

Feb. 13, 1945.

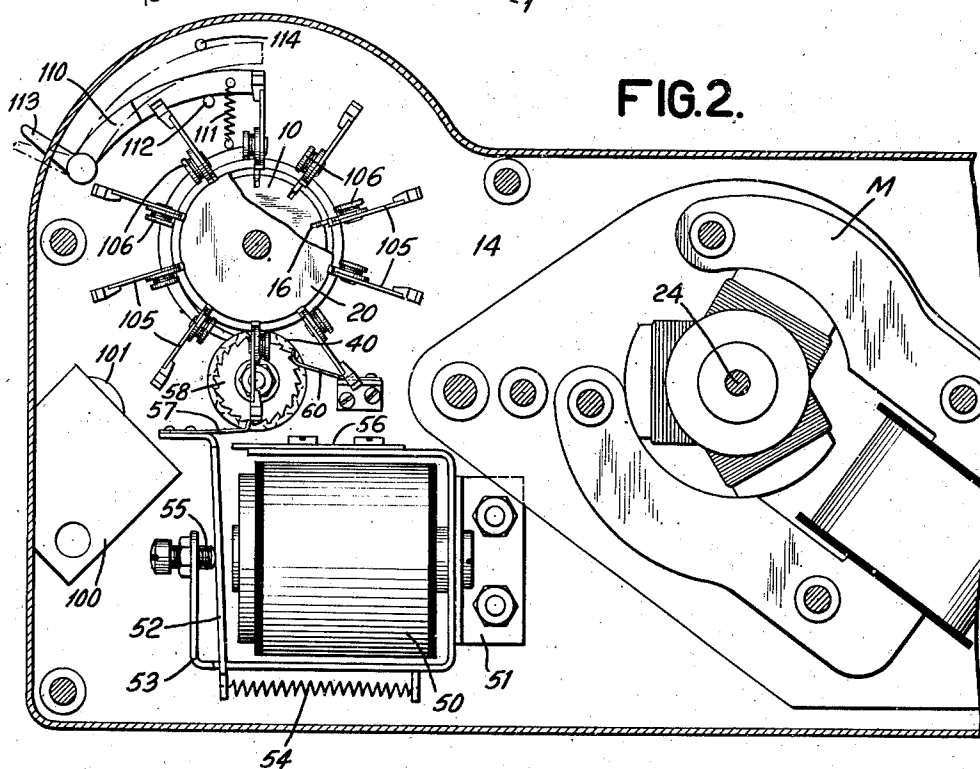
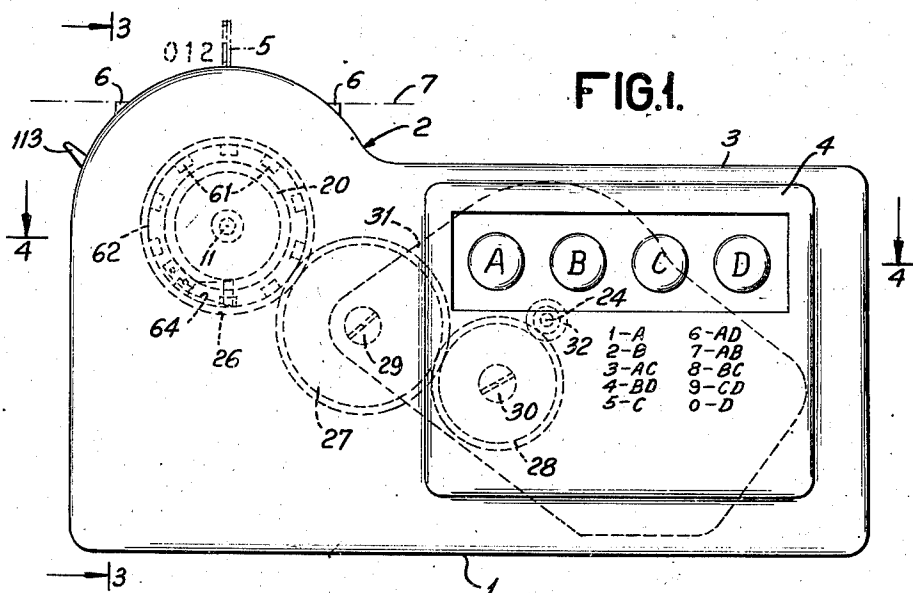
R. T. CASEY

2,369,433

PRINTING MACHINE

Filed July 21, 1942

3 Sheets-Sheet 1



Feb. 13, 1945.

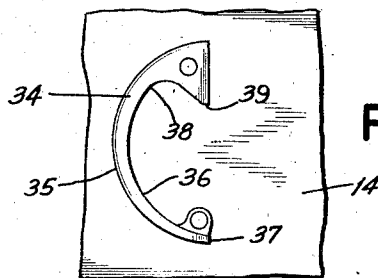
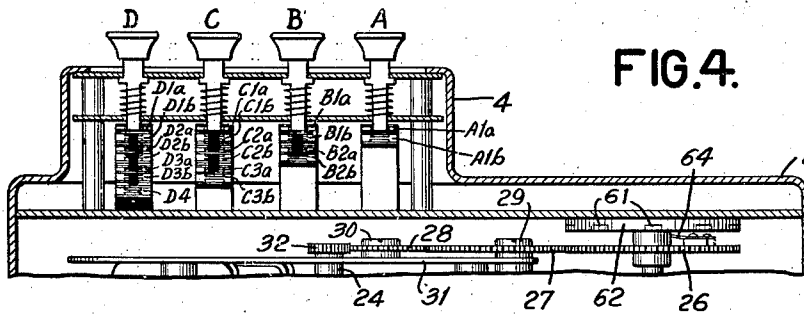
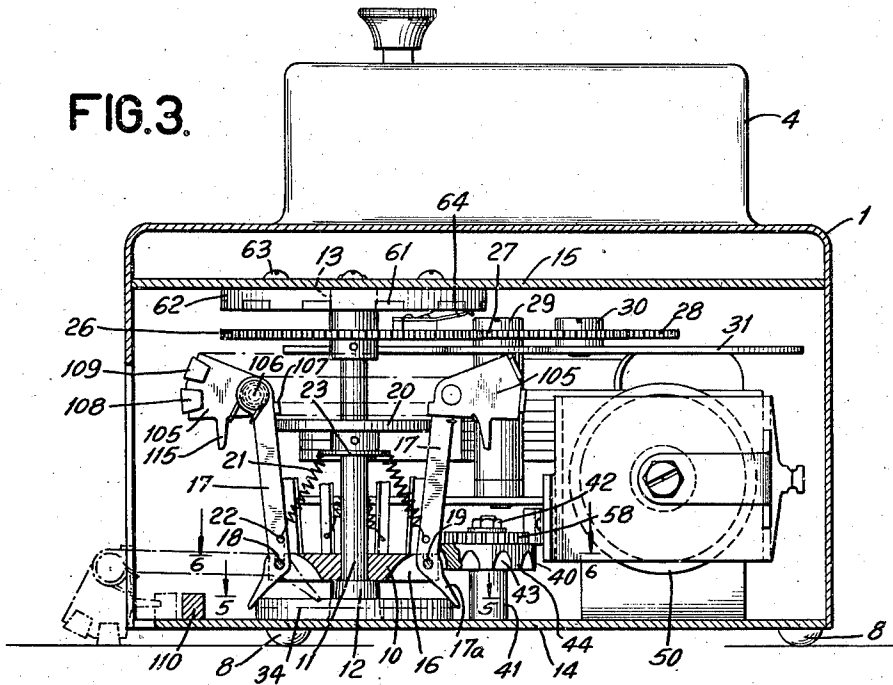
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PRINTING MACHINE

Filed July 21, 1942

3 Sheets-Sheet 2



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3 Sheets-Sheet 3

FIG. 6.

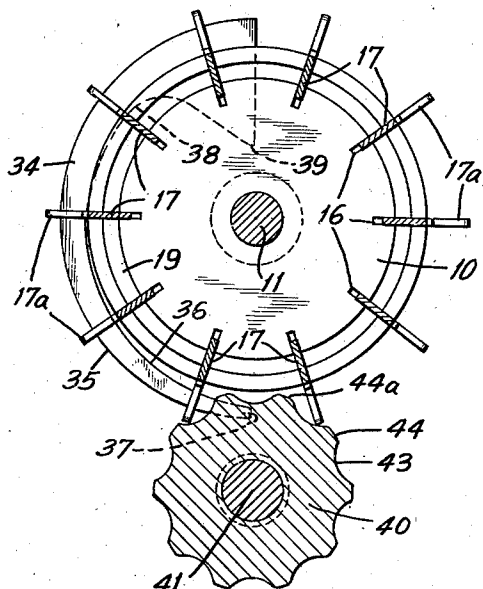


FIG. 7.

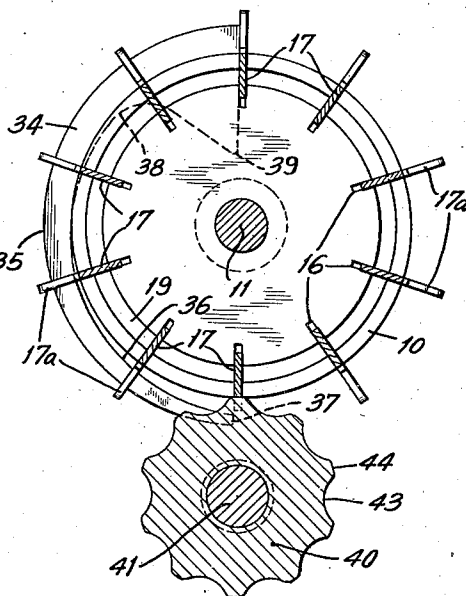
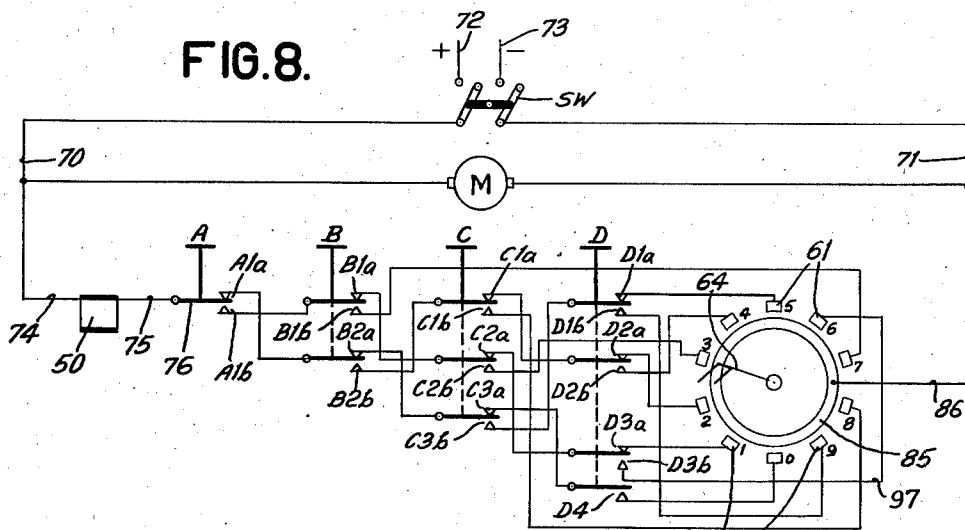


FIG. 8.



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2,369,433

PRINTING MACHINE

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Application July 21, 1942, Serial No. 451,749

9 Claims. (Cl. 197—2)

This invention relates to a printing machine and its principal object is to provide a small portable machine capable of printing upon a sheet spread flat on a table.

A particular object of the invention is to provide a machine of the kind described in which the power for operating the printing mechanism is derived from a small motor. In a preferred embodiment the printing mechanism is operated by an electric motor under control of key operated switches.

The invention includes a new type bar movement not necessarily limited to the particular application above mentioned.

The printing mechanism comprises a printing unit including a set of type bars, the unit being constantly driven by a motor, the type bars being selectively cocked by manually controlled means and thereupon actuated for printing by the combined force of the momentum of the printing unit and power supplied from the motor. This enables a relatively small motor to furnish sufficient power for a forceful operation of the type bars.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings which disclose, by way of example, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawings:

Fig. 1 is a plan view of a printing machine constructed in accordance with the invention.

Fig. 2 is a plan sectional view on a larger scale.

Fig. 3 is a vertical section on the line 3—3 of Fig. 1.

Fig. 4 is a vertical section on the line 4—4 of Fig. 1.

Fig. 5 is a detail sectional view on the line 5—5 of Fig. 3.

Figs. 6 and 7 are sectional views on the line 6—6 of Fig. 3 showing the type bar cocking mechanism in two different positions.

Fig. 8 is a wiring diagram.

Referring first to the general plan view (Fig. 1), the machine is housed in a casing 1, the left part 2 of the casing containing the printing unit and the right part 3 enclosing the motor. A keyboard turret 4 is positioned above the motor. On the under side of the bottom plate 14 (Fig. 3) are buttons 8 which support the machine upon a flat surface covered by the sheet which is to be printed upon. The machine prints on a line indicated by the dotted numerals 0, 1, 2, one of the type bars being represented at 5 in dot and dash lines in the act of printing the next nu-

meral. The machine is manually positioned on the sheet upon which the matter is to be printed with the aid of guides 6 on the casing which may be aligned with a guide line 7 previously drawn on the sheet.

In order to simplify the disclosure, I have chosen to illustrate the invention by a machine designed for printing numerals, since this machine requires only ten printing members. It will be evident as the description proceeds that a lettering machine or a lettering and numbering machine can be constructed in the same way, by simply adding the required additional printing members and arranging the keyboard accordingly.

The printing unit comprises a type basket (Figs. 2 and 3) which in the illustrative example is in the form of a horizontal disk 10 fixed to a vertical shaft 11 journaled in bearings 12 and 13 on the bottom plate 14 and a top plate 15. The disk 10 has a number of radial slots 16 symmetrically distributed around its periphery, the number of these slots in the present example being ten in accordance with the number of the characters to be printed. In the respective slots 16 are pivoted type bars 17, the pivot being formed by a circular wire 18 received in an annular slot 19 in the disk 10, which intersects the radial slots 16 and passes through pivot holes in the type bars. When the type bars and wire have been assembled on the disk, the wire can be secured by solder. The type bars are normally held in an idle position against a disk 20 pinned by its hub to the shaft 11 by springs 21 hooked into holes 22 in the type bars and corresponding holes in a flange 23 on the hub of the disk 20. The shaft 11 is rotated by the motor M through a train of gears including a spur gear 26 pinned to the shaft 11, two idler gears 27 and 28 journaled upon bearing posts 29 and 30 fixed to the top plate 31 of the motor frame, and a pinion 32 on the motor shaft 24.

Fixed upon the bottom plate 14 below the disk 10 is a cam 34 (Fig. 5) having a substantially semicircular outer surface 35 and an inner surface 36 which starts from a substantially pointed leading end 37 with curvature gradually approaching the axis of rotation of the type basket, then turns at 38 abruptly toward the axis. The type bars have tails 17a extending down from their pivots at an angle which travel around the outside of the cam 34, when the type bars are in their normal position. The type bars can be selectively cocked by means to be described presently to shift their tails to the inside of the cam

34 just before they reach the leading end of the cam. During the subsequent half revolution of the type basket, a type bar so cocked first rocks outwardly gradually and, after passing the point 38 of the cam, is thrown sharply downward by the hooked end of the cam developing sufficient momentum to strike against the surface being printed upon with a sharp blow, after the tail of the type bar has passed through the end 39 of the cam. The printing position of the type bar is shown in dot and dash lines in Fig. 3.

The mechanism for selectively cocking the type bars comprises a cam disk 40 rotatably mounted upon a post 41 on the base plate 14 and held thereon by a nut 42. The cam disk has notches 43 cut in its periphery (see also Figs. 6 and 7) to provide clearance for the type basket to turn freely past the cam disk with the type bars in idle position. Between the recesses 43 are camming points 44 which are just long enough to turn in frictional contact with the disk 10, when the cam disk is given an initial movement. This movement is timed to occur at the instant when a particular type bar is approaching the camming point which stands in ready position, that is, the point 44a in Fig. 6. As can be seen in Fig. 7, the following coordinated movement of the camming disk and type basket is accompanied by a rocking movement of the type bar, the edge of which normally protrudes slightly beyond the periphery of the disk 10 in position to be engaged by the camming point (as shown in Fig. 7) and rocked into alignment with the periphery of the disk. This rocking movement of the type bar occurs just before the tail of the type bar reaches the leading end 37 of the cam 34 and is sufficient to shift the tail of the type bar to the inside of the cam. The printing movement of the cocked type bar then follows automatically during the next half revolution of the type basket, the power for the printing movement being derived partly from the momentum of the rotating unit and partly from the motor. The cam should be so shaped that the velocity of the type downward at the moment of impact will be greater than its horizontal velocity to insure a clear print.

The initial movement of the cam disk 40 is brought about by a solenoid 50 mounted by a bracket 51 on the base plate 14. The armature 52 of the solenoid is rockably mounted upon a frame 53 and normally biased by a spring 54 against a set screw 55. Inward movement of the armature 52 is limited by an adjustable bar 56 on another part of the frame 53. The armature 52 carries at its extremity a spring pawl 57 which coacts with a ratchet wheel 58 fixed to the top of the cam disk 40. The ratchet wheel 58 has twice as many teeth as the number of camming points 44 on the cam disk. When the solenoid is energized, the pawl 57 drives the ratchet disk 58 through a distance of about one tooth space which is sufficient to bring the camming point 44a into contact with the rotating disk 10. The camming disk then moves through another tooth space by frictional contact with the disk 10 and is finally centered by a spring detent 60 at the next neutral position. The detent 60 holds the cam disk 40 against backward movement as the pawl 57 travels back on de-energization of the solenoid.

The selection of the differential time of energization of the solenoid 50 for selection of a particular type bar is accomplished, in the pres-

ent embodiment, by selectively closing circuits leading to the respective contact segments 61 of a commutator 62. The commutator is fixedly mounted by screws 63 upon the top plate 15 in concentric relation to the shaft 11. A spring brush 64 mounted on the gear 26 and grounded thereto travels over the segments of the commutator as the type basket 11 revolves. The circuit arrangement will now be described with reference to the wiring diagram (Fig. 8).

The wiring diagram shows the motor M connected directly across two line wires 70, 71 which are connected to a source of current 72, 73 by a switch SW. One terminal of the solenoid 50 is connected to the line wire 70 by a wire 74, and the other terminal is connected by a wire 75 to a system of circuits controlled by switches operated by four keys A, B, C, and D (see also Figs. 1 and 4). The leadout wires of the system are connected to the respective commutator segments 61 numbered 1, 2, 3, 4, 5, 6, 7, 8, 9 and 0. Spring brush contact 64 grounds the commutator segments successively to the metallic parts of the machine, indicated diagrammatically by the ring 85, to which the other line wire 71 is connected by a wire 86.

The circuit arrangement shown is merely illustrative. It is designed for the combinational code operation of the keys A, B, C, D in accordance with the code table represented on the top plate of the machine in Fig. 1. One circuit through the system will be traced by way of example. If a 6 is to be printed, the code table in Fig. 1 shows that this calls for a depression of the keys A and D. The circuit will be from line wire 70, through wire 74, solenoid 50, wire 75, contacts A1b, B1a, C2a, D3b, wire 97, the 6 commutator segment 61, brush 64, and wire 86 to line wire 71. The brush 64 will make contact with the 6 commutator segment 61 just as the tail of the 6 type bar is approaching the leading end of the cam 35. The solenoid 50 energized at this time will turn the cam disk 40 at the proper time to cause its point 44a to engage the tail of the 6 type bar and cock it to the inside of cam 35. The printing movement of the type bar will follow automatically during the next half revolution of the type basket.

Means are provided to ink the type of any type bar which has been cocked and started on its printing movement. In a box 100 mounted on the end wall of the casing of the machine there is a conventional ink feeding system terminating in a felt inking roller 101, a portion of the periphery of which projects from the side of the box 100. The inking roller 101 is so positioned that the type on a type bar which has been cocked will wipe upon it during the first part of the printing movement of the type bar when it is traveling over the gradually curved portion of the cam 34. By this arrangement, the type are inked only when started on their printing movement, the idle type remaining out of contact with the roller.

In accordance with a particular feature of the invention, the type bars carry two sets of type which can be selectively brought into operative position by a rocking movement of the head of the type bar. Each type bar 17 has a head 105 pivoted to it by a pin 106. A coil spring 107 engages the shaft of the type bar at one end and the head 105 at its other end, biasing the head so that a detent 107 thereon is held against the back of the type bar 17. There are two type

slugs 108, 109 on the head 105 angularly related to each other. When the head 105 is in the normal position, the type slug 108 will print. To bring the type slug 109 to printing position, there is pivoted on the base plate 14 a stop arm 110 which is normally held by a spring 111 against a pin 112, as shown in full lines in Fig. 2, but which can be rocked by an arm 113 to the dot and dash line position against a pin 114. In the latter position, the stop 110 stands in the path of a finger 115 projecting rigidly from the type head 105 so as to rock the type head just prior to its contact with the paper. In the numbering machine shown in this application by way of illustration, the two sets of type would be two different styles of numbers, but in a machine for lettering the two sets of type would ordinarily be capital and small letters.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a single modification, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention therefore to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. In a printing device, a stationary cam, a type basket having a cyclical movement in relation to said cam, a set of type bars mounted on said type basket so as to be individually movable in relation thereto, means normally holding said type bars in an idle position out of contact with said cam as said type basket executes its cyclical movement; and means to selectively cock the type bars into engagement with said cam; said cam being adapted to deflect any type bar engaged therewith, as the movement of the type basket continues, to cause the type bar to execute a printing movement.
2. In a printing device, a movably mounted type basket, a set of type bars individually pivoted thereon, means for cyclically moving said basket, a stationary cam adjacent said basket, cam follower means on each of said type bars normally traveling at one side of said cam as said basket moves, and means for selectively throwing the cam follower means of individual type bars to the other side of said cam, said other side being shaped to cause a printing movement of the type bar as the basket moves.
3. In a printing device, a movably mounted type basket; a set of type bars individually pivoted thereon; means to move said basket so that said type bars travel in sequence along a certain path; a normally idle element stationed beside said path adapted upon being energized to impart a cocking movement to the momentarily passing type bar; selecting means to energize said element at differential times coordinated with the movement of said basket for selective coaction with said type bars; and a stationary cam adapted to be engaged only by cocked type bars and to complete a printing movement thereof.
4. In a printing device, a type basket mounted for rotation on a vertical axis, a set of type bars pivoted to said basket so as to move in planes radiating from said axis from a normal upright position to an approximately horizontal printing position; yielding means to hold said type bars in normal position; a stationary cam disposed so that a part of each type bar normally travels along one side thereof; and means for selectively rocking the type bars to the other side of said cam, said cam being shaped to throw such rocked type bars to printing position.
5. In a device for printing upon a record sheet supported on a flat surface, a frame having means to support the same stably upon the record sheet; a type basket movably mounted on said frame; a set of type members individually pivoted on said type basket so as to be capable of executing a printing stroke from a normal inoperative position; means to move said type basket so that said type members travel in sequence along a certain path in normal position; means to selectively cock said type members as they pass through a certain point in said path; and means acting uniformly upon cocked type members to cause them to execute printing strokes such as to strike the record sheet adjacent a particular point on said frame.
6. In a device for printing upon a record sheet supported on a flat surface; a frame having means to support the same stably upon the record sheet; a type basket mounted on said frame so as to rotate about an axis normal to the record sheet; a set of type bars individually pivoted to said type basket so as to swing in planes radiating from said axis; means to rotate said type basket; yielding means normally holding said type bars in an inoperative position approximately parallel to said axis; means to selectively cock said type bars as they pass through a certain point in their rotation with said type basket; and means to cam down any cocked type bar so that its type will print on the record sheet adjacent a certain point on said frame.
7. In a printing device, a printing unit comprising a set of type members having similar individual printing movements, a frame upon which said printing unit is mounted for a prescribed movement, in the course of which the set of type members travels in succession past a cocking station and then a printing station; means to selectively impart cocking movements to said type members as they pass through said cocking station; and cam means adapted to engage any cocked type member to cause the latter to execute an individual printing movement terminating at said printing station.
8. In a printing device, a cyclically movable printing unit comprising a set of individually movable type members which are normally caused to travel in succession along a prescribed path by the cyclical movement of the printing unit, cocking means to selectively impart a cocking movement to said type members as they pass through one phase of the cycle, and means adapted to coact only with cocked type members to cause printing movements thereof.
9. In a printing device, a cyclically movable printing unit comprising a set of individually movable type members which are normally caused to travel in succession along a prescribed path by the cyclical movement of the printing unit, cocking means to selectively impart a cocking movement to said type members as they pass through one phase of the cycle, and cam means adapted to engage only the cocked type members to cause printing movements thereof during another phase of the cycle.

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