July 16, 1940. M. REYNOLDS ET AL 2,207,874

PRINTING APPARATUS

Filed June 9, 1938 3 Sheets-Sheet 1

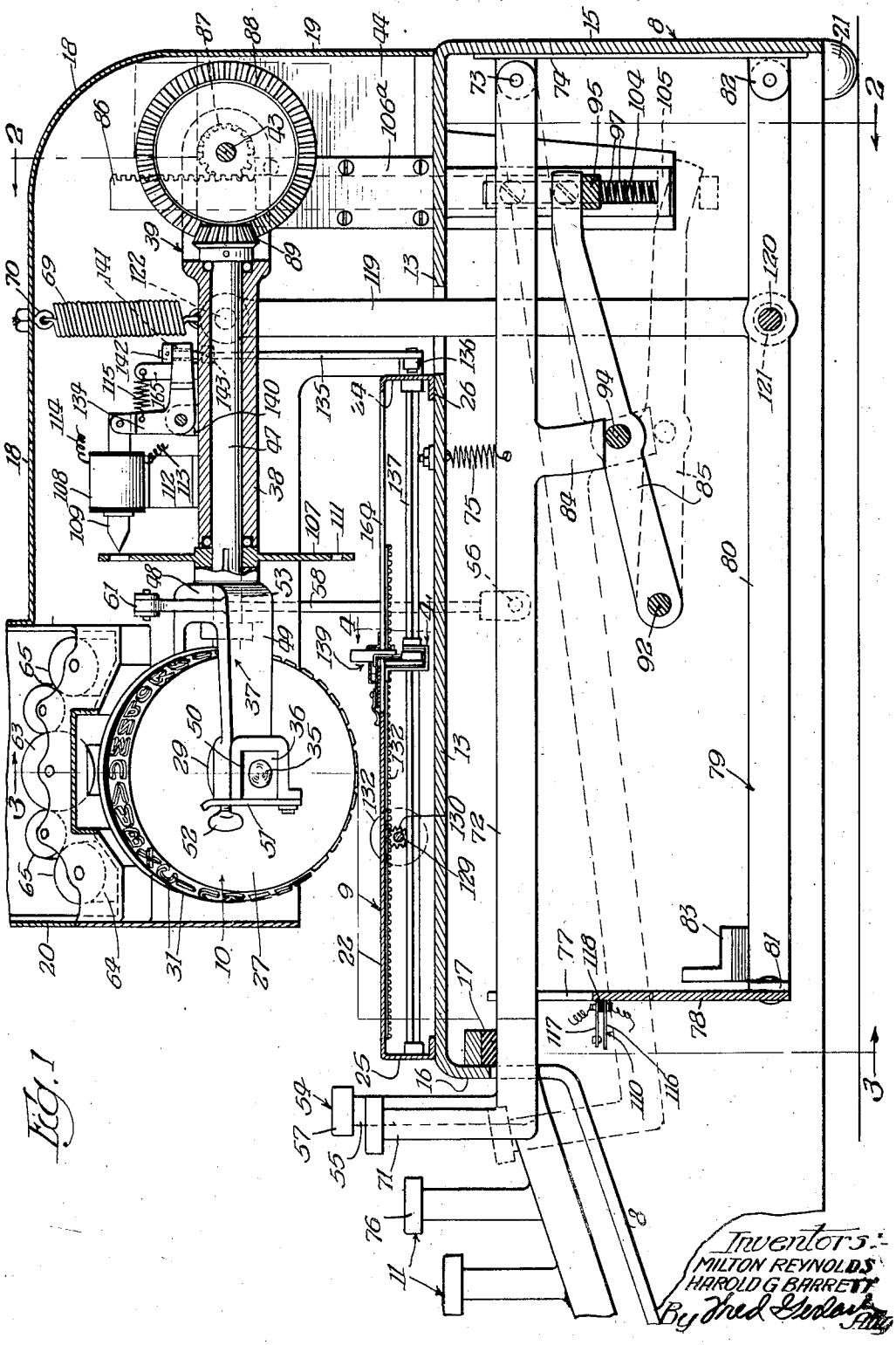


Fig. 1

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PRINTING APPARATUS

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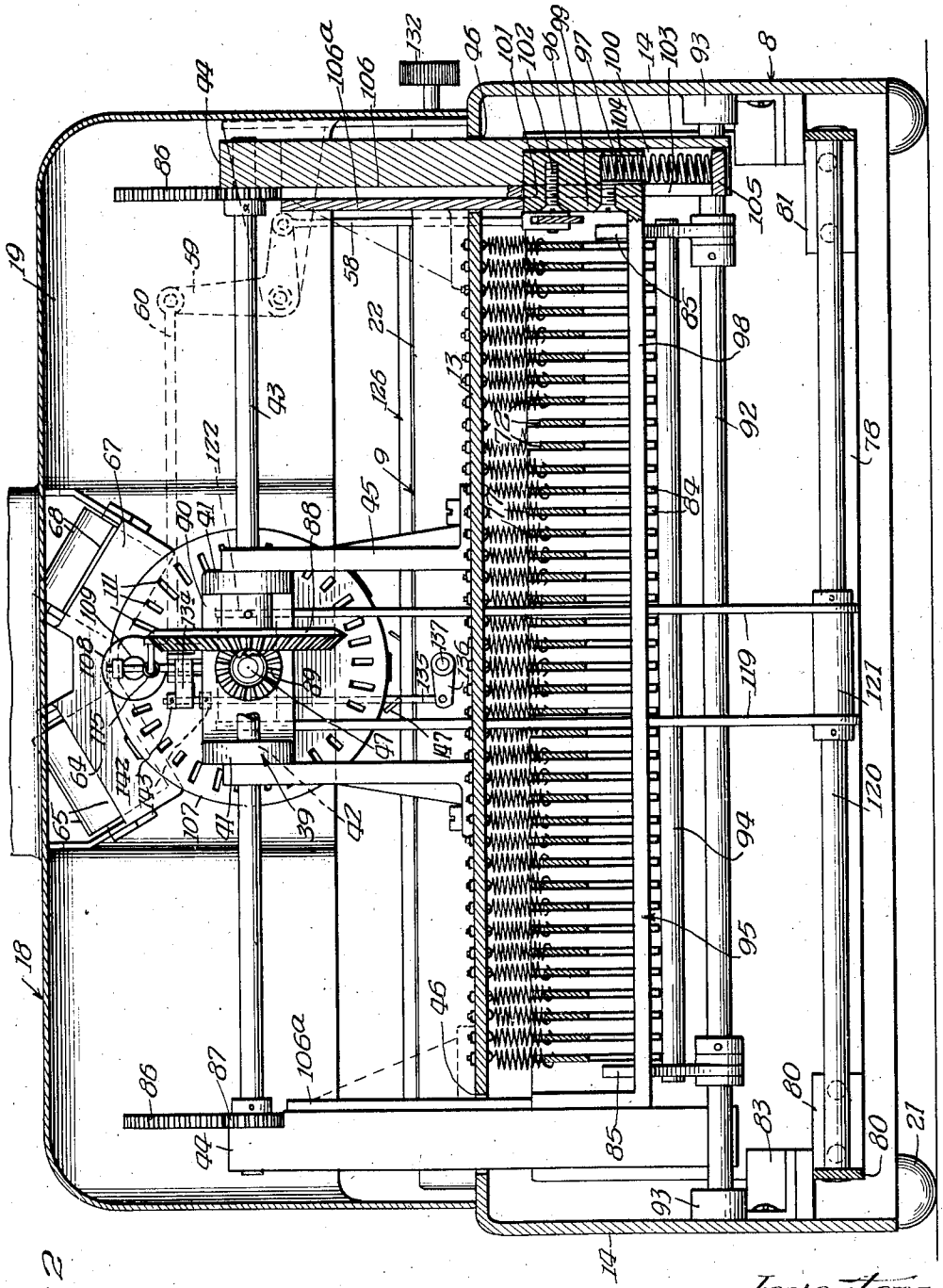


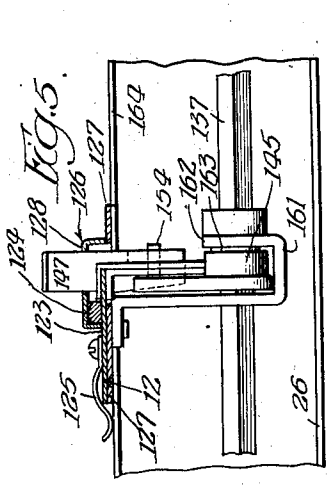
Fig. 2

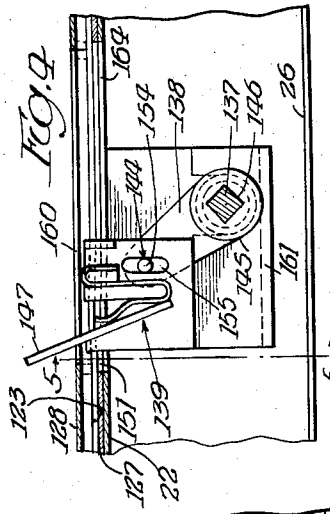
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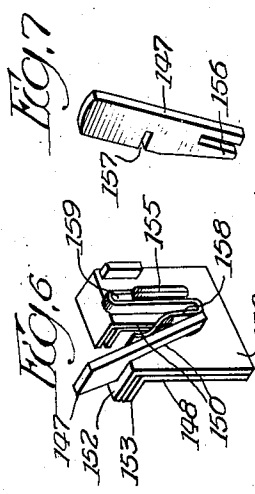
July 16, 1940. M. REYNOLDS ET AL 2,207,874

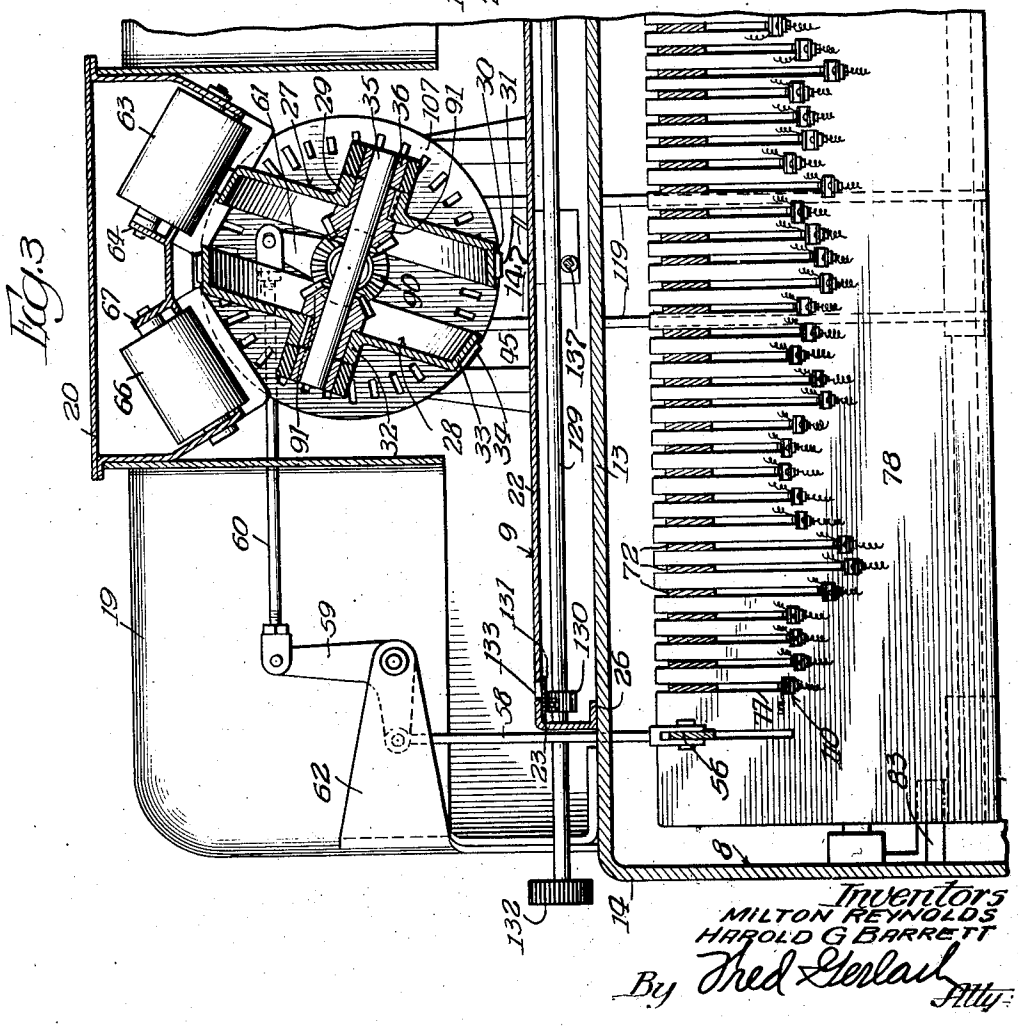
PRINTING APPARATUS

Filed June 9, 1938 3 Sheets-Sheet 3









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UNITED STATES PATENT OFFICE

2,207,874

PRINTING APPARATUS

Milton Reynolds and Harold G. Barrett, Chicago, Ill.; said Barrett assignor to said Reynolds

Application June 9, 1938, Serial No. 212,787

13 Claims. (Cl. 197—2)

The present invention relates generally to printing apparatus. More particularly the invention relates to that type of printing apparatus which is designed to print sheets of paper or paper board to form signs or advertising placards and comprises as its main parts a housing with a sheet supporting member on the top thereof, a type unit above the sheet supporting member, a plurality of vertically movable keys for actuating the type unit so as to cause it to effect impressions on the sheet in response to downward movement of the keys, a sheet retaining bar on the supporting member, and mechanism for automatically and longitudinally shifting the sheet retaining bar in a step-by-step manner for sheet feeding purposes in connection with actuation or operation of the keys.

One object of the invention is to provide a printing apparatus of this type which is an improvement upon, and has certain advantages over, previously designed apparatus of the same general character and, in addition, is more compact and embodies fewer operating parts.

Another object of the invention is to provide a printing apparatus of the type under consideration in which the type unit comprises a pair of laterally spaced rotary type wheels which are mounted on the forward end of a vertically swinging arm over the sheet supporting member and are adapted to be tilted laterally in order to bring one or the other wheel into a printing position over a subjacent sheet on the member.

Another object of the invention is to provide a printing apparatus of the last mentioned type and character which includes novel and simple mechanism whereby in response to initial downward movement of any one of the keys the operative type wheel is rotated to the proper extent to bring the type corresponding to the key letter or number into a printing position over the sheet on the sheet supporting member and in response to further downward movement of the key the arm and wheels are swung downwards in order to cause the proper or selected type on the operative wheel to make an impression on the sheet.

A further object of the invention is to provide a printing apparatus of the aforementioned character in which the mechanism for automatically and longitudinally shifting the sheet retaining bar in a step-by-step manner for sheet feeding purposes in connection with actuation or operation of the keys is of such design that it operates to effect shift or feed movement of the bar prior to downward swing of the type wheels and arm and shifts the bar and sheet a distance which corresponds in width to the width of the selected type letter, number or character.

A still further object of the invention is to provide a printing apparatus which is generally of new and improved construction and may be manufactured at a low and reasonable cost.

Other objects of the invention and the various advantages and characteristics of the present printing apparatus will be apparent from a consideration of the following detailed description.

The invention consists in the several novel features which are hereinafter set forth and are more particularly defined by claims at the conclusion hereof.

In the drawings which accompany and form a part of this specification or disclosure and in which like numerals of reference denote corresponding parts throughout the several views:

Figure 1 is a vertical longitudinal sectional view of a printing apparatus embodying the invention and illustrating in detail the construction and design of the mechanism whereby in response to initial downward movement of any one of the keys the operative type wheel is rotated to the proper extent to bring the type corresponding to the key letter or number into a printing position over the sheet and in response to further downward movement of the key the arm and wheel are swung downwards in order to cause the bottom type on the operative wheel, that is, the selected or proper type to make an impression on the subjacent sheet;

Figure 2 is a vertical transverse sectional view taken on the line 2—2 of Figure 1 and further illustrating the construction and design of the type wheel rotating and swinging mechanism;

Figure 3 is a fragmentary vertical transverse section taken on the line 3—3 of Figure 1 and illustrating the arrangement and design of the two laterally spaced type wheels which constitute the key actuated type unit over the sheet supporting member on the top of the housing;

Figure 4 is an enlarged sectional view taken on the line 4—4 of Figure 1 and showing in detail the one-way clutch which is slidably mounted on the sheet retaining bar and constitutes one of the operating parts of the automatic step-by-step feed mechanism for the bar;

Figure 5 is a sectional view taken on the line 5—5 of Figure 4;

Figure 6 is a perspective of the housing part of the one-way clutch of the aforementioned automatic mechanism; and

Figure 7 is a perspective of the dog or movable part of the clutch.

The printing mechanism which is shown in the drawings constitutes the preferred embodiment of the invention. It is designed for use in printing sheets of paper or cardboard to form signs or advertising placards and comprehends as its main parts a housing 8, a sheet supporting member 9 on top of the housing, a type unit 10, a plurality of keys 11, and a sheet retaining bar 12. In addition to these parts the apparatus comprises mechanism for actuating the type unit in response to downward movement of the keys and also mechanism for automatically shifting the bar 12 longitudinally before each printing operation for sheet feeding purposes.

The housing 8 is preferably in the form of a metal casting. It serves as a frame structure for the mechanism and comprises a top 13, a pair of sides 14, a back 15, and a front (not shown). The top 13 of the housing is flat and rectangular and forms a base for the sheet supporting member 9. It extends between and is joined to the upper margin of the back 15 and the rear portions of the upper margins of the sides 14 and terminates at the front thereof in a downwardly extending flange 16. The latter is disposed inwardly of the front ends of the sides and carries a bumper equipped stop bar 17 for the keys 11. The sides 14 of the housing are held in laterally spaced relation by the top 13 and the back 15 and have tapered front ends which project beyond the flange 16 and are adapted to accommodate the keys 11 therebetween when the keys are depressed in connection with operation of the apparatus. In addition to the top, sides, back and front the housing 8 comprises a hollow arm 18. This arm overhangs the rear portion of the sheet supporting member 9 and has a transversely elongated vertically extending rear part 19 and a forwardly extending horizontally positioned front part 20. The rear part overlies and extends upwardly from the rear portion of the housing top 13 and serves to hold the front part 20 a small distance above the sheet supporting member 9. Said front part 20 serves as a housing for the type unit 10 and is positioned midway between the sides 14 of the housing 8. At its front and rear or lower corners the housing is provided with hemispherical feet 21 of rubber or like resilient material. These feet are adapted to rest on the supporting surface on which the apparatus is placed.

The member 9 serves as a support for the sheet to be printed. It is rectangular and comprises a top 22, a pair of sides 23, a back 24, and a front 25. The top is flat and serves as a platen for the sheet to be printed. It is disposed over the front portion of the housing top 13 and is spaced a small distance above the latter by means of the sides, back and front of the member 9. Said sides, back and front of the member are equal in height and have inturned bottom flanges 26 which rest on the top face of, and are suitably secured to, the top face of the housing top 13. The back 24 of the member 9 abuts against the front lower portion of the rear part 19 of the hollow arm 18 and the front 25 is disposed slightly inwardly of the flange 16 along the front margin of the housing top 13.

The type unit 10 consists of a pair of type wheels 27 and 28 and is encased or housed by the front part 20 of the hollow arm 18, as hereinbefore described. These two wheels are arranged in side-by-side relation and are adapted to be rotated by the keys in order to bring the proper or desired type into a printing position over the central portion of the top 22 of the sheet supporting member 9. The wheel 27 embodies a hub 29 and a rim 30. The rim is frusto-conical and carries upper case type 31 on its outer periphery. The type wheel 28 comprises a hub 32 and a frusto-conical rim 33 and is the same in size as the wheel 27. The rim 33 is provided on its outer periphery with lower case type 34. The latter are arranged in an annular series and are adapted in response to rotation of the wheel 28 to be brought into a printing position with respect to the sheet to be printed. The two wheels 27 and 28 extend around a shaft 35 which is journaled at the ends thereof in a pair of bearing blocks 36. The latter are carried by a fork 37 at the distal end of a longitudinally extending vertically swinging arm 38. This arm is disposed in and extends longitudinally through the front part 20 of the hollow arm 18 and has a fork 39 at its proximal end. The latter is formed as an integral part of the arm and consists of a cross-piece 40 and a pair of side pieces 41. The side pieces embody aligned holes 42 through which a horizontally extending shaft 43 extends. This shaft is disposed in the rear part 19 of the hollow arm 18 and is journaled at its ends in a pair of bearing brackets 44. The holes 42 are of slightly greater diameter than the shaft 43 and hence the arm 38 together with the two type wheels 27 and 28 is free to swing vertically. The fork 39 is disposed midway between the ends of the shaft 43 and is held against axial displacement by means of a pair of brackets 45 which are fixed to and extend upwardly from the top 13 of the housing 8 and are arrranged in lapped relation with the outer faces of the side pieces 41 of the fork 39 at the proximal end of the arm 38. The bearing brackets 44 are vertically elongated and project downwardly through holes 46 in the rear corner portions of the housing top 13. The arm 38 is tubular and forms a journal for a shaft 47. This shaft extends longitudinally through the arm and is of such length that the ends thereof project beyond the arm ends. The fork 37 at the distal end of the arm 38 comprises a cross piece 48 and a pair of side pieces 49 and projects in the direction of the front of the housing 8. The side pieces 49 are disposed in lapped relation with the type wheels 27 and 28 and have at the outer ends thereof U-shaped sockets 50 in which bearing blocks 36 are secured by way of plates 51 and bolts 52. The cross piece 48 of the fork 37 has a central hole 53 through which the front end of the shaft 47 extends. This hole 53 is of slightly greater diameter than the shaft with the result that the fork 37 together with the type wheels is free to tilt sidewise. When the fork is tilted clockwise as viewed from the front (see Figure 3) the type wheel 27 is so angularly positioned that the type on the bottommost portion of its rim is in a printing position over the central portion of the top 22 of the sheet supporting member. When the arm, as hereinafter described, is swung downwards such type is adapted to make an impression on the subjacent sheet. When the fork is tilted or rotated in the reverse direction the type wheel 27 is swung out of its operative or printing position and the type wheel 28 with the lower case type 34 is swung or shifted into an operative or printing position. In the latter position the type on the lowermost portion of the rim 33 is disposed directly over the central

portion of the top 22 of the sheet supporting member 9 and is adapted in response to downward swing of the arm 38 to make an impression on the subjacent sheet. When the type wheel 27 is disposed in its operative position the upper case type 31 thereon may be brought successively into a printing position over the subjacent sheet by rotation of the wheel. When it is desired to print with the upper case type the fork is shifted clockwise, as viewed from the front, and when it is desired to use the lower case type 34 on the type wheel 28 the fork 37 is tilted or rotated counter-clockwise. Tilting or swinging of the fork for type wheel shifting purposes is effected by means of a shift key 54. This key is located slightly inwards of the front end of one of the sides 14 of the housing 8 and comprises a vertically extending part 55 and a horizontal rearwardly extending part 56. The latter part is pivotally connected at its rear end so that the key is free to swing vertically. The vertically extending part 55 of the key is mounted in close proximity to the down-turned flange 16 along the front margin of the top 13 of the sheet supporting member 9 and embodies a finger button or pad 57 at its upper end. The key is connected to tilt or rotate the fork 37 by way of a vertically extending link 58, a bell crank 59, a link 60 and an arm 61. The link 58 extends vertically and is pivotally connected at its lower end to the central portion of the horizontal part 56 of the key 54. The bell crank 58 is pivotally connected at the central portion thereof to a bracket 62 on the rear part 19 of the hollow arm 18 and has one arm thereof connected pivotally to the upper end of the link 58. The link 60 extends horizontally and is connected at one end thereof to the other arm of the bell crank. The other end of the link 60 is pivotally connected to the arm 61. This arm, as shown in Figures 1 and 3, is connected to, and projects outwardly from, the central portion of the cross-piece 48 of the fork 37. When the key 54 is depressed or swung downwards it so actuates the link 58, the bell crank 59, the link 60 and the arm 61 that the fork 37 is tilted or rotated in a counter-clockwise direction and the type wheel 28 is thus brought into its operative or printing position. When the key 54 is raised, the fork 37 is tilted or rotated counter-clockwise and the type wheel 27 with the upper case type 31 is thus brought into its operative or printing position. By manipulation of the key either type wheel may be brought into play, that is, into its operative position. Preferably, the key 54 is provided with means (not shown) whereby it may be locked in either of its shifted positions. Such means serves to lock the fork and type wheels against rotation or tilting movement. The type wheel when in its operative or printing position is inked by means of an ink roll 63. This roll is positioned in an angular position above the type wheel 27 and is carried in suitable brackets 64 at the upper forward portion of the front part 20 of the hollow arm 18. When the wheel 27 is in its printing position the type 31 are adapted in response to rotation of the wheel to come in contact with, and receive ink from, the outer periphery of the roll 63. As shown in Figure 1, the roll 63 has ink spreading rollers 65 associated therewith. These rollers are disposed in parallel relation with the ink roll 63 and are carried by the brackets 64. When the type wheel 27 is in its inoperative or non-printing position, the upper case type 31 are out of contact with the ink roll 63 and are hence subjected to no inking in response to rotation of the wheel. The lower case type 34 on the rim 33 of the type wheel 28 are inked by means of an ink roll 66. The latter is mounted in such an angular position above the wheel 28 that when the latter is swung into its operative or printing position the type thereof is adapted in response to rotation of the wheel to come successively into contact with and receive ink from the outer periphery of the roll 66. Said roll 66 is carried by a bracket 67 in the forward upper portion of the front part 20 of the hollow arm and has ink spreading rollers 68. When the wheel is in its inoperative or non-printing position, as shown in Figure 3, the type 34 are out of contact with the ink roll 66 and hence are not inked during rotation of the wheel 28. When the latter wheel is in its printing position the type are adapted, as hereinbefore described, to contact and receive ink from the roll in response to rotation of the wheel. The fork and type wheel carrying arm 38 are urged upwards by means of a tension spring 69 in order normally to hold the operative type wheel in engagement with its ink roll and above the subjacent sheet on the sheet supporting member 9. This spring extends vertically and is anchored at its upper end to an eye-bolt 70 on the top of the front part 20 of the hollow arm 18. The lower end of the spring is attached to the central portion of the lower arm 38. After rotation of the operative type wheel so as to bring a selected or desired type directly over the subjacent sheet on the top of the member 9, the arm is adapted to be swung downwards in order to bring the selected type into contact with the sheet for impression purposes. Upon release of the arm after a printing operation the spring 67 returns the arm to its normal position wherein the operative type wheel is free for further rotation in connection with a type selecting operation.

The keys 11 are similar to typewriter keys and are positioned in side by side relation. They serve, as hereinafter described, to control the action of the operative type wheel and comprise vertically extending front parts 71 and horizontal rearwardly extending parts 72. The latter parts extend under the top 13 of the housing, as shown in Figure 1, and are pivotally connected at their rear ends to a horizontal rod 73 so that the keys are free to swing vertically. The rod 73 is located adjacent to the back 15 of the housing 8 and is carried by a bracket structure 74. The front ends of the horizontal parts 72 of the keys project beyond the flange 16 along the front margin of the top 13 of the sheet supporting member and are adapted normally to abut against the bumper part of the stop bar 17. Tension springs 75 are connected to and extend between the central portions of the parts 72 of the keys and the central portion of the housing top 13 and serve to urge the keys upwards into abutment with the bumper part of the stop bar 17. The vertically extending parts 71 of the keys are arranged in banked formation over the front portion of the housing 8 and have buttons 76 at their upper ends. These buttons have numbers and letters printed thereon corresponding to the type of the two wheels 27 and 28 and are adapted to receive the operator's fingers in connection with depression or downward movement of the keys. After depression of any one of the keys the tension spring 75 for such key returns the key to its normal position. The front ends of the horizontal part 72 of the keys extend through vertically extending slots

77 in a substantially vertical plate 78 under the front margin of the housing top 13. This plate is fixedly secured to the front end of a horizontally extending frame 79 and has the slots 77 in its upper portion. Said slots correspond in number to the keys and accommodate the front ends of the parts 72 respectively. They vary in height, as shown in Figure 3, and limit downward swinging of the keys relatively to the plate 78. The frame 79 is adapted to swing vertically and comprises a pair of side bars 80 and a front bar 81. The side bars are positioned adjacent to, and extend parallel with, the sides 14 of the housing 8, and are pivotally connected at their rear ends to a pair of brackets 82 on the housing back 15. The front bar 81 extends between and is connected at its ends to the front ends of the side bars 80 of the frame 77 and is fixedly secured in any suitable manner to the bottom margin of the plate 78. The frame 79 normally extends horizontally and upward swinging movement of the frame is limited by means of a pair of stops 83, which, as shown in Figure 2, are secured to and project inwardly from the housing sides 14 and overlie the front ends of the side bars of the frame. The keys 11 are adapted to be pressed individually downwards in connection with operation of the apparatus and embody on the central portions of the horizontal part 72 thereof downwardly extending lugs 84.

The mechanism for actuating the type unit in response to downward movement of the keys includes means whereby during the initial downward movement of any one of the keys the operative type wheel is rotated to the proper extent to bring the type corresponding to the key letter or number into a printing position over the subjacent sheet on the sheet supporting member 9, and in addition means operative in response to further downward movement of the key to swing the arm and type unit downwards in order to cause the bottom or selected type on the operative wheel to make an impression on the sheet. The first mentioned means comprises a pair of arms 85, a pair of vertically extending racks 86, a pair of pinions 87, a bevel gear 88, a bevel pinion 89, a bevel gear 90, and a pair of bevel pinions 91. The arms 85 are located adjacent to the sides 14 of the housing and extend rearwardly and upwardly, as shown in Figure 1. The front ends of the arms are pivotally connected to a shaft 92 which extends horizontally across the central portion of the housing 8 and has its ends journaled in a pair of bearings 93 on the inner faces of the housing sides 14. The front ends of the arms are preferably keyed or otherwise fixedly secured to the shaft 92 so that they swing vertically together. The central portions of the arms 85 are cross-connected by means of a rod 94. This rod underlies and is adapted to be engaged by the depending lugs 84 on the horizontal part 72 of the keys. When any one of the keys 11 is depressed the lug 84 on the horizontal part 72 thereof operates through the medium of the rod 94 to swing the arms 85 downwardly. The rear ends of the arms 85 are connected to the lower ends of the racks 86 by means of a U-shaped element 95, a pair of blocks 96, and a pair of springs 97. The element 95 extends horizontally and comprises a cross-piece 98, and a pair of side pieces 99. The side pieces extend upwardly and fit slidably against the inner faces of the racks 86. The blocks 96 fit and are vertically slidable in a pair of vertically extending guideways 100 in the lower ends of the bearing brackets 44. They embody vertical ribs 101 on the inner faces thereof and are connected to the side pieces 99 of the U-shaped element 95 by way of screws 102. The ribs 101 fit within vertical slots 103 in the lower ends of the racks 86 and abut against the outer faces of the side pieces 99. The screws 102 extend through aligned holes in the side pieces and the ribs and serve rigidly to connect the blocks to the U-shaped element. The springs 97 are compression springs and extend vertically. The upper ends of these springs fit within sockets 104 in the lower ends of the blocks 96 and the lower ends of the springs abut against out-turned ears 105 on the lower ends of the racks. The racks are mounted for vertical sliding movement in grooves 106 in the inner faces of the bearing brackets 44 and are held in such grooves by means of plates 106a. When any one of the keys is initially depressed in connection with a printing operation the racks 86 are caused to slide downwards simultaneously with downward swing of the arms 85. The rear ends of said arms bear against the end portions of the cross piece 98 of the U-shaped element 95, as shown in Figures 1 and 2. The springs 97 normally hold the blocks 96 in the upper portions of the guideways 100. As a result of the connection between the arms 85 and the racks 86 the racks are caused to slide downwards in response to the initial part of the downward movement of any of the keys. The pinions 87 are disposed adjacent to the upper ends of the bearing brackets 44 and are fixed to the ends of the shaft 43. They mesh with and are driven by the racks 86 and operate to rotate the shaft 43 in one direction in response to upward movement or shift of the racks and to rotate the shaft 43 in the reverse direction in response to lowering of the racks. The bevel gear 88 is fixedly secured to the central portion of the shaft 43 and is disposed between the side pieces 41 of the fork 39, as shown in Figure 2. The bevel pinion 89 meshes with and is driven by the bevel gear and is fixedly secured to the rear end of the shaft 47. The bevel gear 90 is fixed to the front end of the shaft 47 and is disposed adjacent to the central portion of the shaft 35 between the type wheels 27 and 28. The bevel pinions 91 are rotatably mounted on the ends of the shaft 35 and mesh with, and are driven by, the bevel gear 90. They are positioned in opposed relation, as shown in Figure 3, and are fixedly secured to the hubs of the two type wheels. When any one of the keys 11 is initially depressed the arms 85 are swung downwards and operate through the medium of the U-shaped element 95, the blocks 96, and the springs 97, to shift downwards the racks 86. During downward shift of the racks the pinions 87 operate to rotate the shaft 43 and the latter, in turn, operates to rotate the bevel gear 88. Rotation of this gear operates to turn or drive the shaft 47 and causes rotation of the type wheels 27 and 28. The amount of rotation of the type wheels is determined by the extent of the downward strokes of the keys relatively to the plate 78. The slots 77 vary in length, as heretofore described, and hence the downward strokes of the keys relatively to the plate vary. Each slot is so formed, as far as length is concerned, that when the key which is associated therewith is depressed to its fullest extent in the slot, the type wheels are rotated the proper distance to bring into its printing position over the subjacent sheet the type which corresponds to the letter or number on the button of the key. By having the slots vary in length, the type wheels are differentially

rotated in response to depression of the various keys and the proper type for the associated key is brought into its printing position over the top of the sheet supporting member at the end of the down-stroke of the key relatively to the plate 78. When the keys are swung upwardly in response to the action of the springs 75, the type wheels are reversely rotated back to their starting position. Such position is reached by the wheels as soon as the horizontal parts 72 of the keys come into abutment with the bumper part of the stop bar 17. The gearing is preferably such that each type wheel makes more than a complete turn or revolution in connection with selection of any type. As a result of this, proper inking of the type wheels is assured. The arms 85, the racks 86, the pinions 87, the bevel gear 88, the pinion 89, the bevel gear 90 and the bevel pinions 91 constitute simple means whereby during the initial downward movement of any of the keys the type wheels are rotated to the proper extent to bring the type corresponding to the letter or number of the key into its printing position over the sheet to be printed. The two type wheels are adapted due to the gearing arrangement to rotate in opposite directions and therefore the upper case type 31 extend around the wheel 27 in one direction and the lower case type 34 extend around the wheel 28 in the opposite direction. Both sets of type are, however, so arranged that when any one of the keys is depressed the corresponding upper and lower case type pieces are brought into a printing position. When the wheel 27 is in its operating or printing position the keys when depressed will make an upper case impression on the sheet to be printed and when the wheel 28 is in its operative or printing position as the result of depression of the shift key 54 lower case impressions will be made on the sheet in response to depression or downward movement of the keys 11.

In order to lock the type wheels against rotation and over-run after they reach their proper position at the conclusion of the initial part of the down-stroke of any one of the keys 11 a disk 107, a solenoid 108, an armature 109 and a series of switches 110 are provided. The disk 107 is mounted on, and keyed or otherwise fixedly secured to the shaft 47. It is disposed between the front end of the arm 38 and the cross piece 48 of the fork 37 and has an annular series of radially extending slots 111 in its outer margin. The solenoid 108 is mounted on a bracket 112 immediately behind the slotted disk 107. As shown in Figure 1, the bracket is fixedly secured to and extends upwardly from the front end of the vertically swinging arm 38. Current is supplied to the solenoid by means of a pair of conductors 113 and 114. These conductors lead from a suitable source of current to the ends of the coil which constitutes the solenoid. The armature 109 is slidably mounted within the solenoid and embodies a pointed or wedge-shaped front end. When the solenoid is energized the armature is adapted to move forwards into contact with the outer margin of the disk 107. A suitably anchored tension spring 115 serves to retract the armature when the circuit for the solenoid is broken. The armature is aligned with the slots 111 and is adapted when shifted forwardly in response to action of the solenoid to have its pointed end enter the contiguous or aligned slot. When the pointed end of the armature is in one of the slots 111 the disk together with the shaft 47 and the type wheels is locked against rotation. The switches 110 are mounted on the plates 78 at the front end of the flange 79. They correspond in number to, and are disposed respectively at the bottom of, the slots 77 in the upper portion of the plates 78 and are included in one of the conductors for the solenoid in such manner that when any one of them is closed the circuit for the solenoid is completed and the solenoid is thus energized. As shown in Figure 1, the switches 110 comprise fixed lower contacts 116 and movable upper contacts 117. The lower contacts are fixed to and project forwardly from a bar 118 of insulating material on the front face of the plate 78 and the movable contacts 117 overlie the lower contacts and are aligned with the lower ends of the slots 77. Said movable contacts are also carried by the bar 118 and are adapted to be urged downwardly into contact with the lower contacts by the horizontal parts 72 of the keys as soon as such parts reach the bottom of the slots 77 in connection with the initial downward movement of the keys in connection with printing operations. When any one of the keys is depressed or shifted downwards to bring the desired type into printing position over the sheet supporting member 9, the switch for such key is closed as soon as the horizontal part of the key reaches the end of the key slot in the plate 78. Upon closing of the switch the armature 109 moves forwards in response to the action of the solenoid and enters the contiguous slot 111 in the disk 107. As long as the switch remains closed the armature remains in interlocked relation with the disk and thus holds the type wheels against rotation. The slots 111 correspond in number to the type on each type wheel and are so arranged that one slot is aligned with the armature when any single type is in its printing position, that is, directly over the central portion of the bottom of the sheet supporting member 9. Forward shift of the armature takes place immediately upon closing of any one of the switches 110 with the result that as soon as any of the keys 11 is shifted downwards the proper distance to bring into its printing position the associated type on the operative type wheel, the wheel is instantaneously locked against rotation. The disk 107, the solenoid 108, the armature 109 and the switches 110 constitute simple electrical means for automatically locking the type wheels of the type unit 10 in place after rotation thereof to the proper printing position as the result of key manipulation.

The means for swinging downwards the arm 38 and the type unit for impression making purposes in response to a further downward movement of any one of the keys 11 includes the frame 79 and in addition a pair of links 119. These links extend vertically, as shown in Figure 1, and are pivotally connected to a cross-rod 120 by way of a sleeve 121. The cross-rod extends between and is fixedly secured at its ends to the side bars 80 of the frame 79 at a point approximately one-third of the distance from the front bar 81 of the frame. The sleeve 121 is rotatably mounted on the central portion of the rod 120 and extends between and is formed integrally with the lower ends of the links 119. The upper ends of the links are pivotally connected to a pair of trunnions 122 which are connected to, and project outwardly in opposite directions from, the rear end of the arm 38. When any one of the keys is depressed the operative type wheel is rotated to its proper position during the initial portion of the downward stroke of such key. In response to further

downward movement of such key the frame 79 is swung downwards and operates through the medium of the links 119 to swing the arm 39 downwards and to bring the type at the bottommost portion of the operative type wheel against the sheet to be printed on the sheet supporting member 9. After locking of the disk 107 in response to forward movement of the armature 109 further downward movement of the keys 11 in connection with downward swinging of the arm 38 for printing purposes is permitted by the springs 97. As heretofore pointed out during the initial movement of any one of the keys 11 the racks are shifted downwards conjointly with the arms 85. As soon as the depressed key contacts with its switch 110 and thus effects locking of the arm 38 and the type wheels the racks are held against further downward shift. In response to the latter part of the depression of the selected key the springs 97 compress and thus permit of downward swinging movement of the arms 85 relatively to the racks. When a key, after depression or downward movement thereof, is released at the end of the printing operation the spring 69 serves to retract or swing upwardly into its normal position the frame 79. The pivotal connection between the link 60 and the arm 61 is sufficiently loose so that during downward swing of the arm 38 in connection with a printing operation there is no tendency for the type wheels to tilt sidewise.

The sheet retaining bar 12 rests on and extends transversely across the top 22 of the sheet supporting member 9. It is disposed in parallel relation with the front 25 of said member and consists of a flat metal strip 123 and an upstanding rib 124. As hereinafter described, the bar is shiftable laterally, that is, to and from the front of the member 9 for line spacing purposes, and is also longitudinally shiftable for sheet shifting purposes. The strip 123 is provided with a longitudinal series of sheet retaining spring type clips 125. These clips are applied to the front margin of the strip 123 and are adapted to grip the rear margin of the sheet to be printed and hold it in clamped relation with the front portion of said strip 123. When the rear margin of the sheet to be printed is inserted between the strip 123 and the clips the sheet is held in fixed relation with the bar 12 and is movable or shiftable with the latter. The clips 125 have upturned front or distal ends in order to permit the ready entry of the rear margin of the sheet to be printed between the clips and the subjacent or front margin of the strip 123. The rib 124 is suitably secured to the central portion of the strip 123 and extends from one end of the strip to the other. The sheet retaining bar 12 is carried for transverse and longitudinal sliding movement by an elongated guide member 126. This member consists of a flat metallic bottom strip 127, a short top channel strip 128, and suitable filler strips (not shown). The bottom strip 127 of the guide member underlies the strip 123 of the sheet retaining bar 12. It is approximately one-half again as wide as the strip, as shown in Figure 5, and is arranged so that its front edge is flush with the front edge of the strip 123 and its rear marginal edge projects rearwards of the rear edge of said strip 123. The channel strip 128 is suitably secured to the bottom strip 127 and is arranged so that one front flange rests on the strip 127 and its rear edge is in hooked relation with the rib 124. The filler strips are located within the end portions of the channel strip 128 and fit between the rear flange of the channel strip and the rear edge of the strip 123. As the result of the arrangement of the three aforementioned strips of the guide member 126 and because of their respective position relatively to the strip 123 and the rib 124 the sheet retaining bar 12 is also connected to the guide-member that it is longitudinally slidable with respect to the guide member and is conjointly movable with said member to and from the front of the sheet supporting member 9. When the sheet retaining bar 12 is shifted transversely as the result of forward or rearward shift of the guide member 126 the sheet to be printed, that is, the sheet which is retained by the clips 125 of the bar 12 against the strip 123 is shifted forwards or rearwards over the top of the member 9. When the bar 12 is slid lengthwise the sheet is moved conjointly therewith in a sideways direction. Transverse shift of the sheet retaining bar 12 serves to move the sheet to be printed for line spacing purposes. The mechanism for so shifting the bar comprises a cross-shaft 129, a pair of pinions 130 and a pair of angle type rack bars 131. The cross-shaft is disposed beneath the top 22 of the sheet supporting member 9 and is suitably journaled for rotation. One end of the shaft projects through a hole in one of the sides 23 of the member 9 and is provided on the extremity thereof with a knurled shaft turning wheel 132. The latter is pinned or otherwise fixedly secured in place so that it operates when turned to rotate the shaft. The pinions 130 are fixed to the end portions of the shaft 129 and mesh with the rack bars 131. The latter are disposed inwardly of and extend parallel to the sides 23 of the member 9 and are connected at their rear ends to the ends of the guide member 126 by way of suitable slide pieces (not shown) which fit within and slide in a pair of parallel slots 133 in the side portions of the top 22 of the member 9. When the knurled wheel 132 is rotated in one direction the pinions 130 shift the rack bars 131 so as to cause the guide member 126 and the sheet retaining bar 12 to shift rearwardly over the top 22. When the wheel 132 is reversely rotated the pinions and rack bars operate to shift the guide member 126 and the sheet retaining bar 12 toward the front of the member 9. From the foregoing it is manifest that by turning the wheel 132 in one direction or the other the sheet to be printed may be shifted to and from the front of the member 9 and thus brought into the proper or desired position for printing. After a line of printing has been formed or made on the sheet, the sheet by operation of the aforementioned mechanism comprising the cross-shaft 129, the pinions 130, and the rack bars 131 may be shifted rearwards in order to bring another portion of the sheet into position for printing.

The sheet to be printed is adapted prior to each impression, that is, each printing operation, to be shifted toward the left hand side of the apparatus. Such shift is effected by sliding the sheet retaining bar 12 longitudinally relatively to the guide member 126. As hereinbefore pointed out, the apparatus includes mechanism for automatically shifting or sliding the bar longitudinally before each printing operation for sheet feeding purposes. This mechanism is actuated by the armature 109, effects a step by step feeding of the sheet in connection with successive impressions on the sheet, and comprises a bell crank 134, a link 135, a crank arm 136, a rock shaft 137, a crank 138, and a one-way clutch 139. The

bell crank 134 is pivotally connected to a bracket 140 on the central portion of the arm 38 so that it is free to swing vertically. One arm of the bell crank is pivotally connected to the rear end of the armature 109 and the other arm, as shown in Figure 1, extends horizontally and in offset relation with respect to the subjacent portion of the arm 38. The link 135 extends vertically and is positioned at one side of the arm 38. The upper end of the link extends loosely through a vertically extending hole or socket 141 in the outer or distal end of the horizontally extending arm of the bell crank 134 and is provided with an upper stop collar 142, and a lower stop collar 143. These two collars straddle the outer end of the horizontally extending arm of the bell crank 134 and cause the link 135 to move vertically in response to swinging of the aforesaid bell crank. The lower end of the link 135 is disposed behind the back 24 of the sheet supporting member 9 and is pivotally connected to one end of the crank arm 136. The other end of the crank arm is in the form of a hub which is mounted on and secured to the rear end of the rock shaft 137. The latter is disposed under the top 22 of the member and is journaled at its ends in suitable bearings on the inner faces of the back and front of the member 9. The rock shaft is square in cross section and through the medium of the link 135 and the crank arm 136 is rocked in response to swinging of the bell crank. The crank 138 projects upwards from the rock shaft and is connected to the clutch 139 by a pin and slot connection 144. The inner or lower end of the crank has an enlarged hub 145 with a square opening 146 therein through which the rock shaft extends. By reason of the fact that this opening is square the crank is free to slide longitudinally of the rock shaft and at the same time is connected to the shaft so as to swing or rock therewith. The clutch 139 comprises a clutch dog 147, and a two piece housing for the dog. The housing consists of an inner stamped metal piece 148 and an outer stamped metal piece 149, and is positioned above the rock shaft 137. The two housing pieces are suitable secured together in lapped relation and have vertically extending wedge-shaped notches 150 therein in which the clutch dog fits. The upper portion of the clutch housing fits in a slot 151 in the central portion of the rear margin of the bottom strip 127 of the guide member 126 and is carried or suspended for longitudinal sliding movement on the rear margin of the strip 22 of the sheet retaining bar 12 by means of a pair of upper ears 152 and a pair of lower ears 153. The upper ears are formed integrally with and extend forwardly from the upper margin of the outer piece 149 of the clutch housing and fit against and rest on the top face of the rear margin of the strip 123. The lower ears 153 are spaced beneath the upper ears and are formed integrally with the upper margin of the inner piece 148 of the clutch housing. They project inwardly from the housing piece 148 and fit against the bottom face of the rear margin of the strip 123. The ears 152 and 153 constitute a connection whereby the clutch housing is suspended from the card retaining bar 12 and is connected to the latter so that it is free to slide longitudinally thereof. The pin and slot connection 144 between the crank 138 and the clutch consists of a horizontally extending pin 154 on the upper or distal end of the crank and a vertically extending pin receiving slot 155 in the housing of the clutch. This pin and slot connection so connects the crank and the clutch housing that the clutch as a whole is shifted horizontally back and forth in the direction of the sides of the member and in response to rocking of the rock shaft 137. The crank 138 is so arranged that it operates to rock the rock shaft 137 in a clockwise manner (as viewed from the front of the apparatus) when the link 133 is moved downwards and in a counter-clockwise direction (as also viewed from the front of the apparatus) when the link is moved upwards. As a result of this the clutch is shifted to the right (as viewed in Figure 3) during downward movement of the link and is shifted to the left (as also viewed in Figure 3) when the link 133 is raised. The clutch dog 147 is positioned in an upstanding manner in the wedge-shaped notches 150 in the housing pieces and has a bifurcated lower end 156 which straddles the portions of the housing pieces which define the lower or pointed ends of the notches 150. The central portion of the clutch dog embodies a horizontally extending notch 157 through which the front margin of the strip 123 extends. The right hand portions of the wedge-shaped notches 150, as viewed from the front, are inclined or angled to the right and the left hand portions of the notches extend vertically. As a result of this notch design or arrangement the clutch dog is free to swing from a substantially vertical position wherein it is in unclutched relation with the rear margin of the strip 123 into a tilted position wherein it is in clutched relation with said rear margin of the strip 123 as the result of the gripping action of the edges of the notch 157 on the strip 123. A U-shaped spring 158 is attached to a forwardly extending lug 159 on the outer piece 149 of the clutch housing and operates to urge the clutch dog into its clutched position. When the clutch dog is in its clutched position, that is, in clutched relation with the front margin of the strip 123 of the sheet retaining bar 12 and the clutch is shifted to the left, as viewed from the front of the apparatus, the bar 12 together with the sheet which is attached thereto is slid or fed lengthwise to the left. When the clutch is shifted to the right in connection with downward movement of the link 135 the clutch dog swings upwards into its unclutched position and releases the strip 123 of the sheet retaining bar 12 with the result that the clutch slides relatively to the bar and does not displace the latter. The sheet retaining bar 12 together with the sheet which is retained thereby is shifted to the left, as viewed from the front (see Figure 3), on the upstroke of the link 135 and to the right on the down-stroke of said link. As a result of the action and arrangement and design of the clutch 132 the sheet retaining bar 12 is shifted to the left for sheet feeding purposes on the upstroke of the link 136. During downward shift of said link the clutch slides to the right into a retracted position wherein it is again operative to shift the bar for sheet feeding purposes upon the next upward stroke of the link 136. From the aforegoing it is manifest that when the armature 109 is moved forwards in connection with a printing operation the clutch is slid to the left and as a result of being in clutched relation with the strip 123 moves or feeds the bar 12 together with the sheet to the left. When the armature is retracted by the spring 115 at the conclusion of the printing operation and the link is lowered the clutch is shifted to the right without moving or disturbing the sheet retaining bar 12. The upper end of the clutch dog 147 of the

clutch extends upwards through a longitudinal slot 160 in the central or web portion of the top channel piece 128 of the guide member 126 and forms a handle whereby the dog may be manually shifted into its unclutched position when it is desired to free the sheet retaining bar 12 so that it together with the sheet may be shifted to the right for card adjusting or positioning purposes. The sides of the upper or handle forming ends of the clutch dog engage the sides of the slot 160 and hence the clutch 139 is connected to the guide member 126 so that it is shiftable bodily to and from the front of the base 21 with the guide member and card retaining bar. In order to cause the crank 138 to move with the clutch 139 when the guide member 126 and the bar 12 are shifted to and from the front 25 of the member 9 by manipulation of the knurled wheel 132 in connection with adjustment of the sheet to be printed, a bracket 161 is provided. This bracket is fixed to the bottom face of the bottom strip 127 of the guide member 126, extends downwards around the rock shaft 137 and is provided at its lower end with an upstanding fork 162 which fits within an annular groove 163 in the central portion of the hub 145 of the crank 138. Because of the construction of this bracket the crank 138 is caused to slide on the rock shaft 137 and maintain its operative relation with the clutch when the guide member and sheet retaining bar are shifted, as hereinbefore pointed out. A slot 164 in the central portion of the top of the member 9 permits the clutch 139 to move to and from the front 25 of the member in connection with transverse adjustment of the guide member and sheet retaining bar. This slot 164 is of uniform width from end to end and extends rearwards from the central portion of the top 22 of the member 9.

The length or amount of feed of the sheet retaining bar 12 in response to the action of the one-way clutch 139 at the beginning of each printing operation depends upon the length of the stroke of the armature 109. When the forward stroke of the armature is a long one the feed stroke of the sheet retaining bar is a long one. When the forward stroke of the armature is short then the feed stroke of the bar 12 is correspondingly short. In order adjustably to regulate or control the length of the strokes of the armature so that such stroke is in proportion to the varying type widths the slots 111 in the disk 107 on the shaft 47 are of varying length. When the armature 109 is moved forwards during the initial downward movement of any one of the keys 11 the wedge-shaped or pointed end thereof projects into the adjacent slot 111, as previously pointed out. Each slot 111 is proportionately equal in width to the type character of the type with which it is associated wtih the result that the slots which are associated with comparatively wide type letters or characters, such as those forming the letters "W" and "M" are comparatively long and the slots which are associated with the small type letters, such as those forming the letters "I" and "L" are comparatively short. When the armature moves forwards into a long slot 111 it travels farther than when it is shifted forwardly into a short slot and as a result it has a greater forward stroke and the sheet retaining element 12 together with the sheet is fed laterally a greater distance. By forming the slots 111 so that the length thereof is in proportion to the type with which they are associated lateral feed of the sheet retaining bar is controlled so that during normal or regular operation of the apparatus the impressions are spaced properly or equidistantly apart. The stop collars 142 and 143 on the upper end of the link 135 are spaced a sufficient distance apart so that there is a slight lost motion connection between the horizontal arm of the bell crank 134 and the link. This lost motion connection permits downward swinging movement of the arm 38 and the type wheels during the latter part of the downstroke of any one of the keys. The spring 115 for retracting the armature 109 after opening of the circuit for the solenoid is anchored to an upwardly extending lug 165 on the central portion of the arm 38 and is attached to the arm of the bell crank 134 which is pivotally connected to the rear end of the armature.

The operation of the apparatus is as follows: When it is desired to print a sheet and form it into a sign or placard for advertising or other purposes, the sheet is first placed on the top 22 of the sheet supporting member 9. It is then shifted or manipulated so as to bring the rear margin thereof between the clips 125 and the strip 123 of the sheet retaining bar 12. After such manipulation the sheet is fixedly secured to the bar. After connection or attachment to the bar, as hereinbefore described, the sheet is shifted into the desired printing position beneath the type wheels 27 and 28 of the type unit 10. If longitudinal adjustment of the sheet is desired, that is, adjustment to or from the front 25 of the member 9, the knurled wheel 132 is turned. If lateral adjustment of the sheet is necessary or desired, the one way clutch 139 is first released by swinging the clutch dog 147 into its vertical or inoperative position and the sheet retaining bar 12 is shifted longitudinally in the desired direction. When it is desired to print a letter or character on the sheet the key 11 for the desired letter or character is depressed. During the initial portion of the downward stroke of the selected key the operative type wheel is rotated, as hereinbefore pointed out. As soon as the horizontal rearwardly extending part 72 of the selected key reaches the end of the slot 77 in the plate 78 the switch 110 for the key is closed. This results in closing of the circuit for the solenoid 108 and causes forward movement of the armature 109 into the aligned slot 111 in the disk 107. During forward movement of the armature the bell crank 134 is swung upwardly and operates through the medium of the upper stop collar 142 to raise the link 135. Such movement of the link operates through the medium of the crank arm 136, the rock shaft 137, the crank 138 and the one-way clutch 139 to advance or feed the sheet retaining bar 12 and the sheet a distance corresponding to the selected type. When after arrest of the part 72 of the selected key by engagement thereof with the bottom of the slot 77 for such key further downward movement of the selected key swings the frame 79 downwards and causes downward swinging of the arm 38 and the type wheels. As soon as the operative type wheel is brought into engagement with the subjacent sheet the selected type on the bottom of the wheel makes an impression on the sheet. When the selected key is released after the printing operation the spring 69 swings upwardly the arm 38 and the frame 79. As soon as the horizontal part of the selected key moves out of contact with the switch 110 for the key the flow of current to the solenoid ceases and the spring 115 operates to retract the armature 109. During rearward movement of the armature the bell crank 134 is caused to swing downwards and

operates through the medium of the lower stop collar 133 to move downwardly the link 135. Such movement of the link operates, as hereinbefore described, to retract or shift to the right the one-way clutch. By manipulating or depressing different keys 11 any desired printing may be made on the sheet on the top of the member 9. After completion of a line of impressions on the sheet the sheet may, if desired, be shifted rearwardly and another line of impressions made. Inking of the type on the operative wheel is effected during rotation of the wheel in connection with selection of a type.

The herein described printing apparatus due to the specific arrangement of the parts thereof occupies but a small amount of space. Due to its simplicity it may be manufactured at a low and reasonable cost and in addition operates in an efficient manner.

The invention is not to be understood as restricted to the details set forth, since these may be modified within the scope of the appended claims, without departing from the spirit and scope of the invention.

Having thus described the invention, what we claim as new and desire to secure by Letters Patent is:

1. In a printing apparatus of the character described, the combination of a frame structure having a movable sheet supporting member associated therewith, an arm positioned adjacent to the member and carried by the structure so as to move to and from the member only, a type unit carried by the arm for movement therewith and having a set of movable type characters adapted to be selectively moved into a printing position with respect to the member, a set of keys for the type characters respectively, supported on the structure for individual vertical movement, mechanism operative in response to initial downward movement of any one of the keys to move the type character associated with such key into its printing position and further operative in response to further downward movement of the one key to move the arm towards the member in order to cause the associated type character to make an impression, and means controlled by the keys and including movable operating parts mounted on the arm for feeding the sheet supporting member laterally and relatively to the arm at the end of the initial downward movement of any one of the keys.

2. In a printing apparatus of the character described, the combination of a frame structure having a movable sheet supporting member associated therewith, an arm positioned adjacent to the member and carried by the structure to swing to and from said member, a type unit carried by the distal end of the arm and having a set of movable type characters adapted to be selectively moved into a printing position with respect to the member, keys for the type characters respectively, supported on the structure for individual vertical movement, mechanism operative in response to initial downward movement of any one of the keys to move the type character associated with such one key into its printing position and further operative in response to further downward movement of the one key to swing the arm towards the member in order to cause the associated type character to make an impression, and means controlled by the keys and including parts mounted on the arm for feeding the sheet supporting member laterally and relatively to the arm at the end of the initial downward movement of any one of the keys.

3. In a printing apparatus of the character described, the combination of a frame structure having a movable sheet supporting member associated therewith, an arm positioned adjacent to the member and carried by the structure so as to move to and from said member only, a rotary type wheel carried by the arm for movement therewith and having a set of type characters on the rim thereof adapted in response to rotation of the wheel to be selectively rotated into a printing position with respect to the member, keys associated with the type characters respectively and supported on the structure for individual vertical movement, mechanism operative in response to initial movement of any one of the keys to rotate the wheel so as to cause the type character associated with such one key to move into its printing position and further operative in response to further downward movement of the one key to move the arm towards the member in order to cause the associated type character to make an impression, and means controlled by the keys and including parts mounted on the arm for feeding the sheet supporting member laterally and relatively to said arm at the end of the initial downward movement of any one of the keys.

4. In a printing apparatus of the character described, the combination of a frame structure having a movable sheet supporting member associated therewith, an arm positioned in overhanging relation with the member and carried by the structure to swing to and from said member, a rotary type wheel carried by the distal end of the arm and having a set of type characters on the rim thereof adapted in response to rotation of the wheel to be selectively rotated into a printing position with respect to the member, keys for the type characters respectively positioned in front of the member and supported by the structure for individual vertical movement, mechanism operative in response to initial downward movement of any one of the keys to rotate the type wheel so as to bring the type character associated with the one key into its printing position and further operative in response to further downward movement of the one key to swing the arm downwardly toward the member in order to cause the associated type character to make an impression, and means controlled by the keys and including parts mounted on the arm for feeding the sheet supporting member laterally and relatively to said arm at the end of the initial downward movement of any one of the keys.

5. In a printing apparatus of the character described, the combination of a frame structure having a movable sheet supporting member associated therewith, an arm positioned adjacent to the member and carried by the structure to move to and from said member only, a type unit carried by the arm for movement therewith and having a set of movable type characters adapted to be selectively moved into a printing position with respect to the member, a set of keys for the type characters respectively supported on the structure for individual vertical movement, mechanism operative in response to initial movement of any one of the keys to move the type character associated with such one key into its printing position and further operative in response to further movement of the one key to move the arm towards the member in order to cause the associated type character to make an

impression, and means controlled by the keys and including parts mounted on the arm for feeding the sheet supporting member laterally and relatively to said arm at the end of the initial downward movement of any one of the keys and at the same time locking the selected type character in its printing position.

6. In a printing apparatus of the character described, the combination of a sheet supporting member, an arm positioned adjacent to the member and mounted to move to and from the latter, a type unit carried by the arm for movement therewith and having a set of movable type characters adapted to be selectively moved into a printing position with respect to the member, a set of keys for the type characters respectively, mechanism operative in response to initial movement of any one of the keys to move the type character associated with such one key into its printing position and further operative in response to further movement of the one key to move the arm towards the member in order to cause the associated type character to make an impression, and electrical means for automatically feeding the sheet supporting member laterally and relatively to the arm at the end of the initial downward movement of any one of the keys and at the same time locking the selected type character in its printing position, including a set of switches corresponding in number to and associated respectively with the keys and arranged so as to be controlled by the keys at the end of the initial downward movement thereof.

7. In a printing apparatus of the character described, the combination of a movable sheet supporting member, an arm positioned in overhanging relation with the member and mounted to swing to and from the latter, a type unit carried by the distal end of the arm and having a set of movable type characters adapted to be selectively moved into a printing position with respect to the member, a set of vertically movable keys associated with the type characters respectively and positioned in front of the member, mechanism operative in response to initial downward movement of any one of the keys to move the type character associated with such one key into its printing position and further operative in response to further downward movement of the one key to swing the arm downwardly toward the member in order to cause the associated type character to make an impression and electrical means controlled by the keys at the end of their initial downward movement and including a solenoid and armature mounted on the arm, for automatically feeding the sheet supporting member laterally and relatively to the arm and at the same time locking the selected type characters in their printing position.

8. In a printing apparatus of the character described, the combination of a sheet supporting member, an arm positioned adjacent to the member and mounted to move to and from the latter, a rotary type wheel carried by the arm for movement therewith and having a set of type characters on its rim adapted in response to rotation of the wheel to be selectively brought into a printing position with respect to the member, a set of vertically movable keys associated with the type characters respectively, mechanism including a rotatable shaft on the arm, operative in response to initial downward movement of any one of the keys to rotate the wheel in order to bring the type characters associated therewith into its printing position and further operative in response to further downward movement of the one key to move the arm towards the member in order to cause the associated type character to make an impression, and means for automatically locking the type wheel in place after rotation thereof in response to initial movement of any one of the keys, comprising a disk fixedly secured to and rotatable with said shaft and having an annular series of slots in the margin thereof and an element mounted on said arm to slide into and out of the slots.

9. In a printing apparatus of the character described, the combination of a frame structure having a movable sheet supporting member associated therewith, an arm positioned adjacent to the member and carried by the structure so as to move to and from said member only, a rotary type wheel carried by the arm for movement therewith and having a set of type characters on its rim adapted in response to rotation of the wheel to be selectively brought into a printing position with respect to the member, a set of keys associated with the type characters respectively and supported on the frame structure for individual vertical movement, mechanism operative in response to initial downward movement of any one of the keys to rotate the wheel in order to bring the type character associated therewith into its printing position and further operative in response to further downward movement of the one key to move the arm towards the member in order to cause the associated type character to make an impression, means controlled by the keys for feeding the sheet supporting member laterally and relatively to the arm in connection with each impression, and electrical means for automatically locking the type wheel in place after rotation by any one of the keys in connection with movement of a type character into its printing position comprising a solenoid and armature mounted on the arm and a set of solenoid controlling switches corresponding in number to, and associated respectively with, the keys and arranged so that they are controlled by the keys at the end of their initial downward movement.

10. In a printing apparatus of the character described, the combination of a frame structure having a movable sheet supporting member associated therewith, an arm positioned adjacent to the member and carried by the structure so as to move to and from said member only, a rotary type wheel carried by the arm for movement therewith and having a set of type characters on its rim, adapted in response to rotation of the wheel to be selectively brought into a printing position with respect to the member, a set of keys associated with the type characters respectively and supported on the supporting structure for individual vertical movement, mechanism operative in response to initial downward movement of any one of the keys to rotate the type wheel so as to bring the type character associated with the one key into its printing position and further operative in response to further downward movement of the one key to move the arm towards the member in order to cause the associated type character to make an impression on the sheet including a rotatable shaft on the arm means controlled by the keys for feeding the sheet laterally and relatively to the arm in connection with each impression, and means for automatically locking the type wheel in place after rotation by any one of the keys in connection with movement of a type character into a printing position

comprising a disk fixedly secured to the shaft and having an annular series of slots in the margin thereof, a solenoid mounted on the arm, an armature slidably mounted with respect to the solenoid and adapted when the solenoid is energized to move into one of the slots in the disk, and a set of solenoid controlling switches corresponding in number to and associated respectively with the keys and arranged to be closed by the keys at the end of their initial downward movement.

11. In a printing apparatus of the character described, the combination of a sheet supporting member, a type unit positioned adjacent to the member and having a set of movable type characters of various widths adapted to be selectively moved into a printing position with respect to the member, a set of keys associated with the type characters respectively and adapted when depressed to cause the characters to make impressions, and electrical mechanism operative automatically in connection with the making of an impression by depression of any one of the keys to feed the sheet laterally a distance in proportion to the width of the type character for the depressed key.

12. In a printing apparatus, the combination of means including a longitudinally slidable bar for retaining a sheet to be printed, type characters adapted to be selectively moved into a printing position, a set of keys associated with the type characters respectively and adapted when depressed to cause the characters to make impressions, and mechanism for automatically feeding the bar step by step with respect to the type characters in connection with successive impressions comprising a one-way clutch applied directly to the bar and adapted when moved in one direction to grip the bar and move it and the sheet and when moved into the opposite direction to release the bar and move into a retracted position, a solenoid having a circuit therefor and adapted when energized to move the clutch in one direction and a set of solenoid circuit controlled switches corresponding in number to, and associated respectively with, the keys and arranged to be closed by the keys in response to movement thereof.

13. In a printing apparatus, the combination of means including a longitudinally slidable bar for retaining a sheet to be printed, type characters adapted to be selectively moved into a printing position, a set of keys associated with the type characters respectively and adapted when depressed to cause the characters to make impressions, and mechanism for automatically feeding the bar step by step with respect to the type characters in connection with successive impressions thereon comprising a one-way clutch in the form of a laterally movable clutch dog with a notch therein through which the bar extends, and adapted when moved in one direction to grip and move the bar and when moved into the opposite direction to release the bar and slide relatively thereto into a retracted position, and a key controlled solenoid having a circuit therefor and adapted when energized to move the clutch in said one direction, and spring means for moving the clutch into its retracted position

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