

March 1, 1966

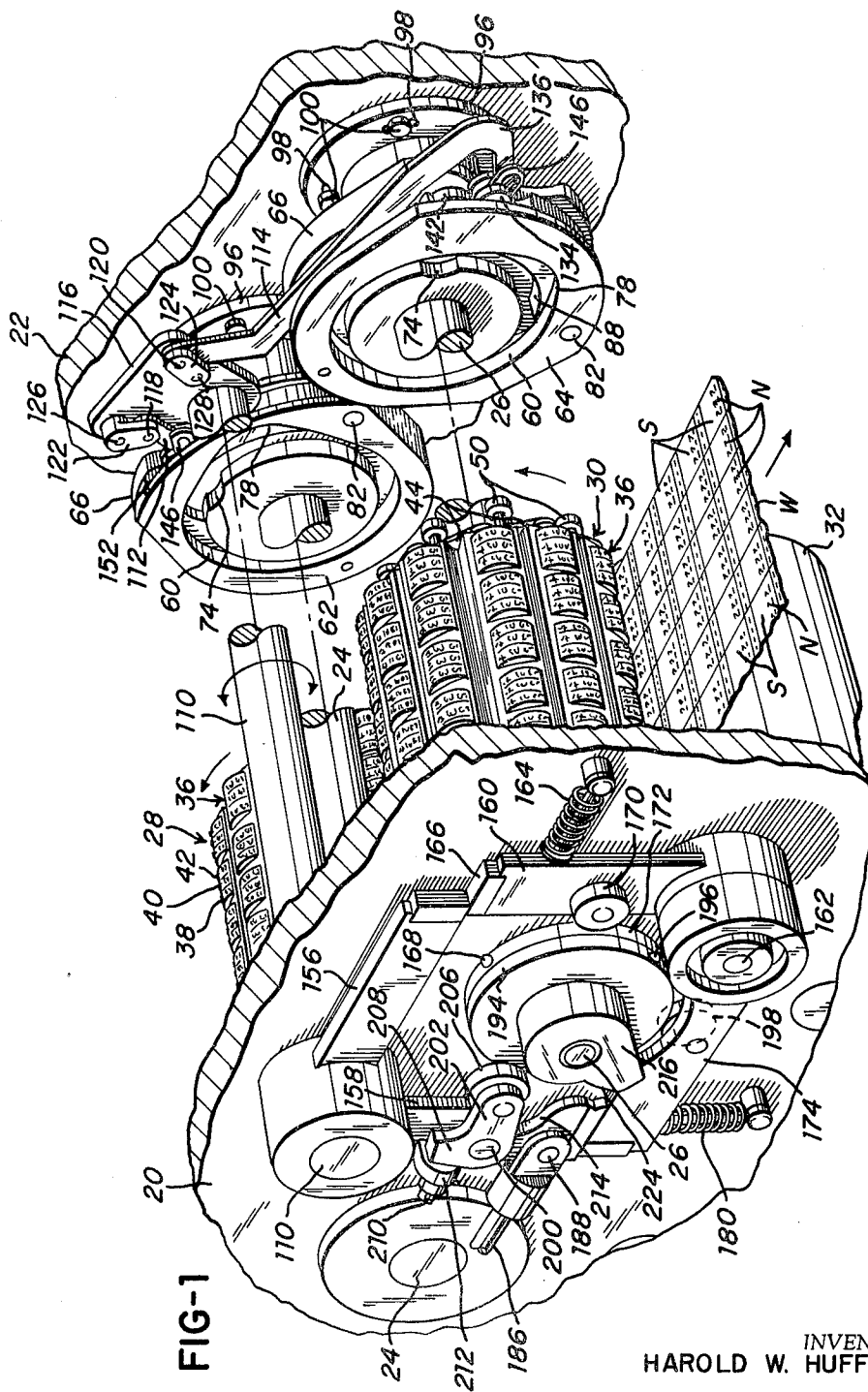
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3,237,556

PRINTING PRESS MECHANISM

Filed Jan. 29, 1964

6 Sheets-Sheet 1



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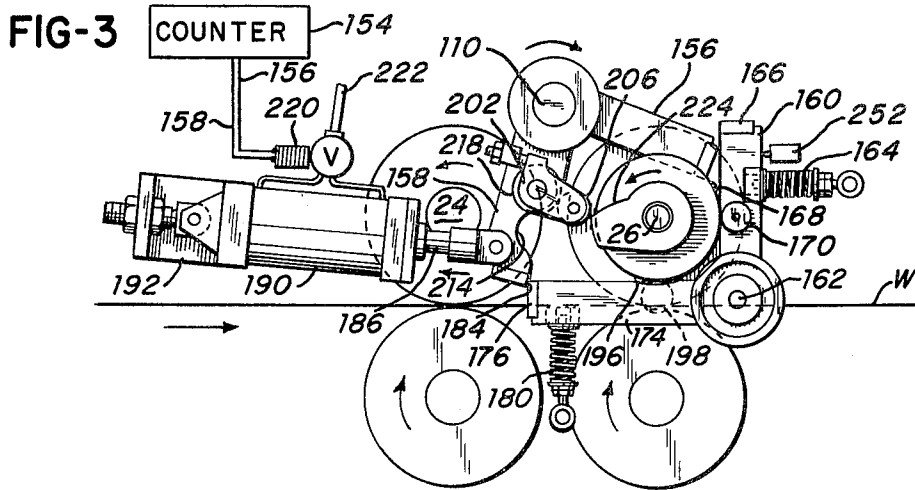
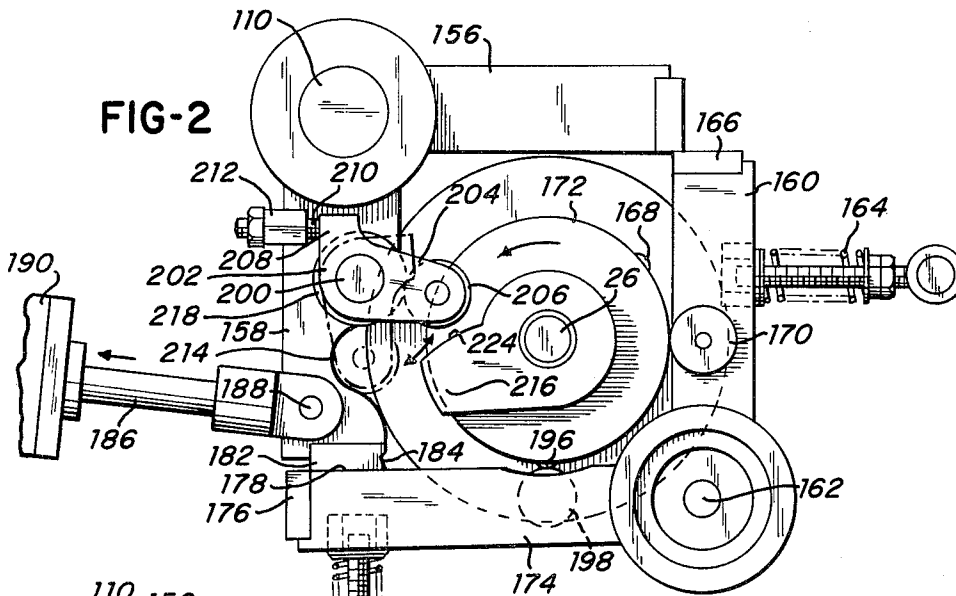
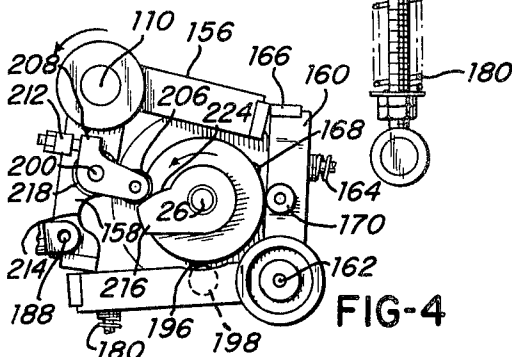
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PRINTING PRESS MECHANISM

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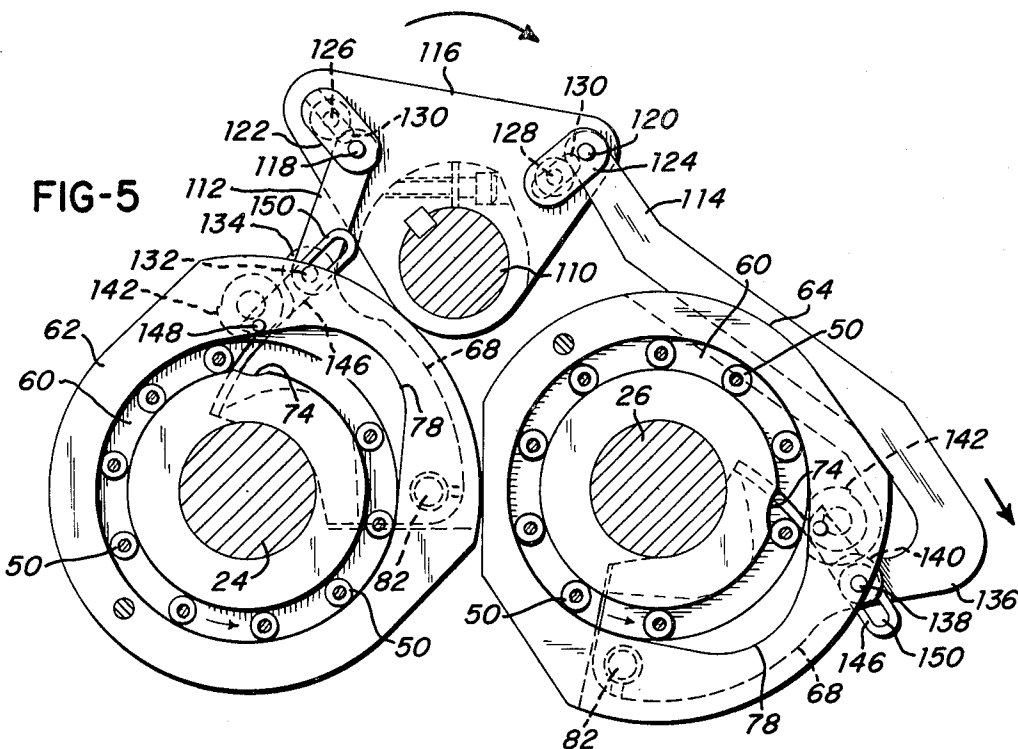
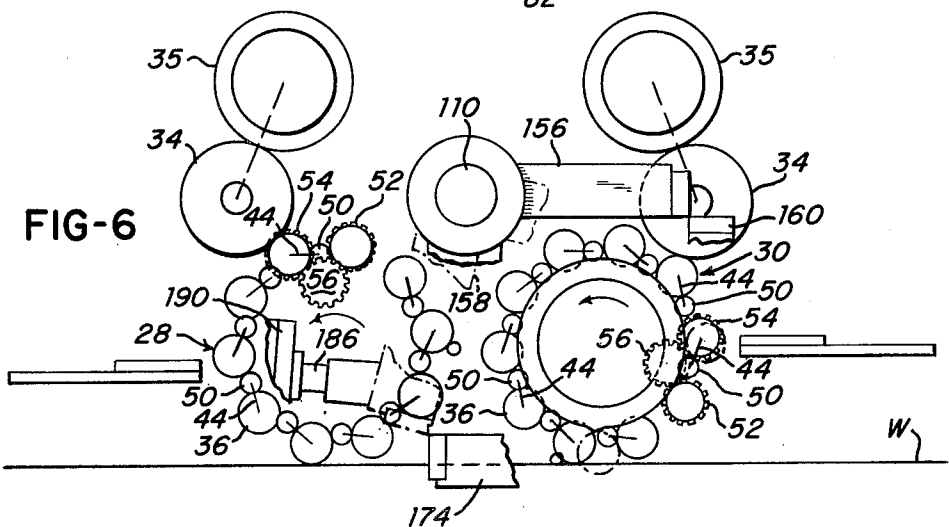
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PRINTING PRESS MECHANISM

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6 Sheets-Sheet 3



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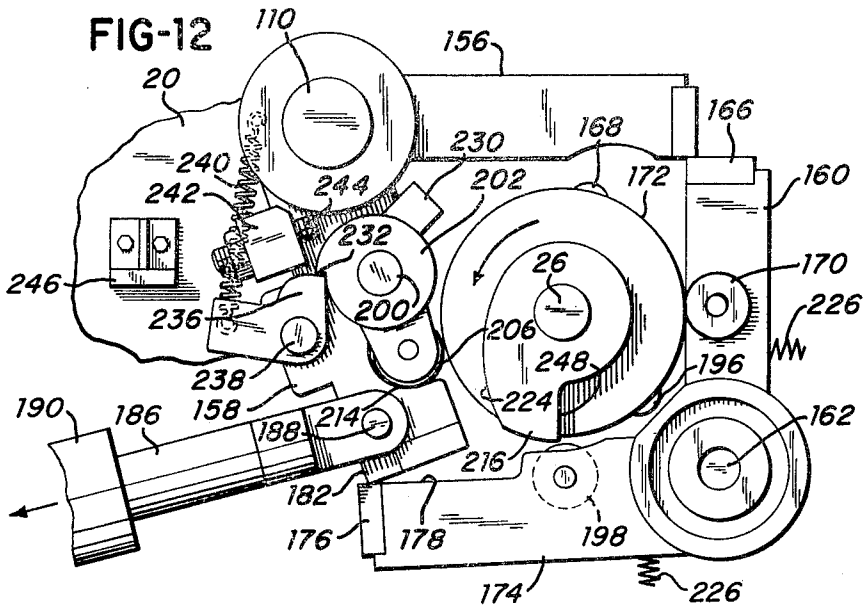
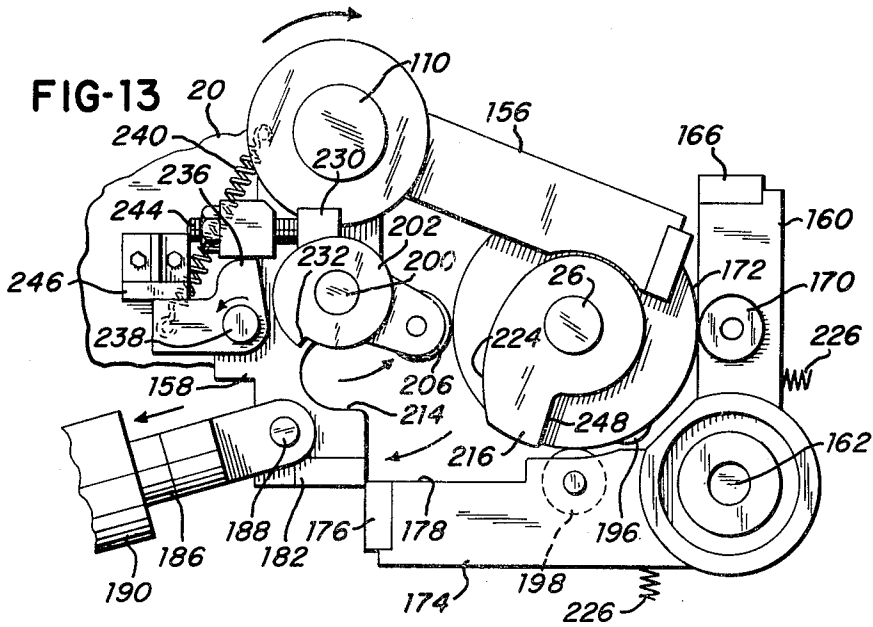
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H. W. HUFFMAN
PRINTING PRESS MECHANISM

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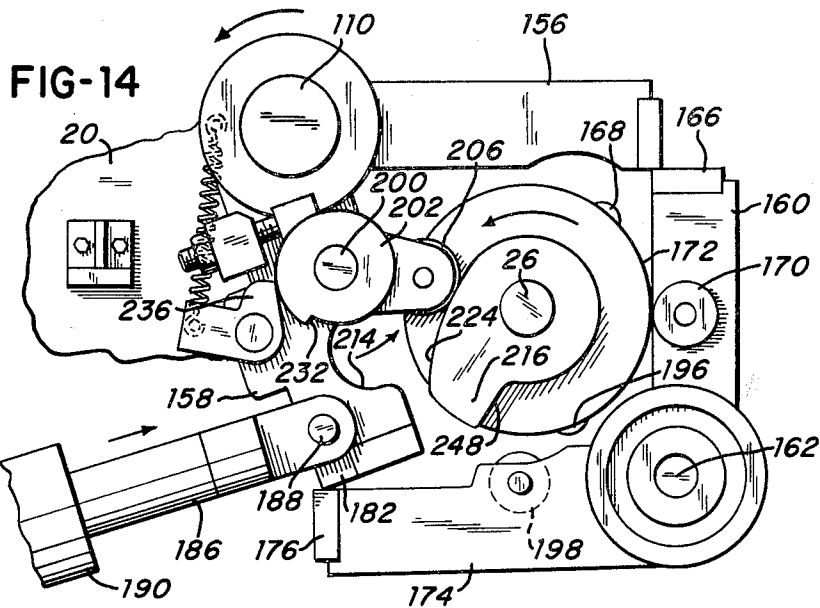
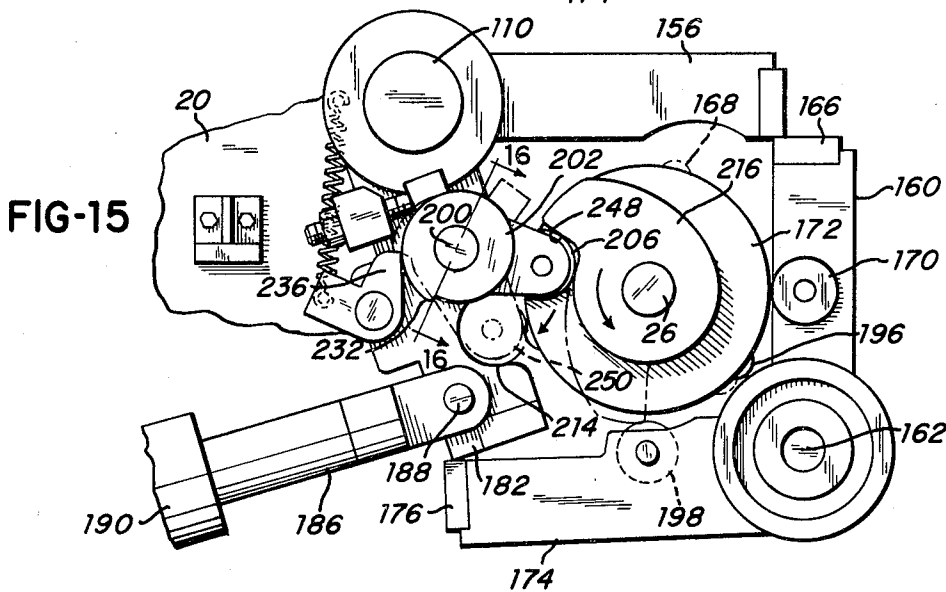
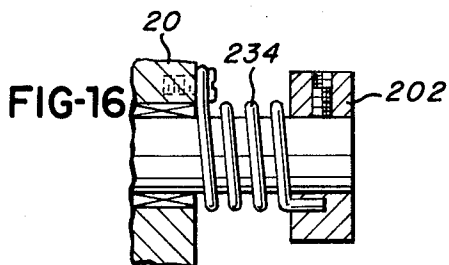
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6 Sheets-Sheet 6



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PRINTING PRESS MECHANISM

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18 Claims. (Cl. 101—77)

The present invention relates to a numbering mechanism and method such as might be used for printing identification numerals upon trading stamps or the like while the stamps are in sheet formation. Such stamps in manufacture are usually produced by advancing a paper web of indeterminate length through a rotary printing machine, which prints the stamps in rows and columns, and perforates the web lengthwise and crosswise to define the individual stamps. The basic procedure may be the same as is employed in producing postage stamps, for example.

In the case of trading stamps and perhaps other kinds of stamps, it is considered desirable to run the printed webs at high speed through a numbering mechanism, which imprints identifying numbers on the stamps. This procedure involves printing a given identifying number upon all stamps in a predetermined footage of web, and then changing the identifying number automatically, and without interrupting the web feed, to apply a new number to subsequent stamps throughout a predetermined advancement of web footage; this procedure being repeated so that the end result may be a long web of stamps, the first forty feet (for example) of which has all its stamps identified by a given number, the next forty feet having all its stamps identified by a different number, the following forty feet having all its stamps identified by a still different number, and so on until the end of the web is reached.

In the explanation above recited, the identifying numbers applied to the stamps of the successive forty-foot sections of web, are preferably consecutive numbers, such as 400, 401, 402, 403, etc. The length of web imprinted with any one identifying number before a change is made to the next consecutive identifying number, may be forty feet as recited in the foregoing example, or any desired footage greater or less than forty, this being a matter of adjustment of the numbering mechanism.

After all of the stamps of a web have been numbered, those stamps bearing a given identifying number may be shipped to one customer; those bearing the next consecutive number may be shipped to a second customer; and those bearing the following identifying number may be shipped to a third customer, and so on, with the result that different customers are supplied with stamps bearing different identifying numbers. The numbering plan affords various advantages to the customers and to the stamp supplier, including the tabulating of regional stamp usage statistics, the tracing of stamp thefts, etc., all of which is inherent in the plan.

An object of the present invention is to provide a mechanism for applying different identifying indicia to successive groups of stamps in web formation, with an automatic change of indicia occurring without interruption of the web advancement through said mechanism.

Another object is to provide an indicia-applying or numbering mechanism of the character stated, the constituent parts of which are so constructed and combined as to function under conditions of minimum wear and shock, thereby to ensure reliable service-free operation of the mechanism over a long period of time.

Another object of the invention is to provide a numbering mechanism of the character referred to, which is so constructed as to apply different numbers to suc-

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cessive sections of a moving web with great accuracy, and to eliminate the production of rejectable web sections.

A further object is to simplify and expedite the application of predetermined identifying numbers or indicia to successive groups of stamps in rapidly moving web formation, with substantial savings of time and expense.

The foregoing and other objects are attained by the means described herein and as illustrated upon the accompanying drawings, in which:

FIG. 1 is a fragmental perspective view, in partly exploded condition, showing the numbering mechanism of the invention operative for applying a given numeral repeatedly to columns and rows of stamps in moving web formation.

FIG. 2 is a front elevation of the same, showing a cam indexing linkage in a normal operating condition.

FIG. 3 is a view similar to FIG. 2, showing the cam indexing linkage in the indexing condition.

FIG. 4 is a view similar to FIG. 3, showing the cam indexing linkage undergoing restoration to a cocked condition.

FIG. 5 is an elevational view partly in cross-section, showing a pair of counter-actuating cams in a normal non-indexed condition.

FIG. 6 is a diagrammatic view of certain components of the numbering mechanism and their relationship to one another.

FIG. 7 is a sectional view showing a counter-actuating cam in the normal non-indexed condition.

FIG. 8 is a view similar to FIG. 7 showing the same cam in the counter-operating indexed condition.

FIG. 9 is a greatly enlarged fragmental elevation showing an intermediate position of a movable cam track segment featured in FIG. 8.

FIG. 10 is an exploded perspective view of a counter-actuating cam assembly shown in FIGS. 7, 8, 9 and 11.

FIG. 11 is a cross-section of the structure illustrated by FIG. 7, with a face of the cam broken away.

FIG. 12 is an elevational view of a modified form of cam indexing linkage, in normal operating condition.

FIG. 13 is a view similar to FIG. 12, showing the linkage cocked preparatory to prolating the cam to FIG. 8 condition.

FIG. 14 is a view similar to FIG. 13, showing the linkage triggered to prolate the cam.

FIG. 15 is a view similar to FIG. 14 showing the linkage undergoing cocking, to normalize the counter-actuating cam.

FIG. 16 is a cross-section taken on line 16—16 of FIG. 15.

Generally stated, the machine of the invention comprises a frame including spaced upright side walls 20 and 22 (FIG. 1), which support for rotation a pair of spaced parallel numbering drum shafts 24 and 26. Fixedly mounted upon shaft 24 is a numbering drum 28, and a second numbering drum 30 is fixed upon shaft 26. Shafts 24 and 26 are driven shafts rotatable in a common direction, and beneath each numbering drum is a platen roll 32 to support an advancing web W in contact with the numbering drums. The drums are inked continuously by ink rolls 34, 35 (FIG. 6).

Web W is a sheet of indeterminate length, pre-printed and perforated to define columns and rows of trading stamps S, or equivalent separable stamps or tabs. Each stamp of the web, in passing through the machine herein disclosed, will be imprinted with a number as indicated by reference character N. The numbering is performed by numbering drums 28 and 30. As was previously stated herein, the stamps in a predetermined footage of the web will be identically numbered. Then, the numbers

will be changed automatically upon the drums, to imprint a different number upon the stamps of a succeeding predetermined footage of the web; and the process will be continued to apply different identifying numbers to successive predetermined web footages or sections until the end of the long web is reached.

Each numbering drum is constituted of a battery of numbering units 36, conventional in design, and arranged in rows lengthwise upon the drum. By preference, though not of necessity, each numbering unit may include but three numbering or printing wheels 38, 40, 42, these being digits, tens, and hundreds wheels, respectively. The wheels are actuated in conventional manner by a trip lever 44 (FIG. 10). Numbering units such as 36 are sometimes referred to as "counters."

Each horizontal row of numbering units as shown in FIG. 1, has a common actuating shaft 46 (see FIG. 10), so that a single trip lever 44 at one end of the shaft actuates all numbering units of a row, simultaneously. Thus, if the numbering units of a row are printing a given number upon the stamps S, a single actuation of lever 44 will change the number on all the units of that row. It will therefore be apparent that a desired change of numbers on all units of the drum, may be effected by tripping the levers 44 accompanying each row of numbering units 36 on the drum. The levers are to be tripped in succession by means of a cam, during a single rotation of each numbering drum.

Each trip lever 44 carries at its outer end a laterally extending stud 48, which supports a cam follower or roller 50 adapted to ride within a variable cam track as will be explained. All of the rows of numbering units, with the exception of one on each drum, carry a trip lever and follower 50. The excepted one row of numbering units on each drum, has its actuating shaft 46 provided with a fixed pinion 52 (FIG. 6), which is rotated in unison with a pinion 54 fixed on the next adjacent actuating shaft, through an idler pinion 56. Thus, the two geared numbering units of each drum will be tripped by means of a single cam follower 50, when the follower is cam-actuated to rock the actuating shaft 46 which carries such follower. All the remaining rows of numbering units on the drums, has each its own cam follower 50 and trip lever 44.

Referring to FIG. 1, it would be understood that in practice, all the cam followers 50 of drum 30 ride in the groove or track 60 of cam 64, and those of drum 28 ride in the groove or track 60 of cam 62. Cams 62 and 64 are stationary, and followers 50 ride in the cam tracks as drums 28 and 30 rotate to number the stamps of moving web W. Cams 62 and 64 are identical in construction, though differently oriented to the drums as will be explained hereinafter.

The tracks 60 of cams 62 and 64 are circular normally, so that as in FIG. 7, the followers 50 travel therein inactively, or without rocking their trip levers 44. However, these tracks are subject to variation mechanically, as in FIG. 8, to prolate them at one location for guiding the followers 50 from the circular path outwardly, which results in rocking the trip levers successively as their followers depart from and return to the circular path. Such departure of the followers 50 in succession, acts to rock the shafts 46 of the rows of numbering units in succession, for changing the numbers to be imprinted upon web W. The cams 62 and 64 remain prolated during one complete rotation of its associated numbering drum, and are then automatically restored to the normal circular track condition until such time as the numbering is to be again changed.

FIGS. 7 to 11 illustrate the details of a variable cam such as 62. The cam has three principal parts, 62, 66 and 68. Part 62 has an inner hub having a bore 70, and concentric to the bore is an inner wall 72 of track 60. Wall 72 is circular, except for the presence of a small notch or depression 74 which normally affords no inter-

ference with the circular travel of followers 50 in track 60.

The outer wall 76 of track 60 is principally circular, except at the location 78 where it is prolated to form a dip or bay permitting deviation of followers 50 from a normal circular path, as in FIG. 8. A recess 80 in the back of cam part 62, accommodates the track diverter element 68 which is pivoted to part 62 by means of a pivot pin 82 journaled in the cam base 66 at 68, FIG. 10. Base 66 is rigidly secured to cam part 62, to enclose the diverter element 68 which may be shifted about pin 82 within limits established by a stationary stop 84. An arcuate socket 86 formed in one face of element 68 accommodates stop 84, to limit rocking movement of element 68 about pin 82.

Diverter element 68 carries an arcuate cam face 88 which complements the circular track 60, to complete the circular track as in FIG. 7. This nullifies any effect of bay 78 to direct the followers 50 from the circular path of the cam. However, shifting of diverter element 68 about pivot 82 to the FIG. 8 position, displaces cam face 88 outwardly beyond bay 78, and brings into the bay a lobe 90. This lobe has a cam face 92 which, in the clockwise shifted position of diverter element 68 (FIG. 8), complements the bay portion 78 of track 60 to detour all followers 50 into the bay 78. Each follower on entering the detour, rocks its lever 44 (FIG. 10) to actuate all numbering units of a row so as to bring a new number into printing position with relation to web W.

At the right in FIG. 10 is shown a bearing member having a hub 94 and a flange 96. The flange is slotted at 98 to receive screws 100 (FIG. 1), which secure the flange against frame member 22. Cam base 66 is supported upon hub 94, the hub being received in bore 102 and keyed therein utilizing the keyways 104 and 106. As was previously mentioned above, cam base 66 provides a rigid mount for cam part 62, with diverter element 68 interposed therebetween for shiftability about pivot pin 82. A drum shaft such as 24 or 26 extends loosely through the bores of parts 62 and 66, and is supported for rotation within the bore 108 of hub 94 serving as a shaft bearing.

As FIG. 1 indicates, there are two cam assemblies like that of FIG. 10, fixed upon frame member 22 by means of the flanges 96, 96. Each cam assembly receives therein one of the rotary numbering drum shafts 24, 26, as shown, with the followers 50 of the drums riding in the tracks of the cams.

Transformation of the cam tracks from the circular to the prolate configuration, and back to the circular configuration, as required for advancing the numbering wheels from time to time, is accomplished by shifting the diverter elements 68 in opposite directions about their pivots 82. This shifting of the diverter elements is performed by a rock shaft 110 and a linkage system associated therewith, including a pair of links 112 and 114.

Shaft 110 may be journaled in frame members 20 and 22 for rocking movement, in parallelism with drum shafts 24 and 26. Near one end, shaft 110 may carry a plate 116 fixed thereon, and to the plate are pivoted the links 112 and 114, at locations 118 and 120. For purposes of adjustment and timing, pivots 118 and 120 may be relocated with respect to plate 116 by providing small cranks 122 and 124, which carry the pivots. The cranks are fixable to plate 116 at screw connections 126 and 128, which when loosened permit adjustment of the cranks rotationally and also radially within the limits of slots 130 formed in the plate.

Directing attention to link 112, it is noted that the lower end thereof carries a pin 132 whereby said link is pivotally connected to an ear 134 of diverter element 68. In the normal position of shaft 110 and plate 116 (FIG. 5), link 112 holds the diverter element in the

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retracted position of normalcy, at which its cam face 88 forms a continuation of circular track 60, according to FIGS. 5 and 7. Referring now to FIG. 5, if shaft 110 and plate 116 be rocked in clockwise direction, link 112 will rotate diverter element 68 to the right about pivot 82, thereby to establish the relationship of FIG. 8 in which lobe 90 is advanced toward bay 78 to in effect prolate the track 60 and enforce detour of followers 50 from the normal circular path of travel.

The followers 50 in traveling the prolated path of FIG. 8, actuate the numbering units to change the number to be printed upon the web, as was explained previously herein.

By referring to FIG. 5, it is noted that cam element 64 and its assembly are identical to that of cam element 62, but its bay 78 is differently oriented to the axis of rock shaft 110. This difference of orientation requires that the actuating link 114 be longer than link 112, and provided with a bend 136, in order to reach the pivot 138 on ear 140 of the lower diverter element 68. However, when rock shaft 110 is rotated in one direction or the other, the links 112 and 114 operate simultaneously to shift both diverter elements 68 in unison, to change the track configurations of both cam assemblies 62 and 64 in exact correspondency one with the other.

The trip lever of a numbering unit or counter as generally manufactured, swings through an arc of about 50 degrees. Of this amount, approximately 40 degrees of the swing is utilized for bringing into position for printing, one numbering wheel figure to replace a previous figure. The trip lever thus has an over-run of about 10 degrees with each actuation, this being for the purpose of assuring a slight over-rotation of the numbering wheel which under spring pressure settles back to printing position upon reversal of the trip lever movement through 10 degrees.

Reversal of the 10 degree over-run may be effected by means inducing each follower 50 to momentarily dip into the depression 74 of track 60, while said track is in the prolated condition of FIG. 8. Such means may include an eccentric 142 rotatably mounted on cam base 66, at bushing 144, the eccentric being rotatable to one position at which it partially enters cam track 60 (FIGS. 8 and 9), and to a second position at which it clears said cam track (FIGS. 7 and 5).

Eccentric 142 may be actuated by a link 146 having at one end a pivot connection 148 upon the eccentric, and at its opposite end a sliding connection with pivot 132 on diverter element 68. At pivot 132, said link includes an elongated slot 150 in which the pivot moves. Upon comparison of FIGS. 7 and 8, it is evident that pivot 132 may push link 146 toward eccentric 142 (FIG. 7), for rotating the eccentric out of the path of followers 50; or in the alternative, it may pull the link away as in FIG. 8, for rotating the eccentric 142 into the path of the followers 50.

The above stated movements of eccentric 142 result from rocking the cam control shaft 110, as FIG. 5 clearly indicates. The eccentric arrangement just described in connection with cam element 62, is duplicated in connection with cam element 64. Eccentrics 142 in both instances are located directly opposite the cam track depressions 74, to enforce dipping of cam followers 50 into the depressions whenever diverter elements 68 are shifted outwardly as in FIG. 8 to prolate the cam tracks 60. As best illustrated by FIGS. 9 and 10, the eccentric 142 works within a recess 152 of cam element 62. Cam element 64 in like manner accommodates its similar eccentric 142.

Summarizing the preceding explanation, it should be understood that rocking the cam control shaft 110 in counter-clockwise direction shifts the diverter elements 68—68 to the normal advanced position of FIGS. 5 and 7, wherein cams 62 and 64 guide the followers 50

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in a circular orbit. As long as the followers travel in the circular orbit the numbering wheels of all the numbering units on rotating drums 28 and 30 will print a given number upon all stamps of the advancing web W.

When the number being applied to the web requires change to a different number, it is necessary only to rock the cam control shaft 110 in clockwise direction, this serving to retract diverter elements 68—68 to the FIG. 8 position for changing the course of followers 50. The followers thereupon detour into bays 78 in succession, causing actuation of the numbering unit trip levers 44 in succession for bringing into web printing position a new number on each unit. The detouring of followers 50 as above related, persists during approximately one complete rotation of the numbering drums; then the cam control shaft 110 is rocked in counter-clockwise direction to normal position, at which the followers resume travel in the circular orbit of FIG. 7. Until cam control shaft 110 is again rocked clockwise, the new numbers turned up on all the numbering units 36 will be printed upon the advancing web W.

Cam control shaft 110 may be subject to rocking upon the happening of some event, such as passage of a given footage of web, or a predetermined number of rotations of the numbering drums or perhaps the passing of a predetermined time interval. By way of example, it may be assumed that a rocking of shaft 110 to change numbers being printed upon the stamps of the web, will be initiated whenever a numbering drum has completed a given number of rotations. Thus, a counter 154 (FIG. 3) may be actuated by one of the numbering drums, and arranged to complete an electric circuit including conductors 156 and 158, at preselected readings of the counter. Closing of the circuit whenever occurring, is to initiate a rocking of shaft 110 in clockwise direction, as will be explained.

Cam control shaft 110 has fixed thereon a bell crank comprising the latch arms 156 and 158 (FIGS. 2, 3, and 4). These arms may be arranged at approximate right angles to one another, to rock with shaft 110. A prop 160 pivoted upon a stationary stud 162, is yieldingly biased toward shaft 110 by a compression spring 164, and has an end wear pad 166 which normally underlies arm 156, FIG. 2. Arm 160 may be moved to the right about pivot 162, to clear arm 156, by the action of a knob 168 striking a roller 170 on arm 160. Knob 168 is carried by the periphery of a circular disc 172 which is fixed upon drum shaft 26.

Upon the same shaft 162 with prop 160, is pivoted a latch arm 174 having a wear pad 176 on its free end, said arm 174 being movable independently of prop 160. A side edge 178 of arm 174 is normally urged upwardly against the free end of arm 158, by spring 180. The free end of arm 158 may carry a fixed wear pad 182 having a forward notch 184 which, at times, may engage an upper corner of pad 176 (FIG. 3). Arm 158 is capable of being rocked with control shaft 110 to which it is fixed, by reciprocative action of a piston rod 186. The piston rod is pivoted at 188 to arm 158, and is powered by a double-acting air cylinder 190. The air cylinder base 192 is fixedly mounted upon the machine frame element 20, so that movements of the piston rod may be transmitted to arm 158.

Upon drum shaft 26 and immediately adjacent to disc 172, is fixed a second disc 194 carrying on its periphery a knob 196. This knob 196 is adapted upon rotation of shaft 26, to strike a roller 198 on arm 174 so as to rock said arm about its pivot 162, particularly when said arm is raised as in FIG. 3 to latch the arm 158.

Arm 158 intermediate its ends carries a lateral stud 200, upon which is pivoted a roller carriage 202 shaped as an L, one leg 204 of which supports a cam follower or roller 206. The other leg 208 forms an abutment to limit counter-clockwise rotation of the carriage. Abutment 208 may be stopped against one end of an adjust-

ment screw 210 on arm 158. The screw may be threaded through a sleeve 212, which sleeve is fixed to arm 158.

Roller carriage 202 may be rotated from the full-line position to the broken line position, depicted by FIG. 2. A helical spring 218 surrounding stud 200, yieldingly biases carriage 202 in counter-clockwise direction to the full-line position, at which the roller 206 thereof is in the path of a cam 216 which is fixed to rotary drum shaft 26. Roller 206 when struck and moved in clockwise direction by cam 216, may momentarily enter a recess 214 formed in an edge of arm 158.

The operation of the device is as follows.

Let it be assumed, referring to FIG. 1, that the numbering drums 28 and 30 are rotating counter-clockwise to feed web W to the right while imprinting a given identical number upon all stamps S of the web. The trip mechanism at the left in FIG. 1 will be conditioned as shown, with arm 156 resting upon prop 160 to hold cam control shaft 110 in counter-clockwise rotated position, at which the tracks of cams 62 and 64 are circular. The followers 50 of the numbering drums, riding in the circular cam tracks 60, will simply follow the circular path without any tendency to actuate the numbering units 36. Accordingly, the numbering units will continually apply the given identical number to all the stamps as web W advances through the machine.

The rotating cam 216 merely displaces the roller 206 and its carriage 202 repeatedly, in opposition to the force of spring 218, without moving the arm 158.

Upon the advancement of a predetermined amount of web through the numbering machine, stamps S are to receive a new number. Imprinting of the new number may be initiated by counter 154 (FIG. 3), which upon receiving a predetermined number of actuations imparted thereto by rotation of a numbering drum 28, operates to momentarily close an electric circuit through the coil 220 of a conventional solenoid-operated valve V. Valve V delivers air under pressure to cylinder 190 from a supply pipe 222, the valving being such that air pressure normally is maintained at the rear of cylinder 190 to urge piston rod 186 toward extended position. Upon momentary closing of the solenoid circuit by counter 154, valve V is actuated to briefly reverse the air flow to cylinder 190, causing piston rod 186 to retract and then immediately attempt to extend to normal position.

Thus, under normal operation the trip mechanism is found in the FIG. 2 condition, with cam 216 rotating in the direction of the arrow and repeatedly displacing roller 206 with no effect. Cylinder 190 is under charge, maintaining parts 158, 110, and 156 at their limit of counter-clockwise rotation established by diverter element stop 84. This position of parts 158, 110, and 156 persists, under the urging of piston rod 186, notwithstanding slight rocking movements of arms 174 and 160 produced by knobs 196 and 168 striking the rollers 198 and 170, respectively.

If counter 154 now actuates valve V, to momentarily air-charge the rod end of cylinder 190, prop 160 will oppose clockwise rotation of assembly 156-158-110 by piston rod 186, until knob 168 comes around to strike roller 170 and thereby displace prop 160. Upon displacement of prop 160 (FIG. 3), assembly 156-158-110 is forced by the retracting piston rod to rotate in clockwise direction, thereby causing cam control shaft 110 to actuate the diverter elements of cams 62 and 64 for pro-rating their cam tracks 60, which detours the cam followers 50 in succession to actuate the numbering units 36 and bring a new number into printing position.

The aforesaid retraction of piston rod 186 is followed immediately by restoration of valve V to normal position, whereupon air pressure is introduced behind the piston; however, the piston cannot immediately advance because notch 184 has engaged the end 176 of arm 174 (FIG. 3), causing pressure to build up behind the piston.

At a proper instant of timing, however, which is just sufficient to allow all the cam followers 50 to traverse the prolation of cams 62 and 64, knob 196 of FIG. 3 strikes roller 198 to displace latch 176 downwardly from notch 184, thereby permitting piston rod 186 to push the released arm 158 to the right, for rocking shaft 110 in counter-clockwise direction.

As FIG. 4 clearly indicates, the counter-clockwise rotation of shaft 110 and its connected arms 156 and 158, is placed under restraint and cushioned, by reason of roller 206 riding upon an arcuate inclined face 224 of rotating cam 216. Cam 216 thereby softens the advancement of piston rod 186, and absorbs shock which would otherwise be transmitted to the moving parts of counter-actuating cams 62 and 64 and their connecting linkage.

As roller 206 (FIG. 4) rides centerward along cam face 224, arms 156 and 158 rotate to the FIG. 2 position at which they are latched by prop 160. In this position the cam control shaft 110 is normalized for restoring cams 62 and 64 to circular-track condition, so that the changed numbers of the numbering units on both drums will be imprinted upon moving web W. Such imprinting will continue without change or interruption until a predetermined footage of web passes through the numbering mechanism, whereupon the counter 154 of FIG. 3 will operate to again initiate operation of the trip mechanism of FIG. 3 for elongating the cam tracks 60 and advancing the numbering wheels of numbering units 36, to print a new number upon the web.

With each successive operation of counter 154, all the numbering units of the numbering drums will be indexed to present a new number for printing upon the individual stamps or divisions of the web.

A modification of the trip mechanism of FIGS. 1 through 4, is illustrated by FIGS. 12 through 16, wherein similar parts are indicated by the same reference characters.

In the modification, FIG. 12 illustrates the relationship of elements attending imprinting of the web W with a given identifying number. Arm 156 is kept elevated by the persistent force of piston rod 186 acting upon arm 158, said arm 158 and the arm 156 being fixed to cam control shaft 110. Also, prop 160 is beneath the free end of arm 156, and arm 174 is kept slightly depressed by the overlying end 182 of arm 158. Springs 226 or equivalent means serve to bias both arms 160 and 174 toward drum shaft 26.

Roller carriage 202, of substantial L-shape, carries roller 206 and abutment lug 230, and is provided with a notch 232 on its hub. A torsion spring 234 (FIG. 16) constantly biases carriage 202 in counter-clockwise direction of rotation upon stud 200. In the normal operation of web imprinting, a pawl 236 (FIG. 12) restrains carriage 202 to hold roller 206 retracted from cam 216, so that cam 216 in rotating clears roller 206. In this position, roller 206 may rest within the recess 214 of arm 158.

Pawl 236 is pivoted at 238 upon arm 158, and is constantly urged clockwise by spring 240, to engage notch 232. A bored internally threaded lug 242 integral with arm 158 carries an adjusting screw 244, the purpose of which is to engage abutment lug 230 and thereby limit counter-clockwise rotation of carriage 202 under certain conditions to be explained.

Under the conditions of FIG. 12, the numbering drums on shafts 26 and 24 are rotating in counter-clockwise direction to apply a given identifying number to all the stamps of web W. Shaft 26 while rotating carries with it the cam 216, and discs 172 and 194. Roller 170 rides upon disc 172, and may be struck and slightly moved outwardly by knob 168 with each rotation of shaft 26. This slight movement of roller 170 and the arm 160 upon which it is mounted, is normally ineffective of any decisive function so long as piston rod 186 is extended for holding arms 158 and 156 in the FIG. 12 position.

If now the identifying number has been imprinted upon the required footage of web, counter 154 of FIG. 3 will be actuated by a numbering drum or other moving part, to energize solenoid 220 and momentarily shift the valve V as previously explained. Such momentary shifting of valve V, as previously explained, feeds compressed air first to the rod end of cylinder 190, and then promptly feeds compressed air to the opposite end thereof.

The first charge of compressed air seeks to retract the piston rod 186, but such retraction is opposed by prop 160 upholding arm 156, until such time as knob 168 comes around to strike roller 170 and thereby displace the prop. Upon displacement of prop 160, the condition illustrated by FIG. 13 occurs, wherein arm 156, shaft 110, and arm 158, are rocked clockwise as a unit by the retractile action of piston rod 186. The resultant rocking of shaft 110 to FIG. 13 position actuates the linkage at the right in FIG. 1, to prolate the tracks of cams 62 and 64 in accordance with previous explanation, to detour the cam followers 50 and thereby bring up a new number on each numbering unit 36 of the numbering drums.

It will be noted from FIG. 13 that arm 158, in moving to the left, has brought pawl 236 into a position beneath and against a lug 246 fixed upon frame 20, the pawl upon striking the lug being rotated thereby in counter-clockwise direction to leave the notch 232 and release carriage 202 to the action of torsion spring 234, which spring rotates the carriage to extend roller 206 toward cam 216. At approximately the same time, the end 176 of arm 174 moves upwardly into position to block the return of arm 158 toward cam 216, which arm is under stress in that direction due to the charging of the rear end of cylinder 190 with air pressure through valve V. Arm 174 will latch arm 158 thusly until knob 196 comes around to strike roller 198, which action displaces arm 174 downwardly to unlatch arm 158.

Immediately upon the aforesaid displacement of arm 174, air pressure built up behind piston rod 186 projects the rod and arm 158 to the FIG. 14 position, with roller 206 riding on cam face 224 centerward of cam 216 to govern the rate of projection of piston rod 186. Cam face 224 accordingly retards or cushions the return of shaft 110 and arms 156 and 158, to the normal position enforced by the advance of piston rod 186; this being effective to relieve the cams 62 and 64, their actuating components, and the numbering units, of undue shock and premature wear.

As cam 216 of FIG. 14 continues its counter-clockwise rotation, the radial face 248 thereof comes around as in FIG. 15 to strike roller 206, moving the roller and its carriage 202 to the broken line position 250 (see also FIG. 12). The carriage in this position becomes latched by pawl 236 engaging notch 232 of the carriage. The pawl is enabled to assume latching position by reason of the fact that it is free of restraint by lug 246, the pawl having been moved away from said lug coincidentally with the counter-clockwise rocking of arm 158 which carries the pawl.

The various elements now having assumed the relationship depicted by FIG. 12, are normalized for imprinting web W continuously with the new number brought forth on the numbering units. Such new number will be printed upon the stamps of the web until by the action of counter 154, FIG. 3, the linkage is once again tripped as in FIG. 13 to prolate the tracks of cams 62 and 64 and thereby actuate the numbering units to bring a new number into printing position.

As was previously mentioned herein, counter 154, FIG. 3, may be actuated a predetermined number of times by a regular movement of some element of the numbering mechanism, until with the execution of the predetermined number of actuations, it momentarily closes an electric switch in the circuit of solenoid 220 to initiate the change of numbers on the numbering units 36. By way of example, the regular succession of slight movements of

arm 160, produced by knob 168 striking roller 170, may be transmitted to a micro-switch 252 electrically connected to counter 154 for actuating the counter, say forty times, until the counter acts to close the circuit of solenoid 220 momentarily. During the forty actuations, a predetermined desired footage of web will have been imprinted with a given identifying number; and at the forty-first actuation a new number will be brought forth for printing due to tripping of the cam linkage initiated by momentary closing of the solenoid circuit by counter 154.

Control of the linkage actuation by a counter such as 154, is applicable to the form illustrated by FIGS. 1 through 4, and also to the modification illustrated by FIGS. 12 through 16 as well. Any regularly movable part of the mechanism may be utilized in imparting the required actuations to counter 154, as will be understood.

The foregoing explains the mode of operation of the numbering mechanism. Attention will now be directed to certain structural details which are worthy of notation.

The numbering drums 28 and 30 may be constructed basically as elongate cylinders of equal length and diameter. The peripheral face of each drum may be grooved or ribbed longitudinally of the drum axis, to provide ways or the like in which are suitably anchored the bases of the numbering units 36. Accordingly, the numbering units are arranged in rows extending lengthwise of the drums. An actuating shaft 46 extends through all the numbering units of a row, to actuate the numbering wheels with each rocking movement of shaft 46 induced by a trip lever 44 disposed at an end of each row of numbering units, as previously explained.

Each numbering unit may include numbering wheels 38, 40, 42 (FIG. 10), these being identified respectively as the digits, tens, and hundreds wheels. In every numbering unit, the digits, tens, and hundreds wheels carry ten characters which may be the consecutive numbers 0-1-2-3-4-5-6-7-8-9, for imprinting the stamps or divisions of web W.

The distance between rows of numbering units on drum 28, is so gauged that the units of successive rows imprint every other stamp lengthwise of the web, with a given identifying number. Similarly, the units of successive rows of units on drum 30, imprint the remaining alternate stamps of the web, with the same number. It is therefore apparent that the web upon passing beneath both drums 28 and 30, will have exposed its stamps or divisions S to one or the other of drums 28 and 30, for an acceptance of a specific printed number or character. As will be appreciated, the identifying characters imprinted upon the stamps may be numbers, letters, or symbols of any desired or required nature.

The alternate printing of stamps by the units of the two drums, makes possible the printing of successive stamps even though the stamps may be of limited length less than the span of printing figures from one row of units to the next, peripherally of a drum.

Referring to FIG. 1, it is evident that drum 28 imprints alternate transverse rows of stamps well in advance of any printing applied by drum 30, because of the distance occurring between the axes of the drums. Accordingly, when the time comes to effect a change of numbers to be imprinted, the change must occur first on numbering units of drum 28, followed by a change on units of drum 30, with some overlapping occurring. The time at which a number change occurs upon the units 36 of drum 30, is governed by bodily rotational disposition of the normally stationary cam part 64. In this connection, attention is directed to FIG. 5.

In FIG. 5, rotation of the drums and their shafts 24 and 26 is counter-clockwise, and both cam tracks 60 are in circular condition so as to induce no numbering change within the numbering units of the drums. When a numbering change is to occur, cam control shaft 110 will be rocked clockwise, causing links 112 and 114 to shift the movable cam elements 68-68 simultaneously outwardly,

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thereby to prolate the cam tracks 60 as explained earlier herein, and as shown by FIG. 8.

It will be noted that the track of cam 62 is prolated in an upward direction, or toward shaft 110, whereas the track of cam 64 is prolated in a downward direction, or away from shaft 110. This difference in angularity of cam prolation effects a difference in timing of the numbering change occurring upon the units of the two drums, so that drum 28 will begin printing the new number brought up on its associated numbering units, while drum 30 is still printing the old number. The angularity of track prolation is such that the new number is brought forth on a row of units of the second drum 30, by the time the first row of stamps imprinted with the new number by drum 28 arrives beneath drum 30, with an adjacent unprinted row in position for application of the new number by the units of drum 30.

This arrangement assures that no stamps delineated upon web W will pass the drums in unnumbered condition as the result of the numbering change, and that the cut-off point at which the new number begins and the old number ends, will be defined by a single line of transverse perforations separating two adjacent transverse rows of stamps. The tracks 60 of cams 62 and 64 remain prolated only long enough to detour once, each follower 50 of the numbering units of the drums; this being somewhat less than a complete rotation of each drum, due to the gear drive 52, 54, 56 of FIG. 6 which eliminates one follower on each numbering drum. By reason of the function of gearing 52, 54, 56, the drum rotation necessary for actuating all of the numbering units of a drum is foreshortened by about thirty-six degrees, which is sufficient to ensure return of cam elements 68 to the normal circular-track condition of FIG. 5 without a miss in printing.

In one practical embodiment of the invention, the drums 28 and 30 may be 17½ inches in circumference, with the numbering units arranged 36 degrees apart upon the circumference. The bays 78 of cams 62 and 64 may be disposed at an angle to one another approximating 90 degrees. With respect to FIG. 6, it is noted that inking rolls 34 are so located with relation to bays 78, that all numbers newly presented on the numbering units 36 for printing, will be inked prior to making an impression upon web W.

The numbering device herein disclosed is highly accurate and dependable in operation, and is relatively free of noise and frequent servicing requirements. The number and character of the printing wheels of units 36 may be varied according to the nature of the work to be performed, and various other modifications and changes may be made in structural details, within the scope of the appended claims, without departing from the spirit of the invention.

What is claimed is:

1. Apparatus for applying identifying characters to small subdivisions of a traveling web arranged in long columns and short transverse rows, said apparatus comprising in combination: platen means to support the traveling web, and a pair of like cylindrical drums rotatable upon spaced parallel axes, a multiplicity of like numbering units each comprising a set of adjustable printing wheels bearing a succession of differing print characters, and means mounting said units upon the peripheries of the drums in rows parallel to the drum axes, the number of units in each row on the drums corresponding to the number of columns of subdivisions upon the web, actuable means adjacent each cylinder for causing each row of numbering means to advance simultaneously as it reaches the position of said actuable means when said actuable means is actuated, means for actuating both of said actuable means simultaneously, and the spacing of the unit rows upon the drums being gauged to the subdivision rows of the web, so that the printing wheels of the drum-supported units of one drum apply printed impressions to the subdivisions of every other row on the web, and the

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printing wheels of the units on the other drum apply printed impressions upon the subdivisions of the remaining alternate rows of the web.

2. The apparatus as set forth in claim 1, wherein the printing wheels of the units on both drums apply identical impressions to the web subdivisions, and wherein the means for actuating the actuating means for actuating the numbering means includes means operative upon completion of a predetermined number of such impressions, to advance the printing wheels of the units while the drums continue rotating, for bringing into printing position upon all the units a different identifying character for application to the web subdivisions.

3. Apparatus for applying identifying characters to small subdivisions of a traveling web arranged in long columns and short transverse rows, said apparatus comprising in combination: platen means to support the traveling web, and a first and a second cylindrical drum rotatable on spaced parallel axes, the web passing the first drum then the second drum in succession between the drums and the platen means, a multiplicity of similar numbering units each comprising a set of adjustable printing wheels bearing a succession of differing print characters, and means mounting said units upon the peripheries of the drums in rows parallel to the drum axes, the number of units in each row corresponding to the number of columns of subdivisions upon the web, the unit rows upon the drums being spaced apart so that the printing wheels of the units of the first drum apply impressions to the subdivisions of every other row on the web, and the printing wheels of the units on the second drum subsequently apply identical impressions to the subdivisions of the remaining alternate rows of the web, a plurality of rock shafts, one associated with each row of numbering units on the drums, and actuatable to rotate the printing wheels of the units of a row for placing different characters in printing position, a cam follower associated with each rock shaft excepting one on each drum, and means driven by an adjacent rock shaft for rocking said excepted rock shaft, a pair of stationary cams each having a normally circular cam track concentric with a drum, and in which the followers ride as the drums rotate, shiftable means for prolate said cam tracks each along a different line of projection, which lines are disposed at an angle to one another, and means operative after all the cam followers once traverse the prolated cam tracks, for restoring said cam tracks to normal circular condition.

4. The apparatus as set forth in claim 3, wherein the lines of projection along which the cam tracks are prolated, are disposed at approximate right angles to one another.

5. Apparatus for applying identifying characters to small subdivisions of a traveling web arranged in long columns and short transverse rows, said apparatus comprising in combination: a first and a second cylindrical drum rotatable on spaced parallel axes, a multiplicity of similar numbering units each comprising a set of adjustable printing wheels bearing a succession of differing print characters, and means mounting said units upon the peripheries of the drums in rows parallel to the drum axes, the number of units in each row corresponding to the number of columns of subdivisions upon the web, the unit rows upon the drums being spaced apart so that the printing wheels of the units of the first drum apply impressions to the subdivisions of every other row on the web, and the printing wheels of the units on the second drum subsequently apply identical impressions to the subdivisions of the remaining alternate rows of the web, means guiding the web into contact with the printing wheels of both drums simultaneously, a plurality of rock shafts, one associated with each row of numbering units on the drums, and actuatable to rotate the printing wheels of the units of a row for placing different characters in printing position, a cam follower associated with each rock shaft excepting one on each drum, and means driven

by an adjacent rock shaft for rocking said excepted rock shaft in unison therewith, a pair of stationary cams each having a normally circular cam track concentric with a drum, and in which the followers ride idly as the drums rotate, shiftable means operative while the drums are rotating, for prolating said cam tracks substantially simultaneously, each along a different line of projection in a plane parallel to the plane of drum rotation, and means operative immediately after all the cam followers once traverse the prolated cam tracks, for returning said cam tracks to normal circular condition.

6. The apparatus as set forth in claim 5, wherein the combination includes means to control the rate of return of the cam tracks to the normal circular condition.

7. Apparatus for applying identifying characters by printing, to small subdivisions of a traveling web arranged in long columns and relatively short rows, said apparatus comprising in combination: a first and a second like cylindrical drums rotatable on spaced parallel axes, a multiplicity of like numbering units each comprising a set of adjustable printing wheels bearing a succession of differing print characters, and means mounting said units upon the peripheries of the drums in rows parallel to the drum axes actuable means adjacent each cylinder for causing each row of numbering means to advance simultaneously as it reaches the position of said actuable means when said actuable means is actuated, means for actuating both of said actuable means simultaneously, the number of units in each row corresponding to the number of columns of subdivisions upon the web, and the unit rows upon the drums being spaced apart so that the printing wheels of the units of the first drum apply impressions to the subdivisions of every other row on the web, and the printing wheels of the units on the second drum subsequently apply identical impressions to the subdivisions of the remaining alternate rows of the web, means guiding the traveling web into contact with the printing wheels of both drums simultaneously, and wherein said means for actuating the actuable means for advancing the numbering means includes means operative while the drums rotate, and upon completion of a predetermined number of impressions, to adjust the printing wheels of the numbering units for bringing into printing position a different identifying character on all the numbering units by progressively advancing the rows of units on each drum in such order that the subdivision rows between alternate web rows imprinted with the initial identifying character incident to rotation of the first drum, are imprinted with the initial identifying character carried by the second drum, before all the rows of numbering units on the second drum are adjusted to present the new identifying character to printing position.

8. The apparatus as set forth in claim 7, wherein the adjusting means completes the adjustment of the printing wheels of all the numbering units of both drums, within the period of a single rotation of one of the drums.

9. Apparatus for applying identifying characters by printing, to small subdivisions of a traveling web arranged in long columns and relatively short transverse rows, said apparatus comprising in combination: a first and a second cylindrical drum, a pair of rotatable spaced parallel shafts each supporting a drum and fixed thereto, and means for rotating said shafts in a common direction of rotation, a multiplicity of similar numbering units each comprising an adjustable printing wheel bearing a succession of differing print characters, means mounting said units upon the peripheries of the drums in rows parallel to the drum shafts, with each unit of a row in position to print upon one of the subdivisions of a transverse row of the web, the rows of units upon the drums being spaced apart so that the printing wheels of the units of the first drum apply impressions upon every other web row, and the printing wheels of the units of the second drum apply identical impressions upon the remaining alternate web rows, a plurality of rock shafts on each drum, one rock

shaft being associated with each row of numbering units and actuatable to adjust the printing wheels of a unit row for placing different characters in printing position, a cam follower associated with each rock shaft excepting one on each drum, and means driven by an adjacent rock shaft for rocking said excepted rock shaft in unison therewith, a pair of stationary cams each having a normally circular cam track concentric with a drum, and in which the followers ride idly as the drums rotate, a shiftable cam element associated with each stationary cam, for prolating the cam tracks each along a different line of projection in a plane parallel to the plane of drum rotation, thereby to detour the cam followers from the normal circular path for actuating the rock shafts in succession as the drums rotate, a cam element control shaft rockable in opposite directions to a normal position and to an indexing position, linkage means connecting the control shaft with the shiftable cam elements, whereby rocking of the control shaft to indexing position moves the shiftable cam elements to prolata the cam tracks, and rocking thereof to the normal position moves the shiftable cam elements to circularize the cam tracks, means including a power cylinder actuatable for rocking the cam control shaft, and means associated with one of the drum shafts for timing the actuation of the power cylinder means in conformity with positions of the drums relative to the subdivisions of the traveling web.

10. The apparatus as set forth in claim 9, wherein the means last mentioned includes a releasable latch opposing force of the power cylinder tending to rock the cam control shaft to indexing position, a second releasable latch opposing force of the power cylinder tending to rock the cam control shaft to normal position, and means movable with said one drum shaft to release the latches in alternation.

11. A web printing device comprising in combination: a first and a second like rotary drums, and a pair of rotary shafts spaced apart in parallelism, with a drum fixed upon each shaft, like rows of numbering wheels mounted peripherally upon each drum, said numbering wheels bearing each a succession of identifying characters movable alternatively into printing position, a series of shiftable cam followers in each drum including means to move the numbering wheels of the rows of wheels, a pair of stationary cams each having a normally circular cam track concentric with a drum, and in which tracks the followers carried by the drums ride idly as the drums rotate, a shiftable cam element in operative engagement with each stationary cam, including a track section interposable in each circular cam track for prolating the cam tracks each along a different line of projection in a plane parallel to the plane of drum rotation, thereby to detour the cam followers from the normal circular cam track path for moving the numbering wheels to present different identifying characters for printing, and means for shifting said shiftable cam elements substantially in unison.

12. The device as set forth in claim 11, wherein the combination includes means associated with one of the drum shafts, for controlling actuation of the aforesaid means for shifting the shiftable cam elements.

13. A web printing device comprising in combination: a first and a second like rotary drums and a pair of rotary shafts spaced apart in parallelism, with a drum fixed upon each shaft, rows of like numbering units mounted peripherally upon each drum, said units each including a numbering wheel bearing each a succession of identifying characters movable alternatively into printing position, a series of shiftable cam followers carried by each drum, including means to move the numbering wheels of the rows of units, a pair of stationary cams each having a normally circular cam track concentric with a drum, and in which tracks the followers carried by the drums ride idly as the drums rotate, a shiftable cam element in operative engagement with each stationary cam, includ-

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ing a track section selectively interposable in each circular cam track for prolating the cam tracks to detour the cam followers from the normal circular path, thereby inducing movement of the numbering wheels to present different identifying characters for printing, a cam element control shaft rockable to and from a normal position and an indexing position, and means connecting the control shaft with the shiftable cam elements, for simultaneously moving said cam elements to prolating position when the control shaft is in indexing position, said cam elements being moved to circular track disposition upon return of the control shaft to the normal position.

14. The device as set forth in claim 13, wherein the combination includes means under the control of drum shaft rotation, for rocking the cam element control shaft to and from the normal and the indexing positions.

15. A web printing device comprising in combination, a frame, a first and a second rotary drum, and a pair of rotary shafts journaled on the frame in spaced parallelism, with a drum fixed upon each shaft, rows of numbering wheels mounted upon each drum periphery, said numbering wheels bearing each a succession of identifying characters movable alternatively into a printing position, a series of shiftable cam followers on each drum including means to move the numbering wheels of each row of wheels, a pair of stationary cams each having a normally circular track concentric with a drum and in which the followers ride as the drums rotate, a shiftable cam track prolating means to alter the track configuration and thereby detour the cam followers for moving the numbering wheels and present different print characters for printing, a control shaft parallel to the drum shafts and journaled in the frame for rocking movement from a normal non-indexing position at which the cam tracks are prolated, means for translating the control shaft movements to the track prolating means, pneumatic means for rocking the control shaft to the indexing and the non-indexing positions, releasable latch means holding the control shaft stationary in opposition to the force of the pneumatic means, and means controlled by rotation of a drum shaft, for releasing the latch means to free the control shaft for movement by said pneumatic means.

16. The device as set forth in claim 15, wherein the combination includes means associated with the control shaft and a drum shaft, for governing the rate of speed at which the pneumatic means rocks the control shaft.

17. A web printing device comprising in combination: a frame, a first and a second rotary drum, and a pair of rotary shafts journaled on the frame in spaced parallelism, with a drum fixed upon each shaft, rows of numbering wheels mounted upon each drum periphery, said numbering wheels bearing each a succession of identifying characters movable alternatively into a printing posi-

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tion, a series of shiftable cam followers on each drum including means to move the numbering wheels of each row of wheels, a pair of stationary cams each having a normally circular track concentric with a drum and in which the followers ride as the drums rotate, a shiftable cam track prolating means to alter the track configuration and thereby detour the cam followers for moving the numbering wheels, a control shaft parallel to the drum shafts and journaled in the frame for rocking movement from a normal position to an indexing position, and means translating the control shaft movements to the track prolating means, a bell crank fixed on one end of the control shaft including a pair of angularly extended latch arms, a rotary cam fixed on one drum shaft for rotation therewith, and having an inclined face and an opposite radial face, a roller carriage pivoted upon one latch arm, a roller on the carriage, and yielding means to bias the carriage and its roller into the path of movement of the rotary cam, pneumatic means tending normally to swing the latch arms in a direction to project the carriage bodily toward the rotary cam, a first prop pivoted upon the frame, and yielding means urging said prop to a position for latching the latch arms against rocking toward the control shaft indexing position, a second prop pivoted upon the frame and yieldingly movable to a position for latching the latch arms against rocking the control shaft toward normal position, means for momentarily reversing the action of the pneumatic means, and means governed by rotation of a drum shaft, for displacing the props in succession to free the latch arms for movement by said pneumatic means.

18. The device as set forth in claim 17, wherein displacement of the second prop for releasing the latch arm on which the carriage is mounted, directs the carriage and its accompanying roller toward the rotary cam, with said carriage roller in riding position upon the inclined face of the rotary cam, to retard the rate of speed at which the pneumatic means moves the latch arms and the control shaft fixed thereto, to the normal non-indexing position of the control shaft.

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