216 by means of a pin 223 and the other end is fixed to the pin-wheel 218 by means of a pin 224. To permit initial tensioning of the spring to the degree required, we provide a plurality of openings 218a about the side of wheel 218 in which the pins for holding that end of the spring may be selectively inserted. It will be apparent that if shaft 217 is held stationary, and gear 216 is rotated in the direction of

the arrow as shown in Fig. 4, the spring 222 will be wound under tension.

Pivotally mounted by means of a screw 226 to the side plate 11 is a rearwardly extending arm 227. The screw 226 passes through a slot 226a in plate 11, whereby the arm 227 may be shifted longitudinally of the apparatus. The free end of the arm is biased upwardly by means of a spring 228 against a stop pin 229, likewise projecting inwardly from the inner side of the plate 11. It is to be noted that the arm 227 occupies a position between the outer side of the pin-wheel 219 and the inside of the plate 11.

Mounted on the outer side of the pin wheel 219 is a lug 230. On the upper edge of the arm 227 is an upstanding detent 230a disposed, when the free end of the arm 227 is raised by the spring 228, to lie in the path of the lug 230, thus to hold the shaft 217 and consequently both pinwheels against rotation. Due to the slot 226a, arm 227 may be shifted whereby its detent 230a engages the lug 230 after slightly greater or less rotation of the pin wheels 218 and 219. This arrangement provides means for determining precisely the point along its length at which the upper sheet 14 will be cut, as will later appear.

Mounted on the main shaft 87 adjacent the side plate 11, to rotate alongside the arm 227 is a crank arm 231. On the outer end of the arm 231 is an outwardly projecting pin 232 adapted, as the arm 231 rotates, to engage the upper surface of the arm 227, pivoting the latter downwardly and disengaging the detent 230a from behind the lug 230. This action occurs after the spring 222 has been wound in a manner later to be explained, and therefore releases the pin wheels for rotation responsive to unwinding of the spring 222 thereby feeding the sheet S through the apparatus. Immediately after engaging and moving arm 227 downwardly, the pin 232 runs off a shoulder 227a on the arm 227, permitting the arm to snap upwardly, thus to immediately again place the detent 230a in the path of lug 230.

Secured to the pinwheel shaft 217 is a crank arm 233 carrying on its outer end a roller 234. Mounted on the main shaft 87 is an arm 236 disposed to engage the roller 234 at the proper time in the cycle of operation, thereby to impart to the shaft 217 a final and positive amount of rotation after the spring 222 has unwound, thus to position the paper with the original form 14 between the stationary and movable elements of a shear, later to be described.

The customer's copy 14 of the policy is separated from the retained copy 16 by separators later to be described, and fed over a stationary blade 237 mounted across the top of the plates 10 and 11 on suitable brackets 238.

Journaled in bearings in the side plates 10 and 11 is an operating shaft 239 for actuating a movable blade 241 of the shear. Fixed to the shaft 239 adjacent the inner side of the plates 10 and 11 are crank arms 242 and 243. Pivotally mounted to the ends of the arms 242 and 243 are links 244 and 246, in turn pivotally mounted at their other ends to the lower ends of vertically disposed pins 247 and 248, slidably mounted in blocks 249 and 251 secured to the side plates 10 and 11. The movable blade 241 of the shear is carried on the upper ends of the pins 247 and 248.

The shaft 239 projects through the side plate 10 and is provided on its projecting end with a forwardly extending arm 252. Mounted on the end of the shaft 87, inwardly of the arm 136, is an

arm 253 carrying on its free end a roller 254 adapted, upon rotation of the arm 253 to strike the arm 252, moving the outer end of the same upwardly as viewed in Fig. 3. Through this linkage the movable knife 241 is moved downwardly to shear the paper.

In order to raise the movable knife 241, we pivotally mount to the side plate 10 as at 256 an L-shaped plate 257. The leg of the plate 257 is provided with a rounded under portion 258 disposed to be struck by the roller 254 and rock the plate clockwise as viewed in Fig. 3. This motion of the plate 257 causes a roller 255 on its other leg to engage the end of the arm 252, moving the same downwardly, thus to raise the knife. If for any reason the plate 257 fails to rock about its pivot 256, we provide an extension 257a on the leg carrying the roller 255 which is disposed to be struck by the end of arm 253, to rock the plate 257. We therefore accomplish with this simple mechanism the motions of a box cam, but without the complications incidental to the manufacture of a true box cam.

Mounted on a bracket 259, in turn secured on the base plate 13 of the frame, is a switch 271 having an arm 272 spring biased toward closed position by a spring 273. Mounted on the end of the switch arm 272 is a small roller 274 disposed in the path of a cam 276 carried on the main shaft 87. The cam 276 strikes the roller 274 upon rotation of shaft 87, thereby opening switch 271.

Mounted on the side plate 11 is a switch 277 having an arm 278 and which is of the type to snap to open or closed position. The switch 277 is closable manually by the operator of the machine by means of a downwardly movable button 279. The switch 277 is opened by means of a lever 281 pivoted to the side plate 11 as at 282. The lever 281 has one end disposed in the path of the pin 232 on the arm 231, whereby when the pin 232 strikes the same the arm moves clockwise as viewed in Fig. 6. On the opposite end of the arm 281, and projecting through a suitable slot 283 in the side plate 11 is a pin 284. The pin 284, upon upward movement engages switch arm 278, and opens the switch.

Again referring to the cross shaft 208, which as will be recalled is rotatably oscillated through the link 211, we provide thereon between the plates 10 and 11 a forwardly extending arm 286. Pivotaly connected to the end of the arm 286 is a vertically disposed bar 287, biased forwardly of the machine by means of a spring 288. The upper end of the bar 287 rests against the cross member 12 and may freely slide vertically while resting thereagainst. Projecting outwardly of the bar 287 to lie beneath the pawl arm 39 is a pin 289. From the construction just described it will be apparent that when shaft 208 is rotated counterclockwise as viewed in Fig. 2, clockwise as viewed in Fig. 6, a sufficient amount, the pin 289 engages beneath the end of the arm 39, releasing the pawl 41 from the ratchet gear 36. This action permits the spring 37 to reset the amount wheel to starting position.

Referring now more particularly to Fig. 6, the sheet S comprising the original and duplicate sheets 14 and 16 pass upwardly immediately behind the ribbon 177 and over a rotatable rod 291. The sheet is supported on a plate 292, in turn supported on cross members 293 and 294 fixed at each end to the side plates 10 and 11. The sheets 14 and 16 forming sheet S continue rearwardly still in collated relation until they are divided by a plate 296, extending across the width

thereof and provided with slots 297 adjacent each end for clearing the pins 221 of the pin wheels. The separator plate is provided at each end with notches 298 and 298a disposed to engage over a pair of lugs 299 and 301 upstanding from the support plate 292. The lugs, and consequently the notches in the plate 296, are disposed beyond the marginal edges of the sheet S. By this means the sheet 14 is separated from the sheet 16.

Adapted to overlie the upper sheet 14 is a hold down plate 302. The plate 302 is provided at its rear end with an upstanding screw 303 slidably fitting in a notch carried in the end of a lug 304, secured to the movable knife 241 by a screw 306. The forward end of the hold down plate 302 may be adjustably supported in spaced relation with respect to the upper sheet 14 by means of a pair of screws 307 disposed to engage the upper surface of the plate 292. The supporting plate 292 is notched at its sides as indicated at 308. Likewise, the hold down plate 302 is notched as at 309 to permit the pins 221 to project therethrough.

Referring more particularly to Figs. 6 and 7, we provide a slidable plate or shutter 311 having depending yokes 312 disposed to fit about the pins 147 and 148 carried in the upper ends of the arms 144 and 146. When the machine is at rest, the plate 311 covers the heading 18 of the sheets; and as will be explained in connection with the operation of the apparatus, the plate 311 moves rearwardly to uncover the heading, thus permitting the operator to write in the data required.

Referring to the wiring diagram, Fig. 8, the switch 66 is connected by a line 313 to one contact of the switch 151. The opposite contact of the switch 66 is connected to the power line 61. The opposite contact of switch 151 is connected both to the motor 77 and to one contact of switch 271 through lines 316 and 317. The opposite contact of the switch 271 is connected by a line 318 to one contact of the switch 277, and the opposite contact of switch 277 is connected to the power line 61. The other side of the motor is connected by a line 322 to the power line 64.

From the foregoing, the operation of our improved form issuing apparatus may now be explained and readily understood. As before stated, the mechanism herein described is mounted in a suitable cabinet, and the cabinet may be of a height whereby a person may conveniently fill in the data on the form while standing. The manually operated button 279 is accessible from the upper surface of the cabinet in which the mechanism is mounted.

The operation of the apparatus is commenced by the insertion of a coin in the chute 21 of the coin mechanism 19. In its downward movement, the coin strikes the pivoted member 54, momentarily closing the switch associated therewith and momentarily energizing the solenoid 48. This causes rotation of the shaft 32, bringing the lowest figure of raised type on the wheel 31 into position for printing on the forms the amount thereon. As soon as the wheel 31 moves sufficiently for lug 69 to disengage the roller 68, switch 66 closes, establishing a circuit from line 61, to the motor 77 through the line 313, switch 151, line 317 and thence returning to line 64 through line 322. The motor continues to operate until cam 149 opens switch 151 to break the circuit. It is to be noted that at the beginning of this operation the arm 108 is in the dotted line position shown in Fig. 5 wherein the pin 103 has ridden up on the inclined end 114 thereof, thus

to disengage the pawl 99. The motor therefore starts without load other than the friction of the gears 79 and 81, and the pawl 99 is not engaged until the cam 104 strikes the lower end of the arm 108, thereby moving the upper end 114 thereof from beneath the pin 103. Likewise, due to the coaction between the cam 106 and the arm 111, the pawl 99 is withdrawn immediately after switch 151 is opened due to the pin 103 riding on the inclined end 116 of the arm 111. The motor thus coasts to a stop since cam 149 is timed to open switch 151 just as the pin 103 is raised by arm 111. During this initial operation period the arm 227 is in raised position whereby its detent is engaged behind the lug 230 of the pinwheel 219. The spring 222 thus is wound up responsive to rotation of gear 216 by gear 214. Likewise, in response to this partial rotation of the main shaft 87, the hammers are cocked by the coaction of the roller 174 moving the arm 173 downwardly, thus stressing the springs 163 and readying the hammers for their printing strokes. However, the apparatus is so timed that the hammers are not released until the second and final phase of the operation. Likewise during the first phase of the operation cam 276 has moved to a position to permit switch 271 to close readying the motor for a second energization upon closing of switch 277. Likewise, during the first phase of operation the plate 311 is moved to uncover the space on the form where the operator is to write in the required data.

The operator now fills in the data of the headings 18, and having completed this, presses downwardly on the manually operable button 279. This action establishes a circuit from the line 61 through the switch 277, the line 318, through switch 271, line 316, the motor 77, and line 322 to line 64. The motor now commences to rotate driving the gear 86, cams 104 and 106, and the ratchet gear 94. As soon as cam 106 strikes the arm 111, the end 116 thereof is moved out from under the pin 103, again permitting the pawl 99 to engage with the gear 94 and locking the gear 86 to the shaft 87. Immediately that the shaft 87 commences to turn, roller 174 runs off the end of arm 173, permitting the hammers to snap forwardly, thus printing the forms. By this time, pin 232 on arm 231 has moved around to a position to engage the top of arm 227, lowering the free end thereof and removing detent 230a from behind lug 230 on the pin wheel 219. This movement releases shaft 217 for rotation responsive to unwinding of the spring 222. The sheet S is thus fed rearwardly, it being remembered that the upper form has been separated and is passing at this time between the fixed and stationary blades of the shear. At a time immediately after the foregoing operations, arm 236 moves around to strike roller 234 further rotating the shaft 217 to move the sheet 14 to a definite position whereby when the shear blade 241 moves downwardly, the upper sheet 14 is cut at a predetermined position along its length. The ratchet gear 94 continues to turn and the cam 104 permits the arm 108 to pivot backwardly responsive to spring 112 until such time as the pin 103 again rides upon the end 114 of the arm 108. By this time, link 211 will have rotated shaft 208 to raise the bar 287, releasing pawl 41, and permitting the amount wheel to turn back to starting position with pin 35a engaging stop 35, and with lug 69 again beneath the roller 68. This action opens the switch 66. Likewise, by this time, pin 232 will have struck and pivoted arm 231, thereby to

open switch 277. Simultaneously with the opening of switch 277, cam 276 opens switch 271, de-energizing the motor 77. Prior to the opening of the switches the upper form is sheared and the blade 241 is returned in the manner already explained, and the plate 311 has moved back to cover up the data column of the next form to be issued, thus completing a cycle of operation. The slide 311 is locked in forward position due to the dead center relation of arms 136 and 139.

In the event a customer deposits more than a given number, say five, coins in the chute 21, the closing of switch 72 moves the member 76 into the path of the coins, causing them to return to the customer through a slot in the manner of such devices.

Referring again to Fig. 5, each of the cams 104 and 106 is provided on the leading side thereof with gradually increasing spiral portions 104a and 106a, respectively. The purpose of these is to assure complete disengagement of the pawl from its ratchet gear, thereby preventing chattering of the pawl against the teeth of the gear.

From the foregoing it will be apparent that we have devised an improved form issuing machine in which the power required to operate the same is exceedingly small and in which the motor therefor is never started under load. Further, we have found that the spring feed for effecting the major portion of the paper feeding operation, in combination with the final positive feeding operation motion produced by the arms 236 and 233 is highly satisfactory and that the forms are sheared at precisely the correct point along their length. As stated the exact point of shear is readily determined by adjusting the arm 227 in the longitudinal slot 226a. The action of the shear is such that the form is quickly cut after it is fed. A customer thus does not have time to take hold of the end of the form and pull the same before it is sheared, thus preventing damage to the form by tearing.

While we have herein described our machine as being particularly adapted for issuing policies of insurance, it will be apparent to those skilled in the art that the same may be adapted for the issuance of various kinds of forms, and accordingly, we do not wish to be limited in that respect. Likewise, while we have shown the machine as issuing one copy of a duplicate form and retaining the other copy, it will be apparent that the same may be utilized to full advantage for issuing only a single copy. In actual operation we have found that the parts of our improved apparatus are unusually free of wear surfaces and we are therefore permitted to use for the most part relatively low grade steel throughout.

While we have shown our invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications, without departing from the spirit thereof, and we desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What we claim is:

1. In apparatus for issuing individual paper forms from a continuous sheet of the same wherein the sheet is provided with a row of regularly spaced openings along each margin, a pair of sheet feeding wheels having pins thereon engaging in said openings, a rotatable shaft on which the wheels are fixedly mounted, a gear rotatably mounted on the shaft, a coil spring between the gear and one of said wheels, means

to anchor the ends of the spring to the gear and to the said one of the wheels, a second rotatable shaft, a second gear fast on the said second shaft and in mesh with the first named gear, a third gear rotatably mounted on the second shaft, an electric motor for rotating the third gear, means to energize the motor, a clutch interposed between the third gear and the second shaft, mechanism for engaging the clutch after the motor is started thereby to lock the third gear to the second shaft and rotate the first and second gears and wind the spring, mechanism operable to hold the first shaft stationary while the clutch is engaged, mechanism to disengage the clutch after the spring is wound, other mechanism for again engaging the clutch, and means operable responsive to further rotation of the second shaft for releasing the first shaft for rotation responsive to unwinding of the spring.

2. Apparatus as defined in claim 1 in which the clutch comprises a ratchet gear rotatable with the third gear, a pawl mounted for rotation with the second shaft and spring biased into engagement with the ratchet gear, and in which the clutch engaging and disengaging mechanism comprises cams rotatable with the third and ratchet gears, and a pair of arms pivotally mounted for rotation with the second shaft and disposed to be positioned by said cams to engage the pawl with the ratchet gear and upon said further rotation to position said arms to disengage the pawl.

3. Apparatus as defined in claim 1 in which the second shaft is provided with an arm, and a spring biased holding cam disposed to coact with said arm to prevent counter rotation of the second shaft responsive to winding of the spring.

4. In apparatus for issuing individual paper forms from a continuous sheet of the same wherein the sheet is provided along each margin with a row of regularly spaced openings, mechanism for printing data on the forms embodying hammers, springs operatively connected to the hammers for moving the same on their printing strokes, sheet feeding mechanism embodying wheels having pins thereon disposed to engage in said openings, a spring for rotating the wheels, an electric motor, a clutch disposed to operatively connect the motor to the hammer and wheel rotating springs for stressing the same, mechanism for engaging the clutch after the motor has commenced rotation, and other mechanism for releasing the hammers and wheels for actuation by their respective springs.

5. In apparatus for issuing individual paper forms from a continuous sheet of the same, an electric motor, a coin mechanism, a switch in circuit with said motor disposed when a coin is dropped in the coin mechanism to close and energize the motor, a plate movable by the motor to a position to uncover a portion of the form to be issued, spring actuated printing and form feeding mechanisms, means operatively connecting the motor to the printing and feeding mechanisms to stress the springs thereof, a second switch in circuit with said motor, means operable after the springs are stressed to open said switch and deenergize the motor, a manually operable switch in circuit with the motor for again energizing the same, mechanism operable after the motor is energized the second time to release the printing and feeding mechanisms for actuation by their respective springs, means to return said plate to position to cover the next form of said sheet, a shear operated by said motor for cutting the form to be issued from the sheet after the

feeding movement is completed, and means operable responsive to continued rotation of the motor after the paper cutting operation to open the manually operated switch thereby to again deenergize the motor.

6. Apparatus as defined in claim 5 in which there is a third electric switch in series with the motor and manually operated switch, and mechanism disposed to hold said switch open until after the motor has stressed the springs.

7. Apparatus as defined in claim 5 embodying a clutch operatively interposed between the motor and the springs, and engaging and disengaging mechanism for said clutch operable responsive to the rotation of the motor whereby the motor starts without load each time it is energized.

8. Apparatus as defined in claim 7 in which there is a holding dog operatively associated with said springs and operable to assume the loads thereof after the motor is deenergized the said first time.

9. In apparatus for issuing individual forms from a continuous sheet of the same wherein the sheet is provided along each margin with a row of regularly spaced openings, a main shaft, a gear rotatably mounted on the main shaft, a ratchet gear rotatable with said gear, an electric motor for rotating said gear, a pair of axially displaced substantially diametrically opposed cams rotatable with said gears, an arm non-rotatably mounted on said main shaft alongside the ratchet gear, a pawl for said ratchet gear pivotally mounted on said arm and spring biased into engagement with the ratchet gear, a pin projecting from said pawl and disposed upon outward movement to disengage the pawl from the ratchet gear, substantially diametrically opposed pivotally mounted members each spring biased into engagement with one of said cams, the outer ends of said members lying in the path of said pin to raise the same when the cams are out of contact with the members, switches associated with said motor and operable immediately after the pin engages said members to deenergize the motor, spring actuated printing and paper feed mechanisms, means to stress the springs thereof responsive to rotation of the main shaft, a manually operable switch in circuit with said motor to again energize the same when it is deenergized after said partial rotation, and mechanism for releasing the printing and feed mechanisms for actuation by their springs responsive to further rotation of the main shaft.

10. In apparatus for issuing individual forms from a continuous sheet of the same, a coin mechanism, an electric switch closable upon the insertion of a coin in the coin mechanism, mechanism for printing data on the forms embodying spring actuated hammers and a type carrying amount wheel, electrically operated means controlled by said switch to partially rotate the amount wheel and place the type thereon in printing position responsive to the insertion of a coin in said coin mechanism, spring actuated sheet feeding mechanism, an electric motor for stressing the springs of the hammer and feeding mechanism, a second electric switch closable upon partial rotation of the amount wheel, circuits leading from said second switch to the motor for energizing the motor, mechanism to operatively connect the motor for stressing the hammer and paper feeding springs, means for releasing the printing and paper feeding mechanisms for actuation by their springs, and a shear

for cutting a form from said sheet after the printing and feeding operations.

11. In apparatus for issuing individual forms from a continuous sheet of the same embodying in combination spring actuated printing, sheet feeding and shearing mechanisms, a plate slidable to a position to uncover a portion of the form, an indicia wheel carrying different indicia on its periphery, an electrically operated indexing mechanism associated with the indicia wheel, an electric motor for stressing the springs of said printing and feeding mechanisms and for actuating said shear, electrical circuits in which are included the motor and a source of power, a switch in said circuits closable upon actuation of the indexing mechanism to energize the motor, another switch in said circuit openable after a predetermined rotation of the motor to de-energize the same, means to hold said springs stressed while the motor is deenergized, a manually closable switch in said circuits for again energizing the motor, means to free the printing and feeding mechanisms for actuation by the said springs after the motor is again energized, means to actuate the shear after the completion of the sheet feeding movement, and means operable in response to a second predetermined amount of rotation of the motor to open the manually closable switch to again deenergize the motor.

12. Apparatus as defined in claim 11 in which the spring for actuating the sheet feeding mechanism is a coil spring, and in which means are provided for placing said spring under a selectable amount of initial tension.

13. Apparatus as defined in claim 11 in combination with a clutch interposed in operative driving relation between the motor and said springs, and mechanisms for engaging said clutch after the motor is energized each time, said mechanisms likewise being adapted to disengage the clutch upon each deenergization of the motor.

14. In apparatus for issuing individual forms from a continuous sheet of the same wherein the form requires the hand written entry thereon of data by the operator of the apparatus, mechanism for printing other data on the form including rotatable type carrying wheels and spring actuated platens therefor, means to feed the form between the type wheels and the platens, an electric motor operatively connected when energized a first time to stress the springs of said platens, a plate slidable by said motor during the first period of energization thereof to a position to uncover the space on the form wherein the operator is to write in the data, means to de-energize the motor after the plate is moved and said springs are stressed, a pair of sheet feeding wheels non-rotatably mounted on a common shaft and engaging the sheet, manually operated means to energize the motor a second time,

means responsive to rotation of the motor to release the platens to the action of their springs and to effect rotation of the feeding wheels, a shear for cutting a form from the end of the sheet fed through the apparatus, and means operable after all of the foregoing operations to again deenergize the motor.

15. In apparatus for issuing individual forms from a continuous sheet of the same wherein the form requires the handwritten entry thereon of data by the operator of the apparatus, mechanism for printing other data on the form including a rotatable type carrying wheel and a movable platen therefor, means to feed the form between the type wheel and the platen, an electric motor operatively connected when energized a first time to position the platen for striking movement toward the form and type wheel, a member movable by said motor during the first period of energization thereof to a position to uncover the space on the form wherein the operator is to write in the data, means to de-energize the motor after the member is moved and said platen is positioned for striking movement, a pair of sheet feeding wheels non-rotatably mounted on a common shaft and engaging the sheet, manually operated means to energize the motor a second time, means responsive to rotation of the motor during the second period of energization thereof to first release the platen for striking movement and subsequent thereto effect rotation of the sheet feeding wheels, means for severing a form from the end of the sheet fed through the apparatus, and means operable after the rotation of the sheet feeding wheels to again de-energize the motor.

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