

Dec. 5, 1944.

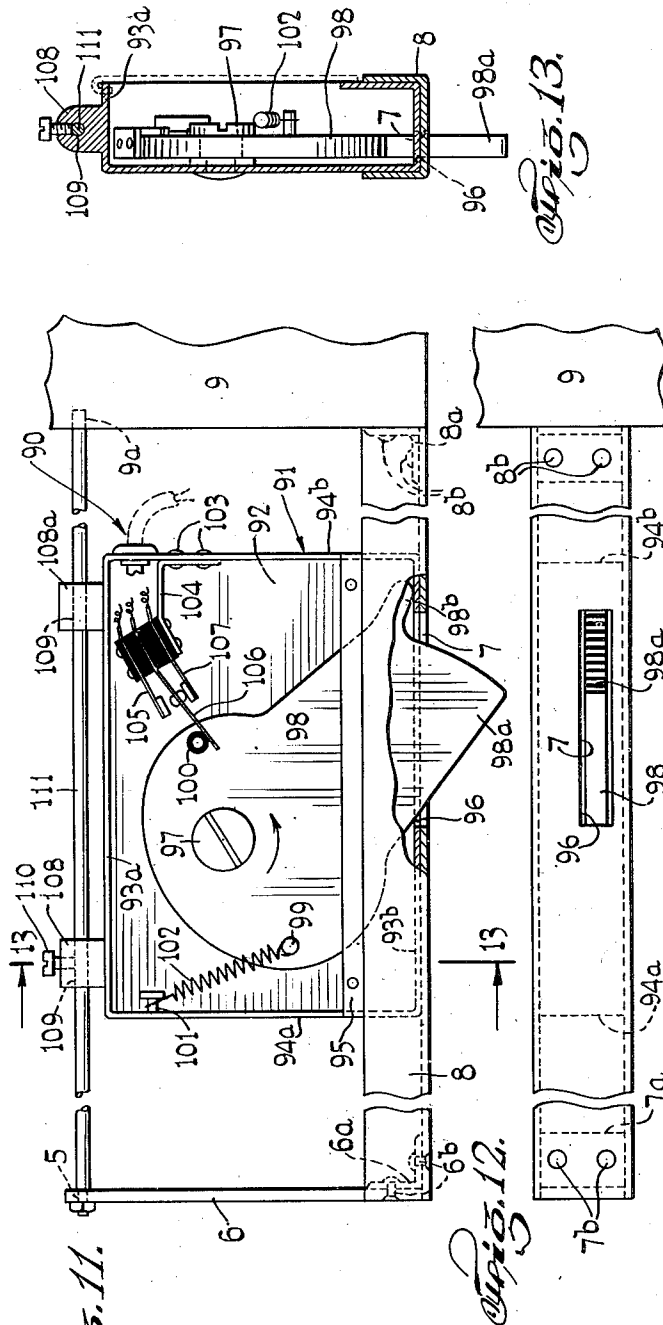
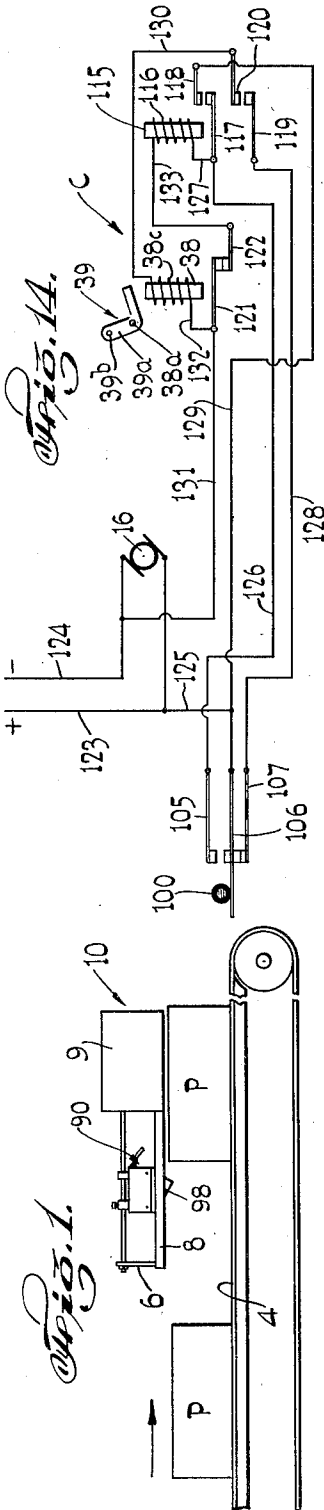
B. COOPER

2,364,345

SERIAL NUMBERING DEVICE

Filed Dec. 12, 1940

6 Sheets-Sheet 1



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Dec. 5, 1944.

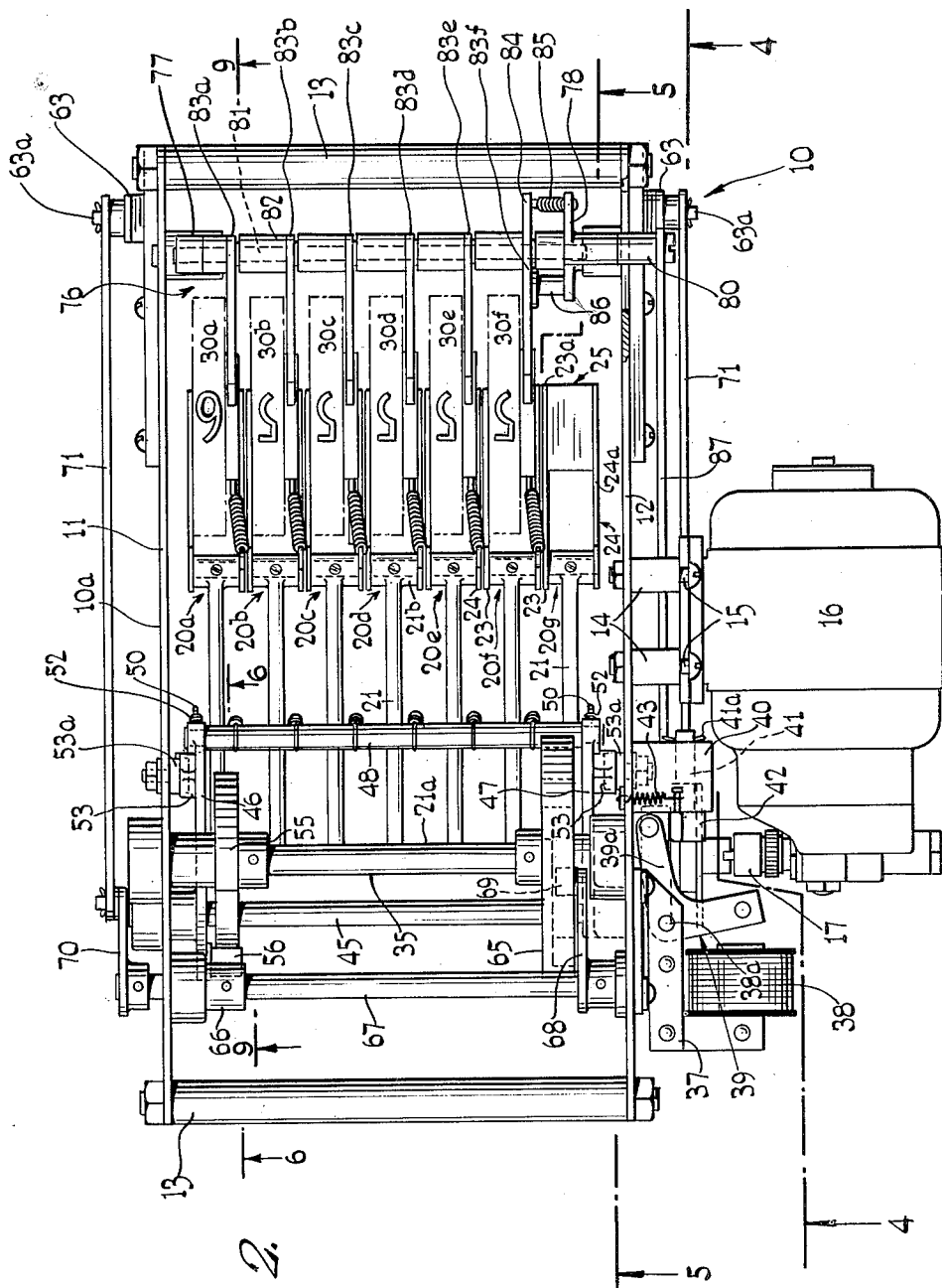
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2,364,345

SERIAL NUMBERING DEVICE

Filed Dec. 12, 1940

6 Sheets-Sheet 2



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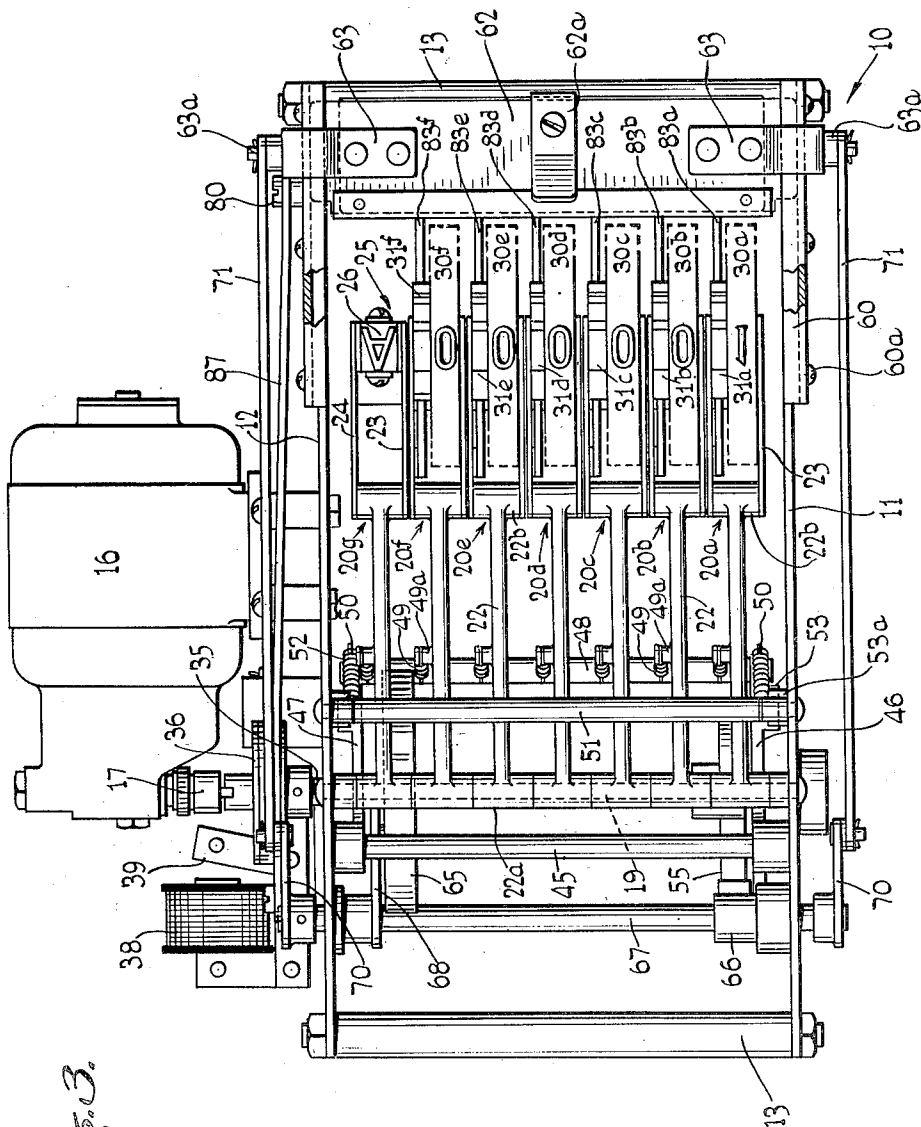
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2,364,345

SERIAL NUMBERING DEVICE

Filed Dec. 12, 1940

6 Sheets-Sheet 3



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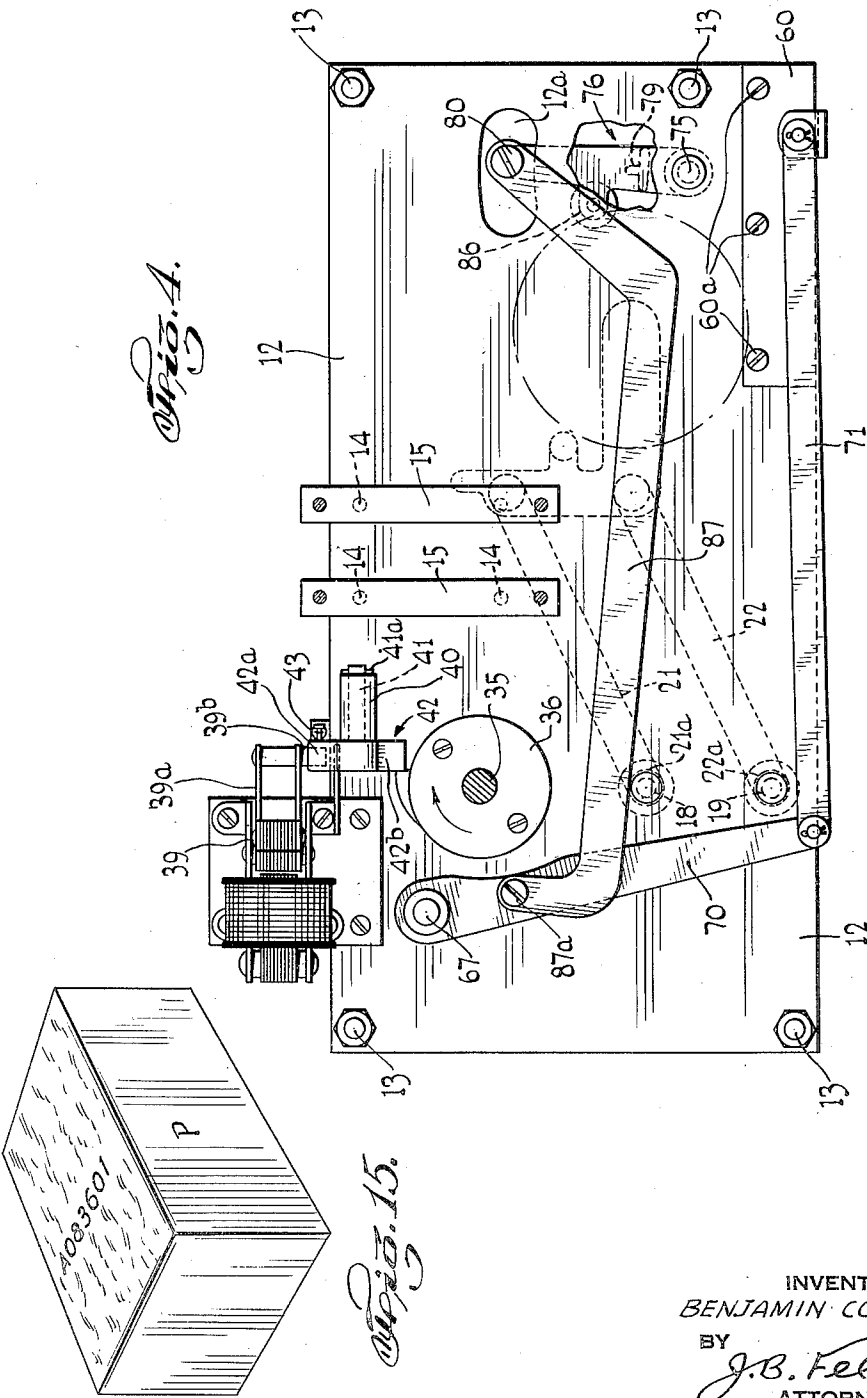
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SERIAL NUMBERING DEVICE

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6 Sheets-Sheet 4



Dec. 5, 1944.

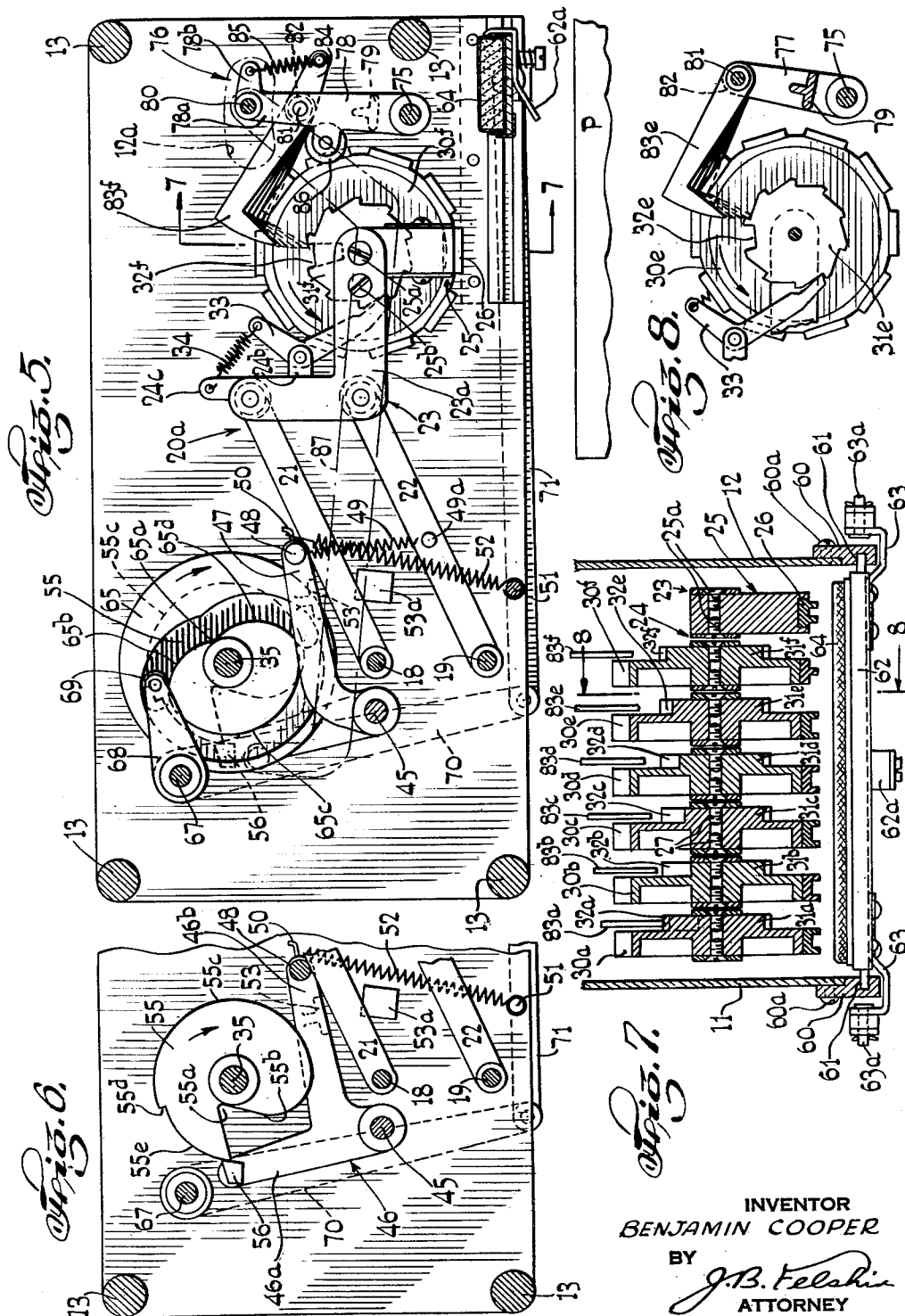
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2,364,345

SERIAL NUMBERING DEVICE

Filed Dec. 12, 1940

6 Sheets-Sheet 5



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2,364,345

SERIAL NUMBERING DEVICE

Filed Dec. 12, 1940

6 Sheets-Sheet 6

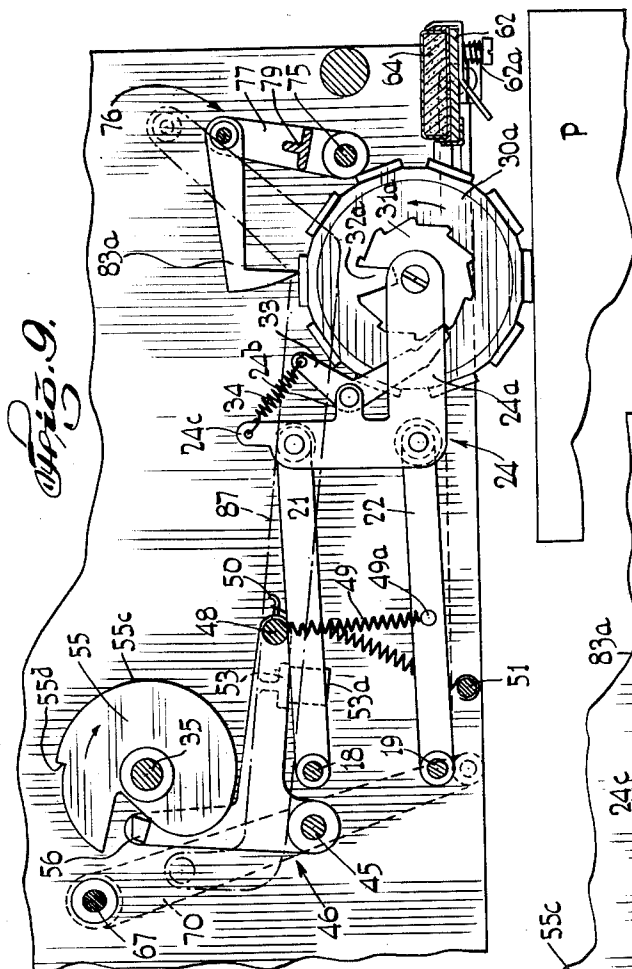
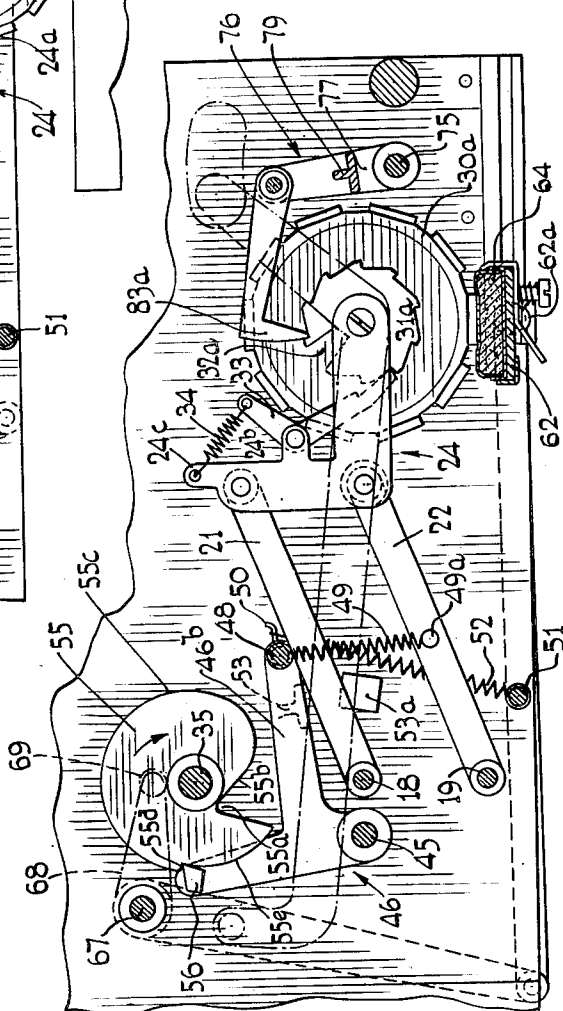


Fig. 10.



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UNITED STATES PATENT OFFICE

2,364,345

SERIAL NUMBERING DEVICE

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Application December 12, 1940, Serial No. 369,859

15 Claims. (Cl. 101—44)

This invention relates to serial numbering devices. It is particularly applicable for serially numbering cartons, packages, or cases moving on a conveyor or turntable.

An object of this invention is to provide a serial numbering device of the character described which will print serial numbers on packages while the packages are moving past said device, said device being adjustable to accommodate packages of various sizes.

Another object of this invention is to provide a serial numbering device of the character described which shall be readily installed in existing conveyor or turntable systems.

Another object of this invention is to provide a serial numbering device of the character described having means to prevent more than one print on each package and to prevent smudging, smearing, or blurring of the printed numbers.

A further object of this invention is to provide a serial numbering device of the character described having means for first advancing the printing wheels to the next consecutive number and means to thereafter ink the portions of the wheels which will be printed, and means to thereafter press the wheels against the package to serially number the package.

Yet another object of this invention is to provide in a serial numbering device of the character described a plurality of printing hammers mounted independently of each other and each bearing a printing wheel, the hammers moving the printing wheels in a straight line motion, perpendicular to the surfaces of the packages to be marked.

Still another object of this invention is to provide a serial numbering device of the character described in which rebound of the printing wheels is eliminated to insure a single clear and legible imprint on the packages or cartons, and prevent plural prints.

Still a further object of this invention is to provide a serial numbering device of the character described which shall print clearly and legibly on packages, cartons, or cases having uneven or curved surfaces.

Yet another object of this invention is to provide a strong, rugged and compact numbering device of the character described, which shall be relatively inexpensive to manufacture, comprise of comparatively few and simple parts, which shall be smooth and positive in operation, and yet practical and efficient to a high degree in use.

Other objects of this invention will in part be obvious and in part hereinafter pointed out.

The invention accordingly consists in the features of construction, combinations of elements, and arrangement of parts which will be exemplified in the construction hereinafter described, and of which the scope of application will be indicated in the following claims.

In the accompanying drawings in which is shown one of the various possible illustrative embodiments of this invention,

Fig. 1 is a side plan view of an automatic numbering device embodying the invention installed over a package carrying conveyor.

Fig. 2 is a top plan view of the numbering device.

Fig. 3 is a bottom plan view of the numbering device.

Fig. 4 is an elevational view taken along the line 4—4 of Fig. 2.

Fig. 5 is an elevational view taken along the line 5—5 of Fig. 2 showing the position of the printing hammers in initial position.

Fig. 6 is an elevational view along line 6—6 of Fig. 2 showing the initial position of the printing cam and its follower.

Fig. 7 is a cross sectional view along the line 7—7 of Fig. 5.

Fig. 8 is an elevational view along line 8—8 of Fig. 7 showing the printing wheel advancing mechanism.

Fig. 9 is an elevational view along the line 9—9 of Fig. 2, showing the device in printing position.

Fig. 10 is an elevational view the same as Fig. 9 showing the inking operation of the device.

Fig. 11 is an enlarged front elevational view of the switch mechanism of the device.

Fig. 12 is a bottom plan view of the switch mechanism.

Fig. 13 is a cross sectional view along line 13—13 of Fig. 11.

Fig. 14 is a wiring diagram of a circuit controlling the operation of the device.

Fig. 15 is a perspective view of a numbered package.

Referring now in detail to the drawings, 10 designates a device embodying the invention. Said device comprises an outside casing 9 mounted in any suitable manner over a conveyor 4 carrying the packages P past said casing (Fig. 1). Fixed to casing 9 is a horizontally extending channel arm 8, fixed thereto as by bracket 8a and screws 8b. Said casing is also provided with a threaded opening 9a disposed over arm 8 and in alignment therewith. Channel arm 8 is provided with a longitudinal slot 7, for purposes herein-

after described. Fixed to the outer end of arm 8, as by a bracket 6a and screws 6b is an upwardly extending arm 6 provided at its upper end with a through opening 5, said opening being in horizontal alignment with the threaded opening 9a. Interconnecting the upper end of arm 6 with casing 9 is a horizontal guide rod 111 having one end passing through opening 5 and the other end screwed into opening 9a.

Referring further to Figures 11, 12, and 13, there is provided a switch member 90 slideably received in the channel shaped arm 8 and slideably suspended on guide rod 111. Said switch member comprises a rectangular box shaped member 91, having a rear plate 92, two side walls 93a and 93b, two end walls 94a and 94b, and a front wall 95, the side wall 93b being provided with a longitudinal slot 96 registering with slot 7 in the arm 8. Fixed to the outer surface of side wall 93a are two guide rod posts 108 and 108a, each post being provided with a through opening 109 in alignment with opening 5 and threaded opening 9a. Guide post 108 is further provided with a thumb screw 110 adapted to register with the opening 109. The guide rod 111 passes through the openings 109.

Pivotally mounted to rear plate 92, as by screw 97, is a wing shaped trip member 98, having a depending portion 98a extending through the slots 96 and 7, and a stop portion 98b. Fixed in the face of wing shaped member 98 is a pin 99 and an insulated button 100. Mounted on the interior surface of end wall 94a is another pin 101, connected by a coil tension spring 102 to pin 99. Spring 102 tends to rotate the member 98 in a clockwise direction (Fig. 11) about its pivot 97, the stop 98b bolting the rotation by abutting side wall 93b.

As the packages P are carried past the device 10 by the conveyor 4 (Fig. 1), the top of packages will engage the depending portion 98a, rotating the wing shaped member in a counterclockwise direction about its pivot 97, charging spring 102. After a package has moved past the depending portion 98a, the wing shaped member 98 will be rotated in a clockwise direction about its pivot 97 until stop 98b again abuts the side wall 93b.

Fixed to end wall 94b adjacent side wall 93a, as by screws 103, is a bracket 104. Mounted on side bracket are three insulated spring fingers 105, 106, and 107, spring finger 106 being engaged by the insulated button 100. Spring finger 106 normally engages spring finger 107 when wing shaped member 98 is in its initial position. Upon rotation of member 98 in a counterclockwise direction in the manner previously described, spring finger 106 moves out of engagement with spring finger 107 and into engagement with spring finger 105. The clockwise rotation of member 98 to its initial position will again bring spring finger 106 into engagement with spring finger 107. The purpose of the switch operation described above will be apparent in the description hereinafter given of the operation of the case marker.

Mounted within casing 9, in any suitable manner, is a frame 10a having two parallel side walls 11 and 12, spaced apart by four spacer rods 13 (Figures 2, 3, and 4). Side wall 12 is provided with a curved through opening 12a near the right hand edge thereof.

Journalled in side walls 11 and 12 are two horizontally aligned, parallel shafts 18 and 19. Rotatably mounted on said shafts are printing hammer members 20a, 20b, 20c, 20d, 20e, 20f, and

20g. Each of said printing hammer members comprises two aligned arms 21 and 22, said arms being provided at both ends with hubs 21a and 21b; and 22a and 22b, respectively, hubs 21a and 22a receiving the shafts 18 and 19, respectively. Each aligned pair of arms 21 and 22 is made into a parallelogram forming a printing hammer by means of two bell crank shaped members 23 and 24 being pivotally connected to the hubs 21b and 22b, said bell cranks being provided with angularly extending arms 23a and 24a, respectively. Bell crank shaped member 24 of the printing hammer members 20a, 20b, 20c, 20d, 20e, and 20f is provided with a projection 24b and an extension arm 24c.

Fixed between arms 23a and 24a of printing hammer member 20g, as by screws 25a, is a type holder 25, said type holder being provided with the removable printing type 26 (Figures 4 and 6). Rotatably mounted between the ends of arms 23a and 24a of each of the remaining printing hammer members, as by studs 27, are digit printing wheels 30a, 30b, 30c, 30d, 30e, and 30f, respectively. Said digit printing wheels are provided with type numerals from "0" to "9." The digit printing wheels 30a, 30b, 30c, etc., will hereinafter be referred to as the "units" wheel, the "hundreds" wheel, the "thousands" wheel, etc., respectively.

Mounted with the digit printing wheels 30a, 30b, 30c, 30d, 30e, and 30f, adjacent arms 24a, are ratchet wheels 31a, 31b, 31c, 31d, 31e, and 31f, respectively, said ratchet wheels being provided with ten teeth. Pivotally mounted to the extensions 24b of bell crank members 24 are stop pawls 33a, 33b, 33c, 33d, 33e, and 33f, said pawls being held in engagement with the teeth of ratchet wheels 31a, 31b, etc., respectively, by coil tension springs 34 fixed to said pawls and to the extensions 24b of members 24.

For the purposes hereinafter appearing, each of the ratchet wheels 31a, 31b, 31c, 31d, and 31e is provided with a peripheral notch 32a, 32b, 32c, 32d, and 32e, respectively, said notches being placed diametrically opposite the figure "9" of the digit printing wheels. The notch 32a is deeper in radial depth than notch 32e, the depth of notches 31b, 31c, and 31d being progressively graduated between the two extremes, the varying depths of the notches being in a straight line.

Means is provided to move the printing hammer members 20a, 20b, etc., into printing position to print on a carton or package P passing beneath casing 9 after tripping the trip member 98a.

Fixed to the outer side of wall 12, as by studs 14, are two parallel strips 15. Fixed to strips 15 is an electric motor 16 provided with a drive shaft 17.

Journalled in wall 11 and through wall 12 is a shaft 35, perpendicular to said walls and concentric with drive shaft 17. Fixed to shaft 35 adjacent the exterior surface of wall 12 is a one revolution clutch 36 coupled to the drive shaft 17.

Means is provided to permit shaft 35 to rotate one revolution each time a package P passes beneath the casing 9. To this end there is affixed to the outer surface of wall 12 a bracket 37 supporting a solenoid 38, having an armature 39 pivoted to said bracket as at 38a. Armature 39 is provided with an extending arm 39a at right angles to said armature and provided at its outer end with a contact pin 39b (Fig. 4). To the right of bracket 37 and in alignment therewith is a support 40 fixed to the exterior of wall 12. Piv-

oted within said support as by shaft 41 and pin 41a, is a latch 42 having arms 42a and 42b.

Arms 42a and 42b are held in engagement with contact pin 39b and clutch 36, respectively, by means of a coil tension spring 43 connected to arm 42a and the side wall 12. When solenoid 38 is energized in the manner hereinafter described, armature 39 will be rotated in a clockwise direction about its pivot 38a (Fig. 2). The contact pin 39b will move latch 42, freeing clutch 36 from arm 42b. Motor 16 will then rotate shaft 35 one revolution in a counterclockwise direction (Fig. 4).

Referring now to Fig. 14, there is disclosed a circuit C for energizing the solenoid 38. Said circuit includes the motor 16, the solenoid 38, and a relay 115 provided with an actuating coil 116. Solenoid 38 is provided with an actuating coil 38c.

Associated with the relay 115 are two switch arms 117 and 119 normally open and adapted to be moved into engagement with fixed contacts 118 and 120, respectively, upon energizing said relay. Associated with solenoid 38 is a switch arm 121 normally engaging fixed contact 122 and adapted to be moved out of engagement with said contact upon energizing said solenoid.

Motor 16 is connected to plus power supply by wire 123 and to minus power supply by wire 124. Spring finger 106 is connected to plus power supply by wires 125 and 123. Spring finger 105 is connected by wire 126 to switch arm 117, and by wires 126 and 127 to coil 116 of relay 115. Spring finger 107 is connected by wire 128 to switch arm 119. Spring finger 106 is connected by wire 129 to fixed contact 118.

Fixed contact 120 is connected by wire 130 to coil 38c. Switch arm 121 is connected by wires 131 and 124 to minus power supply, and by wire 132 to the coil 38c. Fixed contact 122 is connected by wire 133 to coil 116.

The operation of circuit C will now be described.

Upon rotation of trip member 98 in a counterclockwise direction by the passage of a package P, as previously described, spring finger 106 engages spring finger 105, energizing the relay 115, the energizing circuit being from plus power supply, through wires 123 and 125, spring fingers 106 and 105, wires 126 and 127, coil 116, wire 133, switch 121—122, and wires 131 and 124 to minus power supply. By energizing relay 115, switches 117—118 and 119—120 close. Closing switch 117—118 completes a holding circuit for coil 116, holding relay 115 energized after spring fingers 106 and 105 open, the holding circuit being from plus power supply through wires 123, 125, and 129, switch 117—118, wire 127, coil 116, wire 133, switch 121—122, wires 131 and 124 to minus power supply.

Upon return of the trip member 98 to its initial position in the manner previously described, spring finger 106 moves out of engagement with spring finger 105 and into engagement with spring finger 107. Solenoid 38 is thus energized, the circuit being from plus power supply through wires 123 and 125, spring fingers 106 and 107, wire 128, switch 119—120, wire 130, coil 38c, wires 132, 131, and 124, to minus power supply. Energizing solenoid 38 pivots armature 39 about its pivot 38a to trip the latch 42, releasing the clutch 36 and permitting shaft 35 to rotate through one revolution. Switch 121—122 is also opened, de-energizing the relay 115. By de-energizing relay 115, switch 119—120 is opened to de-energize

the solenoid 38, thus restoring circuit C to its initial condition. Latch 42 is returned to its original position by spring 43 to stop the shaft 35 after the latter has rotated through one revolution.

It will be noted that packages, cases, and cartons are made in various lengths and heights. The device 10 may be installed over conveyor 4 at any desired perpendicular distance above said conveyor. For a run of packages to be numbered, the device 10 is so adjusted that the top of packages P will just clear the bottom edges of arm 8 and casing 9. Thus the top of said packages will engage trip 98a to energize the solenoid 38.

Switch member 90 is adjustable as to its horizontal distance from casing 9 for a run of packages of particular length. Number 90 is moved along arm 8 and guide rod 111 so that when the trip member 98a is released by a package P, the surface of said package will be in a position to be printed upon. For a run of packages of the same length, member 90 is fixed in its proper position by fastening the thumb screw 110.

Means is provided to oscillate printing hammer members 20a, 20b, etc., about shafts 18 and 19 each time shaft 35 rotates through one revolution, to print on the package passing the casing 9.

To this end there is fixed to shaft 35, adjacent wall 11, a cam 55 provided with a sharp drop 55a, followed by a sharp ascending spiral portion 55b of about 60°, a slightly ascending spiral portion 55c of about 230°, followed by a slight drop 55d, and an ascending spiral portion 55e of about 70°. Journaled in walls 11 and 12, and parallel to shaft 35 is a shaft 45. Mounted on said shaft adjacent wall 12 is an arm 47 adapted to be rotated by said shaft, and provided with a stop plate 53 adjacent wall 12. Rigidly fixed to shaft 45 adjacent wall 11 is an angular shaped member 46 having radial arms 46a and an arm 46b, similar in form to arm 47, and also provided with a stop plate 53 adjacent to the opposite wall 11. Fixed to the inner surfaces of walls 11 and 12 are two stop members 53a adapted to be engaged by stop plates 53 of arms 46a and 47.

Mounted in the outer ends of arms 46b and 47, and parallel to shaft 35, is a transverse rod 48. Arms 21 of the printing hammer members 20a, 20b, etc., are held in engagement with rod 48 by means of coil tension springs 49 connected to said rod and to pins 49a on each of the arms 22.

Fixed in side walls 11 and 12, near the lower edges thereof, is a rod 51 parallel to the shaft 35. The upper ends of arms 46b and 47 are provided with pins 50, said pins and rod 51 being interconnected by coil tension springs 52. The springs 52 tend to rotate arms 46b and 47 in a clockwise direction about shaft 45 (Fig. 6). Arm 46a is provided with a cam follower 56 at its outer end and in the place of cam 55 arm 46a is rotated by the action of springs 52 holding cam follower 56 in engagement with the periphery of cam 55 (Fig. 6). Arms 46b and 47 are thus positioned in accordance to the position of cam follower 56 on cam 55, positioning the printing hammer members 20a, 20b, etc.

The printing operation of the device will now be described.

Motor 16 is in continuous operation, rotating its drive shaft 17. Upon energization of solenoid 38, by passage of a package to be marked beneath casing 9, armature 39 will trip the latch 42 to release clutch 36. Shaft 35 will then be

rotated one complete revolution in a clockwise direction.

Cam 55 will thus be rotated in a clockwise direction by shaft 35. Follower 56, held in engagement with the periphery of cam 55 by springs 52, will ride over the ascending portion 55e of said cam a short distance, reaching the drop 55a. As drop 55a is reached by said follower, coil tension springs 52 will snap angular member 46 and arm 47 in a clockwise direction (Fig. 9), the rotation being halted by the engagement of stop plates 53 on said members and the stops 53a. Rod 48 will thus be moved downwardly, carrying the printing hammer members 20a, 20b, etc., with it. Said printing hammer members will thus be rotated in a clockwise direction about the shafts 18 and 19. When the motion of rod 48 is halted by the engagement of stop plates 53 and stops 53a, printing hammer members 20a, 20b, etc., due to their inertia, will continue their rotation, charging springs 49. Type 26 and digit printing wheels 30a, 30b, etc., will thus be propelled beyond the bottom edges of walls 11 and 12 against the package P (Fig. 9).

It will be noted that the rotation of printing hammers 20a, 20b, etc., in a clockwise rotation about shafts 8 and 9 will move printing wheels 30a, 30b, etc., and type 26 in a straight line, passing through the center of said printing wheels and parallel to the plane of shafts 18 and 19 and thus, type 26 and the figures of said printing will be pressed squarely against the surface of package P, insuring a clear imprint on said package.

After the printing operation, charged springs 49 will rotate the printing hammer members 20a, 20b, etc., in a counterclockwise rotation about shafts 18 and 19 until arms 21 again abut rod 48. Rod 48 is then quickly rotated in a counterclockwise direction about shaft 45 due to the action of cam follower 56 riding over the sharp rise 55b in the periphery of cam 55. Thus printing hammer members 20a, 20b, etc., are rotated in a counterclockwise direction about the shafts 18 and 19 away from the surface of package P. The quick rotation of rod 48 in the manner described prevents any rebound of the type 26 and the digit printing wheels 30a, 30b, etc., thus insuring a clear imprint on said package, and preventing smearing and blurring.

As cam 55 continues to rotate, cam follower 56 will slide over the ascending spiral portion 55c of said cam, rotating arm 46a in a counterclockwise direction. Shaft 45 is thus rotated in the same direction, rotating arms 46b and 47 against the action of springs 52. Printing hammer members 20a, 20b, etc., will thus be rotated in a counterclockwise rotation about shafts 18 and 19 to their initial position. As drop 55d, the purposes of which will be hereinafter described, in said cam is reached, said printing hammer members are in their initial position. After drop 55e has been passed, follower 56 will ride over the ascending spiral portion 55e to return printing hammer members 20a, 20b, etc., again to their initial position and charging springs 52.

It will be noted that each of the printing hammer members 20a, 20b, etc., are independently rotatable about shafts 18 and 19, and are independently connected to rod 48 by the coil tension springs 49. Each of said members may thus move independently of each other for varying angular distances. Thus, if package P has a curved or irregular surface, the type 26 and digit

printing wheels 30a, 30b, etc., will be propelled against such surfaces leaving a clear imprint on said package (Fig. 15).

Means is provided to ink the type 26 and the printing digit wheels 30a, 30b, etc., before each printing operation.

To this end, there is fixed to the lower edges of side walls 11 and 12, as by screws 60a, a pair of plates each provided on the inside surfaces thereof, with a longitudinal horizontal groove 61 (Figures 4 and 7). Slideably received within the grooves 61 is an ink pad holder 62 provided with a clamping device 62a of any well-known character holding an ink pad 64. Said holder is further provided with two extension arms 63, extending around the edges of walls 11 and 12. Arms 63 are provided with stud pins 63a extending outwardly therefrom and perpendicular to side walls 11 and 12.

Fixed to shaft 35, adjacent wall 12 is a positive cam 65, provided with a low point 65a in its periphery, an ascending portion 65b of about 90°, a circular portion 65c of about 80°, and a descending portion 65d of about 90°. Mounted on wall 11 is a bearing 66. Journaled in said bearing and through the walls 11 and 12 is a shaft 67, parallel to shaft 35. Fixed to shaft 67 adjacent the interior surface of wall 12, is an arm 68, provided at its outer end with a cam follower 69, engaging the periphery of the positive cam 65, the initial position of said cam and said follower being shown in Fig. 5.

Referring now to Figures 2 to 4, inclusive, there is fixed to the outer ends of shaft 67, adjacent the exterior surfaces of walls 11 and 12, the arms 70. Pivotaly connected to the outer ends of arms 70 are links 71, the other ends of said links being pivoted to pins 63a of the arms 63.

The operation of the inking device will now be described.

Referring now to Figures 4 and 5, shaft 35 will be rotated in a clockwise direction in the manner heretofore described, rotating the positive cam 65 in the same direction. Cam follower 69 will ride over the ascending portion 65b of said cam, rotating arm 68 in a counterclockwise direction. Shaft 67 will thus be rotated in the same direction, rotating the arms 70.

As arms 70 are rotated in a counterclockwise direction, links 71 will be moved from left to right (Fig. 4) sliding the ink pad holder 62 in grooves 61 of plates 60 to the right hand edges of said plates. Cam follower 69 will then slide over the radial portion 65c of positive cam 65 for about 180°, holding the ink pad holder 62 in its right hand position.

As cam follower 69 rides over the descending portion 65d of cam 65, arm 68 will be rotated in a clockwise direction, rotating the arms 70 in the same direction. Link 71 is thus moved from right to left, sliding the ink pad holder 62 in the same direction. When cam follower 69 reaches the low point 65a of cam 65, ink pad holder 62 will be moved to its extreme left hand position, i. e., to the ends of grooves 61 and aligned with type 26 and the digit printing wheels 30a, 30b, etc.

It will be noted that while ink pad holder 62 is moved in the manner described, cam 55 has been rotated to return the printing hammer members 20a, 20b, etc., to their initial position, thus permitting the ink pad holder 62 to be moved into the aforesaid position. As cam 55 continues to rotate, cam follower 56 will fall into drop 55d of said cam at the same time that cam follower 69

reaches the low point 65a in cam 65. By falling into drop 55d, cam follower 56 will cause a slight rotation of the printing hammer members 20a, 20b, etc., in a clockwise direction about the shafts 18 and 19. Printing wheels 30 and type 26 are thus moved against the surface of the ink pad 64.

The continued rotation of cam 55 will rotate the printing hammer members 20a, 20b, etc., in a counterclockwise direction about the shafts 18 and 19 to their initial position, while the continued rotation of cam 65 will rotate arm 68 in a counterclockwise direction, moving ink pad holder 62 to its initial position.

Means is further provided to advance the printing digit wheels 30 one figure after each of the aforescribed printing operations.

To this end there is mounted in the side walls 11 and 12, a shaft 75, parallel with shaft 35. Rotatably mounted on shaft 75 is a pawl swing 76, comprising two parallel arms 77 and 78 rotatably mounted on shaft 75 adjacent the side walls 11 and 12, respectively, and a transverse member 79 fixed to said arms and parallel to shaft 75. Arm 78 is provided with an upward extension 78a, provided with a protrusion 78b. Fixed to the end of extension 78a, and perpendicular thereto, is a stud 80, passing through the opening 12a of side wall 12. Mounted in the end of arm 77 and in arm 78 is a rod 81 parallel to shaft 75. Rotatably mounted on said rod is a sleeve 82.

Fixed to sleeve 82 are six actuating pawls 83a, 83b, 83c, 83d, 83e, and 83f, disposed in the planes of ratchet wheels 31a, 31b, 31c, etc., respectively, and adapted to register with the teeth of their respective ratchet wheels. Pawl 83f is provided with an extension arm 84. The actuating pawls 83a, 83b, etc., are so fixed to sleeve 82 that the points of said pawls are in a straight line parallel with the line of the varying depths of notches 32a, 32b, etc.

Fixed to the outer end of arm 84 is a coil tension spring 85, the other end of said spring being connected to the protrusion 78b. Spring 85 tends to rotate pawl 83f in a counterclockwise direction about rod 81 (Fig. 5), thus rotating the sleeve 82 and the other actuating pawls in the same direction. The counterclockwise rotation of said pawls is halted by a stop 86 mounted on arm 78 of the pawl swing 76.

Pivoted to the arm 70, as at 87a, is a link 87, pivoted at its other end on stud 80 of the pawl swing 76.

The operation of the actuating pawls 83a, 83b, etc., will now be described.

By its connection to arm 70, link 87 is actuated by the operation of the positive cam 65 and its follower 69. As cam follower 69 slides over the descending portion 65d of positive cam 65, arm 70 is rotated in a clockwise direction (Figs. 4 and 5). Link 87 will thus be moved from right to left, rotating pawl swing 76 in a counterclockwise direction about shaft 75 (Fig. 4).

By rotating pawl swing 76 in said manner, and by the counter clockwise rotation of printing hammer members 20a, 20b, etc., in a counterclockwise direction in the manner previously described, actuating pawl 83a will engage the teeth of ratchet wheel 31a, rotating the ratchet wheel in a counterclockwise direction to advance the digit printing wheel 30a one figure.

In advancing ratchet wheel 31a, actuating pawl 83a is rotated slightly in a clockwise direction about rod 81 due to the counterclockwise rotation of pawl swing 76. As cam follower 69 slides over the ascending portion 65b of cam 65, pawl

swing 76 is rotated in a clockwise rotation about shaft 75, the charged spring 85 returning the actuating pawl 83a to its initial position.

It will be noted that when actuating pawl 83a engages the ratchet wheel 31a, none of the other actuating pawls engage their respective ratchet wheels because of the manner in which the actuating pawls 83a, 83b, etc., are fixed to sleeve 82. Should the digit printing wheel 30a have the digit "9" in printing position, the "tens" printing wheel must be advanced one figure as well as the "units" printing wheel. When actuating pawl 83a is rotated by the pawl swing 76 in the manner described, the point of said pawl will pass into notch 32a of ratchet wheel 31a, thus permitting the actuating pawl 83b to engage the teeth of ratchet wheel 31b. The rotation of pawl swing 76 will thus rotate the "units" and "tens" printing wheels in a counterclockwise direction, advancing each wheel one figure.

In like manner, if the "units" wheel and then "tens" wheel have the numeral "9" in printing position, after the printing operation of said serial number, the pawl swing 76 will rotate actuating pawls 83a, 83b, and 83c into engagement with their respective ratchet wheels. Actuating pawls 83a, and 83b will pass into the notches 32a and 32b, respectively, while pawl 83c will engage the teeth of ratchet wheel 32c. Thus printing wheels 30a, 30b, and 30c are rotated one step, bringing into printing position for the next printing operation the next higher serial number. Similarly, where the "units," "tens," and "hundreds" wheels have the numeral "9" in printing position, printing wheels 20a, 20b, 20c, and 20d will be advanced in the manner described.

It will thus be seen that there is provided a device in which several objects of this invention are achieved and which is well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiment above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In a device for printing on articles moving on a conveyor, a printing head adjacent to the path of said articles, means to propel said head to impact said article to imprint thereon a switch normally projecting into the path of said articles and adapted to be moved out of said path by each article as it passes said switch, said switch being located before the printing head in the direction of movement of said articles on said conveyor, and spaced from said printing head, means to move said switch back to normal position as each article moves beyond said switch, means operative responsive to the movement of said switch back to normal position after it is moved by said article to actuate said propelling means as each article moves beyond said switch, and means to move said printing head away from said article directly upon impact with said article.

2. In a device for printing on articles moving on a conveyor, a printing head adjacent the path of said articles and adapted to move transversely to the direction of movement of said articles, toward and away from a side of each article, a switch normally projecting into the path of said articles and adapted to be moved out of said path by each article as it passes said switch,

means to move said switch back to normal position as each article moves beyond said switch, means controlled by the restoration of said switch to normal position for propelling said printing head against a side of each article as it moves on said conveyor, for a printing operation, and means for moving said printing head away from said article directly upon impact with said article.

3. In a device for printing on articles moving on a conveyor, in combination with a printing head adapted to print against an article, means to bias the head towards said article, means to maintain said printing head spaced away from said article, against the tension of said biasing means, an inking device, means to move said inking device between said printing head and said article while it is maintained away from said article, means to release said printing head to permit the biasing means to move the printing head toward each article and into contact with said inking device, means to then move said printing head out of contact from said inking device and away from said article, and tension the biasing means, means to move said inking device from between said printing head and said article as said printing head is being moved away from said article, means to thereafter again release said printing head to permit said biasing means to move said printing head against said article for a printing operation, and means to move said printing head away from said article directly upon impact with said article.

4. In a device for printing on articles moving on a conveyor, in combination with a printing head adapted to print against an article, means to bias the head towards said article, means to maintain said printing head spaced away from said article, against the tension of said biasing means, an inking device, means to move said inking device between said printing head and said article while it is maintained away from said article, means to release said printing head to permit the biasing means to move the printing head toward each article and into contact with said inking device, means to then move said printing head out of contact from said inking device and away from said article and tension the biasing means, means to move said inking device from between said printing head and said article as said printing head is being moved away from said article, means to thereafter again release said printing head to permit the biasing means to move said printing head against said article for a printing operation, and means to move said printing head away from said article directly upon impact with said article, the means for moving the printing head away from said article after the printing operation, being adapted to move said printing head away from the article at a faster rate than the movement of said printing head off the inking device by the means which moves the printing head off the inking device.

5. In a device for printing on articles moving on a conveyor, in combination, a printing head adapted to print against an article, a cam adapted to be rotated, follower means associated with said printing head to engage said cam, means to bias said printing head toward said article and said follower against said cam, an inking device and means to rotate said cam; said cam having a dwell portion for maintaining said printing head away from said article against the tension of said biasing means, means to move said inking device between said print-

ing head and said article while said printing head is maintained away from said article, a radial downward step on said cam at one end of said dwell portion to permit said biasing means to move said printing head against said inking device, a rise portion on said cam beyond said step for moving said printing head out of contact with said inking device and away from said article against the tension of said biasing means, means to move said inking device from between said printing head and said article as said printing head is moved away from said article, a sharp drop on said cam at the end of said rise portion to release said printing head to permit the tensioned biasing means to propel said printing head against said article for a printing operation, and a sharp rise portion on said cam extending from said drop to the other end of said dwell portion for moving said printing head away from said article directly upon impact with said article.

6. In a device for printing on articles moving on a conveyor, in combination, a printing head adapted to print against an article, a cam adapted to be rotated, follower means associated with said printing head to engage said cam, means to bias said printing head toward said article and said follower against said cam, an inking device, and means to rotate said cam; said cam including means to maintain said printing head away from said article, means to move said inking device between said printing head and said article while said printing head is maintained away from said article, means on said cam to permit the biasing means to move said printing head toward said article and into contact with said inking device, means on said cam to thereafter move said printing head away from said article and out of contact from said inking device against the tension of said biasing means, means to move said inking device from between said printing head and said article as said printing head is moved away from said article and said inking device, means on said cam to release said printing head to permit said biasing means to propel said printing head against said article for a printing operation, and means on said cam to move said printing head away from said article directly upon impact with said article.

7. In a device for printing on an article, the combination comprising, two parallel shafts, an arm rotatably mounted on one of said shafts, a second arm rotatably mounted on the other of said shafts, parallel and in alignment with the first said arm, means interconnecting the ends of said arms, printing means mounted on said interconnecting means, a cam adapted to be rotated and formed with a sharp drop, follower means for said cam, biasing means to hold said follower against said cam, a second biasing means to hold said second arm against said follower, and means to rotate said cam whereby said cam will release said follower as said follower engages the sharp drop thereof, to permit the first said biasing means to propel said printing means on said arms against said article for a printing operation.

8. In a device for printing on an article, the combination comprising, two parallel shafts, an arm rotatably mounted on one of said shafts, a second arm rotatably mounted on the other of said shafts, parallel and in alignment with the first said arm, means interconnecting the ends of said arms, printing means mounted on said interconnecting means, a cam adapted to be rotated and formed with a sharp drop, follower

means for said cam, biasing means to hold said follower against said cam, a second biasing means to hold said second arm against said follower, and means to rotate said cam one revolution, whereby said cam will release said follower as said follower engages the sharp drop thereof, to permit the first said biasing means to propel said printing means on said arms against said article for a printing operation, said cam being further formed with a sharp rise at the end of said drop thereof, whereby said follower is moved against the tension of said first biasing means to permit said second biasing means to move said printing means away from said article directly upon impact with said article.

9. In a device for printing on an article, the combination comprising, two parallel shafts, an arm rotatably mounted on one of said shafts, a second arm rotatably mounted on the other of said shafts, parallel and in alignment with the first said arm, means interconnecting the ends of said arms, printing means mounted on said interconnecting means, a cam, a follower for said cam, biasing means to hold said follower against said cam, a second biasing means to hold said second arm against said follower, and means to rotate said cam, said cam including a dwell portion to hold said follower away from said articles against the tension of said first biasing means, a rise portion at one end of said dwell portion to further tension the first said biasing means, a sharp drop at the end of said rise portion to release said follower to permit the first said biasing means to propel said printing means against said articles for a printing operation, a sharp rise extending from said drop to the other end of said dwell portion, to permit the second biasing means to move said printing means away from the printed article directly after impact therewith.

10. In a device for printing on an article, the combination comprising, two parallel shafts, an arm rotatably mounted on one of said shafts, a second arm rotatably mounted on the other of said shafts, parallel and in alignment with the first said arm, means interconnecting the ends of said arms, printing means mounted on said interconnecting means, a cam adapted to be rotated and formed with a sharp drop, follower means for said cam, biasing means to hold said follower against said cam, a second biasing means to hold said second arm against said follower, and means to rotate said cam whereby said cam will release said follower as said follower engages the sharp drop thereof, to permit the first said biasing means to propel said printing means on said arms against said article for a printing operation, a second cam coaxial with the first said cam and fixed thereto for rotation therewith, an inking device slideable substantially perpendicular to the direction of movement of the printing means, and means coacting with the second cam for moving said inking device.

11. In a device for printing on an article, a printing head, a cam adapted to be rotated, follower means for said cam, means on said follower means to move said printing head in one direction, spring means to retain the follower means in engagement with the cam and to bias the printing head in said direction, said printing head being movable independently of said follower means, spring means interconnecting the printing head with the follower means, means to rotate said cam, said cam having a drop where-

by said cam will release said follower means as said follower passes said drop to permit the first spring means to propel the printing head against an article for a printing operation.

12. In a device for printing on an article, a printing head, a cam adapted to be rotated, follower means for said cam, means on said follower means to move said printing head in one direction, spring means to retain the follower means in engagement with the cam and to bias the printing head in said direction, said printing head being movable independently of said follower means, spring means interconnecting the printing head with the follower means, means to rotate said cam, said cam having a drop whereby said cam will release said follower means as said follower passes said drop to permit the first spring means to propel the printing head against an article for a printing operation, said cam being formed with a rise beyond said drop, whereby said follower will be caused to move by said rise against the tension of the first spring means, and causing the second spring means to move the printing head in said opposite direction away from the article directly after impact with said article.

13. In a device for printing on an article, a printing head, a cam, follower means for said cam, spring means to hold said follower means against the cam, a second spring means to hold the printing head against said follower means, and means to rotate said cam, said cam including a dwell portion to hold said printing head away from said articles against the tension of the first spring means, a rise portion at one end of the dwell portion to further tension the first spring means, a sharp drop at the end of said rise portion to release said follower means to permit the first spring means to propel said printing head against said article for a printing operation, a rise extending beyond said drop to move said follower, whereby said second spring means will move the printing head away from the printed article directly after impact therewith.

14. In a device for printing on an article, a printing head, a cam adapted to be rotated and formed with a sharp drop, follower means for said cam biasing means to hold said follower against said cam, a second biasing means to draw the printing head to the follower means, means to rotate said cam, whereby said cam will release said follower means as said follower means passes the drop to permit the first biasing means to propel said printing head against an article for a printing operation.

15. In a device for printing on an article, a printing head, a cam adapted to be rotated and formed with a sharp drop, follower means for said cam, biasing means to hold said follower against said cam, a second biasing means to draw the printing head to the follower means, means to rotate said cam, whereby said cam will release said follower means as said follower means passes the drop to permit the first biasing means to propel said printing head against an article for a printing operation, a second cam co-axial with the first cam and fixed thereto for rotation therewith, an inking device, and means co-acting with the second cam for moving said inking device beneath the printing head, said first cam having a second drop to permit the first biasing means to move said printing head against said inking device.

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