

APPLICATION FILED APR. 7, 1910.

4 SHEETS—SHEET 1.

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Fig. 5

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ADDING MACHINE.

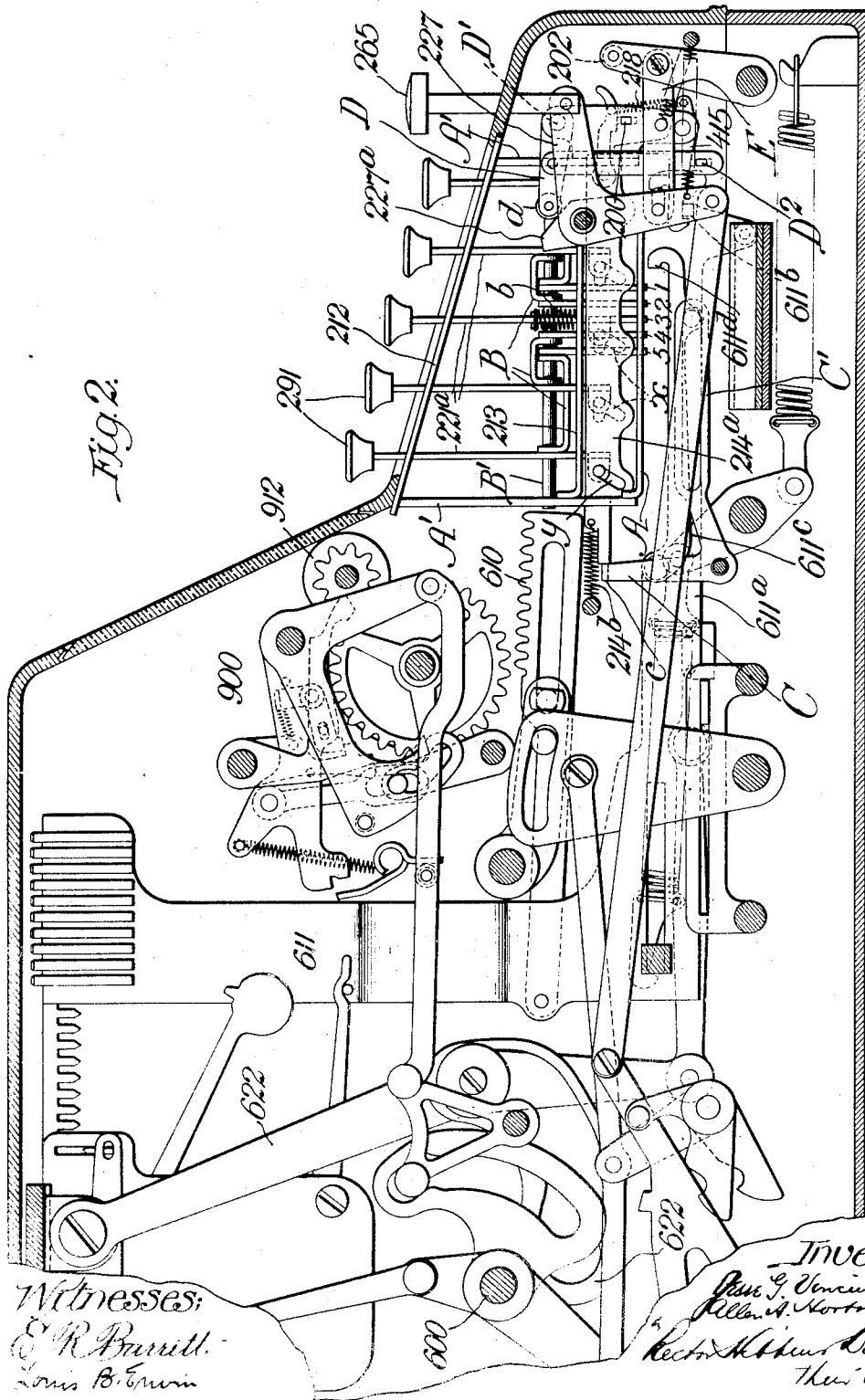
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Patented Dec. 10, 1912.

4 SHEETS—SHEET 2.

1,046,513.

Fig. 2.



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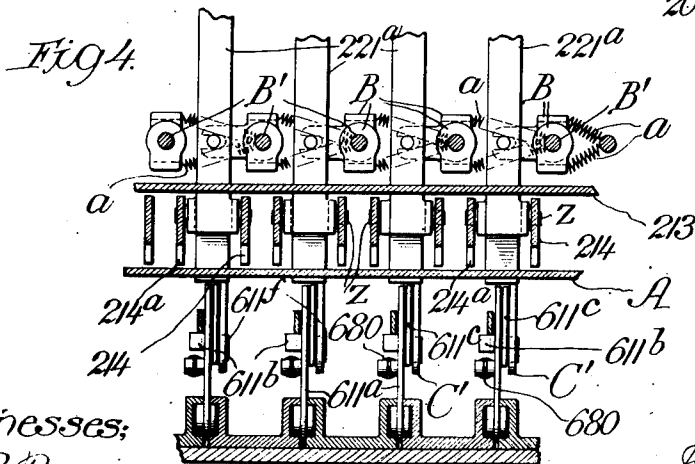
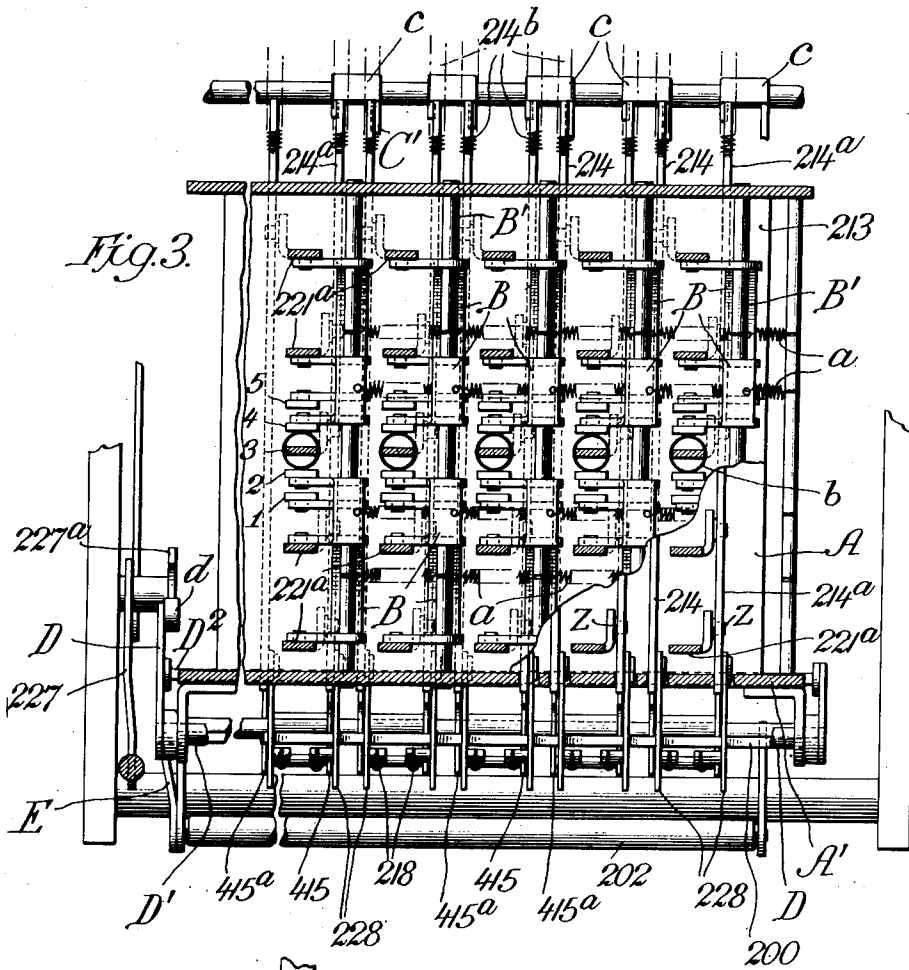
ADDING MACHINE.

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1,046,513.

Patented Dec. 10, 1912.

4 SHEETS-SHEET 3.



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ADDING MACHINE.

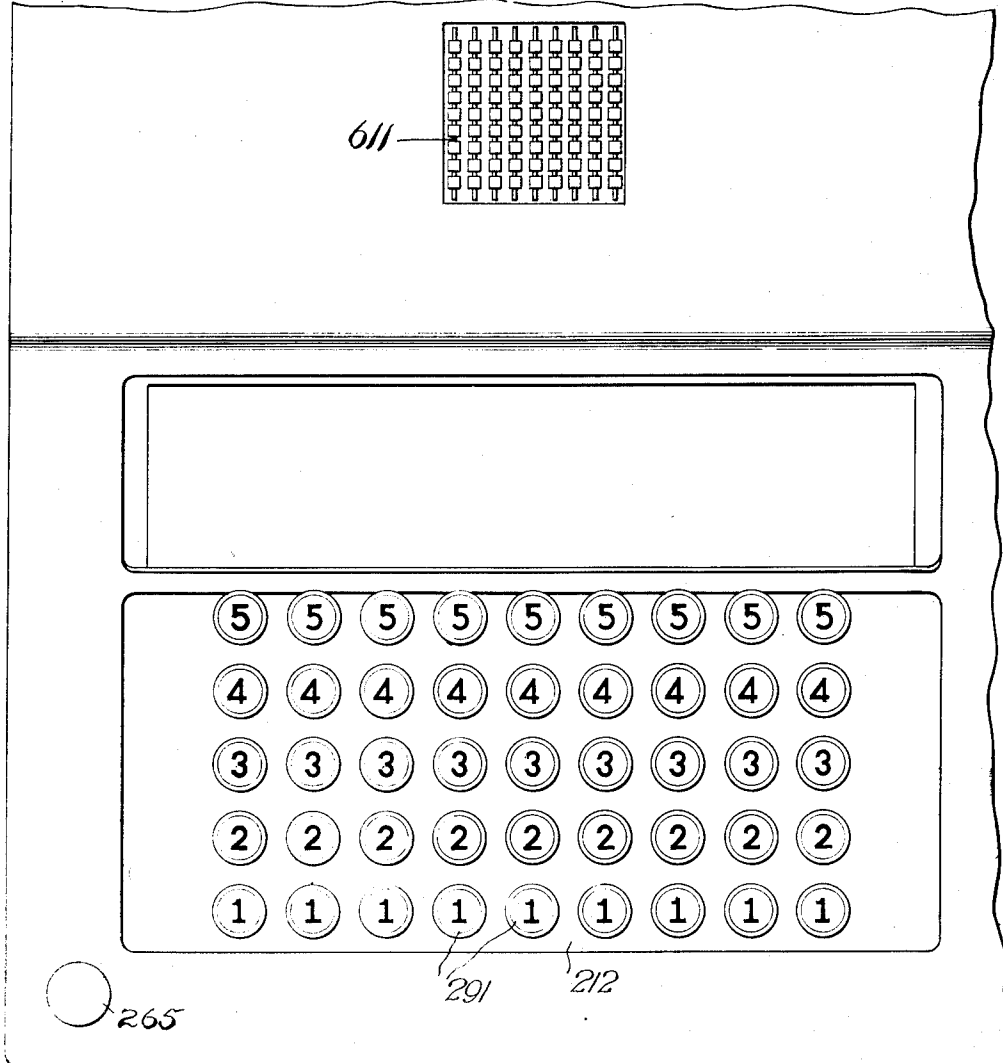
APPLICATION FILED APR. 7, 1910.

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Patented Dec. 10, 1912.

4 SHEETS—SHEET 4.

Fig. 6



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UNITED STATES PATENT OFFICE.

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ADDING-MACHINE.

1,046,513.

Specification of Letters Patent.

Patented Dec. 10, 1912.

Application filed April 7, 1910. Serial No. 554,020.

To all whom it may concern:

Be it known that we, JESSE G. VINCENT and ALLEN A. HORTON, citizens of the United States, residing at Detroit, county of Wayne, and State of Michigan, have invented certain new and useful Improvements in Adding-Machines, of which the following is a specification.

The object of the present invention is to reduce the area of the keyboard in that type of adding machines where several rows of keys are employed, one for each order or denomination of numerals, and the object is attained by using a less number of keys for each row than ordinarily employed while at the same time the capacity of the machine is not reduced. Thus five keys will be employed in each row instead of nine and yet the machine will be capable of registering up to 9 by a combined use of keys. It is obvious that by such reduction in the area of the keyboard advantage may be had in the matter of reducing the size of the machine and particularly in connection with combined typewriting and adding machines where it is of great importance to condense the double keyboard arrangement as far as possible.

With the above-stated object in view the invention consists in certain novel features of construction and combinations of parts, the essential elements whereof are recited in the appended claims and a preferred form of embodiment of which is described in detail hereinafter and fully illustrated in the accompanying drawings forming a part of this specification.

Of said drawings, Figure 1 represents in longitudinal section an adding machine embodying the invention; Fig. 2 represents the machine for the most part in left-side elevation; Fig. 3 is a horizontal section taken on the line 3—3 of Fig. 1; and Fig. 4 is a vertical section taken on the line 4—4 of Fig. 1. Fig. 5 is a perspective view of a rack retaining latch. Fig. 6 is a fragmentary top plan view of the machine.

We have here shown and shall specifically describe our invention as applied to the adding machine known on the market as the Universal, though it is to be understood that the invention is not necessarily limited to embodiment in this type of adding machine. As to the general principle on which the

said Universal machine operates reference may be had to the patent of Frank C. Rinsche, No. 751,207, issued February 2, 1904, though as to details of construction the drawings herein follow later developments of the Universal machine than that shown in said patent. See in this connection Patent No. 995,569, issued June 20th, 1911, upon the invention of Frank C. Rinsche. Furthermore, for the purposes of the present invention or the present embodiment thereof, various parts of this Universal machine have been reversed. Thus the horizontally movable type carriers stand normally forward and are differentially movable rearward to set up the amount in type, instead of being normally rearward as in the standard construction of the Universal machine. Correspondingly the restoring frame is normally forward instead of rearward and its actuating cams are reversed,—extending downward and forward instead of upward and rearward from the rock shaft. The numeral designates pendent arms which said cams actuate and which are connected by links with said restoring frame, the latter working backward and forward as usual in slotted supports. The denominational adding gears are designated by the numeral 916 and the display wheels by the numeral 912, and these accumulator elements are actuated as usual by racks pivoted to the type carriers. These racks are here shown pivoted to vertical portions of the type carriers instead of to horizontal slide bars as in the usual construction. As the adding wheels will, under the reversed arrangement, be turned oppositely to the direction in which they are customarily turned in this type of machine, the transfer mechanism, generally designated by the numeral 900, is reversed in arrangement as compared with that commonly found in the Universal machine. Since changes such as above mentioned amount merely to reversal in arrangement of parts and not alteration in either principle of operation or details of construction, it is believed to be unnecessary to be more specific in this connection. In so far as the present invention is concerned the particular thing to be noted is that the horizontal portions of the type and rack carriers, to-wit the slide bars move

rearwardly instead of forwardly when keys are depressed and the handle of the machine pulled. These slide bars are as usual connected by springs 680 with the restoring frame 613 and are normally engaged by latches 415 separately pivoted at the front part of the machine and engaging over lugs 611^b on the slide bars, as illustrated in Figs. 1 and 2. Instead of each slide bar having a series of lugs, one for each key in a row and graduated in normal spacing from the keys, each slide bar, for the purposes of the present invention as here shown embodied, has two stop members, one to cooperate with key stops when keys are depressed singly and the other to cooperate with the same key stops when combinations of keys are used.

Coming now to a more detailed explanation of the present form of embodiment of our invention and confining the description to a single denominational set of devices, the numeral 291 designates depressible keys of which there are five, inscribed from front to rear with numerals from 1 to 5. (See Fig. 6.) The stems 221^a of these keys slide through a top panel 212 and an interior supporting plate 213 and operate a series of five stop blades designated 1, 2, 3, 4 and 5 respectively and arranged to slide through a lower supporting plate A. These stop blades are equidistant from each other and the distance measures a unit of movement of the slide bar 611^a and the associated rack 610 and adding gear 916. Each of the two stop members on the slide bar is common to the group of stop blades and hence the latter are not all merely extensions of the key stems as in prior constructions where there is, on the slide bar, a stop member for each key, but said stop blades 1, 2, 3, 4 and 5 are grouped at the middle of the row of keys in an area about corresponding with that between two key stems. The stop blade of the middle or 3-key is simply a continuation of its stem. The other stop blades slide through the supporting plate 213 and 213^a, two on each side of the stem of the 3-key, and are connected by yokes B with their respective keys. The yokes are journaled upon a supporting rod B' mounted in upright supporting plates A' of the framework and each yoke has a laterally-extending arm coupled to the key stem and at the other end a similarly extending arm coupled to the key. The yoke for the 5-key is necessarily longer than that for the 4-key and it extends within the latter or in other words the 4-key yoke embraces the forward portion of the 5-key yoke. The same thing is true of the 1 and 2-key yokes, as clearly illustrated in Fig. 1. Springs *a*, applied to the several yokes (here shown as connecting them with the supporting rod B'), normally elevate the four keys to which the

yokes are connected, and a spring *b* surrounding the stem of the 3-key normally elevates that key.

Pivotaly mounted upon the slide bar is a stop member in the form of an arm 611^c extending forward from its pivot and having at its free end an upstanding portion 611^d normally presenting a straight vertical edge for abutment against any one of the stop blades which has been lowered into its path by depression of a key. This end portion or nose of said arm 611^c is normally forward of the 1-key stop blade a distance to provide for movement of the slide bar rearward a single step when the 1-key has been depressed. It will be obvious from what has been before stated that the slide bar will move multiples of such distance when others of the keys are depressed. This of course provides for registration and recording up to 5. The occasion for pivoting the above-described stop member is to provide for retiring it in favor of another stop member which will provide for increasing the rearward movement of the slide bar five spaces. This is in the form of an upward projection or nose 611^e formed at the forward end of the slide bar and having the same outline as the nose of the pivoted stop member but its vertical edge being forward of that of the nose 611^d a distance corresponding with five units of registering movement of the slide bar. Consequently with the pivoted stop member out of the way and the 1-key depressed the slide bar will move rearward six steps and with the 2-key depressed seven steps and so on up to 9. The retiring of the pivoted stop member is brought about by depression of the 5-key either simultaneously with depression of one of the other keys or while one of the other keys is depressed so that the two depressed keys indicate the amount to be registered and recorded. This involves modification of the usual key detenting mechanism, which we next describe. There is a detent plate 214 common to the 1, 2, 3 and 4-keys and a separate detent plate 214^a for the 5-key. The detent plate 214 has the usual form of angular slots *w*, one for each of the four keys mentioned, the stems thereof having ears with studs *z* engaging the said slots respectively. Upon depression of any one of these four keys the said plate is slid forward, being guided in the vertical frame plates A', and is held forward by the engagement of its pivoted catch 228 with a cross-bar 200. Depression of one of these four keys therefore locks it down and also locks out the other three keys but not the 5-key because that engages only the additional detent plate 214^a. The latter also has a catch 228 to engage over the cross-bar 200 and both detent plates are adapted to act upon the slide bar latch 415 which has upstanding arms 415^a, one springing

from the latch itself and the other secured to the extended hub of the latch, as shown in Fig. 5. Springs 218 connecting the latches 228 and a cross rod of the latch structure just mentioned serves to enforce engagement between the catches and the cross bar 200 and between the latch and the slide bar lug 611^b. Springs 214^b applied to the said detent plates hold them normally rearward. As the 5-key is the only one that engages the detent plate 214^a the latter merely has an oblique slot *y* to receive the stud *w* on the stem of said key. Control of the pivotal slide bar stop member is had through the agency of these two detent plates. Each projects rearwardly into engagement with a laterally-turned portion *c* of the upstanding arm C of a lever pivoted to the frame-work and having a forwardly-extending arm C' slotted lengthwise to embrace a roller stud 611' on the arm 611^c. This engagement of the detent plates with said lever normally serves to uphold the slotted arm of the lever and thereby uphold the stop arm 611^c so that its nose may coöperate with the key stops. Inasmuch as both detent plates engage this lever it is obvious that depression of the 5-key alone will not permit movement of the lever nor will depression of any one of the other keys alone or all or any number of them together for that matter. However, depression of any one of those keys while the 5-key is depressed or depression of the 5-key when any of the others are depressed or simultaneously depression of the 5-key and one of the other keys, will move both detent plates forward, whereupon the long arm of the lever, together with the stop arm, will drop, taking the nose 611^a out of position to co-act with the key stops and leaving the nose 611^c to do that. It is obvious therefore that by depressing the 5-key and one of the other keys any amount in excess of 5 up to and including 9 may be registered notwithstanding there are but five keys in a row.

The totaling system is the same as that shown and described in the aforesaid Patent No. 995,569, the numeral 265 designating the totaling key; 227, the bell crank lever to which it is attached; 227^a, the cam plate rocked by said lever (Figs. 2 and 3); D, the pivoted arm carrying roller *d* acted upon by said plate; D', the rock shaft to which said arm is attached; D², the bail which depends from said arm and a companion arm at the other end of the rocked shaft (Fig. 3) and which extends under all of the latches 415; and E, the slotted link which connects the bell crank 227 to the key restoring bail 202.

It will be seen that mechanism such as above described serves to thoroughly accomplish the object primarily stated though it is of course to be understood that the in-

vention is not limited to the precise construction shown and described. In adapting the invention to various types of adding machines there would necessarily be variations in the form of means for carrying it out. 70

What we claim is:

1. In a machine of the character described, the combination with keys, key-stops, and a differentially reciprocable accounting element; of means for measuring excursions of the latter by the setting of the key-stops through operation of keys singly, and means for more extendedly measuring excursions of said element by the setting of key-stops in concurrent operation of keys. 80

2. In a machine of the character described, the combination with keys and key-stops; of a differentially reciprocable accounting element having two stop members to coöperate with said key-stops, one upon operation of keys singly and the other upon operation of keys concurrently. 85

3. In a machine of the character described, the combination of depressible keys, key-stops, detent members, one operated by certain keys and the other by the remaining key, and a differentially reciprocable accounting element having a stop member to coöperate with a key-stop when that remaining key is depressed concurrently with depression of one of the other keys, said accounting member having another stop member for coöperating with a key-stop when a key is depressed singly but adapted to be disabled by the detent members upon concurrent depression of keys. 90 95 100

4. In a machine of the character described, the combination of depressible keys, key-stops, detent members, one operated by certain keys and the other by the remaining key, and a differentially reciprocable accounting element having a stop member to coöperate with a key-stop when that remaining key is depressed concurrently with depression of one of the other keys, said accounting member having another stop member held by engagement with the two detent members in position for coöperating with the key-stops and adapted to retire in favor of the first mentioned stop member when such detent members are both operated. 105 110 115

5. In a machine of the character described, the combination of depressible keys, key-stops, detent members, one operated by certain keys and the other by the remaining key, and a differentially reciprocable accounting element having a stop member to coöperate with a key-stop when that remaining key is depressed concurrently with depression of one of the other keys, said accounting member having another stop member pivotally mounted upon it and held by engagement with the two detent members in position for coöperating with the key-stops and adapted to retire in favor of the 120 125 130

first-mentioned stop member when such detent members are both operated.

6. In a machine of the character described, the combination of depressible keys, key-stops, detent members, one operated by certain keys and the other by the remaining key, and a differentially reciprocable accounting element having a stop member to coöperate with a key-stop when that remaining key is depressed concurrently with depression of one of the other keys, said accounting member having another stop member pivotally mounted upon it, and a slotted holding member engaging said pivoted stop member and engaged by the two detent members and adapted upon operation of both the latter to withdraw the said stop member from coöperative relationship with the key-stop leaving the first-mentioned stop member to measure excursions of the accounting element.

7. In a machine of the class described, the combination with a slide bar and means for reciprocating the same; of depressible keys and connected stops grouped for coaction with the slide bar; a detent common to a number of said keys; a separate detent for a remaining key; stops on the slide bar spaced apart a distance to correspond with

movement of the slide bar an extent permitted by said remaining key—the one of said stops which is nearest the key stops being normally in line with them and movably mounted on the slide bar; and means controlled by the two detents for withdrawing said stop from such line.

8. In a machine of the class described, the combination with a slide bar and means for reciprocating the same; of depressible keys and connected stops grouped for coaction with the slide bar; a sliding detent plate common to a number of said keys; a separate sliding detent plate for a remaining key; stops on the slide bar spaced apart a distance to correspond with movement of the slide bar an extent permitted by said remaining key—the one of said stops which is nearest the key stops being normally in line with them, and pivotally mounted on the slide bar; and a bell crank lever having an arm engaged by the two detent plates and an arm slotted to engage the pivoted stop.

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