May 5, 1931. A. B. FROEHLICH 1,804,160

PRINTING MECHANISM

Filed July 12, 1928 3 Sheets-Sheet 1

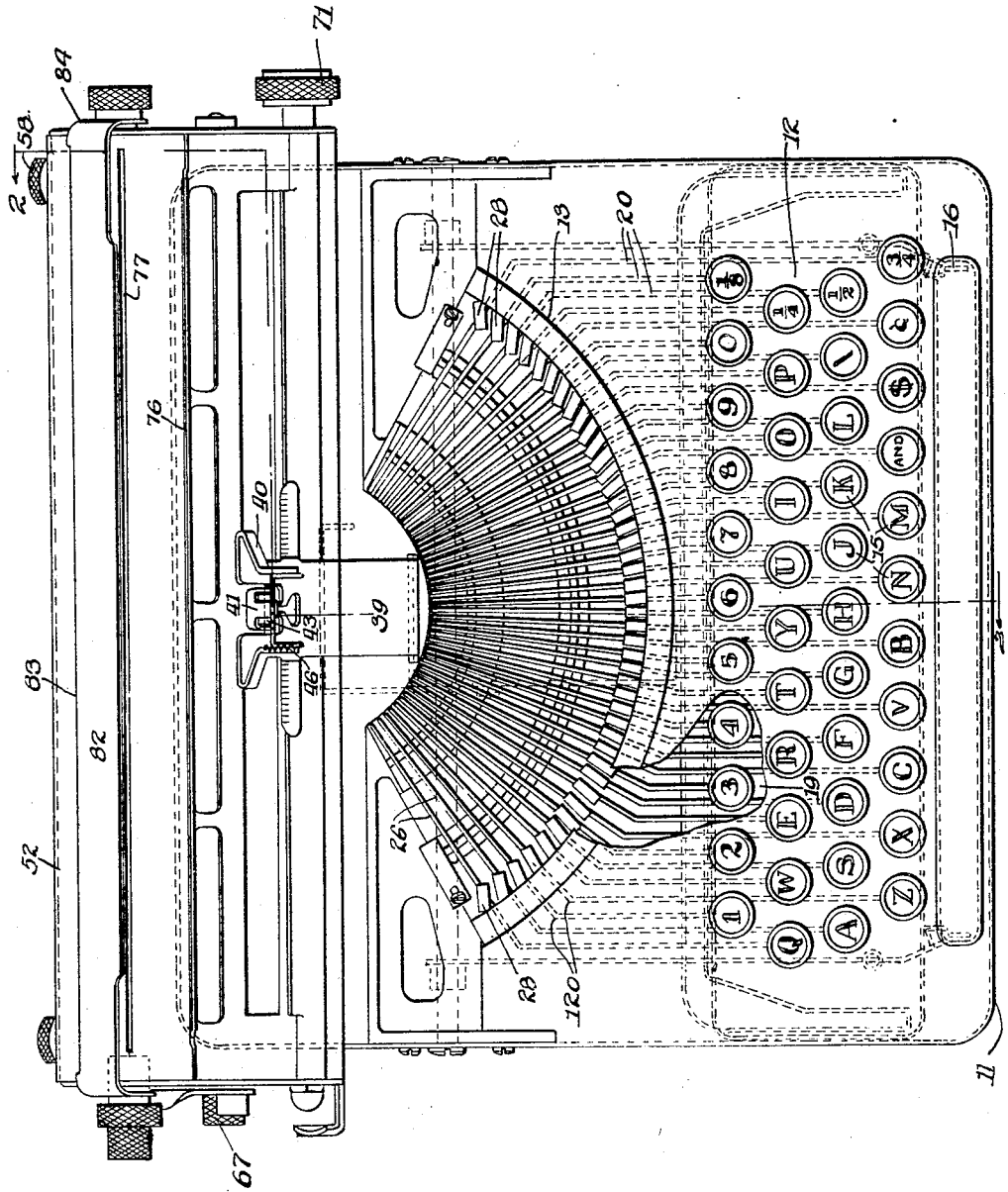


Fig. 1.

Witness
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Inventor,
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By Joseph Harris
his Atty.

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PRINTING MECHANISM

Filed July 12, 1928 3 Sheets-Sheet 2

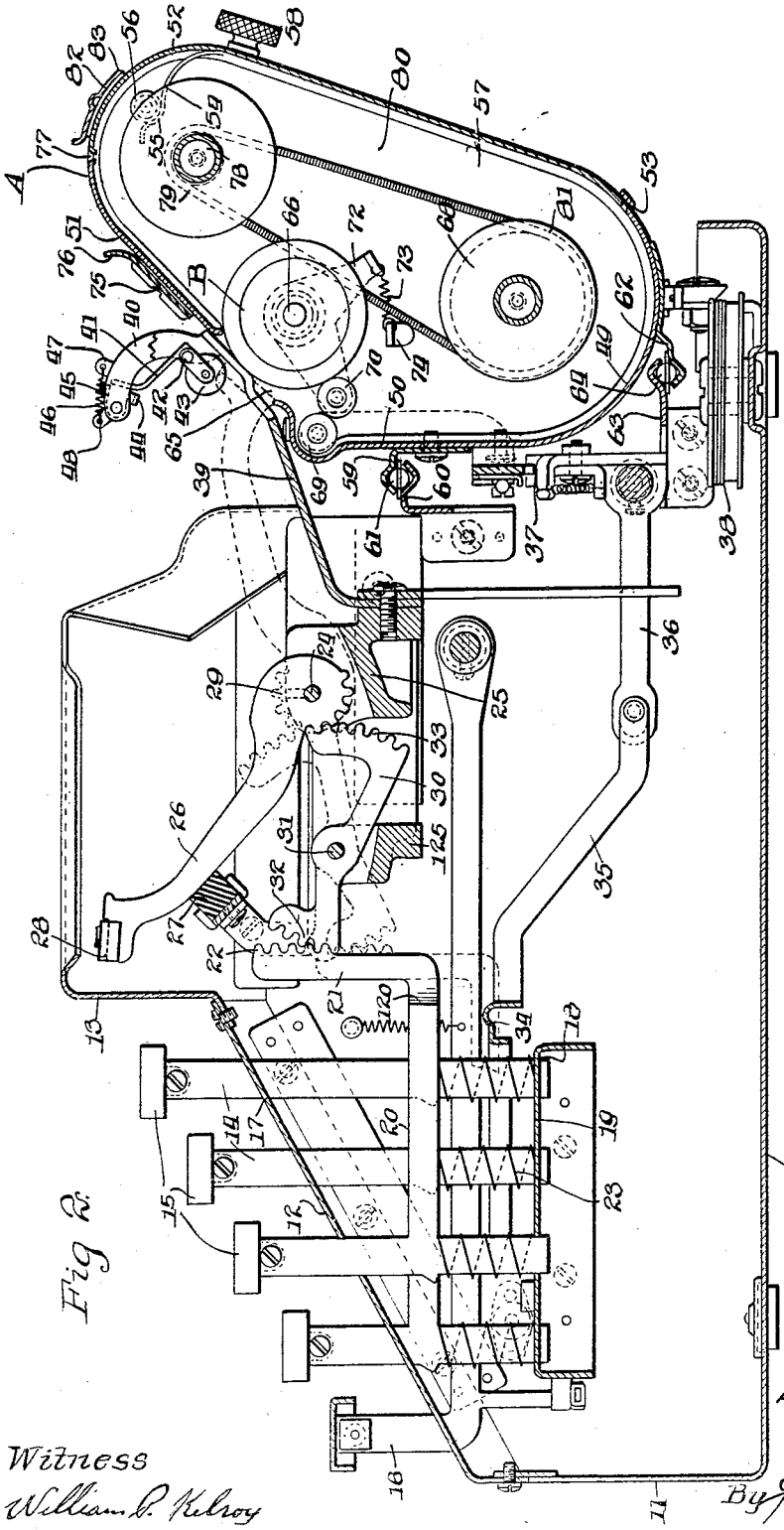


Fig 2.

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PRINTING MECHANISM

Filed July 12, 1928 3 Sheets-Sheet 3

Fig. 3.

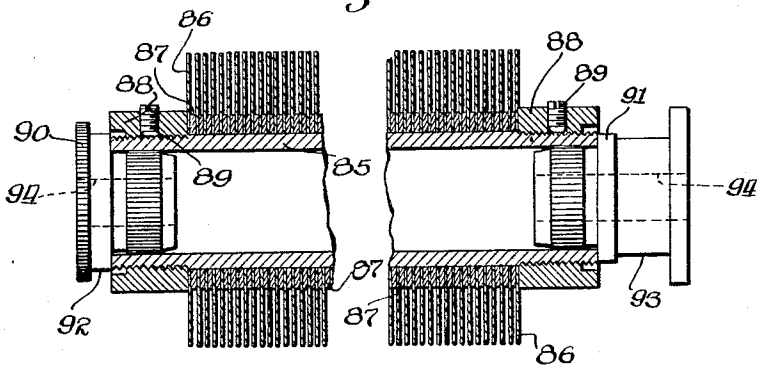


Fig. 4.

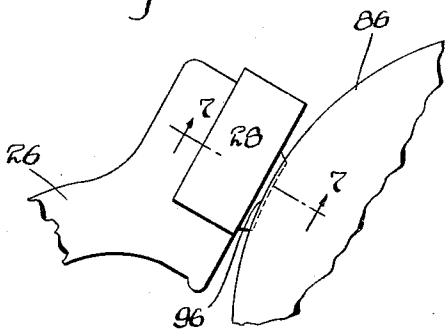


Fig. 5.

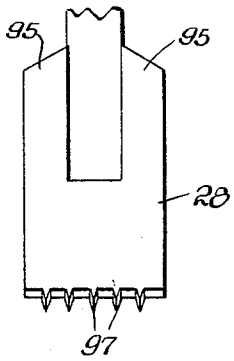


Fig. 6.

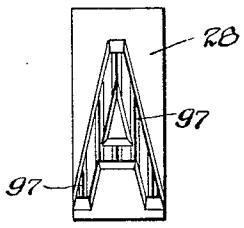
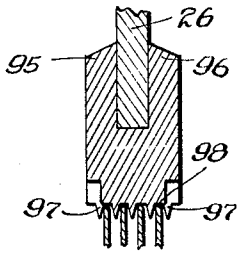


Fig. 7.



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UNITED STATES PATENT OFFICE

ARTHUR B. FROEHLICH, OF CHICAGO, ILLINOIS

PRINTING MECHANISM

Application filed July 12, 1923. Serial No. 292,237.

This invention relates to improvements in printing mechanism, and more especially printing mechanism of the typewriter class, for writing checks or other documents in which it is essential to prevent alteration, it being understood however that certain features of the invention are capable of use in other types of printing machines.

In check writing machines, it is customary to provide cooperable printing members so arranged that not only an inked impression of the desired letter, numeral, or symbol is obtained but simultaneously with the impression, the paper is torn or the fibers so disrupted that an alteration cannot be made without leaving clearly visible evidence thereof. Obviously, such cooperable printing members, to disrupt the fibers, must either imbed one within the other or overlap and heretofore no such entirely satisfactory printing members have been available, the same being subject to rapid wear or causing excessive multilation of the paper, or easily getting out of cooperative alinement, and other reasons.

One object of this invention, therefore, is to provide improved cooperable combined printing and fiber-disrupting members so designed and arranged as to reduce wear of the parts to a minimum, to insure uniformity of operation at all times, and wherein the problem of proper alinement of the printing members is substantially eliminated.

Another object of the invention is to provide a novel platen of long life and characterized by simplicity and cheapness of manufacture and assembling.

Another object of the invention is to provide a check writer wherein a supply of blank checks may be carried in the machine and successively presented to printing position and there filled out, to the end that a large number of checks, fully protected against alteration, may be made out in a minimum amount of time.

A further object is to provide a check writer of the type indicated in the preceding paragraph and wherein a complete copy or record of all checks issued may be retained without entailing any additional effort on the part of the operator.

An additional object of the invention is to provide a machine of the type indicated in the preceding paragraphs wherein the printing is accomplished by individual key-operated members.

General objects of the invention are to provide a machine of the type indicated which will be of simple but sturdy and efficient construction; in which the various parts may be readily manufactured, mostly as stampings, to reduce cost of manufacture; and to provide a novel, easily operable typewriter action.

Other objects of the invention will more clearly appear from the description and claims hereinafter following.

In the drawings forming a part of this specification, Fig. 1 is a top plan view of a machine embodying the invention, certain parts being broken away to more clearly illustrate details of construction. Fig. 2 is a vertical sectional view from front to rear of the machine and corresponding approximately to the line 2—2 of Fig. 1, Fig. 2 being approximately full size and on a somewhat larger scale than Fig. 1. Fig. 3 is a broken longitudinal diametrical sectional view of the improved platen. Fig. 4 is a broken side elevational view of the type bar head and platen, showing the relation of the printing elements at the time of making an impression. Fig. 5 is a top plan view of one of the type heads. Fig. 6 is a face view of one of the type. And Fig. 7 is a sectional view corresponding to the line 7—7 of Fig. 4. Figs. 3 to 6, inclusive, are upon a greatly enlarged scale, to more clearly illustrate the parts.

In said drawings, the machine is shown as having a casing enclosing the several actions, said casing being preferably of sheet metal and having a bottom wall 10, front wall 11, keyboard wall 12 and an upstanding arcuate section 13 concealing the type bars. Four banks of keys 14—14 are preferably employed, having the desired letters, numbers and characters indicated by the finger pieces 15—15. The spacer bar is indicated at 16.

The keys 14, corresponding to what are

commonly known as the key levers of a typewriter action, are confined to rectilinear movement in a vertical plane, this being accomplished by the keys 14 passing through alined sets of slots 17 and 18 in the keyboard section 12 of the casing and a fixed guide plate 19 within the casing, as clearly shown in Fig. 2. Each key, in addition to the vertical stem or portion carrying the finger piece 15, is provided with an integral inwardly extending section 20, from the inner end of which extends vertically upwardly an arm 21. The arm 21 is provided on its inner edge at the top with a series of teeth 22 forming a rack cooperable with the corresponding intermediate lever, hereinafter described.

Associated with each key is a return spring 23 preferably mounted on the vertical stem and interposed between the fixed plate 19 and the horizontal section 20. As will be apparent from an inspection of Fig. 1, all of the horizontal sections 20 of the keys extend parallelly for the greater part of their length, but have the innermost portions 120 thereof angularly offset as best indicated in Fig. 1, to bring the arms 21 and teeth 22 thereon in radial alinement with the respective radially arranged series of type bars, hereinafter described.

Pivotally mounted on the type bar pivot wire 24, carried by the type bar segment 25, is the radially arranged set of type bars 26. The type bars 26 normally rest against a support 27, as shown in Fig. 2. Each type bar 26 carries a type head 28, hereinafter described, at its free end, and, at the pivot end, is provided with a segmental gear 29.

Also mounted on the outer portion 125 of the type bar segment is a series of intermediate levers 30, the latter being pivotally supported on a pivot wire 31, as clearly shown. Each intermediate lever is provided at its outer end with a segmental gear 32 cooperable with the key rack 22 and in this connection, it will be observed that the arms 21 of the keys and the outer segmental ends 32 of the intermediate levers work between the partitions of the type bar segment 125, and hence danger of the racks and segmental gears getting out of mesh is eliminated. At its inner end, each lever 30 is provided with another segmental gear 33 which meshes with the segmental gear 29 of the corresponding type bar 26, it being observed also that the segmental gear portions 33 and 29 of the intermediate lever 30 and type bar 26, respectively, are likewise confined by the partitions of the type bar segment 25.

The operation of the typewriter action will be clear from the preceding description and drawing, it being evident that, as a key is depressed, the corresponding intermediate lever 30 is oscillated in a counter-clockwise direction and this in turn induces a movement in a clockwise direction of the corresponding type bar 26, thus swinging the type head 28 to the printing position, as shown by dotted lines in Fig. 2.

Associated with the typewriter actions is a universal bar 34 from which extends a universal bar lever 35, pivotally connected to a bell crank 36 which operates the escapement mechanism indicated conventionally at 37. As will be understood, any desired form of escapement mechanism may be employed for controlling the movements of the magazine carrier hereinafter described. The spring for influencing the shift of the carriage during each escapement action, is indicated conventionally at 38 and it will be understood that this may assume any desired or well known form, it being deemed unessential for the purposes of this application, to describe in detail either the escapement mechanism or the connection between the spring and carriage.

Mounted on the framework is a type bar guide 39 which may be of any desired suitable form and secured to the latter is an upstanding forked bracket 40 on which is pivotally mounted a carrier 41, the latter having rotatably mounted thereon between the arms 42 thereof, an inking roll 43 so disposed that, as a type head 28 is impelled to printing position, it will wipe over the roll 43 to thereby ink the type. Due to the pivotal mounting of the member 41, it will obviously swing out or be pushed out of the path of the type head, permitting the latter to continue its movement to printing position.

Movement of the member 41 is limited in both directions by stops 44 and 45 in the form of flanges which engage with one of the arms of the bracket 40. The member 41 is normally maintained in its operative position, that is, in the path of the type heads, by a coil spring 46, one end of which is attached to a fixed ear 47 and the other to an ear 48 preferably made integral with the member 41.

The improved combined carriage and magazine is indicated generally by the reference character A. The same is preferably in the form of a substantially enclosed shell or casing composed of sheet metal having a rounded bottom 49, vertical front wall 50, sloping exposed top wall 51, above the type bar guide and a removable cover or closure plate 52. The latter may be held in place by any suitable means, such as by the tangs 53 at the bottom thereof fitting in suitable openings in the curved bottom wall, and leaf springs 54, each of which has an offset 55 therein arranged to engage beneath a roller stop 56 secured to the end walls 57 of the casing. A knob 58, to facilitate taking off and putting on the closure plate, is also preferably employed.

Said carriage A is provided on the front thereof with a longitudinally extending supporting track 59 disposed opposite a corre-

sponding track 60 affixed to the main frame of the machine, said tracks being of V-formation and having anti-friction balls 61 therebetween, to facilitate the movement back and forth. A similar arrangement is provided at the bottom of the carriage A in the form of plate-like track 62 fixed thereto and which cooperates with an opposed plate track 63, secured to the main frame of the machine and between which is disposed another series of anti-friction balls 64.

The casing of the carriage is open as indicated at 65, opposite the improved platen or printing member, designated B and which is described in detail hereinafter. Said platen B is rotatably journaled in the carriage so as to bring successive portions of its periphery into cooperative relation with the several type bars, the journals of the platen being indicated at 66. At its left hand end, the platen B is provided with a knob 67 by which it may be manually rotated to thereby shift the active portions of the platen surface.

Rotatably supported in the magazine carriage A and preferably at the bottom thereof, is a paper roll or reel 68 adapted to contain a roll of blank checks and preferably also a roll of second sheets or blanks for obtaining a record of all checks issued, as hereinafter described. The paper is led off from the supply roll 68 upwardly between two feed rolls 69 and 70 disposed beneath the type bar guide, said rolls being preferably made of rubber or other suitable material to give the desired friction for advancing the paper. One of said rolls, preferably the roll 69, has its journal extended at the right-hand end of the machine, as shown in Fig. 1, and to which is affixed a knob 71 by which the roll may be rotated and the paper or blank checks thus fed, as will be understood. The other roll 70 is preferably supported on bell cranks 72 which may be pivotally mounted on the journals of the platen B, said bell cranks 72 having connected thereto springs 73, the opposite ends of which are attached to fixed brackets 74 carried by the end walls of the carriage casing. With this arrangement, it will be obvious that the roll 70 is influenced under spring tension toward the roller 69 so as to maintain the frictional contact with the paper or blank checks for effecting advancement thereof.

The paper or blank check, after passing between the feed rollers 69 and 70, is passed over the surface of the platen B and guided beneath a guide plate 75 which is held in slightly spaced position from the sloping wall 51 of the casing, said plate 75 having an outwardly curved upper flange 76 to facilitate the insertion of a single check or piece of paper by hand from the top, whenever this is desired.

To retain a complete record of all checks issued, a second roll of paper or blank checks may be used, as above described, and in such event the second or record sheet is fed back into the magazine through the slot 77 which is preferably left between the upper edge of the cover plate 52 and edge of the fixed wall 51 of the casing. After being led through the slot 77, it is attached to the wind-up or take-up reel or roll 78 suitably journaled at its ends in the end walls 57 of the casing. To insure rotation of the reel 78, the same is preferably provided with a small diameter pulley 79 at one end, over which takes a coil spring belt 80, the latter also passing over a larger pulley 81 carried by the supply roll 68. In this manner, rotation of the roll 78 at a higher rate of speed than the rotation of the roll 68 is insured at all times regardless of the constantly decreasing diameter of the reel of paper on the feed roll and the correspondingly increasing diameter of the roll of paper on the take-up reel and hence, as the paper is fed by the feed rolls 69 and 70, any difference in circumferential speeds of the unreeling and reeling rolls will be accommodated by slippage of the belt on the respective pulleys, in a well known manner.

The original printed checks, after passing the guide plate 75, may be passed beneath a tear-off plate 82 having a tearing edge 83, said plate 82 being pivotally adjustably mounted by means of arms 84 at its ends which are rotatably mounted on extended ends of the take-up reel 78. By employing a suitable frictional clamp, the tear-off plate 82 may be adjusted and maintained in any desired position, in accordance with varying widths of checks, so as to bring the line of tear at the proper place each time a check has been printed.

The details of the improved platen B are best indicated in Fig. 3. As there shown, said platen comprises a hollow tube-like shell 85, on which are assembled a series of annular discs 86 of very thin, hardened, flexible, preferably metallic plates, said discs 86 being uniformly spaced by washers or spacers 87, as shown. The discs 86 and washers 87 are held tightly assembled on the tube 85, by bushings 88—88, at each end, which are threaded on the tube 85 and held in proper position by set screws 89—89. Suitable journal-providing plugs 90 and 91 are pressed into the ends of the tube 85, as shown in Fig. 3, the former having a journal proper 92 and the other a wider journal proper 93, said plugs 90 and 91 being suitably apertured as indicated at 94—94, to permit the employment of a rod or shaft therethrough, to which may be secured the knob for effecting rotation thereof, it being understood that the openings 94 are of non-circular contour, to fit a correspondingly shaped shaft or rod.

Referring next to Figs. 4, 5 and 6, each type head 28 consists of a block forked as indicated at 95—95, to straddle the corre-

sponding type bar and be secured thereto in any well known manner. On the face of the type head is applied to letter or type, Fig. 6, illustrating the letter "A". The face of the type head is preferably concave, as indicated in Fig. 4, at 96 and the face of the letter, numeral or symbol is also slightly concave. To adapt the type for printing cooperation with the platen B and so as to insure disruption of the fibers of the paper, the type proper is formed with a series of spaced, preferably sharply tapered ribs 97—97, extending vertically of the type, that is, parallel to the discs 86 of the platen. In this manner, a series of valleys 98 is provided, alternating with the type ribs 97.

Referring more particularly to Fig. 7, the mode of operation of the ribs of the type and the discs 86 of the printing platen is clearly shown. The spacing of the ribs 97 is made to correspond with the spacing of the discs 86 and hence as the type comes into printing position, the ribs 97 will seat themselves between the edges of the discs 86, thus allowing a sufficient overlapping of the active portions of the two printing elements to insure slight tearing or rupture of the paper fibers. Due to the sharp edges of the ribs 97 and the preferably rounded edges of the discs 86, combined with the flexibility laterally of the discs 86, the entering of one rib or centering thereof between two discs 86 will insure corresponding centering of all the remaining ribs of the type with respect to adjacent sets of discs 86 of the platen so that the problem of alinement is reduced to an absolute minimum because of the flexibility of the discs and the readiness with which the same may flex as the two printing members come into cooperative relation.

In Figs. 3 to 7, inclusive, the scale of the parts is greatly enlarged. In actual practice, the discs 86 will be approximately only .005 of an inch in thickness, with a space between each pair of approximately .013 of an inch and, as will be understood, the ribs 97 will be made to correspond. Another important feature, as will be apparent from Fig. 7, is the fact that the amount to which the active portions of the two printing elements may overlap is determined by the edges of the discs coming into contact with the bottoms of the valleys 98 of the type head and, inasmuch as the discs are of hardened material, the amount of wear is reduced to a minimum since the usually softer metal of the type proper is not called upon to resist the final impact. Another important feature will be observed from the fact that the entire periphery of the platen B may be availed of so that the danger of any portion thereof becoming unduly worn down is minimized and the life of the platen correspondingly prolonged.

Referring back to the magazine carriage, it will be seen that provision is made for the writing in or filling out of a large number of checks with a minimum of effort, the blank checks being fed successively from a continuous strip and filled in in the same manner as and as rapidly as a regular typewriter while at the same time perforating or disrupting the paper sufficiently to prevent alteration thereof. Also, by using a second sheet or strip, a complete record of every check issued is retained, an important feature, particularly in those business houses where it is necessary to issue a great many checks. The magazine carriage may be loaded or emptied with very little effort and there are none of the inconveniences usually present with check writers of heretofore known types.

The preferred embodiment of the invention has been illustrated and described in detail, but all changes and modifications are contemplated that come within the scope of the claims appended hereto.

I claim:

1. As an article of manufacture, a printing member comprised of a plurality of thin and independent flexible plates, the edges of which constitute the active printing portion, and spacing means between said plates whereby said edges are spaced to receive therebetween portions of a cooperable printing member.

2. In a machine of the character described, the combination with a plurality of key-operated type bars having serrated type; of a rotatable, cylindrical cooperating platen having the surface portions thereof formed with spaced ribs to permit interfitting therewith of the serrated type.

3. As an article of manufacture, a printing platen comprised of a plurality of axially alined flexible discs having the peripheral portions thereof spaced to thereby provide recesses for the reception of projecting portions of a cooperating printing member.

4. As an article of manufacture, a cylindrical printing platen comprising a plurality of assembled flexible discs, the edge portions of which are spaced and yieldable laterally toward and from each other.

5. As an article of manufacture, a printing platen comprising a central support, a plurality of circular thin flexible sheet metal discs threaded on said support; a plurality of spacers interposed between adjacent discs; and means for locking said discs and spacers on the support.

6. In a printing machine of the character described, the combination with a plurality of key-actuated type bars; of an axially movable and rotatable platen having the active portions thereof formed with alternating spaces and ribs, the type having cooperable interfitting rib formations.

7. In a printing machine of the character

described, the combination with a plurality of key-actuated type bars; of a rotatable cylindrical platen composed of laterally flexible spaced discs, the type having cooperable formations.

8. In a check writer, the combination with a plurality of key-actuated type bars, each of the latter carrying serrated type; of a laterally movable magazine carriage; escapement mechanism controlling the movement thereof and actuated by said actions; a rotatable platen mounted in said carriage, said platen being comprised of a series of flexible spaced metal discs; and an inking device disposed adjacent the platen and in the path of the type.

9. In a printing machine, a cylindrical platen having peripherally extended flexible teeth spaced apart in a direction along the length of the platen to provide spaced peripheral grooves, a type bar engageable with the printing zone of said platen to print upon a sheet confined thereagainst and having serrated type, the serrations of which nest with the teeth of the platen and rupture the sheet during printing, and means for mounting the platen for rotation about its longitudinal axis, whereby the sheet to be printed upon may be advanced in line spacing direction through printing position by rotation of the platen and printing accomplished in different rotary positions of the platen.

10. In a printing machine, a cylindrical rotary platen device for mounting a sheet to be printed upon and feeding different zones of the sheet into printing position, the periphery of said platen device having spaced flexible ribs which are locally and laterally shiftable without bodily movement of the platen device, and serrated type engageable with said device to print upon said sheet, the serrations of the type nesting with said ribs during printing contact which is permitted by the local flexing of said ribs.

11. In a printing machine, a cylindrical rotary platen device for mounting a sheet to be printed upon and feeding different zones of the sheet into printing position, the periphery of said platen device having spaced flexible ribs which are locally and laterally shiftable without bodily movement of the platen device, serrated type mounted for movement against said platen device to print upon said sheet, the serrations of the type nesting with said ribs during printing contact which is permitted by the local flexing of said ribs, and inking means disposed in the path of movement of said type for inking the serrations as the type moves toward the sheet and terminating contact with said type before the latter engages said sheet.

12. In a printing machine, a cylindrical platen having peripherally extending, spaced ribs, means for mounting said platen for rotation about its longitudinal axis, a type bar mounted for movement into contact with the convex periphery of said platen and having concave type fitting the convexity of said platen, the type having projections which interfit with the ribs of said platen during contact.

13. In a printing machine, a platen comprising a plurality of discs of flexible resilient material of uniform diameter, and a plurality of smaller discs interposed between the first mentioned disc to space the latter along their peripheral portions, whereby the platen will have a rib like surface, with the ribs running peripherallv of the platen, and means for compressing the discs face to face to form a compact unit.

In witness that I claim the foregoing I have hereunto subscribed my name this 2nd day of July, 1928.

ARTHUR B. FROEHLICH.