Sept. 12, 1933. J. W. BRYCE 1,926,891

PRINTING MECHANISM FOR ACCOUNTING MACHINES

Filed Sept. 5, 1928 4 Sheets-Sheet 1

FIG. I.

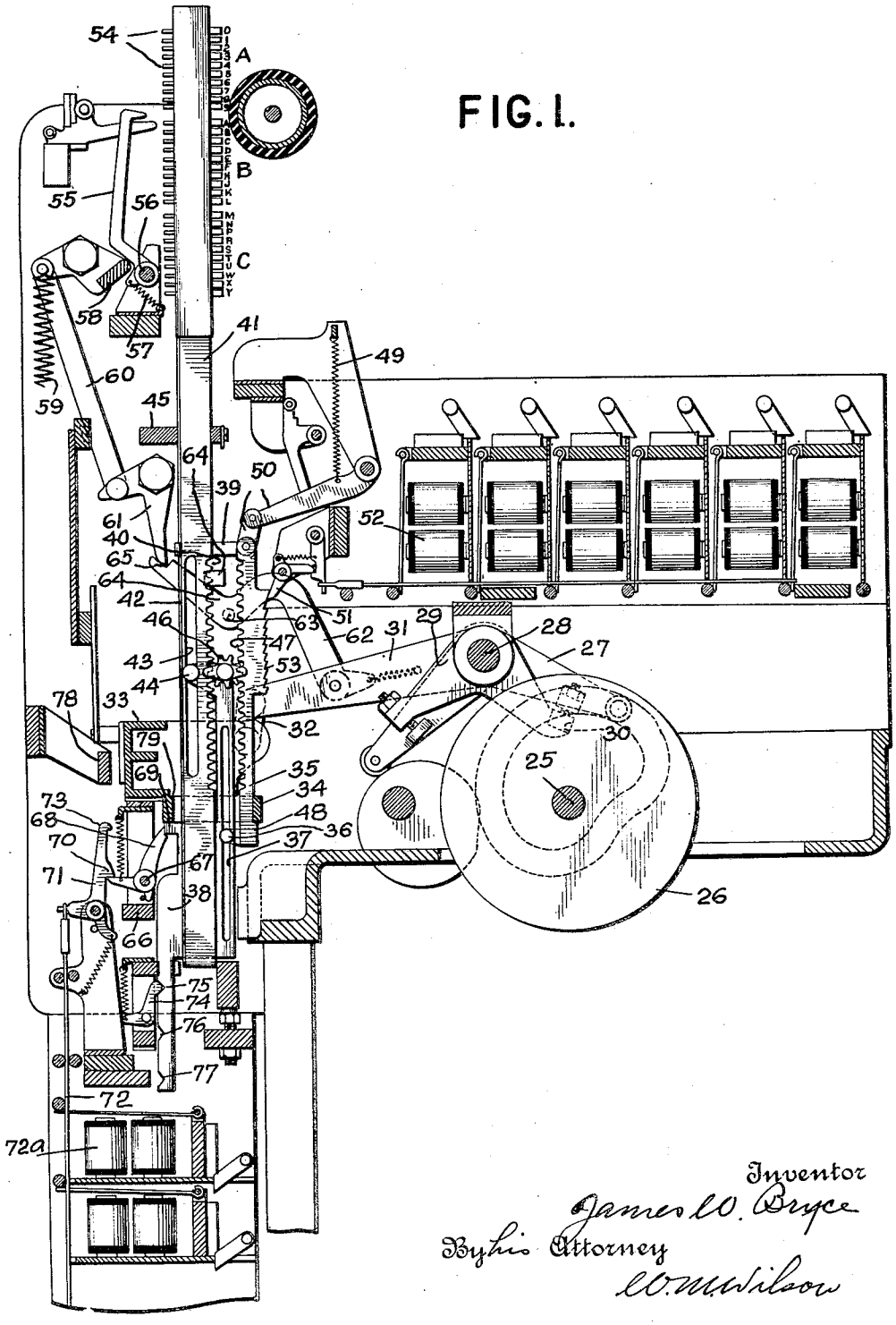

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FIG.2.

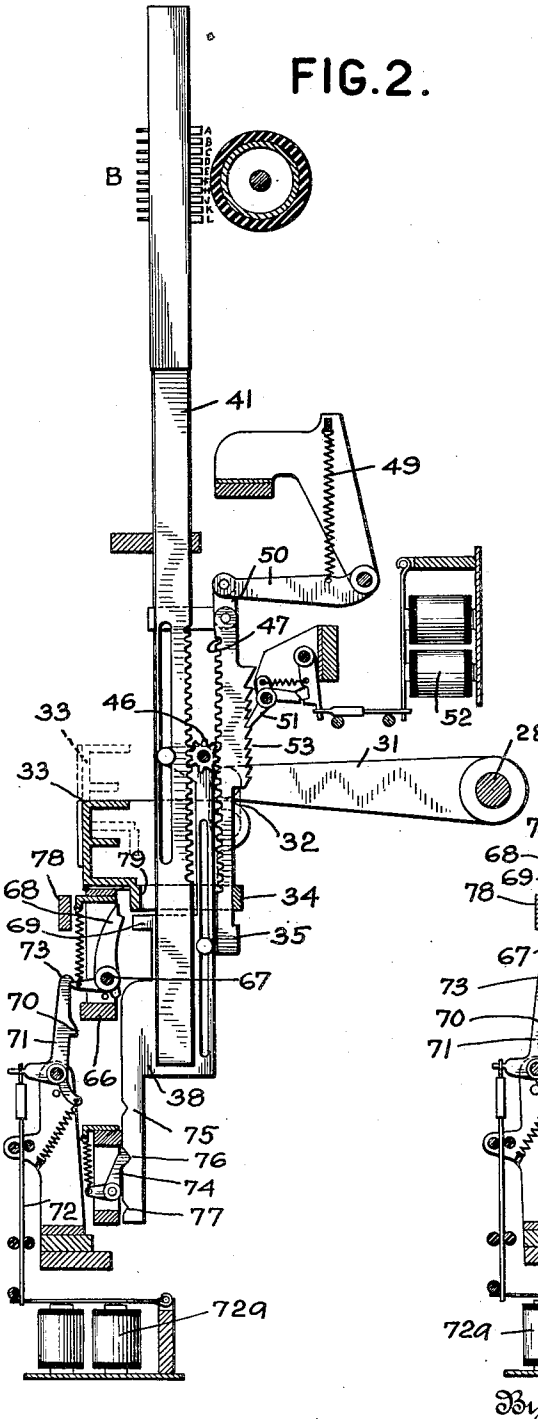
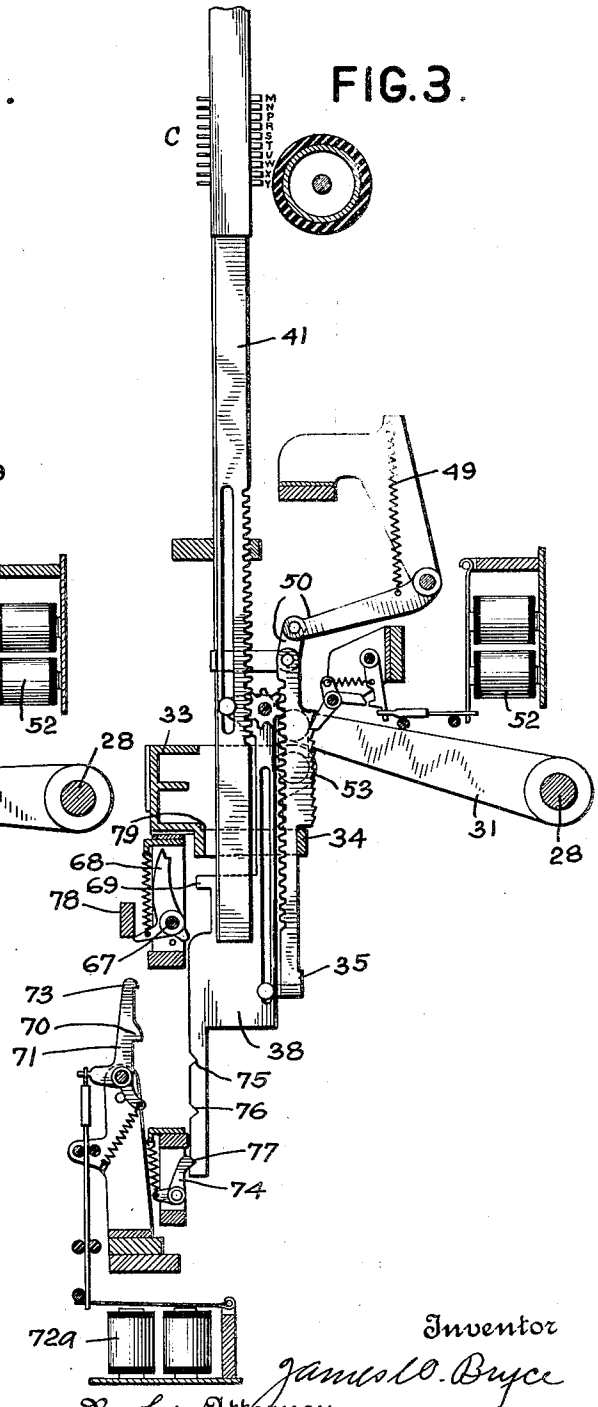


FIG.3.



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PRINTING MECHANISM FOR ACCOUNTING MACHINES

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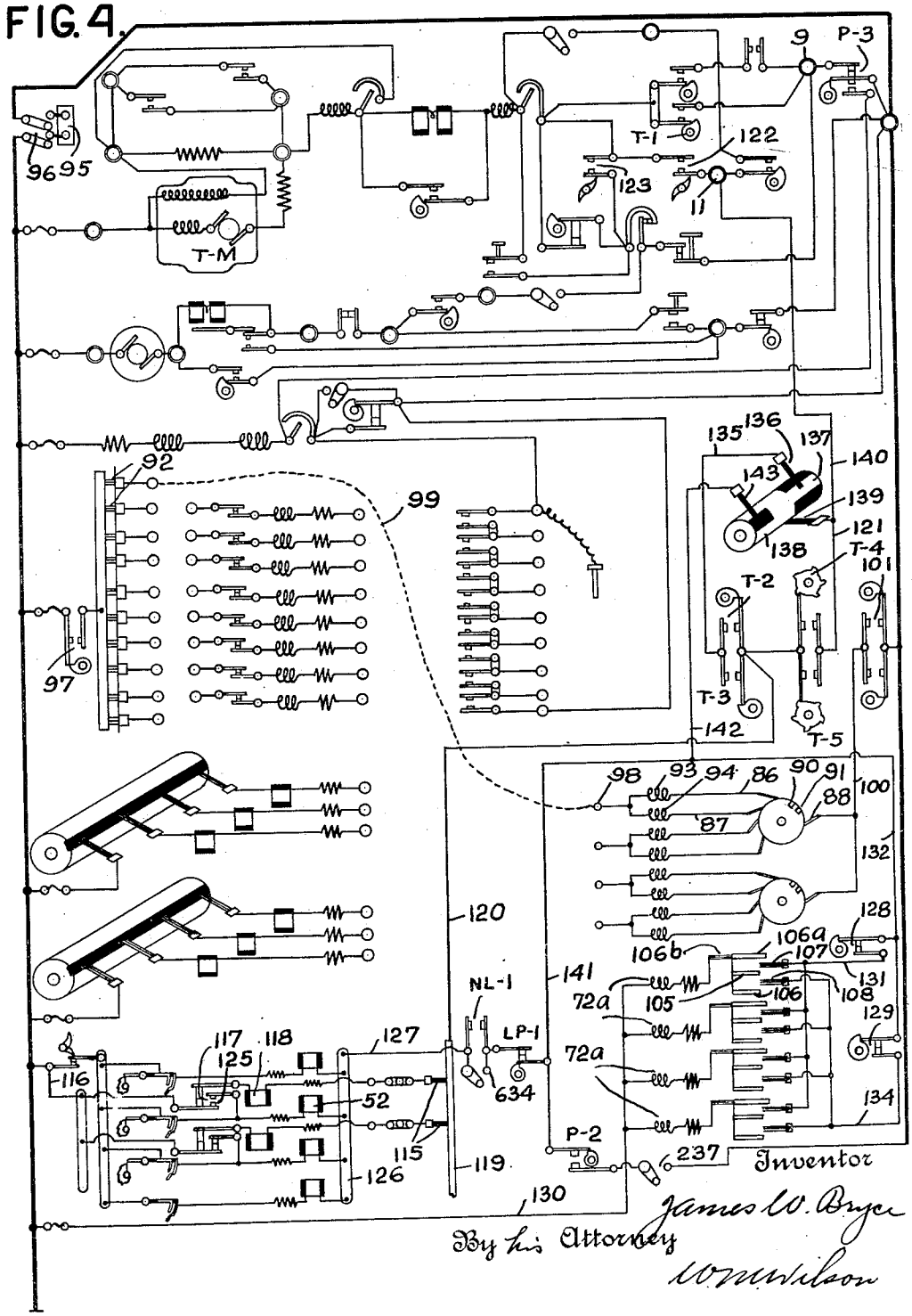
FIG. 4.



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PRINTING MECHANISM FOR ACCOUNTING MACHINES

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FIG.5.

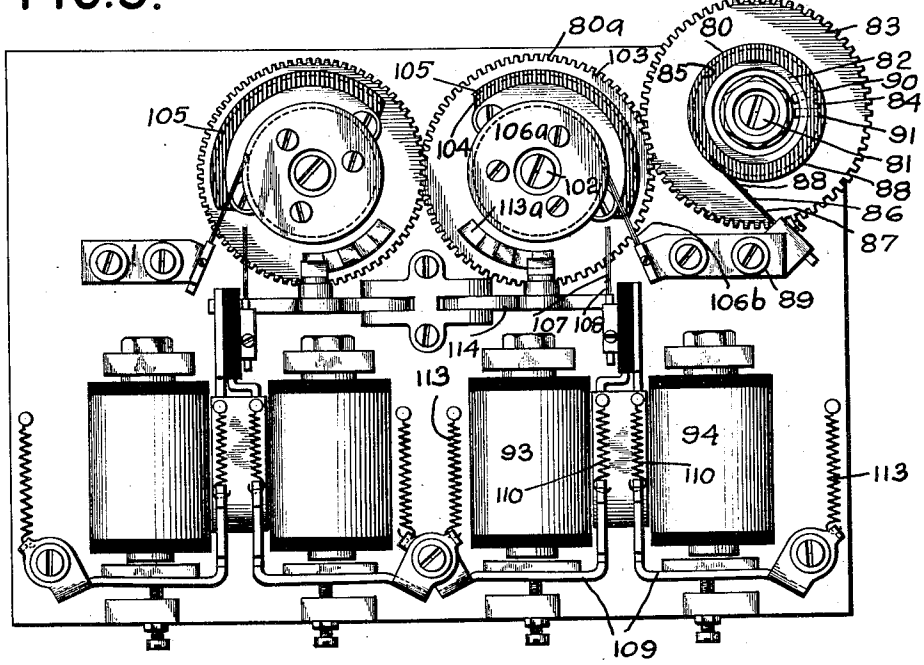


FIG.6.

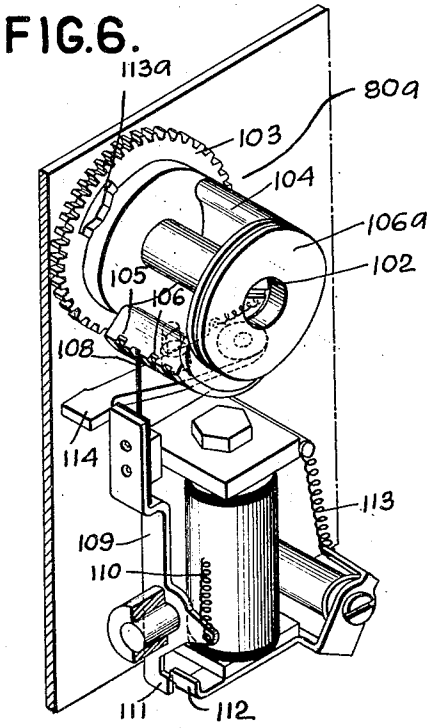
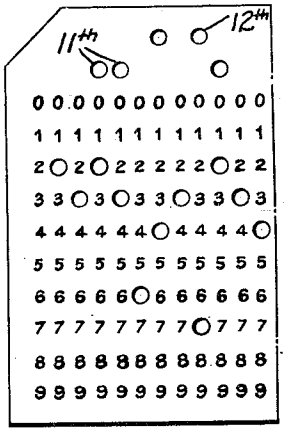


FIG.7.



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UNITED STATES PATENT OFFICE

1,926,891

PRINTING MECHANISM FOR ACCOUNTING MACHINES

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Application September 5, 1928. Serial No. 304,138

33 Claims. (Cl. 101—96)

This invention relates to tabulating machines and more particularly to improvements in the printing mechanisms therefor.

Tabulating machines, as presently developed, are provided with printing mechanisms whereby numerals represented by index point perforations may be indicated by printing upon a record strip, and, in addition thereto, such printing mechanisms are also employed to represent the result of some computation, such as a total of a series of items. It frequently happens that it is desirable to identify the printed items or computations by printed words or the like and in some instances this can readily be accomplished by substituting letter type for the numeral bearing type so that the index points will represent alphabetical or other characters. Due to the limitations in the number of index points in a card column, which is usually ten, a limited number of characters may be printed detracting from the usefulness of such an expedient.

It is then the main object of the present invention to extend the usefulness of such printing mechanisms by providing an improved printing mechanism which may be called upon when occasion requires to print either numerals or alphabetical characters.

It is a further object of the present invention to provide an improved form of differential type controlling mechanism designed to be controlled by a single card column which may select for printing either alphabetical or numeral characters arranged in groups, which characters are far in excess of the number of index points in a card column.

It is a further object of the present invention to provide improved means whereby group selection and type selection occur during successive card feeding cycles and by separate analyzing means. In order to carry out the above object correlated reading-in and reading-out commutators or translators are provided. Thus one set of brushes may control group selection during one card cycle while another set may select a desired type of the selected group during the next card cycle.

In carrying out the present invention, the preferred means comprises a type carrying member provided with a plurality of groups of type, one group for example, being numeral type, the second, letters of the alphabet and the last, if so desired, other letters of the alphabet. The numeral group of type are normally presented to the printing point so that as the card perforations register with the lower analyzing brushes the type will be differentially selected. If a group selecting perforation should register with an upper or group analyzing brush the reading-in translator will cause the energization of the magnet related to the reading-out translator. This setting is held over by the reading-out translator until the card containing the group controlling perforation is presented to the lower or usual analyzing brushes. This results in the selection of a particular type in the desired group. In this manner the card controlling columns may differentially control a number of type to make up, for example, either a number, word, or abbreviation.

These and other incidental objects which will be pointed out hereinafter will be clear from the following detailed description, in which:

Fig. 1 is a transverse sectional view through the printing mechanism illustrating a single embodiment of the invention;

Fig. 2 is a view similar to Fig. 1 illustrating the position of the parts for differentially selecting a type of the intermediate group;

Fig. 3 is a view similar to Figs. 1 and 2 illustrating the position of the parts for differentially selecting a type of the third group;

Fig. 4 is a circuit diagram of the machine to which the present improvements are applied;

Fig. 5 is a view in side elevation of the commutators forming part of the present improvements;

Fig. 6 is a perspective view of one of the commutators;

Fig. 7 is a representation of part of a regular Hollerith card illustrated as punched for selecting either numerals or letters by means of the present invention.

Referring to Fig. 1 drive shaft 25 driven by the tabulating motor TM (Fig. 4) carries a box cam 26 the race of which reciprocates a lever 27 loose on a rock shaft 28. Fixed to the shaft 28 is a bell crank 29 having a projection 30 in engagement with a screw carried by lever 27. In this manner a reciprocation of lever 27 by cam 26 will rock shaft 28 and levers 31 carried thereby. The ends of the oscillatory levers 31 are connected by links 32 to a cross head 33 and imparts vertical movement thereto as fully disclosed in the Lake Patent No. 1,379,268 dated May 24, 1921.

Extending from the cross head 33 are arms carrying a bail 34 which is adapted to control the upward movement of a slidable plate 35 which at its lower end is guided by a pin 36 carried by a bent integral portion of plate 35. The shank of pin 36 protrudes through a slot 37 in a plate 38

and the pin has an enlarged head overlying the face of plate 38. At its upper end plate 35 has an integral projection 39 suitably recessed to receive the rack portion 40 of a type carrying plate 41, one edge of plate 41 being bevelled at 42 to receive a similar internal bevel of the overturned portion of projection 39. Plate 41 has an elongated slot 43 receiving a pin 44 which is similar to pin 36 but is carried by an extending portion of plate 38. The upper portion of plate 41 is also guided by a slotted bar 45. Mounted on plate 38 for engagement with the rack portion 40 of plate 41 is a pinion 46 also in continuous engagement with a rack portion 47 of plate 35. Considering plate 38 fixed it will be obvious that a movement of plate 35 causes an opposite and equal movement of plate 41.

Bar 34 engages the shoulders 48 of the plates 35 and plates 35 are normally drawn upwardly by spiral springs 49 connected to them through links and levers 50 and, therefore, are in contact with the bail 34 and follow the upward movement of the latter imparted by levers 31 until arrested by pawls 51 operated by magnets 52 and engaging in one of a series of notches 53 in the side edges of plates 35.

The spacing of the notches 53 corresponds with the spacings of the type bars 54 constituting numeral type bars of group A. It will be clear that as plate 35 moves differentially the rack portion 47 thereof will drive pinion 46 thus moving plate 41 oppositely bringing the desired type bar in correspondence with the printing platen. The movement of type bars 54 is synchronous with the movement of perforated cards through the machine so that when a perforation is encountered by a brush in the tabulator the corresponding magnet 52 is energized, as will be hereinafter set forth, and the plate 35 is stopped at a point in its upward travel and, therefore, bar 41 in its downward travel which brings the type corresponding to such perforation into the printing position and holds it there until after the printing.

The hammers proper comprise members 55 pivoted on shaft 56 and drawn away from the type 54 by springs 57. The hammers are adapted to be struck up by a striking bail 58 which is spring actuated by a spring 59. A link 60 connects bail 58 with arm 61 and the bail is locked in place by means of a trip finger 62 engaging arm 61. The finger 62 is pivoted upon the arm 31 and spring connected thereto and provided with a pin 63 which engages with a coacting stop pin 64 fixed to the frame of the machine so as to trip off the notched end 65 of the lever 62 from the depending fingered end of arm 61 when lever 31 is being elevated. After notch 65 is completely disengaged, the spring 59 swings the bail 58 in a counterclockwise direction and impels the hammers 55 against the type. The hammer details form no part of the present invention and for further details of construction reference may be had to the application of C. D. Lake, Serial No. 541,347 filed March 6, 1922.

Movable with the reciprocatory frame 33 is a cross bar 66 having a rod 67 upon which are pivoted spring urged pawls 68 normally engaging projections 69 of each of the plates 38. When numeral type of group A, for example, are selected for operation each pawl 68 is engaged by a shoulder 70 of a related hooked member 71 so that as bar 66 rises pawl 68 will be rocked to disengage its upper end from the projection 69 so that as cross bar 66 rises further the latter will not elevate plate 38. Plate 38 will then be held impositively by a pawl 74 engaging a notch 75.

When the frame 33 has reached its extreme upward position it is reversely moved by the levers 31, the bail 34 engaging the projections 48 of the various differentially elevated plates 35 restoring them also to normal. As each plate 35 is moved downwardly the inclined edge of one of the notches 53 will cam the stop pawl 51 to its normal latched position. As cross bar 66 returns to its normal starting position pawl 68 will again latch over projection 69 of plate 38.

If a magnet 72*a* is energized prior to the elevation of cross bar 66 hooked member 71 will be rocked by a call rod 72 attached thereto and moved by the armature of the magnet. As cross-bar 66 rises thereafter pawl 68 will raise plate 38. As bail 34 rises spring 49 will be effective to permit plate 35 to follow the movement of said bail, and type carrying plate 41, plates 35 and 38 moving upwardly as a unit will bring type bars of group B in correspondence with the platen and if plate 35 is not stopped in its upward movement by the engagement of a pawl 51 with one of the notches 53, type carrying plate 41 will be elevated until the lowest type bar of group B will be at the printing point. At a definite position of the plate 38 pawl 68 (Fig. 2) will engage an upper hooked portion 73 of hooked member 71 rocking pawl 68 out of engagement with the projection 69. As plate 38 reaches a predetermined position it is held impositively by pawl 74 engaging the intermediate notch 76 in the side of plate 38.

In the event that magnet 52 should be energized during the elevation of plate 35 pawl 51 will engage one of the notches 53 thus stopping the movement of plate 35. Since plate 38 is rising pinion 46 will roll in a clockwise direction over the stationary rack portion 47 thus elevating plate 41, but not to the same extent as before to present the desired type to the printing platen. Describing the operation more in detail it will be clear that if character "L" is to be selected for printing bar 35 will be checked almost immediately so that as plate 38 rises it will roll pinion 46 clockwise over the rack portion 47 thus elevating plate 41 at double speed so that as pawl 74 engages notch 76 the lowermost type "L" of group B will be at the printing point. If the next character "K" should be selected for printing, bars 35 and 38 will be simultaneously elevated a unit before the former is checked. Thereafter the elevation of plate 38 alone will raise bar 41 to present character "K" to the printing point. For the selection of the printing character E, plate 35 and plate 38 will be moved simultaneously to directly present type character "E" to the printing point at which time plate 35 will be checked against further upward movement by pawl 51 and plate 38 by pawl 74. For the remaining characters A, B, C, or D, the movement is composite, that is, it is the same as when type character "E" is selected for operation with the exception that plate 35 may then rise independently of plate 38 since it is not checked by pawl 51. As it rises under control of bail 34 it will depress bar 41 to select the proper type, the extent of this movement depending upon the time that plate 35 is checked by pawl 51.

As bar 33 approaches its maximum elevated position (shown by dotted lines in Fig. 2) pawl 68 will be entirely disengaged from the hook 73 and will strike a bar 78 (see Fig. 3) at the extreme upward position of bar 33. Restoration of the parts is performed as premised hereinbefore with

the exception that a portion 79 of frame 33 engages projection 69 to restore plate 38 to the position shown in Fig. 1. In the above manner, any of the alphabetical characters A, B, C, D, E, F, H, J, K or L may be selected for printing.

The type carriers for printing the alphabetical characters, M, N, P, R, S, T, U, W, X, Y, constituting group C are selected in a similar manner, it being observed in this instance that magnet 72*a* will be retained energized during the time bar 66 is raised upwardly which serves to keep the hooked ends 70 and 73 from engaging pawl 68, the latter being effective to raise plate 38 from the position shown in Fig. 1 to the position shown in Fig. 3 this position of plate 38 being impositively held by pawl 74 engaging notch 77. The selection of any of the type bars for printing any of the alphabetical characters constituting group C is precisely as described heretofore. Restoration of the parts brings them to the position illustrated in Fig. 1 where the numeral type of group A may be normally selected for printing.

The construction and operation of the translator mechanism for controlling the energization of magnet 72*a* will be explained in connection with Figs. 4, 5, and 6 of the drawings. A complete unit for a denominational order is illustrated in Fig. 5, the commutator 80 being geared to the commutator 80*a* with a one to one ratio, the commutators being driven from one of the driving shafts of the machine and in synchronism with the card feeding operations.

The mechanical structure of the reading in commutator 80 may best be understood from Figs. 4 and 5 of the drawings. A stud 81 fixed to the base plate of the unit rotatably supports the commutator structure which includes a central metal portion 82 to which is attached the commutator driving gear 83 and the cup-shaped insulating body portion 84.

For each denominational order the insulating body portion is provided with two grooves 85 in which ride the stationary brushes 86 and 87 while a stationary brush 88 contacts the periphery of the metal portion 82. The brushes 86, 87 and 88 are all carried by and are mounted upon an insulated brush holder 89 fixed to the base plate. A plurality of metal pins 90 and 91 are inserted through the metal portion 82 and insulating body 84 and have their heads exposed in the grooves 85 to contact with their related brushes 86 or 87.

The pins 90 and 91 are not only spaced axially to contact with their related brushes 86 or 87 but are displaced angularly about the periphery of the insulating body portion 84. The spot 90 is timed so as to contact with brush 86 when the 11th position of the card (see Fig. 7) is in registration with one of the upper controlling brushes 92 (Fig. 4) while spot 91 contacts its related brush 87 when the 12th position of the card is in registration with the same brush 92. It will be apparent, therefore, that if a perforation should be at either the 11th or 12th positions the corresponding spot 90 or 91 will permit the energization of a magnet 93 or 94 by a circuit now to be traced.

Referring to Fig. 4 the machine circuits are energized from a source of energy indicated at 95 connected to the circuits through a double pole switch 96. Upper brushes are energized through cam contacts 97 which close during the feeding of cards and open between successive card cycles. Brushes 92 are, of course, electrically connected in some suitable manner to sockets 98 connecting the pairs of magnets 93, 94 and in the present instance the connection is exemplified by the jumper connection 99 thus electrically connecting brushes 92 and magnets 93 or 94. By either of the spots 90 or 91 the circuit then extends by brush 88 and wire 100 to the usual cam contacts 101 to the other side of the line.

The construction of one of the reading out commutators 80*a* is illustrated in Figs. 5 and 6. The commutator 80*a* is rotatably mounted on a stud 102 and driven by a gear 103. The commutator is provided with a raised portion 104 provided with four circumferential grooves. A pair of conducting annuli or metal tracks 105 and 106 are located at the bottom of two of these grooves, a pair of brushes 107, 108, and tracks 105, 106, being provided for each denominational order. Attached to the raised portion 104 is a grooved metal wheel 106*a* electrically connected to the tracks 105 and 106. A brush 106*b* is adapted to engage the groove in wheel 106*a*. The commutator is cut away for substantially one half of its periphery and when this cut-away portion is opposite the brushes 107 and 108 these brushes are free from contact with the commutator.

When the raised portion is opposite a particular brush that brush rides in either a plain or metal tracked groove depending on the energization status of related magnet 93 or 94. Each brush 107 or 108 is mounted on a pivoted lever 109 urged by a spring 110 to cause the movement of the related brush 107 or 108 into position to cause the brush to ride on a metal track 105 or 106. This lever is provided with an extension 111 which coacts with a latch lever 112 on the pivoted armature structure of the associated magnet 93 or 94. The armature supporting structure is urged by a spring 113 to the position shown in Fig. 6 in which the latch member 112 engages the extension 111 of the lever 109 and holds the latch in position to guide the brush 107 or 108 to one of the plain grooves.

When either the magnet 93 or 94 is energized to attract its related armature the latch 112 will be disengaged from the extension 111 permitting spring 110 to be effective to shift lever 109 to cause it to move either brush 107 or 108 to engage the metal track 105 or 106, respectively, depending upon which magnet 93 or 94 is energized. It will be understood that these shifting operations occur when brushes 107 or 108 are opposite the lower portion of commutator 80*a*. Just after the brushes 107 or 108 leave the grooves in the raised portion of the commutator a cam 113*a* mounted on the gear 103 encounters a pivoted arm 114 whose end engages the lever 109 and rocks it to restore the lever 109 to the position shown in Fig. 6, thus restoring the brush to its normal position.

The operation of the device will now be explained in connection with the circuit diagram illustrated in Fig. 4 and which is similar to that disclosed in the co-pending application of G. F. Daly and R. E. Page, Serial No. 6,980, filed Feb. 5, 1925, the circuits being altered to include the new mechanism to realize the present advantages. The circuit connections by which magnets 93 or 94 are energized when either a perforation at the 11th or 12th position registers with one of the upper brushes has previously been described.

The card columns controlling printing may or may not contain these extra perforations but have the usual perforations for differentially selecting a particular type bar of the desired

group. These perforations are sensed by lower brushes 115. These perforations close the counter magnet circuits traced as follows for one column, from the left side of the line, wire 116, contacts 117, counter magnet 118, brush 115, common bar 119, wire 120 to the right side of contacts T2, T3, and when the first card is being listed, through contacts T4, T5, by wire 121 to binder post 11.

If a tabulating operation is being performed on a card other than the first card of a group the current instead of passing through T4 and T5 will pass through T2 and T3, wire 135, brush 136, segment 137 through commutator 138, brush 139, wire 140 to binder post 11.

After the machine has operated a certain extent contacts T1 close, extending the circuit just described from the binder post 11 through upper and lower card lever contacts 122 and 123, closed contacts T1, binder post 9, closed contacts P3 to the other side of the line.

The energization of counter magnet 118 sets up a supplementary circuit as follows: from the left side of the line contacts 125, printer magnet 52, common bar 126, wire 127 to non-list switch 634 closed when listing is desired. With this switch closed, during the first card cycle and with commutator circuit 139, 138, and 143 closed during the same card cycle, current would be supplied from binder post 11 to the common bar 119 through wires 142 and 141, contacts LP1 now closed and through switch 634. In this way magnets 52 are provided with a return path for the current which, as will be understood, is a secondary circuit which has been completed by the energization of the counter magnets from the brushes and the subsequent closing of contacts 125.

It will be understood that if no other perforations appear in a card column aside from the usual perforation in one of the ten designated points the numeral type in group A will be controlled differentially the particular type selected depending upon the differential time that printing magnet 52 is energized. If a perforation should also appear in the 11th position magnet 93 will be energized, as premised hereinbefore, which will release one of the levers 109 this releasing action occurring in the same machine cycle. As commutator 80*a* subsequently rotates brush 107 will contact metal track 105 and current will then flow from the left side of the line by wire 130, through magnet 72*a*, brush 106*b*, track 106*a*, track 105, brush 107, and wire 131 to contacts 128 and thence by wires 132 and 142, brush 143 contacting with revolving commutator 138, brush 139, wire 140 to binder post 11 then to the other side of the supply line as before. Cam contacts 128 are timed so that whenever the card containing the 11th perforation is presented to the lower brushes the contacts will subsequently close to energize magnet 72*a* at the proper time. This will result in the disengagement of hook 70 (Fig. 1) from pawl 68 permitting the parts to be adjusted for selecting type of the second group which are then differentially selected according to the time energization of magnet 52. Contacts 128 open however, prior to the time that frame 33 reaches its uppermost position allowing hook 73 to again engage the extension of pawl 68 (see Fig. 2).

If the controlling perforation should be at the 12th position the principle of operation is similar to that described heretofore with the exception that magnet 94 will be energized shifting brush 108 to engage metal track 106. Magnet 72*a* is now in serial connection with cam contacts 129 by wire 134 and the cam controlling these contacts is preferably arranged to keep magnet 72*a* energized retaining pawl 71 in the position shown in Fig. 3. This results in a direct adjustment of the type carrying bar 41 to differentially select the type constituting group C.

A relatively important phase of the invention is that the particular means provided for controlling group selection is active during a different card cycle than that in which type selection occurs. This delayed action permits the upper brushes to be used for performing the function of group selection while during a subsequent card cycle the type to be selected may be controlled by the lower brushes. Reading in and out commutators 80 and 80*a* act, therefore, as delayed time relays, but it will be understood that other structures may be adapted to provide for the necessary delayed action.

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

1. An accounting machine comprising in combination, a bar provided with a plurality of groups of type, an invariably reciprocated member having a connection to positively move said bar to present a pre-selected group of type to a printing point and card controlled means for stopping said bar during the movement of said reciprocating member to select a type of the pre-selected group.

2. An accounting machine comprising in combination, a bar provided with a plurality of groups of type, an invariably reciprocated member having a connection to positively move said bar to successively present the groups of type to a printing point, and card controlled means comprising index points operable singly or in combination for controlling said reciprocating member for group and type selection.

3. An accounting machine comprising in combination, a bar carrying a plurality of groups of type common to a single controlling column of a record card, a cyclically operable member having connections for differentially adjusting said bar to successively present said groups of type one after another to a printing point during a single cycle of machine operation, and card controlled means for differentially stopping said bar for selecting a particular type of the selected group.

4. An accounting machine comprising in combination, a member carrying a plurality of groups of type common to a single controlling column of a record card, means comprising a pawl for adjusting said member to successively present said groups of type to a printing point, and means for selectively controlling said pawl to select a desired group of type.

5. An accounting machine comprising in combination, a bar carrying a plurality of groups of type, an invariably moved member, means whereby said bar is positioned differentially by said invariably moved member to select a group of type and supplemental means whereby a desired type of the pre-selected group is presented to the printing point.

6. An accounting machine comprising in com-

bination, a bar carrying a plurality of groups of type common to a card column of a record card, a member adapted to differentially position said bar to select a group of type, a pawl adapted to position said member and means for selectively controlling said pawl.

7. An accounting machine comprising in combination, a bar carrying a plurality of groups of type common to a card column of a record card, a pair of members cooperating with said bar adapted to differentially position said bar to select a particular type of a group, a pawl adapted to position one of said members to select any group of type, and means for selectively controlling said pawl.

8. An accounting machine comprising in combination, a bar carrying a plurality of groups of type common to a card column of a record card, a pair of members cooperating with said bar adapted to differentially position said bar to select a particular type of a group, and record controlled means adapted to differentially control the extent of movement of one of said members to select a particular group of type.

9. A tabulating machine comprising in combination, means for feeding record cards having separate card fields representing groups of type and individual type of the groups, analyzing means for analyzing card fields representing type groups, and electrically controlled means for suspending the effective action of said analyzing means until the card field representing individual type is analyzed.

10. A tabulating machine comprising in combination, means for feeding record cards having separate card fields representing groups of type and individual type of the groups, analyzing means for analyzing card fields representing type groups, and means comprising reading-in and reading-out translators for suspending the effective action of said analyzing means until the card field representing individual type is analyzed.

11. A tabulating machine comprising in combination, means for feeding record cards having separate card fields representing groups of type and individual type of the groups, means whereby said separate card fields are analyzed during different card feeding cycles, and a device for reading out the representation of one field during the time the other field of the same card is being analyzed whereby group and type selection occur contemporaneously.

12. A tabulating machine comprising in combination, groups of printing type, of means for successively feeding record cards to a set of analyzing brushes adapted to sense perforations to select a desired group of type, a supplemental set of analyzing brushes spaced apart from the first-mentioned set of analyzing brushes adapted to sense perforations to select a particular type in a selected group and means comprising reading-in and reading-out translators whereby type group selection occurs contemporaneously with type selection.

13. A tabulating machine comprising in combination, groups of printing type each group comprising a series of type, means for successively feeding perforated record cards, a set of analyzing brushes for sensing card perforations representing the desired group of type, a supplemental set of analyzing brushes for subsequently analyzing other perforations representing the desired type in the group, and means comprising reading-in and reading-out translators whereby type and group selection occurs contemporaneously.

14. In a machine of the class described, the combination of a type bar carrying several groups of type, an invariably operated member adapted to shift said bar to select one of the several groups of type, a latch between said type bar and the operated member, and card controlled means for selectively controlling said latch.

15. In a machine of the class described, the combination of a type bar carrying several groups of type, and an invariably operated member adapted to shift said bar to select one of the several groups of type by a movement of said bar which is variable with respect to said member.

16. In a machine of the class described, the combination of a type bar carrying several groups of type adapted to be shifted to select a type of any particular group, and a pair of members correlated with said bar, one adapted to effect a positive movement of said bar to select any group of type and the other to control the extent of movement to determine the type of the group selected.

17. In a machine of the class described, the combination with a type bar carrying groups of type and rack teeth, a supplemental toothed bar, an intermediate member carrying a pinion intermeshing with the type bar and supplemental bar and card controlled means for determining the movement of said member to select a group of type.

18. In a machine of the class described, the combination with a type bar carrying teeth, of a supplemental toothed bar, and an intermediate member carrying a pinion intermeshing with the type bar and supplemental bar and means for differentially positioning said intermediate member to position the type bar.

19. In a machine of the class described, the combination with a bar carrying a plurality of groups of type and having rack teeth, of a toothed bar relatively fixed with respect to said type bar, and a pinion meshing with the rack teeth of the type bar adapted to roll over said toothed bar and adjust the type bar to select a particular group of type.

20. In a machine of the class described, the combination with a bar carrying a plurality of type and having rack teeth, of a toothed bar fixed with respect to said type bar, and a pinion meshing with the rack teeth of the type bar adapted to roll over said toothed bar and adjust the type bar, and means for differentially positioning the axis of said pinion.

21. A tabulating machine comprising in combination, a type bar having more than two groups of type, a single type bar adjusting device for selecting any one of two groups of type by movement of the type bar in a single direction, an adjusting device for shifting the type bar to select the type of the desired group, and means whereby group and type selection are controlled by separate fields of a record card.

22. A tabulating machine comprising in combination, a type bar having more than two groups of type, a single member for effecting the unidirectional adjustment of the type bar for selecting any one of two groups of type and a supplemental member for effecting the selection of the type of the selected group.

23. A tabulating machine comprising in combination, a type bar having several groups of type controlled by a record having separate card fields representing groups of type and individual type of the group, and means including a translator for reading out a representation obtained under control of a card during one cycle for effecting

type group selection during the subsequent cycle the card is analyzed for type selection.

24. In a machine of the class described, a type bar having several groups of type, a magnet for selecting either one of two groups of type, a supplemental magnet for selecting one of the type of a selected group, and means whereby the type group and type selecting magnets are energized during the same cycle.

25. In a machine of the class described comprising in combination, a type bar having more than two groups of type and controlled by a record card in motion, a pair of controlling members one for selecting either of two groups of type and the other for selecting a type of any group, and means whereby said members are adjusted during a single cycle of the machine coincident with the analysis of the record for type selection.

26. In a machine of the class described, in combination, a type bar controlled by records analyzed in motion and having several groups of type, a single means for selecting any one of two groups of type, and means whereby the positioning of the type bar group selecting means occurs during the time the record is analyzed for type selection.

27. In a machine of the class described, several groups of type carried by a single bar, means for analyzing a record to determine the pre-selected group of type, means for subsequently analyzing the same record to determine the selected type of the pre-selected group, and a reading in and reading out device whereby type and group selection occur during the same cycle.

28. In a machine of the class described, in combination a type bar having several groups of type, means controlled by a field of a record in motion for normally selecting type of a certain group, and a single means controlled by a separate field of a record for adjusting the type bar for selecting any one of the remaining groups of type.

29. In a machine of the class described, in combination, a type bar having more than two groups of type, a record controlled means for selecting a type of a desired group, and record controlled means whereby a single member when operated selects either of two groups of type by a movement of the type bar in the same direction.

30. In a machine of the class described, in combination, a pair of analyzing devices for completing in two machine cycles the analysis of records of the Hollerith type while in motion, a plurality of alphabet type carrying bars having the type arranged in separate groups, and controlling devices for the type bars controlled by the analyzing devices and including a reading in and out commutator whereby alphabet type are selected for printing during the second cycle of analysis.

31. In a machine of the class described, in combination, a type bar carrying several groups of type, means for preselecting a group of type under control of designations of a field of a controlling record analyzed during one cycle, and means for reading out the designation of the record during a subsequent cycle to select the group of type for printing.

32. In a machine of the class described, a plurality of bars each carrying alphabet type arranged in two groups, and numeral type in another group and each bar movable only in two directions, a single member under control of the field of a record for selecting the desired group of alphabet type by moving a type carrying bar in the same direction, and means whereby the numeral type selecting device selects the alphabet type of the selected group.

33. In a machine of the class described, in combination, a bar movable in only two directions and having a set of numeral type arranged to be normally presented to a platen and two groups of alphabet type, a single member for moving the bar in the same direction for selecting a desired group of alphabet type, and a numeral type selecting device effective when a group of alphabet type are presented to the platen to select the desired alphabet type.

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