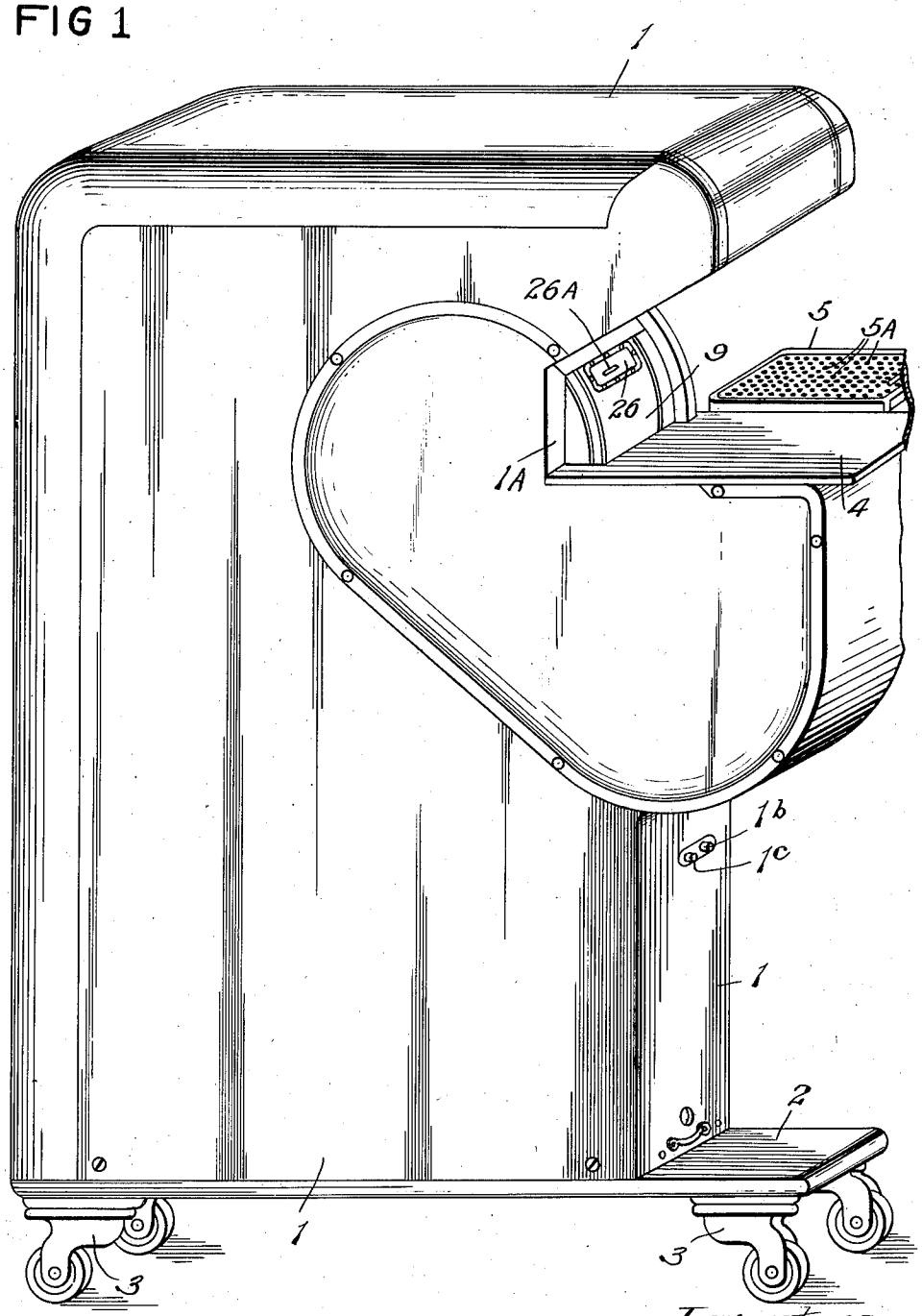
Feb. 18, 1941. H. R. BAKER ET AL 2,232,424

MACHINE FOR PRINTING COMMERCIAL PAPER INSTRUMENTS

Filed Aug. 29, 1939 13 Sheets-Sheet 1

FIG 1



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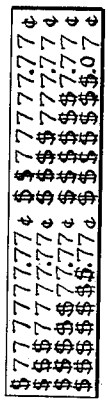


FIG. 3A.

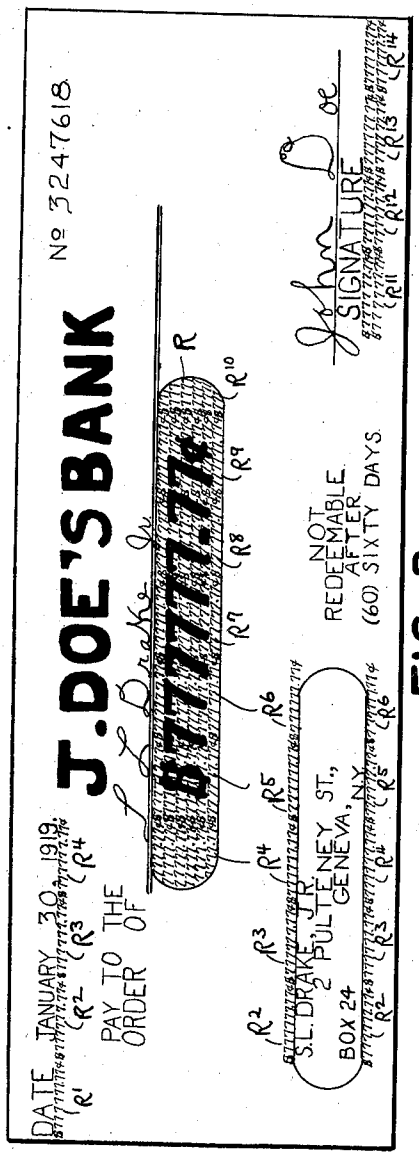


FIG. 2

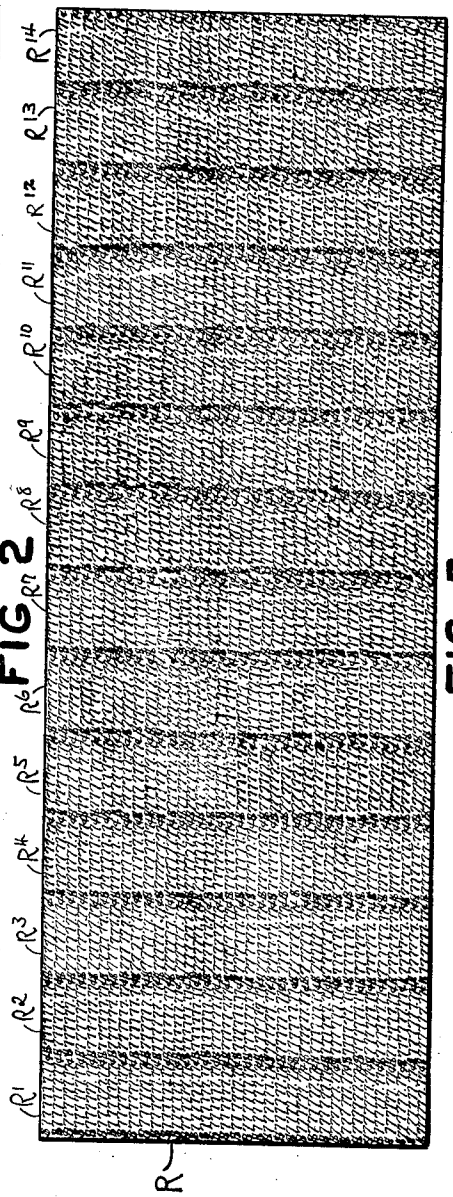


FIG 3

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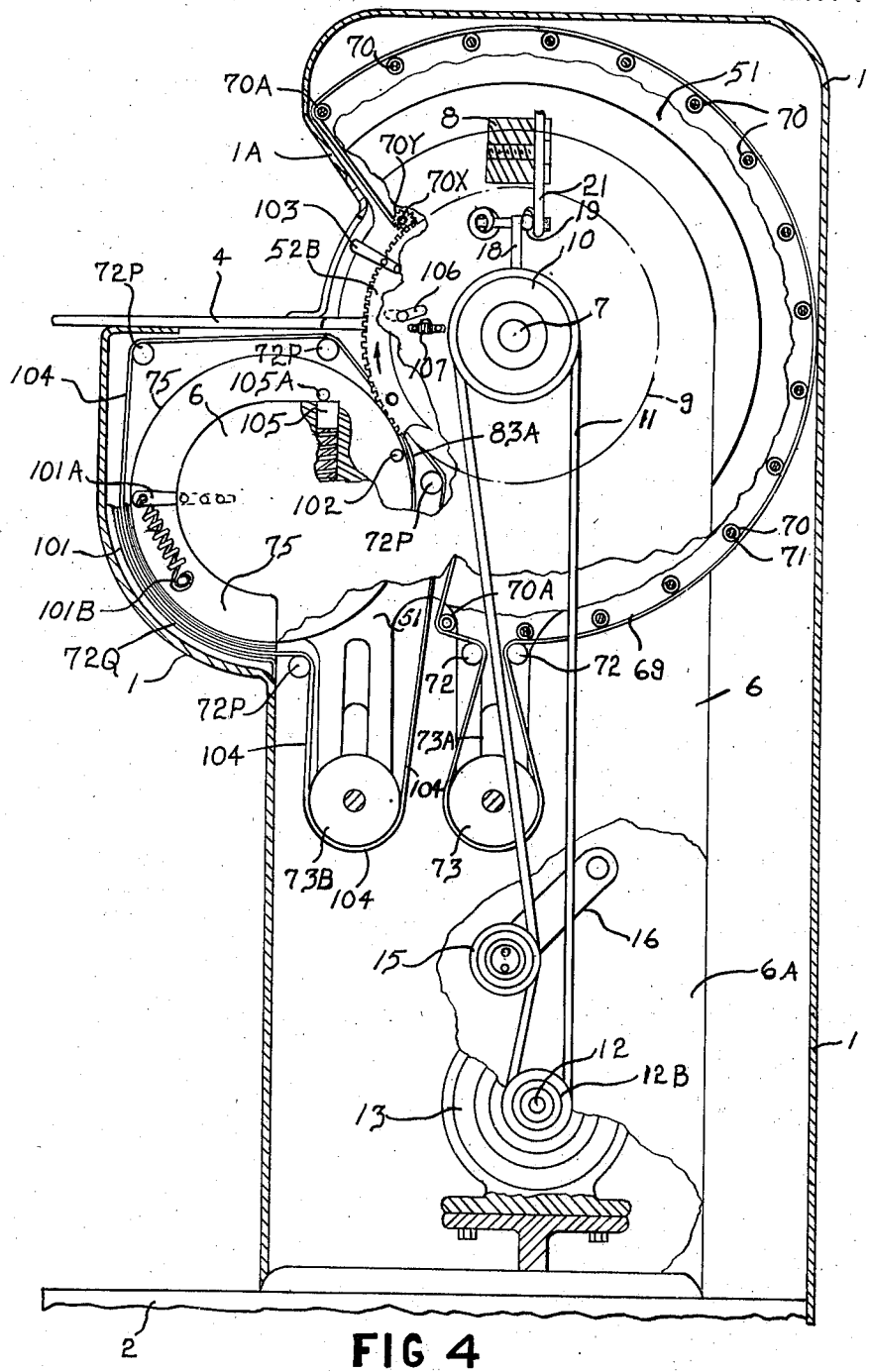


FIG 4

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Filed Aug. 29, 1939 13 Sheets-Sheet 4

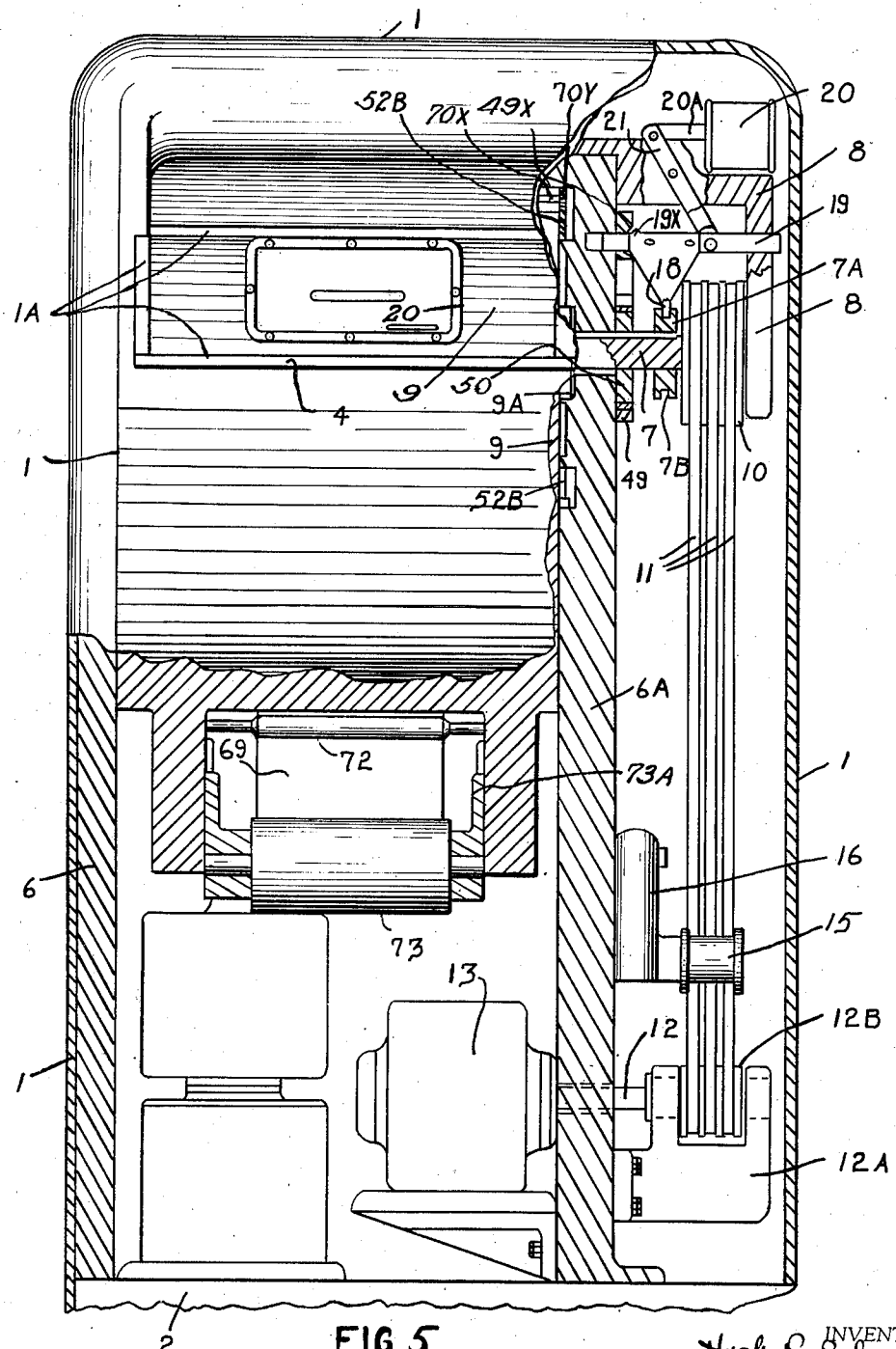


FIG 5

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Filed Aug. 29, 1939 13 Sheets-Sheet 5

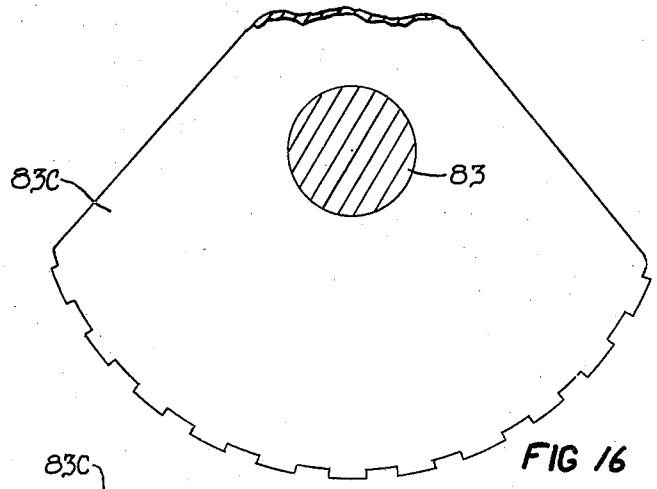


FIG 16

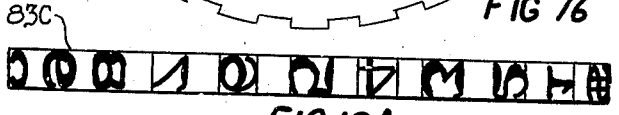


FIG 16A

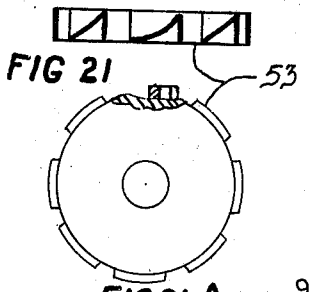
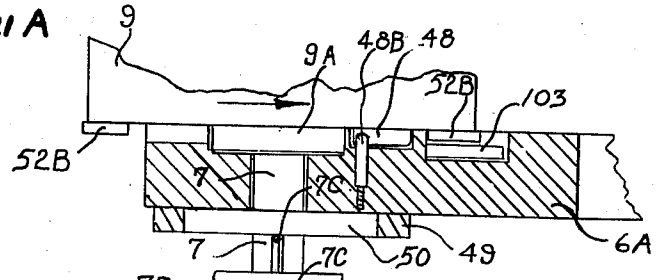


FIG 21

FIG 21 A



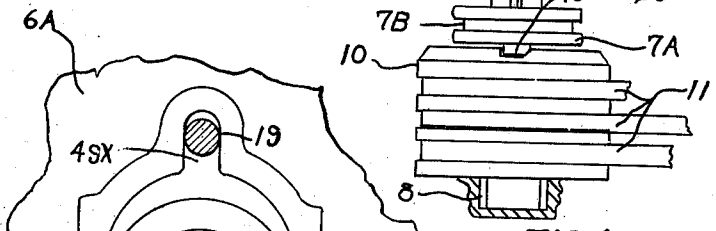


FIG 6

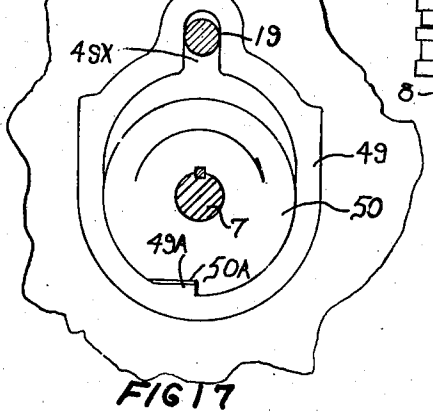


FIG 17

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MACHINE FOR PRINTING COMMERCIAL PAPER INSTRUMENTS

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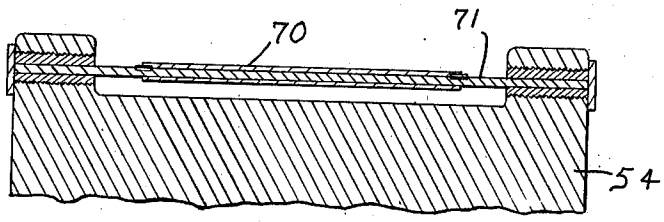


FIG 8

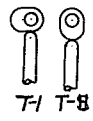


FIG 7A

FIG 7

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MACHINE FOR PRINTING COMMERCIAL PAPER INSTRUMENTS

Filed Aug. 29, 1939 13 Sheets-Sheet 7

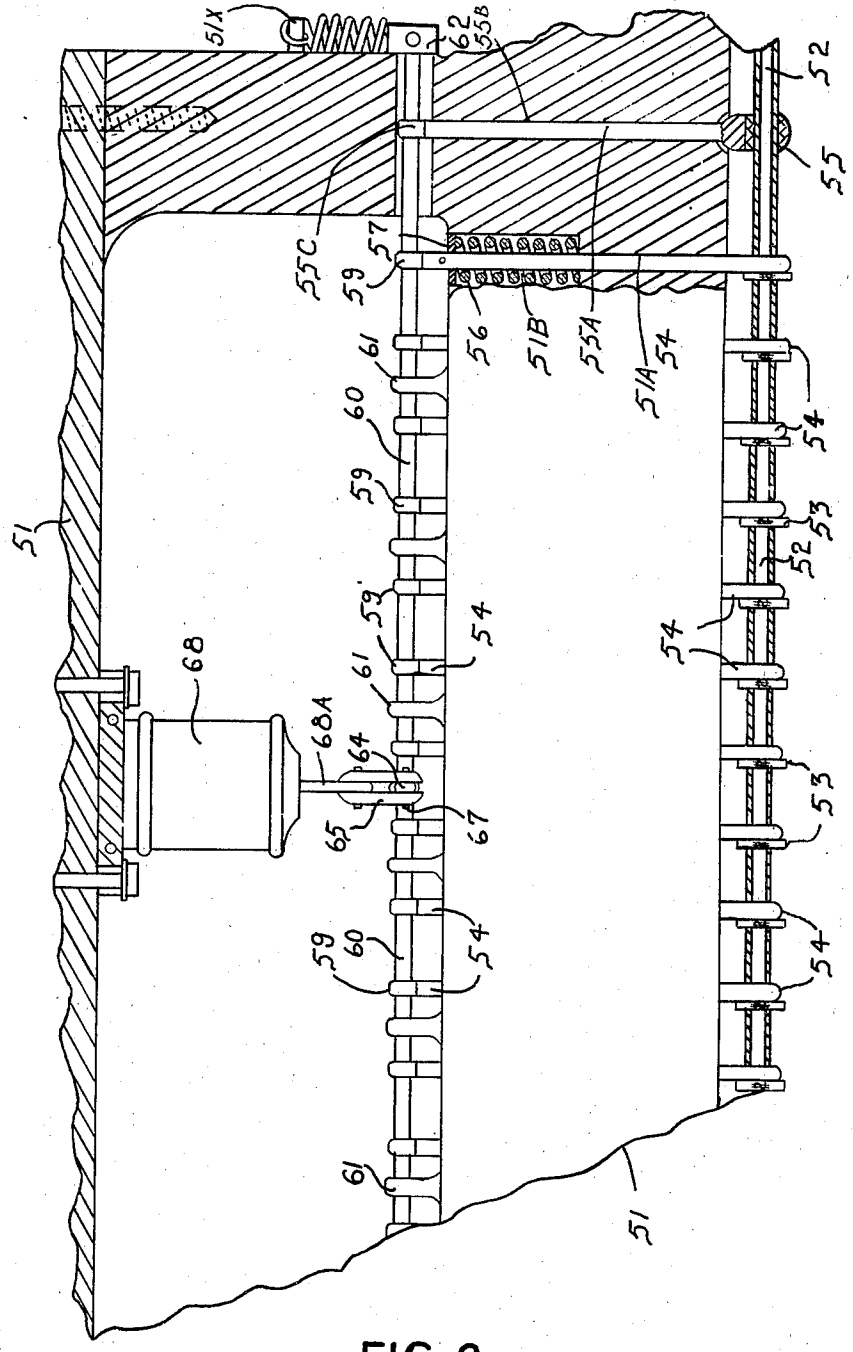


FIG 9

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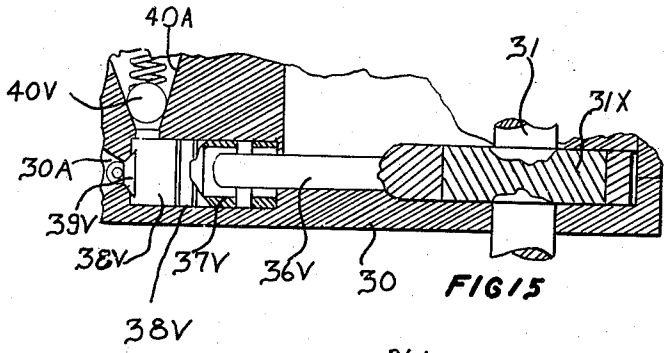


FIG 15

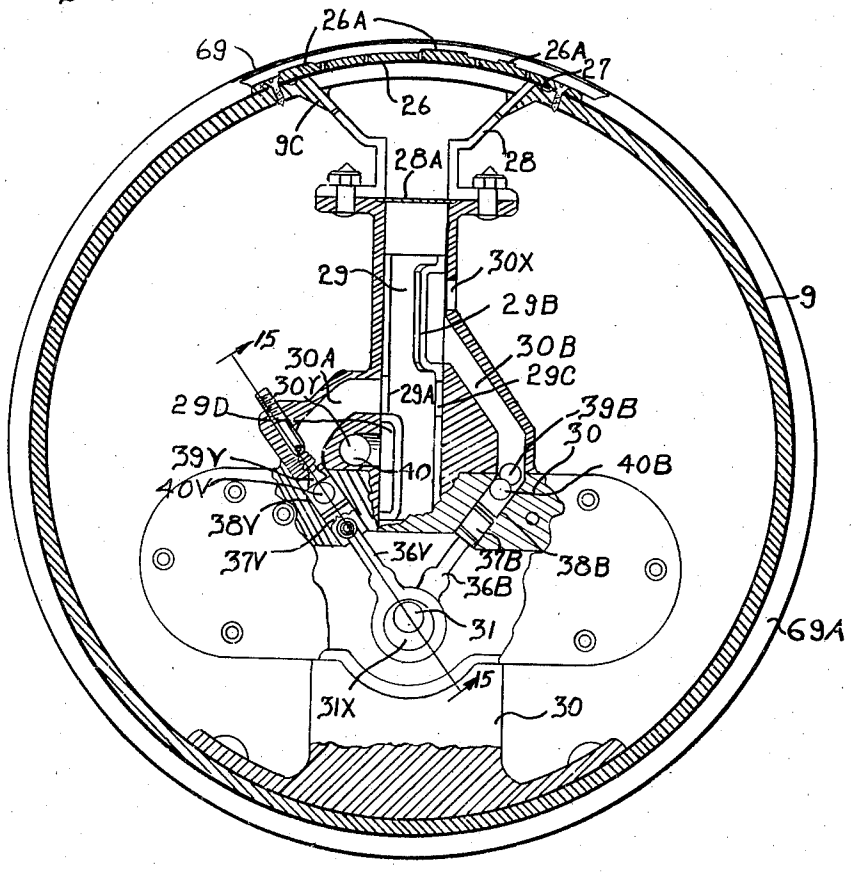


FIG 10

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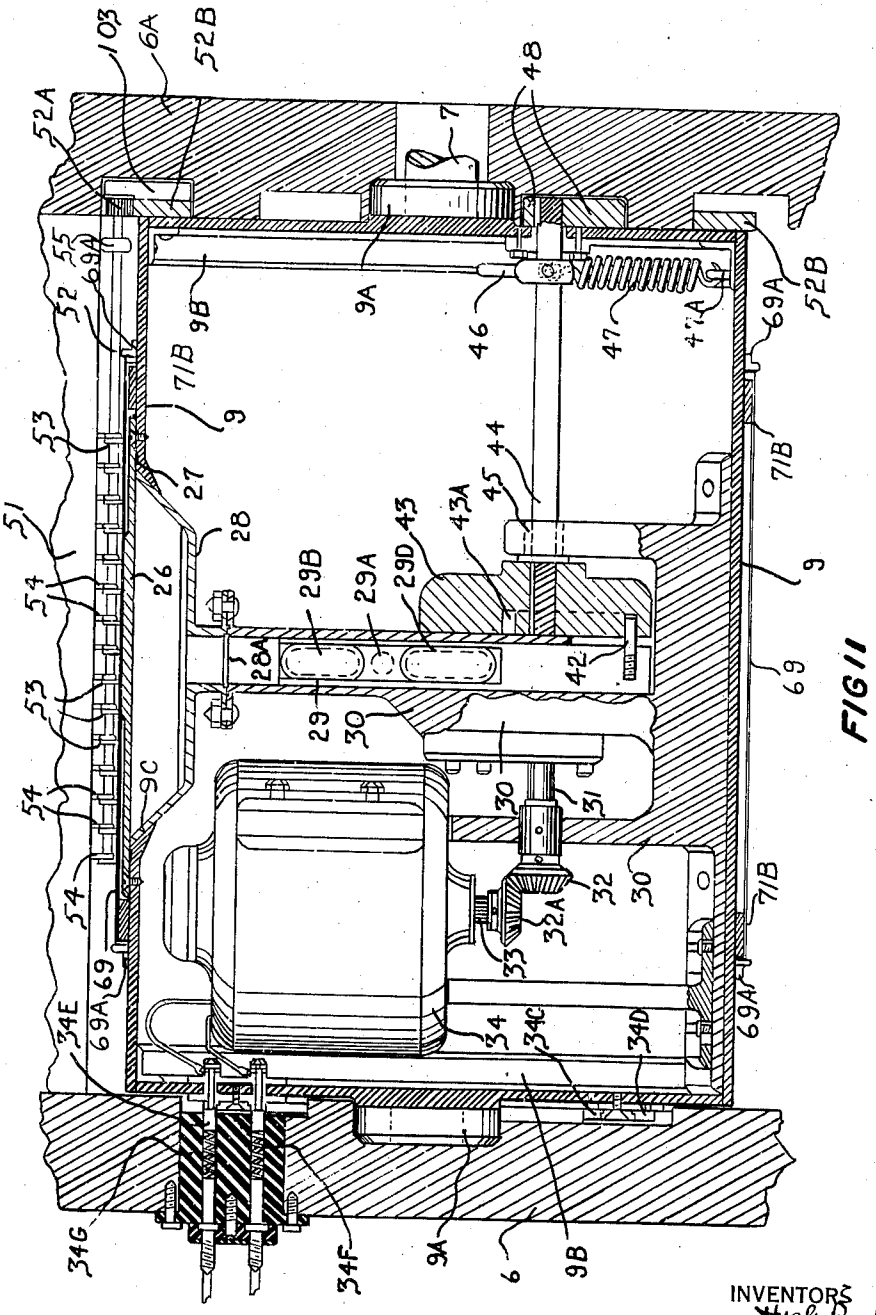


FIG 11

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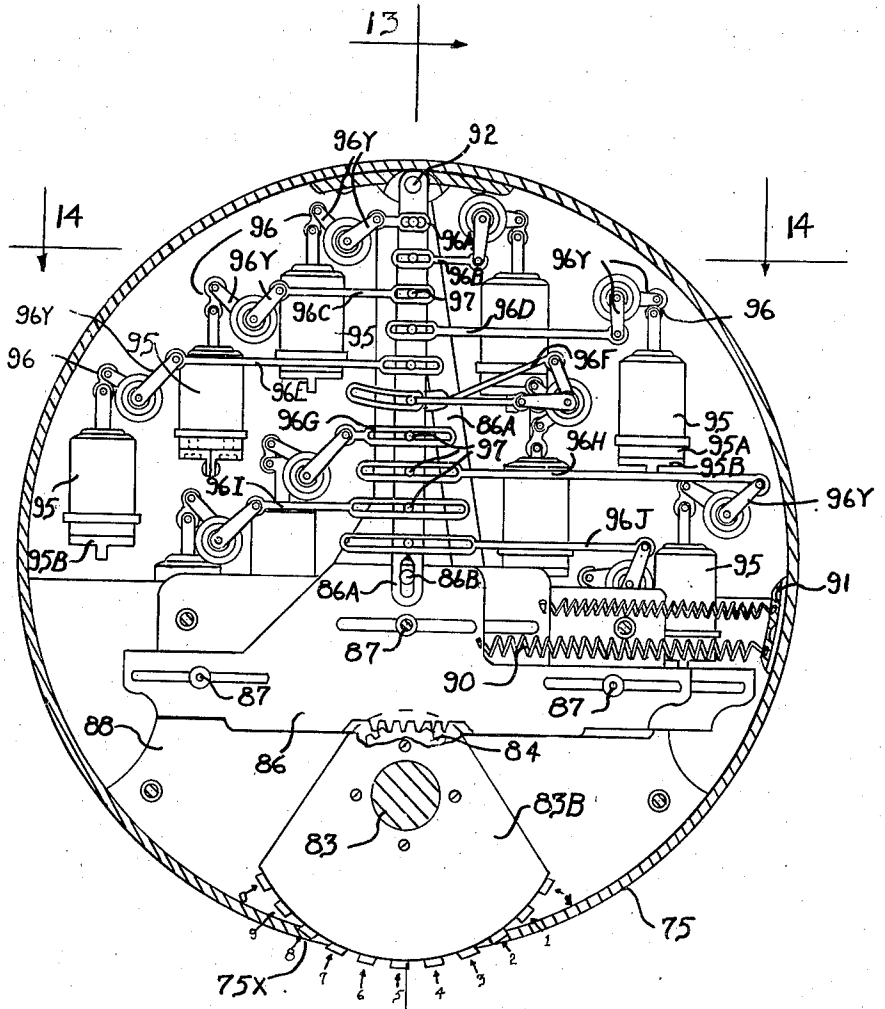


FIG 12.

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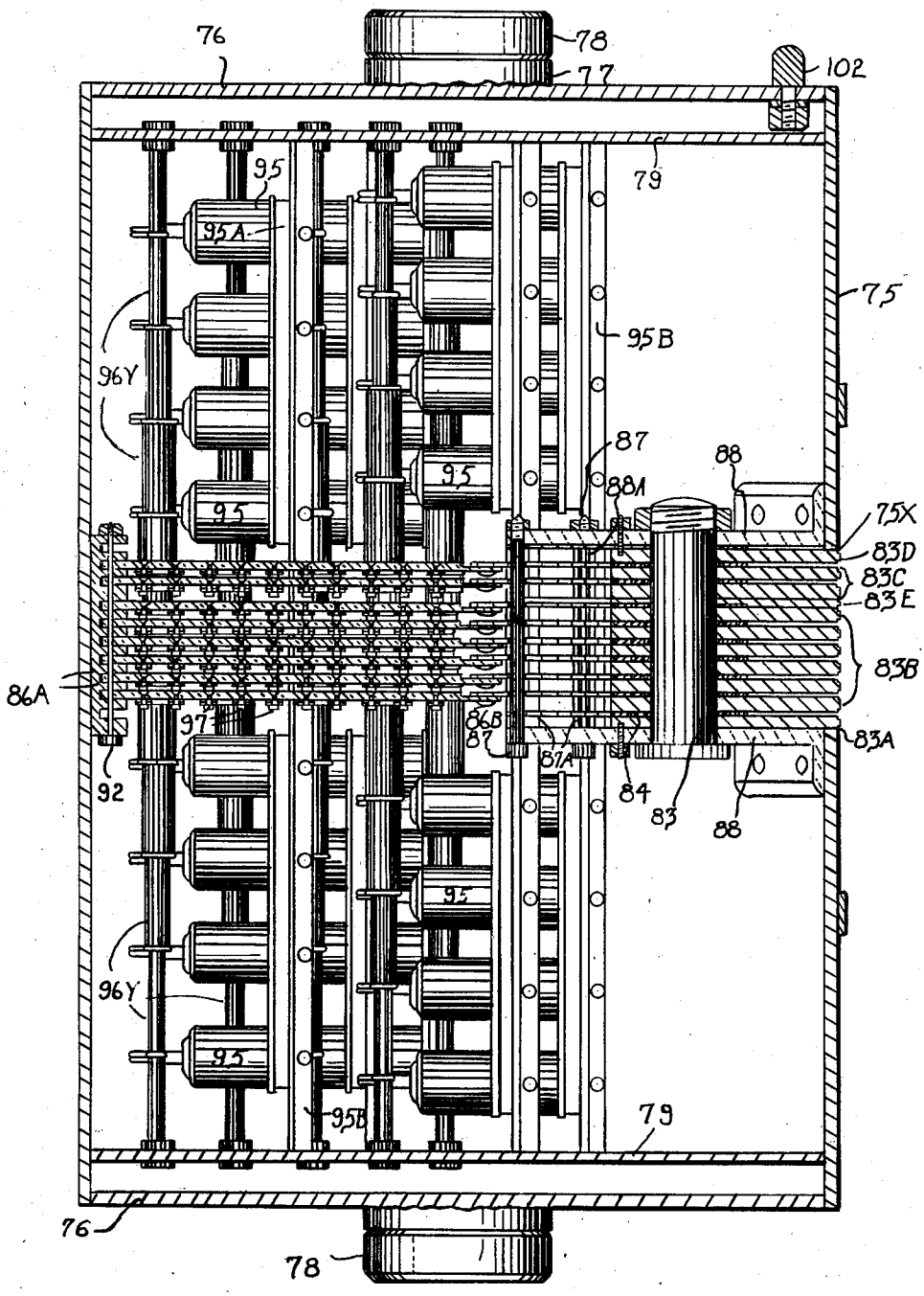


FIG 13

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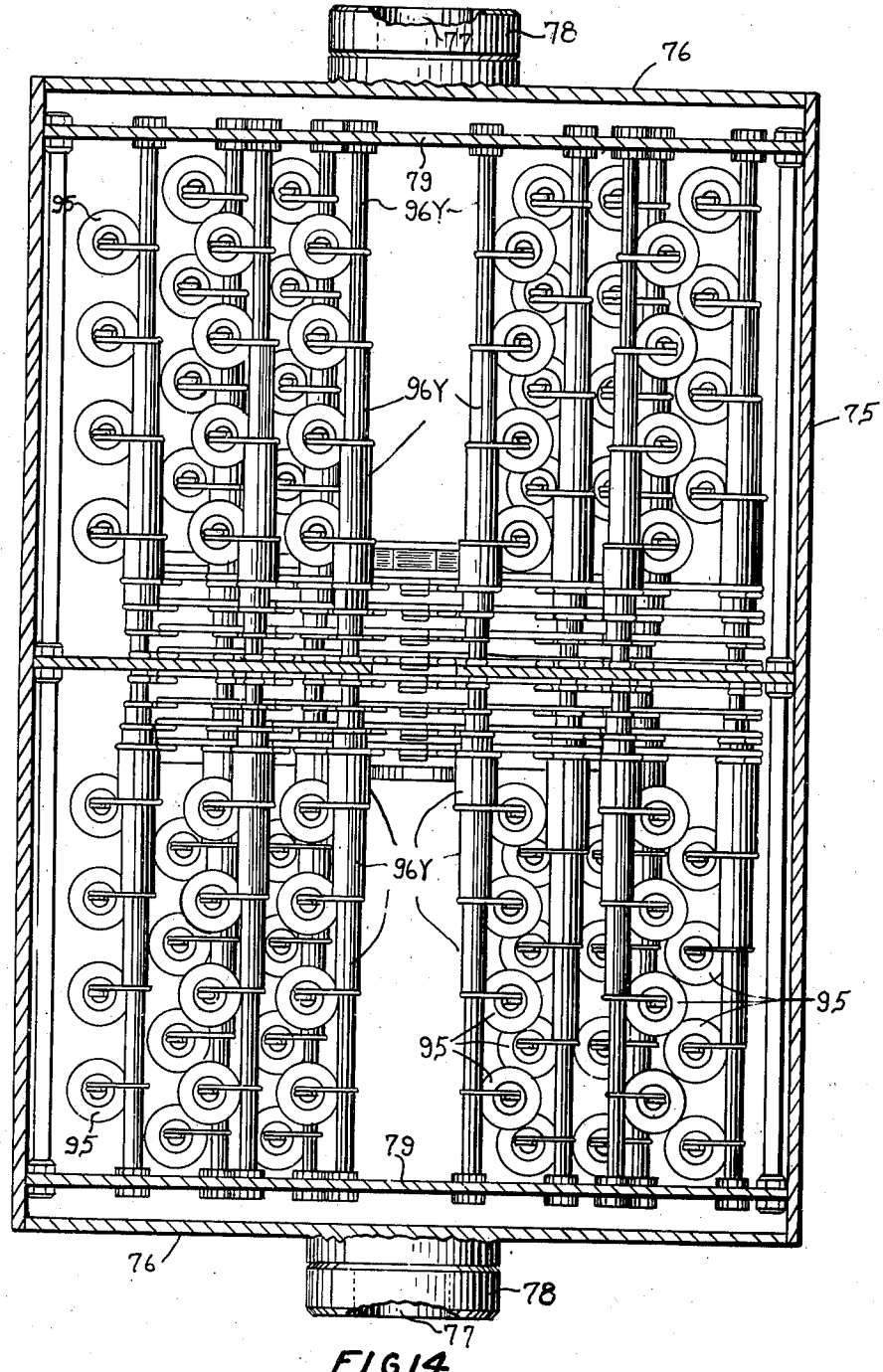


FIG 14

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MACHINE FOR PRINTING COMMERCIAL PAPER INSTRUMENTS

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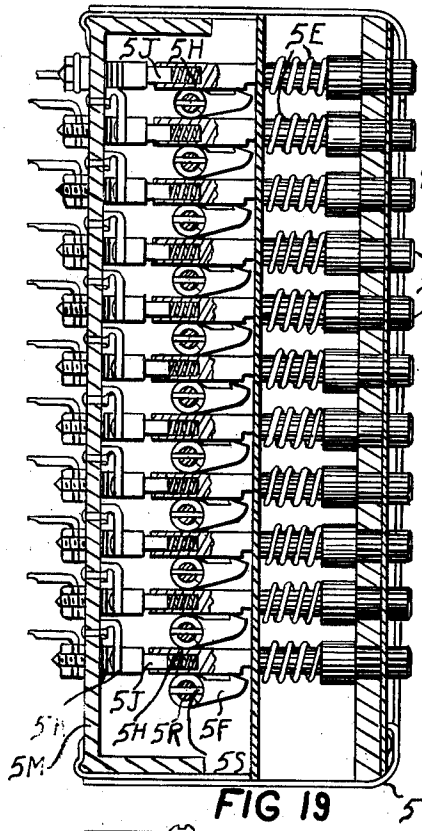


FIG 19

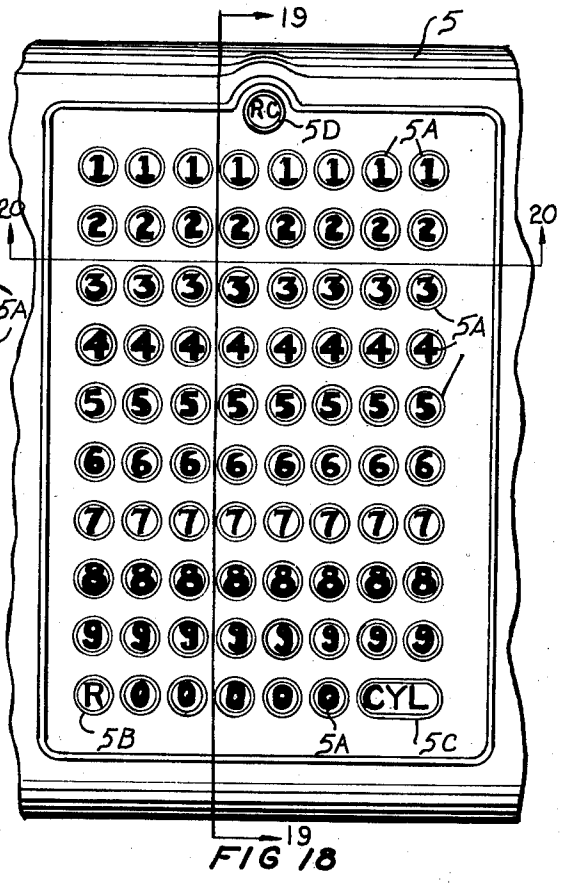


FIG 18

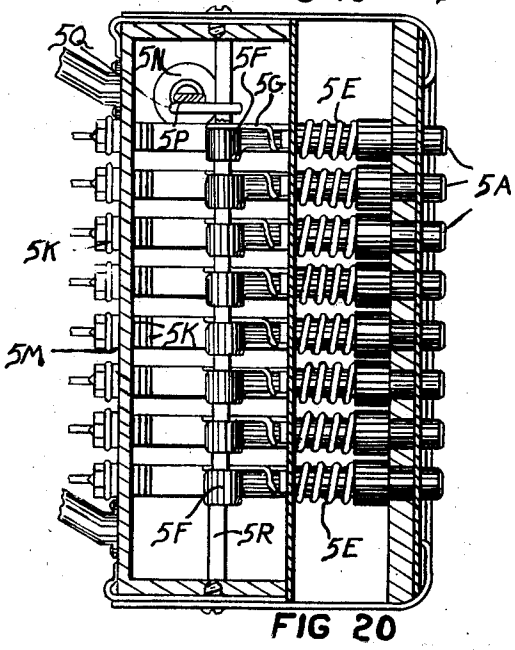


FIG 20

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Patented Feb. 18, 1941 2,232,424

UNITED STATES PATENT OFFICE

2,232,424

MACHINE FOR PRINTING COMMERCIAL PAPER INSTRUMENTS

Hugh R. Baker and Chester S. Wilson,
Geneva, N. Y.

Application August 29, 1939, Serial No. 292,510

32 Claims. (Cl. 101—91)

Our invention is a novel machine for protectively writing the monetary or unitary figures of value on stock certificates, letters of credit, drafts of exchange, certificates of deposit, money orders, bank checks, notes and all other forms of securities and commercial paper, both negotiable and non-negotiable, our unique writing rendering virtually impossible any fraudulent altering or raising of such figures of amount; and further tending to preclude the forging of the signature of a payer and to safeguard in no small degree against counterfeiting of the instrument. The chief object of our invention is to provide a machine that will impose the numerals of value on the instrument, but which preliminarily, or by the same operation, will impress a safety tint on the paper, covering the entire surface of the instrument or any portion thereof, said tint consisting of compact, parallel rows of minute repetitions of the actual figures of the amount which latter figures are overprinted on the tint. Thus the writing of the amount automatically supplies the underlying tint, and eliminates any necessity for first printing the tint by a prior operation, or by a separate machine or press. Our protective background, thus automatically created, need not be in sensitive ink. It functions at all parts simultaneously, not merely or exclusively at the immediate point of alteration, and thus it is immaterial whether the ink of the tint be fugitive or permanent. The effect of our novel tint is to broaden the protective area, to multiply the obstacles confronting the forger, and to make the amount of the instrument self-verifying or self-attesting. Mechanical or facsimile signatures, used in conjunction with our tint, would be safeguarded to a considerable extent, and since a ribbon texture is hard to photo-engrave, the tint would constitute a strong protection against counterfeiting.

We will explain the invention with reference to the accompanying drawings, which illustrate one practical embodiment thereof, to enable others familiar with the art to adopt and use the same; and will summarize in the claims the novel features of construction, and novel combinations of parts, for which protection is desired.

In said drawings:

Fig. 1 is a perspective view of our novel machine.

Fig. 2 is a plan view, showing a typical negotiable instrument printed by our machine.

Fig. 3 is an enlarged plan view, showing the tint or background of the over-writing.

Fig. 3A is a diagrammatic view of the tint elements.

Fig. 4 is a vertical section, looking into the machine from the right-hand side of Fig. 1.

Fig. 5 is an elevation of the front of the machine, partly broken away, to show the power drive and the clutch for the semi-vacuum cylinder, also the idler for the ribbon.

Fig. 6 is an enlarged plan view of the clutch and adjacent parts.

Fig. 7 is an enlarged elevation showing the secondary digit carrier and solenoid coils which actuate the tint mechanism.

Fig. 7A is a diagram of cam movements of $ symbols.

Fig. 8 is a section through the ribbon roll on the outer side of the digit carrier.

Fig. 9 is an enlarged section, showing the actuating mechanism for the secondary digits.

Fig. 10 is a transverse section through the semi-vacuum cylinder.

Fig. 11 is a longitudinal section through the semi-vacuum cylinder.

Fig. 12 is a transverse section through the primary cylinder.

Fig. 13 is a longitudinal section through the primary cylinder taken on the line 13—13, Fig. 12.

Fig. 14 is a longitudinal section through the primary cylinder taken on the line 14—14, Fig. 12.

Fig. 15 is a section through a single cylinder of the pump, taken on the line 15—15, Fig. 10.

Figs. 16 and 16A are plan and edge views of one of the primary cylinder cams for printing the over-writing.

Fig. 17 is a section on the line 17—17, Fig. 6.

Fig. 18 is a top cam view of the control box.

Fig. 19 is a section through the control box on the line 19—19, Fig. 18.

Fig. 20 is a section through the control box on the line 20—20, Fig. 18.

Figs. 21 and 21A are edge and plan views of one of the secondary digit wheels.

As shown, the machine preferably comprises a casing 1 of substantially rectangular shape, having side, end, and top walls, the same resting upon a base 2 preferably supported upon casters 3 so that same may be conveniently moved from place to place, as desired. In one narrow vertical wall of casing 1 adjacent the upper end is a rectangular inwardly contracting mouth 1a, the walls of which terminate adjacent the periphery of a semi-vacuum cylinder within the casing, hereinafter referred to, and a shelf 4 is

provided in the lower part of the mouth extending substantially horizontally from the periphery of the cylinder and beyond the front of the casing. At the side of shelf 4 is a control box 5 for operating the primary and secondary digits, and for setting the machine in motion, as hereinafter described.

Within casing 1 extending longitudinally thereof is a pair of frame members 6 and 6a adapted to support the primary and semi-vacuum cylinders, the digit carrier and ribbon units, as hereinafter described, said members being spaced apart as desired, and one member 6a (Fig. 5) being spaced from the adjacent side face of the casing 1. Journaled between the frames 6—6a is a shaft 7 coaxial with the shaft of the semi-vacuum cylinder 9, hereinafter described. Said shaft 7 has one end extending between the side frame 6a and the adjacent wall of casing 1 and has its outer end journaled in a bearing in a depending bracket 8 (Figs. 5 and 6) supported upon the upper end of frame 6a. On said shaft is a drive pulley 10 preferably having grooves for a plurality of V-belts 11, three being shown, said pulley 10 being loose upon shaft 7. Journaled in a bracket 12a on frame 6a below the shaft 7 is a drive shaft 12 driven directly by an electric motor 13 or the like, said shaft 12 having a drive pulley 12b thereon, likewise provided with grooves for the belts 11. In order to maintain the belts at substantially constant tension, an idler pulley 15 is provided journaled on an arm 16 pivoted on the frame 6a, said arm 16 being normally disposed at such angle to the vertical that the weight of the same and the pulley will normally deflect the runs of the belts 11 towards each other to take up any slack in the belts. Splined on the shaft 7 is a collar 7a having a groove 7b receiving a fork 18 mounted upon a slide bar 19 operatively controlled from the control box 5 as hereinafter described Said collar 7a carries clutch dogs 7c adapted when shifted in a direction towards pulley 10 to engage corresponding clutch recesses in the adjacent face of said pulley, said clutch being disengaged when the slide bar 19 is shifted in the opposite direction. When the clutch is engaged the shaft 7 is locked to pulley 10 to cause the shaft to rotate therewith.

The inner end of the shaft 7 between the frames 6—6a is operatively connected with the semi-vacuum cylinder 9, the opposite end of the cylinder being journaled in a bearing 9a in the opposite frame 6, whereby rotation of the shaft 7 will rotate the said cylinder, the periphery of which cylinder is exposed through the open mouth 1a of the casing 1. Preferably the slide bar 19 is operated by a solenoid 20 having a core 20a, and a link 21 pivoted in the bracket 8 connects the core 20a and the slide bar 19 whereby as the core is actuated the slide bar will be reciprocated in the opposite direction. The coil of the solenoid is connected in a suitable electric circuit including a starting button in the control box 5, hereinafter described.

The semi-vacuum cylinder 9 (Figs. 10–11–15) preferably comprises a cylindrical member having end plates carrying bosses 9a forming bearings for the cylinder in the side frames 6—6a, the end walls being preferably secured to the ends of the cylinder by means of angle iron rings 9b secured to the members by rivets or the like. In the periphery of the cylinder is a substantially rectangular opening 9c having its long axis disposed axially of the cylinder, and over said opening, secured by screws or the like, is a parti-cylindrical plate 26 preferably formed of brass or other like metal, said plate being provided with raised portions and depressed portions and provided with openings or perforations as hereinafter described. Between the plate 26 and cylinder 9 is a gasket 27. Within the cylinder 9 behind said opening 9c and embracing said opening in an air-tight manner is a nozzle member 28 having a bore in which is mounted a slide valve 29, hereinafter described, cooperating with a combined pressure and vacuum pump 30 mounted within the cylinder 9, said pump 30 having a shaft 31 journaled in a bracket and carrying a bevel gear 32 at one end meshing with a bevel gear 32a on the shaft 33 of an electric motor 34 which is likewise housed in the cylinder 9, whereby the motor 34 will directly drive the pump 30 and will direct air under pressure in, or will withdraw air under vacuum from, the nozzle 28. Preferably the pump shaft 31 as shown in Figs. 10 and 15 carries an eccentric cam 31x which operates, by means of a piston rod 36v a piston 37v housed in a cylinder 38v in the pump casing 30, said cylinder 38v forming the vacuum producing means for the nozzle 28, and said cylinder 38v having in its outer end beyond the piston 37v an inwardly opening valve 39v (Fig. 15) normally maintained seated by a spring, the valve 39v opening into a duct 30a leading directly through valve sleeve 29 into the nozzle 28. In the side of the cylinder 38v beyond the piston 37v is a port 40a preferably a V-port in which is seated an outwardly opening spring pressed ball valve 40v whereby as the piston 37v is reciprocated by the shaft 31 air will be sucked through the plate 26 and strainer 28a and through port 30a to the nozzle 28 past the valve 39v at the end of the cylinder 38v and discharged on the next compression stroke of the piston 37v past the ball valve 40, the air escaping to the atmosphere within the cylinder 9.

In the pump 30 is a second cylinder 38b (Fig. 10) housing a piston 37b operated by piston rod 36b from cam 31x on the shaft 31 in a manner similar to the piston 37v previously described, said cylinder 38b producing pressure and containing valves 39b and 40b similar to valves 39v and 40v previously described, except that the ball valve 40b opens inwardly and the valve 39b in the end of the cylinder 38b opens outwardly, whereby as piston 37b is reciprocated by shaft 31 air under pressure is drawn from within the cylinder 9 and directed past the valve 39b into the nozzle 28 to force air under pressure through the perforations therein.

At one end of the semi-vacuum cylinder 9 are a pair of concentric collector rings 34c—34d constantly engaged by a pair of brushes 34e mounted in insulating block 34g and urged towards the rings by springs 34f, said brushes being connected in an electric circuit whereby the motor 34 will be constantly energized to operate the pump 30 when the master switch is on. The collector rings 34c—34d and their mountings are necessarily insulated from each other and from the end wall of the cylinder 9 in the usual manner, whereby whenever the master switch is on the motor 34 will constantly actuate the pump 30 irrespective of whether or not the cylinder is rotating, to establish either vacuum or air pressure in nozzle 28 depending upon the position of the valve 29.

Within the duct (Figs. 10–11) leading to nozzle 28 is a tubular valve 29 comprising a sleeve carrying its lower end a pin 42 engaging an eccentric groove 43a in a face cam 43 fixedly

mounted on a shaft 44 extending through the opposite end wall of cylinder 9. Shaft 44 is also provided with a lateral arm 46, and a spring 47 is connected with arm 46 and to an eye 47a fixed of the interior of cylinder 9 whereby cam 43 is normally maintained in the position shown in Fig. 11, in which sleeve valve 29 is retracted to its lowermost position. The projecting end of shaft 44 carries a rigid trip arm 48 exteriorly of the casing 9 for actuating cam shaft 44 at predetermined times, as hereinafter explained.

Valve sleeve 29 is provided with four ports 29a, 29b, 29c and 29d and sleeve 29 is open at its upper end. One port 29a connects the duct 30a extending from the vacuum pump 30, with the interior of the valve sleeve when the valve 29 is in normal position as shown in Fig. 11, so that the air will be sucked into the vacuum cylinder 38v and preferably through strainer 28a disposed in the connection between the nozzle 28 and the pump housing 30. When in such position a second port 29b in the valve tube connects the duct 30b from the pressure cylinder 38b of pump 30 with an opening 30x in the side wall of the pump, whereby the air under pressure from the pressure cylinder 38b is directed through opening 30x directly into the interior of cylinder 9 and the air under pressure is thus diverted from entering the nozzle 28. When the trip arm 48 is actuated by a pin 48b (Fig. 6) as hereinafter explained, the cam shaft 44 is rotated approximately 180° and the valve sleeve 29 is raised by action of the pin 42 in the cam groove 43a to raised position, at which time a port 29c in the valve sleeve 29 is in register with the duct 30b from the pressure cylinder 38b of pump 30 whereby air under pressure is directed into the nozzle 28 and through the perforated cover plate 26 for the purpose hereinafter explained. At the same time a fourth port 29d in the valve sleeve 29 connects the vacuum cylinder duct 30a with an idle port 30y communicating directly with the interior of the cylinder 9 so as to relieve unnecessary strains within the vacuum cylinder 38v of pump 30.

On cam shaft 44 is an extension of the previously mentioned arm 46 adapted to engage a fixed lug on the inner face of the adjacent end wall of the cylinder to limit the returning movement of the cam 43 whereby the cam will always be returned to its normal position shown in Fig. 11 when trip arm 48 is released.

Means are provided whereby whenever the vacuum cylinder is idle the perforated cover plate 26 of cylinder 9 will be accessible through the mouth 1a of the casing 1, as indicated in Figs. 1 and 2. As shown in Figs. 5, 6 and 17 a ring member 49 is provided having a radially disposed slot 49x slidably mounted on the slide bar 19 of side frame 6a, the ring 49 embracing a disk 50 on the shaft 7 of the cylinder 9 and being vertically movable with respect to shaft 7. At the lower end of the ring 49 is an inwardly or upwardly projecting lug 49a (Fig. 17) adapted to engage a corresponding recess 50a in disk 50 thereby locking shaft 7 against rotation in the same position whenever the ring 49 is raised, and thus insuring that the perforated cover plate 26 of cylinder 9 will be visible through the mouth 1a in the casing 1. The upper end of the slot is provided with an inclined cam surface adapted to be engaged by a corresponding cam lug 19x on slide bar 19, whereby when the slide bar 19 is shifted in a direction to disengage the clutch 7a the engaging cam surfaces will lift the ring 49 sufficiently to enter the lug 49a in the notch 50a as the shaft 7 rotates the disk 50 and the ring 49 will lock the shaft 7 in such position until the main switch has operated the solenoid 20 to engage the clutch 7a on the next succeeding operation of the machine.

As shown in Figs. 4, 7, 9 and 11, within the casing, disposed concentrically of the semi-vacuum cylinder 9 is an arcuate digit carrier 51 disposed between the slide frames 6 and 6a and disposed coaxially of said cylinder. The upper wall of the mouth 1a of casing 1 is substantially normal to the axis of the cylinder 9, and the digit carrier 51 commences in the upper part of the casing adjacent the upper wall of the mouth as shown in Fig. 4, arcuately throughout an arc of approximately 205°. The digit carrier includes a series of closely adjacent shafts 52 parallel with the axis of cylinder 9 each having fixedly mounted thereon dies 53 (Fig. 9), said shafts being movable radially towards or from the periphery of the cylinder 9. Each shaft 52 is supported in carrier 51 by a plurality of parallel arms 54 carrying at their outer ends self-oiling bearings, said arms projecting through bores 51a extending through the carrier 51, the bores being enlarged at their outer ends as at 51b and carrying springs 56 interposed between the bases of the enlarged bores and washers 57 mounted adjacent the outer ends of the arms 54 which latter project beyond the adjacent ends of the bores 51b as shown in Fig. 9. By the above construction, each shaft 52 is supported in a position parallel with the axis of the cylinder 9 and slightly spaced therefrom as shown in Fig. 11; and each die wheel 53 is of small diameter and contain repetitions of the same number, said wheel 53 being preferably fixedly mounted on said shafts 52.

Each shaft 52 is actuated towards the cylinder 9 by means of a plurality of cams 59 (Fig. 9) mounted upon a cam shaft 60 journaled in fixed bearings 61 in the adjacent face of the carrier 51, said cams 59 directly engaging the outer ends of the arms 54 and controlling the spacing of the shaft 52 with respect to the walls of cylinder 9. Each cam shaft 60 is provided on one end with an arm 62, and a spring 63 connects the arm 62 with a fixed lug 51x on the carrier 51 whereby the shaft 60 is normally maintained in position to maintain dies 53 spaced from cylinder 9. Each shaft 60 is rotated by means of an arm 64 thereon connected by links 65 with the core 68a of a fixed solenoid 68 mounted in the carrier opposite the related cam shaft 60 whereby when the solenoid 68 is excited, the cam shaft 60 will be rocked to cause the cams 59 to act on the ends of the arms 54 and move the die shaft 52 towards and into contact with the semi-vacuum cylinder 9. Each solenoid 68 is connected in its related electric circuit leading to its respective button on the control box 5 mounted on the casing 1, hereinafter described.

The die shafts 52 of the digit carrier 51 are rotated by and with the rotation of the semi-vacuum cylinder 9, each said die shaft 52 of the digit carrier carrying on its end adjacent frame 6a a pinion 52a meshing with a ring gear 52b of the adjacent end of cylinder 9 (Fig. 11). The end of each shaft 52 adjacent the gear 52b is preferably supported against flexing by means of a sliding bearing 55 (Fig. 9) having a shank 55a passing through a bore 55b in the carrier 51 and operated by a cam 55c on the related cam shaft 60 similar to the action of cams 59 which operate the sliding arms 54 of the shafts 52.

Referring to Figs. 2 and 3, the machine illustrated is shown as, but not necessarily limited to, having sufficient dies to print $999,999.99¢ the dollar symbol, the decimal point and cents symbol being applied as hereinafter described, and thus the digit carrier 51 shown in the present embodiment must be provided with eight sets of die shafts 52 for each row R'—R14 (Fig. 3) of Figures in the tint R, and each set has die shafts adapted to print numerals 1 to 0. As there are only six digits in the maximum dollars that the machine shown will print, the first set in the digit carrier comprises six shafts 52 in a bank T (Fig. 7) each containing dies 53 adapted to print dollar symbols, it being understood that a dollar symbol is to be displayed in place of a figure 1–9 or 0 when such figure is not shown in the amount, as indicated in Fig. 3A. The second bank T' (Fig. 7) in the digit carrier consists of eight die shafts 52 one for each digit in the amount and each die shaft in this second bank contains dies 53 adapted to print the numeral "1". The third bank T2 (Fig. 7) likewise consists of eight die shafts 52, one for each digit in the amount each having dies 53 adapted to print the numeral "2". The fourth bank T3 of die shafts in the digit carrier consists of eight shafts one for each digit in the amount each adapted to print the numeral "3". Similarly, a bank is provided successively for each individual numeral in the overwriting adapted to print the numerals "4", "5", "6", "7", "8", "9", "0", respectively. For convenience we have not attempted to show all of the shafts and operating means in the digit carrier as those illustrated in Figs. 7 and 9 are sufficient to show the operation of all the banks. If desired the bank for the zero dies may be inserted between the dollar symbol bank T and the bank T' for printing the numeral "1", although generally it is preferable to dispose the "zero" bank at the end of the digit carrier as above described.

The tint panel R may comprise as many parallel rows or groups R'—R14 of the amount for which the check is to be drawn as desired. The panel R may cover the area of the entire check as shown in Fig. 3 or merely small fields within the border thereof as indicated in Fig. 2. The primary purpose of the invention is to have the numerals in the rows or groups R'—R14 in the tint R correspond in amount with that of overwriting W (Fig. 2) for which the check or instrument is drawn. In the example shown in Fig. 2, the check is drawn for $777,777.77¢ and in order to set the digit carrier 51 for the above amount, a control panel 5 is provided in which the digits may be set in the desired order.

As indicated in Figs. 1, 18, 19, 20, the control panel 5 is provided with eight vertical rows of buttons 5a with ten buttons in five of the rows, and the buttons are marked on their faces to indicate the particular number "1" to "9" and/or "0" which it controls in the digit carrier 51, and thus in order to set up the amount $777,777.77¢ shown in the tint R in Fig. 3, the button "7" in each of the eight rows of control buttons 5a would be pressed. The pressing buttons 5a in the control panel 5 closes their respective electric solenoid circuits of the digit carrier whereby depressing a button 5a will actuate the related solenoid 68 to draw the plunger 68a inwardly of the coil and thereby rock the related cam shaft 60 and shift the related die shaft 52 towards the periphery of the cylinder 9 in which position the die wheels 53 on the die shaft 52 will make printing contact with any raised portions 26a (Fig. 10) of the die plate 26, so that when a piece of paper or the like is held onto the die plate 26 by the action of vacuum within the nozzle 28 of cylinder 9, the paper will have printed thereon in parallel rows or groups R'—R14 (Fig. 3) a tint consisting of a plurality of minute and legible figures which will serve to verify the amount of the overwriting W (Fig. 2) for which the check or other negotiable instrument is drawn.

In the panel 5, aside from the above mentioned buttons 5a, is a button 5b (Fig. 18) bearing the letter "R" adapted when depressed to release the vacuum normally set up within nozzle 28 of cylinder 9 for the purpose hereinafter explained; also another button 5c (Fig. 18) bearing the notation "CYL" adapted when depressed to actuate the clutch solenoid 20 which causes rotation of the semi-vacuum cylinder 9; also a button 5d (Fig. 18) marked "RC" for restoring all the depressed control buttons 5a to normal position for resetting purposes in case a wrong button 5a may have been depressed in setting up the amount in the digit carrier 51. Buttons 5a are held in a normal "out" position by springs 5e (Fig. 19) around the shanks of the buttons, until depressed by the operator, whereupon same are locked in such positions by latches 5f on shafts 5r, which latches are urged into locking positions by springs 5g (Fig. 20). When a button 5a is depressed, a spring 5h in a bore in the end of the shank of said button acts upon a telescoping pin 5j causing the latter to close the related electric contacts 5k mounted on a non-conducting plate 5m held firmly in the back of panel 5.

Referring to Fig. 18, the vertical column of buttons 5a at the right on panel 5 are electrically connected to their respective banks of solenoids 68 to actuate, i. e., project, the die shafts 52 in the digit carrier 51 for the corresponding die wheels 53, to print the amount shown on the depressed button 5a in the "cents" columns of all the rows R'—R14 of the tint; similarly the second column will control the "tens of cents" values appearing in the rows in the tint; the third column will control the "dollars"; the fourth column, the "tens of dollars"; the fifth column, the "hundreds of dollars"; and so on to the eighth column which will control the "hundreds of thousands of dollars," the setting up of the tint thus being automatic according to the particular buttons 5a in panel 5 which are depressed.

Normally the related banks of die wheels in the digit carrier are automatically actuated into printing position so that if no buttons 5a in the panel 5 are depressed, the tint impressed on a sheet run through the machine will read $$$$$$$.00¢. Whenever however a button 5a in any of the vertical columns in panel 5 is depressed, the related "$" or "0" symbol is automatically retracted and the symbol corresponding with the depressed button is projected into printing position. As soon as the said button is released, however, the "$" or "0" symbol is automatically returned into printing position by suitable cam means actuated by magnets controlled by the buttons on said panel. After the buttons 5a have been properly depressed to set up the tint, and cylinder 9 has been rotated for almost one complete revolution as hereinafter described, a lever 106 (Fig. 4) is moved by an arm 103 on cylinder 9 to close a switch 107 in an electric circuit including a solenoid 5n (Fig. 20) in the panel 5 to retract the core 5p thereof and actuate an arm 5q on shaft 5r and rotate same so as to cause

pads 5s thereon to engage latches of 5f and thereby disengage the latch hooks from the shanks of the buttons 5a, thereby permitting all buttons 5a to be returned by springs 5e to normal positions.

In the digit carrier 51, the first bank T (Fig. 7) is utilized only in event the amount shown in the tint is below one hundred thousand dollars, in which event the proper control buttons 5a of panel 5 would be depressed to set up "dollar" symbols as shown in Fig. 3A in any of the unused dollars columns of each row of the tint. Thus in the event the amount of the check was less than ten thousand dollars, the buttons on the control panel 5 would be operated to print two "dollar" symbols at the extreme left of the amount in each row of the tint. If the amount was less than ten dollars the control buttons would be operated to print five "dollar" symbols at the extreme left of the amount in each tint.

The actual printing from the digit carrier 51 on the check is effected by means of an endless inking ribbon 69 (Figs. 4–5–7–11) having one run interposed between the die wheels 53 of the digit carrier 51 and the periphery of the cylinder 9, the said ribbon running over guide rollers 70 mounted on shafts 71 (Figs. 7–8) journaled in the outer periphery of the digit carrier 51, and over rollers 70a at the ends of the digit carrier. The inking ribbon 69 also runs between spaced guide rollers 72 (Fig. 4) at the lower end of the digit carrier 51, and under a looping roller 73 mounted in vertical guides 73a in the frame for maintaining constant tension on inking ribbon 69. The shaft 70x of the upper guide rollers 70a (Figs. 4–5–7) nearest cylinder 9 constitutes the drive shaft for the inking ribbons 69, the shaft 70x projecting through the frame 6a parallel with the cylinder 9 and carrying on its end a small pinion 70y (Fig. 5) meshing with a ring gear 52b carried by the cylinder 9 whereby the ribbon 69 will be moved or advanced in the same direction as the cylinder 9 and at substantially the same peripheral speed, so as to prevent smudging of the ink on the check or other blank carried by the cylinder 9 during the printing operation, the ribbon 69 being moved by the rotation of roller 70a on shaft 70x and by gripping of the portion of the ribbon interposed between die wheels 53 and printing plate 26. As the outer run of ribbon 69 is supported upon the series of idler rollers 70 mounted upon rods 71 journaled on the outer arcuate face of digit carrier 51, the passage of said ribbon around the digit carrier is effected with a minimum of friction.

Cooperating with the vacuum cylinder is a primary cylinder 75 journaled in the side frames 6, 6a parallel with the periphery of the semi-vacuum cylinder 9, but spaced therefrom a slight distance for the purpose hereinafter described, the cylinder 75 being rotatably mounted for oscillation through small arcuate limit. Primary cylinder 75 preferably comprises a cylindrical drum closed at both ends by end plates 76 carrying studs 77 and bearings 78 which engage journals in the side frames. Spaced from the end plates 77 are panels 79 for the purpose hereinafter described. Adjacent the center of cylinder 75 are a pair of spaced parallel brackets 88 through which passes a shaft 83 of relatively large diameter disposed parallel with but offset from the axis of cylinder 75. In the periphery of cylinder 75 between the brackets 88 is an opening 75x (Figs. 12–13), and journaled on the shaft 83 are a plurality of closely adjacent dies 83a to 83e of substantially sector shape, the peripheries of which are adapted to project through openings 75x slightly beyond the periphery of cylinder 75. The arcuate end of each die 83b and 83c (Figs. 16–16A) carries spaced dies adapted to print in relatively large characters the numerals "1" to "9" and "0", whereby the cams when pivoted on the shaft 83 into operative position, as hereinafter described, may be arranged to print any desired value. As shown in Fig. 13, there is one die 83a, six dies 83b, one die 83e, two dies 83c, and one die 83d adapted to form a bank which will print values up to $999,999.99¢; thus die 83a bears only the "$" symbol. The six dies 83b which are adapted to print the dollars values each bears dies to print the values "1" to "9" and "0", also one "$" symbol. The single die 83e prints only the decimal point. The two dies 83c which are adapted to print the cents values each bears dies to print only the values "1" to "9" and "0". The single die 83d bears only the "¢" symbol. Thus dies 83a and 83d are fixed to their respective brackets 88 by screws or pins 88a (Fig. 13), also die 83e is fixed; while dies 83b and 83c are oscillatory on shaft 83. The inner end of each movable die 83b—83c is preferably provided with a gear 84 adapted to engage its respective rack bar 86 (Fig. 12) slidably mounted on two or more parallel rods 87 mounted in said brackets 88, the sliding racks 86 having elongated slots of such length that any printing symbol on the related die 83b—83c may be brought into proper printing position with respect to the opening 75x in the side of cylinder 75.

The dies 83b—83c are mounted upon shaft 83 in closely adjacent relation, with the operating gears 84 of each die mounted on the side thereof, said gears serving also as spacing washers for the bank of dies. The rack bars 86 which actuate the respective dies 83b—83c are held in spaced relation upon the supporting rods 87 by means of spacers 87a (Fig. 13) of suitable thickness. By the above construction each rack bar 86 will only operate its related die 83b—83c and the various rack bars may be adjusted, as hereinafter described, to set up the bank to print the desired value. Each rack bar 86 is normally yieldably maintained in position to bring the "$" symbol of each die 83b and the "0" symbol of each die 83c into printing position by means of contractile springs 90 each having one end hooked into its related rack bar and the other end engaging a fixed bracket 91 on the wall of the cylinder.

On the upper end of each rack bar 86 is a lateral stud 86b receiving an elongated slot in the lower end of an operating lever, 86a the upper end of which lever is pivoted on a shaft 92 secured adjacent the wall of the cylinder 75 by suitable brackets and at a point substantially diametrically opposite the shaft 83, whereby as the lever is swung transversely of the cylinder 75 the related rack bar 86 will be shifted against the action of its spring 90 and thereby shift the related die 83b—83c to bring the symbol for the desired numeral or character into printing position.

As shown in Figs. 12–13–14 the means for shifting each arm 86a comprises a bank of ten solenoids 95 supported upon non-conducting pads 95a and angle-iron brackets 95b, five solenoids preferably being disposed at each side of the lever 86a, said solenoids having cores disposed vertically and adapted to respectively operate links 96a, 96b, 96c, 96d, 96e, 96f, 96g, 96h, 96i,

and 96j connected with a series of ten spaced studs 97 on the side of the lever, each solenoid 95 operating its respective link. The upper end of each solenoid core is connected by a link 96x to one arm of a bell crank lever 96y, the other arm of which is connected to its related link 96a—96j which link has an elongated slot directly fitting over its related stud 97 on the arm 86a whereby as the plunger of the solenoid is depressed, when its coil is excited, the slotted link will be shifted laterally by operation of the bell crank 96y to shift the operating arm 86a according to the length of the respective slot in the link. As shown, the slots in links 96a—96j inclusive, associated with the respective studs 97 on the operating levers 86a progressively increase in length from the upper link 96a (Fig. 12) towards the lower link 96j so that when the uppermost link 96a is shifted by its related solenoid 95 the lever 86a is shifted through a larger angle to shift the related die 83b—83c from the position in which the "$" symbol is in operative position in cylinder 75, into the position in which the "0" symbol is disposed in operative position. Similarly, as each next lower link 96b, 96c et seq. is shifted by its related solenoid 95 so that the die 83b—83c will be swung on the shaft 83 through successively smaller arcs to bring successive symbols "9" to "1" into printing position, i. e., midway of the opening 75x in the wall of cylinder 75. Each of the solenoids 95 is in electric circuit with its related button 5a in its related row on the control panel 5, so that when a particular button in a row on the control panel 5 is depressed to set up the desired numerals in the digit carrier 51 of the tint panel, the corresponding solenoid 95 in the primary cylinder 75 is simultaneously actuated to shift the related die 83b in the bank in cylinder 75 so that the same figure will be printed in the same row in the overwriting of the check, and thus the setting of the dies for the tint and for the overwriting is automatic and simultaneous and the tint will act to verify the amount for which the check or other negotiable instrument is drawn.

In order to conserve space within cylinder 75 the bell crank levers 96y which actuate the slotted levers 96a for uppermost pins 97 on each of the operating levers 86a, are preferably made in the forms of telescoping tubes or shafts, whereby the shafts may pass one through another while preserving the same axis of rotation, and the shafts operating the outermost rack bars 86 in the bank being the larger (as shown in Figs. 13–14), while those operating the centrally disposed rack bars are the smaller.

The dies 83a—83b—83c—83d—83e of the primary cylinder 75 when in printing position, project beyond the periphery of said cylinder such distance that same will contact with any raised portions 26a on the printing plate 26 of the semi-vacuum cylinder 9 when the cylinders are revolving. Normally the primary cylinder 75 rests in such position that its dies 83a—83e are out of contact with the plate 26 on cylinder 9 through the action of a light spring 101 (Fig. 4) fixed at one end to a pin 101b on the end of the primary cylinder, the other end of the spring engaging a bracket 101a on the frame. The primary cylinder also carries a pin 102 (Figs. 4 and 13) substantially opposite the die opening 75x adapted to be engaged by a lug 103 (Figs. 4 and 11) on the vacuum cylinder 9 after the vacuum cylinder has almost made one complete revolution, i. e., after cylinder 9 has carried the check or other negotiable instrument throughout the entire length of the digit carrier 51, whereupon the lug 103 comes into contact with the pin 102 on primary cylinder 75 and causes the primary cylinder to rotate therewith in such direction that the dies 83a—83e of primary cylinder 75 contact squarely with the check on the raised portions 26a on the printing plate 26 of vacuum cylinder 9. After such printing operation the primary cylinder 75 will again return to its normal position by means of the spring 101.

Suitable means are provided for inking the dies 83a—83e of primary cylinder 75, said means consisting of an endless ribbon 104 passing over guide rollers 72p and an arcuate guide 72q disposed adjacent the periphery of the primary cylinder 75 (Fig. 4), said ribbon having one run disposed between the primary and vacuum cylinders 5 and 9, the ribbon below the vacuum cylinder passing under a weighted roller 73b, vertically slidably mounted between the side frames 6—6a, the weight of roller 73b maintaining a substantially constant tension upon the inking ribbon 104. Said ribbon is progressed step by step around the orbit the primary cylinder by reason of the fact that the one run is interposed between the vacuum and primary cylinders 9 and 75 and is therefore shifted therewith while the printing plate 26 and dies 83a—83e are in contact, the ribbon moving in the direction of rotation of the vacuum cylinder. As soon as the printing plate 26 and the dies 83a—83d of primary cylinder 75 have rolled out of contact, the primary cylinder is snapped back by the action of the spring 101, until a pin 105a (Fig. 4) on the end wall of the cylinder 75 strikes a spring-pressed plunger 105 mounted in the side frame 6, the plunger acting to cushion the cylinder 75 against sudden jars, and the primary cylinder 75 and its inking ribbon 104 thereafter coming to rest. Owing to the quick-return of the primary cylinder to its normal out-of-register position, the inking ribbon 104 is prevented from moving with said cylinder, thereby preserving the function of moving the ribbon 104 step-by-step with each operation of the primary cylinder. Ribbons 104 and 69 may bear ink of any colors or combinations of colors.

Referring to Fig. 3, it will be noted that for any amount or value appearing in the tint, the decimal point, the "¢" symbol, and the "$" symbol at the extreme left of the amount, always appear and therefore it is not necessary to provide in the digit carrier 51 solenoid operated dies to print these, and we accordingly provide yieldable dies on the digit carrier for printing the above symbols irrespective of any value appearing in the print, said dies being preferably mounted at the tail end of the digit carrier 51 on shafts similar to the die shafts 52 shown in Fig. 9, except that the shafts therefore are mounted in yieldable bearing arms rather than positively operated bearing arms, and each shaft carries its respective die symbol, one die carries the "$" symbol at the extreme left of each row or group of figures in the tint; another die carrying the decimal point for each row of groups of figures in the tint, and the third die carrying the "¢" symbol at the extreme right of each row of figures in the tint. Each shaft furthermore carries on its outer end a pinion 52a meshing with the ring gear 52b on the vacuum cylinder 9 whereby the three die shafts are rotated whenever the vacuum cylinder is rotated; and the

three shafts are yieldably mounted with respect to the vacuum cylinder whereby the desired pressure will always be set up between the dies and the check or the like carried on the cylinder 9.

Whenever the cylinder 9 is rotating, the operation of the motor 34 normally sets up a vacuum within the nozzle 28, which vacuum is broken when the trip arm 48 is tripped as previously described. Means are also provided whereby the vacuum may be broken at will, the same comprising a button 5b marked "R" (Fig. 18) mounted upon the control box which when depressed will actuate through a solenoid 5n (Fig. 20) to shift the slide valve 29 thereby breaking the vacuum within the nozzle 28 and directing air under pressure into said nozzle in the manner previously described.

Operation

Normally, the parts are at rest and the printing plate 26 on the semi-vacuum cylinder 9 is visible through the mouth 1a of the casing as indicated in Fig. 5, while the primary cylinder 75 is maintained by the spring 101 out of contact with the vacuum cylinder 9. In the control board all of the buttons would be normally in raised position. When a check is to be printed with a value, such as $777,777.77 as indicated in Figs. 2 and 3, the operator first depresses a button 1b on the front of casing 1 (Fig. 1) which actuates the prime mover, 13, which drives, through belts 11, the belt pulley 10 loosely mounted upon the shaft 7 of the vacuum cylinder 9, it being understood as previously explained that the belt pulley on said shaft normally rotates idly thereon, the clutch 7a being normally disengaged.

Thereupon the operator presses a button 1c (Fig. 1) on the front of casing 1 which closes the circuit for the motor 34 of the pump 30 within the vacuum cylinder 9, and the pump is thereupon set into operation normally setting up vacuum through duct 30a within the nozzle 28 while the air under pressure from the pressure cylinder 40b of the pump is diverted to the atmosphere within the vacuum cylinder. The operator then presses the buttons 5a in their respective vertical columns in control panel 5 to set up the dies 53 for the desired amount to be reproduced not only in the tint but in the overwriting, each button 5a operating its respective solenoid 68 which projects its related die shaft 52 for each row or group of figures in the tint, and at the same time simultaneously operates the particular solenoid 95 to set up corresponding dies in the bank in the primary cylinder 75, the operation of the buttons 5a thus automatically correlating the tint and the amount of the overwriting. If a wrong button 5a in panel 5 is accidentally depressed in setting up the amount to be printed in the tint and overwriting, the operator may depress button 5d in the panel marked "RC" whereupon all the depressed buttons 5a will be released and restored to normal position for resetting purposes.

The operator then places a negotiable instrument, which usually but not necessarily will be a check on the printing plate 26 of vacuum cylinder 9. In event the check should not be properly placed on the printing plate, the vacuum in nozzle 28 may be released by pressing button 5b marked "R" (Fig. 18) on the control panel and the air in nozzle 28 will blow the check off the printing plate. Upon releasing said button "R" the check may be replaced on the printing plate and held thereon by vacuum within the nozzle, so that the portions of the check which are to bear the tint and overwriting may be properly supported upon the raised surfaces 26a of the plate 26.

The operator then presses button 5c (marked "CYL" in Fig. 18) operating solenoid 20 which throws in the clutch 7a connecting the drive pulley 10 with the clutch collar 7c on shaft 7.

As soon as the button 5c is depressed the locking ring 49 for the shaft 7 of vacuum cylinder 9 is initially released by movement of the slide rod 19 and immediately thereafter the clutch 7a is engaged so that the shaft 7 is driven with the pulley 10. The check thus held on the vacuum cylinder 9 will then be carried around, by rotation of the vacuum cylinder under the dies 53 of the digit carrier 51, thereby reproducing, on all portions of the check which happen to be positioned over raised surfaces 26a of the printing plate 26, a plurality of rows or groups of valves corresponding with the desired value for which the control panel 5 of the machine has been set, the area of the portions or panels of the tint conforming with the areas and arrangements of the raised portions 26a on the printing plate 26.

After the tint has been applied and the vacuum cylinder 9 has rotated substantially 205°, the arm 103 on the end of the vacuum cylinder 9 opposite the printing plate 26 contacts with the pin 102 on the end of primary cylinder 75 disposed adjacent the dies 83a—83d and rocks the primary cylinder on its pivots in the same direction as the movement of the vacuum cylinder, thereby bringing the dies of the primary cylinder 75 into contact with the check on the printing plate 26, to thereby impress upon the previously impressed tint the amount of the overwriting, which amount automatically corresponds in value with that of the tint. Upon further rotation of the vacuum cylinder 9, the arm 103 and pin 102 become disengaged, and the spring 101 restores the primary cylinder 75 to its normal position in which the dies 83a—83d are out of contact with the vacuum cylinder 9, and at the movement the printing plate 26 still carrying the check, reappears opposite the mouth 1a in the casing 1, the trip arm 48 controlling the pump valve 29 is contacted by pin 48b fixed in the frame 6a to shift said valve, breaking the vacuum in the nozzle 28 and admitting air under pressure therein, and the printed check is blown from the vacuum cylinder 9 through the said casing mouth. As soon as the trip arm 48 passes the pin 48b the valve 29 is returned by spring 47 to normal position, and the stop ring 49 is raised by releasing movement of the clutch rod 19 to stop the vacuum cylinder in normal position in which the printing plate 26 is accessible through the mouth of the casing. Whenever the vacuum cylinder 9 is rotating, the ring gear 52b on the end of said cylinder is constantly driving the shafts 52 of all the tint dies 53 also the shafts of the fixed dies for the "$", decimal, and "¢" symbols of the tint.

In stopping, the arm 106 on the vacuum cylinder 9 strikes button 107 just as the cylinder 9 has almost completed its revolution, and closing button 107 excites solenoid 5n in control box 5 serving to release all buttons 5a letting the buttons 5a spring back into normal position, thus deenergizing the solenoids for all overwriting and tint numerals, also releasing the clutch 7a and engages the brake 49, which stops vacuum

cylinder 9 and primary cylinder 75 in normal positions.

Thus the construction is such that as soon as an operation or cycle has terminated, the vacuum within the nozzle 28 is restored, and means are actuated for releasing all of the buttons 5a as the machine comes to rest.

We claim:

1. In a machine of the character specified, an arcuate series of printing dies individually rotatable and selectively radially shiftable; a cylinder coaxial with said series; means on said cylinder for supporting a sheet to be printed; an oscillatory member adjacent said cylinder and carrying a second series of selective printing dies normally out of contact with said cylinder; means for rotating the cylinder whereby the sheet will receive an impression from the first series; and means during said rotation for shifting the member whereby the sheet will receive a second impression superimposed upon the first impression.

2. In a machine as set forth in claim 1; said first series being adapted to impress a plurality of closely adjacent rows in the form of a tint; and said second series being adapted to impress the overwriting, and means for setting the dies of each series to print the same value.

3. In combination with a machine as set forth in claim 1, a control panel; and means operated by said panel for simultaneously setting up the dies in both series to print the same value.

4. In a machine as set forth in claim 1, said sheet supporting means comprising a perforated printing plate on the cylinder having a formed impression surface; means for normally setting up partial vacuum behind the plate to hold the sheet thereon; and means for releasing the vacuum.

5. In a machine as set forth in claim 1, said sheet supporting means comprising a perforated plate on the cylinder having raised surface defining the areas on the sheet which will receive the impressions; means for normally setting up partial vacuum behind the plate to hold the sheet thereon; and means for releasing the vacuum.

6. In a machine as set forth in claim 1, said cylinder rotating means comprising a prime mover; a shaft on said cylinder; a pulley loosely journaled on the shaft and driven by said prime mover; normally open clutch means for locking the shaft to the pulley; manual means for engaging the clutch; and means for automatically disengaging the clutch and for stopping the cylinder in the same position after the cylinder has made one complete rotation.

7. In a machine as set forth in claim 1, said cylinder rotating means comprising a prime mover; a shaft on said cylinder; a pulley loosely journaled on said shaft and driven by said prime mover; normally open clutch means for locking the shaft to the pulley; manual means for engaging the clutch; means for automatically disengaging the clutch after the cylinder has made one complete rotation; and said member shifting means comprising lugs on the member and cylinder adapted to engage after the sheet has received the first impression.

8. In combination with a machine as set forth in claim 1, inking ribbons having runs respectively extending between the cylinder and first series, and between the cylinder and second series; said runs being advanced by the clamping action thereon between the rotating cylinder and the dies during the respective printing operations.

9. In a machine of the character specified, a rotatable cylinder for supporting a sheet to be printed; an arcuate die carrier disposed external to and coaxial with the cylinder; a closely adjacent series of die shafts radially movably mounted in the carrier and disposed parallel with the axis of the cylinder; die wheels mounted on said shafts normally disposed out of engagement with said cylinder; and means for selectively shifting the shafts to bring their respective die wheels into printing position with respect to the sheet on the cylinder.

10. In combination with a machine as set forth in claim 9, means operated by the cylinder for rotating the die shafts therewith.

11. In a machine as set forth in claim 9, said shifting means comprising a control panel having buttons; magnetic means in the carrier for individually operating the shafts; and means controlled by the setting of the buttons in the panel for actuating the respective magnetic means.

12. In combination with a machine as set forth in claim 9, an inking ribbon having a run extending between the cylinder and die wheels, said run being advanced by the clamping action thereon between the rotating cylinder and die wheels which have been shifted into printing position.

13. In a machine as set forth in claim 9, said die shafts each having a series of die wheels adapted to print the same indicia in corresponding columns in closely adjacent rows; said shafts being arranged in blanks corresponding with the number of columns in each row; and each bank containing the die wheels for all indicia to be printed in its respective column.

14. In a machine as set forth in claim 9, each die shaft being supported in bearings in spring retracted plungers mounted in the carrier; actuating cams cooperating with the plungers of each shaft; means for normally positioning the cams to permit retraction of the plungers; and selective means for actuating the cams to project the plungers.

15. In a machine of the character specified, an arcuate series of radially shiftable rotatable printing dies; a rotatable cylinder coaxial with said series said series being external of the cylinder; means for rotating the cylinder; a perforated plate on said cylinder communicating with the interior thereof and adapted to support a sheet in printing position; means in the cylinder for normally setting up a vacuum behind the plate during a portion of each revolution of the cylinder to hold the sheet thereon; and means for releasing the vacuum during the remaining portion of said revolution.

16. In a machine as set forth in claim 15, said plate having raised portions thereon defining the area of the sheet which will receive the impressions.

17. In a machine as set forth in claim 15, said vacuum means comprising a vacuum pump in the cylinder; a motor in said cylinder driving the pump; a nozzle within the cylinder behind the plate; valve means for normally connecting the pump with said nozzle; a stationary member and means mounted on the cylinder coacting with said member during rotation of the cylinder for shifting the valve after the printing operation to cut off the vacuum from the nozzle.

18. In a machine as set forth in claim 15, said vacuum means comprising a vacuum-pressure

pump in the cylinder; a motor in said cylinder driving the pump; a nozzle within the cylinder behind the plate; valve means for normally connecting the suction side of the pump with said nozzle; a stationary member; and means mounted on the cylinder coacting with said member during rotation of the cylinder for shifting the valve after the printing operation to connect tne pressure side of the pump with the nozzle.

19. In combination with a machine as set forth in claim 15, an inking ribbon having a run extending between the cylinder and die wheels, said run being advanced by the clamping action thereon between the rotating cylinder and any dies which are shifted into printing position.

20. In a machine as set forth in claim 15, said series of dies being mounted in an arcuate carrier adjacent to and coaxial with the cylinder and including a series of movable shafts each carrying a series of die wheels adapted to print the same indicia in a plurality of corresponding columns in closely adjacent rows; means for normally retracting said shafts; and means for selectively projecting the shafts to bring their respective dies into printing position with respect to the plate.

21. In a machine as set forth in claim 15, said series of dies being mounted in an arcuate carrier adjacent to and coaxial with the cylinder and including a series of movable shafts each carrying a series of die wheels adapted to print the same indicia in a plurality of corresponding columns in closely adjacent rows; said shafts being arranged in banks corresponding with the number of columns in each row; and each bank containing the die wheels for all indicia to be printed in its respective column; means for normally retracting said shafts; and means for selectively projecting the shafts to bring their respective dies into printing position with respect to the plate.

22. In a machine of the character specified, a series of shiftable printing dies, a rotatable cylinder adapted to cooperate with said series, said series being external of the cylinder, means for rotating the cylinder, a perforated plate on said cylinder communicating with the interior thereof, and adapted to support a sheet in printing position, means in the cylinder for normally setting up a vacuum behind the plate during a portion of each revolution of the cylinder to hold the sheet thereon, and means for releasing the vacuum during the remaining portion of said revolution; said series of dies being mounted in an oscillatory member disposed parallel with the axis of the cylinder; means for normally maintaining the member in such position that the dies are out of contact with the cylinder; and means fixed on the cylinder cooperating with the oscillatory member for oscillating the member to bring the dies into contact with the sheet on the printing plate during rotation of the cylinder.

23. In a machine of the character specified, a rotatable cylinder adapted to carry a sheet to be printed; means for rotating said cylinder; an oscillatory member adjacent to and parallel with said cylinder; a series of printing dies on said member; means for normally maintaining the member in such position that the dies are out of contact with the cylinder; and means fixed on the cylinder cooperating with the oscillatory member for oscillating the member to bring the dies into contact with the sheet during rotation of the cylinder.

24. In a machine of the character specified; a rotatable cylinder; a stationary bank of external dies cooperating with the periphery thereof; a perforated plate on the cylinder; means for normally setting up partial vacuum behind the plate to hold a sheet thereon during partial rotation of the cylinder; and means for releasing the vacuum during the remaining portion of rotation of the cylinder; said vacuum means comprising a vacuum-pressure pump in the cylinder; a motor in said cylinder driving the pump; a nozzle within the cylinder behind the printing plate; valve means for normally connecting the suction side of the pump with said nozzle; a stationary member; and means mounted on the cylinder coacting with said member during rotation of the cylinder for shifting the valve to connect the pressure side of the pump with the nozzle.

25. In a machine as set forth in claim 24, said plate having raised portions thereon defining the area of the sheet which will receive the impressions.

26. In a machine of the character specified, an arcuate die carrier comprising a base; a series of die shafts on the base each having a series of die wheels adapted to print the same indicia in a plurality of corresponding columns in closely adjacent rows; said shafts being arranged in banks corresponding with the number of columns in each row; and each bank containing the die wheels for all indicia to be printed in its respective column; means for normally retracting said shafts; and means for selectively projecting the shafts to bring their respective dies into printing position.

27. In a machine as set forth in claim 26, each die shaft being carried in bearings in spring retracted plungers in the base; cam means for projecting the plungers; means for normally positioning the cams to permit retraction of the plungers; and selective means for actuating the cams to project the plungers.

28. In a machine as set forth in claim 26, said projecting means comprising a control panel; magnetic means in the carrier for individually operating the shafts; and means controlled by the panel for actuating the respective magnetic means.

29. In a machine of the character specified, a pivoted casing having an opening; a shaft in the casing adjacent the opening and pivotally supporting a series of printing dies; said dies having segmental die faces projecting through the opening; and means within the casing for selectively shifting the respective dies throughout various angles; said shifting means comprising a series of rack bars reciprocably mounted in the casing and operating their respective dies; a series of levers pivoted in the casing and having slotted connections with their respective rack bars; and means for selectively operating the respective levers.

30. In a machine of the character specified, a pivoted casing having an opening; a shaft in the casing adjacent the opening and pivotally supporting a series of printing dies; said dies having segmental die faces projecting through the opening; and means within the casing for selectively shifting the respective dies throughout various angles; said shifting means comprising a series of rack bars reciprocably mounted in the casing and operating their respective dies; a series of levers pivoted in the casing and having slotted connections with their respective

rack bars; said levers each having series of pins thereon corresponding with the number of printing symbols on the segmental faces of their related dies; series of slotted arms engaging the respective pins on their related levers, the slots in each series progressively increasing in length; and means for selectively operating the respective arms.

31. In a machine of the character specified, a pivoted casing having an opening; a shaft in the casing adjacent the opening and pivotally supporting a series of printing dies; said dies having segmental die faces projecting through the opening; and means within the casing for selectively shifting the respective dies throughout various angles; said shifting means comprising a series of rack bars reciprocably mounted in the casing and operating their respective dies; a series of levers pivoted in the casing and having lotted connections with their respective rack bars; said levers having series of pins thereon corresponding with the number of printing symbols of the segmental faces of their related dies; series of slotted arms engaging the respective pins on their related levers; the slots in each series progressively increasing in length; series of solenoids in the casing; bell-crank levers connecting the related solenoid cores and related slotted arms; and means for selectively actuating said solenoids whereby the related dies will be shifted.

32. In a machine of the character specified, a pivoted casing having an opening; a shaft in the casing adjacent the opening and pivotally supporting a series of printing dies; said dies having segmental die faces projecting through the opening; and means within the casing for selectively shifting the respective dies throughout various angles; said shifting means comprising a series of rack bars reciprocably mounted in the casing and operating their respective dies; a series of levers pivoted in the casing and having slotted connections with their respective rack bars; said levers having series of pins thereon corresponding with the number of printing symbols of the segmental faces of their related dies; series of slotted arms engaging the respective pins on their related levers; the slots in each series progressively increasing in length; series of telescoping shafts in the casing; series of solenoids in the casing; arms connecting the related shafts with the related solenoid cores and related slotted arms whereby the axes of the shafts for the corresponding slotted arms of all the levers will be coaxial; and means for selectively actuating said solenoids whereby the related dies will be shifted.

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