

E. THOMAS & B. C. STICKNEY.
 COMBINED TYPE WRITING AND COMPUTING MACHINE.
 APPLICATION FILED JAN. 22, 1915.

1,292,538.

Patented Jan. 28, 1919.

4 SHEETS—SHEET 1.

FIG. 1.

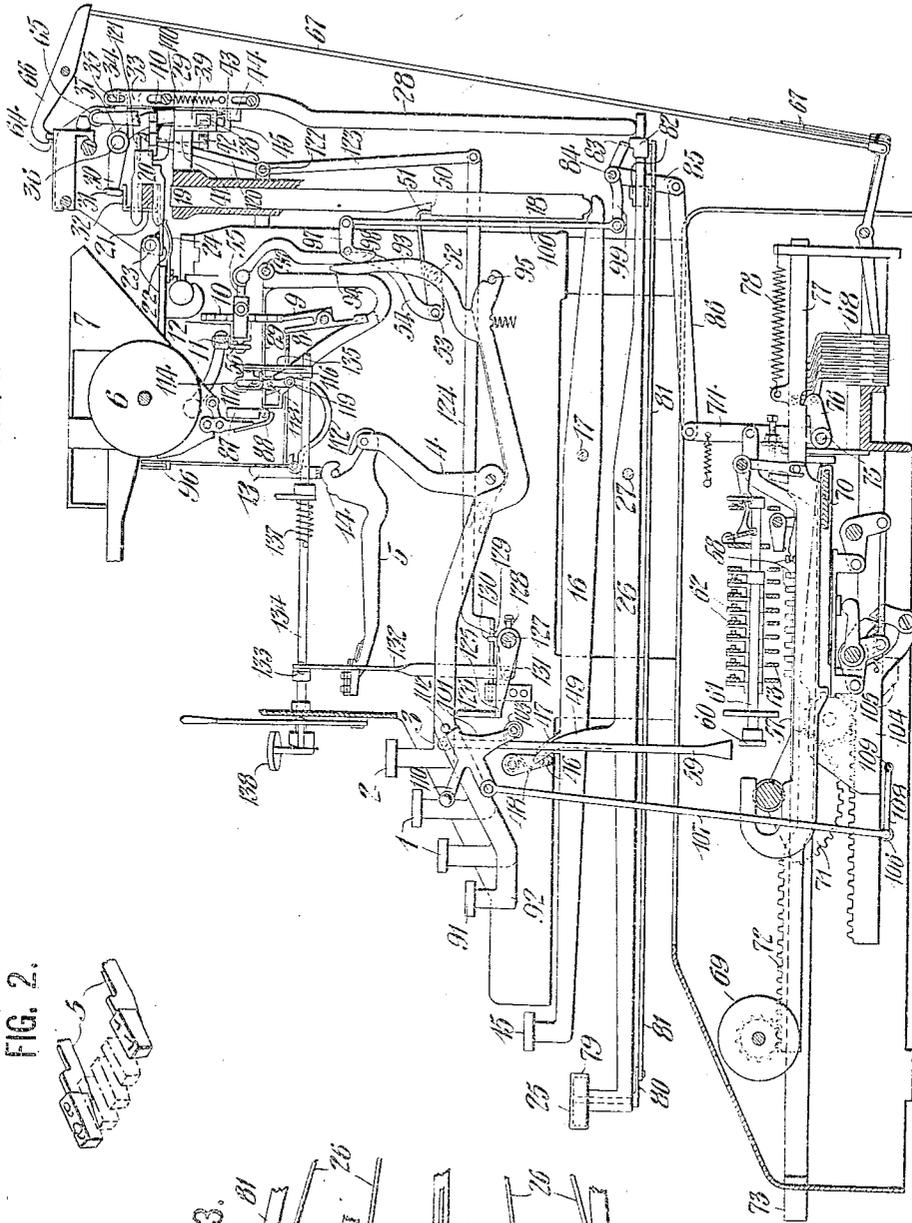


FIG. 2.

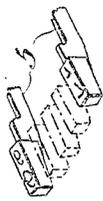
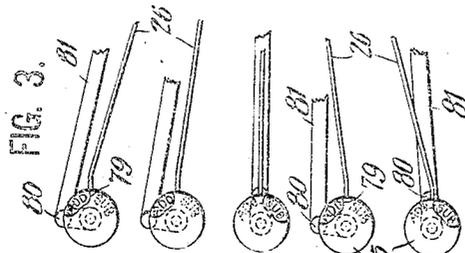


FIG. 3.



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4 SHEETS—SHEET 2.

FIG. 4.

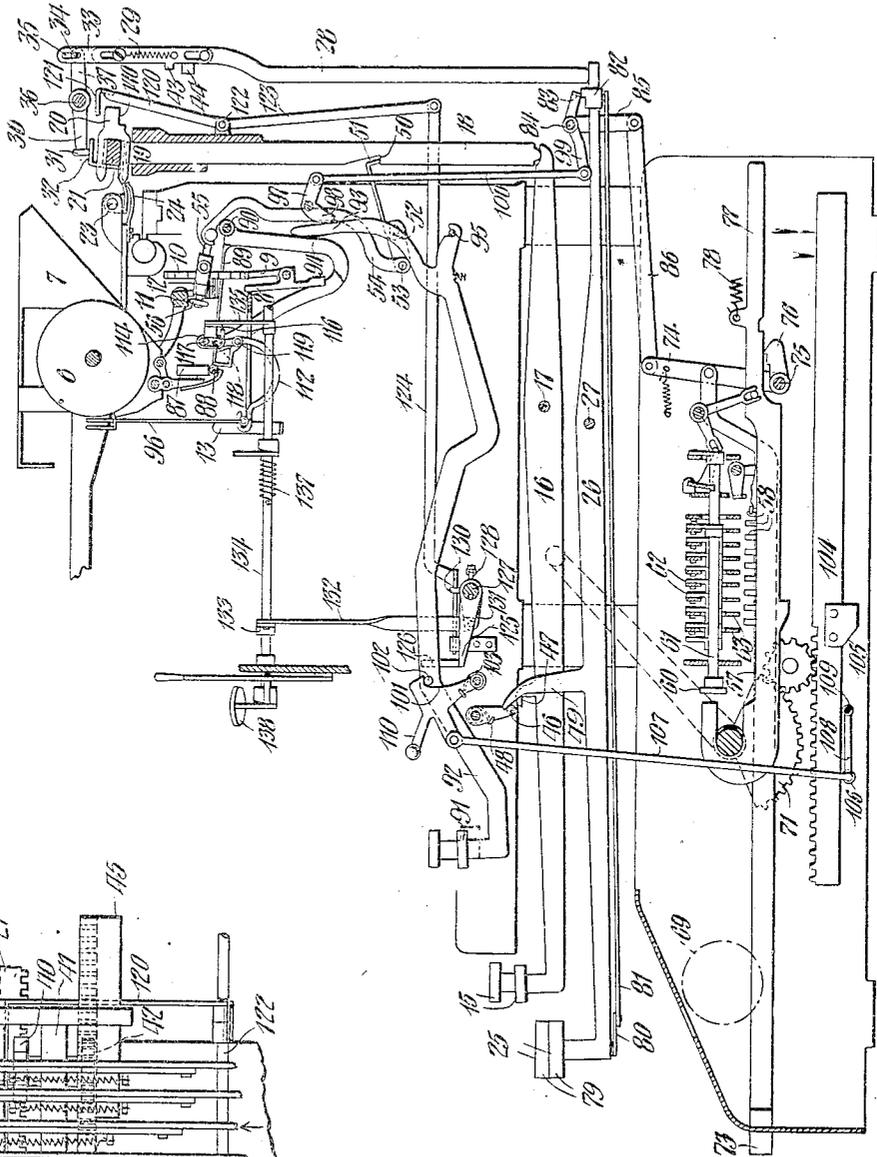
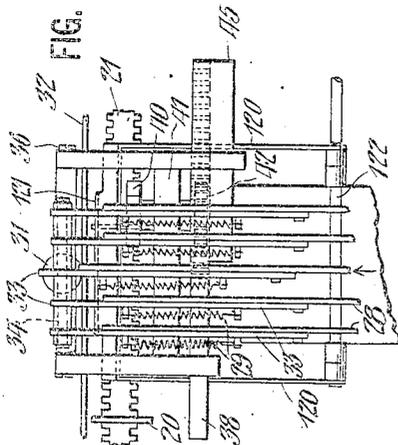


FIG. 5.



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Patented Jan. 28, 1919.
4 SHEETS—SHEET 3.

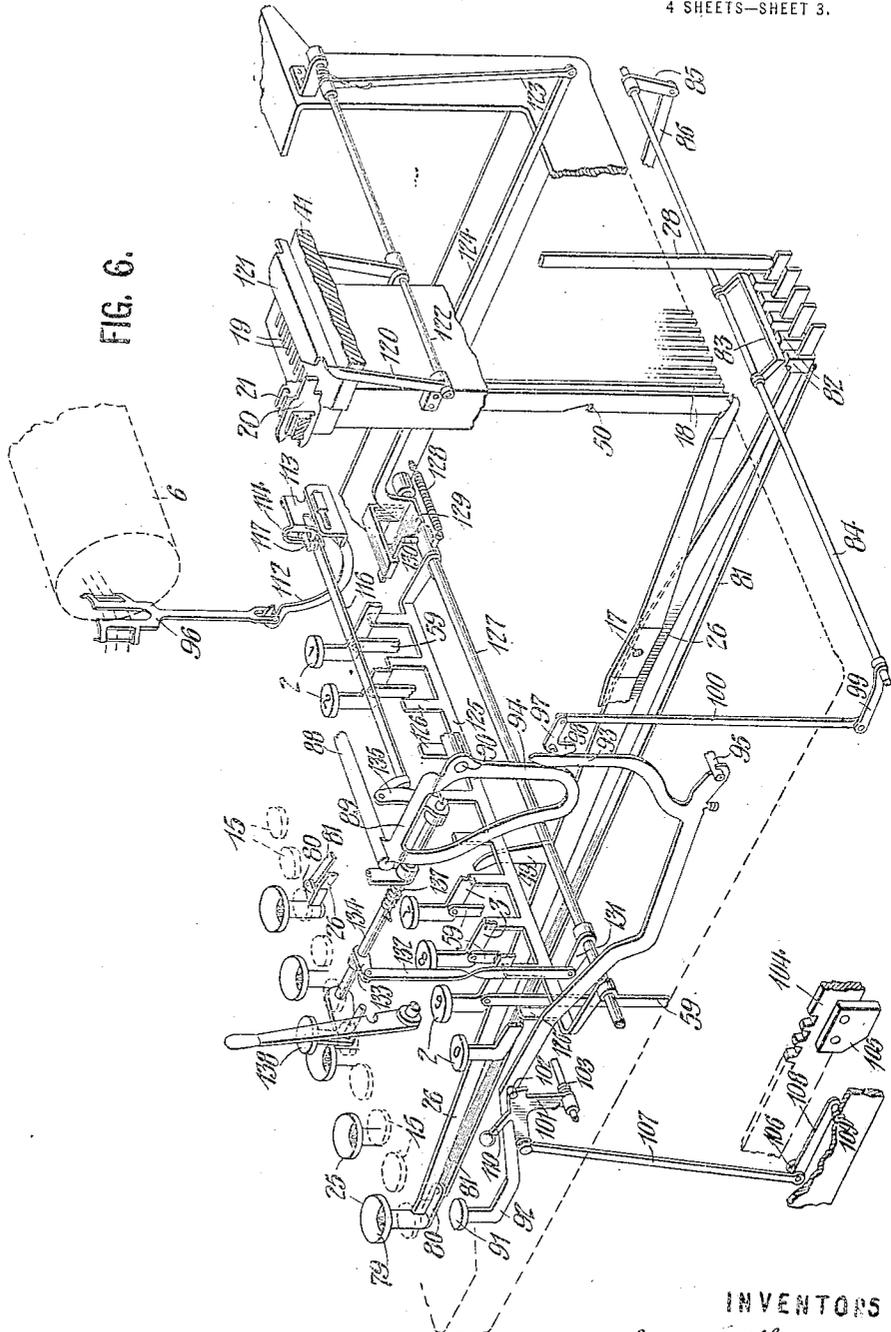


FIG. 6.

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4 SHEETS—SHEET 4.

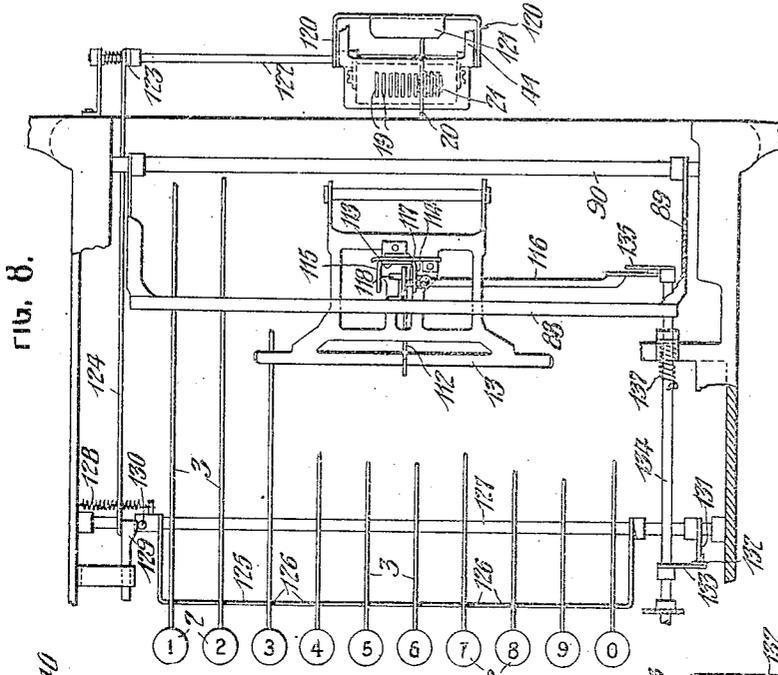


FIG. 8.

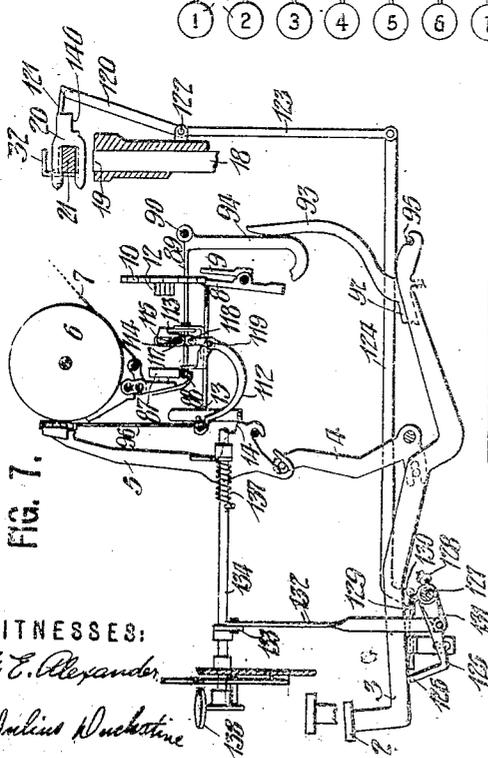


FIG. 7.

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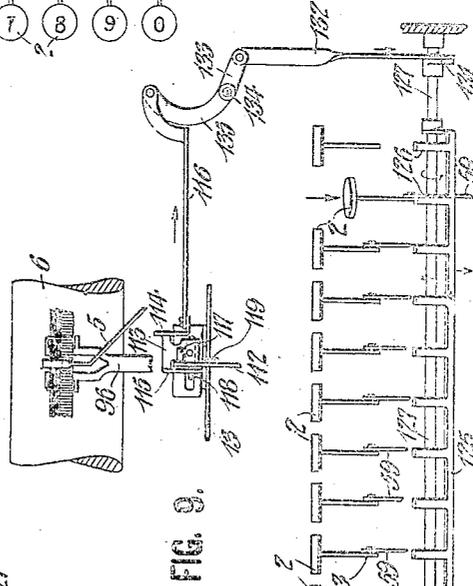


FIG. 9.

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UNITED STATES PATENT OFFICE.

EDWARD THOMAS, OF NEW YORK, N. Y., AND BURNHAM C. STICKNEY, OF ELIZABETH, NEW JERSEY, ASSIGNORS, BY MESNE ASSIGNMENTS, TO UNDERWOOD COMPUTING MACHINE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

COMBINED TYPE-WRITING AND COMPUTING MACHINE.

1,292,538.

Specification of Letters Patent.

Patented Jan. 28, 1919.

Application filed January 22, 1915. Serial No. 3,391.

To all whom it may concern:

Be it known that we, EDWARD THOMAS and BURNHAM C. STICKNEY, both citizens of the United States, said THOMAS residing in New York city, county and State of New York, and said STICKNEY residing in Elizabeth, county of Union, and State of New Jersey, have invented certain new and useful Improvements in Combined Type-Writing and Computing Machines, of which the following is a specification.

This invention relates to computing and printing machines, and is herein described as applied to a combined typewriting and adding machine of the Underwood-Hanson type, in which machine, the numeral keys of the typewriter during the writing of numbers in an adding column, set up such numbers on a series of denominational members or pin bars. After a number has thus been completely written, the number thus set up is carried into computing or adding wheels which form a totalizer.

In the operation of most kinds of combined typewriting and computing machines, many kinds of errors are likely to occur, and the present invention is designed to either prevent certain kinds of such errors from being made, or to make the tracing out or location of such errors a perfectly obvious and easy operation. One of the errors frequently made by typists in operating such machines is to set the machine for subtraction and then to continue to leave the machine set at subtraction after the subtraction has been completely finished, and an adding operation should have been begun. One method of making an error of this kind perfectly obvious is to print all numbers subtracted in a different kind of type from those printed in an adding operation. In the present disclosure, the difference between numbers printed in addition and those printed in subtraction, is herein illustrated as shown by the size of type used. Another form of error is the extremely insidious one of printing numbers as though they were computed when they are not so computed. In the present disclosure, an error of this kind is indicated by the fact that a number printed in a computing column, which is, in fact, not computed, is automatically printed in red, thus calling the attention of both the typist and

of anyone who reads the printed matter, to the fact that the number is in some way extraordinary.

Another source of error is due to the positioning of the carriage by the column-selecting key, of say the first column, when said column has already been passed. In most machines hitherto made any column-selecting key will be effective in some irregular manner if it is depressed after the typewriter carriage has passed the column for which said key should be effective. According to the present invention, connections may be made whereby it is impossible to depress a column-selecting key after the column has been passed for which that key should be effective.

Other features and advantages will hereinafter appear.

In the accompanying drawings,

Figure 1 is a sectional side view of an Underwood-Hanson combined typewriting and computing machine showing this invention as applied thereto.

Fig. 2 is a fragmentary perspective view showing a few type-bar heads and the adding and subtracting types thereon.

Fig. 3 is a plan view of the column-selecting keys.

Fig. 4 is a view similar to Fig. 1, but showing a column selecting key depressed, and the machine effective to perform subtraction.

Fig. 5 is a rear view of part of the column-selecting mechanism showing especially, the parts controlled by the typewriter carriage, in said view the third column-selecting key being effective.

Fig. 6 is a skeleton perspective view showing more particularly the connections whereby figures not computed in a computing zone are written red.

Fig. 7 is a diagrammatic sectional side view of the parts shown in Fig. 6.

Fig. 8 is a plan view of the parts shown in Fig. 7.

Fig. 9 is a front view of the same.

In the usual Underwood-Hanson combined typewriting and computing machine, alphabet keys 1 and numeral keys 2 depress levers 3 to rock bell cranks 4 which are connected to swing type-bars 5 upwardly and rearwardly against the front side of a platen 6, mounted in a carriage 7. The car-

riage 7 travels step by step at each depression of a numeral key by means of the usual escapement dogs 8 and 9, which are effective on the usual escapement wheel 10 permitting the carriage to be drawn forward by a spring barrel, not shown herein. The carriage is controlled by said escapement wheel through a rack 11 swingable on said carriage, but normally meshing with a pinion 12 connected with said escapement wheel. To permit said escapement wheel to turn, the dogs 8 and 9 are rocked at each depression of a numeral key, by means of a universal frame 13, which is actuated by a heel 14 on each type-bar as it approaches the platen. In addition to the above-described forward letter feed of the carriage, the Underwood typewriting machine usually includes a tabulating mechanism for rapidly positioning the typewriter carriage at any one of a number of selected letter-spaces. For this purpose, the machine is provided with decimal tabulating keys 15 mounted on the front ends of key levers 16, pivoted at 17, so that when any one of said keys is depressed, the rear end of its lever will rise and lift a plunger 18, so that the upper end thereof, forming a counterstop 19, will lie in the path of any column-stop 20, which is in effective position, said column stops being adjustable along the rack bar 21, which includes teeth at letter-space intervals.

In the present machine, the mechanism is somewhat modified from the usual Underwood mechanism and is of the general type illustrated in the patent to Wernery, No. 1,108,415, August 25, 1914, and illustrated more in detail in the co-pending application No. 782,391, filed August 1, 1913. In the mechanism illustrated in said patent and application, the column stop bar 21 is normally raised so as to hold its stops 20 out of the reach of the counterstops 19 even when a counterstop is projected, as above described; the rack bar for this purpose comprising arms 22 which are pivoted at 23 on the typewriter carriage, thus permitting a spring 24 to normally hold said rack bar in its elevated position.

Whenever it is desired to perform the tabulating operation, it is necessary in the present invention to depress both a decimal tabulating key 15 and a column-selecting key 25, and the connections are such that whenever a column-selecting key is depressed, the rack bar 21 will be swung downwardly when the column stop 20 thereon approaches the proper column, with the result that the stop 20 then lies in the path of the elevated counter stop 19. In other words, the zone in which the tabulating is to be done must be first determined by the column-selecting key 25 and then the particular letter-space in said zone is determined by the decimal tabulating key 15, which in the meantime, has

been depressed. In order to bring about this result the column-selecting keys 25 are effective to depress the rack bar 21 only when said rack bar has brought the stop thereon approximately to the beginning of the desired zone or column.

To accomplish this, the column-selecting keys 25 which are mounted on the front ends of key levers 26, pivoted at 27, raise at their rear ends, column-selecting bars 28, which normally are ineffective on the rack bar 21, but which are each adapted to tension their own springs 29, with the result that when the stop 20 arrives at the proper column, the spring 29 which is tensioned by its column-selecting key, will depress the rack bar 21, this being accomplished through connections to be described presently in detail, but which include a lever 30 comprising a roller 31, rolling on the top of a plate 32, fast to said column stop rack bar 21. Whenever a spring 29 is thus tensioned, it tends to raise a slide 33 on its bar 28 and as soon as it can raise said slide, the slide will rock the lever 30 by means of a bail 34, which passes through slots 35 in all of the slides 33. This bail is fast to the rear end of the lever 30, which is pivoted on a shaft 36, and has a rearward extension 37 carrying said bail. From this it will be seen that the depression of a given column or zone-selecting key 25 tends to make the slide 33 rise, and if said slide were permitted to rise at once, the lever 30 would depress the rack bar 21, so as to carry the column stops thereon within the range of any elevated counter-stop 19 and thus the first column stop 20 would arrest the typewriter carriage by colliding with the elevated counter-stop 19.

In order to prevent this, the column stops 20 are adapted to operate a slidable locking bar 38 which prevents any slide 33 from prematurely becoming effective to move the column stops 20 within the range of the counter-stops 19. This slidable locking bar is mounted in brackets 39 and is normally at rest. It, however, is moved along one step whenever any column stop 20 passes the array of decimal tabulating counter-stops 19, and for this purpose, the column stops 20, as they pass said array of counter stops, are adapted one after another, to hit and turn to the extent of one tooth, a slide-operating wheel 40, which therefore moves said slidable locking bar one step whenever one of said column stops 20 passes said array of decimal stops 19.

To do this, the wheel 40 is fast on a shaft journaled in an extension of the framework 41 in which the counter-stops are mounted, said shaft carrying at its opposite end, a pinion 42 meshing with a rack bar forming part of the slidable locking bar 38. This slidable locking bar comprises, as disclosed in the aforesaid application and patent, a

shelf which normally overlies the lugs 43, there being one lug 43 on each slide 33. The shelf however, is interrupted at one point, or provided with a notch so that whenever the slidable locking bar 38 occupies an appropriate position, it will permit one of the lugs 43 to slide upwardly through said notch, and therefore will permit the slide 33 of which said lug forms a part, to be drawn upwardly by its spring 29 and become effective on the bail 34, and thereby depress the rack bar 21, with the result that the column stop 20, at that moment approaching the decimal counter-stops 19, is depressed enough to be intercepted by the elevated counter stop 19. This permits the carriage to be arrested at the zone which has been selected by the column-selecting key 25 depressed at the moment because any column-selecting key 25 tensions only its own spring 29.

In order to prevent any column-selecting key from being depressed after the typewriter carriage has passed the zone in which said key is supposed to be effective, the bar 28, operated by said key, is provided with a locking lug 44, which however is normally free to be elevated upward. When, however, the typewriter carriage has passed the zone in which any given column-selecting key 25 is to be effective, the locking lug 44 belonging to that key, is prevented from being moved upwardly, because the slidable locking bar 38 has, in moving along, carried a shelf 45, forming part of said slidable bar, above the lug 44 aforesaid, thus completely blocking the column-selecting key 25 until the typewriter carriage is returned to a point which moves the aforesaid locking bar 38 to a point where it clears said locking lug 44.

In order to prevent the typewriter carriage from being released from its escapement mechanism to travel to a new column before any column-selecting key is depressed, the decimal tabulating keys 15 operate the usual carriage-release mechanism (described below) but are normally held locked against being depressed by a swinging bail 46, which underlies ears 47 projecting upwardly from the levers 16 of said keys. This swinging bail 46 normally holds said key levers locked, because a spring 48 holds it rearwardly under the overlying upper parts of the ears 47. When, however, any column-selecting key 25 is depressed, said bail 46 is swung to ineffective position by means of an upwardly extending follower 49 on the key lever 26 of the column-selecting key, and said ear cams the rocking bail 46 forwardly clear of the ears 47, thereby freeing all the decimal tabulating keys 15.

The carriage 7 is freed from the escapement mechanism in the usual manner when any one of the decimal selecting keys 15 is depressed. For this purpose, the plungers

18 are provided with shelves 50 effective on a short universal bar 51 pivoted at 52, so that when any plunger 18 is lifted, the front end 53 of said universal bar draws down on a link 54, thereby drawing down the rear end of a lever 55, so that the front end of said lever will lift, off the escapement pinion 12, the rack bar 11 by means of an idle wheel 56, which runs on the lower side of said rack bar.

The computing mechanism of the Underwood-Hanson machine illustrated herein, is, so far as the principal operating parts are concerned, the machine known as the Underwood standard adding machine with subtraction attachment, and is illustrated in the application No. 797,714, filed October 28, 1913 and application No. 626,550, filed May 11, 1911. In said machine, the numeral keys 2 of the typewriter, in a computing column, set up on computation members 57 of the computing mechanism proper, the numbers written in any adding column, this being done by depressing digit pins 58 on said computation members, there being one pin for each digit on each computation member 57, and the members 57 being selected, one for each decimal space, by the typewriter carriage as it travels from letter space to letter space.

To accomplish these results, the numeral keys 2 are provided with the usual pendants 59, which as they descend, are adapted to strike rock arms 60 fast on rock shafts 61, said shafts operating pin-setting linkages 62 in the usual manner for the Underwood-Hanson machine. These pin-setting linkages 62 comprise pin-setting bars 63 which normally move idly, being out of alinement with the digit pins 58, as shown in Fig. 1. When, however, the typewriter carriage is in the adding zone, a settable tappet 64 thereon selects in the manner described in said application 797,714, a computation bar 57 and shifts said bar so that the pins 58 thereon stand in alinement with the pin-setting bars 63. If any numeral key is depressed with the carriage in this column or decimal position, the key will set its corresponding digit pin 58 on the computation bar 57, which for the moment, is held in ineffective position by the typewriter carriage, through said tappet 64. The tappet 64 is normally in ineffective position but in the proper zone is held effective by the silencing roller 65 in the manner described in said application 797,714. When so elevated, the tappet 64 is effective on a series of jacks 66, raising the front ends thereof, with the result that said jacks shift the computation members 57 to effective position by depressing rods 67 on which the rear ends of the jacks 66 rest, said rods 67 being effective through the transposition device shown at 68, to move the computation members 57 one

after another, to bring their pins to effective position under the pin-setting bars 63. The exact details of this structure form no part of the present invention, but are illustrated in said application 797,714, and are of the type customarily employed in Underwood standard adding machines.

The members when set in the manner described in outline above, and represented by a series of depressed pins 58 are carried into the computing wheels 69 by means of a general operator including a cross bar 70. This general operator 70 may be hand-operated by the usual segment 71, so as to slide forward, catch the bottoms of any depressed pins and drive forward the computation bars 57, with the result that the racks 72 on the forward ends thereof, turn the computing wheels 69 to an extent determined by the pins depressed. On its return stroke the general operator restores the rack bars, operates the carry-over mechanism, and restores the set pins to their unset position in the usual manner.

The machine includes a subtraction device, so that the operative may cause the machine to effect either addition or subtraction. For this purpose, the machine is provided with a manually operable subtraction key 73, which, when pushed in, rocks rearwardly a rock arm 74 fast on a rock shaft 75, said rock shaft also carrying a catch 76. When the subtraction key 73 is pushed rearwardly, the catch 76 is rocked downwardly by rotation of its shaft 75, thereby releasing a subtraction bar 77, so that said bar can be drawn rearwardly by a spring 78, setting the machine for subtraction. In the present disclosure, the subtraction device is of the kind known as complementary subtraction, which is fully set forth in the application 797,714 above referred to. At this point, it will suffice to state that the computing wheels 69 always turn in the same direction, and subtraction is caused on said wheels by shifting of the rock shafts 61 at the setting of the subtraction bar 77, so that said rock shafts instead of engaging the pin-setting linkages 62 which they engage for addition, engage another set of pin-setting linkages, which however, operate the same pin-setting bars 63. At the same time, all the "9" pins 58 are set. The precise form of the subtraction device is immaterial to most features of the present invention, and therefore will not be further described since it is fully described in application No. 797,714.

Subtraction-setting may be obtained not only by the operation of the subtraction key 73, but also by settable devices forming part of the column-selecting keys 25. For this purpose, each column-selecting key includes a revoluble head 79 which can be set to either addition or subtraction, as is clearly shown

by the plan view, Fig. 3. Each head 79 is fast to a crank 80 pivoted to a link 81, which is adapted to operate a subtraction setting interponent 82, there being one interponent on each column-selecting key lever 26. These interponents 82 are shiftable along the rear ends of the key levers 26 of the column-selecting keys 25 and are adapted to occupy either a subtraction position or another position which may correspond either to adding or to normal position. Whenever any interponent 82 is in subtraction position, it will throw the subtraction bar 77 to effective position whenever its column-selecting key 25 is depressed. For this purpose, there is provided a bail 83 overlying a place which the interponents 82 would occupy when in subtraction position, said bail being fast on a rock shaft 84, with the result that when any column-selecting key 25 is depressed to raise the rear end thereof, its interponent 82, if in subtraction position, will lift the bail 83, rock the shaft 84 to which said bail is fixed and thereby rock a rock arm 85 also fixed on said shaft. This rock arm 85 is joined by a link 86 to the above-described rock arm 74, said arm 74, it will be remembered, being the one which throws the catch 76 to ineffective position, and thereby allows the subtraction bar 77 to become effective.

From this brief description it will be seen that any column-selecting key may be utilized to determine whether the machine shall add or subtract in the particular column for which that key is effective. When a subtraction operation is finished, the subtraction bar 77 is returned to normal position by the general operator 70 where the catch 76 will again engage and hold it. The details for doing this are immaterial and are disclosed in the application 797,714, above referred to, and are also found in the machines now in use.

Means are provided whereby when any column-selecting key is effective to cause subtraction, (or in fact when subtraction setting is obtained by actuating the subtraction key 73), the typewriter is caused to print its numbers in some distinctive fashion, which is herein shown as being larger figures than those employed for addition. To bring about this result, the usual Underwood case-shift mechanism is utilized. In said mechanism, the platen 6 forms part of the usual shift frame which comprises a roller 87 riding on a rail 88, said rail as usual, forming part of a bell-crank 89 pivoted at 90 at the rear of the machine. The usual Underwood typewriting machine includes platen or case-shift keys 91 on the front ends of key levers 92, and said key levers at their rear ends have upwardly extending arms 93 which are adapted to bear against the rear sides of the lower ends 94

of the bell-cranks 89. Since the platen shift keys are pivoted at their rear ends at 95, depression of the shift key will raise the bell-crank 89, thus lifting the platen shift frame with its platen 6, to upper case position, in which position, the upper case types (Fig. 2) are effective to print through the ribbon which passes through the ribbon vibrator 96, instead of the lower case types which usually print therethrough. This mechanism is connected to be operated through the subtraction setting interponents 82 by a bell-crank 97 having an arm 98 which bears against the rear side of the upper extension 93 of the platen shift key levers 92. This bell-crank is operated by the subtraction interponent 82 through the above-mentioned bail 83 and rock shaft 84, and said rock shaft for this purpose, has fast thereon a rock arm 99 which is joined by a link 100 to the bell-crank 97, with the result that when any column-selecting key 25 is depressed, and its subtraction interponent 82 is effective, said link is drawn down, thus depressing the platen shift key 91, and raising the platen 6 to upper case position. When this is done, the platen is latched in its upper case position by the usual latch 101 which swings so as to overlie a pin 102 fast on the shift key lever 92, being drawn to such position by a spring 103, coiled about the pivot on which said latch 101 swings. This holds the platen shift frame in upper case position so long as said latch is effective.

When a number has been completely written after depression of the subtraction zone selecting key, the general operator moves forward to carry the numbers written and set up into the computing wheels 69 in the usual manner. This motion of the general operator serves to release the platen shift key from the latch 101 and for this purpose, the general operator, which not only includes the bar 70 above described, but also includes the side bars 104, has fast to one of said side bars, a cam 105 which is adapted to strike and draw down a wrist or shaft 106 at the lower end of a link 107, the upper end of which is pivoted to said latch 101. When the general operator does this, it releases said latch, and thus the usual Underwood mechanism restores the platen to lower case printing position.

The link 107 is guided at its lower end by a guide link 108, best shown in Fig. 6, as pivoted in the frame of the machine at 109, and pivoted to the wrist 106. The latch 101 may be the same kind of a latch which is used on certain types of standard Underwood typewriting machines, and includes the usual handle 110.

According to the present invention, means are provided whereby numbers written in the adding zone, if not computed, are written in red, thus making it clear that such

numbers are not computed, to anyone who afterward even glances at the work-sheet. For this purpose, the usual bichrome mechanism of the Underwood typewriting machine is utilized. Said mechanism includes the usual ribbon vibrator 96 through which the bichrome ribbon is threaded at the top, said bichrome being actuated by the lever 112. This lever is adapted to be given various throws, according to the color of printing desired, and the color of the printing is varied by the fact that the top of the ribbon, for example, as shown in Fig. 9, may be black, whereas the bottom of the ribbon may be red. Thus a small throw of the lever 112 will cause black printing, and a larger throw will cause red printing. The varying throw of the lever 112 is obtained by the usual bichrome actuator of the Underwood machine, said actuator being in the form of an open box, best shown in Fig. 9, as comprising a rear side 113, a black printing side 114 and a red printing side 115. This actuator as usual, is mounted on the universal bar or frame 13, at the rear end thereof, and is shiftable sidewise on said frame by means of a link 116, for the purpose of bringing either the side 114 or the side 115 in engagement with one or the other of actuating pins 117 and 118. The side 114 has a slot in it in which the pin 117 can work, and since said pin is remote from the pivot 119 about which the lever 112 works, said pin will give said lever 112 a comparatively small throw. The shape of this slot is best shown in Fig. 7 where it appears that the slot is vertical, and that its sides fit the pin 117 closely. The side 115 of the actuator box has a somewhat similar slot which actuates the pin 118, and since said pin is comparatively near the pivot 119 of the lever 112, it will give said lever 112 a comparatively large throw, thus bringing the red stripe of the typewriter ribbon to the printing point. The actuator box is slidably held in the usual manner on said universal bar or frame 13.

The red printing part of this mechanism is automatically brought into play whenever a number is written in a computing zone, but has been written without properly operating the column-selecting keys.

To bring about this result, this connection is herein disclosed as connected to the column stops 20 of the typewriter, since these stops are customarily used for selecting an adding or computing zone, and in the present invention are used to an even greater extent than in some machines for said purpose. The column stops are effective to determine whether the machine shall write in red or black, by means of an arm 120 pivoted at the rear of the machine, on which arm they are effective through a cam 121 fast on said arm. The arrangement of the column stops 20 and the cam 121 is

such that if no column-selecting key 25 has been depressed, the column stop 20, as it travels along with the typewriter carriage, will engage (see Fig. 1) and cam outwardly (see Fig. 7) the cam 121, with the result that the arm 120 on which said cam is fast, is swung rearwardly and rocks its color control shaft 122.

Fast on this shaft 122 is a rock arm 123, which has pivoted upon its depending lower end a forwardly extending cam-operating link 124. This link operates a cam for the purpose of compelling every numeral key, when said cam is in its effective position, to shift the ribbon so that the printing will be done in red. This is effected by putting a ribbon-shifting member 125 under the numeral keys of the typewriter, which is adapted to shift the above-described actuator 113 from its normal black-printing position to a position in which it causes the printing to take place in red. It will be noted that the connections are such that this ribbon-shifting member 125 is operated only by the numeral keys of the typewriter, with the result that the alphabet keys of the typewriter may write black in any column whereas the numeral keys are compelled to write red in a computing column when the column-selecting keys have not been operated. The purpose of such connections is described more fully below.

This ribbon-shifting member 125 is in the form of a bail having upstanding arms 126, one of which is adapted to lie under every numeral key, the intervening spaces being left for the operation of the alphabet keys of the typewriter. The bail 125 is splined on a transverse rock shaft 127, and is normally drawn by a spring 128 in such a way that the upstanding arms 126 are clear of the numeral keys of the typewriter. When, however, a column-selecting stop 20 strikes the cam 121, as described above, so as to shove the cam-operating link 124 forward, the link carries its cam 129 forward, so as to thrust the bail 125 sidewise by a pin 130 fast thereon. This thrusts said bail 125 so that the arms 126 thereon are in their effective positions under the numeral keys. With the parts positioned thus, every time a numeral key is depressed, it will rock said bail 125 and the shaft 127 on which the bail is mounted. When the shaft 127 is so rocked, a rock arm 131 thereon draws down a link 132 attached to a rock arm 133 on the usual color-control shaft 134 of the Underwood typewriting machine. This color-control shaft includes the usual rock arm 135, to which is pivoted the actuator-shifting link 116, and this link, when shifted to the right, when viewed as normally in Fig. 9, causes the machine to write in red.

The link 116 is normally thrust to the right by a spring 137 coiled around the shaft

134, and shown in Fig. 6. These connections are such, therefore, that the ribbon connections normally stand so that they will print in black, but whenever a numeral key is operated, the ribbon shifts to red, if the cam 121 engages the column stop 20. The color-control shaft 134 may be extended in front of the frame of the typewriting machine, in order to enable the operative to control the color manually, and may be provided with a suitable key 138, whereby the ribbon may be held down to print red when it would otherwise print black. In order that the numeral keys need not print red in an adding zone, the cam 121 is so placed that when a column-selecting key swings the rack bar 21 downwardly, it carries every column stop 20 thereon below the level of the cam 121, so that said cam is idle, and the connections between the numeral keys and the color shift are ineffective.

In order to make the equipment of the machine as simple as possible, the column stops 20 may have their sides of two forms, or be unsymmetrical, as seen in Fig. 1, etc., one side being cut away as seen at 140 (see Fig. 4). When this cutaway side is uppermost, the cam 121 is always entirely out of reach of the column stops, so that the machine, then, will write normally in black in every column, or in any column in which the column stop 20 is appropriately set.

In setting up the machine for use with any given kind of forms, the operative will put a tappet 64 at each zone in which computing is to be done, and in alinement with said tappet will place a column stop 20 with the side 140 downward, so that when the typewriter carriage arrives at that zone by the normal method of travel for typewriting machines, viz., by action of the escapement mechanism alone or by manual positioning of the typewriter carriage, the arm 120 will be thrown rearwardly, thus shifting the color-control bar 125 to effective position, with the result that the depression of a numeral key in that zone, under said circumstances, will shift the color printing to red, although the depression of any other key will allow the machine to print in black, its normal color. On the other hand, as described above, bringing the typewriter carriage to a computing zone by actuation of the column-selecting keys, will prevent such color shifting. Under these latter circumstances all keys write black.

The operative may place such column stops 20 as are desired at any other zone; but stops in non-computing zones are placed with their sides 140 uppermost, with the result that such stops are always ineffective on the arm 120, so that outside of the computing zones, the column stops will be unable to shift the color in which printing is done.

From the above description, it will be seen that we have provided a machine in which the column-selecting keys automatically determine whether addition or subtraction shall be done, and the machine also indicates in every computing column whether the characters written therein represent narrative matter or computed digits.

Since the columns in which computation is done are selected exclusively by the tappets 64, it is unnecessary to provide any neutral position for the column-selecting keys in the present form of the invention, because, unless a tappet 64 is in position in a given column, the numeral keys will be absolutely ineffective on the computing mechanism.

The situation, from this point of view, then, may be summed up by saying that the tappets 64 determine in what columns computation can be done; the column-selecting keys determine what kind of computation shall be done, if computation is possible; and the printing mechanism indicates by the color whether computation was done in a given column, or not.

Certain specific features relating to bi-chrome mechanism and the tabulating and case-shift mechanisms, capable of use in typewriting machines, have been made the subject-matter of divisional applications, No. 138,159, filed December 21, 1916, and No. 267,440, filed December 19, 1918, pursuant to the requirements of the Patent Office, and have been separately claimed therein.

Variations may be resorted to within the scope of the invention, and portions of the improvements may be used without others.

Having thus described our invention, we claim:

1. In a computing machine, the combination with a registering mechanism, of printing means adapted to print in several columns either for computing or non-computing matter, column-selecting keys for determining where such printing shall be done, means associated with said keys for determining whether the matter printed shall be computed in a given manner or not, and means also associated with said column-selecting keys for varying the printing, so that the work-sheet will indicate whether digits printed are computed or not.

2. In a combined typewriting and computing machine, the combination with a traveling carriage and registering mechanism, of devices settable on said carriage for positioning said carriage and for determining in what column computing shall be done, column-selecting keys for selectively positioning said carriage by certain of said devices, means associated with each column-selecting key for determining if the mechanism shall add or subtract when computing is being done, and means associated with

certain of the carriage-positioning devices adapted to cause the printing to show whether computation was actually done or not.

3. The combination with typewriting mechanism, of computing mechanism, said typewriting and computing mechanisms cooperating to effect a combined typewriting and computing action, the typewriting mechanism being effective to print in more than one color, to indicate different states of the computing mechanism, said typewriting mechanism including a traveling carriage, alphabet keys and numeral keys arranged normally to print in different colors, column-selecting keys for determining zones in which combined typewriting and computing actions may take place, and means under the control of said column-selecting keys for causing the printing by all of said printing keys to be done in the same color.

4. The combination with computing mechanism, of typewriting mechanism cooperating with said computing mechanism to effect a combined typewriting and computing action, said typewriting mechanism including alphabet and numeral keys, a key-operated printing mechanism for printing in more than one color, a carriage, and column stops settable on said carriage to determine printing and computing zones, and an interponent mechanism whereby said numeral keys are effective on said color-printing mechanism, to vary the relative color of the printing by said numeral keys with respect to the printing by said alphabet keys, according as to whether the numeral keys are acting to cause a computing action of said computing mechanism or solely a typewriting action.

5. The combination with computing mechanism, of typewriting keys, including alphabet and numeral keys, said numeral keys being arranged to operate said computing mechanism so as to effect a combined typewriting and computing action, printing mechanism operated by all of said keys to print in more than one color, a traveling carriage, column stops adjustable on said carriage, and connections operable by certain of said stops, effective to enable said numeral keys to vary the color of printing in accordance with the computing action or inaction, while ineffective to vary the color of printing by said alphabet keys.

6. The combination with computing mechanism, of typewriting keys, including alphabet and numeral keys, said numeral keys being arranged to operate said computing mechanism so as to effect a combined typewriting and computing action, printing mechanism operated by all of said keys to print in more than one color, a traveling carriage, a rack bar on said carriage, column stops adjustable on said rack bar, connec-

- tions operable by certain of said stops, effective to enable said numeral keys to vary the color of printing in accordance with the computing action or inaction, while ineffective to vary the color of printing by said 5 alphabet keys, and means for shifting said rack bar so as to render said stops ineffective in determining the color of printing by said numeral keys.
- 10 7. The combination with computing mechanism, of typewriting keys arranged to control said computing mechanism so as to effect a combined typewriting and computing 15 action, a traveling carriage, a variable color-printing mechanism cooperating with said keys and said carriage to effect different color printing, column stops settable on said carriage to cause it to be arrested at 20 computing zones, and connectible to said color-printing mechanism to change the color of printing, and column-selecting keys cooperating with said column stops to render said column stops ineffective on said color-printing mechanism in a computing zone.
- 25 8. The combination with computing mechanism, of typewriting keys connected to operate said computing mechanism to effect a combined typewriting and computing action, a traveling carriage, a variable color-printing 30 mechanism cooperating with said keys and said carriage, to give different color-printing at different times, column stops settable on said carriage and adapted to determine typewriting and computing zones, 35 an interponent mechanism operable by said stops to change the color of printing when certain of said keys are used in normal computing zones, and column-selecting keys acting to cooperate with said stops to determine 40 zones including computing zones, and at the same time rendering said stops ineffective to operate said interponent mechanism, thus silencing the control of said color-printing mechanism from said stops.
- 45 9. The combination with computing mechanism, of typewriting keys connected to control said computing mechanism so as to effect a combined typewriting and computing 50 action, a traveling carriage, color-printing mechanism cooperating with said keys and said carriage to effect printing of different colors, column stops carried by said carriage including stops normally determining computing 55 zones, and interponent mechanism operable by said stops to change the color of printing of some of said keys when said keys are operated solely for typewriting in a normal computing zone.
- 60 10. In a combined typewriting and computing machine, the combination with alphabet and numeral keys, of a variable color printing mechanism, a traveling carriage for selecting columns in which printing is done, types operated by said keys adapted to indicate 65 whether computed numbers are added or subtracted, and column stops adapted to vary the printing so that the printed numbers indicate whether they are computed or not, and if computed how computed, said stops ineffective to vary the printing of the 70 alphabet printed characters so that the alphabet characters may always read normally.
11. In a combined typewriting and computing machine, the combination with alphabet 75 and numeral printing keys adapted to print normally and abnormally, column-selecting keys adapted to determine how numbers shall be computed and automatically effective at the same time to determine how said 80 printing keys shall print, and column stops selectively made effective by said column-selecting keys adapted to cause said printing to be in an abnormal color unless the number printed in a computing column was 85 actually computed.
12. In a combined typewriting and computing machine, the combination with alphabet and numeral printing keys adapted to print normally and abnormally, column-selecting 90 keys adapted to determine how numbers shall be computed and automatically effective at the same time to determine how said printing keys shall print, and column stops selectively made effective by said 95 column-selecting keys adapted to cause said printing to be in an abnormal color unless the number supposed to be computed was so computed, said column stops adapted to occupy either of two positions, in one of which 100 they are effective to cause the color printing to be abnormal, and in another position they are not so effective.
13. In a typewriting machine, the combination with alphabet and numeral types, of 105 a printing ribbon whereby the types are adapted to print normally in one color, connections whereby said numeral types normally print in a different color in a limited number of predetermined columns, a computing 110 device, and means whereby when said device is made effective to properly compute at said predetermined columns the numeral types print everywhere in the same color as the alphabet types. 115
14. In a typewriting machine, the combination with alphabet and numeral types, of a traveling carriage, means whereby said types may print in either of two colors, a computing device, devices adapted to be set 120 on said carriage to enable it to be simultaneously brought to a proper position and cause said computing device to be connected to said numeral keys, and means whereby failure to make said settable devices effective 125 will cause the numeral types to print in an abnormal color in a given column.
15. In a typewriting machine, the combination with alphabet and numeral printing keys, of computing devices operable 130

thereby, means whereby said keys may print in either of two colors, devices whereby the printing may further indicate what kind of computation is being done, column-selecting keys for making said indicating devices effective, connections for altering the color of said printing of the numeral keys only to indicate whether the computing devices are properly connected with said keys, and means operated by said column-selecting keys for making said indicating connections ineffective when the proper column selecting key is operated.

16. In a typewriting machine including a carriage, the combination with alphabet and numeral keys and types operated thereby, of a computing device, devices settable on said carriage to enable said carriage to be rapidly positioned and the numeral keys to be simultaneously connected to operate the computing device, means associated with certain of said settable devices for automatically changing the color of printing, column-selecting keys, and connections therefrom to operate the color-changing means to make said means ineffective.

17. In a combined typewriting and computing machine, the combination with a registering mechanism and a traveling carriage, of column-selecting keys for positioning said carriage and for shifting the mechanism from addition to subtraction, typewriter keys connected for computing in said register, two kinds of type operated by said typewriter keys, means controlled by said column-selecting keys for determining which type shall be effective, and means adapted to be controlled by positioning said carriage

for determining in what color the printed matter shall be printed by the typewriter keys.

18. In a combined typewriting and computing machine, the combination with a registering mechanism and a traveling carriage, of column-selecting keys for positioning said carriage and for shifting the mechanism from addition to subtraction, typewriter keys connected for computing in said register, two kinds of type operated by said typewriter keys, means controlled by said column-selecting keys for determining which type shall be effective, a polychrome ribbon device to enable the type to print in a plurality of colors, column stops for cooperating with said column-selecting keys and settable on said carriage; and connections operable by said stops to shift said ribbon device to determine in what color the printing shall be done.

19. In a combined typewriting and computing machine, the combination with a traveling carriage, of computing mechanism devices adapted to bring the carriage to a computing column and automatically cause the mechanism to be effective to subtract, a case-shift mechanism automatically made effective by said subtraction setting, and means for making said case-shift mechanism ineffective by completing the computation of a given number.

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Witnesses:
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