

Sept. 30, 1958

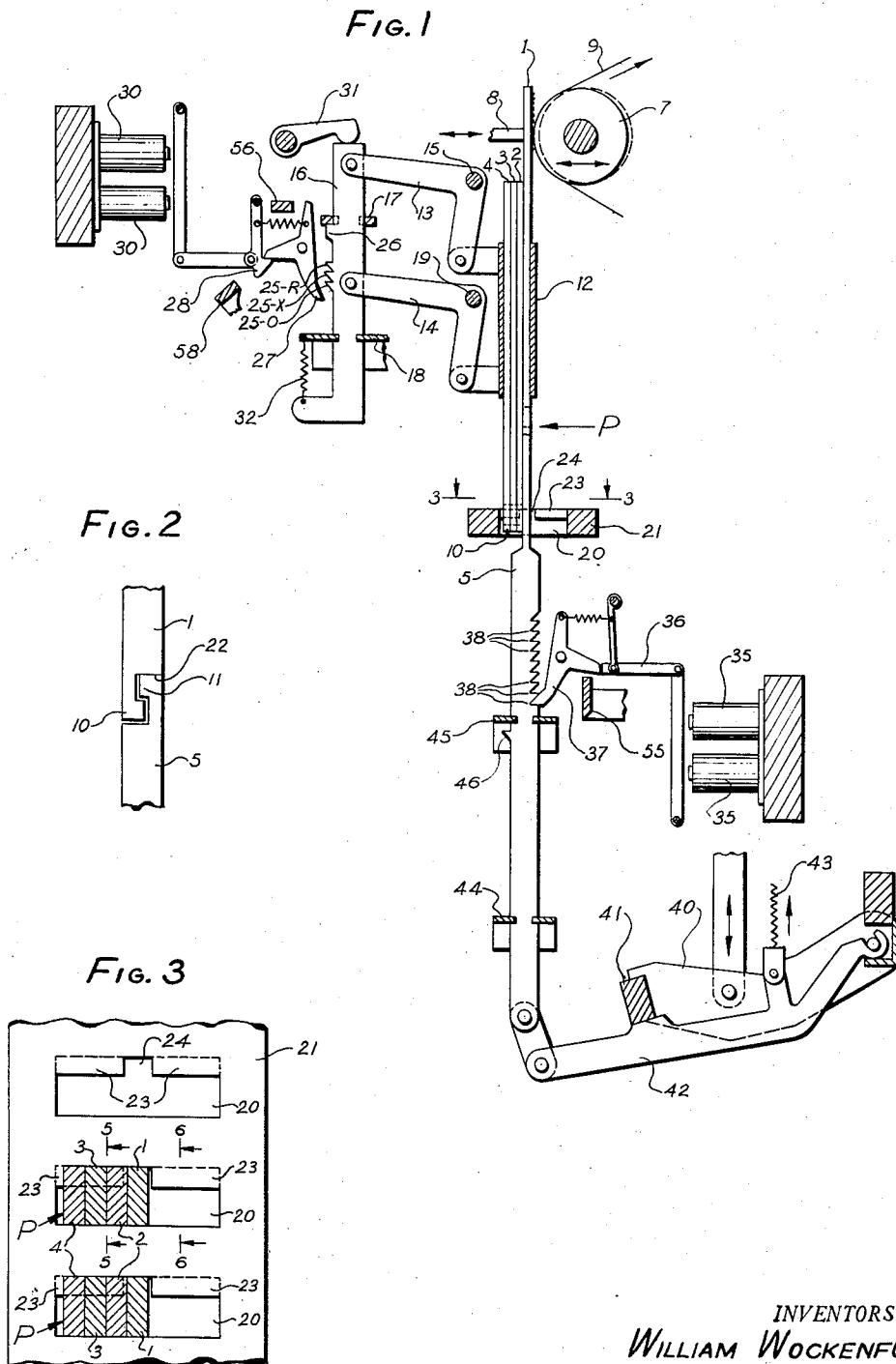
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2,853,940

TYPE BAN GROUPS IN RECORD CONTROLLED PRINTING MACHINES

Filed Dec. 31, 1953

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

FIG. 4

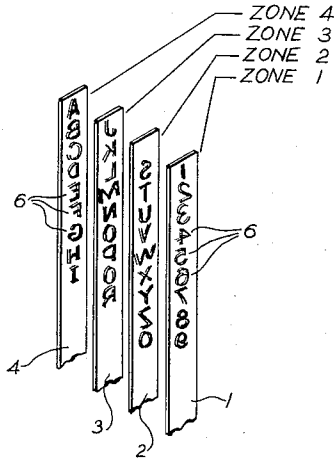


FIG. 5

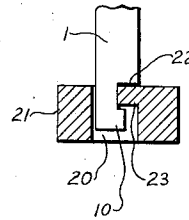


FIG. 8

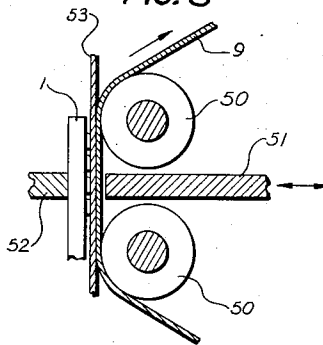


FIG. 6

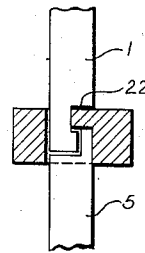
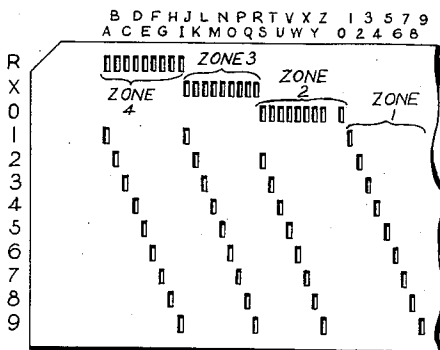


FIG. 7



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1

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TYPE BAR GROUPS IN RECORD CONTROLLED
PRINTING MACHINES

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7 Claims. (Cl. 101—93)

This invention relates to selective printing machines, and particularly to machines of this class which are adapted to print alphabetical and numerical information from preformed type elements.

Conventional printing machines having preformed type are so constructed that each individual printing member (such as a type bar or a type wheel) must carry a very large number of type elements. The various alphabetical and numerical characters require at least thirty-six type elements, and this number must be increased further if any additional symbols are desired. The relatively large mass and size of these printing members place undesirable limitations upon their speed of operation.

An object of the present invention is to enable higher operating speeds to be achieved by reducing the effective mass and length (or circumference) of each printing member without reducing its capacity or range of character selection.

A further object is to greatly decrease the number of type elements which must be moved in each printing cycle or operation of the machine, thereby increasing the machine speed.

A feature of the invention is the sectional construction of each printing member, wherein the type elements for printing a complete series of characters are separated into groups respectively carried by a plurality of individually movable, light-weight sections. Only the section which carries the group of type elements containing the selected character need be actuated in each instance. The selection of any particular section for operation can be accomplished under the control of zone indicia in a source record, so that the proposed mechanism will be usable with standard record cards.

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

In the drawings:

Fig. 1 illustrates an embodiment of the invention which is adapted for use in a well-known form of card-controlled printing apparatus.

Fig. 2 is a fragmentary side view of a coupling employed in the mechanism of Fig. 1.

Fig. 3 is a fragmentary plan view of a guide block, taken on the line 3—3 in Fig. 1.

Fig. 4 is an exploded view of the type sections employed in a printing member.

Figs. 5 and 6, respectively, are cross sections through the guide block taken on the lines 5—5 and 6—6, Fig. 3.

Fig. 7 is a fragmentary view of a record card, showing the various code punchings which may be employed to represent different characters.

Fig. 8 is a partial, vertical section illustrating a modified form of platen structure.

In accordance with the principle of the invention, each printing member P, Fig. 1, comprises four type sections

2

1, 2, 3 and 4 which are adapted to be actuated selectively by an actuating bar 5. There will be one of these printing members P for each column or character printing position of the machine (see Fig. 3). The four type sections 1—4 carry groups of preformed type elements 6, Fig. 4, which together are capable of printing an entire series of characters. In the example shown, there are 36 of the type elements 6 for printing the various alphabetical and numerical characters. Additional type elements may be provided on these type sections for printing extra symbols if desired, the exact number of type elements employed being immaterial insofar as the invention is concerned.

In the illustrated embodiment, the sections 1—4 of the printing member P are in the form of type bars. However, it is contemplated that the principle of the invention may be applied also to type wheels or type sectors, under certain circumstances at least.

As a first step in each operation of the printing member P, the group of type sections 1—4 is positioned laterally to align a selected one of these sections with the upper end of the actuating bar 5. This may be referred to as a "zoning" step. Then the actuating bar 5 is elevated, carrying with it the selected type section. For example, in Fig. 1 the type section 1 is being actuated by the bar 5. This upward movement of the type section continues until the selected type element on this section has been brought into the printing position defined by the platen 7 and printing hammer 8. Movement of the bar 5 and the actuated type section is arrested at this time so that an impression can be made from the selected type element onto a sheet 9 or other impression-receiving body.

Where the printing mechanism is being employed in a card-controlled printer, the zoning step just described may be performed under the control of zone indicia in a record card of the type shown in Fig. 7. In this representation of the record card, the code punchings have been arranged by zones as shown. In zone 4, the code representations are characterized by the presence of an "R" hole or perforation, which in combination with a perforation at one of the index points 1—9 represents an alphabetical character of the group A to I. In zone 3, each of the code representations includes an "X" hole or perforation, which in combination with a perforation at one of the index points 1—9 represents a letter of the group J to R. In zone 2, the "0" perforation may be employed in combination with a perforation at one of the index points 2—9 to represent one of the letters from S to Z, or standing by itself it may represent the cipher "0." In zone 1, single perforations only are employed, and these are located at the index points 1—9 to represent the various numerical digits 1—9. In other words, the absence of a hole at the index points R, X and 0 signifies that the character is a numerical digit in zone 1. This constitutes the well known twelve-point code for representing alphabetical and numerical information in record cards.

It will be assumed herein that each record card is sensed by a single set of reading brushes, which engage the index points R, X and 0 to 9 successively in the order just stated. Zone selection will have been accomplished by the time the R, X and 0 points have been sensed, and in the remainder of the cycle the desired type element is brought into printing position by elevating the selected type section for a measured distance, as indicated by Fig. 1. The invention is not limited to this particular mode of operation, however, since it would be feasible also to sense the index points of the record card in a reverse sequence (starting with "9"). This, of course, would necessitate a rearrangement of the type elements, and the zone holes would have to be sensed by an advance reading station, but the novel principle disclosed herein would be essentially unchanged.

3

Referring again to the mechanism shown in Fig. 1, the type sections 1-4 are in the form of type bars carrying groups of type elements for selectively printing the characters contained in the respective zones (Figs. 4 and 7). The lower end of each bar or section 1-4 has a coupling portion 10 thereon (see Fig. 2) which is adapted to be received by a complementary coupling portion 11 on the upper end of the actuating bar 5.

Zone selection (that is, the alignment of a selected type bar or section 1, 2, 3 or 4 with the actuating bar 5) is accomplished by laterally positioning the group of type bar sections 1-4 in accordance with the zone which contains the character to be printed. For example, if the character "3" is to be printed, this being in zone 1 (Figs. 4 and 7), the type bar or section 1 is brought into alignment with the actuating bar 5. In the description which follows it will be assumed that zone selection is performed under the control of a record card of the type shown in Fig. 7. The presence of an "R" perforation in the combinational hole punching indicates that a character in zone 4 is being represented. Similarly, if the code punching contains an "X" perforation, this signifies zone 3. An "0" perforation is indicative of characters in zone 2.

The coupling portions 10 and 11 are capable of relative lateral movement when the sections 1-4 are in their normal rest positions. The type bar sections 1-4 extend through a sleeve or housing 12, Fig. 1, which is slidably fitted thereon. The sleeve 12 is pivotally connected to a pair of bell cranks 13 and 14, which are mounted on stationary pivots 15 and 19. At their other ends the bell cranks 13 and 14 are pivotally connected to a zoning bar 16 which is supported by combs 17 and 18 for sliding vertical movement therein. Movement of the zoning bar 16 in a vertical direction produces corresponding lateral movement of the sleeve 12 and the type sections 1-4 contained therein. The means for effecting and controlling the movements of the bar 16 will be explained shortly.

When the type sections 1-4 are in their normal rest positions, the coupling portions 10 at the lower ends thereof are disposed within a guideway 20, Figs. 1 and 3, in a block 21. Fig. 3 shows the guideways 20 for three separate column printing positions. The spacing between the guideways 20 has been exaggerated somewhat for clarity, and the type bar sections have been omitted from one of these guideways for the same reason. Each of the bars 1-4 has a shoulder 22, Figs. 2, 5 and 6, which normally is adapted to ride on top of a rib or lug 23, Figs. 1 and 3. The hooked lowermost part of each coupling portion 10 (Fig. 5) extends beneath the rib 23, except when a type bar is positioned in the opening 24, Fig. 3. The rib 23, therefore, will restrain all type bars from upward movement except in the case of the bar which is positioned at opening 24.

Zone selection entails the positioning of the selected type bar section 1, 2, 3 or 4, as the case may be, at the opening 24 which is aligned with the actuating bar 5. The coupling portion 11 at the upper end of the bar 5 (Fig. 2) normally is positioned in the opening 24. As the bars 1-4 are shifted laterally to the right (as viewed in Fig. 1), the shoulders 22 thereon, Figs. 2, 5 and 6, successively slide across the left-hand portion of the rib 23 (as viewed in Fig. 3), then across the top of the coupling portion 11, Fig. 2, and onto the right-hand portion of the rib 23. The type bars 1-4 then commence a return movement, shifting to the left as viewed in Fig. 1. This return lateral movement of the type bars is arrested when the desired type bar is at the opening 24. This particular type bar then will be supported by the coupling portion 11 of the actuating bar 5, while the remaining type bars will be supported and held in place by the rib 23. Hence, as the actuating bar 5 moves upwardly, only the aligned type bar will be permitted to move upwardly with it.

The zoning bar 16, Fig. 1, is provided with a series of three teeth which are designated by the reference numeral

4

25 followed by a letter suffix indicating one of the three zones. Thus, the tooth 25-R relates to zone 4, which is identified by an "R" perforation, Fig. 7. Similarly, the tooth 25-X relates to zone 3, which is identified by an "X" perforation, Fig. 7. Tooth 25-0 relates to zone 2, identified by a "0" perforation, Fig. 7. There is no tooth 25 corresponding to zone 1, but the bar 16 is provided with an equivalent lug 26, Fig. 1, cooperating with the comb 17, and this lug relates to zone 1. The significance of this will become apparent as the description proceeds.

The various teeth 25 on the bar 16 are adapted to cooperate with a pawl 27, which normally is restrained by a zoning pawl 28 controlled by zoning magnets 30, Fig. 1. To select a zone, the zoning bar 16 first is depressed to its lowermost position by a rocker 31, against the action of a restoring spring 32 which is extended between the comb 18 and the lower end of the bar 16. This action causes the sleeve 12 to be shifted into its extreme right-hand position (not shown in Fig. 1). The rocker 31 then is retracted, and the bar 16 starts its upward movement under the influence of spring 32. The type bars tend to move toward the left, as viewed in Fig. 1. If a zone perforation is detected in one of the index points R, X or 0, Fig. 7, the zoning magnets 30 are energized at the appropriate time to withdraw the latch 28 and release the pawl 27. Pawl 27 thereupon is urged by spring tension into engagement with one of the teeth 25. According to the zone hole which has been sensed, engagement of the pawl 27 with a tooth 25 arrests the upward movement of the bar 16 and causes a type bar 2, 3 or 4 to be positioned in alignment with the upper end of the actuating bar 5. If no zone hole is sensed in the index positions R, X and 0, the bar 16 continues to move upwardly until arrested by the engagement of lug 26 with the comb 17. This causes the type bar 1 to be effectively positioned over the actuating bar 5, as shown in Fig. 1.

The zoning magnets 30, Fig. 1, are so arranged that they respond only to the perforations in the index points R, X and 0 of the card, Fig. 7. The remaining index points 1-9 are adapted to control the type selection magnets 35, Fig. 1, which operate a latch 36 for a pawl 37. The pawl 37 cooperates with a series of teeth 38 on the actuating bar 5, each of these teeth 38 corresponding to an index point from 1-9. After the lateral shift movement of the type bars 1-4 has been accomplished under control of the zone selection means, as just described, a drive rocker 40, Fig. 1, executes an upward movement, in the course of which it carries a bail 41 upwardly with it. This releases a series of rockers 42 to the action of their springs 43, and these rockers 42 are pivotally connected to individual actuating bars such as the bar 5, Fig. 1. Each bar 5 (of which only one is shown) is slidably supported and guided in combs 44 and 45. As each actuating bar 5 rises, it pushes an aligned type bar section 1, 2, 3 or 4 upwardly toward the printing position defined by the platen 7 and hammer 8.

When a perforation in an index point 1-9 is sensed, the type selection magnets 35 are momentarily energized, tripping the pawl 37. Pawl 37 thereupon engages a tooth 38 to arrest the actuating bar 5. If no perforation is present in one of the index positions 1-9, as in the case of the numeral "0," the bar 5 will continue to rise until a lug 46 thereon strikes the comb 45, thereby terminating the upward movement of the actuating bar 5. In whatever way the bar 5 is arrested, whether by coaction of the pawl 37 with the teeth 38, or of the lug 46 with the comb 45, the aligned type bar section (such as 1, Fig. 1) is so positioned that the desired one of the type elements 6, Fig. 4, thereon is disposed between the hammer 8 and the platen 7. When this has been accomplished, the platen 7 moves toward the type bar, while the hammer 8 supplies the necessary pressure or impact to print a character upon the sheet 9.

5

An alternative arrangement of the printing elements is shown in Fig. 8. Here the sheet 9 is passed around a pair of spaced guide rolls 50, between which is disposed a movable platen 51. A fixed platen 52 is mounted in alignment with the platen 51 on the opposite side of the type bar such as 1. At the appropriate time the platen 51 presses the sheet 9 against the aligned type element to make the impression. The inking ribbon 53 is shown in Fig. 8, but is omitted from Fig. 1.

To restore the mechanism shown in Fig. 1, the bail 41 descends and pulls the actuating bars 5 down to their normal positions. Another bail 55 restores the pawl 37 to a position where it will be retained by its latch 36. The rocker 31 then executes a movement, during which a bail 56 restores the pawl 27 to the position shown. A bail 58 restores the latch 28 into a position to engage the tail of the pawl 27. The bar 16 and sleeve 12 return to their normal or extreme left-hand positions shown in Fig. 1, and thus the mechanism is completely reset in readiness for a new operation.

The illustrated mechanism has the advantage that it eliminates the conventional type bar carrying 36 or more type elements, all of which must be oscillated in each printing cycle, and substitutes therefor a group of four type bar sections each carrying only one-fourth the usual number of type elements. Hence, the mass which must be moved by the drive means in each printing operation is reduced to a small fraction of what it was formerly, and the length of the operating stroke likewise is reduced accordingly. This enables the printing mechanism to operate at a much higher speed than conventional mechanisms, thus making it more suitable for modern high-speed printers. It is evident, of course, that the number of type bar sections employed is a matter of choice.

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

The invention is claimed as follows:

1. A printing member for selectively printing any one of a series of different characters at a character printing position, said member comprising a plurality of type sections each carrying a group of preformed type elements for selectively printing certain characters of said series, an actuating device adapted to be coupled selectively to any one of said type sections for presenting the type elements of the selected sections serially to said character printing position, group selection means to orient said type sections for coupling a selected type section to said actuating device in accordance with the character to be printed, said type sections being disengaged from each other insofar as actuation thereof by said actuating device is concerned, means effective upon the type sections which are not coupled to said actuating device for holding the same in a given position, and type selection means adapted to control the movement of the selected type section by said actuating device for disposing the desired type element in said character printing position.

2. A printing member for selectively printing any one of a series of different characters at a character printing position, said member comprising a plurality of type sections arranged side by side and each carrying a group of preformed type elements for selectively printing certain characters of said series, an actuating device adapted to be coupled selectively to any one of said type sections for presenting the type elements thereof serially to said character printing position, group selection means operable to position said type sections transversely relative to said actuating device for thereby coupling any selected one of said type sections to said actuating device, said type sec-

6

tions being disengaged from each other insofar as actuation thereof by said actuating device is concerned, means effective upon the type sections which are not coupled to said actuating device for holding the same in a given position, and type selection means operable to control the positioning of the selected type section by said actuating device in accordance with the character to be printed.

3. A printing member for selectively printing any one of a series of different characters at a character printing position, said member comprising a plurality of type bars arranged side by side and each carrying a group of preformed type elements for selectively printing certain characters of said series, an actuating device adapted to be coupled selectively to any one of said type bars for presenting the type elements thereof serially to said character printing position, group selection means operable to produce relative transverse movement between said type bars and said actuating device for coupling any selected one of said type bars to said actuating device, said type bars being disengaged from each other insofar as actuation thereof by said actuating device is concerned, means effective upon the type bars which are not coupled to said actuating device for holding the same in a given position, and type selection means operable to control the movement of the selected type bar by said actuating device for disposing the desired type element in said character printing position.

4. A selective printing member adapted to be controlled by source records bearing character representations in which zone indicia are included, said printing member comprising a plurality of type sections each carrying a group of preformed type elements for selectively printing certain characters in said series, each of said groups respectively corresponding to one of the zones indicated in the source records, an actuating device adapted to be coupled selectively to any one of said type sections for presenting the type elements thereof serially to a predetermined character printing position, group selection means to shift any one of said type sections for coupling said actuating device in accordance with the indicated zone of a character to be printed, said type sections being disengaged from each other insofar as actuation thereof by said actuating device is concerned, means effective upon the type sections which are not coupled to said actuating device for holding the same in a given position, and type selection means for controlling the actuation of the selected type section by said actuating device in accordance with the representation of the character to be printed.

5. A printing member for selectively printing characters under the control of recorded character representations in which zone indicia are included, said member comprising an actuating device provided with a coupling portion, a plurality of type bars arranged side by side in disengaged relation to one another and each carrying a group of preformed type elements for selectively printing certain characters of a series, said type bars being supported for transverse shifting movement and being provided respectively with coupling portions adapted to engage the coupling portion of said actuating device in a selective manner during the course of said shifting movement, shifting means responsive to said zone indicia for shifting said type bars selectively, said actuating device being adapted to move the type bar coupled therewith for presenting the type elements thereof serially to a predetermined character printing position, means effective upon the type bars which are not coupled to said actuating device for holding the same in a given position, and type selection means responsive to said character representations for determining the extent to which the selected type bar is moved by said actuating device in each instance.

6. A printing member for selectively printing any one on a series of different characters at a predetermined character printing position, said member comprising an

7

actuating device provided with a coupling portion, a plurality of type bars arranged side by side in disengaged relation to one another and each carrying a group of preformed type elements for selectively printing certain characters of said series, said type bars being supported for transverse shifting movement and being provided respectively with coupling portions adapted to engage the coupling portion of said actuating device in a selected manner during the course of said shifting movement, means for shifting said type bars selectively, said actuating device being adapted to move the type bar coupled therewith for presenting the type elements thereof serially to said character printing position, restraining means adapted to prevent movement of the other type bars with said actuating device, and type selection means for determining the extent to which the selected type bar is moved by said actuating device.

7. A printing member for selectively printing any one of a series of different characters at a predetermined character printing position, said member comprising an actuating device provided with a coupling portion, a plurality of type bars arranged side by side in disengaged relation to one another and each carrying a group of preformed type elements for selectively printing certain characters of said series, means supporting said type bars for transverse shifting movement, means for transversely shifting said type bars, said type bars being provided respectively with coupling portions adapted to engage the coupling portion

8

of said actuating device in a selective manner during the course of said shifting movement, said actuating device being adapted to move the type bar coupled therewith for presenting the type elements thereof serially to said character printing position, said supporting means also being adapted to restrain movement of the other type bars with said actuating device, and type selection means for determining the extent to which the selected type bar is moved by said actuating device.

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