C. F. SMITH.

ENVELOP PRINTING MECHANISM.

APPLICATION FILED FEB. 2, 1910.

1,051,353.

Patented Jan. 21, 1913

7 SHEETS—SHEET 1.

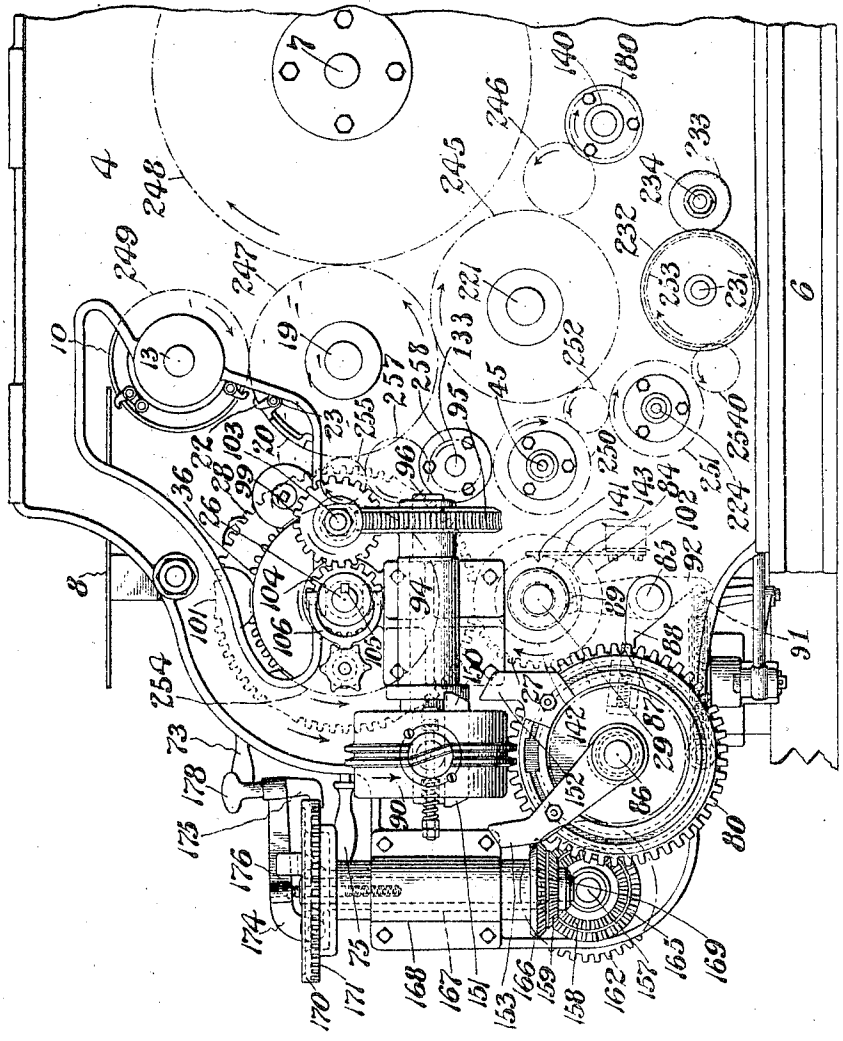

Fig. 1.

Witnesses.

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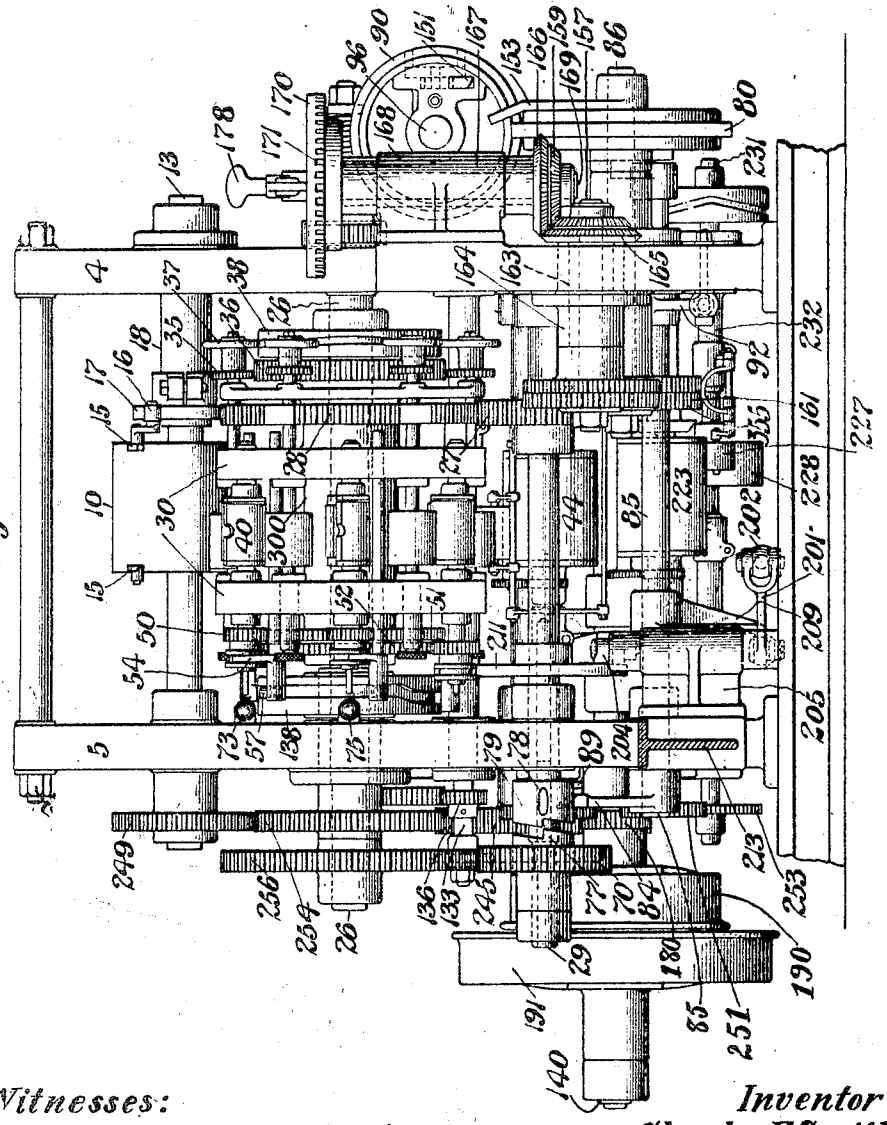
7 SHEETS—SHEET 2.

Fig. 2.



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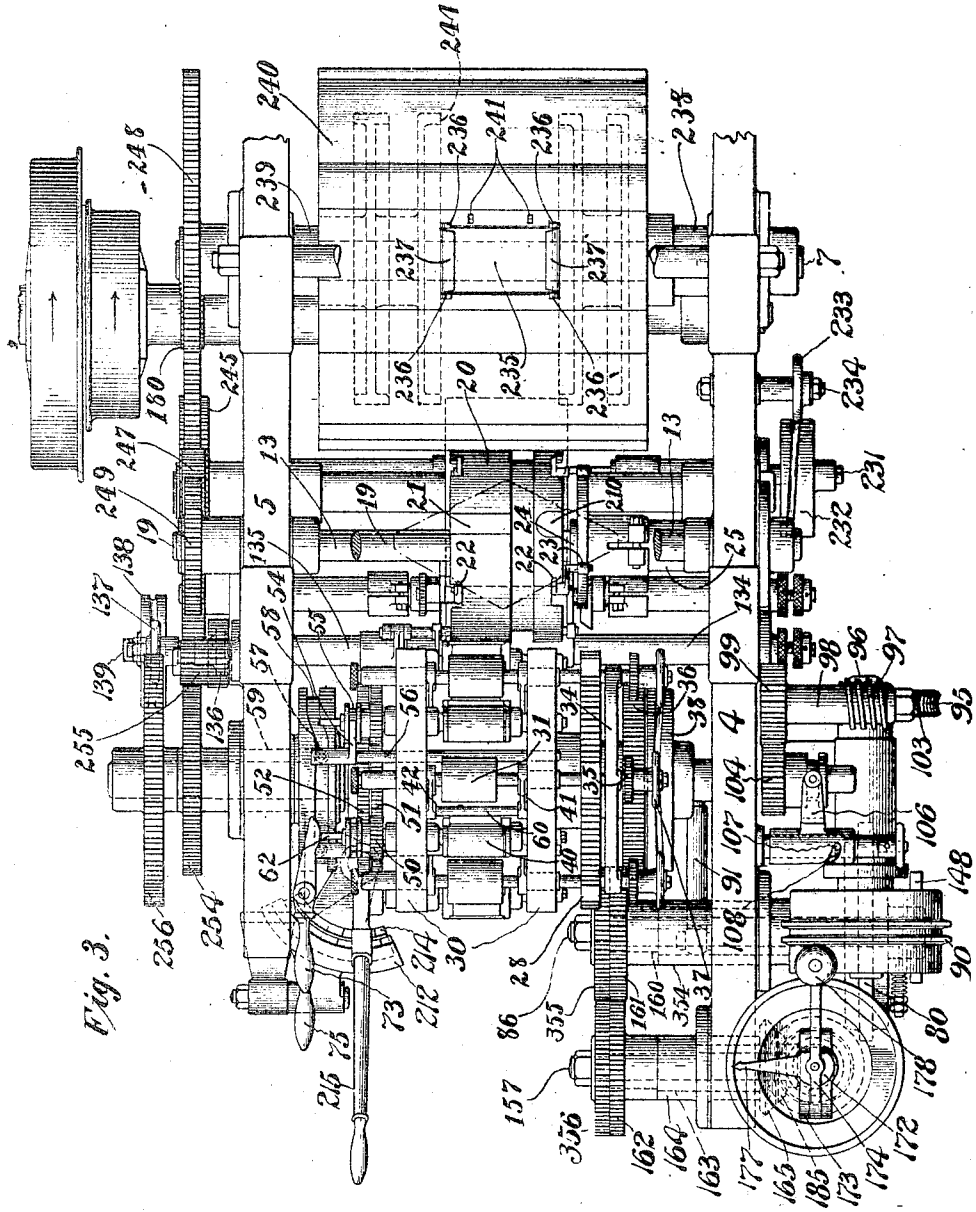

Fig. 3.

Witnesses:

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7 SHEETS—SHEET 4.

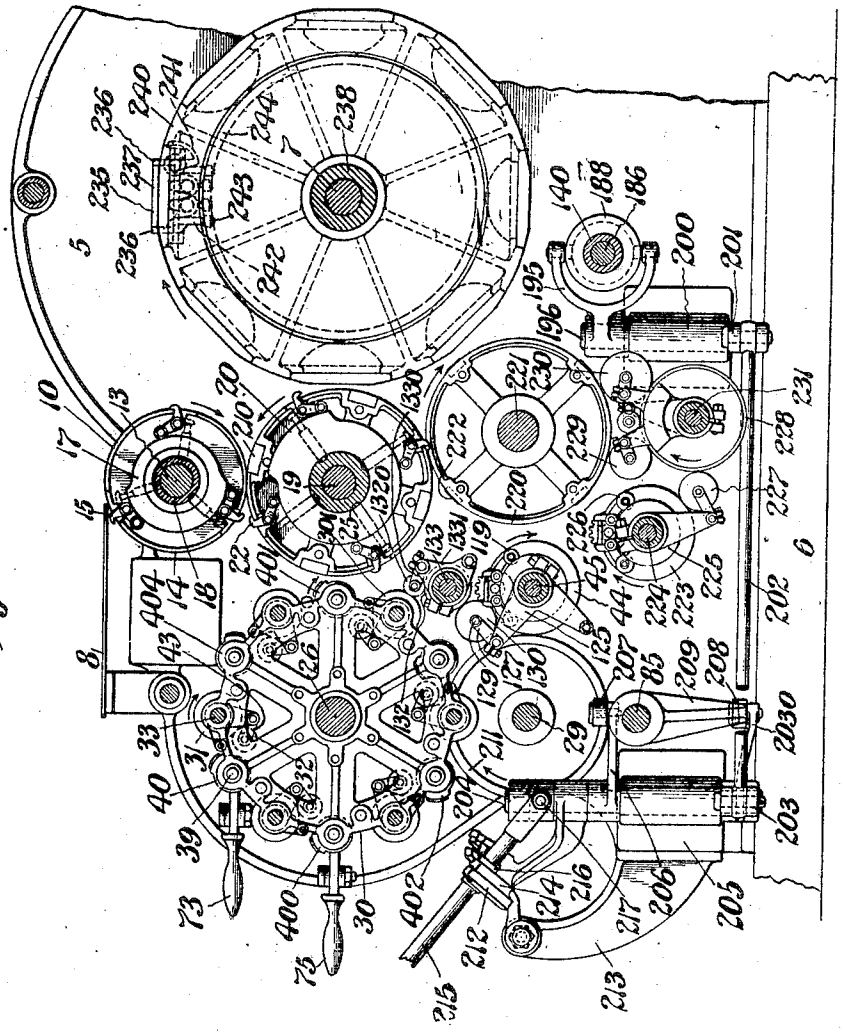

Fig. 4.

Witnesses:

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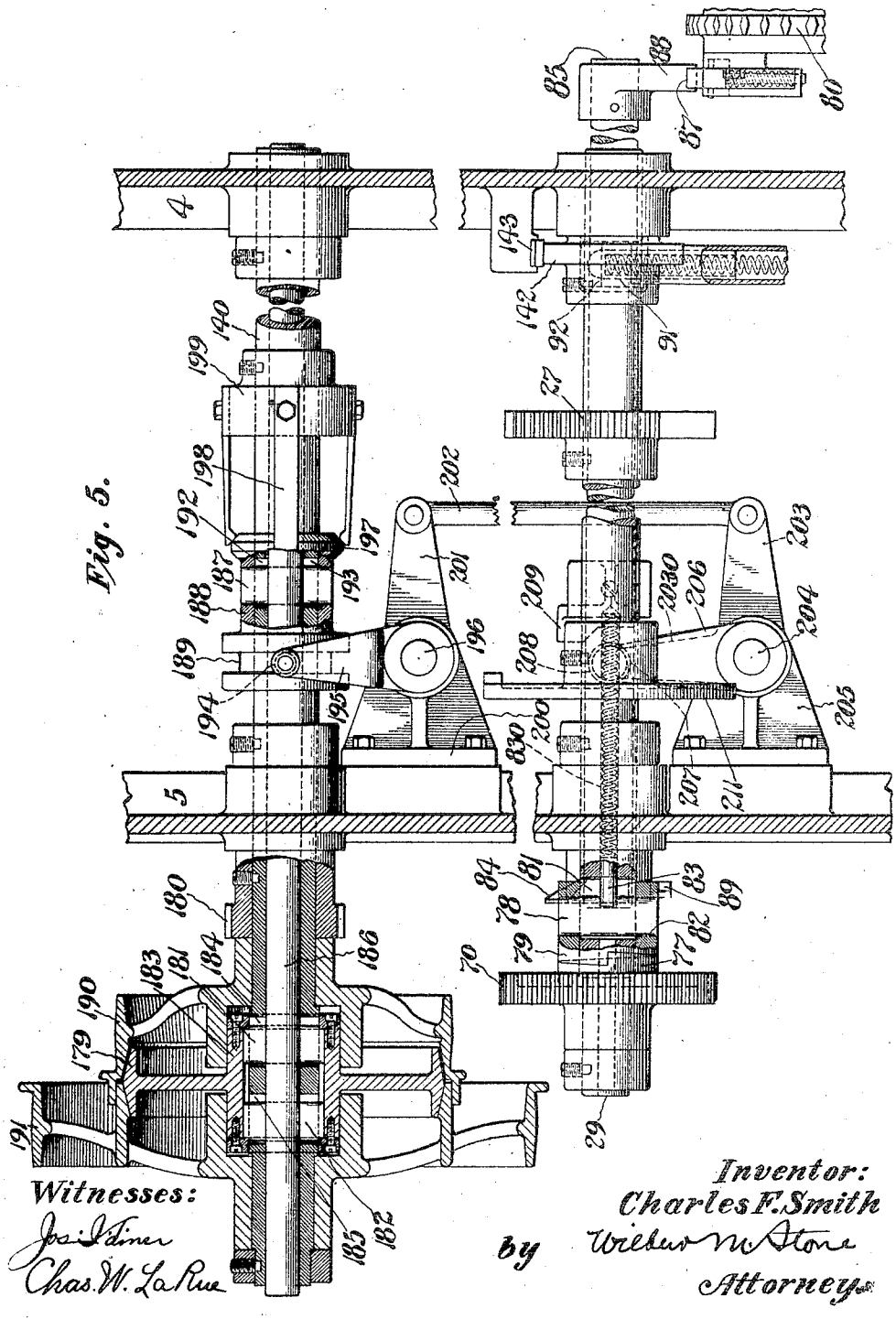
7 SHEETS—SHEET 5.

Fig. 5.



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7 SHEETS—SHEET 6.

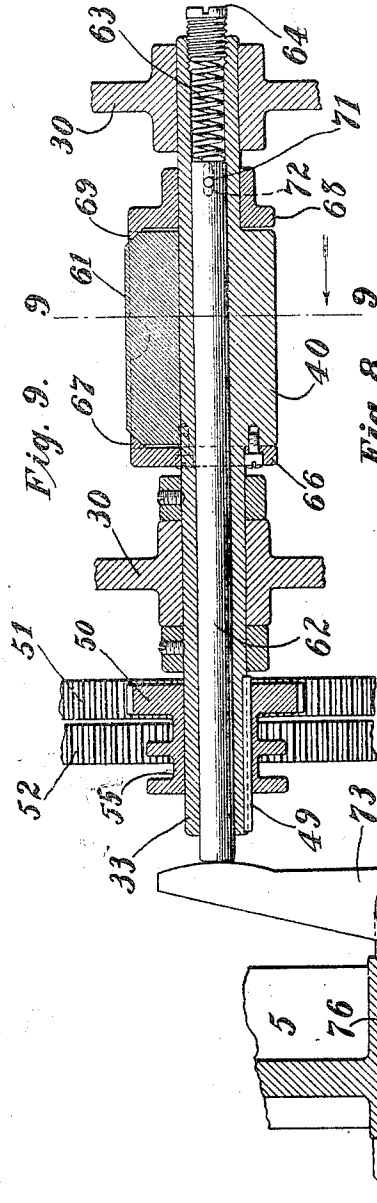

Fig. 9.

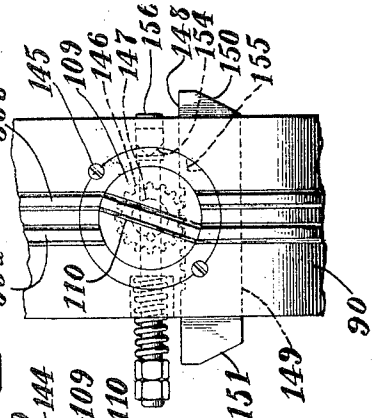

Fig. 7.

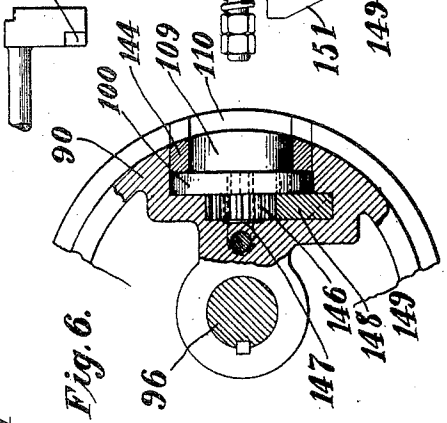

Fig. 8.

Fig. 6.

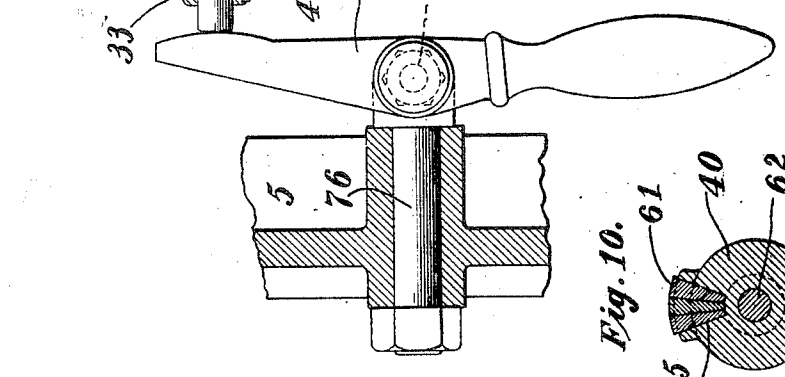

Fig. 10.

Witnesses:

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7 SHEETS—SHEET 7.

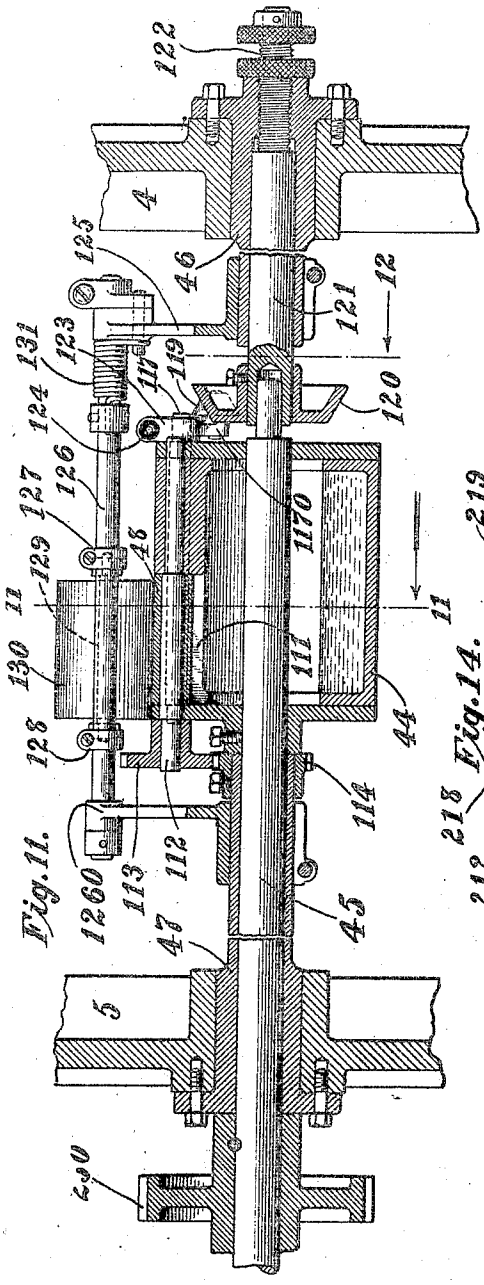

Fig. 11.

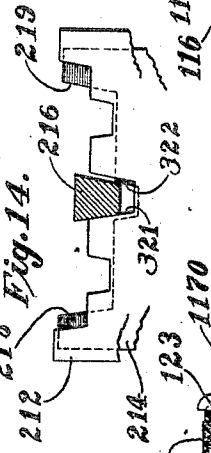

Fig. 14.

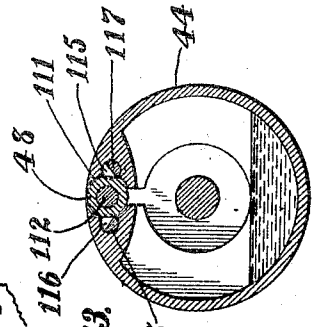

Fig. 13.

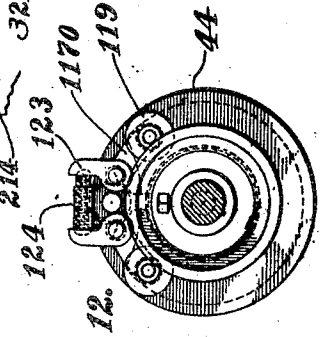

Fig. 12.

Witnesses:

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UNITED STATES PATENT OFFICE.

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ENVELOP-PRINTING MECHANISM.

1,051,353. Specification of Letters Patent. Patented Jan. 21, 1913.

Application filed February 2, 1910. Serial No. 541,596.

To all whom it may concern:

Be it known that I, CHARLES F. SMITH, a citizen of the United States, and a resident of Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Envelop-Printing Mechanism, of which the following is a specification.

This invention relates to printing mechanism particularly adapted for printing envelops or envelop blanks, preferably in conjunction with mechanism for forming said blanks into envelops.

The object of my invention is to furnish a mechanism of the class specified operable at high speed and having means for varying with facility the matter to be printed and the number of impressions to be made and with a minimum delay in the operation of the machine as a whole.

To these ends my improvements comprise combinations of means illustrated in their preferred forms in the drawings accompanying this specification. Therein—

Figure 1 is a side elevation of my improved mechanism, Fig. 2 is an end elevation and Fig. 3 is a plan, corresponding with the side elevation of Fig. 1. Fig. 4 is a longitudinal sectional elevation on line 3, 3 of Fig. 3. Fig. 5 is a plan partly in section, of details of the changeable speed driving mechanism. Fig. 6 is an end view partly in section of a detail of the reversing gear mechanism and Fig. 7 is a plan view corresponding therewith. Fig. 8 is a detail of the detent. Fig. 9 is a plan view largely in section of a detail of my printing mechanism and Fig. 10 is a section on line 9, 9 of Fig. 9. Fig. 11 is a sectional elevation of a portion of one of the inking devices. Fig. 12 is an elevation looking in the direction of arrow 12 of Fig. 11. Fig. 13 is a section on line 11, 11 of Fig. 11. Fig. 14 is a diagrammatic view of a detail of the speed controlling mechanism. The scales of Figs. 5 to 14 inclusive are materially larger than that of Figs. 1 to 4.

General description.—The mechanism of the present invention, while applicable to a wide variety of uses, is herein illustrated as particularly adapted for printing corner cards on envelop blanks and for printing and embossing postage stamps thereon prior to the folding of said blanks into envelops. Said mechanism embodies a plurality of rotatable form cylinders in an intermittently rotatable carrier and means, settable at will, for varying the number of impressions from a given form in predetermined increments from a predetermined minimum quantity to a predetermined maximum quantity, said predeterminations being governed by the gearing ratios in the mechanism. Also as illustrated in the present embodiment the minimum quantity of impressions from one form is the unit of variation to the maximum quantity of impressions that can be made consecutively from one form.

My improvements also include means for automatically reducing the speed of the mechanism while shifting one form cylinder out of printing position and another into printing position, said shifting being accomplished between the presentation of consecutive blanks in printing position.

My improvements include hand operable means for changing the forms in the form cylinders without interfering with the consecutive and continuous operation of my improved printing mechanism.

There are features of improvement in inking mechanism, in governing means, in means for starting and stopping the form cylinders and other features of improvements that will be described in detail later herein.

My improved mechanism may be supported in suitable side frames 4, 5 mounted on bed plate 6. Receiving cylinder 10 fixed to shaft 13 having bearings in side frames 4, 5 is provided with a plurality of receiving beds as 14 having the usual clips 15, 15 actuated by roll 16 thereof in coaction with cam 17 fixed on sleeve 18 inreaching from frame 4 and coaxial with shaft 13. Blanks may be delivered to cylinder 10 from table 8 by any suitable means not shown. Impression cylinder 20 on shaft 19 is positioned directly below receiving cylinder 10 and in rolling coaction therewith. Shaft 19 has bearings in side frames 4, 5. Impression cylinder 20 is provided with a plurality of pairs of impression beds as 21 at one end and 210 at the other end (Fig. 3) for coaction with the corner card printing mechanism and the stamp printing and embossing mechanism respectively. Each pair of impression beds is provided with clips 22, 22 actuated by roll 23 thereof in coaction with cam 24 fixed on sleeve 25 inreaching from frame 4 and coaxial with shaft 19.

Form cylinders and carrier.—Rearward of impression cylinder 20' (to the left in Figs. 1 and 4) freely mounted on shaft 26, having bearings in side frames 4, 5, is rotatable carrier 30, comprising two disk-like members connected by sleeve 300. Between said disk-like members of carrier 30 are mounted, equally spaced and equally distant from the carrier axis, a plurality of form cylinders as 40, for rotation on their respective shafts, as 39 to said cylinder 40, having bearings in said carrier and for revolution about axial shaft 26 thereof. Intermittent gear 28 is coaxial with and fixed to carrier 30 and is driven by mutilated pinion 27 on shaft 29 having bearings in side frames 4, 5.

Stamp printing and embossing means.—Stamp form cylinder 220 is fixed to shaft 221 below impression cylinder 20 and for coaction therewith. Said stamp form cylinder is of the same diameter as said impression cylinder and has four stamp forms as 222 equally spaced in its periphery, corresponding with the four impression beds as 210 of said cylinder 20. Each of said stamp forms may be provided with the usual curved face to be inked and the usual intaglio portions for coaction with complementary cameo portions of impression bed as 210 all of well known construction and not shown in detail herein.

Folding cylinder.—To the right of and in coöperative relation with impression cylinder 20 (Figs. 3 and 4) is folding cylinder 240 on shaft 7 having bearings in sleeves 238, 239 in frames 4, 5 respectively. Said cylinder 240 has a plurality of folding beds as 235 each having end clips 236, 236, end folders 237 and bottom flap folders 241. Said clips and folders may be actuated by some convenient means such as levers 242 having rolls as 243 in coaction with cams as 244 fixed to the frame sleeves as 239.

Inking mechanism.—Each of the form cylinders is provided with ink distributing means mounted adjacent thereto in carrier 30, comprising ink delivery roll as 31, for form cylinder 40, and ink receiving roll 32 in coaction with roll 31. Said roll 31 is fixed to shaft 33 having bearings in carrier 30 and also in supplemental frame 34 of said carrier for supporting the outboard end of said shaft 33. Gear 36 is fixed to shaft 26 and drives gear 35 fixed to shaft 33. Cam roll 37 fixed to said shaft 33 engages cam 38 fixed to shaft 26 to impart endwise reciprocatory motion to ink delivery roll 31. Ink receiving roll 32 is mounted for free rotation in links as 43 adjustably secured to arms 41, 42 supported in carrier 30 coaxial with shaft 33. Rod 60 secures said arms 41, 42 together. Ink receptacle 44 is a hollow cylinder in form and is fixed to shaft 45 having bearings in sleeve 47 inreaching from frame 5 and in rod 121 in sleeve 46 inreaching from frame 4. Said receptacle (Figs. 11, 12, 13) has ink feeding roll 48 pivoted in lengthwise slot 111 therein and with their axes parallel. Said slot 111 forms a passage from the interior to the exterior of said receptacle and roll 48 has its face tangent to the face of receptacle 44. Shaft 112 of roll 48 has gear 113 fixed to one end thereof and said gear is driven, when receptacle 44 is rotated, by gear 114 fixed to sleeve 47. In cylindrical pockets 115, 116 outreaching each side from and parallel with slot 111 are rock rods 117, 118 respectively. Said rods are flatted off lengthwise for engagement with roll 48 so that when they are rocked on their axes the space between those edges of said rods adjacent to said roll 44 approach or recede from said roll thus allowing less or more space for the passage of ink to the outside of receptacle 44. Each of said rods as 117 has an arm as 1170 fixed thereto carrying a conical faced roll as 119 for engagement with opposite conical faced roll 120 fixed to the inboard end of rod 121 in sleeve 46 and coaxial with receptacle 44. Roll 120 may be moved inwardly to force rolls as 119, outwardly to increase the openings between the edges of rock rods 117, 118 and roll 48 by means of screw 122 coaxially threaded into sleeve 46. Arms as 1170, have upstanding portions as 123 between which is mounted spring actuated plunger 124 to urge rolls as 119 into engagement with roll 120 and to force said roll 120 and rod 121 outwardly when screw 122 is slackened. Arms 125, 1260 are clamped to sleeves 46, 47 respectively and carry in their outboard ends rock shaft 126. Arms 127, 128 are clamped to rock shaft 126 and carry between them roll 130 on pin 129. Said roll 130 is urged to engagement with receptacle 44 by spring 131 on rock shaft 126, and is efficient to spread on the cylindrical surface of the receptacle the ink delivered by roll 48. Between roll 130 and the path of travel of the ink delivery rolls, as 31, ink transfer roll 132 is mounted on shaft 133 having bearings in sleeves 134, 135 inreaching from frames 4, 5 respectively. Said shaft 133 has gear 136 and cam roll 137 fixed thereto rearward of frame 5. Said cam roll engages cam 138 on shaft 139 to reciprocate endwise said shaft 133 and ink transfer roll 132 thereon. Intermediate ink roll 1320 mounted in arms 1330 on brackets 1331 delivers ink from roll 132 to roll 301.

The inking mechanism for the stamp forms as 222 of cylinder 220 is of the same general character as that for the forms in cylinders as 40 just described and a brief description will therefore suffice.

Ink receptacle 223 is mounted on shaft 224 and the flow of ink from the interior to the

exterior of said receptacle is controlled by conical roll 225 in engagement with small conical rolls as 226. Ink is spread on the periphery of receptacle 223 and delivered to ink cylinder 228 by roll 227. Rolls 229, 230 transfer ink from cylinder 228 to the passing stamp forms as 222 on cylinder 220. Ink cylinder 228 is fixed to shaft 231 which is reciprocated endwise by means of cam 232 fixed thereon in engagement with roll 233 on stud 234 in frame 4 (Figs. 1 and 2.)

Form cylinder mechanism.—Returning now to carrier 30 and the form cylinders therein, gears 51 and 52 of the same size and same number of teeth are mounted side by side on shaft 26, gear 52 being fixed to said shaft and gear 51 being fixed to carrier 30. Gear 50 is slidably mounted on form cylinder shaft 33 and meshes alternately with gears 51 and 52. Gear 50 is held against rotation relative to its shaft 33 by key 49 (Fig. 9). Gear 50 is moved axially at predetermined times from engagement with gear 51 to engagement with gear 52 and vice versa by means of yoke arm 54 in engagement with groove 55 in the hub of said gear 50. Said yoke arm 54 is slidably mounted on rod 56 in carrier 30 and has roll 57 thereof in engagement with cam 58 fixed to sleeve 59 inreaching from frame 5. Form cylinder 40 is provided with one or more type bars as 61 and the following means are provided for holding said bars in said cylinder and for removing and replacing them therein. For convenience form cylinder 40 is made integral with shaft 33 and said shaft is made hollow for the reception of rod 62, spring 63 and spring retaining screw 64. Form cylinder 40 has a cavity 65 therein for the reception of type bars as 61 and is also provided with end cap 66 having hook 67 for engagement with one end of said bars. The other end of said bars is engaged by hook 69 of slidable end cap 68 fixed to push rod 62 by pin 71. Said pin is free to move endwise in slot 72 of shaft 33. Rod 62 may be urged endwise against spring 63 by means of hand lever 73 pivoted at 74 in stud 76 inreaching from side frame 5. Said lever 73 is located so as to be in operable relation to a form cylinder when said cylinder is in one of its positions of rest in its revolution about axial shaft 26 and when said cylinder is at rest relative to the carrier. Form cylinder 40 is illustrated in the described position relative to lever 73. A second lever 75 is provided at the next cylinder station (400) so that if the operator fails to make the exchange of form by means of lever 73 he has a second opportunity at the next succeeding stop of the cylinder.

Intermittent drive for carrier.—Intermittent gear 28 is provided with lock faces 101, alternating with the toothed portions thereof, for engagement with locking face 102 of mutilated pinion 27. Said lock faces 101 and alternating toothed portions of intermittent gear 28 correspond in number with the number of form cylinders as 40, and the relative lengths of the toothed portions of gears 27 and 28 are such as to cause gear 27 during a portion of one rotation to impart to gear 28 an angular advance equal to the angular distance between adjacent form cylinders and during the remainder of said rotation to lock said gear 28 against rotation.

Mutilated pinion 27 fixed to shaft 29 is actuated intermittently, one revolution at a time by the following means: On the rearward outboard end of shaft 29 gear 70, having clutch 77 formed on the hub thereof, is mounted for free rotation. Complementary clutch 79 is slidably mounted on said shaft 29 for engagement with clutch 77 and is prevented from turning relative to said shaft by key 78 which passes axially through elongated slot 81 therein and engages opposite slots 82 in said clutch 79. Spring actuated plunger 83 in shaft 29 impinges upon key 78 and thus urges clutch 79 into engagement with clutch 77. Clutch 77 and gear 70 are rotated continuously by means to be described later herein. Clutch 79 has an ear 89 for engagement with cam arm 84 fixed to rock shaft 85. Rock shaft 85 is actuated at predetermined times to swing cam arm 84 in a clockwise direction (Fig. 1) out of engagement with ear 89 to allow spring 830 to urge clutch 79 into engagement with clutch 77 to rotate shaft 29 and gear 27 by the following means: On shaft 86 worm gear 80 is mounted for free rotation in engagement with worm 90 on shaft 96. Worm gear 80 is actuated alternately in opposite directions by said worm 90 as hereinafter more fully described. Mounted on the inner face of worm gear 80 is spring urged pawl 87 for engagement with arm 88, fixed on rock shaft 85, when said worm gear 80 is rotated in an anticlockwise direction (Fig. 1). Shaft 85 is constantly urged in an anticlockwise direction by means of spring actuated plunger 91 in engagement with arm 92 of shaft 85, and the duration of engagement of pawl 87 with arm 88 is so timed that said arm 88 is released before clutch 77 has driven clutch 79 one revolution and cam arm 84 therefore engages ear 89 as it approaches the end of its first revolution and withdraws clutch 79 from engagement with clutch 77 at the close of one revolution thereof. Clutch 79 and shaft 29 are stopped and held against rotation at the end of said one revolution by the engagement of notch 141 of disk 142 fixed to said shaft 29 with spring arm 143 fixed to frame 4.

Governing means for intermittent drive.—Worm shaft 96 is mounted in bearing 94 outreaching from side frame 4 and has worm

gear 95 fixed to the right hand end thereof (Fig. 1). Said worm gear is driven continuously in one direction by worm 97 on sleeve 98 of gear 99 all turning together on stud 103, in frame 4. Gear 99 is driven by gear 104 slidably mounted on shaft 26 of carrier 30. Said gear 104 is driven from said shaft 26 by key 705, and may be moved endwise out of engagement with gear 99 by means of slidable yoke 106 actuated by hand rotated pin 107 in engagement with cam 108 in the hub of yoke 106. Worm 90 comprises two circumferential ribs or teeth 90^a, 90^b cut away at one portion thereof by the insertion of oscillatable plug 109 having rib 110, shiftable by the rotation of said plug, from coincidence at one end of said rib 110 with rib 90^a and at the other end with rib 90^b, to the opposite position relative to said ribs 90^a, 90^b (Fig. 7). Ring 144 held in place by screws as 145 is efficient to retain plug 109 in place by engagement with head 100 thereof. Plug 109 is rotated back and forth on its axis by the following means: Pinion 146 is fixed to stem 147 of said plug and engages rack 148 slidable parallel with the axis of worm 90 in seat 149 in said worm. Said rack projects outward at each side of worm 90 and has cam 150 for engagement with arm 152 fixed to worm gear 80 and cam 151 at the other end for engagement with arm 153 suitably fixed to said worm gear 80. Plug 109 has notches 154, 155 in head 100 for engagement with spring actuated detent 156, for retaining said plug 109 alternately in its two operable positions.

Selective mechanism for governing intermittent drive.—The means for moving arm 153 about axis 86 and for setting it relative to arm 152 for varying the number of rotations of worm 90 for rotating worm gear 80 in one direction comprise the following (Figs. 1, 2, 3): Worm gear 80 freely mounted on shaft 86 in sleeve 354 fixed in frame 4 has sleeve 160 inreaching therefrom and has gear 161 fixed to the inner end thereof. Said gear 161 drives gear 162 fixed to the inner end of sleeve 163. Said sleeve 163 has a bearing in sleeve 164 fixed to frame 4 and has bevel gear 165 fixed to its outboard end. Bevel gear 165 drives bevel gear 166 fixed to the lower end of sleeve 167 having a bearing in bracket 168 on frame 4. Disk 170, having notches 171 therein, preferably corresponding in number with the teeth of worm gear 80, is fixed to the upper end of said sleeve 167. The train of mechanism just described from worm gear 80 to notched disk 170 is a close connected train to cause disk 170 to rotate in synchronism with worm gear 80. Shaft 86 of arm 153 has gear 355 fixed to its inner end and said gear meshes with gear 356 fixed to the inner end of shaft 157 rotatably mounted in sleeve 163. Bevel gear 158 is fixed to the outer end of said shaft 157 and meshes with bevel gear 159 on the lower end of shaft 169 rotatably mounted in sleeve 167. To the upper end of shaft 169 is fixed head 172 having ears 173 between which locking lever 174 is pivoted. Said locking lever 174 has tooth 175 at its free end for engagement with notches 171 of disk 170. Said tooth 175 is urged to engage any selected notch by means of spring impelled plunger 176 coaxially mounted in shaft 169, in engagement with the under side of lever 174. Head 172 is provided with pointer 177 to read against graduations, not shown, on the upper face of disk 170.

The train of mechanism just described from arm 153 to lever 174 is a close connected train and is efficient to rotate arm 153 at will by first pressing downwardly handle 178 to unlock tooth 175 from notched disk 170 and then by rotating said lever 174. Then by releasing said handle 178 and locking tooth 175 in a selected notch of disk 170 arm 153 is locked relative to worm gear 80 and will be rotated as a fixed member thereof.

The mechanism about shafts 157 and 169 is furnished to afford convenient means for setting arm 153 relative to arm 152 on worm gear 80 but said mechanism could be omitted and arm 153 efficiently adjusted and set by direct manipulation.

Speed changing mechanism.—For rotating carrier 30 from station to station without undue jar or strain, the speed of rotation of clutch gear 70 is reduced at the time of engagement of clutches 77, 79 and then increased to normal speed after the rotary shift of said carrier and at the time of disengagement of said clutches. Main power shaft 140 is of tubular construction and has bearings in side frames 4, 5. Rearward of frame 5 gear 180 is fixed to said shaft and main pulley 190 and slow speed pulley 191 turn freely on said shaft. Between pulleys 190 and 191 and for engagement with either thereof, friction clutch 179 is mounted for endwise movement on said shaft 140 and is held against rotation relative to said shaft by keys 181, 182 fixed in hub 183 of said clutch 179, but slidable in slots 184, 185 respectively in said shaft. Said keys 181, 182 transfix rod 186 slidably mounted in tubular shaft 140 and are actuated endwise said shaft to cause friction clutch 179 to engage either pulley 190 or 191, or to remain in a neutral position therebetween. Rod 186 is also transfixed by key 187 fixed in sleeve 188 slidably mounted on shaft 140, which last is supplied with slots 192, 193 for the passage of said key 187. Sleeve 188 has circumferential groove 189 therein for engagement with rolls as 194 of yoke 195 fixed to shaft 196 for moving rod 186 endwise to operate friction clutch 179. Sleeve 188 is provided with circumferential rib 197 having

beveled sides for engagement with spring arms 198 of hub 199 fixed to shaft 140 for retaining sleeve 188 at either end of its throw to hold friction clutch 179 in coaction with pulley 190 or 191 as may be. Rock shaft 196 is revolubly mounted in bracket 200 fixed to frame 5 and arm 201 is fixed to the lower end of said shaft. Arm 201 is bifurcated at its free end and has pivotally mounted therein one end of rod 202. The other end of said rod is pivotally mounted in the bifurcated free end of arm 203 fixed to the lower end of rock shaft 204 rotatably mounted in bracket 205. Said arm 203 is a bell crank arm and has member 2030 thereof extending approximately parallel with rod 202 and cam roll 208 is mounted in the free end thereof for engagement with rock cam 209 fixed to rock shaft 85. At the upper side of bracket 205 arm 206 is fixed to rock shaft 204 and has cam roll 207 mounted at its free end for engagement with cam 211 on shaft 29. Hand operable means for rocking shaft 204 to throw clutch 179 into engagement with either of pulleys 190 or 191 or to throw said clutch out of engagement with both pulleys and thus stop the machine comprises the following: Conical segment 212 is fixed coaxial with shaft 204, in bracket 213 of frame 5 and coacting segment 214 is pivotally fixed to shaft 204. Hand lever 215 has one end thereof pivoted for universal movement at 217 on shaft 204 and is provided with wedge-shaped tooth 216 (Fig. 14) for engagement with either abutment 218, 219 of segment 214 to rock shaft 204, or for coengagment with central notches 321, 322 of segments 212, 214 respectively to stop the machine.

Driving gearing.—Gear 180 on main drive shaft 140 drives gear 245 fixed to stamp form cylinder shaft 221, through intermediate 246. Gear 245 drives gear 247 fixed on impression cylinder shaft 19 and gear 247 drives both gear 248 fixed on folding cylinder shaft 7 and gear 249 of receiving cylinder 10. Gear 250 of ink receptacle shaft 45 and gear 251 of ink receptacle shaft 224 are driven from gear 245 through intermediate gear 252. Gear 253 of ink cylinder shaft 231 is driven from gear 251 through intermediate 2540. Gear 247 drives equal gear 254 of form cylinder carrier shaft 26 through intermediate 255 and gear 256, also fixed to shaft 26, drives clutch gear 70 of half its diameter turning freely on shaft 29. Gear 258 on shaft 133 is driven from gear 255 through intermediate gear 257.

Operation.—The operation of my improved envelop printing mechanism is as follows: Pulleys 190 and 191 being rotated in the direction of their arrows from some suitable source of power by the usual belts not shown and wedge 216 of hand lever 215 being in full engagement with notches 321, 322 of segments 212, 214 respectively clutch 179 is free of both said pulleys which therefore turn freely and idly on shaft 186. Lever 215 (Fig. 3) now being lifted and swung into engagement with abutment 218 of segment 214 said segment is forced toward frame 5 (Fig. 14) and through rock shaft 204 and the connecting links between it and clutch 179 (Fig. 5) said clutch is forced into engagement with high speed pulley 190 and the machine started. An envelop blank being now delivered over table 8 in proper time is gripped by clips 15 to advancing receiving cylinder 10 and conducted in a clockwise direction therewith and delivered the other side up to the grip of clips 22 of one of the pairs of beds as 21, 210 of impression cylinder 20. Said impression cylinder 20 conducts the blank in an anticlockwise direction to receive the impression of the form in form cylinder 401 and thence downwardly to receive the impression of the stamp form as 222 in cylinder 220. Said blank is then conducted upwardly and delivered to one of the folding beds as 235 of folding cylinder 240, being gripped to said bed by clips 236, 236. As said cylinder rotates onwardly in a clockwise direction, end folders 237 fold the end flaps of the blank and folders 241 fold the bottom flap thereof. Said blank may then be operated upon by other means not shown, to complete the envelop. Ink delivery roll 31 and ink receiving roll 32 revolve constantly in coaction with each other except during the intermittent rotation of carrier 30 and coact to deliver ink to their adjacent form cylinder at all times when that cylinder is rotating. Said form cylinder is started in rotation two stations before its station of coaction (402) with the impression cylinder so as to afford sufficient time for thorough inking before being brought into printing position. Ink is delivered to ink delivery roll, as 31 only when said roll is in position 301 with its coacting printing form cylinder in printing position. When said ink delivery roll reaches said position 301, it establishes connection with its source of supply in receptacle 44 through the several rolls 1320, 132 and 130. Ink is delivered to the stamp forms on cylinder 220 by rolls 229, 230. Said rolls are supplied with ink from receptacle 223 by intermediate rolls 228 and 227. By means of cam 138 the form cylinder gears 50 are held in mesh with constantly rotating gear 52 half the time from position 402 to position 401 inclusive, and said form cylinder gears 50 are held in mesh with gear 51 fixed relative to carrier 30 during the other half of their revolution about carrier axis 26. During this latter period of rest, relative to their own axes, their printing forms are in position 40 (Fig. 4) relative to carrier 30 and in which position

said form cylinder presents its plunger 62 (Fig. 9) for engagement with lever 73, by which said form may be unlocked, and then removed and a different form substituted therefor. In case the operator fails to make the desired shift of forms at said position 40, a second lever 75 is located for coaction with said plunger 62 at its next station 400. Pawl 87 in its upward movement in engagement with arm 88 rocks shaft 85 and cam 209 thereon into engagement with the roll on arm 2030 of shaft 204 and through the described arms and rods is effective to throw sleeve 188 to the left, and clutch 179 cut out of engagement with high speed pulley 190 and into engagement with low speed pulley 191, all as shown in Fig. 5. At the same time cam arm 84 on said rock shaft 85 swings out of engagement with ear 89 of clutch 79 which last is thereupon urged into engagement with clutch 77 of gear 70 by spring actuated plunger 83. This starts shaft 29, having mutilated gear 27 fixed thereon, in rotation and the toothed portion of said mutilated gear promptly engages the contiguous toothed portion of intermittent gear 28 of carrier 30 and turns said carrier one sixth of a revolution. Said mutilated gear 27 engages said carrier intermittent gear directly after the form cylinder then in coacting relation with the impression cylinder has made its last rotative engagement therewith and at which time said form cylinder has advanced on its own axis one third of a revolution from the position in which it is illustrated in Fig. 4. During the intermittent rotation of carrier 30 its gear 51 travels in unison with gear 52 and said gears have their teeth respectively in line so that gear 50 may be and is slid endwise on shaft 33 during its movement upward with carrier 30, from engagement with gear 52 to engagement with gear 51, and said form cylinder remains at rest relative to carrier 30, with its form in the position shown at 404. At the same time the form cylinder that is passing from position 400 to position 402 has its gear 50 moved endwise from engagement with gear 51 to engagement with gear 52 and when said form cylinder has reached position 402, carrier 30 and gear 51 come to a state of rest and gear 52 continues its revolution thereby starting pinion 50 and its form cylinder revolving. Directly following the completion of an incremental movement of carrier 30 the high part of cam 211 engages the roll on arm 206 and rock shaft 204, and through the described connections throws clutch 179 out of engagement with slow speed pulley 191 and into engagement with high speed pulley 190. In Fig. 1 arm 153 is shown in its nearest relation to arm 152 fixed to worm gear 80 and in position to shift rack 148 to reverse the direction of travel of worm gear 80 to produce the minimum number of impressions for which the machine is settable. By moving tooth 175 in a clockwise direction, Fig. 3, to engagement with the next succeeding notch in disk 170, arm 153 will be moved in an anti-clockwise direction (Fig. 1) one tooth distance farther from arm 152 thereby doubling the minimum number of coacting impressions of the form cylinder which has last come into printing position relative to the impression cylinder. Thus by moving said tooth 175 in a clockwise direction from notch to notch of disk 170, said number of impressions of the form cylinder in coaction with the impression cylinder can be increased at will in increments corresponding with the minimum number of impressions which the machine is timed to make. It is obvious that by modifying the ratio of gearing said increments of increase can bear other relations to said minimum number.

I claim:—

1. An envelop printing mechanism including in combination, an impression cylinder, a plurality of form cylinders, a rotatable carrier in which the form cylinders are rotatably mounted, means for intermittently rotating the carrier to bring the form cylinders successively into coöperative relation with the impression cylinder, means for continuously rotating the coöperating form cylinder in synchronism with the impression cylinder and means for varying the number of coacting revolutions of a form cylinder with the impression cylinder.

2. An envelop printing mechanism including in combination, an impression cylinder, a plurality of form cylinders, a rotatable carrier in which the form cylinders are rotatably mounted, means for intermittently rotating the carrier to bring the form cylinders successively into coöperative relation with the impression cylinder, means for continuously rotating the coöperating form cylinder in synchronism with the impression cylinder and settable means for governing the number of coacting revolutions of each form cylinder with the impression cylinder.

3. An envelop printing mechanism including in combination, an impression cylinder, a plurality of form cylinders, a rotatable carrier in which the form cylinders are rotatably mounted and means for intermittently rotating the carrier to move one form cylinder out of coöperative relation with the impression cylinder and simultaneously to move another form cylinder into coöperative relation with the impression cylinder during the interval between successive impression periods and without stopping the impression cylinder.

4. An envelop printing mechanism including in combination, an impression cylinder, a plurality of form cylinders, a rotatable

carrier in which the form cylinders are rotatably mounted, means for intermittently rotating the carrier to move one form cylinder out of coöperative relation with the impression cylinder and simultaneously to move another form cylinder into coöperative relation with the impression cylinder during the interval between successive impression periods and without stopping the impression cylinder and settable means for automatically governing the periods of rest in the intermittent revolution of the carrier.

5. An envelop printing mechanism including in combination, an impression cylinder, a plurality of form cylinders, a rotatable carrier in which the form cylinders are rotatably mounted, means for intermittently rotating the carrier to move one form cylinder out of coöperative relation with the impression cylinder and simultaneously to move another form cylinder into coöperative relation with the impression cylinder during the interval between successive impression periods and without stopping the impression cylinder and means for continuously rotating the coöperating form cylinder in synchronism with the impression cylinder.

6. An envelop printing mechanism including in combination, an impression cylinder, a plurality of form cylinders, a rotatable carrier in which the form cylinders are rotatably mounted, means for intermittently rotating the carrier to move one form cylinder out of coöperative relation with the impression cylinder and simultaneously to move another form cylinder into coöperative relation with the impression cylinder during the interval between successive impression periods and without stopping the impression cylinder, means for continuously rotating the coöperating form cylinder in synchronism with the impression cylinder and settable means for automatically governing the number of coacting revolutions of each form cylinder with the impression cylinder.

7. An envelop printing mechanism including in combination, an impression cylinder, a plurality of form cylinders, a rotatable carrier in which the form cylinders are rotatably mounted, means for intermittently rotating the carrier to bring the form cylinders successively into coöperative relation with the impression cylinder, means for continuously rotating the coöperating form cylinder in synchronism with the impression cylinder and means for alternately reducing and increasing the speed of the means for intermittently rotating the carrier.

8. An envelop printing mechanism including in combination, an impression cylinder, a plurality of form cylinders, a rotatable carrier in which the form cylinders are rotatably mounted, means for intermittently rotating the carrier to bring the form cylinders successively into coöperative relation with the impression cylinder, means for continuously rotating the coöperating form cylinder in synchronism with the impression cylinder, means for alternately reducing and increasing the speed of the means for intermittently rotating the carrier and automatic means for controlling said carrier rotating means and speed reducing and increasing means.

9. An envelop printing mechanism including in combination, an impression cylinder, a plurality of form cylinders, a rotatable carrier in which the form cylinders are rotatably mounted, means for intermittently rotating the carrier to bring the form cylinders successively into coöperative relation with the impression cylinder, means for continuously rotating the coöperating form cylinder in synchronism with the impression cylinder, means for alternately reducing and increasing the speed of the means for intermittently rotating the carrier and settable means for automatically governing said carrier rotating means and said speed reducing and increasing means to determine the number of coacting revolutions between each form cylinder and the impression cylinder.

10. An envelop printing mechanism including in combination, an impression cylinder, a plurality of form cylinders, a rotatable carrier in which the form cylinders are rotatably mounted, means for intermittently rotating the carrier to move one form cylinder out of coöperative relation with the impression cylinder and simultaneously to move another form cylinder into coöperative relation with the impression cylinder during the interval between successive impression periods and means for alternately reducing and increasing the speed of the means for intermittently rotating the carrier.

11. An envelop printing mechanism including in combination, an impression cylinder, a plurality of form cylinders, a rotatable carrier in which the form cylinders are rotatably mounted, means for intermittently rotating the carrier to move one form cylinder out of coöperative relation with the impression cylinder and simultaneously to move another form cylinder into coöperative relation with the impression cylinder, means for alternately reducing and increasing the speed of the means for intermittently rotating the carrier, means for stopping the rotation of each form cylinder relative to the carrier when said cylinder is out of coöperative relation with the impression cylinder and means positioned for coöperation with each form cylinder when said cylinder is out of coöperative relation with the impression cylinder for releasing the form in said form cylinder.

12. An envelop printing mechanism in-

cluding in combination, an impression cylinder, a plurality of form cylinders, a rotatable carrier in which the form cylinders are rotatably mounted, means for intermittently rotating the carrier to move one form cylinder out of coöperative relation with the impression cylinder and simultaneously to move another form cylinder into coöperative relation with the impression cylinder during the interval between successive impression periods, means for alternately reducing and increasing the speed of the means for intermittently rotating the carrier, means for stopping the rotation of each form cylinder relative to the carrier when said cylinder is out of coöperative relation with the impression cylinder and means positioned for coöperation with each form cylinder during a rest period of the rotating carrier and when said cylinder is out of cooperative relation with the impression cylinder, for releasing the form in said form cylinder.

13. An envelop printing mechanism including in combination, an impression cylinder, a plurality of form cylinders, a rotatable carrier in which the form cylinders are rotatably mounted, means for intermittently rotating the carrier to bring the form cylinders successively into coöperative relation with the impression cylinder, means for continuously rotating the coöperating form cylinder in synchronism with the impression cylinder, ink distributing means mounted on the carrier adjacent to and for coaction with each form cylinder and ink supplying means adjacent to said carrier for successive coaction with the several ink distributing means.

14. An envelop printing mechanism including in combination, an impression cylinder, a plurality of form cylinders, a rotatable carrier in which the form cylinders are rotatably mounted, means for intermittently rotating the carrier to bring the form cylinders successively into coöperative relation with the impression cylinder, means for continuously rotating the coöperating form cylinder in synchronism with the impression cylinder, ink distributing means mounted on the carrier adjacent to and for coaction with each form cylinder, ink supplying means adjacent to said carrier for successive coaction with the several ink distributing means and means for causing each form to coact with its ink distributing means prior to the bringing of said form into coacting relation with the impression cylinder.

15. An envelop printing mechanism including in combination, an impression cylinder, a plurality of form cylinders, a rotatable carrier in which the form cylinders are rotatably mounted, means for intermittently rotating the carrier to bring the form cylinders successively into coöperative relation with the impression cylinder, means for continuously rotating the coöperating form cylinder in synchronism with the impression cylinder, means for varying the number of coacting revolutions of a form cylinder with the impression cylinder, ink distributing means mounted on the carrier adjacent to and for coaction with each form cylinder and ink supplying means adjacent to said carrier for successive coaction with the several ink distributing means.

16. An envelop printing mechanism including in combination, an impression cylinder, a plurality of form cylinders, a rotatable carrier in which the form cylinders are rotatably mounted, means for intermittently rotating the carrier to bring the form cylinders successively into coöperative relation with the impression cylinder, means for continuously rotating the coöperating form cylinder in synchronism with the impression cylinder, means for varying the number of coacting revolutions of a form cylinder with the impression cylinder, ink distributing means mounted on the carrier adjacent to and for coaction with each form cylinder, ink supplying means adjacent to said carrier for successive coaction with the several ink distributing means and means for causing each form to coact with its ink distributing means prior to the bringing of said form into coacting relation with the impression cylinder.

17. An envelop printing mechanism including in combination, an impression cylinder, a plurality of form cylinders, a rotatable carrier in which the form cylinders are rotatably mounted, means for intermittently rotating the carrier to bring the form cylinders successively into coöperative relation with the impression cylinder, means for continuously rotating the coöperating form cylinder in synchronism with the impression cylinder, means for alternately reducing and increasing the speed of the means for intermittently rotating the carrier, ink distributing means mounted on the carrier adjacent to and for coaction with each form cylinder and ink supplying means adjacent to said carrier for successive coaction with the several ink distributing means.

18. An envelop printing mechanism including in combination, an impression cylinder, a plurality of form cylinders, a rotatable carrier in which the form cylinders are rotatably mounted, means for intermittently rotating the carrier to bring the form cylinders successively into coöperative relation with the impression cylinder, means for continuously rotating the coöperating form cylinder in synchronism with the impression cylinder, means for alternately reducing and increasing the speed of the means for intermittently rotating the carrier, ink distribut-

ing means mounted on the carrier adjacent to and for coaction with each form cylinder, ink supplying means adjacent to said carrier for successive coaction with the several ink distributing means and means for causing each form to coact with its ink distributing means prior to the bringing of said form into coacting relation with the impression cylinder.

19. An envelop printing mechanism including in combination, an impression cylinder, a plurality of form cylinders, a rotatable carrier in which the form cylinders are rotatably mounted, means for intermittently rotating the carrier to bring the form cylinders successively into coöperative relation with the impression cylinder, means for continuously rotating the coöperating form cylinder in synchronism with the impression cylinder, a secondary revoluble form cylinder for coaction with the impression cylinder and means for rotating the secondary cylinder in synchronism with the impression cylinder.

20. An envelop printing mechanism including in combination, an impression cylinder, a plurality of form cylinders, a rotatable carrier in which the form cylinders are rotatably mounted, means for intermittently rotating the carrier to move one form cylinder out of coöperative relation with the impression cylinder and simultaneously to move another form cylinder into coöperative relation with the impression cylinder during the interval between successive impression periods and without stopping the impression cylinder, means for continuously rotating the coöperating form cylinder in synchronism with the impression cylinder, a secondary revoluble form cylinder for coaction with the impression cylinder and means for rotating the secondary cylinder in synchronism with the impression cylinder.

Signed this 31st day of January nineteen hundred and ten (1910) before two subscribing witnesses.

CHARLES F. SMITH.

Witnesses:
HOWARD MARSTON,
ELMER H. HOUCK.