

Jan. 5, 1943.

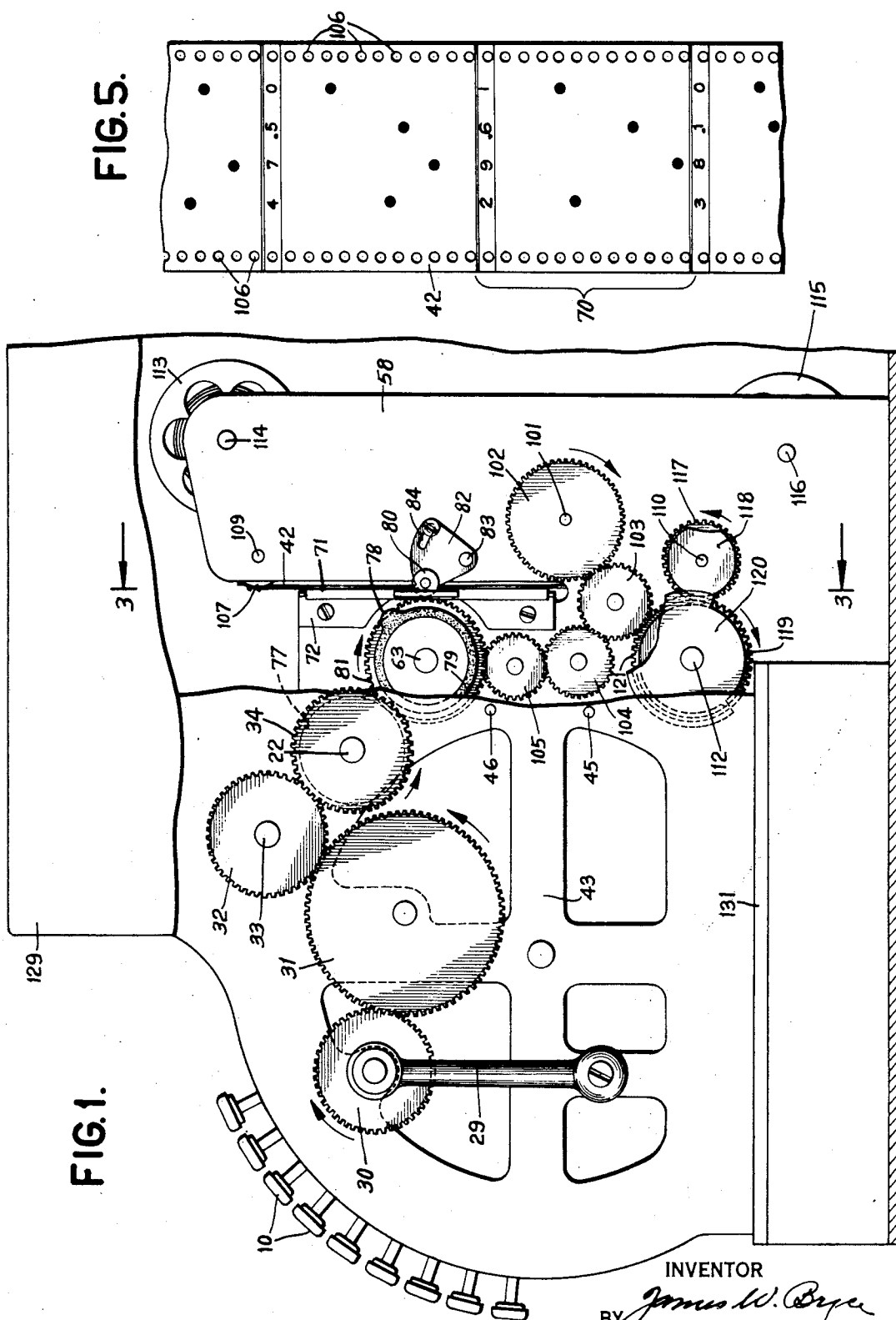
J. W. BRYCE

2,307,108

PRINTING DEVICE

Filed Dec. 14, 1938

7 Sheets-Sheet 1



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2,307,108

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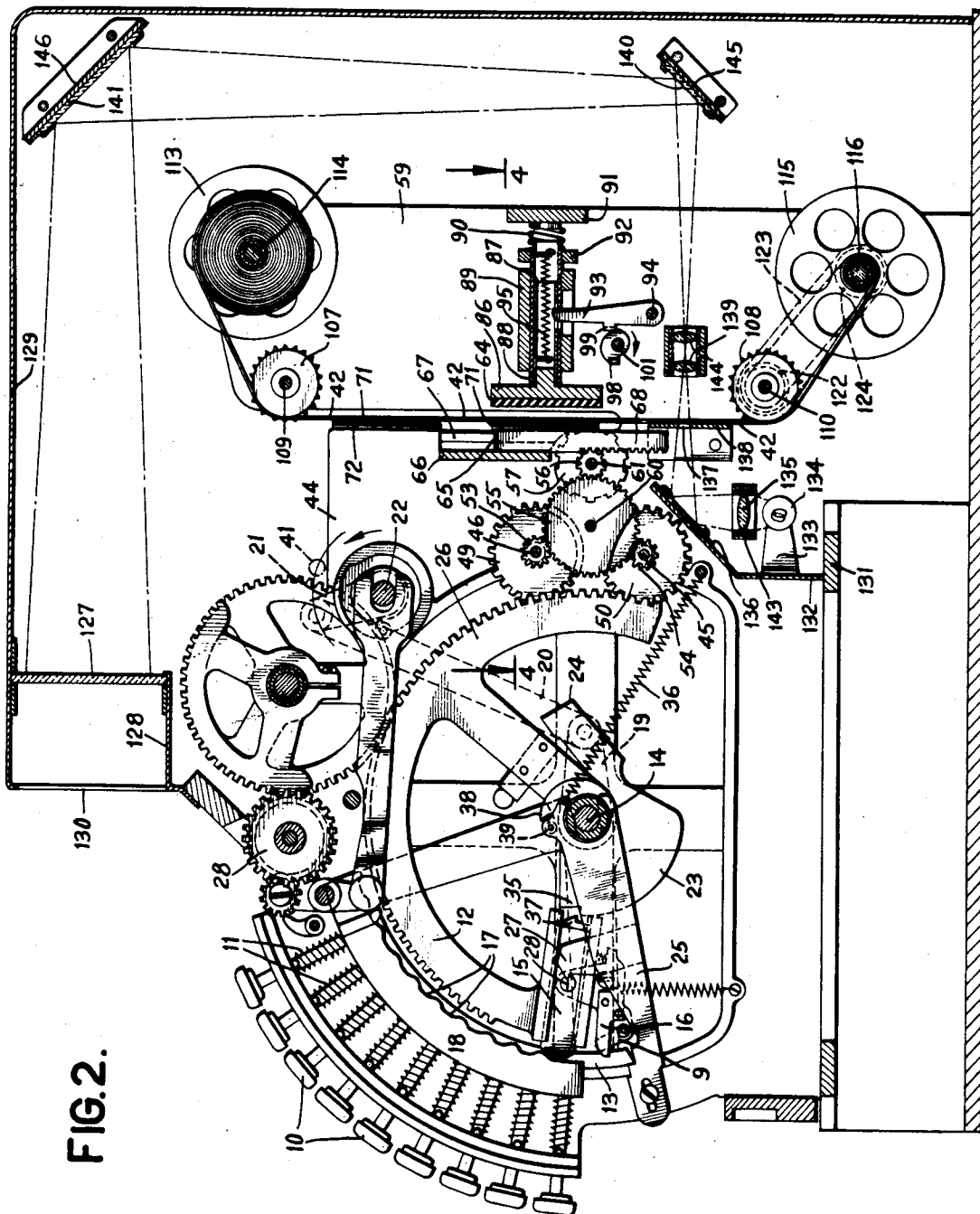


FIG. 2.

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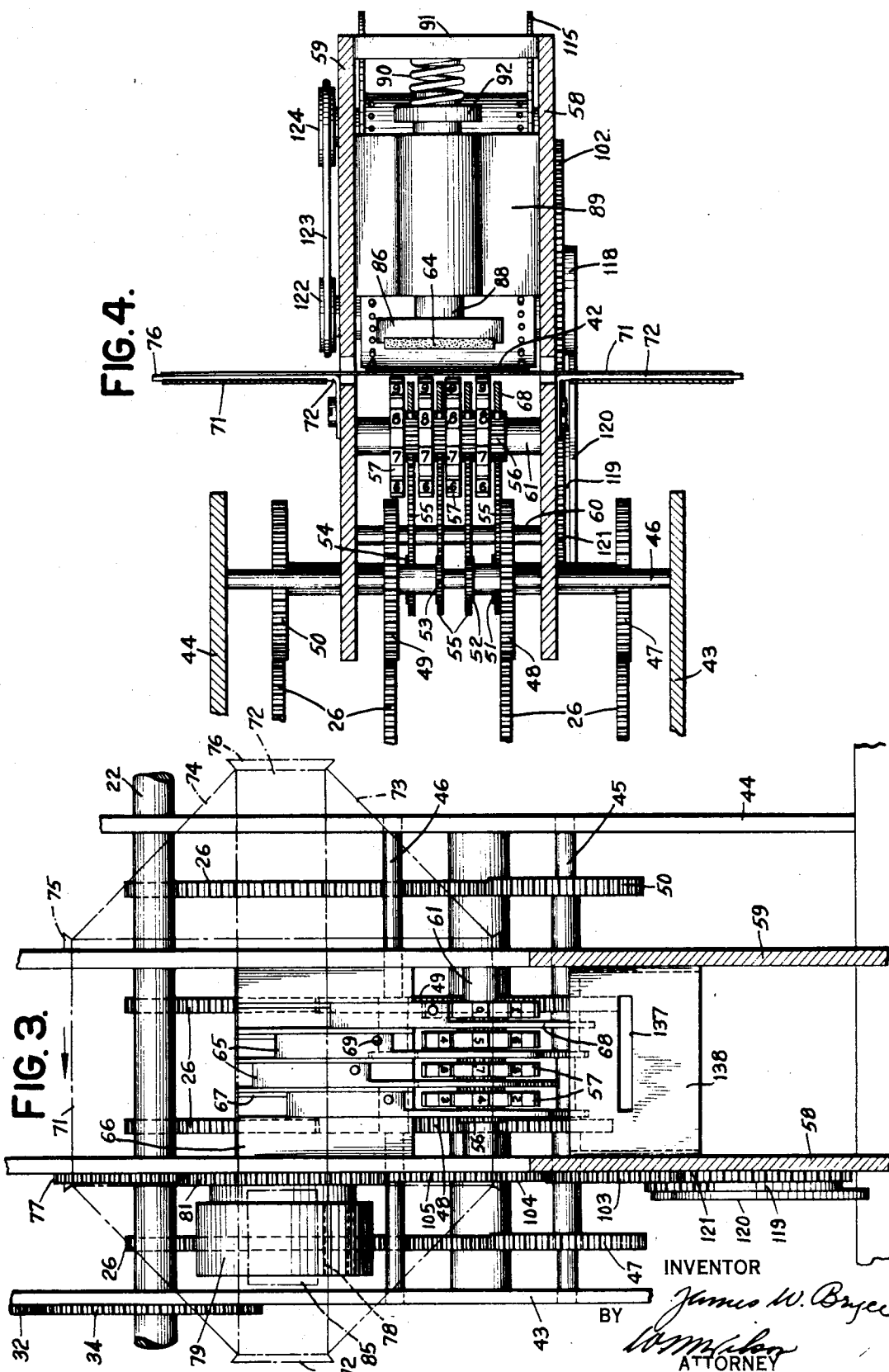
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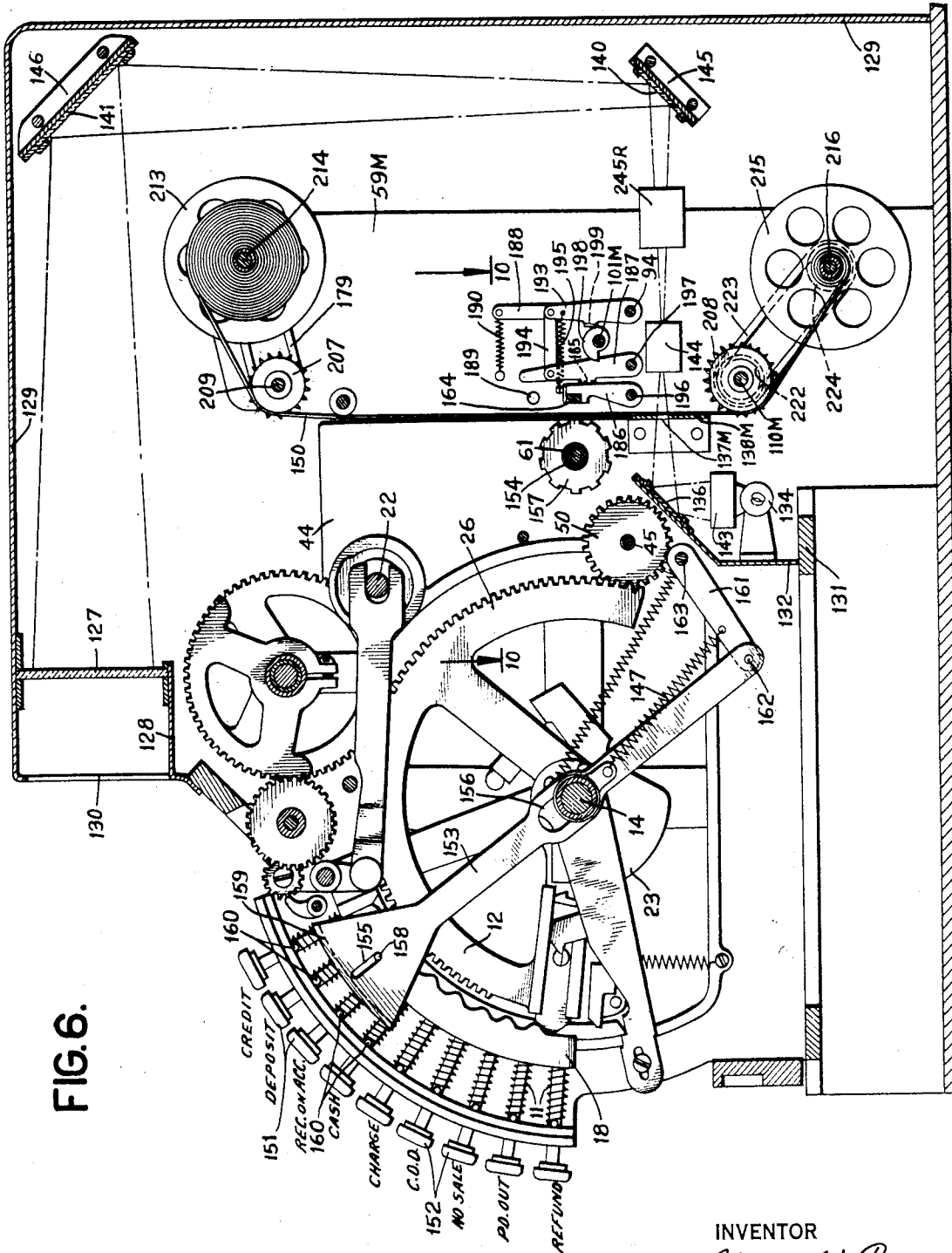


FIG. 6.

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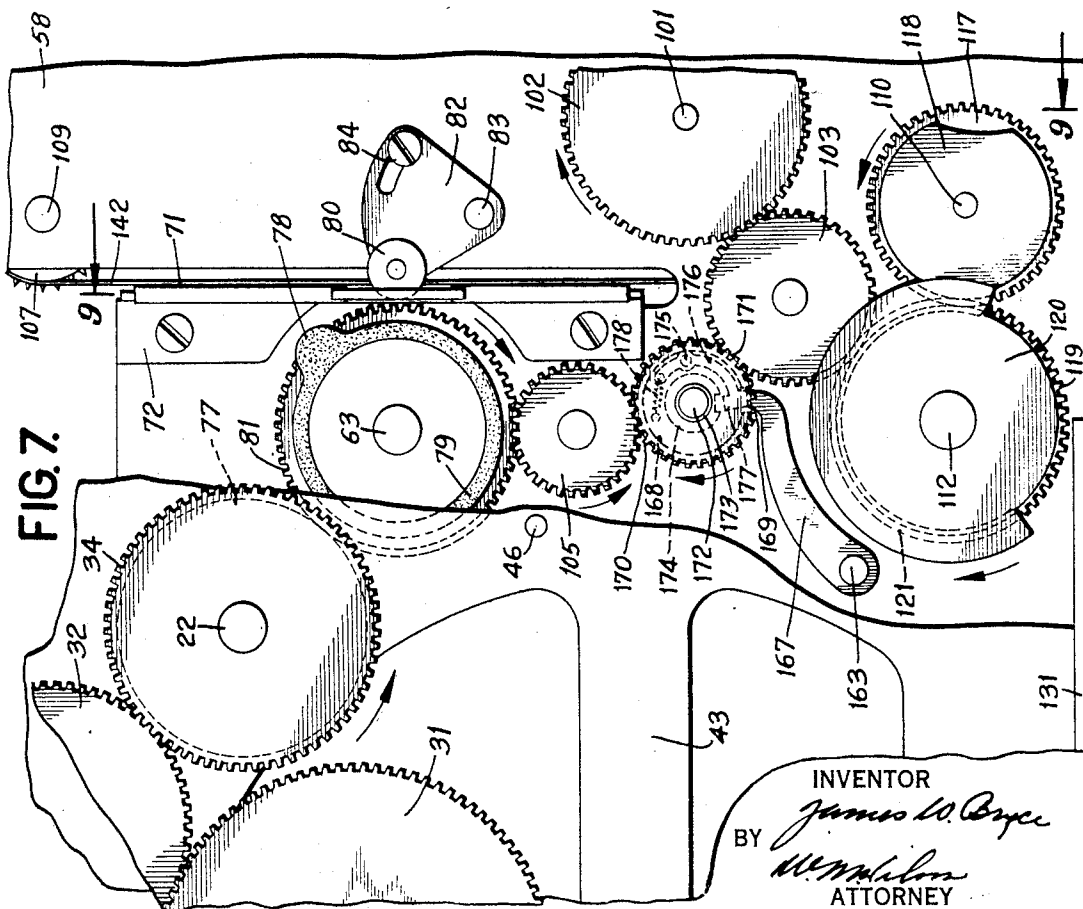
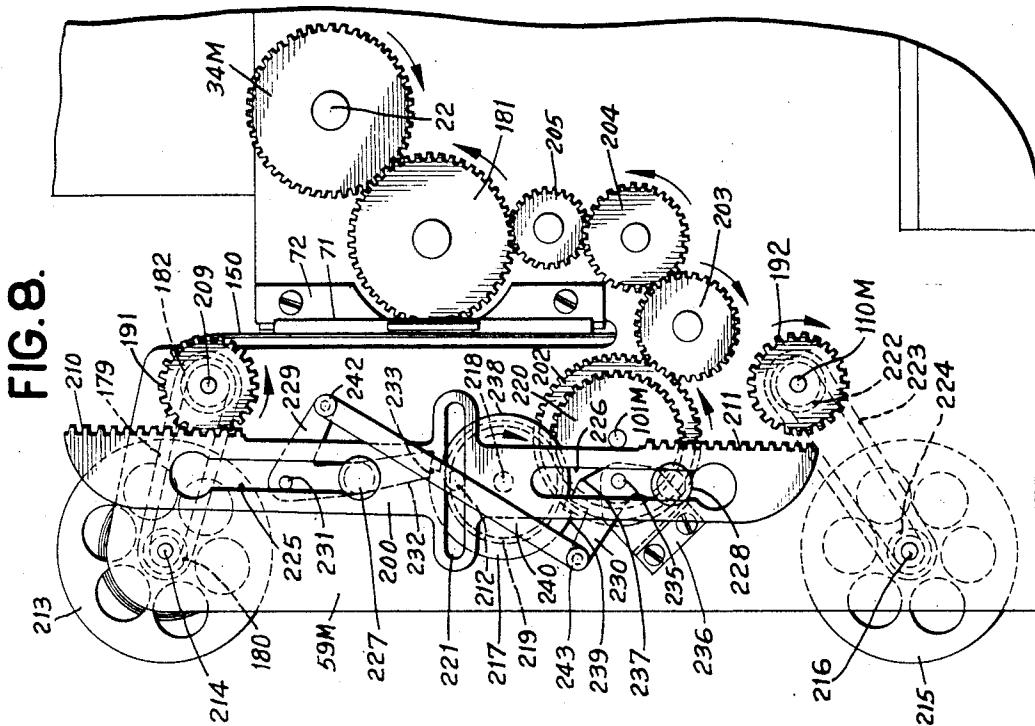
J. W. BRYCE

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PRINTING DEVICE

Filed Dec. 14, 1938

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FIG. 11.

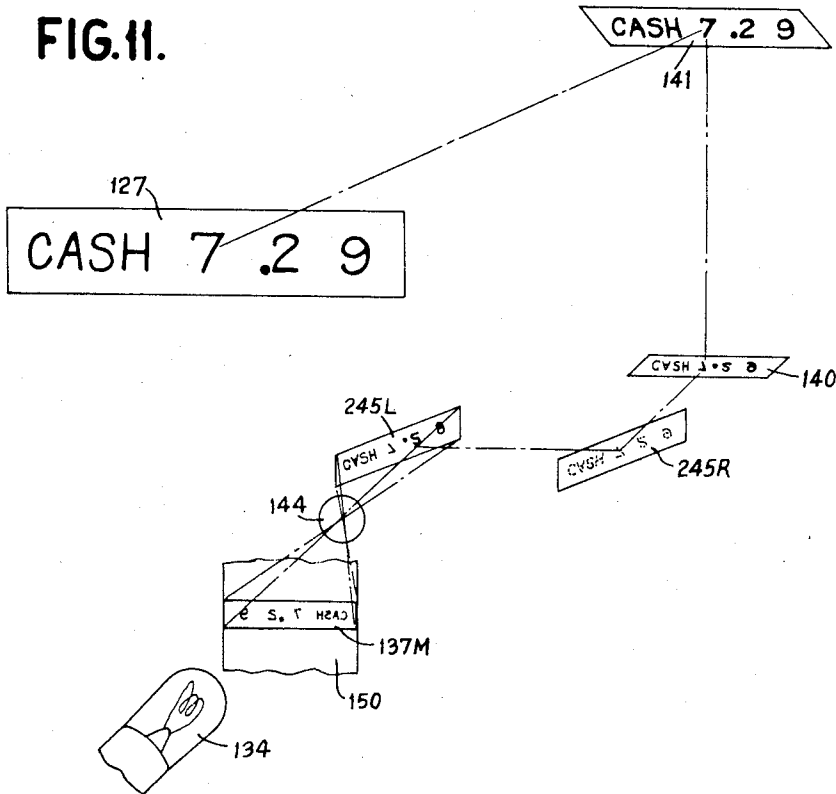
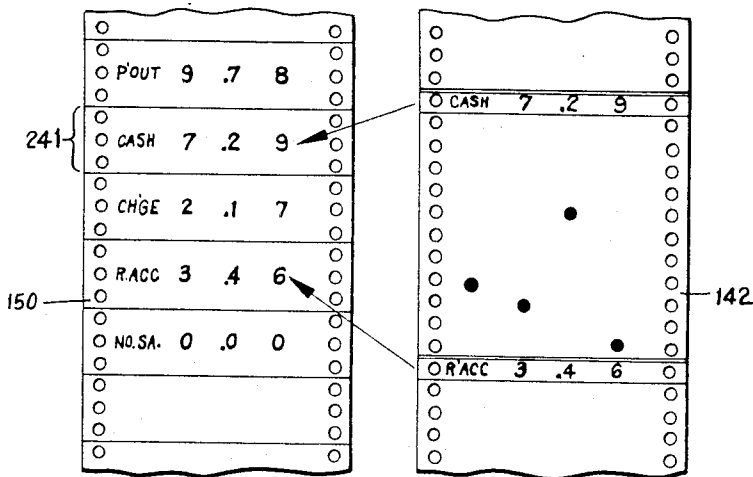


FIG. 12.



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2,307,108

PRINTING DEVICE

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Application December 14, 1938, Serial No. 245,654

5 Claims. (Cl. 101-93)

This invention relates generally to recording devices and more specifically to key controlled devices for printing amounts and identification data and spots associated therewith, said spots or data indicia being located differentially to be representative of said identification and amount data.

An object of the invention is the provision of mechanism controlled by manipulative members for setting up and printing characters and differentially spaced spots located in alignment with said characters, the distance between a character and a related spot being representative of the value or nature of the character.

Another object of the present invention is the provision of an indicating device controlled by a printed record made as an incident to the regular operation of a key set machine.

A feature of the present invention is the production of character recordings on a strip of transparent material, and the provision of optical devices cooperating with said strip for projecting an image of said printed characters. Associated with the transparent strip carrying the printed characters is a source of light which is directed through the strip to carry an image thereof by reflection along by a series of mirrors and through lenses to a translucent screen to reveal an enlarged, upright reproduction of the characters selected by operation of the machine. The screen is mounted in a recessed box to darken it and emphasize the lighted image.

Another further object of the present invention is the provision of a series of spot printing slides geared directly to printing wheels so that adjustment of the wheels to character printing positions is communicated directly to said slides.

A still further object of the invention is the provision in a cash register of strip printing means for recording the data set up by the keys of said machine and then, later in each cycle, projecting an image of the data on the strip and maintaining said projected image until the machine is again operated.

Another object of the present invention is the provision of a pair of transparent strips and controls associated therewith for recording and indicating impressions of classified data set up on a keyboard. The one strip which may be called an indicating strip has imprinted thereon all data set up in the form of characters and numbers which are then projected on an indicating screen. The other strip in the form of a code record only receives certain classes of data which appear thereon as characters and also as differentially

located indicia or coded spots representative of the classified data. The operating transaction keys are divided into classified groups, only certain of which render effective the printing and feeding devices associated with the code strip. For example, "cash," "received on account," and "deposit keys" may call for a code representation, while "charge," "C. O. D.," "no sale" and "paid out" keys prevent printing on the code strip and feeding thereof. The indicating strip is line spaced on each cycle, while the code strip requires a long feed operation which is effected selectively only after the code printing devices are operated.

An object of the invention is the provision of clutch mechanism between a code strip printer and feeder and a driver therefor; said clutch being operable selectively by certain transaction keys of a plurality of transaction keys of different classes.

Another feature of note is the provision of feeding devices for moving an indicating strip back and forth, from print receiving position to indicating position by a long feed operation and then back from indicating position to a position one line space short of the printing position to receive another line of print.

A further object of the invention is the provision of a platen printing hammer operated by a double spring release for effecting an impression by an overthrown movement of the hammer. One spring impels a mover for the hammer, and another spring between said mover and hammer connects the two so that when the former is stopped suddenly, the inertia of the hammer carries it further to strike, but said other spring instantly retracts it to allow strip feeding to take place.

An object of the invention is the provision of means for recording data by coded spot representations and related true numeral and letter representations. The true printed representations are of utility in indicating the amount and nature of the transaction that has been entered into the machine, and also as direct interpretations of the coded marks on the transparent strip where they both appear. The coded spot impressions are of utility in controlling other statistical machines to effect the punching of record cards or the making of other accounting records.

Further objects of the instant invention reside in any novel feature of construction or operation or novel combination of parts present in the embodiment of the invention described and shown in the accompanying drawings whether within or

without the scope of the appended claims and irrespective of other specific statements as to the scope of the invention contained herein.

In the drawings:

Fig. 1 is a side elevation view of the cash register and the drive gearing to the strip printing and feeding devices.

Fig. 2 is a sectional elevation view through the center of the cash register.

Fig. 3 is a sectional elevation view taken along the line 3—3 in Fig. 1 and looking towards the front of the machine at the drive gearing for the typewheels.

Fig. 4 is a sectional plan view taken along the line 4—4 in Fig. 2 and looking down on the printing and strip feeding devices.

Fig. 5 shows a sample length of the transparent record strip.

Fig. 6 is a sectional elevation view of the cash register with the alternative dual record strip control, showing the classified transaction key bank which controls the selective effectiveness of the code strip printing and feeding devices.

Fig. 7 is a side view of the drive gearing showing the clutch which is controlled by transaction keys.

Fig. 8 is a side elevation view of the devices for feeding the indicating tape back and forth from print receiving position to indication position and return.

Fig. 9 is a sectional elevation view taken along the line 9—9 in Fig. 7.

Fig. 10 is a sectional plan view taken along line 10—10 in Fig. 6.

Fig. 11 is a diagrammatic view showing the projection of the data on the transparent strip upon a translucent screen.

Fig. 12 discloses examples of an indication strip and an associated code strip.

The cash register shown in connection with the present improvements is for illustrative purposes only as any other form of item entry accounting device may be employed. The type of machine shown is well known and a complete description thereof may be found in numerous patents, particularly the patent to J. P. Cleal and F. A. Reinhard, No. 580,378, dated April 13, 1897.

As shown in the patent referred to, the machine is provided with a series of banks of nine digit keys, of which only one bank is shown in Fig. 2. These keys are indicated by reference numeral 10 and are depressed against the tension of their springs 11 to determine the differential movement of operating actuators 12. The keys 10 are arranged with the "1" key near the bottom and the others progressing in value up to the "9" key at the top. The operation of any of these keys 10 in a bank elevates an associated arcuate detent 13 to release an actuator for operation. The actuators 12 are all journaled loosely on a main shaft 14 and are provided with slidable locking or latching plates 15. The actuators 12 carry pivoted levers 16 and trip pawls 9 which are adapted to engage and be stopped by the inner end of any depressed key 10.

Slidably mounted on shaft 14 are a series of latches 25, one for each detent 13. Each detent holds a latch to the left with a hook 27 thereon engaging a flattened stud 28 on lever 16. Whenever a key is depressed and the associated detent 13 is raised, latch 25 is released and moved to the right by spring 36 whereupon hook 27 is moved away from stud 28 and lever 16 which then permits latch plate 15 to move inward to hook a point 37 thereon with shoulder 35 and

thus connect actuator 12 to drive segment 23 for differential movement. Restoring cams 38 fastened to shaft 14 cooperate with studs 39 on latches 25 to restore them near the end of the operating cycle.

When the trip pawl 9 abuts against a depressed key, the lever 16 and plate 15 is moved thereby, outward and into one of a series of notches 17 of a plate 18, thereby locking the actuator 12 in a differentially adjusted position.

The main shaft 14 is arranged to be oscillated at each operation by a crank arm 19 connected through a link 20 to a second crank arm 21 rigidly mounted on an operating shaft 22 of the machine. Rigid on shaft 14 is a series of segments 23 one for each actuator 12 which together with depending projections 24 serve to move the actuators 12 in opposite directions in a well known manner. It will be understood that although this mechanism is shown in connection with only one bank of keys, there will be an actuator 12 and a cooperating mechanism for each bank. The actuators 12 each carry a rack 26 which is adapted to control the setting of the usual totalizer element 28 and the printing devices of the present invention.

The operating handle 29 (Fig. 1) of the cash register is provided with a pinion 30 which meshes with a gear 31 which in turn meshes with a gear 32. The gear 32 is secured to one end of a transverse shaft 33 and meshes with a gear 34 secured to the transverse shaft 22.

A change is made in the operating cycle of the cash register to allow more time for operation of the printing and indicating devices of the present invention. As arranged in Patent 580,378, the actuators 12 are restored in the first half cycle and then set differentially in the second half of the operating cycle according to the key settings. This is changed so that in the present disclosure the actuators 12 are set early in the cycle, and then restored in the second half of the cycle. The change is made by advancing the pinion 30 (Fig. 1) through 180 degrees of movement and then reassembling the handle 29 thereto to make the midpoint of the usual cycle, the starting point of operations as presently disclosed.

It may be noted that when the segments 23 are in the normal home position, Fig. 2, they are lowered so that shoulders 35 formed on the segments will be engaged by the slides 15 of the banks in which keys have been depressed, so that the actuators 12 carrying the trip pawls 9 of the levers 16 of the banks in which keys are depressed, will be carried rearwardly distances determined by the values of the depressed keys which are abutted by pawls 9 when shaft 14 is rocked in a clockwise direction.

Upon counterclockwise rotation of shaft 22 by the handle 29 (Fig. 1) and gear train 30, 31, 32 and 34, the segments 23, Fig. 2, are moved clockwise, carrying along therewith all released actuators 12 until the latch plates 15 thereon are opposite depressed keys 10, at which time the plates 15 are moved into a related notch 17 and away from the drive shoulders 35. Thus, the actuators 12 and connected racks 26 are set differentially in the first part of the operating cycle.

In the second half of the operating cycle, shaft 22 is moved further in a counterclockwise direction, and arm 21 thereon is moved upward on the right side of shaft 22. Link 20 is drawn upward towards the home position, and the pro-

jections 24 engage the positioned actuators 12 to move them into the normal position. Then cams 38 on shaft 14 engage studs 39 to restore the latches 25 to the positions wherein they are held by detents 13 until a key is depressed. Because the pivot of link 20 on arm 21 moves over the top dead-center location 41 in going to the normal position, cams 38 are withdrawn from studs 39 after restoring the latches. For the same reason, projections 24 move back slightly away from the restored actuators 12.

Another change made in the actuating mechanism to suit the present requirements is the reversal of cams 38 and the placement of the studs 39 on the top of latches 25 rather than at the bottom as shown in Patent 580,378. This is done to enable restoration of latches 25 by a counterclockwise movement of shaft 14 near the end of the cycle, instead of restoration by a clockwise movement as in the patent. This change in restoration does not affect the detenting action of the latches which are effective as in the usual construction.

From the foregoing, it may be gathered that the amount representing racks 26 are moved clockwise differential extents during the first half of the cycle, and then restored during the second half of the operation. It will now be explained how the movement of said racks is communicated to numeral and spot printing devices early in each cycle, so that printing may be effected on a transparent record 42, Fig. 5, at about the midpoint of the cycle, said transparent record then being fed to an indication projecting position while the racks are being reset late in each cycle.

Referring to the plan view in Fig. 4, it is seen that four amount racks 26 are spaced between a pair of main side frames 43 and 44. These side frames carry a pair of shafts 45 and 46 on which there are pivoted four denominational gears 47, 48, 49 and 50 meshing with the units, tens, hundreds and thousands racks 26, respectively. These gears are connected by tubing to pinions 51, 52, 53 and 54, each meshing with an idler gear 55 engaging a related pinion 56 on one of four numeral type wheels 57. The printing devices are assembled as a unit on a pair of intermediate side frames 58 and 59 between which extend a shaft 60 on which the idler gears 55 turn, and a shaft 61 which supports the type wheels 57.

The type wheels are formed with ten equally spaced type faces bearing embossed digit numeral configurations. Normally, the "0" type is in horizontal alignment with the center of shaft 61, Fig. 2, and facing the rear towards a flat platen 64. Any differential movement of racks 26 causes a corresponding setting of the type wheels 57 into positions representative of the keys operated. In Fig. 3 the parts are shown in an operated position with the wheels positioned ready to print the amount 0574.

Associated with the four type wheels 57, Fig. 3, are four spot printing bars 65. These bars 65 are slidably mounted in a comb guide 66 which is fastened between frames 58 and 59 and formed with four recesses in which there are vertical ribs 67 for engaging in a long notch in the bars to guide them vertically and hold them in place. Each bar 65 is formed with a depending rack 68 having teeth meshing with the pinion 56 on a related type wheel 57. As a wheel is turned counterclockwise, Fig. 2, and set differentially, pinion 56 raises rack 68 and bar 65 so that

an embossed spot printing type face 69, Fig. 3, thereon is positioned above the numeral printing line, a distance commensurate with the value of the numeral which is selected to be printed and indicated. For example, in Fig. 3 it is seen that with the highest order wheel at "0," the highest order spot printing bar 65 is in its lowest position; and with the hundreds order wheel at "5" the related spot bar is raised with the circular marking face 69 five steps above the spot face at the right; and since the tens numeral is "7," the tens bar 65 is raised two steps above the hundreds bar. From the foregoing, it may be gathered that when the numerals and spots are printed on the record strip 42, Fig. 5, the spots will be separated vertically from a related numeral by a distance which is a measure of the size of the numeral. Because the strip 42 is printed while held in an upside down and reversed position, when the strip is viewed as seen in Fig. 5, the ink marks are on the back of the transparent material, and the spots are below the numerals with which they are associated. The portion 70 is a complete frame or picture of the amount 29.61 represented numerically and graphically on the film strip.

Since the spot printing bars 65 are in constant engagement with the type wheel pinions 56, when these wheels are restored to zero at the end of each cycle, the bars are also brought down to the normal zero position.

Between the transparent strip 42, Fig. 4, and the printing wheels and bars, there is placed an inking ribbon 71. This ribbon is a wide continuous band which is so arranged that it follows a substantially square path in a vertical plane across the rear of the printer. Two brackets 72 are fastened to the outside of frames 58 and 59, and the ribbon is fed around the beveled edges 73 and 74, Fig. 3, of the extending part of each bracket. Extensions 75 and 76 are formed on each bracket to confine the ribbon in a fixed path.

The ribbon 71, Fig. 1, is fed early in each cycle by being pinched and shifted between an extension 78 on a rotating rubber cylinder 79 and a roller 80. Cylinder 79 is fastened to a gear 81 which is pivoted on stud 83 and in mesh with a gear 77 connected with drive gear 34, and thus the cylinder is given a complete turn in a clockwise direction on each cycle. Roller 80 is pivoted on a segmental plate 82 which is fulcrumed at 83 on the right side frame 58, said sector being adjustably held by a screw and slot fastening 84 so that the roller 80 may be set in variable positions in the path of the yielding extension 78 to vary the extent of the feed.

Roller 80 projects through an opening 85, Fig. 3, in the left bracket 72 and presses part of the ribbon forward towards the feed extension 78. As viewed in Fig. 3, the ribbon is fed in a counterclockwise direction with the effective lower horizontal part of the ribbon moving towards the right, then up and around the beveled corners 73 and 74 and across horizontally towards the left and then down past the feeding means.

After the type wheels 57 and spot bars 65 are set differentially, a printing impression is taken therefrom. The platen 64 is in effect a printing hammer, because in the middle of each cycle it is thrown against the transparent strip 42 to press it against the ribbon and numeral type 57 and spot faces 69 behind the ribbon. A backing plate 86 to which the platen is fastened, is fixed to a tube 87 which slides within another tube 88. The

two tubes are connected by a spring 95 which holds plate 86 normally pressed against the front of outer tube 88. This outer tube is supported by a casting 89 fixed between side frames 58 and 59. A horizontal cylindrical hole is formed in the center of casting 89, and the tubes are slidable back and forth therein to effect printing. A compression spring 90 presses between a fixed cross bar 91 and a flange 92 on the end of tube 88 and tends to move the platen towards the printing position. Such movement is normally prevented by a tripping arm 93 pivoted at 94 and extending upward through an opening in casting 89 and through a slot in the bottom of the tube 88. The arm abuts against the rear edge of the slot and holds tube 88 and platen 64 normally retracted against the pressure of spring 90.

Movement of tripping arm 93 is governed by a cam 98 which cooperates with a lug 99 on the arm to first rock it in a clockwise direction and then at the middle of the cycle, when the type have been set differentially, lug 99 is suddenly permitted to drop off the high point on the cam, and spring 90 is then free to push the tubes and the platen toward the impression making position. It will be noted that during the first part of each cycle, cam 98 moves arm 93 gradually in a clockwise direction, and the arm pushes tube 88 toward the rear to retract it beyond the normal retracted position. Spring 95 causes the inner tube 87 and the connected platen 64 to follow the outer tube towards the rear.

When the trip arm 93 is released by cam 98 and the tube 88 is permitted to fly forward, the movement of this outer tube is not sufficient to bring the platen against the type. However, the inertia of the moving platen, plate and inner tube is persistent enough to stretch the inner spring 95 and move the inner tube and connected platen forward momentarily with respect to the outer tube. Thus the platen 64 is thrown forward to effect a printing impression and then spring 95 moves the platen back to free the record strip 42 for a feeding operation.

It may be noted that at the bottom of tube 87 the slot encircling the end of arm 93 is longer than the slot in the outer tube 88. This extra length permits relative movement between the tubes. The slots not only cooperate with arm 93 for restoration of the tubes, but they also act as keying means for preventing the tubes from turning in the casting 89.

Cam 98 is attached to a shaft 101 which is turned by a gear 102, Fig. 1. This gear 102 is rotated in a clockwise direction by a train of gearing comprising idler gears 103, 104 and 105, the latter of which meshes with gear 81. Gear 102 and gear 30 are of the same size so that one complete rotation of shaft 101 is effected on each operating cycle. Gears 103, 104 and 105 pivot loosely on studs extending from right frame 58.

The margins of the transparent record or film 42, Fig. 5, are formed with lines of feed perforations 106 which engage teeth on pairs of sprocket wheels 107 and 108, Fig. 2, attached to shafts 109 and 110 pivoted in the intermediate side frames 58 and 59. The film is drawn from a supply reel 113 pivoted loosely at 114; and then it is caught on the guide sprockets 107, passed between ribbon 71 and platen 64, down around feed sprockets 108 and finally wound on a storage reel 115 fastened to a shaft 116.

The shaft 110, to which the feed sprockets 108 are attached, extends out of right frame 58, Fig. 1, and has fixed thereon a pinion 117 and an in-

termittent locking plate 118. Cooperating with pinion 117 and plate 118 are a partial gear 119 and a locking disk 120 on a gear 121 in mesh with the idler gear 103. Gear 121 turns freely on a stud 112 and is proportioned to turn gear 119 and disk 120 one complete revolution in a clockwise direction every time the handle 29 is turned. For more than half of each cycle, pinion 117 remains stationary and the record strip 42 is held still as the periphery of disk 120 slides along one of the two arcuate indentations in plate 118. It is only after printing has been effected that the cutout part of disk 120 is opposite the plate 118 so that the plate is unlocked when the teeth of the partial gear 119 engage pinion 117 and turn it and shaft 110 a half revolution in a counterclockwise direction. This movement of shaft 110 is sufficient to turn sprockets 108, Fig. 2, and draw down strip 42 the distance of one printed frame, i. e., a space indicated by the bracket 70 in Fig. 5.

The slack in the advanced strip 42 is taken up on the storage reel 115 by an arrangement for automatically turning the reel as the sprockets 108 rotate. Fastened to shaft 110 is a pulley 122, Fig. 4, around which is drawn a belt 123 the other end of which passes around another pulley 124 fixed on the end of the storage reel shaft 116. Thus, reel 115 is turned counterclockwise on each feeding operation. Any tendency of the reel 115 to draw an excessive amount of film is compensated for by the slippage of the belt 123.

Devices are provided for indicating the amount set up on the keyboard and impressed as printed numerals on the transparent record strip 42. The printed numerals on the transparent record are displayed by being reflected on a translucent screen 127, Fig. 2, mounted in a recessed shielded box 128 set into the upper part of the casing 129 with an opening 130 facing toward the front of the machine. The light defining the numerals on the screen 127 is projected through the record 42 and a series of lenses and mirrors before reaching the screen.

Mounted on a base plate 131 is a frame 132 holding a bracket 133 which supports a light bulb 134. The rays of light from bulb 134 are directed through a rectangular concentrating lens 135 and reflected horizontally off a mirror 136 held at an angle on frame 132. These horizontal rays of light are directed through a rectangular slot 137 in a shield or mask 138 fastened between the frames 58 and 59. The shield is so located that slot 137, Fig. 3, is a distance below the printing line of numeral type wheels 57 equal to the length of one frame on the record film 42, i. e., a distance equal to the length of feed 70, Fig. 5. Therefore, after each printing and feeding operation, the transparent record is positioned to bring the last line of printed numerals thereon opposite the slot 137, Fig. 2. Since the numerals on the record are quite small and since they are printed upside down, the light rays from the record are directed through enlarging lenses 139 and reflected off mirrors 140 and 141 before reaching the screen 127 where they define the printed numerals right side up. The rectangular lenses 139 are mounted in a holder 144 and lens 135 is held in holder 143, said holders being fixed between the side frames. Mirror 140 is attached to a cross bar 145 fastened to the inner walls of the casing 129, and mirror 141 is mounted in a similar fashion on bar 146.

Since the transparent record 42 remains in the advanced position after each operating cycle, and

since the light of lamp 134 is radiated as long as a main switch is closed, the indicated amount remains displayed on screen 127 until the machine is again operated to print other numerals on the record.

The foregoing portion of the description is concerned mainly with the production and use of a single transparent record strip 42 as set forth in Figs. 1 to 5. A modification disclosed in Figs. 6 to 12 provides for the production of two transparent record strips 142 and 150, Fig. 12. Code strip 142 is similar to the strip 42, Fig. 5, except that transaction data is recorded thereon in addition to amount data.

Only certain kinds of transactions are recorded on the strip 142 for when other transactions are selected, the strip does not receive any printed impressions, nor is it fed. The other transparent strip 150 is used for indicating or display purposes, because on it are recorded all transactions and all amounts set up on the keyboard. In Fig. 12 it may be noted that only cash receiving transactions are recorded on strip 142, but all transactions are printed on strip 150.

The keyboard of the modification, Fig. 6, is the same as that of Fig. 1 in three amount banks, but a bank of transaction keys 151, 152 are provided in which the four upper keys 151, identified as "Credit," "Deposit," "Received on account" and "Cash" keys, relate to money receiving transactions; while the five lower keys 152, identified as "Charge," "C. O. D.," "No sale," "Paid out" and "Refund" keys, are concerned with outlaying transactions. The banks of amount keys and the transaction keys of Fig. 6 control the setting of the differential actuators 12 and operating racks 26 in the same manner as set forth hereinbefore.

In Fig. 10 it is seen that the racks 26 are geared to a set of three numeral print wheels 57 and a transaction print wheel 57T, by means of the gearing 49, 50, 53, 54, 55 and pinions 56 such as the gearing previously described. However, the four print wheels 57 and 57T which are operated directly are not alone on shaft 61, but this shaft is extended beyond frame 59 into another frame 59M, and a second set of printer wheels 157, 157T are provided to print on the transparent indication strip 150, Fig. 12, while wheels 57 and 57T print on the code strip 142. Wheels 157 and 157T are connected to related wheels 57 and 57T by means of a set of four telescopic tubes 154 so that any movement imparted to any of the wheels at the right of the machine may be communicated directly and positively to the related wheel at the left. Of course, the extra set of wheels 157, 157T, at the right in Fig. 9, are reversed in order with the transaction wheel 157T at the left, near the other transaction wheel 57T which is at the right of its related numeral wheels. These positions are made congruent by reversing the type faces so that the type on wheels 157, 157T appear erect from the rear, Fig. 9, while the type on wheels 57 and 57T are upside down.

The inking ribbon 71M used with the type wheels of the modification in Fig. 9 is supported and operated in the same fashion as the ribbon 71 described hereinbefore, except for its greater length and the mounting of bracket 72 on frame 59M instead of frame 59 so that the horizontal portion of the ribbon is wide enough to pass behind all eight of the type wheels.

The spot printing bars 65, Fig. 9, are geared to type wheel pinions 56 in the usual way and sup-

ported in guide 66. The highest order bar 65 instead of representing amounts, prints a spot which is representative of the transaction related to the amount recorded by the other three bars.

From observation of the views in Figs. 9 and 10 it is seen that the code strip 142 is printed by wheels and impression devices at the right side of the machine between frames 58 and 59. And the feeding of the code strip is governed by devices outside the right side frame 58. The other strip 150 is marked by wheels and impression devices at the left side, between frames 59 and 59M. Movement of this indicator strip 150 is controlled by mechanism supported outside the left frame 59M. The controls over the printing and feeding of the two strips are exercised separately, because non-printing control is effected at times in connection with strip 142, and the strips are fed different distances.

The impression effecting devices and feeding devices cooperating with the code strip 142 are the same as those described hereinbefore in reference to strip 42, and they are operated the same with the exception of a break in the driving connections leading to these two devices. Reference to Fig. 7 makes it clear that the drive gearing leading to the printer operating shaft 101 and the feed operating shaft 110 is the same with the exception of a normally disconnected clutch which is placed between drive gears 103 and 105. This clutch is operated to be connected for effecting printing and feeding of the transparent code strip 142 only when one of the four top transaction keys 151, Fig. 6, is depressed.

In Fig. 6, it is noted that a slide 153 is formed with two slots 155 and 156 which cooperate with a stud 158 and shaft 14, respectively, to guide the slide for downward movement at an angle. The top of the slide is widened and provided with a shoulder at 159 to lie in the path of spring pins 160 extending from the sides of four upper cash receiving transaction keys 151. Depression of any of these four keys 151 serves to push slide 153 downward and rock an arm 161 counterclockwise, said arm being articulated with the slide by pivot 162 and fastened to a clutch operating shaft 163. Since the depressed keys 151 are locked down during a substantial part of each operating cycle, the operated slide 153 and arm 161 will also be held in a depressed position. A spring 147 restores the slide 153 and its connections as soon as the depressed key is unlocked.

In Fig. 7, it is seen that the clutch operating shaft 163 carries a clutch closing lever 167 outside the right frame 58. Fastened to this frame is a fixed cylindrical clutch housing 168 which is formed with an opening 169 in alignment with the end of lever 167. Outside the housing 168, Fig. 9, are two gears 170 and 171 loosely mounted on a stud 172 fixed on frame 58 and centralized with respect to the concentric inner wall of the housing. Gear 170 is the driven gear in mesh with pinion 105, and gear 171 is the gear to be driven so that its motion may be communicated to gear 103 which drives the printer and tape feed shafts.

Attached to the outer gear 170 is a tube 173, Fig. 7, which extends inward through gear 171 and into the housing 168 wherein a notched clutch disk 174 is fastened to the end of the tube. Pivoted at 175 on the inner wall of gear 171 is a clutch dog 176 with a hammer shaped projecting end 177 one side of which is aligned with the notch in disk 174, and the outer projecting side normally protrudes through the open-

ing 169 in housing 168 and abuts against the end of lever 167 where it is urged by a spring 178 between the dog and a pin on gear 177.

Normally gear 170 and disk 174 turn freely without engaging dog 176 and gear 171. However, when one of the four upper keys 151, Fig. 6, are depressed, slide 153 is lowered, arm 161 and lever 167, Fig. 7, are rocked counterclockwise, and the end of lever 167 pushes the end 177 of dog 176 into engagement with the notch in disk 174. When the operating handle is turned, gear 170 and disk 174 are rotated clockwise and carry the engaged dog 176 and drive gear 171 along therewith. In the initial part of the engaged clutch movement, the end 177 of dog 176 is moved away from the housing opening 169 and thereafter the end rides on the inner surface of housing 168 and is thus held in engagement with the disk. Gear 170 is proportioned to make two revolutions for each operating cycle. When the clutch is engaged and gears 170 and 171 have turned through one revolution, the end 177 of the dog passes opposite opening 169, but it cannot fall into the opening because the lever end remains lifted to close the opening until the keys 151 are released later in the cycle. Therefore the clutch remains engaged for the second revolution at the end of which, as end 177 approaches the opening 169 it is then clear and the dog is latched therein by spring 178, the dog then dropping away from the disk 174 which is stopped with gear 170 in the normal position.

Whenever gear 171 is driven, it operates gear 103 meshing with operating gears 102 and 121; gear 102 turns the printer shaft 101 to effect an impression of spots and numerals on the code strip, and gear 121 operates the intermittent gearing to turn shaft 110 for a strip feeding operation.

The depression of any of the five bottom transaction keys 152, Fig. 6, relating to cash outgoing or charging transactions, along with depression of amount keys, causes adjustment of both sets of type wheels, but since clutch 170, 176 then remains disengaged, the code strip 142 is not pressed against the type, neither is it advanced. The other strip 150, however, is impressed against its adjusted type and shifted on every cycle, regardless of the nature of the transaction.

The devices for effecting the printing impression on the transparent indicator strip 150 are shown in Figs. 6 and 10. Referring to the view in Fig. 6 it is seen that a bar shaped platen 164 is held on a ball 186 comprising side arms loosely pivoted on a shaft 196 held in frames 59 and 59M. Behind platen ball 186 is another ball with side arms 187 loosely pivoted at 197 and formed with a cross bar 185 contacting the rear edge of arms 186. The top of this second ball is connected by a link 194 to the top of a third ball composed of side arms 188 and 193 pivoted loosely on a shaft 94. Cross bar 199, Fig. 10, of the third ball cooperates with an operating cam 198 fastened to an operating shaft 101M. This shaft is coaxially mounted with respect to shaft 101, but is not connected therewith or operated thereby. Shaft 101M is operated by separate connections located outside the left frame 59M, and these connections are described more fully hereinafter.

Returning to consideration of the three impression controlling bails, Fig. 6, it is noted that the rear bail is urged into constant cooperation with cam 198 by means of a spring 190 which is connected to the top of arm 188. Another spring 195, connected between a stud on the top

of ball 186 and the rear bail, serves to hold the front bail retracted against the cross bar 185 of the middle bail 187.

When shaft 101M is turned in a clockwise direction, the rising edge of cam 198 cooperates with bar 199 to rock the entire impression assembly rearward against the tension of spring 190. Bail 187 is rocked clockwise because it is connected by link 194 to the rear bail which is moved directly by the cam. The platen holder 186 is also rocked clockwise because it is urged by spring 195 to follow bail 187.

At printing time, the shoulder on cam 198 arrives opposite bar 199 and suddenly the entire assembly is released for movement to the left under the tension of spring 190. The two rear bails are stopped abruptly by a stop stud 189, but front bail 186 and platen 164 are carried on further by inertia to strike the record strip 150 and impress it against the ribbon and the adjusted type wheels 157 and 157T. As the platen strikes, spring 195 is stretched to move the platen ball away from cross bar 185, but immediately thereafter the spring takes effect to draw the platen back away from tape 150 so that it may be fed.

The connections for driving the printing control shaft 101M are revealed in Fig. 8. There it is seen that a gear 34M is fixed to the operating shaft 22 that is turned one revolution in a clockwise direction in each operating cycle. The drive from gear 34M to a gear 202 attached to shaft 101M, passes through a train of idler gears 181, 205, 204 and 203. Since gear 202 is the same size as gear 34M, shaft 101M and cam 198, Fig. 6, are turned one revolution every time the machine is operated.

Although the lines of print on the transparent indicator strip 150, Fig. 12, are spaced apart at regular intervals, the feeding devices cooperating with this strip must do more than line space the strip. An unusual movement of strip 150 is necessary because an impressed line of print must be moved down from a position opposite platen 164, Fig. 6, down opposite an indicator sight opening 137M, late in one cycle; and then, early in the next cycle, the strip must be moved upward to bring the line of print one line space or one frame below the printing line so that a new impression may be effected directly above the previous recording.

Strip 150 is guided and moved by pairs of sprocket wheels 207 and 208 fastened on an upper shaft 209 and lower shaft 110M, respectively. A supply reel 213 holds the unused portion of strip 150 on a shaft 214; the printed part of the strip is wound on a storage reel 215 fixed to a shaft 216. Motion of shaft 110M is communicated to shaft 216 by means of a belt 223 which passes around a pulley 222 on shaft 110M and a pulley 224 on shaft 216. The supply reel 213 is also connected for movement in synchronism with the strip feed sprockets. In Fig. 8 it is seen that a belt 179 runs with a pulley 180 on supply shaft 214 and a pulley 182 on sprocket shaft 209.

Although feed shaft 110M, Fig. 9, is coaxial with shaft 110 they are not connected. Shaft 110 is supported in a bushing 183 on one side of frame 59 and shaft 110M rotates in a bushing 184 on the opposite side of the frame.

Outside the left frame 59M, Fig. 8, a pinion 191 is fastened to sprocket shaft 209 and a pinion 192 is fixed to the other sprocket shaft 110M. By turning these pinions alternately, first in one direction and then in the other direction, the indi-

cator strip 150 is raised and lowered from indication position to print receiving position and vice versa. The pinions are operated by a common rack slide 200 which is formed with a rack section 210 meshing with pinion 191 and another rack section 211 adapted to mesh with pinion 192. The rack slide is lowered and raised by means of a drive pin 212 mounted eccentrically on a cam disk 217 loosely pivoted on a stud 218 on frame 59M. Attached to disk 217 is a gear 219 in mesh with a gear 220 fastened to the printer drive gear 202. Through the connections mentioned, disk 217 is turned one revolution in a clockwise direction on every operating cycle, and pin 212 thereon cooperates with a horizontal slot 221 in slide 200 to move the slide down in the first half cycle, and then upward in the second half of each operation.

Slide 200 is formed with vertical slots 225 and 226 through which there extend rollers 227 and 228 on bell cranks 229 and 230 that not only guide the slide in its vertical movement, but also tip the slide so that it engages alternately with the pinions 191 and 192.

Bell crank 229 is pivoted on a stud 231 on frame 59M and this crank is formed with an extending foot 232 which is struck by a shoulder 233 on cam disk 217 late in each cycle to rock the crank and roller 227 to the right, meshing rack section 210 with pinion 191. The rack slide 200 remains engaged with pinion 191 during the first half cycle while said slide is being moved downward, said engagement being maintained because foot 232 rides upon the raised part of the periphery of disk 217. Thus the pinion 191 is turned counterclockwise and strip 150 is raised to print receiving position. At the half stroke position, foot 232 drops off the raised part of the disk, and crank 229 rocks clockwise to disengage rack section 210.

The other bell crank 230 is pivoted on a raised center 235 on a bracket 236 fastened to frame 59M. An extending cam portion 237 on crank 230 rides on a low part 238 of the periphery of disk 217 until the midpoint of the operation, at which time, shoulder 233 strikes cam 237 and rocks crank 230 and roller 228 to the right, meshing rack section 211 with pinion 192. The rack slide 200 remains engaged with pinion 192 during the second half of each cycle while said slide is being moved upward, said engagement being maintained because cam portion 237 rides on the raised part of the periphery of disk 217. In this way pinion 192 is turned clockwise and strip 150 is lowered to indicating position. Late in each cycle, cam 237 on crank 230 drops off a shoulder 239 on disk 217 and the crank rocks clockwise to disengage rack section 211 from pinion 192.

A link 240 is connected loosely on studs 242 and 243 on the ends of the arms of cranks 229 and 230 at the opposite sides of pivots 231 and 235. Through this link connection, movement of one crank to mesh slide 200 with one pinion will automatically swing the other crank to disengage the slide from the other pinion.

Although rack slide 200 moves equal distances downward and upward, the feed movements imparted from the gears 191, 192 to the two sprocket shafts 209 and 110M differ because the top sprockets 207, Fig. 6, are smaller in diameter than the lower sprockets 208. The proportions are such that when sprockets 208 turn counterclockwise to lower the strip 150, it is fed the longer distance from the printing line to opening 137M; and when sprockets 207 turn clockwise to raise the strip, it is lifted through a shorter distance

from opening 137M to one line space or frame length short of the printing line. Therefore the difference in extent of feed is equal to the length 241, Fig. 12, of one frame on strip 150.

An indication is exhibited on the translucent screen 127, Fig. 6 in somewhat the same fashion as the indication already described with reference to Fig. 2. However there are some differences because the transparent strip used for indicating is the character bearing strip 150, Fig. 12, rather than the code strip 142. Reference to the type wheels 157, 157T, Fig. 9, reveals that the impression imparted thereby on the indication strip 150, appear in a left to right order from the rear and are in the correct erect position. Before exhibiting the characters so they read correctly when observed from the front of the machine, they must be reversed in the left to right order. This is done by means of a pair of slanted mirrors 245R and 245L, Fig. 11, which catch the reflection of the characters on the strip 150 after the image passes through the enlarging optical device 144. The reversed image is reflected from mirror 245R to mirrors 140 and 141 and then against the translucent screen 127. The source of light is provided in the usual way by rays from lamp 134, Fig. 6, which pass through lens 143, against mirror 136 and through opening 137M, behind which appears the frame of characters printed on the transparent strip 150.

From the foregoing description it will be apparent that there is thus provided a device of the character described possessing the particular features of advantage before enumerated as desirable, but which obviously is susceptible of modification in its form, proportions, detail construction and arrangement of parts without departing from the principle involved or sacrificing any of its advantages.

While, in order to comply with the statute, the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific features shown, but that the means and construction herein disclosed comprise the preferred forms of several modes of putting the invention into effect, and the invention is, therefore, claimed in any of its forms or modifications within the legitimate and valid scope of the appended claims.

What is claimed is:

1. In a machine for printing a record strip and a code strip, data setting means including groups of classified manipulative members, character printing devices, code printing devices for representing said characters in the form of differentially located spots, means under control of said setting means for adjusting the said character and code printing devices to represent the same data, means cooperating with the character printing devices to print on said record strip character representations of the data set up, normally ineffective means cooperating with said code printing devices to print on said code strip code representations of the data set up, a main operating means, a normally idle clutch between said main operating means and said normally ineffective code printing means, and means under control of certain of said classified manipulative members for making said clutch effective for initiating operation of said code printing devices to print selectively classified data in code on said code strip.

2. In a machine for printing data on a record strip and an associated code strip, means for set-

ting up data including classification keys, character printing devices, code printing devices for representing said characters in the form of differentially located spots, means under control of said setting means for adjusting said character and code printing devices, invariably operated means cooperating with said character printing devices to print all data as character representations on said record strip, normally ineffective means cooperating with said code printing devices to print on said code strip the data set up as code representations, invariably operated line spacing mechanism for feeding said character strip, normally ineffective long feeding mechanism for spacing said code strip, and means under control of certain of said classification keys for initiating operation of said code printing devices and said long feeding mechanism to print a representation in code of certain of said classified data.

3. In a machine for printing data on a record strip which is shifted with relation to an indicating sight opening in said machine, means for setting up said data, type members, means under control of said setting means for adjusting said type members, means cooperating with said members to record the data on said strip, two feeding stations each with feed devices connected to a gear, said gears being operated to move said strip back and forth so that the recorded data are moved from the printing position to said sight opening and from the sight opening to a position one space short of the printing position, a rack slide cooperating with said two gears, an eccentric for reciprocating said slide, and cam devices cooperating with said slide to shift it to mesh alternately with said gears.

4. In a machine for printing character and code data on a transparent sheet adapted for both character data projection and code representation control, means for setting up data, character printing wheels, gears attached to said wheels, spot printing bars formed with racks, said racks having teeth meshing with said gears, supporting means in which said bars are mounted for recip-

roca-tion so that spot type faces on said bars are guided to differential positions in a rectangular area adjacent said character printing wheels, said supporting means having backing portions cooperating with the sides of said bars behind said spot faces, means under control of said setting means for adjusting said wheels to set the wheels and the cooperating spot printing bars into positions presenting characters and differentially located spots representative of the data set up, an inking ribbon extending across said rectangular spot area and the printing line of the character wheels, a rectangular platen opposite said bars and wheels, a holder for said platen, means for supporting said holder and guiding said platen for movement at right angles to the printing faces of said bars and wheels, and means for moving said holder to impress the platen, strip and ribbon against the adjusted wheels and bars to record simultaneously on said transparent sheet, related character and spot representations of the data set up.

5. In a machine for printing code data on a record strip, means for setting up data, printing devices for placing code indicia differentially within a rectangular area on said strip, means under control of said setting means for adjusting said printing devices, an inking ribbon, a flat rectangular platen coextensive with said area within which the code printing devices are adjusted, a cylindrical holder for said platen, said platen extending across one end of said cylindrical holder and centered thereon, means for moving said holder axially to throw the platen towards the printing devices, a stop for stopping said moving means before the platen reaches the printing devices, and a spring connection within said cylindrical holder and between said holder and said moving means, said spring yielding to allow the holder to move beyond the moving means and impress the platen, strip and ribbon against the adjusted printing devices over all of said rectangular area.

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