F. A. HART.

COMBINED TYPE WRITING AND COMPUTING MACHINE.

APPLICATION FILED NOV. 6, 1913.

1,275,681.

Patented Aug. 13, 1918.

2 SHEETS—SHEET 1.

FIG. 1.

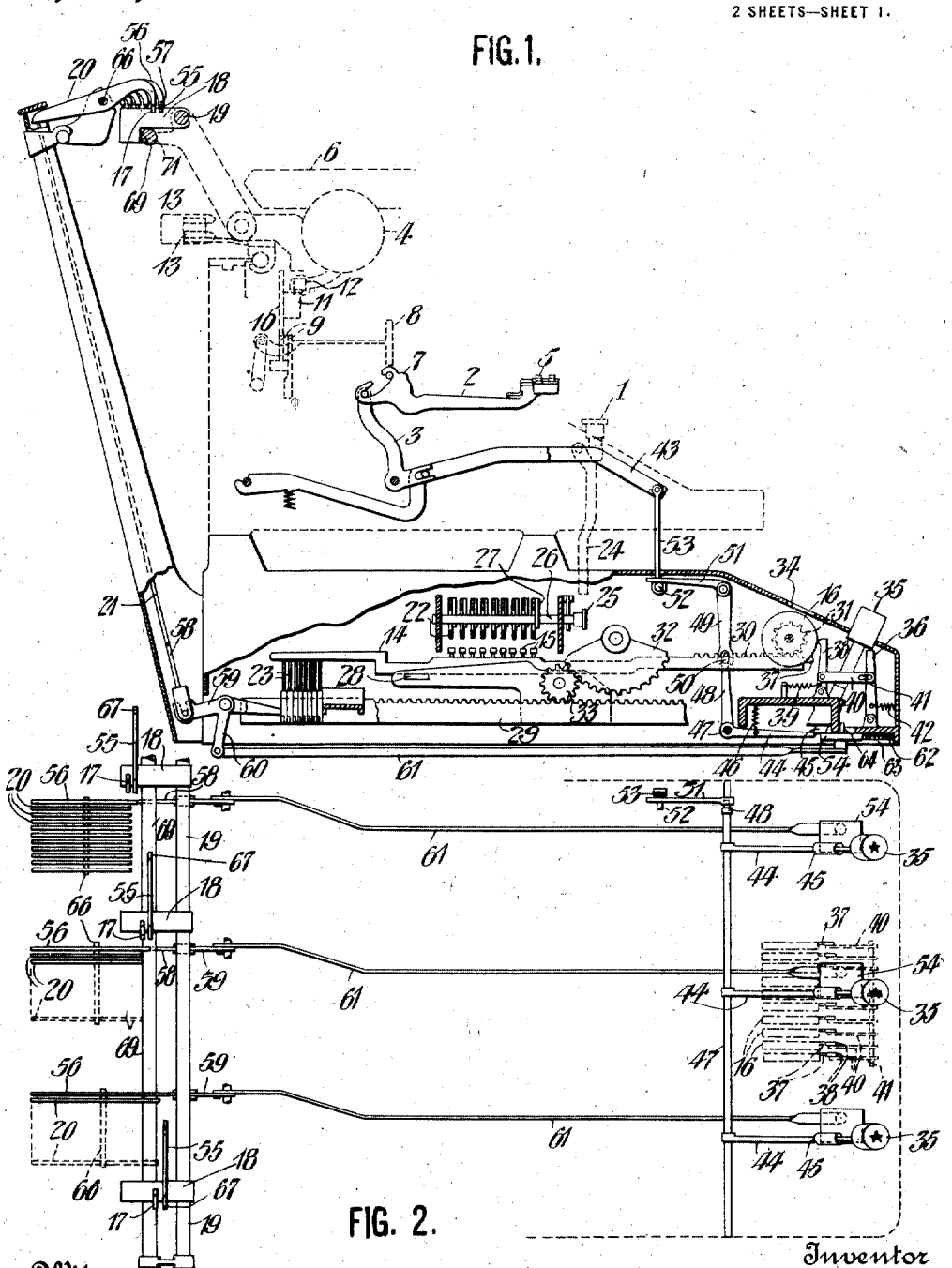

FIG. 2.

Witnesses

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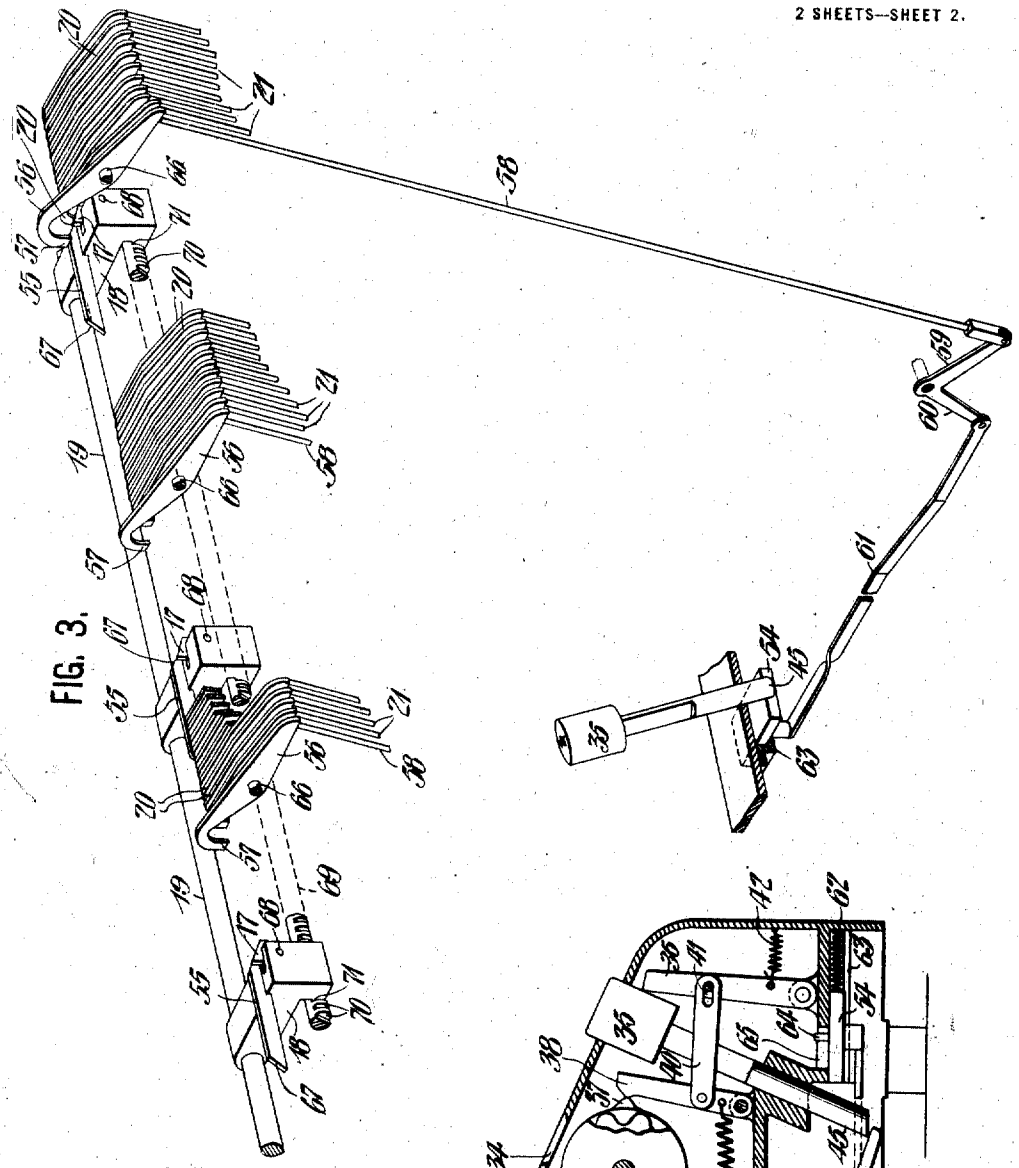

FIG. 3.

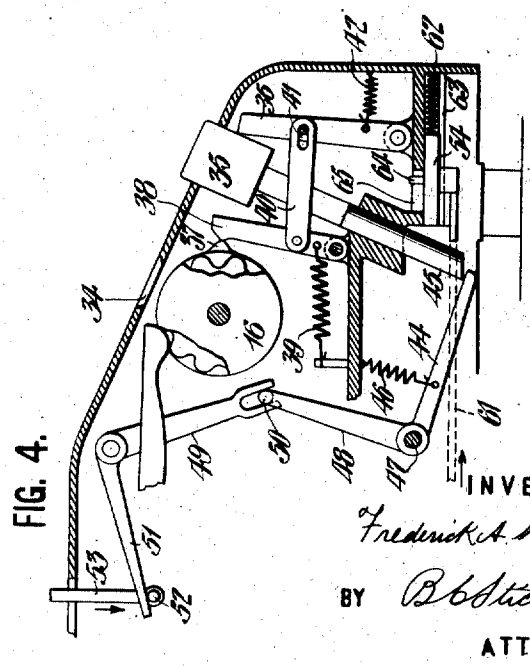

FIG. 4.

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UNITED STATES PATENT OFFICE.

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COMBINED TYPE-WRITING AND COMPUTING MACHINE.

1,275,681. Specification of Letters Patent. Patented Aug. 13, 1918.

Application filed November 6, 1913. Serial No. 799,433.

To all whom it may concern:

Be it known that I, FREDERICK A. HART, a citizen of the United States, residing in Newark, in the county of Essex 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.

My invention relates to computing machines, and is designed to be used with such machines as print the numbers registered and also at some time serve to print in some definite column some special character.

My invention is herein shown as applied to combined typewriting and computing machines of the Underwood-Hanson type, such for instance as that shown in the British Patent No. 3390 of 1912, in which the numeral keys of the typewriter, while printing on the typewriter carriage, set up on computation members or rack bars the numbers thus printed, and from said computation members the numbers thus set up are later carried into the computing wheels of a totalizer. In such machines it is desirable to be able to print some special sign, either in or adjacent to the column in which the printing of the numerals is usually done. Such a sign, for example, may be a star which can be printed only when the computing wheels all stand at zero. Such printing of the star will indicate on the printed record that the wheels then stood at zero. This is especially valuable at the beginning and end of a computation when the accuracy of transcribing a total is proved by subtracting it out of the computing wheels, thus bringing said wheels to zero. This is the common method of using the Underwood-Hanson machine.

Sometimes in writing on a wide sheet it might happen that the operator would print the star at a point remote from the column in which the items and footings are being written, with the result that a reader might fail to associate the star so printed with the column of numbers.

In order to prevent such misplacing of the star on the written record, the key for printing said star may be normally locked, but may be automatically unlocked, whenever the typewriter carriage reaches a point related to the column in which said star may be properly placed. Where such provision is made in the Underwood-Hanson machine, which is disclosed herein, the star printing key is advantageously, automatically locked and unlocked by having its lock under the control of the denomination selector which determines at any moment what computation member or rack bar might be effective to register a digit then being written.

In the ordinary Underwood-Hanson machine, said denomination selector usually includes a tappet adjustable along a rod forming part of the typewriter carriage, said tappet being usually mounted in a block for convenience, and said block may comprise a cam which is effective to unlock the star key. The connections between said cam and said star key may conveniently include a jack and a wire or rod extending from said jack to a bell crank connected to a lock controlling link, thus being analogous to the connections between the usual tappet and the usual computation members, which connections include denomination jacks and a wire or rod extending from each denomination jack to its bell crank, which bell crank moves its computation member or rack bar into position so that the numeral keys will be effective to set up or register digits therein.

The Underwood-Hanson combined typewriting and computing machine is frequently provided with several denomination selectors each frequently set in a different plane from any other, so that each selector may coöperate with only one of several sets of denomination jacks. Where my invention is used in connection with such a machine, a separate cam lock may be provided for the star printing key of each set of jacks, and each key lock may be under the control of a special unlocking cam. Said cams for this purpose may be conveniently arranged in separate planes, so that each key unlocking cam may be effective only on a predetermined key.

The star key printing mechanism may be of any usual or desired type.

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 so much thereof as is convenient for illustrating my invention.

Fig. 2 is a plan view, largely diagrammatic, showing the relation of the denomination selectors and the star keys.

Fig. 3 is a skeleton perspective, showing the general relation of the denomination-selecting tappets, the cams associated therewith, and the star key;

Fig. 4 is an enlarged view of Fig. 1, showing some details of the connections between a star key and its type-bar.

In the usual Underwood-Hanson combined typewriting and computing machines, alphabet and numeral keys 1 when depressed, swing type-bars 2 by means of bell crank levers 3 upwardly and rearwardly against a platen 4, so that type 5 on the type-bars print on said platen, said platen forming part of a traveling carriage 6. As each type-bar 2 approaches the platen, a heel 7 thereon strikes a universal member 8 to control the step-by-step travel of the carriage 6. For this purpose dogs 9 are connected to be vibrated by said universal member 8 into and out of the teeth of an escapement wheel 10, said escapement wheel being connected to a ratchet wheel 11 which meshes with a rack 12 connected to the typewriter carriage, so that as said carriage is drawn along by a spring barrel (not shown herein), it will be intermittently fed forward by said dogs 9.

The carriage 6 may also include the usual column stop rack-bar 13 for positioning said carriage by coöperating with counter-stops operated by tabulator keys (not shown herein). As said carriage 6 travels along, it moves computing members or rack bars 14 *seriatim* into effective position so that digit pins 15 thereon will register the digits written by said keys, the digits so registered being later carried into computing wheels 16, which form a totalizer or computing head.

The connections for moving the computation members 14 to effective position include a denomination selector or tappet 17 mounted in a block 18, said block being pivoted on a rod 19 carried in brackets on the typewriter carriage 6. As said carriage travels along, it carries said tappet 17 under a series of jacks 20, and by raising the front end of said jacks depresses the rear ends thereof so as to force down *seriatim* wires or rods 21, each rod when depressed lifting its computation member 14 so that the pins 15 thereon are within the range of movement of pin-setting linkages 22 operated by numeral keys 1, in a manner hereinafter described. The rods 21 lift said computation members 14 through the usual transposition devices 23, and when so lifted, any key that is depressed will swing its pin-setting linkage 22 downward to set the corresponding pin 15 on the computation member 14. The connections for accomplishing this include a pendant 24 on each numeral key, which, as the key descends, strikes a rock arm 25 fast on a rock shaft 26, which shaft, by means of a second rock arm 27 thereon, swings downwardly its linkage 22, thus depressing or setting the pin on the computation member 14. When a series of pins 15 have thus been set on the computation members 14, the digits represented thereby are carried into the computing wheels 16 by a general operator, which includes a cross bar 28 fast to side racks 29, and reciprocates forwardly and backwardly in such a way that on its forward stroke it strikes any depressed pin 15 and thereby drives its computation member 14 forward to an extent determined by the key depressed, so that its computing wheel 16 is turned by a rack 30 forming part of said computation member 14, said rack meshing with a pinion 31 on the computing wheel 16. On the return stroke of the general operator the pinions 31 revolve idly, because of pawl and ratchet connections between them and their computing wheels 16.

The general operator may be driven in any desired manner, as by the usual hand-driven segment 32 which meshes with an idle pinion 33, said pinion meshing with the rack bar 29 which forms part of said general operator.

If all the computing wheels stand so as to display their zeros through the sight opening 34, a star key 35 may be operated, unless otherwise locked, to print a star on the work sheet, thus indicating that all said wheels are at zero. Said star key 35, however, is normally held locked by means of an upright pivot rod 36 which stands under the bottom of the head of the key 35. When, however, all the computing wheels 16 stand at zero, a lug 37 on each computing wheel bears against a cam tappet 38. Each tappet is pivotally mounted and is drawn back against the computing wheel 16 by a spring 39. When so drawn back, a link 40 attached to said tappet 38 draws the locking rod 36 into effective position, said locking rod being connected to each of the links 40 by a pin and slot connection 41 so that, unless all the tappets 38 are held clear of their wheels 16 by the lugs 37, one or more of the tappets 38 will draw the locking rod 36 into locking position under the star printing key 35. When, however, all the computing wheels stand at zero and hold all the tappets 38 outward, a light spring 42 will swing the locking arm 36 to ineffective position clear of the star printing key 35, thus permitting said printing key to be depressed.

Said key prints from a type-bar of the usual kind, which is connected by the usual bell crank 3 to a key lever 43, said key lever 43, however, having thereon no flat key

top, but being operated from the star printing key 35. The connections between the key lever 43 and the star printing key 35 include a rock arm 44, which is held up against the bottom of the stem 45 of the key 35 by a spring 46. Whenever the star printing key 35 is depressed it swings the rock arm 44 downwardly, thereby rocking its rock shaft 47 to swing a second rock arm 48 thereon, so that said rock arm 48 will draw down the key lever 43. The connections between the rock arm 48 and the key lever 43 include a bell crank 49 having a pin and slot connection at 50 with the rock arm 48, while the other arm 51 of said bell crank overlies a lug 52 on a pendant 53 pivoted on the key lever 43, the connections being such that whenever the bell crank 49 is operated by the star printing key 35, its arm 51 draws down the pendant 53, causing the star type-bar connected to the key lever 43 to print in the usual manner.

In order to prevent printing by said star-key except at some desired column as determined by the jacks 20 and the blocks 18, said star key is normally held locked by a bar or plate 54, which underlies its stem, said plate being moved to ineffective position when the typewriter carriage is in any column in which it may be desirable to have the star key print. Said locking plate 54 is controlled by a member connected to the denomination tappet 17, so that whenever said tappet is effective to cause computation at a given column the star key 35 will be unlocked in some corresponding column or letter-space.

To bring about this result, the block 18 in which the tappet 17 is mounted, is provided with a cam 55 of such number of letter-spaces in width as it is desired to have the star key 35 operable in. Said width may be of any number of letter-spaces from one up to or beyond the number of letter-spaces in the computing column. As seen in Fig. 3, said cams 55 cover one letter-space more than the space of a computing column, and since, as viewed from in front as in Fig. 2, the locking jack 56 is the right-hand jack, said cams extend from the dog 17 to the right thereof. Whenever the typewriter carriage in its travel reaches the point in which it unlocks the star key 35, it does such unlocking by bringing the cam 55 under the front end of a jack 56 similar to the jacks 20, but having its forward end 57 extending into a plane beyond the tappet 17, so that said jack is separately operable by its cam 55. When the front end of said jack 56 is raised, it depresses the rear end, as shown in Fig. 3, so as to press downwardly a rod 58 to rock a bell crank 59, so that the opposite arm 60 of said bell crank will move the locking plate 54 to ineffective position, said arm and plate 54 being for this purpose connected by a link 61. Said block 18 forms a single member serving as a denomination selector and to control the star printing key.

When the typewriter carriage travels along so as to carry the cam 55 clear of the jack 56, the locking plate 54 is returned to the effective position shown in Fig. 1 by a spring 62 which normally holds it in said effective position. The locking plate 54 is supported by rabbeted guides 63 on the machine frame, and has its throw limited by a pin 64 working in a slot 65 in a plate of the computing machine frame.

It will be noted that all the jacks 20 and 56 forming one group, may have a common pivot 66, and that the rod 58 may be substantially identical with the rods 21.

As shown in Figs. 2 and 3, the invention is applied to a machine having three registers, three star keys, and three tappets 17, and three sets of jacks 20. Each star key 35 is separately controlled by its own cam 55 corresponding to the tappet 17 of the set of jacks 20 belonging to its register or group of computing wheels 16. For this purpose the cams 55 are placed in different vertical planes parallel to the travel of the typewriter carriage, so that the cam 55 controlling the left-hand star key 35 is completely in front of the path of the other two cams, and the other two cams likewise travel in paths clear of each other. The cams 55, as best seen in Fig. 3, are beveled off at 67 at each end, so that the ends 57 of the special jacks 56 will slide over them.

The tappets 17 are carried on pivots 68 in the usual manner, so that they slip idly out of the path of the jacks 20 on the return of the typewriter carriage. The blocks 18, as has been stated, are pivoted on a rod 19, and may be swung upwardly around said rod to ineffective position. When swung downward to effective position, the blocks rest at their rear ends on a supporting rod 69, said rod being provided with teeth 70 to mesh with teeth 71 on the blocks 18, thereby holding said blocks in proper position.

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

Having thus described my invention, I claim:

1. In a combined typewriting and computing machine, the combination with computing mechanism, of a traveling carriage, a special printing type, and a single member serving, as determined by said carriage during its travel, as a denominational selector, and to control said special printing type.

2. In a computing machine, the combination with a traveling carriage, of computing mechanism, a special printing type, and a single member serving, as determined by

said carriage during its travel, as a denomination selector and acting jointly with said computing mechanism to determine in what column said special printing type may be effective.

3. In a computing machine, the combination with computing mechanism, said mechanism comprising a totalizer consisting of a group of computing wheels, of a traveling carriage, a special key associated with said totalizer, and a member for said totalizer serving in a manner determined by said carriage as a denomination selector and acting jointly with said computing mechanism to determine in what column said special key may be effective.

4. In a computing machine, the combination with numeral keys, computing wheels and a traveling carriage, of computation members on which numbers are temporarily set up, a series of jacks for selecting said computation members, a special printing key, a supernumerary jack effective to control said special printing key, and a denomination selector effective on said jacks adjusted with reference to all said jacks when adjusted for any.

5. In a computing machine, the combination with computing mechanism, said mechanism comprising a plurality of totalizers, each consisting of a group of computing wheels, of a traveling carriage, a single special printing type, and a member associated with each totalizer serving in a manner determined by said carriage as a denomination selector and to determine in what column said special printing type may be effective.

6. In a combined typewriting and computing machine, the combination with computing wheels and a denomination selector, of a special printing key, a lock for said special printing key under the control of a cam on a computing wheel, and a lock for said key under the control of a cam on said denomination selector, said key being operative on the release of both said locks at the same time.

7. In a combined typewriting and computing machine, the combination with numeral keys and a traveling carriage, of computing wheels, a denomination selector, a special printing key, a lock for said special printing key under the control of a cam on a computing wheel, and a lock for said key under the control of a cam on said denomination selector, said key being operative on the release of both said locks at the same time.

8. In a combined typewriting and computing machine, the combination with computing mechanism and a special printing type, of a denominational selecting block, said block controlling the denominational selection of said computing mechanism, and jointly with said computing mechanism controlling said special printing type.

9. In a combined typewriting and computing machine, the combination with computing mechanism and a traveling carriage, of a series of denomination selectors on said carriage and controlling said computing mechanism, each selector effective only in one plane, a special printing type, and a series of cams on said denomination selectors in separate planes for separately controlling said special printing type according to the columns determined by the travel of said carriage.

10. In a combined typewriting and computing machine, a denomination selector comprising a cam tappet effective in one direction only, and a locking cam effective in both directions, said cams being positioned on said selector to be operative in the same computing zone.

11. The combination with a combined typewriting and computing mechanism, of a special printing mechanism for indicating a characteristic state of said computing mechanism and means for dominating said special printing mechanism, said means coming into play solely in certain predetermined computing zones when such state of said computing mechanism exists, the predetermined zone or position of printing by said special printing mechanism being adjustable with a variation in the adjustment of the computing zone.

12. In a combined typewriting and computing machine, the combination with computing mechanism, of a series of jacks for controlling the denominational selection of said computing mechanism, a special printing type for showing a certain condition of said computing mechanism, and a block for controlling said jacks, said block also controlling said special printing type.

13. In a combined typewriting and computing machine, the combination with a plurality of sets of computing devices, of a plurality of sets of jacks for controlling the denominational selection of each set of computing devices, respectively, a special printing type, and a plurality of blocks, each block controlling the denominational selection of its respective computing device by its respective set of jacks, all of said blocks controlling said special printing type.

14. In a combined typewriting and computing machine, the combination with computing mechanism, of a series of jacks controlling said computing mechanism as to denominational selection, a special jack forming part of said series of jacks, a special printing type, and means controlled by said special jack for controlling said type.

15. In a combined typewriting and computing machine, the combination with computing mechanism, of a set of jacks for con-

trolling said computing mechanism as to denominational selection, a traveling carriage, a block adjustable on said carriage, and a special printing type; said block controlling said jacks to select the denomination of the computing mechanism on the carriage movement, and also controlling said special printing type.

16. In a combined typewriting and computing machine, the combination with a plurality of sets of computing devices, of a plurality of sets of jacks for controlling the denominational selection of each set of computing devices, respectively, a traveling carriage, a special printing type and a plurality of blocks adjustable on the carriage, each block controlling the denominational selection of its respective computing device, and all of said blocks controlling said special printing type.

17. In a combined typewriting and computing machine, the combination with computing mechanism, of a set of jacks to control said computing mechanism as to denominational selection, a block for acting on said jacks, and a special printing type, said type being under the joint control of said computing mechanism and of said block.

18. In a combined typewriting and computing machine, the combination with a plurality of computing devices, of a plurality of sets of jacks to control said computing devices, a plurality of blocks, one for each set of jacks and acting thereon to control said denominational selection, and a special printing type, said type being jointly controlled by each of said blocks and each of said computing devices corresponding to the particular block.

19. In a combined typewriting and computing machine, the combination with computing mechanism, of a set of jacks to control said computing mechanism as to denominational selection, a special printing type, and a block having two cams thereon, one of said cams acting on said jacks to control the said denominational selection, and the other of said cams acting jointly with the computing mechanism to control said special printing type.

20. In a combined typewriting and computing machine, the combination with computing mechanism, of a series of jacks to control said computing mechanism as to denominational selection, a special jack forming part of said series of jacks, a special printing type, and a block acting on said jacks to control said denominational selection, and acting on said special jack to control said special printing type.

21. In a combined typewriting and computing machine, the combination with computing mechanism, of a set of jacks to control said computing mechanism as to denominational selection, a special jack forming part of said set of jacks, a special printing type, and a block having two cams, one of said cams acting on said jacks to control denominational selection, and the other of said cams acting on said special jack to control said special printing type.

22. In a combined typewriting and computing machine, the combination with computing mechanism, of a set of jacks for controlling said computing mechanism as to denominational selection, a special jack forming part of said set of jacks, said jacks and said special jack having portions arranged in different planes, a block having cams thereon, arranged in planes corresponding to the engaging portion of said jacks, and a special printing type, one of said cams acting to control the denominational selection of said computing mechanism while acting in one plane, while said other cam controls said special jack in another plane, to control said special printing type.

23. In a combined typewriting and computing machine, the combination with computing mechanism, of a set of jacks for controlling said computing mechanism as to denominational selection, a special jack forming part of said set of jacks, a special printing type, and a block having two cams thereon, one of said cams acting to control said jacks one at a time to effect denominational selection, said other cam acting continuously on said special jack, during said denominational selection, to control said special printing type.

24. In a combined typewriting and computing machine, the combination with computing mechanism, of a block to control denominational selection of said computing mechanism, a jack, and a special printing type, said type being under the joint control of said block and said computing mechanism, said block also acting to control said type through the medium of said jack.

25. In a combined typewriting and computing machine, the combination with a plurality of computing devices, a plurality of jacks, one corresponding to each computing device, a special printing type, said type being under the joint control of any computing device and its corresponding jack, and a plurality of blocks, one for each computing device, said blocks controlling the denominational selection of its corresponding computing device and also acting to set the corresponding jack.

26. In a combined typewriting and computing machine, the combination with computing mechanism, of a block having two cams thereon, a special printing type, and a jack, said special printing type being under the joint control of said computing mechanism and said jack, one of said cams on said block acting on said jack, and the

other of said cams acting to control the denominational selection of said computing mechanism.

27. In a combined typewriting and computing machine, the combination with computing mechanism, of a set of jacks controlling said computing mechanism as to denominational selection, a special jack forming part of said set of jacks, a special printing type, and a traveling carriage, said carriage controlling said computing mechanism as to denominational selection through the medium of said jacks, and controlling said type through the medium of said special jack.

28. In a combined typewriting and computing machine, the combination with computing mechanism, of a set of jacks controlling said computing mechanism as to denominational selection, a traveling carriage, a block adjustable on said carriage, and a special printing type, said type being under the joint control of said carriage and said computing mechanism, said carriage acting to so control said type through the medium of said block.

29. In a combined typewriting and computing machine, the combination with computing mechanism, of a set of jacks controlling said computing mechanism as to denominational selection, a traveling carriage, a block having two cams and adjustably supported on said carriage, and a special printing type, said carriage acting through one of said cams to control said jacks, said carriage and computing mechanism acting jointly to control said type, the carriage acting to thus control said type through the medium of the other cam.

30. In a combined typewriting and computing machine, the combination with computing mechanism, of a set of jacks controlling said computing mechanism as to denominational selection, a traveling carriage, a block having two cams and adjustably supported on said carriage, and a special printing type, one of said cams acting during the carriage movement successively on said jacks, to control denominational selection of said computing mechanism, said other cam being a continuous cam and acting jointly with said computing mechanism during the carriage movement through the computing zone to control said type, while the first cam is acting to effect denominational selection.

31. In a combined typewriting and computing machine, the combination with computing mechanism, of a carriage, a block adjustable on said carriage to control said computing mechanism as to denominational selection, a jack, and a special printing type, said computing mechanism and said block acting jointly to control said type, said block in so controlling said type acting through the medium of said jack.

32. In a combined typewriting and computing machine, the combination with computing mechanism, of a traveling carriage, a block adjustable thereon, said block having two cams, one of said cams controlling denominational selection of said computing mechanism, a jack, and a special printing type, said special printing type being under the joint control of said computing mechanism and the other cam on said block, said other cam acting through the medium of said jack.

33. In a combined typewriting and computing machine, the combination with computing mechanism, of a traveling carriage, a block adjustable thereon, said block having two cams, one of said cams acting during the carriage movement to successively control denominational selection of said computing mechanism, said other cam being a zonal cam, a jack, and a special printing type, said special printing type being under the joint control of said computing mechanism and said carriage, said carriage in said control acting through the medium of said zonal cam and jack during the time said first-mentioned cam is acting successively to select the denominations.

34. In a combined typewriting and computing machine, the combination with computing mechanism, of a set of jacks controlling said computing mechanism as to denominational selection, a special jack forming part of said set of jacks, a traveling carriage, a block adjustable on said carriage, and a special printing type, said carriage acting through the medium of said block and said special jack to control said special printing type.

35. In a combined typewriting and computing machine, the combination with a plurality of computing devices, of a plurality of sets of jacks to control the denominational selection of said computing devices, respectively, special jacks, one for each set of jacks, and each forming part of said set of jacks, a traveling carriage, a plurality of blocks adjustable thereon, one block for each set of jacks and corresponding computing device, said blocks each having two cams thereon, and a special printing type, one of said cams on each block acting on its corresponding set of jacks, to control denominational selection, and the other one of said cams on each block acting on its corresponding special jack in each set, to control said special printing type, the cams on each block being in pairs, but in different planes, the special jacks terminating in the plane of its corresponding cam, said planes being different for each column.

36. In a combined typewriting and computing machine, the combination with computing mechanism, of a set of jacks controlling said computing mechanism as to de-

nominational selection, a special jack forming part of said set of jacks, a traveling carriage, a block adjustable on said carriage, and a special printing type, said special printing type being under the joint control of said computing mechanism and said carriage, said carriage acting through the medium of said block and said special jack to control said special printing type.

37. In a combined typewriting computing machine, the combination with a plurality of computing devices, of a plurality of sets of jacks to control the denominational selection of said computing devices, respectively, special jacks, one for each set of jacks, and each forming part of said set of jacks, a traveling carriage, a plurality of blocks adjustable thereon, one block for each set of jacks and corresponding computing device, said blocks each having two cams thereon, and a special printing type, said special printing type being under the joint control of each of said blocks and said carriage, one of said cams on each block acting on its corresponding set of jacks, to control denominational selection, and the other one of said cams on each block acting on its corresponding special jack in each set, in its joint control of said special printing type, the cams on each block being in pairs, but in different planes, the special jacks terminating in the plane of its corresponding cam, said planes being different for each column.

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Witnesses:
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