Dec. 19, 1939. C. H. ARNOLD 2,183,829

ACCOUNTING MACHINE

Filed Sept. 13, 1937 5 Sheets-Sheet 1

FIG. 1

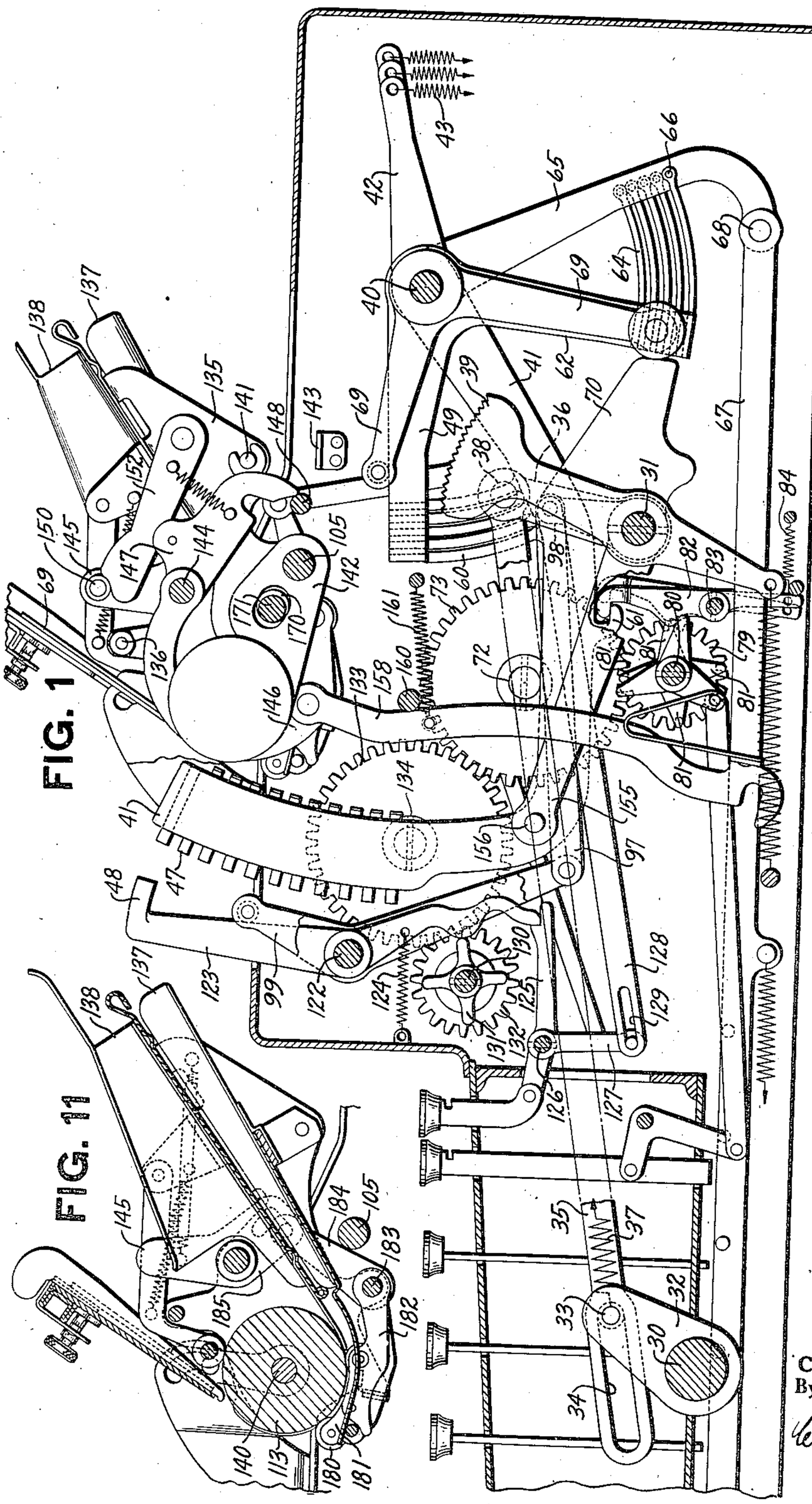

FIG. 11

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ACCOUNTING MACHINE

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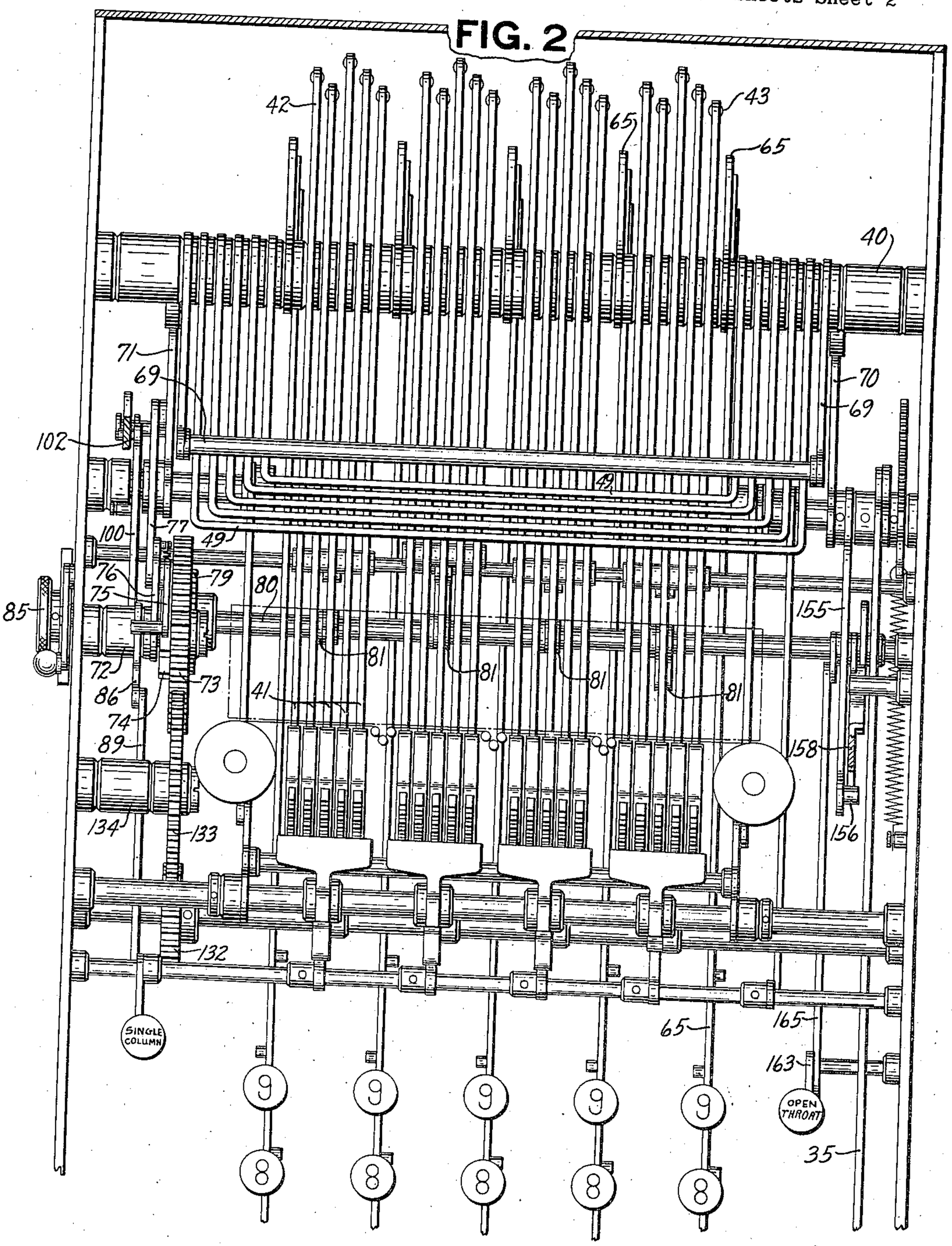
FIG. 2



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ACCOUNTING MACHINE

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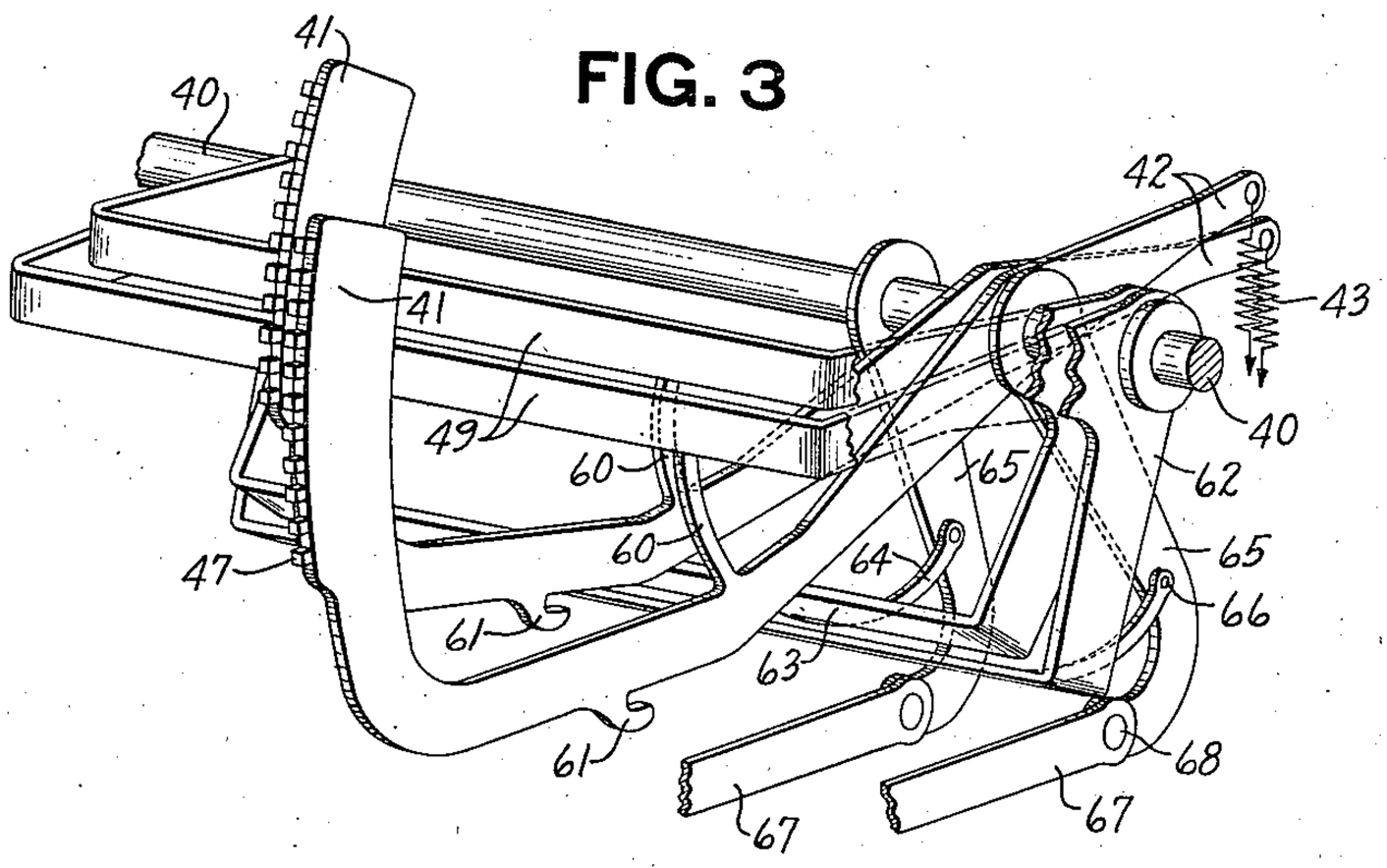
FIG. 3



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ACCOUNTING MACHINE

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FIG. 6

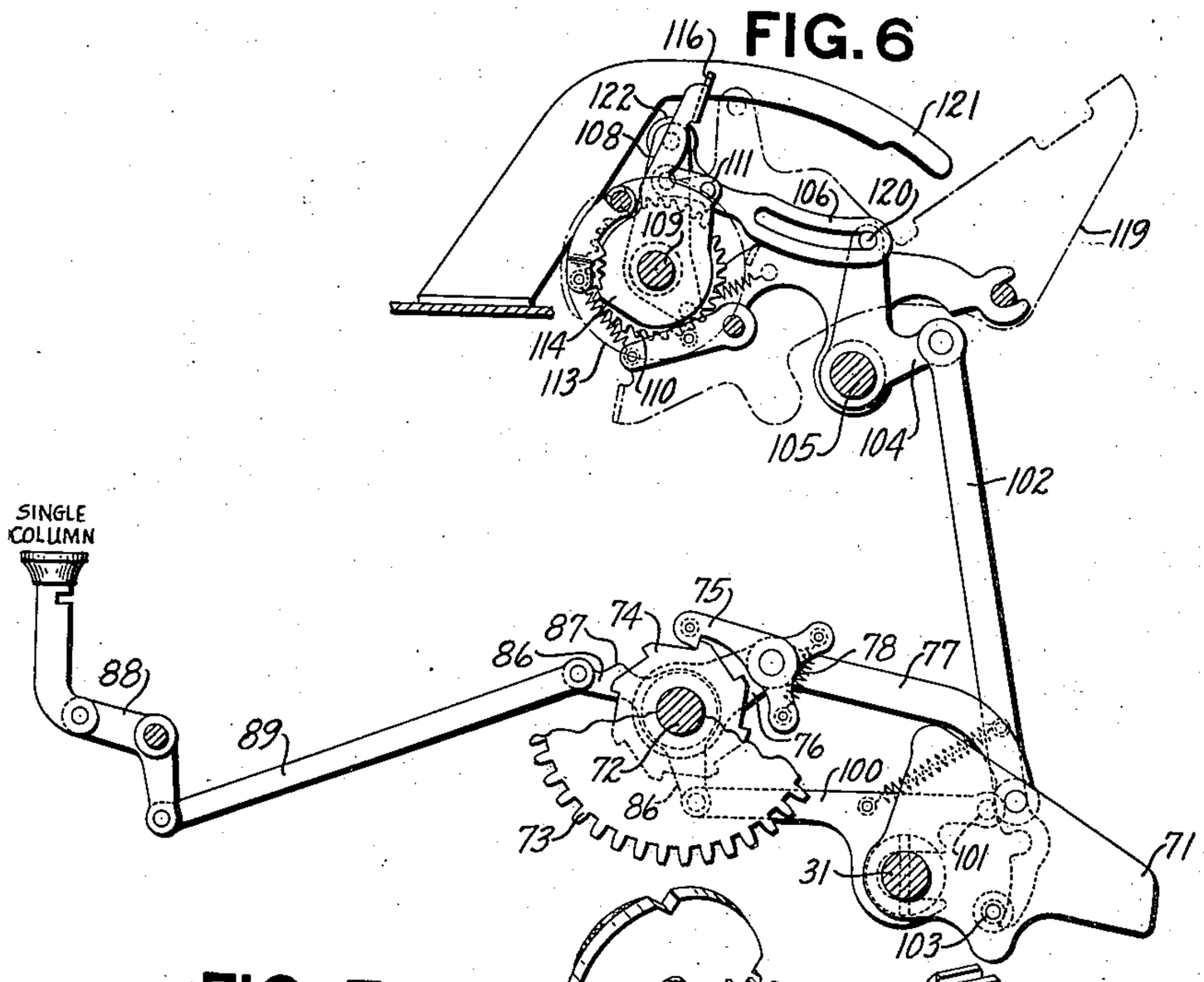


FIG. 7

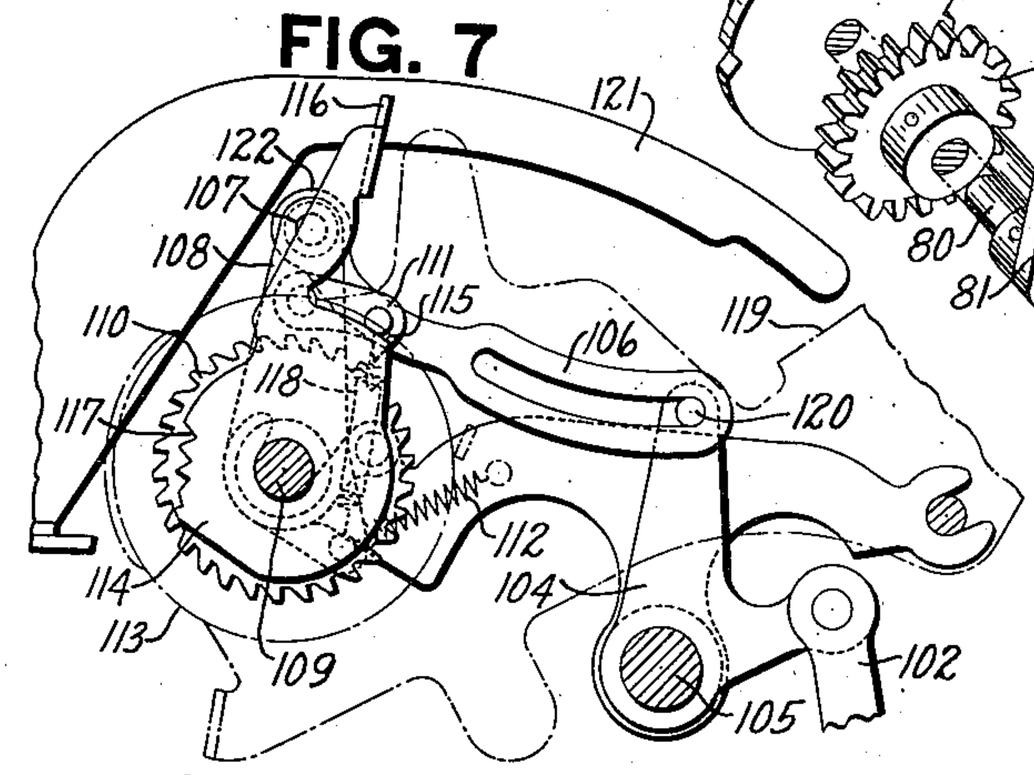
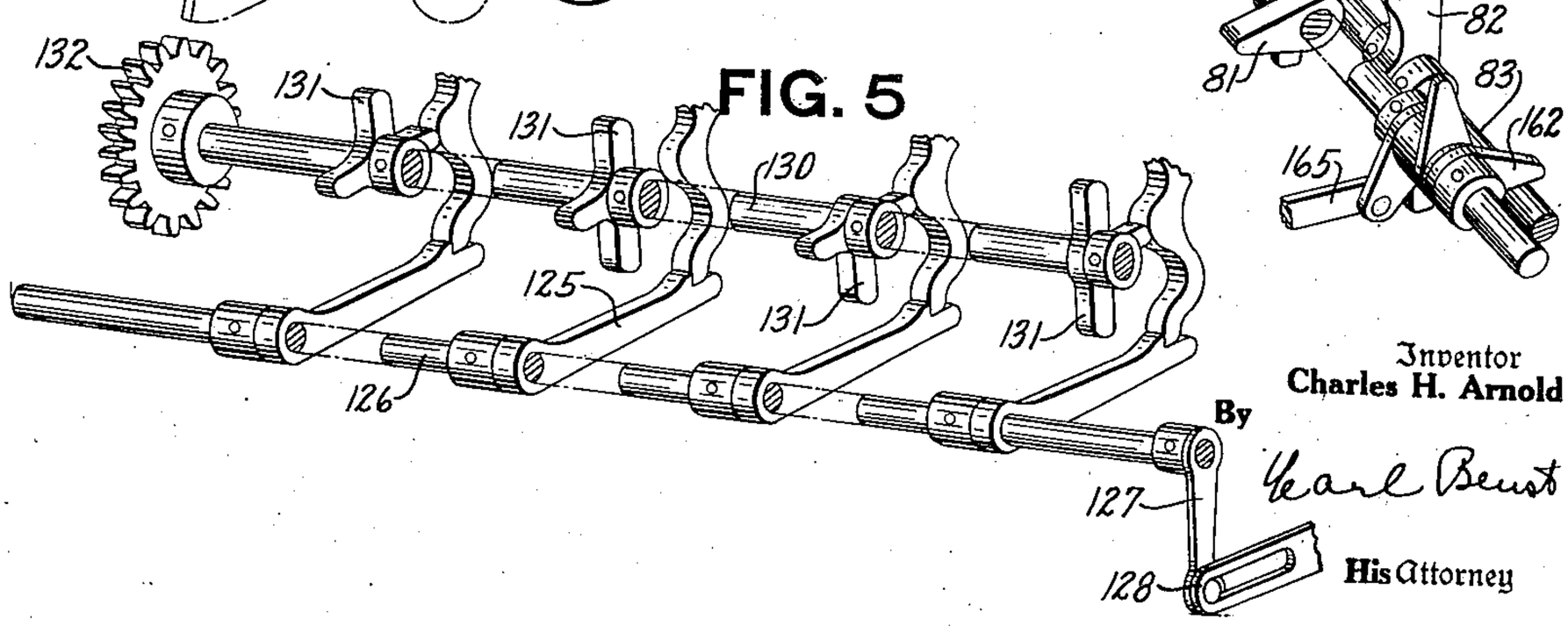


FIG. 4

FIG. 5



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ACCOUNTING MACHINE

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FIG. 13

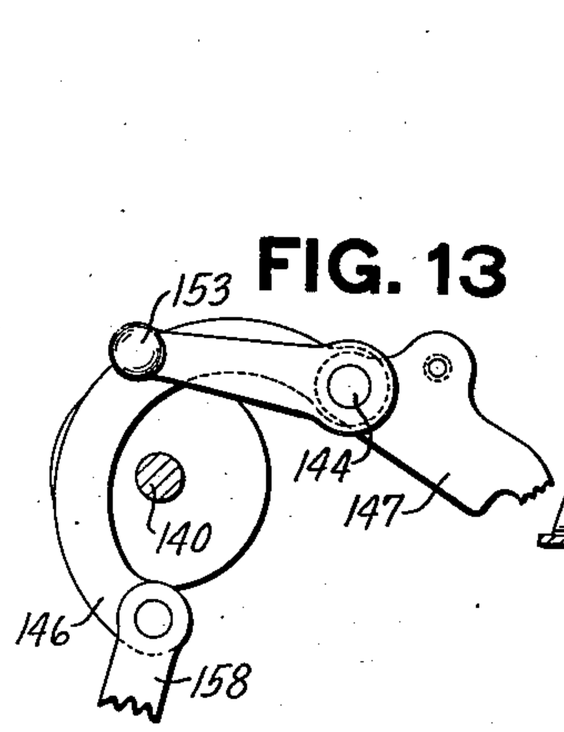
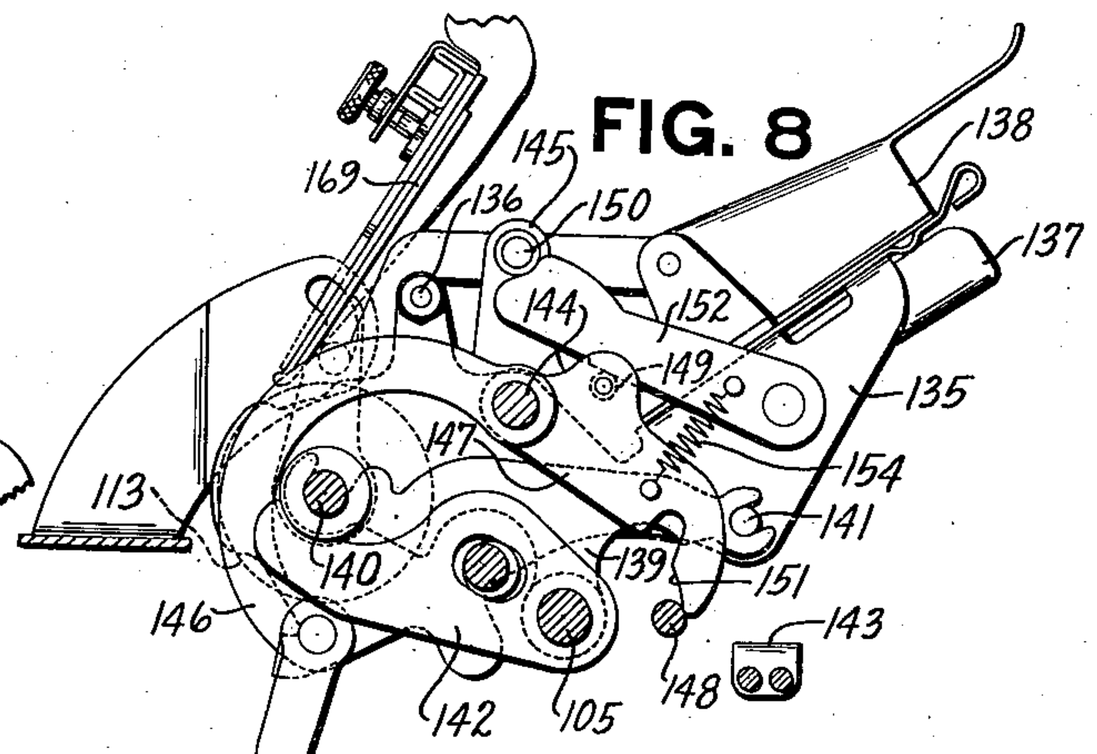


FIG. 8



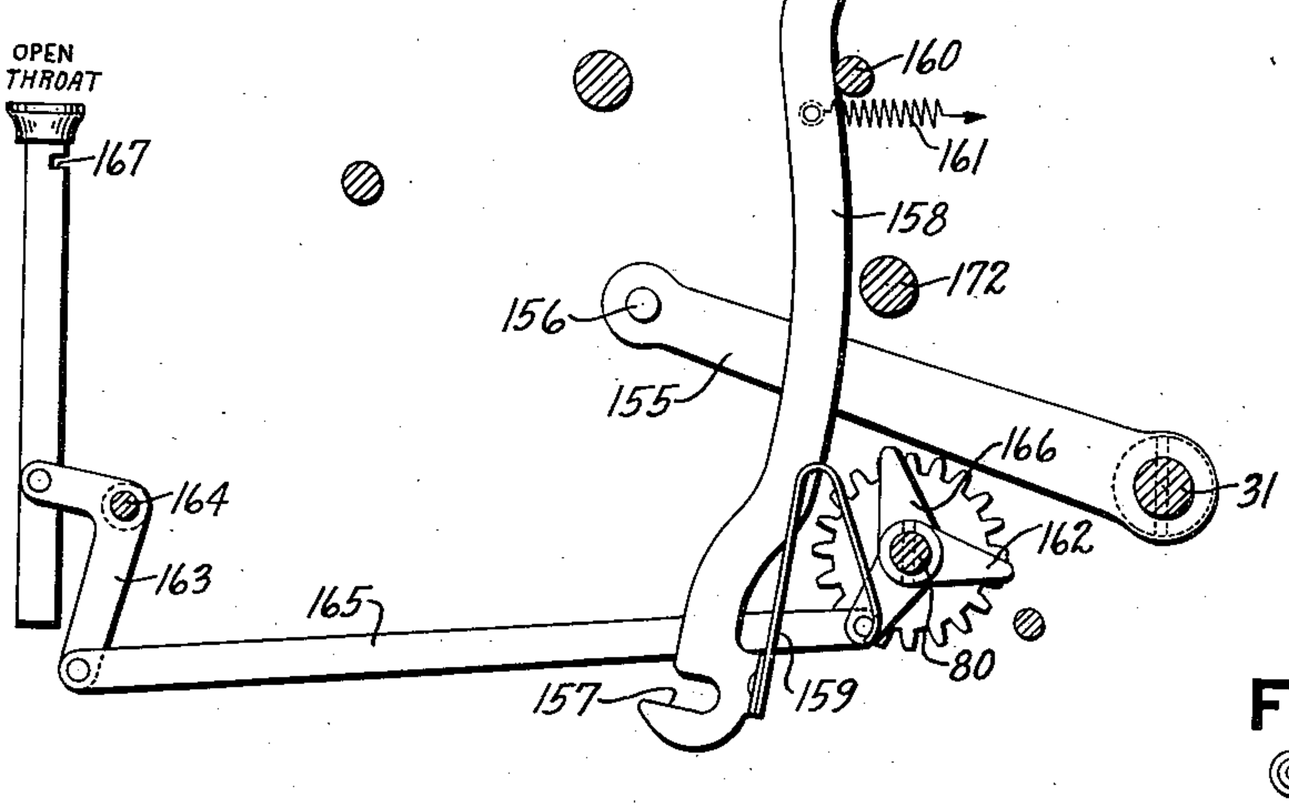


FIG. 12

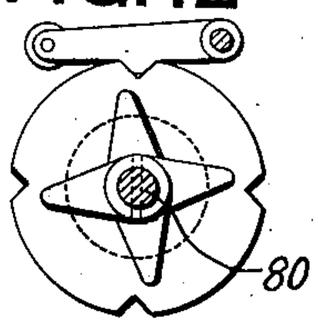


FIG. 9

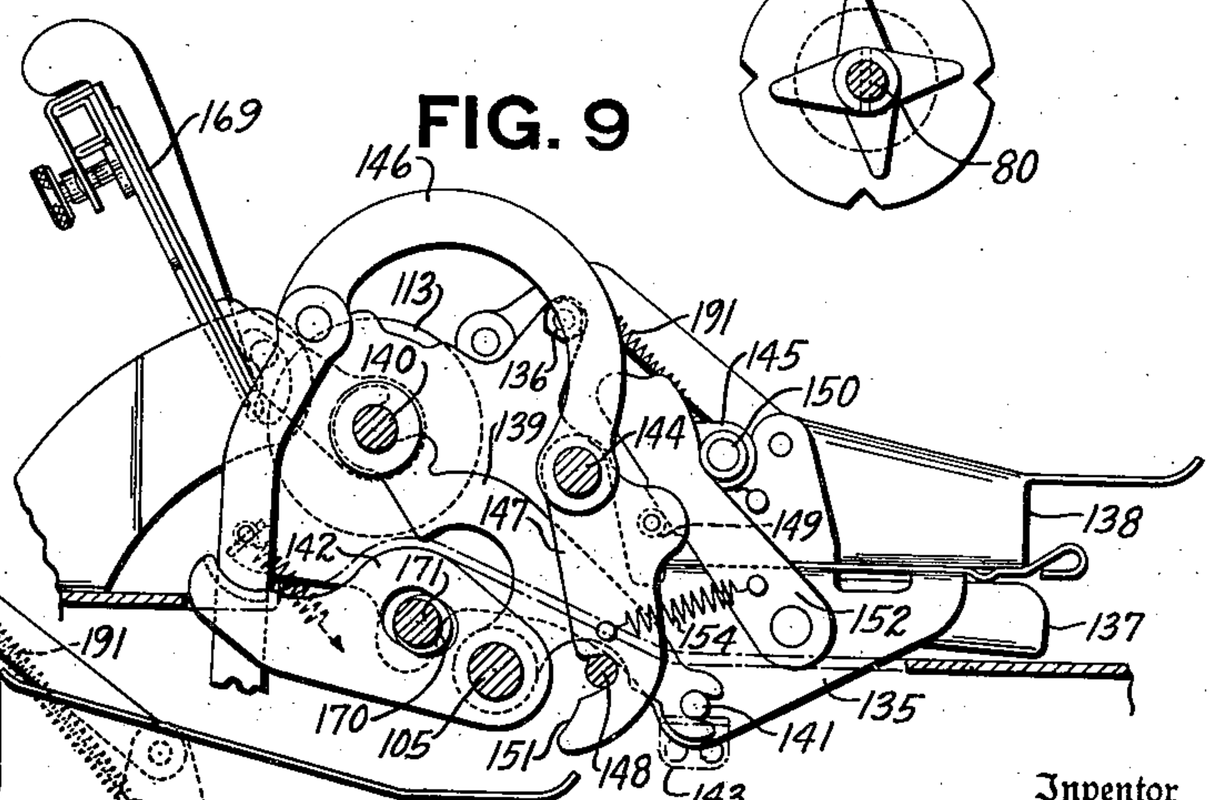
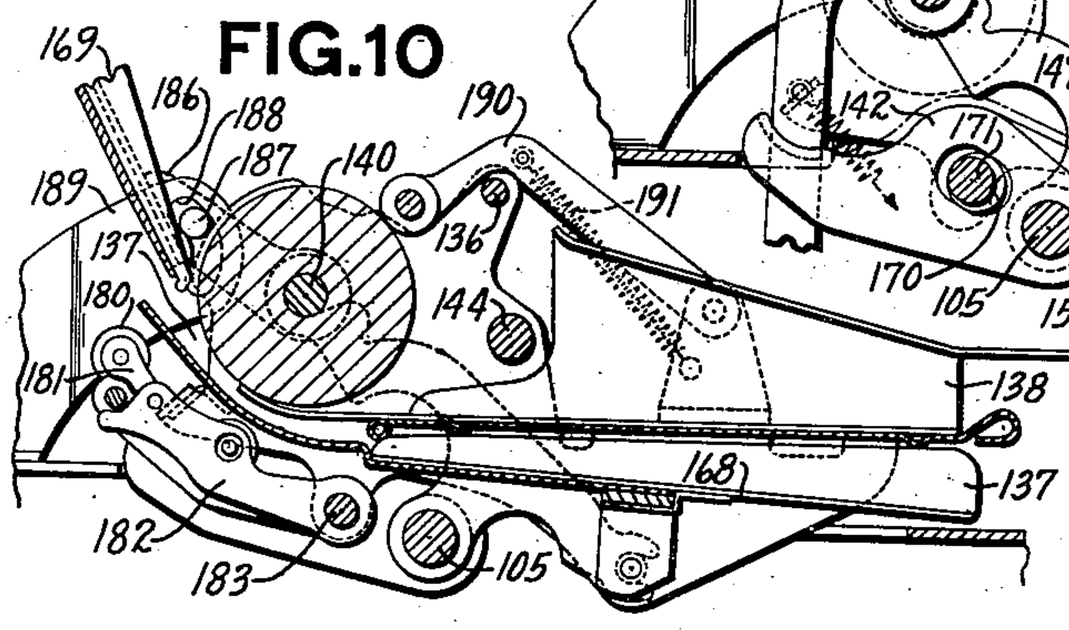


FIG. 10



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Patented Dec. 19, 1939 2,183,829

UNITED STATES PATENT OFFICE

2,183,829

ACCOUNTING MACHINE

Charles H. Arnold, Dayton, Ohio, assignor to The National Cash Register Company, Dayton, Ohio, a corporation of Maryland

Application September 13, 1937, Serial No. 163,627

33 Claims. (Cl. 101—93)

This invention pertains to improvements in the paper holding, paper feeding, and printing mechanisms for adding, calculating, and accounting machines of the type providing multiple and selective column printing, using, to achieve this result, multiple groups of printing elements requiring no relative lateral movement between the record material and the said printing elements. The machine used for the purpose of this disclosure is described in United States Letters Patent No. 1,685,685 and Reissue No. 20,167 of the same patent, granted to Abraham Smith on September 25, 1928, and November 10, 1936, respectively. To a large extent, the paper holding and paper feeding mechanism herein described is disclosed in the application for United States Letters Patent, Serial No. 653,838, filed by Raymond A. Christian on January 27, 1933, and in British Letters Patent No. 424,132 issued to The National Cash Register Company on February 15, 1935.

The principal object of this invention is to provide a machine of the Smith type, above mentioned, with means for rocking the platen away from the printing elements to front-feed or open-throat position, so that paper or other matter may be inserted between the platen and the printing elements, from the front of the machine.

Another object of the invention is to provide such a machine with means for automatically rocking the platen open to front-feed or open-throat position at the end of a series of printing or recording operations or at the end of a machine operation when manually determined at the beginning of such machine operation.

A further object of this invention is to provide such a machine with a disabling mechanism for the automatic column selecting device and a platen rotating mechanism, so that successive printings or recordings may be made in a single vertical column.

A further object of this invention is to provide a positive, automatic locking mechanism for the printing hammers of the groups of printing elements that are to be inoperative during a particular machine operation.

With these and incidental objects in view, the invention includes certain novel features of construction and combinations of parts, the essential elements of which are set forth in appended claims and a preferred form or embodiment of which is hereinafter described with reference to the drawings which accompany and form a part of this specification.

In the drawings, mechanism not essential to the explanation of the disclosure is not shown.

Fig. 1 is a side elevation of the rear portion of the machine, with the left side of the cabinet removed and some of the parts broken away.

Fig. 2 is a plan view of the rear portion of the machine with the cabinet top, and the paper holding and paper feeding elements removed.

Fig. 3 is a perspective view of a portion of the type setting mechanism.

Fig. 4 is a perspective view of the column selecting mechanism and automatic platen rocking controlling cams.

Fig. 5 is a perspective view of the locking and resetting cams for the printing hammers, showing their position at the same period in the machine operation as indicated by the cams in Fig. 4.

Fig. 6 shows the disabling mechanism for the automatic column selector and the vertical paper feeding mechanism.

Fig. 7 is an enlarged view of part of the vertical paper feed mechanism shown in Fig. 6.

Fig. 8 is a view in side elevation of the right end of the platen rocking mechanism, showing the platen in the closed or printing position. There is also shown the mechanism for manual and automatic determination of the platen rocking.

Fig. 9 shows the position of the upper parts of Fig. 8 when the platen is rocked to open-throat or front-feed position.

Fig. 10 is a sectional view of the platen assembly with the platen rocked to open-throat or front-feed position.

Fig. 11 shows the position of the parts in Fig. 10 when the platen is in closed-throat or printing position.

Fig. 12 shows the aligning mechanism for accurately setting the column selecting cams.

Fig. 13 is a detail view showing the handle for manually rocking the platen assembly.

Drive mechanism

The drawings do not show the totalizers, key controlled actuators for the totalizers, key springs, and detents, and the total taking and resetting mechanisms, consideration of which is not relevant to this disclosure, and which mechanisms are fully set forth in the above mentioned Smith Reissue Patent No. 20,167, to which reference is made for complete description.

A transverse rock shaft **30** (Fig. 1) is driven by hand or motor in a counter-clockwise and then a clockwise direction during one machine opera-

tion. To the rear of rock shaft 30 and parallel to it is a second transverse shaft 31, which will hereafter be referred to as "the main drive shaft." Rock shaft 30 has an upwardly extending arm 32 secured to it, and a stud 33 extending from the arm 32 into a slot 34 in a link 35 connecting the arm 32 with a similar arm 36 secured on main drive shaft 31. Spring 37, connecting stud 33 and link 35, affords a gradual application of force from arm 32 to link 35, while stud 33 moves counter-clockwise during the first half of the machine operation and finally makes positive contact at the forward end of the slot 34 with link 35 to move it forward. On the second half of the machine operation the arm 32 moves clockwise, first allowing link 35 to move to the rear and then forcing it to the rear as stud 33 contacts the rear end of slot 34. Link 35, through pivot 38 and arm 36, imparts oscillating motion to the main drive shaft 31, first counter-clockwise and then clockwise, during one machine operation. Fast to the main drive shaft 31 is an arm 39 having a toothed edge adapted to cooperate with a pawl (not shown) to require a complete oscillation of the mechanism once a machine operation has started.

Type selecting mechanism

A transverse shaft 40 (Figs. 1, 2, 3) has pivoted thereon a number of type bar levers 41 (Figs. 1, 2, 3) having rearwardly extending portions 42 fastened to individual springs 43 tensioned to constantly endeavor to cause the type levers to turn clockwise on shaft 40 (Fig. 1). The type bar levers, twenty in number, are divided into four groups of five levers each. The four groups represent four printing columns. It will be shown later that any one group can be made responsive alone to the keys depressed, so that the printing may be done in any column, while the other groups will be locked against printing.

The five type bar levers in each group represent decimal orders (Fig. 2).

Arranged on the upwardly extending arms of the type bar levers are plungers 47 (Figs. 1 and 3) bearing type on their rear ends and adapted to be struck by printing hammers 48 (Fig. 1), there being one printing hammer for each group of type bar levers. The individual type plungers are numbered with digits in vertical order, so that clockwise rotation of a type bar lever on shaft 40 would cause successive numbers to come into printing position.

The type levers are held against clockwise rotation by bails 49 (Figs. 1, 2, 3) pivoted on shaft 40. These bails are five in number and represent the five decimal orders in each group. The bails do not rest directly on the type bar levers, but on fingers 60 (Figs. 1 and 3) projecting upwardly from the type bar levers. The fingers on the type bar levers of the decimal order of tenths, for instance, will be alined to hit the under side of the bail representing tenths. Only one lever in each group rests on any one bail. Consequently, if the tenths bail were allowed to rotate clockwise, all the type lever bars of the order of tenths would be permitted to follow, and would follow, because of the tension of springs 43. The same is true of any of the orders. If the hundreds bail is lifted, the hundreds order type bar lever in each group would rise. The fingers 60 allow such selected type lever motion without interfering with the bails of another decimal order.

Provision is made for locking groups of type levers unwanted in a particular operation, in their lowest or home position, by hooks 61 (Figs. 1 and 4) on the under side of each type bar lever, so that only a selected group or groups will respond to the raised bails 49. The arms of bails 49, which are pivoted to shaft 40, are portions of bell crank levers whose lower extending arms 62 (Figs. 1 and 3) are also joined by bails 63 (Fig. 3). Each of the bails 63 has one rearwardly extending finger 64 (Figs. 1 and 3) joined to its own key actuated lever 65 (Figs. 1, 2, 3) by a pivotal connection 66 (Figs. 1 and 3). The position of finger 64 for the hundreds bail is directly to the rear of the corresponding row of keys on the keyboard.

As set forth more fully in the Abraham Smith patent heretofore referred to, the keys determine the positioning of links 67 (Figs. 1 and 3), which links, through pivotal connections 68 (Fig. 1) and levers 65, set their respective bails to the selected position. If the hundreds key 8 is depressed and the machine operated, the corresponding link 67 will move forward, the hundreds lever 65 will cause the bell crank lever 62 corresponding to the hundreds order to rotate clockwise, and all the fingers 60 of the hundreds order will tend to follow their ascending bail and will be stopped when the type plungers bearing the digit "8" are in printing position. The "8's" in all four groups representing the hundreds order will come to printing position unless retained by hooks 61 (Figs. 1 and 4). The same principle applies to each row of keys and their corresponding bails.

It is apparent that any symbols may be used on the keys and type faces, and that the number of orders in the group or the number of groups may be varied. It is also obvious that the groups of type lever bars need not be spaced uniformly and may be moved to any position laterally to accomplish the purposes to which the machine is put.

There is a sixth bell crank bail 69 (Figs. 1 and 2), which acts as a locking device for all the type lever bars when the machine is inoperative. A pair of plate cams 70 and 71 (Figs. 1 and 2) secured on the main drive shaft 31 is shown in home position and by cooperating with rolls on the locking bell crank bail 69 holds said bail in its extreme counter-clockwise position. The beginning of the operating cycle causes the cams 70 and 71 to turn counter-clockwise and allows the locking bail to turn with any of the other bails 49 that are selected to rise. At the end of the operating cycle, the cams 70 and 71 act on bail 69 to return all the bails 49 to home position.

Printing column selecting mechanism

Attached to the left side of the casing is a stud 72 (Figs. 1, 2, 6) on which is rotatably mounted a gear wheel 73 carrying a ratchet 74 operated by a pawl 75 carried by an arm 76 pivoted on stud 72. A spring 78 (Fig. 6) serves to keep the pawl 75 constantly engaged with the ratchet wheel 74, so that counter-clockwise motion of arm 76 allows the pawl 75 to ride over the ratchet teeth and clockwise motion causes the ratchet and attached gear wheel 73 to be turned in a clockwise direction. The motion necessary to accomplish that result is obtained from the cam plate 71 on shaft 31, through a link 77 pivotally mounted intermediate arm 76 and cam plate 71 (Figs. 2 and 6). Cam 71, turning counter-clockwise on the first half of the operating cycle, causes the link 77 to turn arm 76 and pawl 75 counter-clockwise, and on

the second half of the cycle to return the arm 76 and the pawl 75 to normal and thus turn the geared wheel 73 clockwise 45 degrees. Wheel 73 is geared to another wheel 79 (Figs. 1, 2, and 4), which is one half the diameter of gear wheel 73, and is secured on a transverse shaft 80 (Figs. 1, 2, 4), which shaft 80 is thus turned 90 degrees counter-clockwise for each operating cycle of the machine. On the shaft 80 are four cams 81 (Figs. 1, 2, 4), spaced, one in front of each group of type bars, and the operative surface of each cam is turned 90 degrees from that of its neighbor in spiral fashion. These cams are designed to contact locking pawls or hooks 82 (Figs. 1 and 4) pivoted on a transverse shaft 83 and drawn yieldingly in a counter-clockwise direction by springs 84 (Fig. 1). The upper ends of the pawls engage the hooks 61 on the under side of the type bar levers, one pawl 82 locking all the levers 41 in one group and one cam 81 serving to unlock the pawl it serves once in every four successive machine operations. The result of this is that, in the particular arrangement shown, only one type group is permitted to be set to printing position by the keys in a given machine operation. As the shaft 83 can be manually set to one of four places by turning a knob fastened to it, the operator can determine in what column the first printing shall take place. Fig. 12 shows the alining device for accurately setting the cams either by hand knob 85 (Fig. 2) or by the gear 79. If desired, the hand knob may be furnished with a locking pawl to prevent movement of the gears in a direction reverse to that given in regular machine operations.

It is apparent that the cams 81 may be arranged on the shaft so that the type lever groups may be unlocked in any sequence, or in groups, or in sequence of groups. It will be obvious also that if the gear 79 is splined on shaft 80 so that shaft 80 may be shifted laterally, an auxiliary set of cams could be provided and shifted to the operating plane of the locking pawls.

Fig. 4 shows the second cam from the left unlocking the pawl from the second group of type levers, and therefore the machine is conditioned to print in the second column from the left.

Vertical printing

A method for enabling the machine to print successive transactions, one below the other in the same column, is one of the novel features comprised in this invention. On shaft 72 (Fig. 6) is pivoted a bell crank lever 86 (Figs. 2 and 6) having on one arm thereof a cam projection 87 (Fig. 6) designed to lift pawl 75 from engagement with the ratchet wheel 74. A single column key, so marked in Fig. 6, is depressible, and, in being depressed, rocks bell crank lever 88 counter-clockwise, which moves link 89 to the rear, causing bell crank lever 86 to turn clockwise, thus disengaging the pawl 75 as desired. The column selecting cam shaft thus disabled will not then automatically make a quarter turn at each operation of the machine. Provision is made for turning the platen on its axis to line-space the record material for each printing cycle when the single column key is depressed. The lower extending arm of bell crank lever 86 is attached to a plate 100 (Fig. 6) having a bifurcated portion enabling the plate to move backward and forward on main drive shaft 31. The plate 100 has a rearwardly projecting arm equipped with a stud 101 which, when plate 100 is in the rearward position, holds link 102 from being engaged and moved by stud 103 of cam 71. When the single column key is depressed and plate 100 is drawn forward, the link 102 is engaged by stud 103 as cam 71 is raised on the first half cycle of operation, and, on the downward motion of the cam 71, the link 102 is drawn down by stud 103, which causes bell crank lever 104 to turn clockwise on its pivot 105, said pivot being the rock shaft for the platen assembly to be described.

Reference will now be made to Fig. 7, showing an enlarged view of the upper half of Fig. 6.

Clockwise movement of bell crank lever 104 pulls link 106 to the rear, the other end of which is pivoted at 107 to an arm 108 pivoted on the platen shaft 109. On shaft 109 is secured a toothed ratchet wheel 110 which is engaged by a pawl 111 attached to arm 108. Spring 118 holds pawl 111 in engagement with the ratchet wheel. Spring 112 tends to hold arm 108 in counter-clockwise position. When bell crank lever 104 turns clockwise, link 106 moves to the rear and causes arm 108 and pawl 111 to turn clockwise, which turns the platen shaft and platen 113 clockwise. Counter-clockwise motion of bell crank lever 104 allows spring 112 to cause the arm 108 to resume its former position, ready for the next machine operation.

The number of spaces the paper advances through clockwise rotation of the platen is determined by a plate cam 114 pivoted on shaft 109 beside the ratchet wheel 110, which cam, through an elevated periphery 115, holds the pawl 111 away from the ratchet wheel, making the motion of link 106 ineffective through a determinable part of its movement.

The turning of cam 114 on the shaft 109 by hand lever 116 causes teeth 117 to engage an alining pawl (see Fig. 6) for accurately positioning the cam. Continued movement clockwise of the pawl 111 will cause it to reach the end of the elevated part of the periphery of cam 114 and by the action of spring 118 it will be pulled to engagement with the ratchet teeth. Teeth 117 are cut to make the platen movement one, two, or more spaces. Clockwise movement of plate 114 causes the paper to advance a lesser number of lines.

Because the platen 113 and its supporting frame 119 rock open clockwise around shaft 105, and bell crank lever 104 remains still, being only pivotally mounted on shaft 105, the link 106 will travel to the rear, leaving stud 120 in the forward end of the slot. Clockwise motion of lever 104 will then be ineffective to move the pawl 111, because stud 120 will play idly in its slot.

As the platen rocks open on the same half-cycle as the platen ordinarily would automatically advance, provision is made to cause the rocking open of the platen frame to accomplish this. An arm 121 attached to the machine frame, having a cam surface on its lower edge, is positioned to contact a roller 122 mounted on arm 108, as the platen frame moves clockwise around shaft 105 as a center. The parts are so positioned that arm 108 is moved clockwise and the platen advanced as desired.

Printing hammer mechanism

The printing hammers 48 (Fig. 1) are mounted on levers 123 pivoted on a shaft 122. The lower arms of the levers 123 are provided with springs 124 tending to force the hammers 48 against

the type plungers 47 which are in printing position. When no key of a particular order has been pressed and a zero elimination mechanism such as is described in the Smith patent to which reference was made is operative, the hammers strike dummy plungers in the type levers which act as shock absorbers. In Fig. 1 the hammer is shown opposite the dummy plunger. Holding the hammers away from the type and against the tension of springs 124 is a resetting bail 99 which upon completion of a machine operation resets the hammers which are held by trigger latches 125 (Figs. 1 and 5) secured to a shaft 126. The resetting bail 99 is actuated by shaft 31 through arm 98 and link 97. A downwardly extending arm 127 (Fig. 5), securely mounted to shaft 126, is given a clockwise movement near the end of the first half-cycle of operation. This movement is imparted by a link 128 (Figs. 1 and 5) pivoted to cam plate 70. On the first half-cycle of operation, the link 128 is moved forwardly. Part of such forward movement of the link 128 is idle due to slot 129 (Fig. 1) so as to allow the type bar levers to be differentially set before the hammers strike. When the shaft 126 reaches the extreme clockwise position, all the trigger latches will be rendered ineffective and the hammers will strike in response to the tension of springs 124. Special mechanism is provided for locking selected hammers, as will be described.

Improvements in the mechanism for resetting and locking the printing hammers are a feature of this invention and will now be described.

Securely mounted on shaft 130 (Figs. 1 and 5) are a series of printing hammer resetting cams 131, one cam being provided for each hammer. Each cam has a radial eminence for every 90 degrees of its circumference save one, as shown in Fig. 5. The cams are secured on shaft 130 so that the quadrants of the cams' circumferences having no eminence are set in spiral fashion on the shaft, so that, as the shaft 130 is turned, each quarter turn will find three of the cams with an eminence contacting a surface on the lower arm of the printing hammer levers as shown in Fig. 5, while the second hammer from the left is not contacted by a cam. Those levers 131 being contacted by cams cannot print when trigger latches 125 are sprung, while the hammer, second from the left, that is not retained by a cam, will be actuated by its spring. A sprung hammer will be reset on the next cycle of the machine operation by the reseting bail described, and locked in reset position as the latch triggers are set in the final phase of movement of cam 70 (Fig. 1). All the hammers inoperative during a machine operation are thus locked against movement and all the operated hammers are restored.

The type group selecting cam shaft and the hammer selecting cam shaft each move one quarter of a revolution for each machine operation and are synchronized, so that each is in the same phase of movement. This is shown in the drawings by Figs. 4 and 5, where the type group second from the left and hammer second from the left are both conditioned to be operative. Both cam shafts are driven by gear 73 (Fig. 1), whose driving mechanism has been described. Through an intermediate gear 133 mounted on stud 134 (Figs. 1 and 2), gear 132 is driven with the same angular movement as gear 79.

As with the column type group or selecting cams, the hammer selecting cams may be arranged in a different sequence than that shown, or in such a fashion that more than one hammer is released at once.

Platen rocking mechanism

Another novel feature of this invention is the mechanism for rocking the platen assembly to open-throat or front-feed position, combined with the Smith type of machine herein described.

The platen is carried in a framework composed of side plates 135 (Figs. 8, 9, and 10) and tie rod 136, further supported by transverse operating and pivot shafts to be described. This same framework carries a rear paper table divided into two chutes, the bottom chute 137, for material inserted from the front, and the upper chute 138, for material inserted from the rear for a work sheet or tally sheet used to record a number of transactions, said rear-inserted material being inserted and rolled around the platen as in a standard typewriter.

The side plates 135 of the platen framework are each mounted on a yoke 139 (Figs. 8 and 9) by platen shaft 140 and studs 141, said yoke being pivoted on rock shaft 105, so that the platen frame will rock back and forth between limits established by a stop bracket 142 engaging shaft 140 on the closing or counter-clockwise movement and stop 143 engaging stud 141 on the opening or clockwise movement. Hereafter the position of the platen assembly will be referred to as "closed" when in the counter-clockwise position as shown in Fig. 8, and as "open" in the clockwise position ready for insertion of record material from the front as shown in Figs. 9 and 10. The cylindrical platen 113 is rotatably mounted on shaft 140, hereinafter referred to as the "platen shaft". An adjustable eccentric cam 170, secured by a screw 171 in an elongated hole in the stop 142, adjusts the position of the stop to allow for difference in paper thickness.

Projecting from the right side of the frame 139 is a stud 144 (Figs. 8 and 9) on which is mounted a sleeve, (not shown). Secured to the inner end of the sleeve is an arm 145, and secured to the outer end of the sleeve is another semi-circular arm 146, forming together an offset bell crank lever.

Arms 145 and 146 are rigidly fastened together by means of the above-mentioned sleeve. On the sleeve, between the two arms, is pivotally mounted a hook 147 adapted to hook over a stud 148, attached to the right frame of the machine, when the platen assembly is in the open position as shown in Fig. 9. Pivotally mounted to the rear of the right platen frame is an arm 152 resting on a stud 149 projecting from hook 147. Arm 145 has a roller 150 projecting laterally from its outer end, which is positioned to ride the upper cam edge of arm 152 when the parts are positioned as in Fig. 9, but to be prevented from riding the cam edge when the surface 151 of hook 147 is riding the stud 148 as in Fig. 8.

When it is attempted to rotate arm 146 clockwise on stud 144, the roller 150 bears down on arm 152 and, through stud 149, bears down on hook 147, which bears on stud 148. This locking of parts results in a torque around shaft 105. Surface 151 is arcuate to shaft 105 as a center, so no straining of the parts occurs as the whole platen frame assembly moves clockwise. Surface 151 finally clears stud 148, and the notch of hook 147 drops down over the stud 148, freeing arm 152 so that it may turn counter-clockwise slightly, allowing the roller 150 to ride over the cam-

ming surface so that the parts are locked open in the position shown in Fig. 9, with the hook 147 engaged with the stud 148.

It should be noted that after the notch of arm 147 engages the stud 148, the rotation around shaft 105 as a center ceases, and rotation is thereafter around stud 144. Reverse movement restores the parts to the position shown in Fig. 8, with the aid of spring 154 to pull hook 147 from stud 148. A handle 153 (Fig. 13) is provided to manually operate the opening and closing of the platen assembly. The parts of the platen assembly are so weighted that their center of gravity is to the forward side of shaft 105 when the platen assembly is closed and to the rear side of shaft 105 when the platen assembly is open. Consequently, the platen tends to stay in either closed or open position. Momentum imparted to the assembly will carry it open or closed from the opposite position.

Automatic platen opening

Secured to the main drive shaft 31 (Figs. 1 and 8) is a forwardly extending arm 155 which oscillates with shaft 31, first counter-clockwise, then clockwise in one machine operation. A stud 156 (Fig. 8) at its outer end is adapted to engage hook 157 (Fig. 8) of a link 158 pivoted at its upper end to arm 146. A spring 159, when actuated, is designed to hold the link forward in the path of the descending stud 156. Stud 156 snaps into hook 157 at the middle of the machine cycle and raises the link 158 on the last half of the machine cycle just after the printing has taken place. The upward movement of link 158 gives arm 146 the necessary lift to open and lock open the platen assembly. The rear side of link 158 is developed to ride a stud 160, which holds the hook 157 in engagement with the stud 156 until near the end of the upward movement, when the link 158 curves forward and allows spring 161, then under tension (Fig. 8), to disengage hook 157 from the stud 156. The platen is always closed by the handle 153, leaving the hook in the position shown in Fig. 8.

The means will now be described for causing hook 157 to move forward to engaging position. Shaft 80 (Figs. 1, 4, and 8), on which the type lever selecting cams are mounted, has secured on its right end a cam 162, which turns 90 degrees at each machine cycle, as do the other cams secured thereon. At a point 180 degrees from the position shown in Fig. 8, the cam 162 will push forward on spring 159 and place the hook 157 yieldingly in the path of stud 156. By placing the cam 162 in the proper quadrant, the platen may be automatically rocked open after the printing occurs in any desired column. It is obvious that a plurality of cams may be used if it is desired to open the platen assembly after printing operations in a number of chosen columns.

A manually set cam is provided if it is desired to open the platen assembly after every machine operation. An "open-throat" key (Figs. 2 and 8) on the keyboard, upon being pressed down, causes, through a pivotal connection, a counter-clockwise rotation of bell crank lever 163 (Fig. 8) around pivot 164. This causes link 165 to move to the rear, which link is connected at its rear end with a bell crank lever 166 pivoted on shaft 80. The upper arm of the bell crank lever 166 is a cam which performs the same function as cam 162, when in operating position. Spring 159 is wide enough to engage the two cams which are side by side. The "open-throat" key, being depressed, opens the platen at the end of the next machine operation by exactly the same means actuated by cam 162. The key can be locked in depressed condition by engaging slot 167 with the casing of the machine if it is desired to have the platen open at every subsequent operation.

Front feed guide chute

The bottom or front-feed paper chute 137 (Fig. 10) is adapted for the insertion of working material from the front of the machine when the platen is rocked open. A solid paper table 168 (Fig. 10) extends from the rear to the front of the platen and beyond, leaving clearance for paper between it and the platen, in both the open and closed positions. When the platen is rocked open, the front paper table 169 (Figs. 8, 9 and 10) is rocked away from the platen, as will be explained, so that work material may be inserted from the front between it and the platen into the open-throat of the chute and onto the back paper table. Pressure rollers 180 are carried in cradles 181 on arms 182, which rollers press against the platen through apertures in the lower paper table 168. Arms 182 are secured on shaft 183, which shaft is turned clockwise on the closing of the platen assembly by an arm 184 (Fig. 11) engaging a bifurcated arm 185, which is an extension of arm 145, mentioned before. The pressure roller construction is the same as that in the Christian patent and application referred to above, and reference is made to them for further description.

The front paper table 169 (Fig. 10) is secured to arms 186 pivoted on platen shaft 140. At the upper ends of arms 186 are studs 187 adapted to travel in curved slots 188 in brackets 189 which are attached to the framework of the machine. As the platen is rocked open, the inner ends of arms 186 are carried upward and back by shaft 140, which acts to rotate the arms 186 around the studs 187 and thus throw the front paper table "open". The platen shaft 140, rocking around shaft 105 as a center, forces studs 187 outwardly as in a toggle joint and makes it necessary to provide the curved slots 188 in which the studs can move.

A paper bail 190 (Figs. 9 and 10) attached pivotally to the platen frame side plates 135 and resting lengthwise along the top of the platen, yieldingly held there by springs 191 serves to hold the work sheet or tally sheet around the platen so as not to interfere with material inserted through the front feed chute.

While the forms of mechanisms herein shown and described are admirably adapted to fulfill the objects primarily stated, it is to be understood that it is not intended to confine the invention to the one form or embodiment herein disclosed, for it is susceptible of embodiment in various forms all coming within the scope of the claims which follow.

What is claimed is:

1. In a machine of the class described having a plurality of groups of recording means arranged to record in separate columns identical symbols, said symbols being determined by a single selecting means, the combination of a main operating mechanism; a record material holding means stationary to lateral movement; manually or automatically operated means to select one or more of the columns to be recorded in during the next machine operation; means for recording in the selected one of the columns in one machine operation; normally ineffective means op-

erated by the main operating mechanism for rocking the record material holding means away from recording position to facilitate removal and insertion of record material; and means associated with the column selecting means for rendering the rocking means effective.

2. In a machine of the class described having a plurality of groups of recording means arranged to record in separate columns identical symbols, said symbols being determined by a single selecting means, the combination of a main operating mechanism; a record material holding means stationary to lateral movement; means for recording in selected columns in determinable sequence; means for recording the same or different symbols in each selected column; normally ineffective means operated by the main operating mechanism for rocking the record material holding means away from recording position to facilitate removal and insertion of record material; and means associated with the column selecting means for rendering the rocking means effective.

3. In a machine of the class described having a plurality of groups of recording means arranged to record in separate columns identical symbols, said symbols being determined by a single selecting means, the combination of a main operating mechanism; a record material holding means stationary to lateral movement; machine-operated means for recording in selected columns in determined sequence in successive machine operations; means for recording the same or different symbols in each selected column; normally ineffective means operated by the main operating mechanism for rocking the record material holding means away from recording position after the printing occurs to facilitate removal and insertion of record material; and means associated with the column selecting means for rendering the rocking means effective.

4. In a machine of the class described having a plurality of groups of recording means arranged to record in separate columns identical symbols, said symbols being determined by a single selecting means, the combination of a main operating mechanism; a record material holding means stationary to lateral movement; means to select one of the columns to be recorded in during the next machine operation; means for recording in the selected one of the columns in one machine operation; normally ineffective means operated by the main operating mechanism for rocking the record material holding means away from recording position to facilitate removal and insertion of record material; and means associated with the column selecting means for rendering the rocking means effective.

5. In a machine of the class described having a plurality of groups of recording means arranged to record in separate columns identical symbols, said symbols being determined by a single selecting means, the combination of a main operating mechanism; a record material holding means stationary to lateral movement; means to select one of the columns to be recorded in during the next machine operation; means for recording in the selected one of the columns in one machine operation; normally ineffective means for automatically rocking the record material holding means away from recording position to facilitate removal and insertion of record material; and means associated with the column selecting means for rendering the rocking means effective upon the termination of a determinable sequence of machine operations.

6. In a machine of the class described having a plurality of groups of recording means arranged to record in separate columns identical symbols, said symbols being determined by a single selecting means, the combination of a main operating mechanism; a record material holding means stationary to lateral movement; means for recording in selected columns in automatically determined sequence in successive machine operations; means for recording the same or different symbols in each selected column; normally ineffective means operated by the main operating mechanism for automatically rocking the record material holding means away from recording position to facilitate removal and insertion of record material; and means associated with the column selecting means for rendering the rocking means effective upon the termination of a determinable sequence of machine operations.

7. In a machine of the class described having a plurality of groups of recording means arranged to record in separate columns identical symbols, said symbols being determined by a single selecting means, the combination of a main operating mechanism; a record material holding means stationary to lateral movement; means to select one of the columns to be recorded in during the next machine operation; means for recording in the selected one of the columns in one machine operation; normally ineffective means operated by the main operating means for automatically rocking the record material holding means away from recording position to facilitate the insertion and removal of record material; means associated with the column selecting means for rendering the rocking means effective; and superseding means for manually conditioning the machine before a machine operation to automatically rock the record material holding means away from recording position after the recording has been done in each subsequent machine operation to facilitate removal and insertion of record material; and means to disable said conditioning means.

8. In a machine of the class described having a plurality of groups of recording means arranged to record in separate columns identical symbols, said symbols being determined by a single selecting means, the combination of a main operating mechanism; a record material holding means stationary to lateral movement; means for recording in selected columns in automatically determined sequence; means to select one of the columns to be recorded in during the next and succeeding machine operations; means associated with the column selecting means for rocking the record material holding means away from recording position on selected machine operations to facilitate removal and insertion of record material; machine-operated means for line-spacing the record material after each printing operation when the rocking means is ineffective; and means for operating the line-spacing means by rocking the record material holding means to open position.

9. In a machine of the class described having a plurality of type carrier levers arranged in column printing groups, the combination of a main operating mechanism; a record material holding means stationary to lateral movement; normally ineffective means to line-space the record material holding means; means to select

one of the columns to be recorded in during the next and succeeding machine operations, said means conditioning the line-spacing means to be operated; automatic means associated with the column selecting means for rocking the record material holding means away from recording position after each machine operation of a selected series to facilitate removal and insertion of record material, said rocking of the holding means operating the line-spacing means; and machine-operated means for operating the line-spacing means when the rocking means is inoperative.

10. In a machine of the class described, the combination of a platen supported in a rockable framework stationary to lateral movement; a means for printing in columns on record material held by said platen; a means for selecting a column in which the printing shall take place in the next machine operation; normally ineffective means for rocking the platen away from printing position to facilitate removal and insertion of record material; and means associated with the column selecting means to selectively determine whether said rocking means shall be effective in a given machine operation.

11. In a machine of the class described, the combination of a platen; a rockable framework stationary to lateral movement in which said platen is rotatably mounted; a means for printing in columns on record material held by said platen; a means for automatically printing in different columns in different machine operations in determined sequence; a means controlled by the column selecting means for automatically rocking the platen away from printing position after printing in a determined column; and means superseding the control of the rocking means by the column selecting means whereby the platen is rocked to open position after each machine operation to facilitate removal and insertion of record material.

12. In a machine of the class described, the combination of a platen supported in a rockable framework stationary to lateral movement; means for printing in columns on record material held by said platen; means for automatically printing in different columns in different machine operations in determined sequence; and a means associated with the column printing means for rocking the platen away from printing position after printing in a selected column to facilitate insertion and removal of record material.

13. In a machine of the class described, the combination of a platen supported in a rockable framework stationary to lateral movement; a means for printing in columns on record material held by said platen; a means for automatically printing in different columns in different machine operations in determined sequence; and means operated by the main operating mechanism under control of the automatic means for rocking the platen away from printing position after a printing operation in a determined column to facilitate the insertion and removal of record material.

14. In a machine of the class described, the combination of a platen supported in a rockable framework stationary to lateral movement; means for printing in columns on record material; means for selecting what column shall be printed in on the next machine operation; a main operating mechanism; and means normally disconnected from the main operating mechanism but adapted to be operated thereby under control of the column selecting means during a machine operation to rock the platen to open-throat position after a printing operation in a predetermined column.

15. In a machine of the class described, the combination of a platen supported in a rockable framework stationary to lateral movement; a means for printing in columns on record material; a means for selecting what column shall be printed in on the next machine operation; a main operating mechanism; intermediate members adapted to be given a definite movement by said main operating mechanism on each operation of the machine for rocking the platen away from printing position but normally out of engagement therewith; and means for rendering the main operating mechanism effective to move said members under determinable control.

16. In a machine of the class described, the combination of a platen supported in a rockable framework stationary to lateral movement; a means for printing in columns on record material; a means for selecting what column shall be printed in on the next machine operation; a main operating mechanism; a link adapted to be given a definite movement by said main operating mechanism on each operation of the machine the movement of said link rocking the platen to open or closed position; and a means to engage or disengage said link from the main operating mechanism.

17. In a machine of the class described, the combination of a platen supported in a rockable framework stationary to lateral movement; a means for printing in columns on record material; a means for selecting what column shall be printed in on the next machine operation; a main operating mechanism; a reciprocating member operated by said main operating mechanism; an intermediate linkage between the rockable platen framework and the reciprocating member adapted to convey operating power to rock the platen framework; means to automatically connect and disconnect the reciprocating member and the linkage on each machine operation; and means to disable the automatic connecting means.

18. In a machine of the class described, the combination of a platen supported in a rockable framework stationary to lateral movement; a means for printing in columns on record material; a means for selecting what column shall be printed in on the next machine operation; a main operating mechanism; a reciprocating member operated by said main operating mechanism; an intermediate link and bell crank lever between the rockable platen framework and the reciprocating member adapted to convey power to rock the platen framework; and a cam operating whenever printing has taken place in a certain column that engages said reciprocating member with said link and bell crank lever.

19. In a machine of the class described, the combination of a platen supported in a rockable framework stationary to lateral movement; a means for printing in columns on record material without lateral movement of the type or record material; a main operating means; a means for holding the record material against the platen; a means operated by the main operating means for automatically rotating the platen to advance the record material at each machine operation; means for rocking the platen away from printing position at a time making the

platen rotating means ineffective; and auxiliary means effective on rocking platen out of printing position for rotating the platen to advance the record material while it is being rocked away from printing position.

20. In a machine of the class described, the combination of a platen supported in a rockable framework stationary to lateral movement; a means for printing in columns in sequence on record material without lateral movement of the type or record material; a main operating means; a means for holding the record material so as to be frictionally moved by rotation of the platen; a reciprocating member moved by the main operating means; a link adapted to be connected with and given motion by the reciprocating member; a pawl and ratchet adapted to rotate the platen operated by said link; and means to condition the machine to print in a selected column when the link and reciprocating member are connected.

21. In a machine of the class described, the combination of a platen supported in a rockable framework stationary to lateral movement; a means for printing in columns on record material without lateral movement of the type or record material; a main operating means; a means for holding the record material so as to be frictionally moved by rotation of the platen; a reciprocating member moved by the main operating means; a link adapted to be connected with and given motion by the reciprocating member; a pawl and ratchet adapted to rotate the platen operated by said link; means to print continuously in one vertical column; and means automatically connecting the reciprocating member and the link when the machine is conditioned to print in one vertical column.

22. In a machine of the class described, the combination of a platen supported in a rockable framework stationary to lateral movement; a means for printing in columns on record material without lateral movement of the type or record material; a main operating means; a means for holding the record material so as to be frictionally moved by rotation of the platen; a reciprocating member moved by the main operating means; a link adapted to be connected with and given motion by the reciprocating member; a pawl and ratchet adapted to rotate the platen operated by said link; means to manually select a column to be printed in on the next machine operation; means to condition the machine to print in the same column on successive operations; and means automatically connecting the reciprocating member and the link when the machine is conditioned to print in one vertical column.

23. In a machine of the class described, the combination of a plurality of groups of type carriers arranged to print in separate columns on record material; printing mechanism cooperating therewith including means for supporting said record material in fixed lateral relationship to said groups of type carriers; key mechanism to control the movement of said type carriers to printing position; means normally operable and effective to move all of said type carriers simultaneously under the control of said key mechanism; automatically operable means for selectively preventing the operation of certain of said type carriers by said moving means whereby selective column printing in a predetermined sequence may be obtained; separate printing hammers for each group of type carriers; means to operate the printing hammers when the type carriers are set to printing position; and means to positively lock the printing hammers of those groups in which no printing is to be done in a particular operation.

24. In a machine of the class described, the combination of a plurality of groups of type carriers arranged to print in separate columns on record material; printing mechanism cooperating therewith including means for supporting said record material in fixed lateral relationship to said groups of type carriers; key mechanism to control the movement of said type carriers to printing position; means normally operable and effective to move all of said type carriers simultaneously under the control of said key mechanism; automatically operable means for selectively preventing the operation of certain of said type carriers by said moving means whereby selective column printing in a predetermined sequence may be obtained; separate printing hammers for each group of type carriers; means to operate the printing hammers when the type carriers are set to printing position; and cams locking the printing hammers of all the groups in inoperative position except the group or groups to be printed with during the next operation.

25. In a machine of the class described, the combination of a plurality of groups of type carriers arranged to print in separate columns on record material; printing mechanism; means for supporting said record material in fixed lateral relationship to said groups of type carriers; means to rock said record material supporting means towards and away from printing position to facilitate insertion and removal of record material; mechanism to control the movement of said type carriers to printing position; means normally operable and effective to move all of said type carriers simultaneously under the control of said key mechanism; automatically operable means for selectively preventing the operation of certain of said type carriers by said moving means whereby selective column printing in a predetermined sequence may be obtained; separate printing hammers for each group of type carriers; means to operate the printing hammers when the type carriers are set to printing position; and means to positively lock the printing hammers of those groups in which no printing is to be done in a particular operation.

26. A front-feed machine of the class described having a paper holding platen stationary to lateral movement; groups of type levers; a platen holding framework rockable to form a front-feed throat for receiving work sheets; means for printing in selected columns without relative lateral movement of type and record material; a main operating mechanism; means for rocking the front-feed mechanism to open position by the main operating mechanism, said main operating mechanism being normally ineffective for that purpose; and means under control of the column selecting means for rendering said main operating mechanism effective.

27. A front-feed machine of the class described having a record material holding platen stationary to lateral movement; groups of type levers; a platen holding framework rockable to form a front-feed throat for receiving record material; means for printing in selected columns without relative lateral movement of type and record material; a main operating mechanism; normally ineffective means for rocking the platen holding

framework to open position by the main operating mechanism for insertion and removal of record material; and means associated with the column selecting means to condition the rocking means to rock the front-feed mechanism to open position on the completion of any machine operation.

28. In a machine of the class described having power driving means and a printing mechanism capable of columnar printing without relative lateral movement of the record material and printing mechanism, the combination of a platen mounted in a framework rockable away from printing position to open-throat front-feed position; means to select the column to be printed in; power means operable in each of the columnar printing operations to move said platen to its open-throat position, said means being in normally ineffective condition; and co-existing alternative means to condition the machine to operate to open-throat position on operation of the machine, one of said means being associated with the column selecting means.

29. In a machine of the class described, the combination of a main framework; a recording means; a platen stationary to lateral movement for holding record material; an auxiliary framework in which the platen is rotatably mounted said auxiliary framework being pivotally mounted on the main framework so the platen may be rocked toward or away from recording position for facilitating the insertion and removal of record material; a main operating means; means for rocking the auxiliary framework away from recording position to facilitate the removal or insertion of record material said means being operable by the main operating means at each operation of the machine; and means associated with the recording means to control the operation of the rocking means.

30. In a machine of the class described having a platen adapted to space record material lengthwise but not laterally the combination of a pivoted framework holding the platen; recording means adapted to space the recorded data laterally; a main operating mechanism; means invariably operated at each machine operation by the main operating mechanism; means to rock the platen holding framework away from recording position by being normally coupled to the invariably operated means; and means under control of the lateral spacing means to render said rocking means ineffective during certain machine operations.

31. In a machine of the class described, the combination of a main framework; a main operating mechanism; a platen for holding record material; an auxiliary frame pivotally mounted on the main frame and in which the platen is rotatably mounted so as to be rockable to a position facilitating insertion and removal of record material; a plurality of groups of recording means arranged parallel to the axis of rotation of the platen; a single selecting means by which the same data may be set on each group of recording means; means operable at each machine operation to rotate the platen to space the record material lengthwise; means to disable all but a selected one of the groups of recording means during a machine operation; selective means to automatically change the disabling means at each machine operation so as to select each group of recording means in determined sequence; and automatic means associated with the recording group selecting means and operated by the main operating mechanism for rocking the platen for facilitating insertion or removal of record material at the end of a determinable sequence of operations.

32. In a machine of the class described, the combination of record material supporting means stationary to lateral movement said means having an open position for insertion and removal of record material and a closed record receiving position; means to print in columns on record material held by the supporting means; means to print in the columns in selectively determinable sequence; machine-operated means for rocking the record material supporting means to open position; and means associated with the column selecting means automatically conditioned in one machine operation for causing the record material supporting means to move to open position after the printing occurs in the next succeeding operation.

33. In a machine of the class described, the combination of means to hold record material; normally ineffective means for moving the record material holding means to record removing and record inserting position; means to record in columns on record material without column spacing movement between the recording means and the record material; column selecting means; and means cooperatively associated with the column selecting means for controlling the moving means of the record holding means to be effective on selected machine operations.

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