July 13, 1954 O. DUTRO ET AL 2,683,409

PRINTING AND NUMBERING MACHINE AND INTERRUPTER THEREFOR

Filed April 3, 1950 9 Sheets-Sheet 1

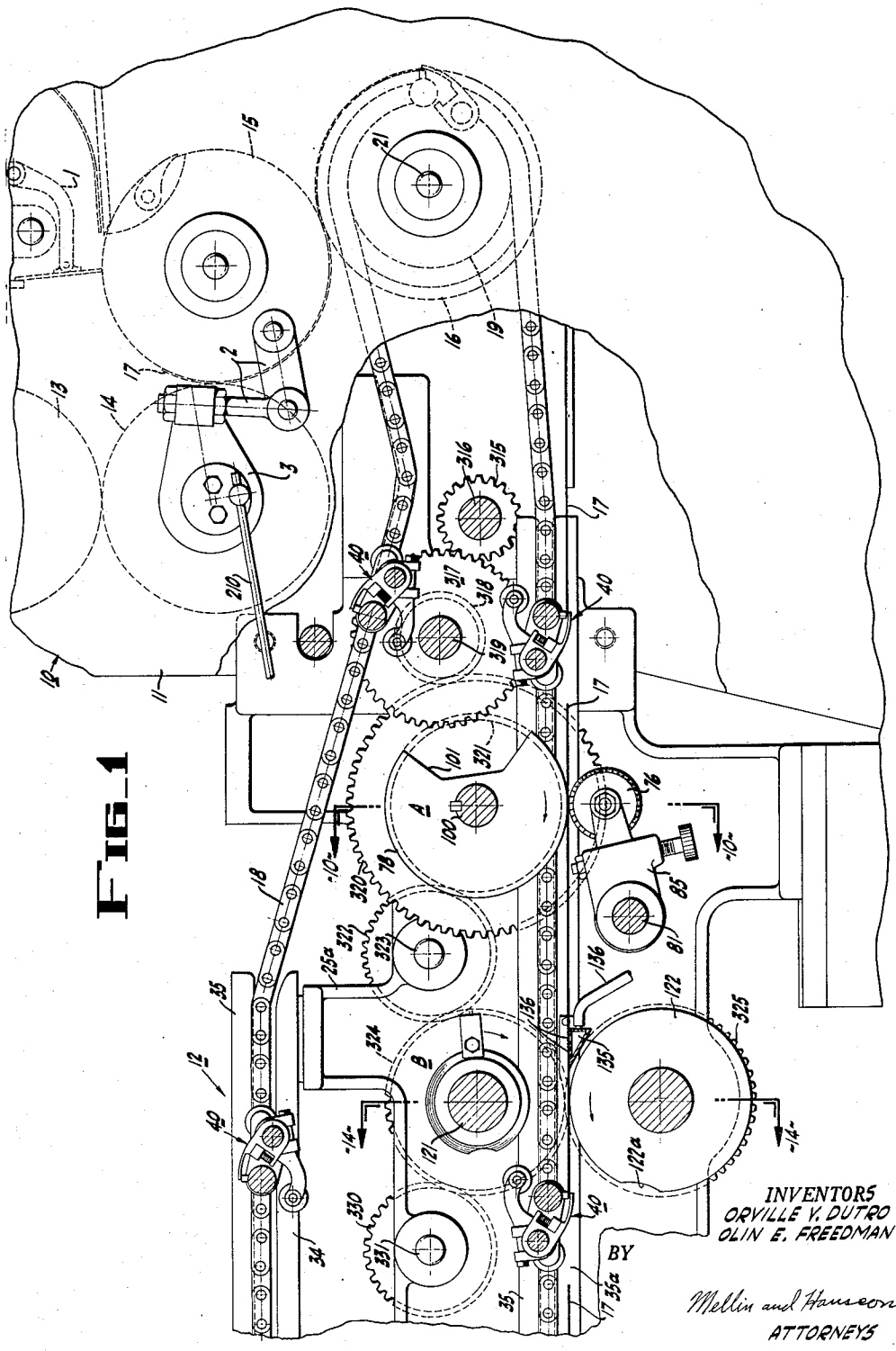

FIG. 1

INVENTORS
ORVILLE V. DUTRO
OLIN E. FREEDMAN

BY

Mellin and Hanscom
ATTORNEYS

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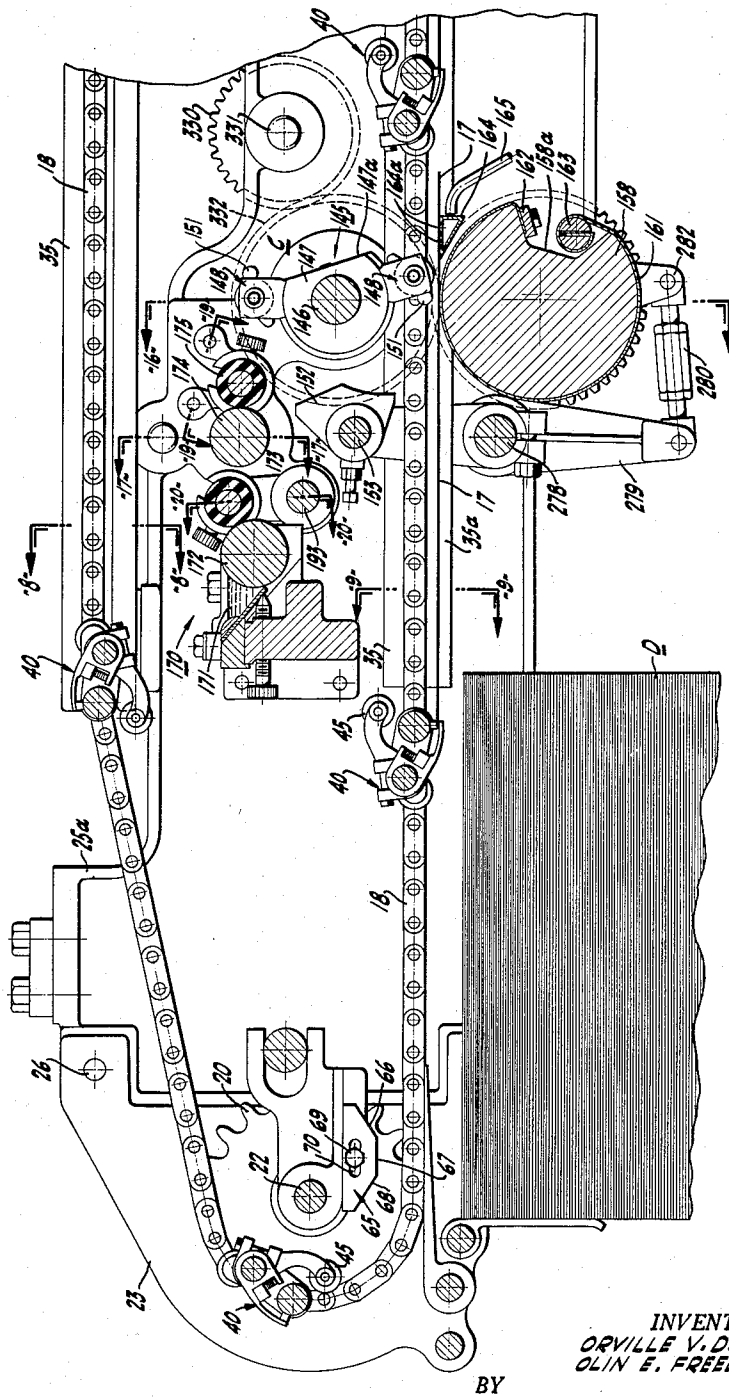
FIG. 2



INVENTORS
ORVILLE V. DUTRO
OLIN E. FREEDMAN

BY

Mellin and Hanscom

ATTORNEYS

July 13, 1954 O. DUTRO ET AL 2,683,409

PRINTING AND NUMBERING MACHINE AND INTERRUPTER THEREFOR

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FIG_3

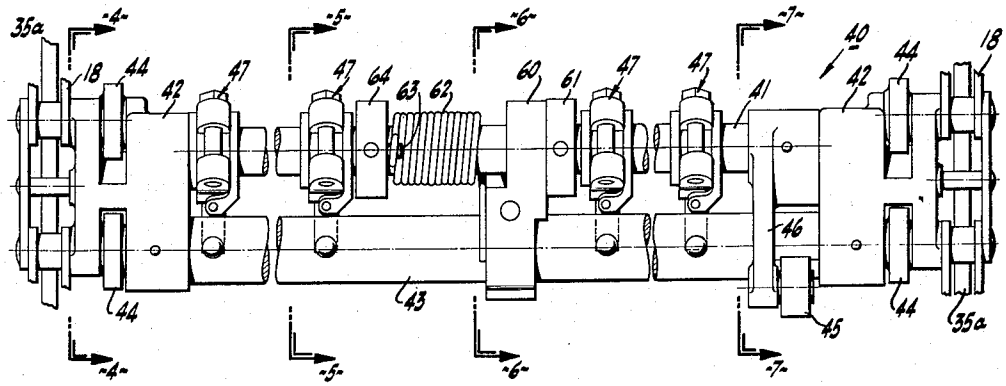


FIG_4

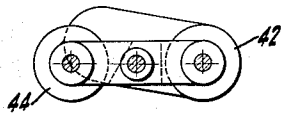


FIG_5

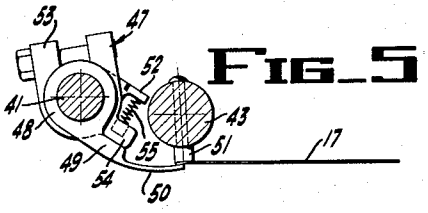
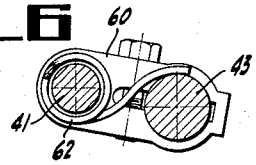


FIG_6



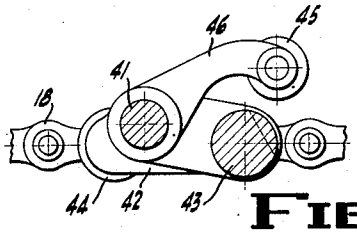
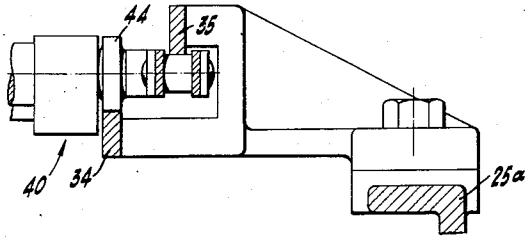


FIG_7

FIG_8



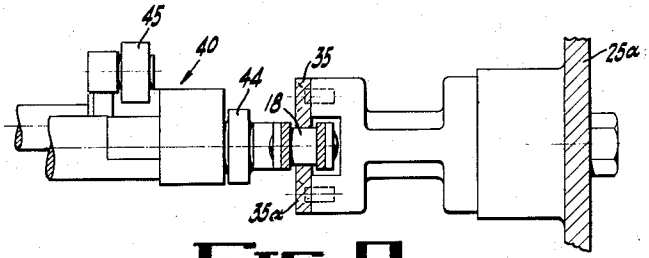


FIG_9

INVENTORS
ORVILLE V. DUTRO
OLIN E. FREEDMAN

BY

Mellin and Hanscom
ATTORNEYS

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PRINTING AND NUMBERING MACHINE AND INTERRUPTER THEREFOR

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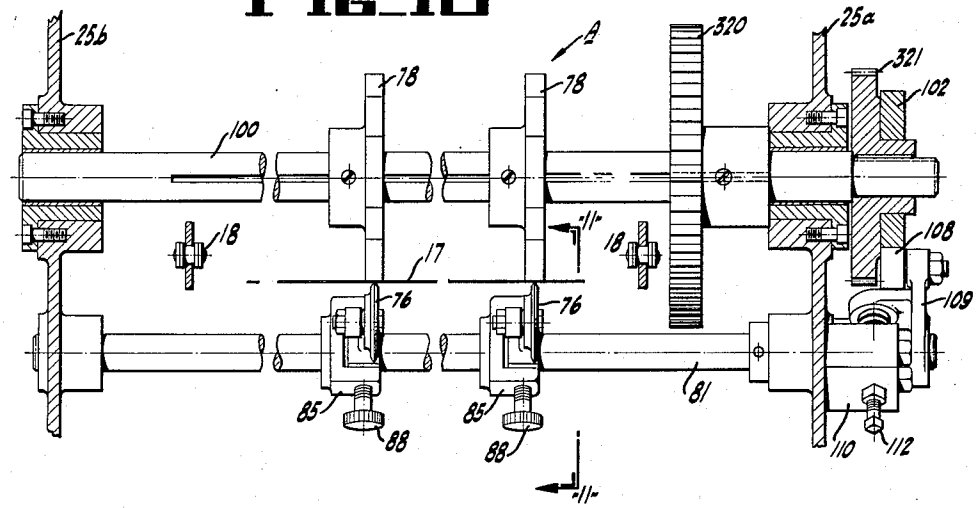
FIG_10



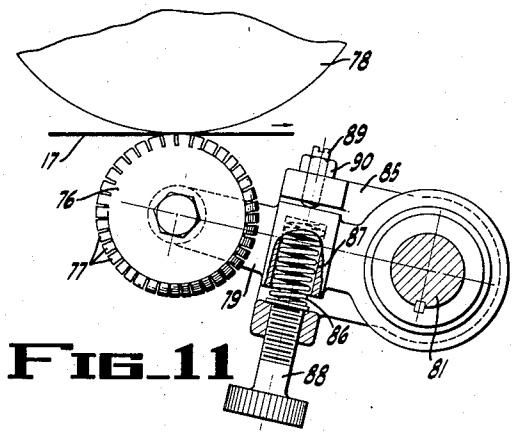


FIG_11

FIG_12

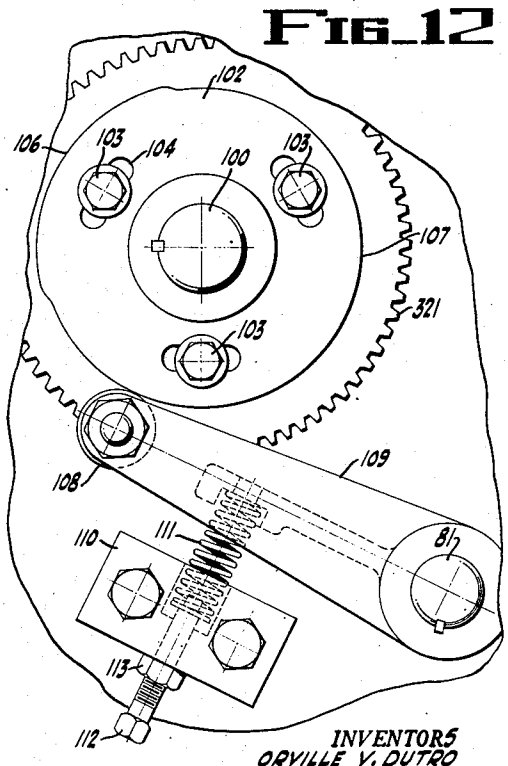
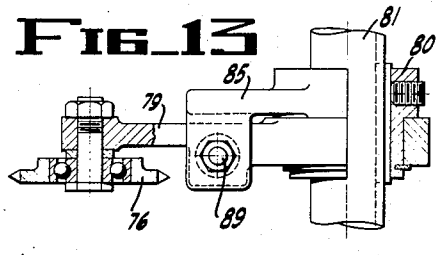


FIG_13



INVENTORS
ORVILLE V. DUTRO
OLIN E. FREEDMAN

BY

Mellin and Hanscom

ATTORNEYS

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PRINTING AND NUMBERING MACHINE AND INTERRUPTER THEREFOR

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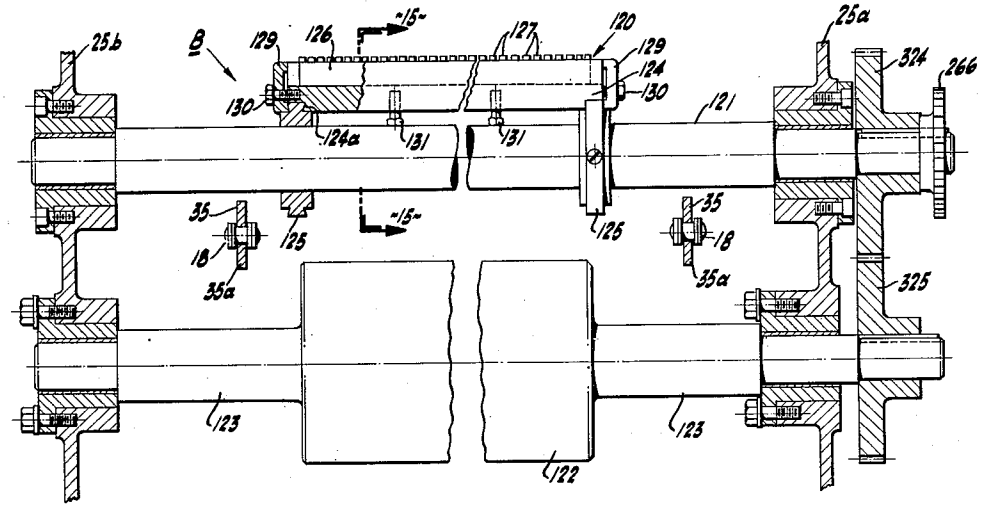
FIG_14



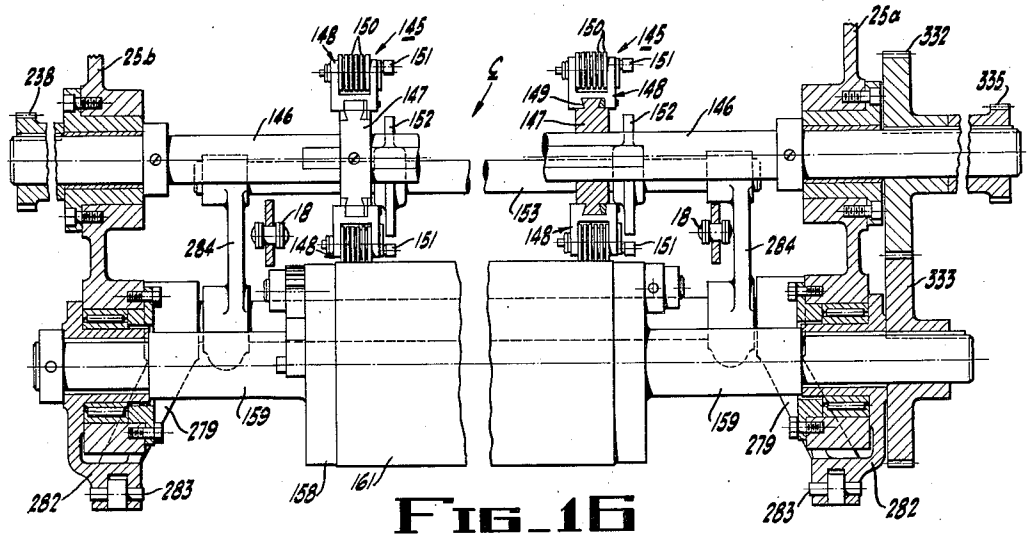


FIG_16

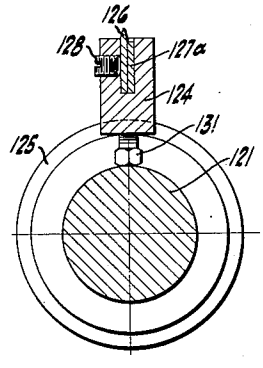


FIG_15

BY

INVENTORS
ORVILLE V. DUTRO
OLIN E. FREEDMAN

Mellin and Hanscom
ATTORNEYS

July 13, 1954 O. DUTRO, ET AL 2,683,409

PRINTING AND NUMBERING MACHINE AND INTERRUPTER THEREFOR

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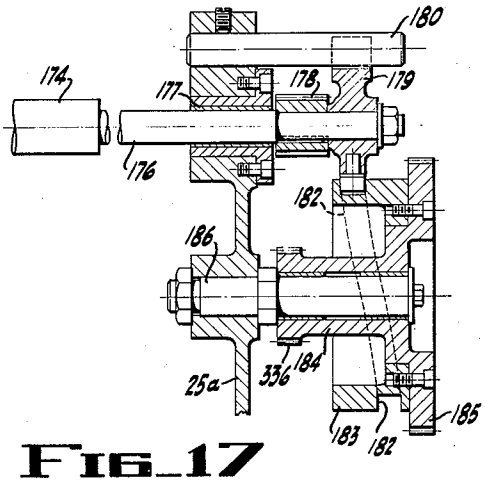


FIG_17

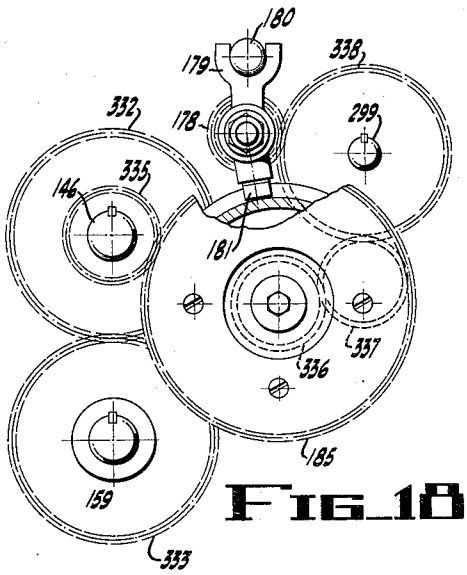
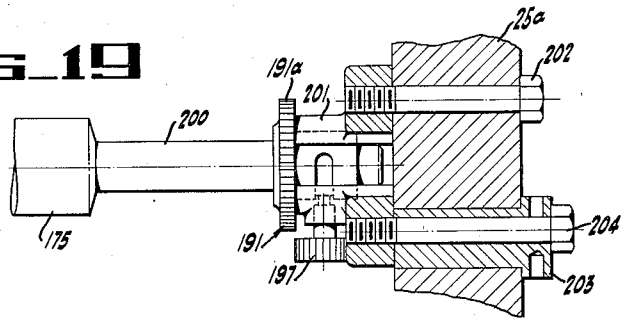


FIG_18

FIG_19



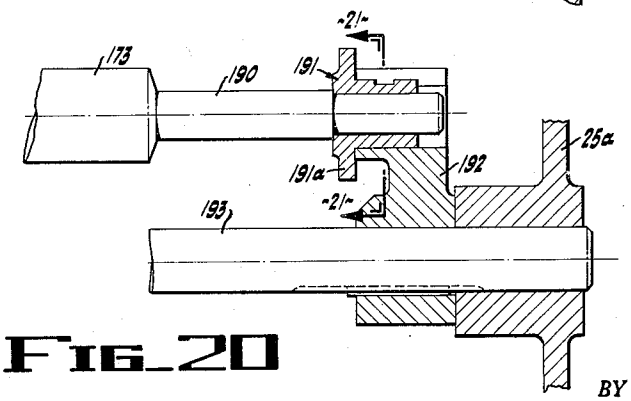


FIG_20

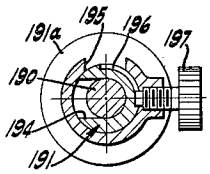


FIG_21

INVENTORS
ORVILLE V. DUTRO
OLIN E. FREEDMAN

BY

Mellin and Hanscom

ATTORNEYS

July 13, 1954 O. DUTRO ET AL 2,683,409

PRINTING AND NUMBERING MACHINE AND INTERRUPTER THEREFOR

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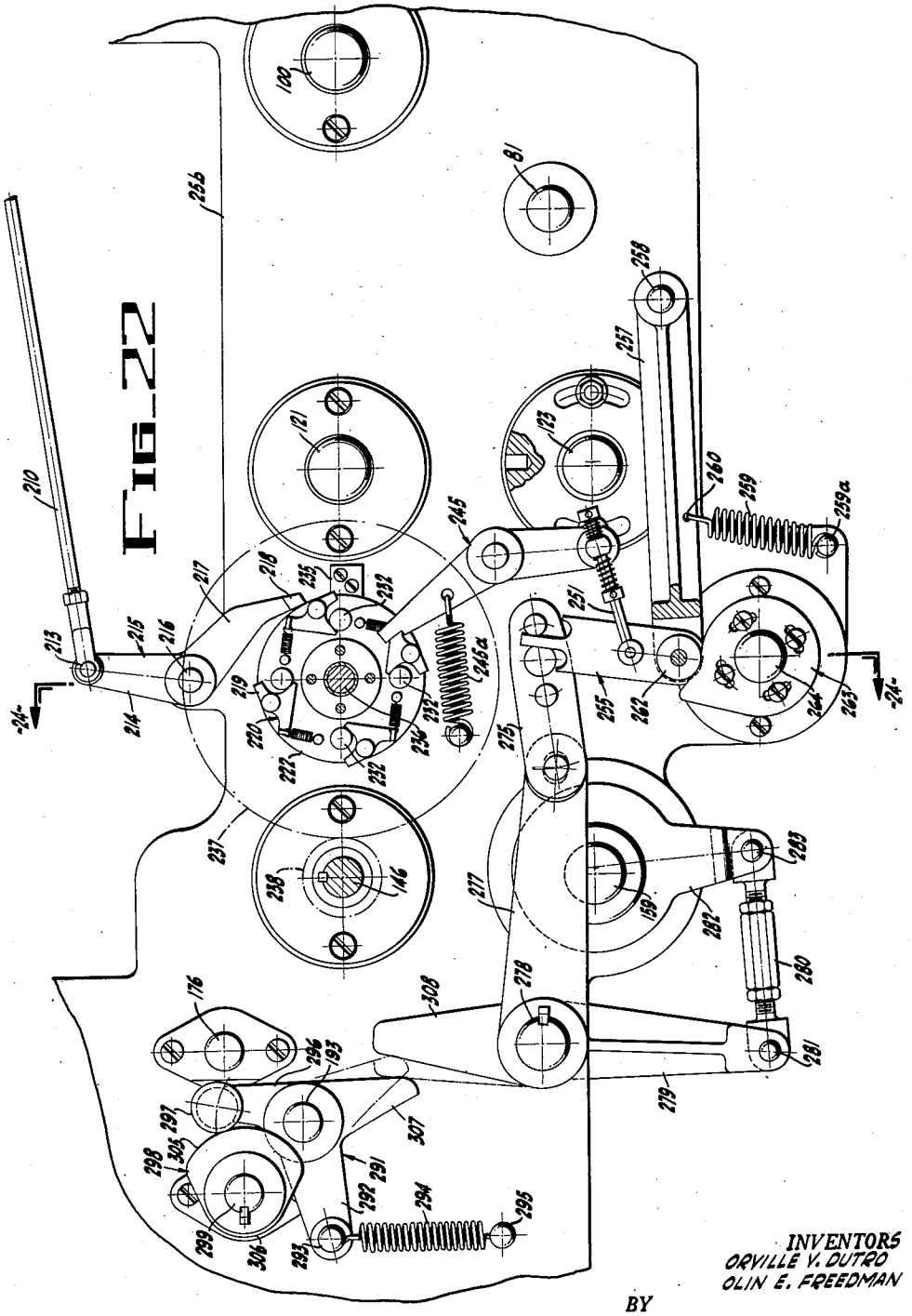
FIG_22



INVENTORS
ORVILLE V. DUTRO
OLIN E. FREEDMAN

BY

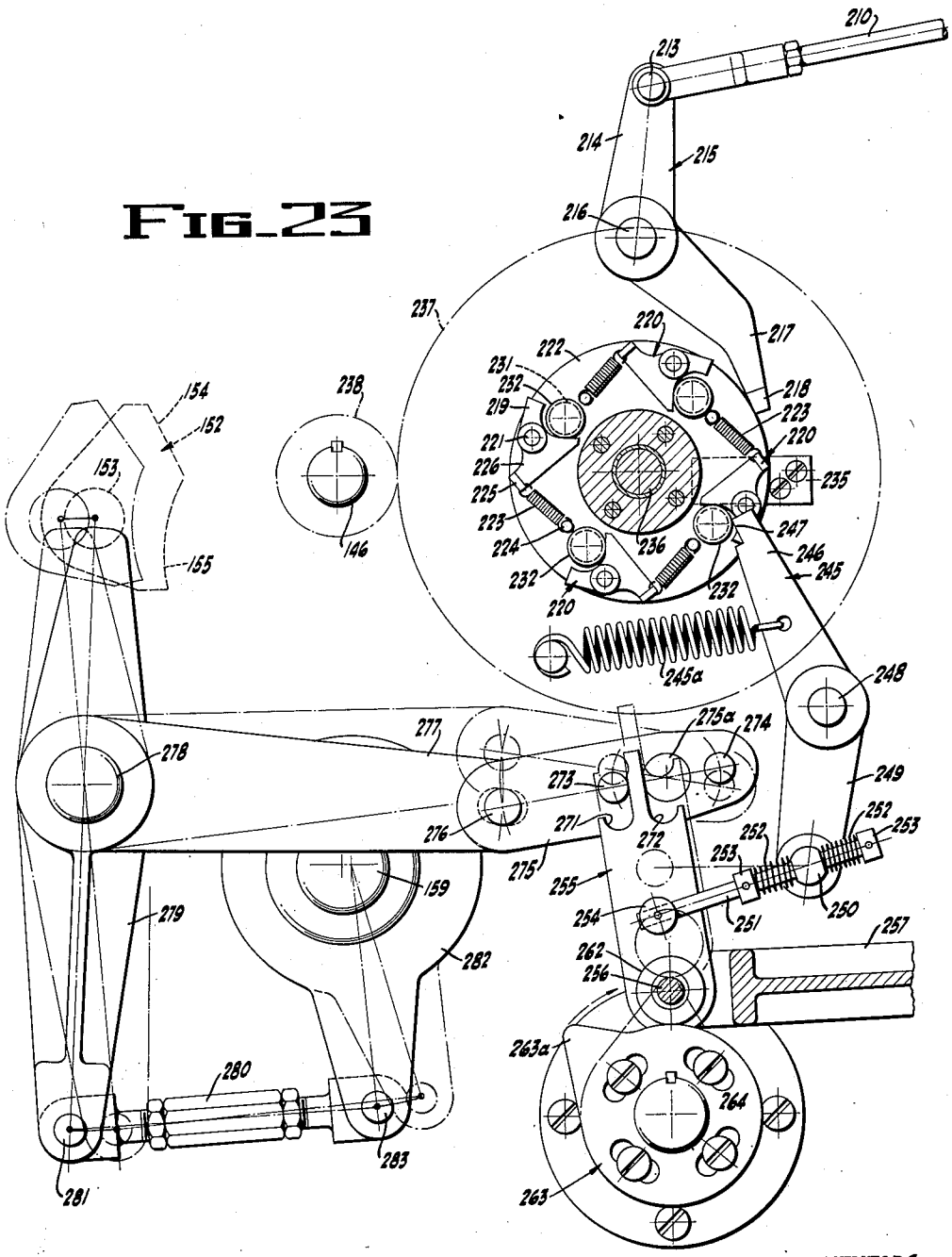
Mellin and Hanscom
ATTORNEYS

July 13, 1954 O. DUTRO ET AL 2,683,409

PRINTING AND NUMBERING MACHINE AND INTERRUPTER THEREFOR

Filed April 3, 1950 9 Sheets-Sheet 8

FIG_23



INVENTORS
ORVILLE V. DUTRO
OLIN E. FREEDMAN

BY

Mellin and Hanscom

ATTORNEYS

July 13, 1954 O. DUTRO ET AL 2,683,409

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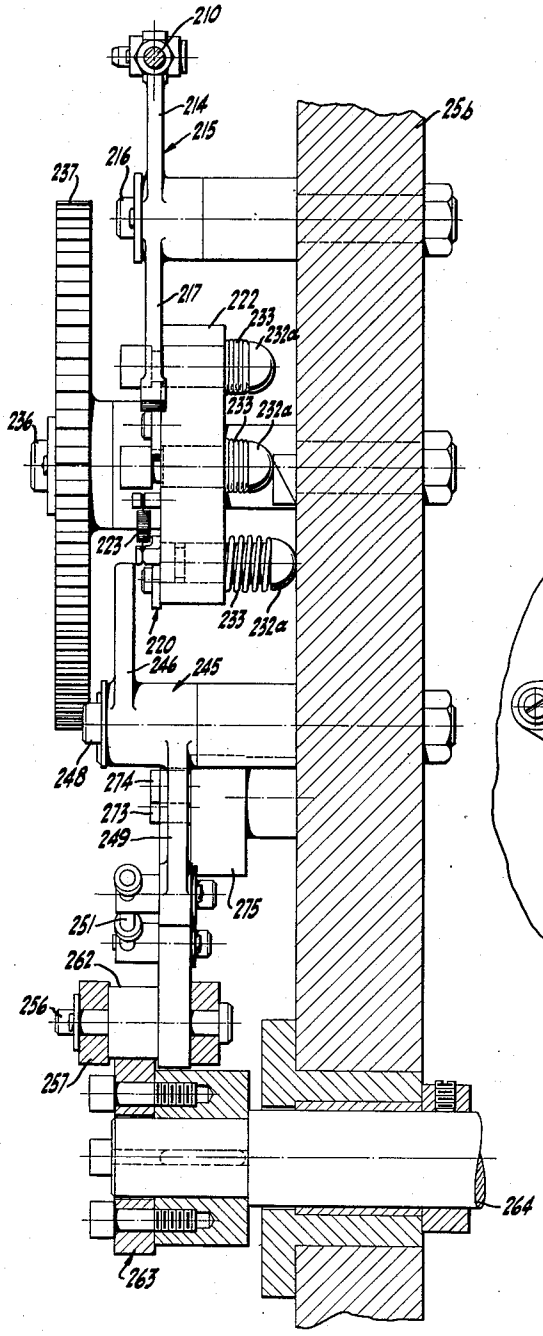

FIG_24

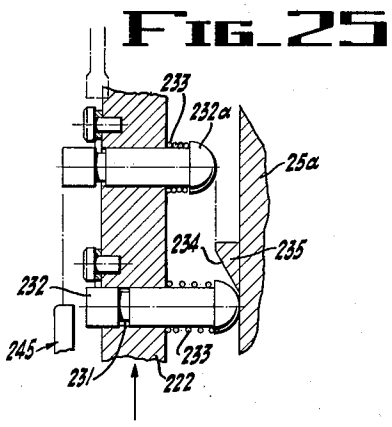

FIG_25

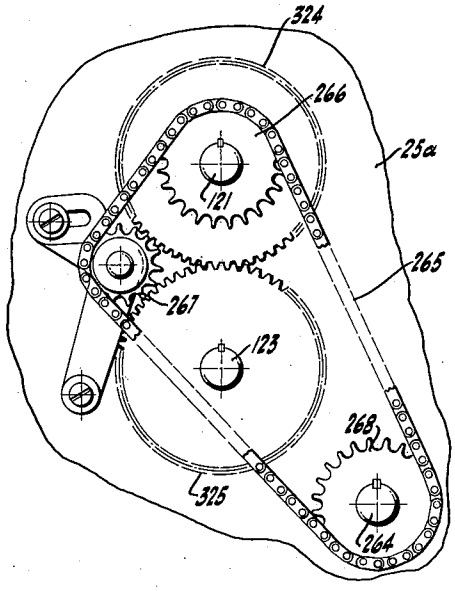

FIG_26

INVENTORS
ORVILLE V. DUTRO
OLIN E. FREEDMAN

BY

Mellin and Hanscom

ATTORNEYS

Patented July 13, 1954 2,683,409

UNITED STATES PATENT OFFICE

2,683,409

PRINTING AND NUMBERING MACHINE AND INTERRUPTER THEREFOR

Orville Dutro, La Canada, Calif., and Olin E. Freedman, Chicago, Ill., assignors to The McBee Company, Athens, Ohio

Application April 3, 1950, Serial No. 153,558

12 Claims. (Cl. 101—77)

1

This invention relates to a machine for the printing, numbering and perforating of individual sheets of paper.

It is the primary object of the present invention to provide in a single machine for the printing, numbering and perforating of individual sheets in rapid succession and whereby the sheets are consecutively numbered.

Another object of the invention is to provide a single machine for the printing, numbering and perforating of successive sheets in which automatic means are provided for stopping the apparatus in the event of a failure of the supply of sheets and by which such stoppage is successive throughout the various instrumentalities and particularly in such manner that the numbering mechanism will continue to function after the printing device has been stopped through failure of the supply and until such time as all the sheets already printed are satisfactorily numbered.

Another object of the present invention is to provide a machine of the class described in which perforations may be performed longitudinally and transversely of the sheets being printed and numbered.

A further object is to provide a new and improved stop mechanism for apparatus of the general character herein set forth.

Another object is to provide novel and improved perforating means for a machine generally of the character herein set forth.

A further object is to provide new and improved numbering means for an apparatus of the general class herein set forth.

A further object is to provide a novel and improved combination and inter-relation of parts for the purpose designated and whereby a rapid, efficient and effective printing, numbering and perforating of individual sheets may be carried on economically.

These and other objects of the invention will be apparent from the ensuing description and the appended claims.

One form which the invention may assume is exemplified in the following description and illustrated by way of example in the accompanying drawings in which:

Fig. 1 is a fragmentary, vertical, longitudinal section through a portion of the machine of the present invention showing the same as being attached to a printing machine.

Fig. 2 is a continuation of Fig. 1, showing the remainder of the machine of the present invention.

Fig. 3 is a top plan view of a gripper bar assembly forming a part of the continuous conveyor means for conveying sheets of paper through the machine.

2

Figs. 4, 5, 6 and 7 are sectional views, taken along the lines 4—4, 5—5, 6—6 and 7—7, respectively, of Fig. 3, showing details of the gripper bar assembly.

Figs. 8 and 9 are sectons taken along the lines 8—8 and 9—9, respectively, of Fig. 2, showing details of the track means employed to guide and support the endless conveyor.

Fig. 10 is a view taken along the line 10—10 of Fig. 1, showing the longitudinal perforator in elevation.

Fig. 11 is a section taken along the line 11—11 of Fig. 10.

Fig. 12 is an end view of the longitudinal perforator as seen from the right of Fig. 10.

Fig. 13 is a fragmentary, bottom view, partly in section, of the longitudinal perforator as seen from beneath Fig. 11.

Fig. 14 is a view taken along the line 14—14 of Fig. 1, showing the cross perforator assembly in elevation.

Fig. 15 is a section taken along the line 15—15 of Fig. 14.

Fig. 16 is a view taken along the line 16—16 of Fig. 2, showing the numbering assembly in elevation.

Fig. 17 is a section taken along the line 17—17 of Fig. 2, showing the driving and oscillating means for the vibrator roller.

Fig. 18 is an end view of the driving and oscillating means for the vibrator roller, as seen from the right of Fig. 17.

Fig. 19 is a section taken along the line 19—19 of Fig. 2, showing the mounting means for the form roller.

Fig. 20 is a section taken along the line 20—20 of Fig. 2, showing the mounting means for the ductor roller.

Fig. 21 is a section taken along the line 21—21 of Fig. 20.

Fig. 22 is a fragmentary, elevational view, as seen from the works side of the machine, of the kickout or time delay mechanism.

Fig. 23 is a view similar to that of Fig. 22 but on a larger scale and showing the kickout mechanism in a different operative position.

Fig. 24 is a section taken along the line 24—24 of Fig. 22, showing certain parts of the kickout mechanism.

Fig. 25 is a fragmentary view similar to that of Fig. 24 but showing the kickout pins in a different operative position.

Fig. 26 is a fragmentary view of the kickout cam drive as viewed from the gear side of the machine.

Referring now to the drawings, and more particularly to Figs. 1 and 2, as indicated the numeral 1 indicates a feeler mechanism in the printing press section of the present machine which is designed to actuate links 2 to rotate an arm 3 which is eccentrically arranged with respect to the axis of the blanket cylinder 14 hereinafter discussed, whereby, upon failure of sheets to be supplied to the impression cylinder 15, feeler 1 will operate to move the arm 3, thus bodily moving the blanket cylinder 14 out of contact with the plate cylinder 13 and the impression cylinder 15. Such feeler mechanisms and the mode of transmitting motion therefrom to links 2 form no part of the present invention and, since many and various feeler mechanisms and motion transmitting devices may be substituted for the one presently contemplated, the details of construction and operation thereof are not here included. Suffice it therefore to point out that the operation is such that, upon failure of paper, the feeler will be actuated and through it the links 2 in such manner as to bodily move the blanket cylinder. It is to be noted that the axle of the blanket cylinder to which the arm 3 is attached is engaged by the forward end of the stop rod 210, which will be hereinafter discussed, in such manner that stoppage of the printing operation under the control of the feeler will impart motion to the rod 210 for the purposes herein to be described.

It will further be understood that various features of the printing section of the present machine as, for instance, the sheet feeding mechanism and like instrumentalities are of generally conventional form and are therefore omitted from detailed disclosure. The printing portion of the machine is generally indicated by the numeral 10 and includes side plates 11, between which are mounted the plate cylinder 13, a blanket cylinder 14 and an impression cylinder 15, together with a transfer roller 16, the printing press thus being of the offset type.

A single sheet 17 is shown in Fig. 1 in the act of transfer from the impression cylinder to the transfer roller to be picked up and operated upon by the numbering and perforating section generally indicated by the numeral 12. For the purpose of conveying the sheet 17 through the numbering and perforating portion of the machine 12, endless conveyor means is provided in the form of a pair of endless chains 18, one of which is shown in Figs. 1 and 2, there being a chain 18 on each side of the machine. Each chain 18 is led over a driven sprocket 19 and an idler sprocket 20 at the opposite end of the machine. The driven sprockets 19 are fixed to the shaft 21 of the transfer roller 16. The idler sprockets 20 are mounted on a shaft 22 which is carried by brackets 23 which are adjustably mounted on the side plate 25*a* and 25*b*. The side plates 25*a* and 25*b* constitute the main frame members of the machine. The brackets 23 are clamped in adjusted position by means of cap screws 26.

The sheets 17 are operated upon by means described hereinafter at a perforating station A to perforate the sheets longitudinally and at a transverse perforating station B to delineate the separate items, such as checks, and to make them readily detachable. Each sheet is also operated upon at a numbering station C to number each sheet or item consecutively.

For the purpose of firmly clamping the sheets 17 to the continuous conveyor means, a plurality of gripper bar assemblies 40 are provided which are fixed to and extend between the conveyor chains 18.

Referring now to Figs. 3 to 9, and more particularly to Fig. 3, each gripper bar assembly 40 comprises a pivot shaft 41 which extends between and is rotatable in brackets 42 which are mounted on the conveyor chain 18. A clamping shaft 43 forms a part of each gripper bar assembly and it extends between and is carried by the brackets 42. As will be seen, each bracket 42 is also provided with rollers 44 to ride upon a track 34 fixed to the frame of the machine (see Fig. 8). Track members 35 and 35*a* (see Figs. 8 and 9) are also provided for each chain 18.

The pivot shaft 41 is provided at one end with a cam follower roller 45 rotatably mounted at one end of an arm or lever 46, the other end of which is clamped to the pivot shaft 41. The cam follower 45 is operated in the manner and for the purpose explained hereinafter. A plurality of gripper members 47 are provided, each being mounted upon the pivot shaft 41 and, as is best shown in Fig. 5, each of the gripper members 47 comprises a split collar 48 which is rotatable on the pivot shaft 41 and is formed with a stop lug 49 and a clamping finger 50. Each finger 50 is engageable with a pin 51 carried by the clamping shaft 43 for the purpose of clamping a sheet 17. The collar 48 is formed with an ear 52. A clamp 53 is provided and is clamped to the pivot shaft 41, and it is formed with a projecting lug 54 serving as a stop member to abut the stop lug 49 and to seat one end of a compression spring 55, the other end of which bears against the ear 52 on the collar 48. It will thus be apparent that the spring 55 will urge the collar 48 and the clamping finger 50 in a counter-clockwise direction as viewed in Fig. 5 to thereby hold the finger 50 in firm engagement with the sheet 17.

One or more tie bars 60 are provided to maintain the pivot shaft 41 and the clamping shaft 43 in accurate alignment, each tie bar being disposed in abutting relation to a collar 61 which is pinned to the pivot shaft 41. A torsion spring 62 is provided which bears at one end against the clamping shaft 43 adjacent the tie bar 60, and at its other end it is fixed to a pin 63 projecting from a collar 64 which is pinned to the pivot shaft 41. It will be apparent that the torsion spring 62 will urge the pivot shaft 41 in a counter-clockwise direction as viewed in Fig. 6, to maintain all of the clamping fingers 50 in firm engagement with the stop pins 51.

As shown in Fig. 2, a tripping cam 65 is provided to engage the cam follower rollers 45 and thereby rock each pivot shaft 41 and its clamping fingers 51 in a clockwise direction, as viewed in Fig. 5, thereby releasing the sheets 17 and dropping them onto a stack D as illustrated. The cam 65 is formed with a rise 66, a dwell 67 and a recede 68 and it is adjustably mounted by means of a cap screw 69 and a slot 70. Similar cam means (not shown) are provided at the printing press to open and close the clamping fingers 51 to transfer the sheet 17 from the impression cylinder 15 to the transfer roller 16, this occurring at the tangent point of the said cylinder and roller.

Referring now to Figs. 1 and 10 to 13, the longitudinal perforating station A is provided with a plurality of perforating discs 76 formed with teeth 77 and each disc 76 cooperates with an anvil roller 78 and is rotatably mounted at one

end of an arm or lever 79. The other end of the arm 79 is rotatable on a collar 80, slidably but non-rotatably mounted on a shaft 81 which is mounted in and extends between the side plates of the machine. Each collar 80 is formed with a bifurcated arm 85 and an expansion spring 86 is provided which is received in a socket 87 formed in the arm 79 and bears at one end against one fork of the arm 85. The compression of spring 86 is adjusted by means of a screw 88. It will be seen that the arm 79 is yieldably urged in a clockwise direction, as viewed in Fig. 11, to hold the perforating disc 76 in abutting relation to the anvil roller 78, and that a certain amount of play is allowed, the degree of which is controlled by means of an adjustment screw 89 and a lock nut 90. The purpose of this play and adjustability is to provide for sheets of different thicknesses. Thus, it is important to hold the perforated discs 76 in firm abutting relation with the anvil rollers 78 and to allow a greater amount of play for thick sheets than for thin sheets.

The anvil rollers 78 are keyed to an anvil roller shaft 100, which is journalled in the side plates of the machine, and each of the anvil rollers is formed with a clearance notch 101 to clear the gripper bar assemblies 40. Means are also provided for periodically pivoting the longitudinal perforating discs 76 away from the anvil roller 78 so as to hold the discs in position during the period when the notches 101 are in alignment with the discs. This means comprises a cam 102 adjustably fixed, as by means of cap screws 103 and slots 104, to the hub of a gear 321 which is fixed to the anvil shaft 100. The cam 102 is formed with a high dwell 106 and a low dwell 107 and it actuates a cam follower roller 108 rotatably mounted at one end of lever 109, the other end of which is fixed to the pivot shaft 81. A compression spring 111 seated at one end against the arm 109 and at the other end in a frame bracket 110 serves to maintain the cam follower roller 108 in contact with the cam 102, and its compression is adjustable by means of a cap screw 112 and a lock nut 113.

It will be seen that as the cam 102 rotates, it will periodically rock the arm 109 in a counterclockwise direction, as viewed in Fig. 12, thus rocking the perforating discs 76 away from their corresponding anvil rollers 78, such movement being timed to align with notches 101 in the anvil roller 78.

Referring now to Figs. 14, 15 and 16, the transverse perforating station B is provided with a transverse perforator 120 mounted on a shaft 121, and an anvil roller 122 mounted on trunnions 123, the shaft 121 and trunnions 123 being journalled in the side plates of the machine. The anvil roller is formed with a recess 122*a* to clear the gripper bar assemblies. The transverse perforator 120 comprises a longitudinally extended, slotted carrier member 124, which is keyed at 124*a* to collars 125, which are locked to the shaft 121. A transverse perforator blade 126 having teeth 127 and a spacer 127*a* are seated in carrier member 124 and are fixed in suitably adjusted position by means of set screws 128. Clamps 129 are provided at opposite ends of the perforator 120 and are fixed to the carrier member 124 by means of cap screws 130. Cap screws 131 are also provided, as illustrated, to provide support for the transverse perforator along its length so that it will lie parallel to the axis of the shaft 121.

For the purpose of holding the sheets 17 in firm engagement with the anvil roller 122, a triangular-shaped suction box 135 having suction openings 136 is provided (see Fig. 1). The suction box 135 is provided with a suction conduit 136 through which a suitable suction is maintained.

Referring now to Figs. 2 and 16, the numbering station B is provided with a plurality of numbering reels 145 mounted on a numbering shaft 146. Each numbering reel 145 comprises a collar 147 having a clearance recess 147*a*, and a pair of numbering machines 148 clamped to the collars as by means of a dovetail connection 149. The numbering machines 148 are of known construction, and they comprise tumblers 150 and a cam follower 151, which is actuated by means of a cam 152 fixed to a cam shaft 153 which is pivotally mounted in the manner explained hereinafter. As is well known in the art, as the numbering shaft 146 rotates, first one and then the other of the cam followers 151 of each of the numbering machines 148 contacts the cam 152, having a rise 154 and a recede 155. Each time the follower contacts the cam, the numbering machine is changed one count and thereby consecutively numbers the sheets 17, or checks or other individual items printed thereon. It will be understood, of course, that as many numbering reels 145 are mounted on the numbering shaft 146 as desired; e. g., as many as there are rows of checks printed on the sheets 17.

The numbering reels 145 cooperate with an impression cylinder 158 having trunnions 159. The impression cylinder 158 is formed with a longitudinal recess 158*a* and it is provided with a blanket 161 clamped at one end at 162 within the recess 158*a* and at its other end in a slotted shaft 163 also located in the recess 158*a*. Means is thus provided for tightening and firmly clamping the blanket 161 on the cylinder 158. As in the case of the transverse perforator assembly, suction means is provided in the form of a triangular-shaped suction box 164 having suction holes 164*a* and fitted with a suction tube 165.

For the purpose of inking the tumblers 150 of the numbering machines, an inking assembly 170 is provided which is shown in vertical mid-section in Fig. 2. As there shown, the inking assembly 170 comprises an ink fountain 171 and an ink fountain roller 172 which transfers ink from the ink fountain to a ductor roller 173. The ductor roller 173 is mounted in the manner explained hereinafter to oscillate between the ink fountain roller and a vibrator roller 174 which rotates and also oscillates axially to transfer ink to a form roller 175, which inks the tumblers 150.

The vibrator roller 174 is rotated about its longitudinal axis and is also oscillated axially by the means shown in Figs. 17 and 18. Referring now to these figures, and more particularly to Fig. 17, it will be seen that the vibrator roller 174 is formed with trunnions 176 which are journalled in bushings 177 mounted in the side plates of the machine. One of the trunnions 176, as shown in Fig. 17, is provided near its outer end with a driving gear 178 for rotating the vibrator roller and at its outermost end thus trunnion carries a guide bracket 179 which is bifurcated at its upper end to slidably receive a guide pin 180 fixed to the frame of the machine. The other or lower end of the bracket 179 is provided with a cam follower roller 181 which is received in a cam groove 182 formed in a cam 183 which is mounted on the hub 184 of a gear 185. The gear 185 is rotatably mounted on a stub shaft 186. It will thus be apparent that as the gears 178 and

185 rotate, the vibrator roller 174 will rotate about its axis and will also oscillate axially.

Referring now to Figs. 20 and 21, the ductor roller 173 is formed at its ends with trunnions 190, each of which is received within a bushing 191 having a knurled head 191a. Each bushing 191 is mounted in one end of an arm or lever 192, the other end of which is fixed to a ductor pivot shaft 193, which is journalled in the side plates of the machine. As will be seen from an inspection of Fig. 21, each bushing 191 is formed with an opening 194 and the corresponding arm 192 is formed with an opening 195. The bushing 191 is also formed with a peripheral groove 196 to receive a set screw 197 which serves to clamp the bushing to the arm 192. Means are thus provided for pivotally mounting the ductor roller 173 and for readily mounting and demounting the same; thus, by loosening the set screws 197 and rotating the bushings 191 to bring the openings 194 and 195 into alignment, the trunnions 190 and the ductor roller 173 can be readily lifted out of their mounting, and they can be as readily remounted.

The mounting of the form roller 175 and its trunnion 200 is similar, except that the pivotal mounting is only for the purpose of adjustment relatively to the numbering reels. Thus a mounting bracket 201 is fixed to a pivot screw 202 which is rotatable in the frame of the machine, and an eccentric 203 and a cap screw 204 are provided to pivot the form roller about the axis of the pivot screw 202. The form roller is clamped in adjusted position by tightening the screw 204.

A time delay or kickout mechanism is also provided for inactivating the numbering assembly in the event that a sheet 17 is missed in the printing press. In the preferred construction there is a four-sheet lag between the point of tangency of the blanket roller 14 and impression roller 15 of the printing press (see Fig. 1) and the point of tangency of the numbering assembly (see Fig. 2). It is, therefore, desirable to actuate the time delay or kickout mechanism four sheets subsequent to a gap in the printing press, thereby numbering each sheet printed in the printing press and keeping accurate count. The means for achieving this object will now be described, with particular reference to Figs. 22 to 25.

Referring now to these figures and to Fig. 1, a kickout shaft 210 is provided which is connected at one end at 211 to a plate arm 3 mounted on the blanket cylinder 14 as hereinbefore described and is thus actuated by the feeler 1. Thus, whenever a sheet 17 is missing, the blanket cylinder is moved away from the impression cylinder so as not to ink the face thereof. When this occurs the shaft 210 is shifted to the left as viewed in Figs. 1, 22 and 23.

The other end of the kickout rod 210 is connected at 213 to an arm 214 of a bell crank lever 215, which is fulcrumed on a pin 216 mounted in the frame of the machine. The other arm 217 of the bell crank 215 is formed at its outer end with a lug or cam 218. Normally, that is, while the blanket cylinder 14 is in contact with sheet 17, the rod 210 holds the lug 218 in the path of travel of arms 219 of latch levers 220 (as shown in Fig. 23). Each latch lever 220 is fulcrumed at 221 on a disc 222, and a biasing spring 223 is provided for each lever 220, being pinned to the disc 222 at 224 and at 225 to the other arm 226 of the latch lever 220. Each latch lever 220 is also formed with a nose 230 which is engageable with grooves 231 formed in pins 232 which are slidably mounted in the disc 222 (see Fig. 25). Each of the pins 232 is formed with a head 232a and a compression spring 233 is provided which is compressed between the head 232a and the disc 222, so as to urge the pin 232 to the right as viewed in Fig. 25. As will be seen, a cam plate 235 is provided which is fixed to the frame of the machine, and the rounded head 232a of each pin 232 rides up a cam groove or track 234 formed in the cam plate 235 during each revolution of the disc 222. The disc 222 is fixed to a shaft 236 to which is fixed a large gear 237 meshing with a small gear 238 fixed to the numbering shaft 146. The gear ratio between the large gear 237 and the small gear 238 is one-to-four, so that the small gear 238 rotates four revolutions per revolution of the large gear 237. As illustrated, there are four of the pins 232, so that one revolution of the numbering shaft 146 rotates the disc 222 through 90° or the distance between two pins 222.

Rotation of the shaft 236 and the disc 222 is counterclockwise as viewed in Fig. 23, and it will be seen that each time a pin 232 rides up the cam track 234, it will be urged to the left or to an advanced position, as viewed in Fig. 25, so that its latch lever 220 is free to rock its nose 230 radially inwardly of the groove 231, thereby latching the pin in the advanced position illustrated by the upper pin in Fig. 25. However, as the disc 222 continues to rotate, the lug 218 on bell crank lever 215 will engage the arm 219 on the latch lever 220 and will thereby trip the latch lever 220 to disengage the pin 232. The latter will, therefore, immediately move to the right-hand or retracted position illustrated by the lower pin in Fig. 25. In this retracted position, the pin 232 will clear a lever 245 which may be considered as a stop lever. The lever 245 is urged counterclockwise as viewed in Figs. 22 and 23 by a spring 245a and it is formed with an arm 246 having a notch 247 at its upper end. The lever 245 is fulcrumed on a pin 248 mounted on the frame of the machine. The other arm 249 of the lever 245 is provided at its outer end with a pin 250 which slidably receives a rod 251. The rod 251 is free to slide through the pin 250 except that such movement is yieldably opposed by compression springs 252 and clamping collars 253, as illustrated. The rod 251 is pivotally connected at 254 to a lever 255, the lower end of which is pivotally mounted at 256 on a lever 257 which is fulcrumed at 258 on the frame of the machine. A tension spring 259 connected to the lever 257 at 260 and at 259a to the frame of the machine urges the lever 257 downwardly so that a cam follower roller 262 mounted on the pivot pin 256 is maintained in engagement with a kickout cam 263 having a high point 263a. The cam 263 is adjustably fixed to a continuously rotating cam shaft 264 which is caused to rotate continuously and at the rate of the numbering shaft 146, by means of a chain 265 which is led over a sprocket 268 fixed to the cam shaft, a sprocket 266 fixed to the transverse perforator shaft 121 and a take-up sprocket 267 which is adjustably mounted on the frame of the machine (see Figs. 14 and 26).

The lever 255 is formed at its upper end with a pair of notches 271 and 272, the notch 271 being engageable with a pin 273 and the notch 272 with a pin 274, depending upon the angular position of the lever 255. The pins 273 and 274 are fixed to and project from a link 275 rotatable on a pin 275a fixed to the frame of the machine.

The link 275 is pivotally connected at 276 to one end of a lever 277, the other end of which is fixed to a pivot shaft 278.

As is shown in Figs. 22 and 23, the pivot shaft 278 is operatively connected to the impression cylinder 158 of the numbering station C, through the medium of a lever 279 fixed to the pivot shaft, an adjustable link 280 pivotally connected at 281 to the lever 279 and a lever 282 pivotally connected at 283 to the link. The trunnions 159 of the impression roller 158 are eccentrically journalled in the hub of lever 282. The pivot shaft 278 is also operatively connected with the numbering cams 152 through the medium of levers 284 which are fixed at one end to the pivot shaft 278 and at the other end to the cam shaft 153 (see Fig. 2). It will, therefore, be apparent that when the pivot shaft 278 is rotated in counter-clockwise direction as viewed in Figs. 1 and 22, the impression cylinder 158 will be rocked out of contact with the numbering reels 145 and the numbering cams 152 will be rocked out of contact with the cam followers 151 which actuate the tumblers 150. Consequently, the numbering assembly will be inactivated and procession of the numbering machine will be interrupted such that, when the pivot shaft 278 is rotated clockwise to reactivate the numbering assembly, the counting will be resumed at the next succeeding number.

It is also desirable to inactivate the inking assembly 170 where the numbering assembly is inactivated. This is accomplished in the following manner. As shown in Fig. 22, the ductor pivot shaft 193 is provided with a lever 291 which is fixed thereto and which has an arm 292 connected at 293 to a tension spring 294 which is connected at 295 to the frame of the machine. The lever 291 has another arm 296 on the end of which is rotatably mounted a cam follower roller 297. The spring 294 normally maintains the roller 297 in contact with a cam 298 fixed to the constantly rotating fountain roller shaft or trunnion 299. The cam 298 has a high dwell 305 which pivots the ductor roller 173 toward the ink fountain roller 172 and away from the vibrator roller 174 (see Fig. 2). The low dwell 306 of the cam 298, of course, allows the ductor roller to pivot oppositely to contact the form roller. During normal operation of the inking assembly, the ductor roller 173 is, therefore, oscillated between the ink fountain roller and the form roller to transfer ink from the former to the latter.

It will be seen that the lever 291 is formed with a third arm 307 which is engageable with a lever 308 fixed to the pivot shaft 278. It will, therefore, be apparent that when the pivot shaft 278 is rocked counter-clockwise (as shown in dash lines in Fig. 22) to inactivate the numbering assembly, the lever 308 will engage the arm 307 to rock the ductor roller 173 away from the form roller 174 and to maintain it in such position, thereby preventing excesive inking of the tumblers 150 while they are inactivated.

The various elements of the machine are driven in the following manner. Referring to Fig. 1, a driving gear 315 is fixed to a driving shaft 316 which is constantly rotated by the printing press 10 at a constant rate relative to the speed of the press. A gear train consisting of the driving gear 315, gears 317 and 318 on a shaft 319 and a gear 320 on the longitudinal perforator shaft 100, drives the longitudinal perforator anvil rollers 78. A gear 321 on the outer, right-hand end of the longitudinal perforation shaft (see Figs. 10 and 12) drives an idler gear 322 on a stub shaft 323 which drives a gear 324 fixed to the transverse perforator shaft 121 (see Figs. 1 and 14). A mating gear 325 on one of the anvil roller trunnions 123 drives the anvil roller 122. As explained above, the kickout cam 263 is driven by chain and sprocket means including the sprocket 266 fixed to the transverse perforator shaft.

Referring to Figs. 1, 2, 14 and 16, the numbering reels 145 are driven by an idler gear 330 on a stub shaft 331 which meshes with the gear 324 and with a gear 332 fixed to the numbering shaft 146. A mating gear 333 fixed to a trunnion 159 of the impression cylinder 158 serves to drive the latter.

Referring now to Figs. 17 and 18, gear 335, also shown in Fig. 16, is fixed to one end of the numbering shaft 146 and drives the gear 185 which oscillates the vibrator roller 174 in the manner explained above. A gear 336 on the opposite end of the hub 184 drives an idler 337 which drives a gear 338 fixed to a shaft trunnion 299 of the ink fountain roller 172. The gear 338 also meshes with the gear 178 fixed to trunnion 176 of the vibrator roller 174. The ductor roller 173 and the form roller 175 are driven by friction with their cooperable rollers, and the ductor roller 173 is oscillated by rotation of the ink fountain roller 172 in the manner described above.

Operation of the machine will be apparent from the discussion above and need not be described again in detail. The conveyor chains 18 move continuously and the various rotating elements such as the longitudinal perforator shaft 100, the transverse perforator shaft 121 and anvil roller 122, and the numbering shaft 146 and impression cylinder 158 also rotate continuously. The gripper bar assemblies 40 open and close at timed intervals to receive, grip and release the sheets 17 in the manner described above.

The time delay or kickout mechanism is inactive during normal operation, that is, while sheets 17 are proceeding through the printing press 10 and the numbering and perforating machine 12 at properly spaced intervals. When, however, a sheet is missed, the blanket cylinder 14 is caused to pivot out of contact with the impression cylinder 15 of the printing press, this being caused to occur in a known manner. This movement actuates the kickout rod 210 to cause the lever 215 to move out of the path of latch levers 200. The next succeeding pin 232 which rides up the cam groove 234 (see Figs. 24 and 25) thereby remains latched in the advanced position. When the latched, advanced pin 232 reaches the lever 245, it will rock the lever 245 in clockwise direction as viewed in Fig. 23, thereby rocking the notched lever 255 from right (as shown in Fig. 22) to left (as shown in Fig. 23).

The gear ratio between gear 237 (which drives the disc 222 and the pins 232) and gear 238 (which is driven by the numbering shaft 146 and, therefore, rotates at press speed) is one-to-four. Accordingly, a 90° rotation of the disc 222, corresponding to the distance between two adjacent pins 232, occurs during each revolution of the numbering shaft. It will therefore be apparent that the numbering shaft 146 will rotate four times, corresponding to four sheets 17, between the time that the kickout rod 210 is actuated and the time that a pin 232 strikes the lever 245 and thereby actuates the kickout mechanism. This corresponds to a four-sheet lag

between the point of tangency of the blanket and impression cylinders 14 and 15 of the press 10 and the point of tangency of the numbering reels 145 and the impression roller 158. Obviously, a different gear ratio between gears 237 and 238 and a different number of pins 232 will be employed in a machine having a different lag between the printing press and the numbering machine.

Assuming that only one sheet 17 is missing, the levers 245 and 255 will be actuated in the manner described, and the high point 263a of cam 263 (which rotates at press speed) will elevate the lever 255 at the proper instant to seat its notch 271 on the pin 273, thereby rocking the link 275 clockwise and the lever 277 counterclockwise to the position shown in broken lines in Fig. 23. This will rotate the pivot shaft 278 counterclockwise, thereby rocking the impression cylinder 158 out of contact with the numbering reels 145, rocking the numbering cams 152 out of the path of travel of the cam followers 151 and holding the ductor roller 173 out of contact with the ink fountain roller 172, these operations being accomplished in the manner described above.

Still assuming that only one sheet 17 is missing, only one of the pins 232 will have been latched in advanced position; before the next pin passes the lug 218 on lever 215, the latter will have been rocked back into the path of travel of the pins to unlatch the next pin. Hence, when the latched pin corresponding to the missing sheet has passed the lever 245, it will return to its normal position under the urging of spring 245a and on its next cycle the cam 263 will urge the lever 255 upwardly to engage its notch 272 with the pin 274 on link 275. This, of course, will act to restore the impression cylinder, the numbering cams and the ductor roller to their normal, operating positions.

Assuming now that several consecutive sheets 17 are missing, the lug 218 on lever 215 will remain clear of the latch levers 220; consequently, the pins 232 will remain latched. The link 275 and lever 277 will remain in the up positions shown in broken lines in Fig. 23, and oscillation of the lever 255, caused by the cam 263, is timed to occur so that the lever does not engage the return pin 274. Therefore, the various operating elements controlled by the kickout mechanism will remain inactive as long as sheets 17 are missing at the numbering station.

It will therefore be apparent that a machine is provided which is capable of use in conjunction with a printing press to consecutively number and to perforate sheets of paper or individual items printed thereon. This machine embodies numerous advantageous features which provide smooth, continuous and rapid operation, and it also embodies a time delay mechanism which accomplishes a "no-sheet-no-number" function. This time delay mechanism operates automatically in response to a condition at a remote point, to inactivate the numbering elements at precisely the right time and as long as the condition exists, and to return the numbering elements to an operative state when the condition ceases to exist.

While we have shown the preferred form of our invention, it is to be understood that various changes may be made in its construction by those skilled in the art without departing from the spirit of the invention as defined in the appended claims.

Having thus described our invention, what we claim and desire to secure by Letters Patent is:

1. In a device of the character set forth an impression cylinder, a bodily movable blanket cylinder, a feeler for said impression cylinder movable in response to failure of feed of material to be printed to said impression cylinder, means operable upon such movement of the feeler to bodily move said blanket cylinder away from the impression cylinder, a numbering mechanism for numbering material fed thereto from the impression and blanket cylinders including bodily rotatable numbering devices, a bodily movable inking roller movable to and from the path of movement of said devices, a number changing means movable to and from the path of travel of said devices, and means operable upon movement of said blanket cylinder for moving said inking roller and said number changing means from the path of travel of said devices.

2. A device of the class described, comprising a printing roller and an impression roller cooperable for successively printing a series of sheets, means for rotating the printing and impression rollers, means operable by the presence or absence of a properly fed sheet to the rollers for automatically throwing the printing roller on or off the impression roller, a numbering device, means for conveying sheets from the printing roller to the numbering device, means for driving the numbering device and conveying means in timed relation to rotation of the rollers, and means for terminating the operation of the numbering device in delayed timed relation to throwing off of the printing roller, comprising a trip mechanism actuated by the second named means and a delaying rotary timer, arranged to be tripped by the trip mechanism and being driven by a step-down drive from the numbering device and being operable when tripped to terminate operation of the numbering device after a period of time proportional to the step-down ratio of the step-down drive.

3. A device of the class described, comprising a printing roller and an impression roller cooperable for successively printing a series of sheets, means for rotating the printing and impression rollers, means operable by the presence or absence of a properly fed sheet to the rollers for automatically throwing the printing roller on or off the impression roller, a numbering device, means for conveying sheets from the printing roller to the numbering device, means for driving the numbering device and conveying means in timed relation to rotation of the rollers, and means driven by the numbering device by a step-down drive operably connected to the second named means to be actuated by second-named means and operable when actuated to terminate the numbering operation after the passage of a period of time proportional to the step-down ratio of the step-down drive.

4. A device of the class described, comprising a printing roller and an impression roller cooperable for successively printing a series of sheets, means for rotating the printing and impression rollers, means operable by the presence or absence of a properly fed sheet to the rollers for automatically throwing the printing roller on or off the impression roller, a numbering device, means for conveying sheets from the printing roller to the numbering device, means for driving the numbering device and conveying means in timed relation to rotation of the rollers, and means for terminating the operation of the num-

bering device and subsequently initiating operation of the numbering device in delayed time relation to throwing off or on of the printing roller, comprising a trip mechanism directly actuated by the second named means and a delaying rotary timer arranged to be actuated two different ways by the trip mechanism and driven by a step-down drive by the numbering device, and being operable when actuated one way to terminate operation of the numbering device after the passage of a period of time proportional to the step-down ratio of the step-down drive and being operable when actuated to initiate operation of the numbering device after the passage of a period of time proportional to the step-down ratio of the step-down drive.

5. A stop mechanism comprising a feeler operable to be moved upon the absence of an article to be detected, a cam operated by the feeler upon actuation of the feeler to move from a first position to a second position, a rotary member adjacent the cam, means for rotating the rotary member, a stop lever for stopping a desired mechanism, stop-lever actuating means on the rotary member carried thereby into engagement with the cam upon each revolution of the member, to be actuated thereby to be rendered incapable of actuating the stop lever, but adapted to be disposed in a position to actuate the lever when the cam is moved to its second position out of the path of travel of said stop-lever actuating means, and means for resetting the stop-lever actuating means after said means has passed the stop lever.

6. A stop mechanism comprising a feeler operable to be moved upon the absence of an article to be detected, a cam operated by the feeler upon actuation of the feeler to move from a first position to a second position, a rotary member adjacent the cam, means for rotating the rotary member, a stop lever for stopping a desired mechanism, stop-lever actuating means on the rotary member carried thereby into engagement with the cam upon each revolution of the member, to be actuated thereby to be rendered incapable of actuating the stop lever, but adapted to be disposed in a position to actuate the lever when the cam is moved to its second position out of the path of travel of said stop-lever actuating means, said lever and cam being angularly spaced around said member whereby there is a timed sequence between the operation of the cam and the actuation of the lever by said stop-lever actuating means, and means for resetting the stop-lever actuating means after said means has passed the stop lever.

7. In a printing and numbering machine, a printing roller and a numbering device, a stop mechanism comprising a feeler for said roller adapted to be actuated upon the absence of material to be printed to be fed to said roller, a cam operated by the feeler upon actuation of the feeler to move from a first position which it normally occupies, to a second position, a rotary member adjacent the cam, means for rotating the rotary member, a stop lever for stopping the numbering device, and stop-lever actuating means on the rotary member carried thereby into engagement with the cam during each revolution of the rotary member, to be actuated thereby, to be rendered incapable of actuating the stop lever, but being disposed in a position to actuate the lever when the cam moves to its second position out of the path of travel of the means to enable said stop-lever actuating means to engage said stop lever and stop said numbering device.

8. In a printing and numbering machine, a printing roller and a numbering device, a stop mechanism comprising a feeler for said roller adapted to be actuated upon the absence of material to be printed to be fed to said roller, a cam operated by the feeler upon actuation of the feeler to move from a first position which it normally occupies, to a second position, a rotary member adjacent the cam, means for rotating the rotary member, a stop lever for stopping the numbering device, and stop-lever actuating means on the rotary member carried thereby into engagement with the cam during each revolution of the rotary member, to be actuated thereby, to be rendered incapable of actuating the stop lever, but being disposed in a position to actuate the lever when the cam moves to its second position out of the path of travel of the means to enable said stop-lever actuating means to engage said stop lever and stop said numbering device, said lever and cam being angularly spaced around said member whereby there is a timed sequence of the operation of the cam and the actuation of the lever by said lever actuating means.

9. In a device of the character set forth, an impression cylinder, a bodily movable blanket cylinder, a feeler for said impression cylinder, movable in response to failure of feed of material to be printed to said impression cylinder, means operable in response to movement of the feeler to bodily move said blanket cylinder away from the impression cylinder, a numbering mechanism for numbering material fed to the numbering mechanism from the impression and blanket cylinders, and including bodily rotatable numbering devices, a bodily movable inking roller, movable to and from the path of movement of said devices, number-changing means movable to and from the path of travel of said devices, and a delaying rotary timer means operable in response to movement of said blanket cylinder for moving, after a predetermined delay period, said inking roller and said number-changing means from the path of travel of said devices.

10. In a device of the character set forth, an impression cylinder, a bodily movable blanket cylinder, a feeler for said impression cylinder, movable in response to failure of feed of material to be printed to said impression cylinder, means operable in response to movement of the feeler to bodily move said blanket cylinder away from the impression cylinder, a numbering mechanism for numbering material fed to the numbering mechanism from the impression and blanket cylinders, and including bodily rotatable numbering devices, a bodily movable inking roller, movable to and from the path of movement of said devices, number-changing means movable to and from the path of travel of said devices, a delaying rotary timer means operable in response to movement of said blanket cylinder for moving, after a predetermined delay period, said inking roller and said number-changing means from the path of travel of said devices, said rotary delaying timer means comprising a cam operated by the feeler upon actuation of the feeler, to move from a first position which it normally occupies to a second position, a rotary member adjacent the cam, means for rotating the rotary member, a stop lever, stop-lever actuating means on the rotary member carried

thereby into engagement with the cam during each revolution of the rotary member, to be actuated thereby to be rendered incapable of engagement with the stop lever, but being engageable with the stop lever whenever the cam is moved to its second position by operation of the feeler, to engage said stop lever, and means operatively connecting said stop lever to said inking roller and number-changing means for moving the same upon operation of the stop lever.

11. In a device of the character set forth, an impression cylinder, a bodily movable blanket cylinder, a feeler for said impression cylinder, movable in response to failure of feed of material to be printed to said impression cylinder, means operable in response to movement of the feeler to bodily move said blanket cylinder away from the impression cylinder, a numbering mechanism for numbering material fed to the numbering mechanism from the impression and blanket cylinders, and including bodily rotatable numbering devices, a bodily movable inking roller, movable to and from the path of movement of said devices, number-changing means movable to and from the path of travel of said devices, a delaying rotary timer means operable in response to movement of said blanket cylinder for moving, after a predetermined delay period, said inking roller and said number-changing means from the path of travel of said devices, said rotary delaying timer means comprising a cam operated by the feeler upon actuation of the feeler, to move from a first position which it normally occupies to a second position, a rotary member adjacent the cam, means for rotating the rotary member, a stop lever, stop-lever actuating means on the rotary member carried thereby into engagement with the cam during each revolution of the rotary member, to be actuated thereby to be rendered incapable of engagement with the stop lever, but being engageable with the stop lever whenever the cam is moved to its second position by operation of the feeler, to engage said stop lever, and means operatively connecting said stop lever to said inking roller and number-changing means for moving the same upon operation of the stop lever, said lever and cam being angularly spaced around said rotary member, whereby there is a timed sequence between the operation of the cam and the action of the lever.

12. In a printing and numbering apparatus a bodily movable printing roll, a bodily movable inking roll, impression means normally in contact with said printing roll, said printing roll and impression means adapted to print on material fed thereto, numbering means normally movable for periodic contact with said inking roll and adapted to number material fed thereto from the printing roll and impression means, a feeler for said impression means movable in response to failure of feed of material to be printed to said impression means to bodily move both of said rolls, said means being operable to move said printing roll in timed sequence with respect to the movement of said inking roll and including a rotatable member, a stop lever adapted when actuated to cause bodily movement of said rolls, movable means on said member movable to and from a stop lever engaging position, a cam movable to and from the path of travel of said movable means under control of said feeler so as to dispose the movable means in its stop lever engaging position when the feeler is actuated by the failure of feed of material to said impression means, and means for advancing the numerals printed by said numbering means, said numbering means being inactivated by said stop lever when the stop lever is actuated.

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