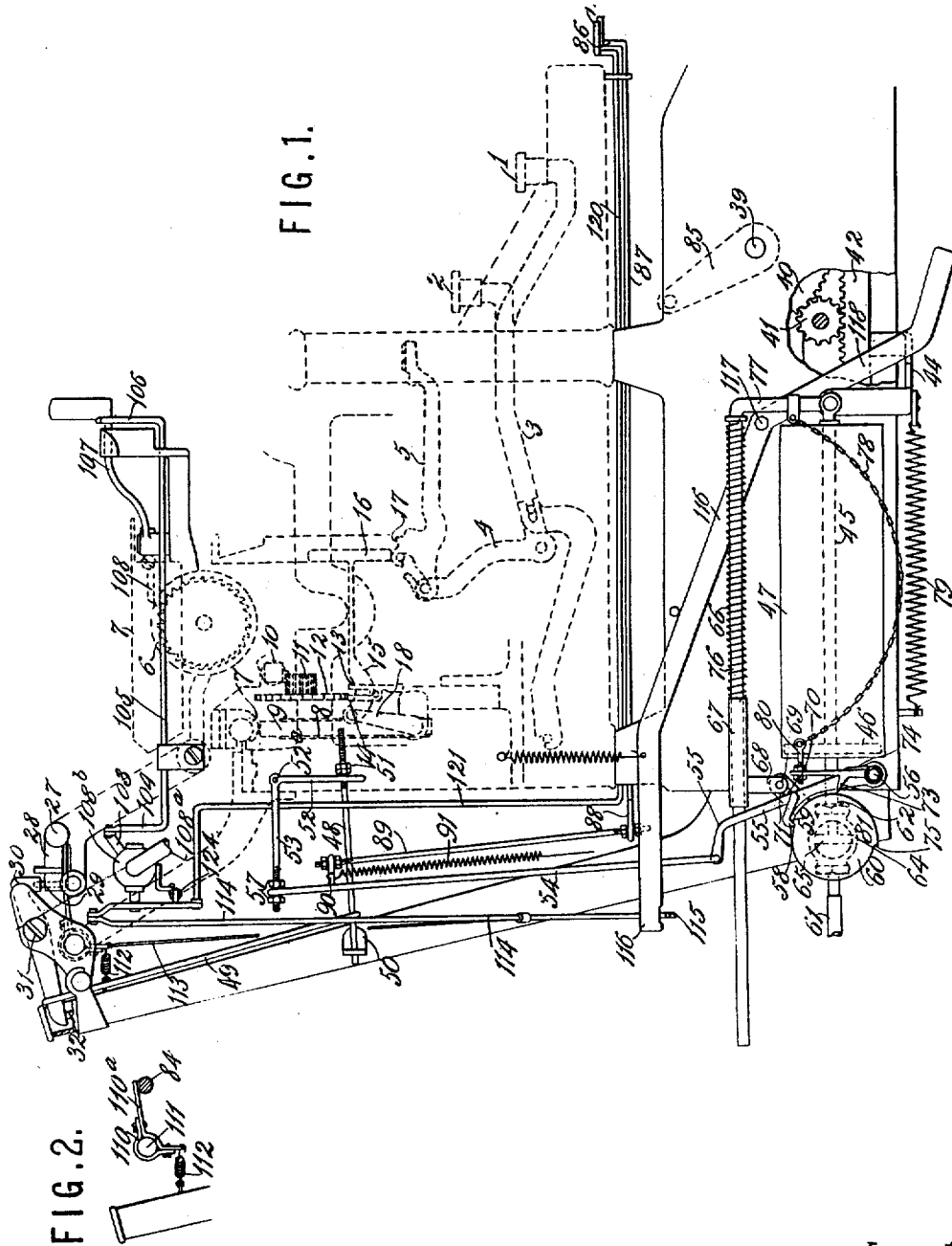


F. F. MAIN.
 COMBINED TYPE WRITING AND COMPUTING MACHINE.
 APPLICATION FILED MAR. 18, 1911.

1,238,065.

Patented Aug. 21, 1917.
 5 SHEETS—SHEET 1.



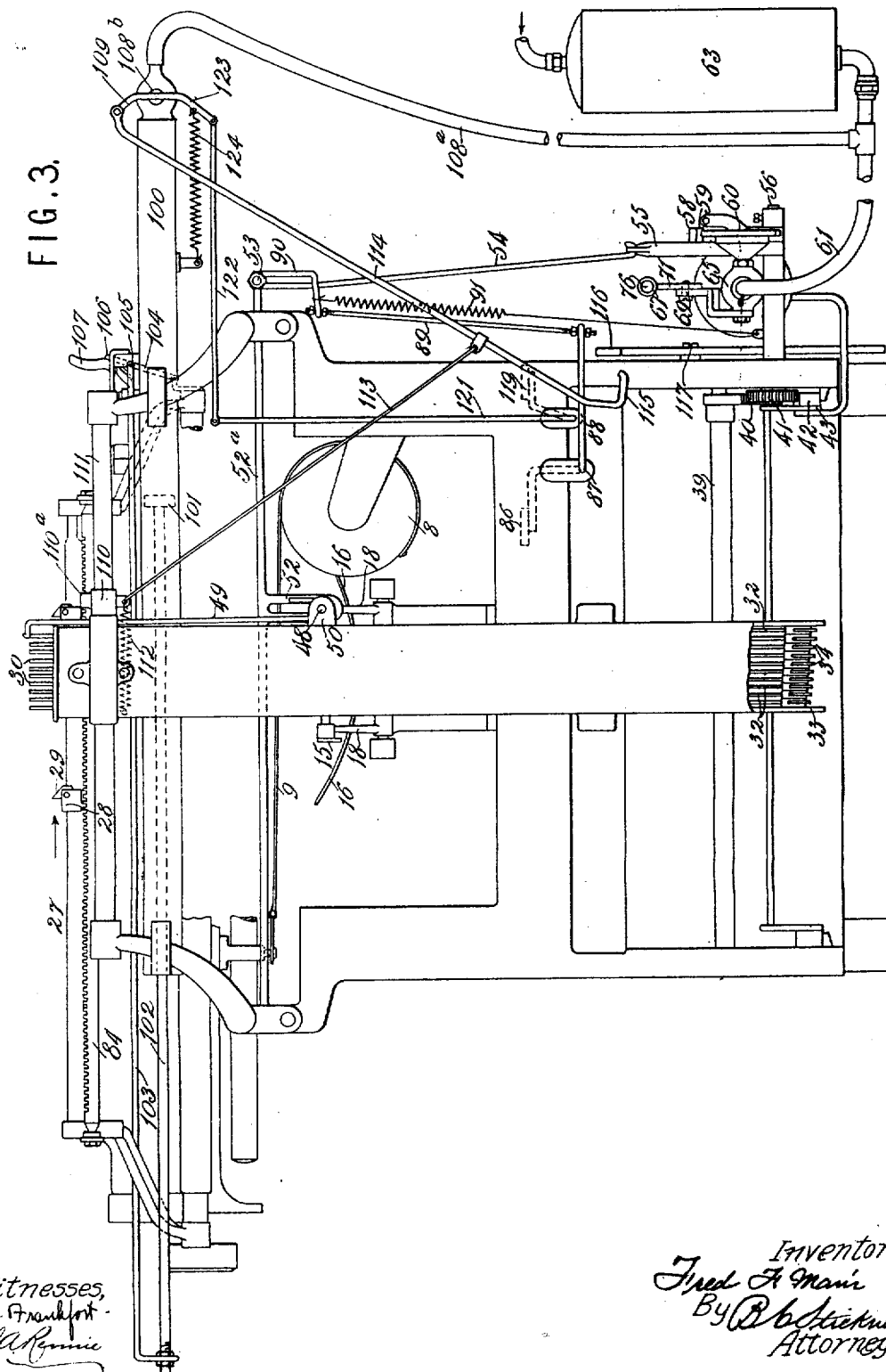
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 J. R. L. L.

Inventor,
 Fred F. Main
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1,238,065.

5 SHEETS—SHEET 2.

FIG. 3.



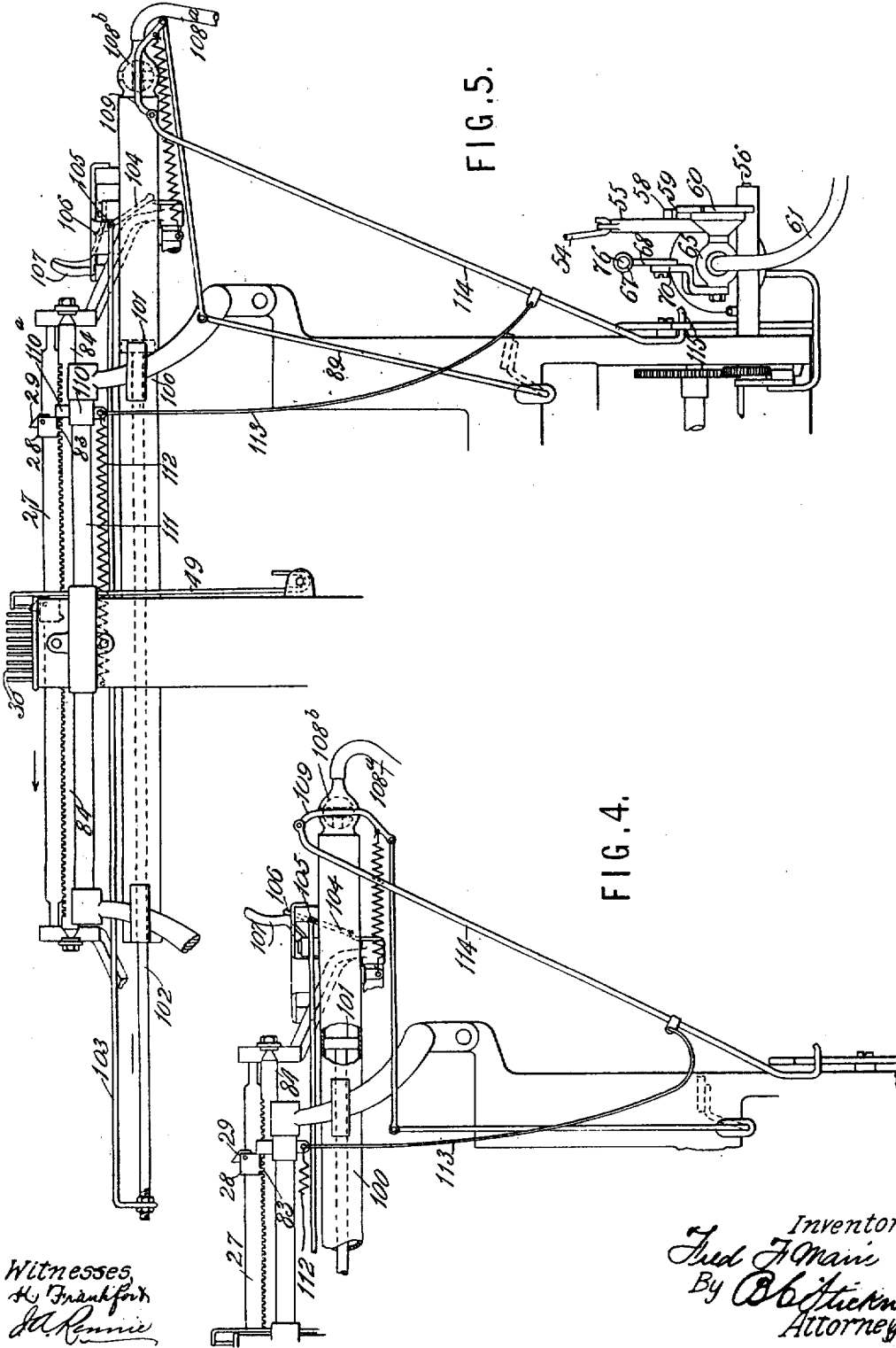
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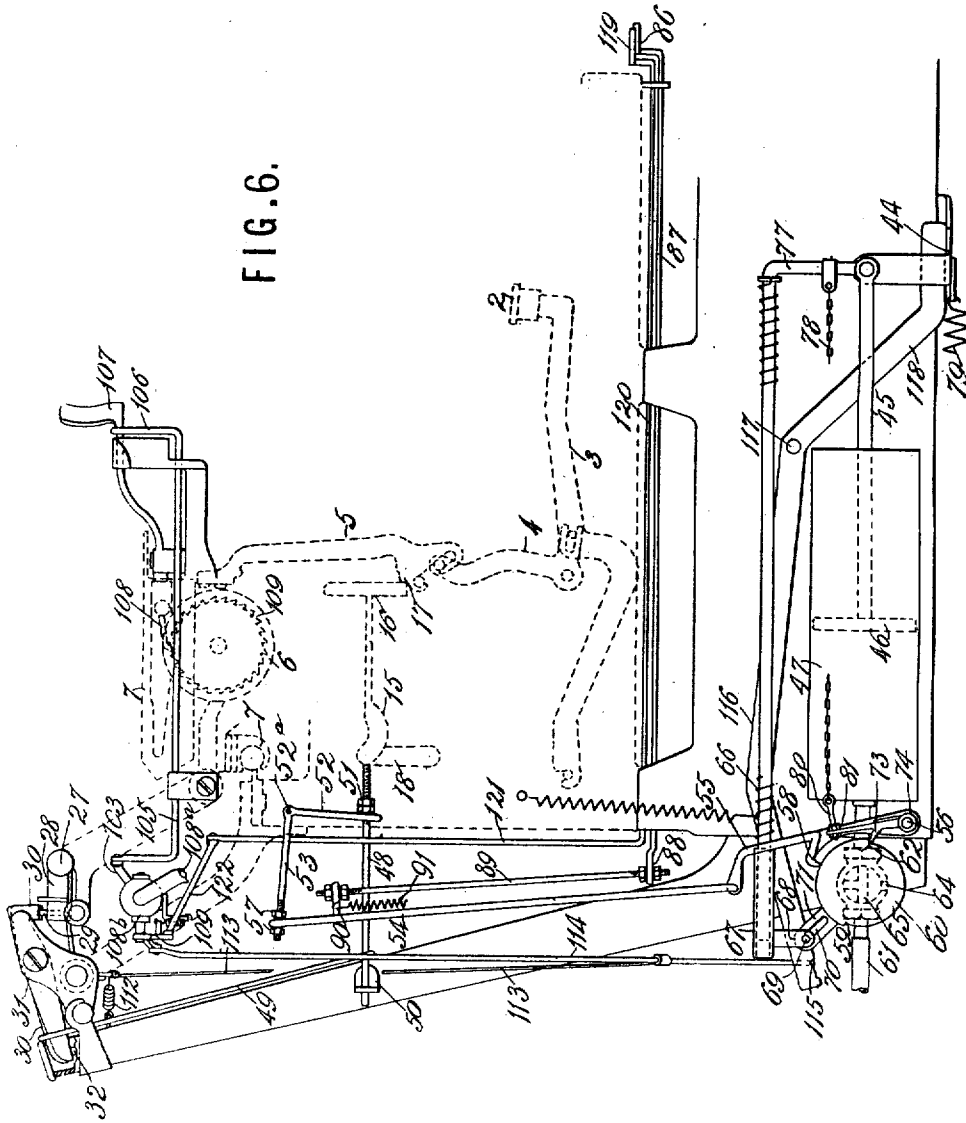
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 5 SHEETS—SHEET 4.

FIG. 6.



Witnesses
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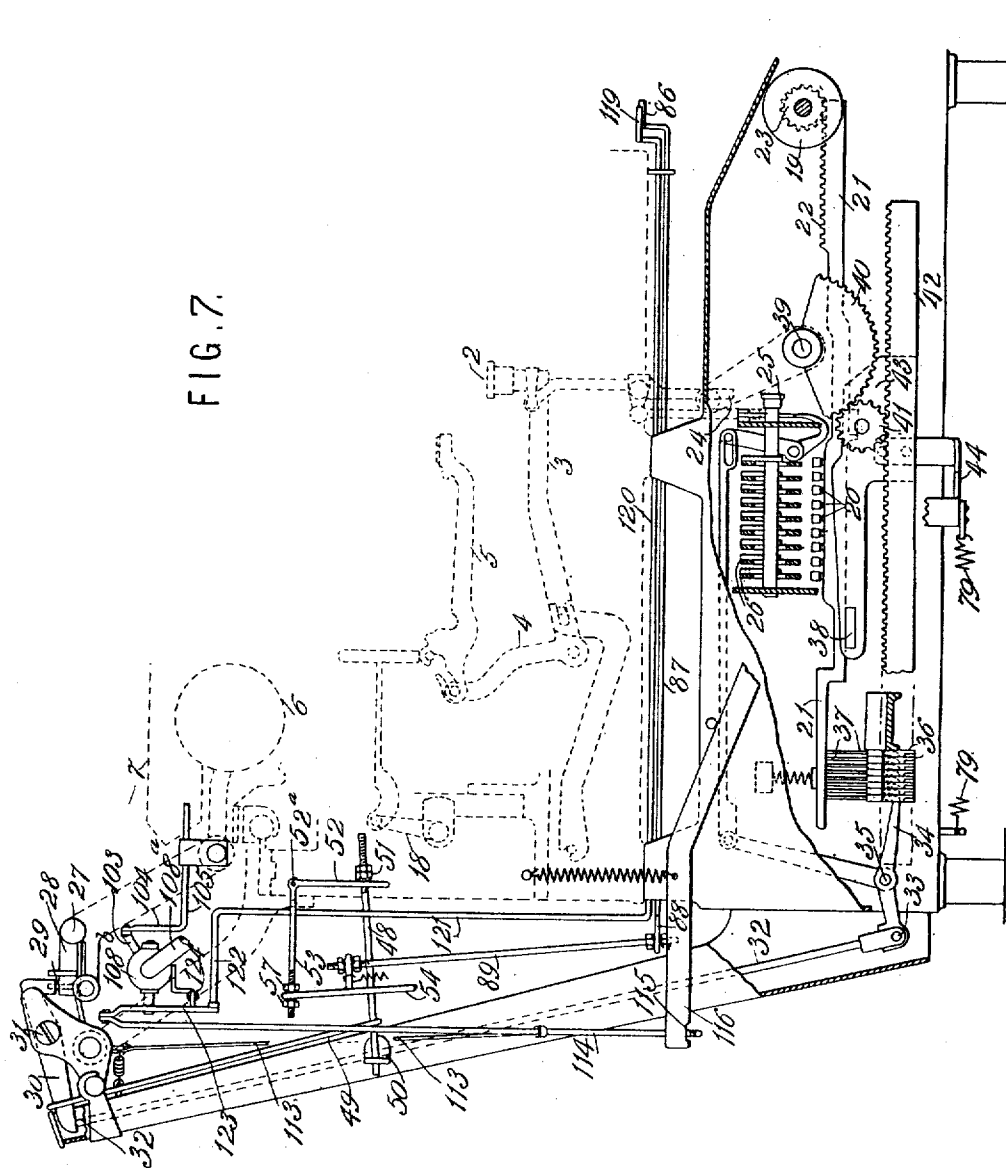
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5 SHEETS—SHEET 5.

FIG. 7.



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UNITED STATES PATENT OFFICE.

FRED F. MAIN, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO UNDERWOOD COMPUTING MACHINE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

COMBINED TYPE-WRITING AND COMPUTING MACHINE.

1,238,065.

Specification of Letters Patent.

Patented Aug. 21, 1917.

Application filed March 18, 1911. Serial No. 615,220.

To all whom it may concern:

Be it known that I, FRED F. MAIN, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, 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 typewriting and computing machines, and particularly to that class of machine illustrated and referred to in my pending application No. 598,278, filed December 20, 1910, in which the numeral keys of the typewriter set up pins which are then used to determine the extent to which the computing wheels shall be turned by a general operator.

According to said application, at the operation of any numeral key to write in the units place, the general operator and the computing wheels were automatically actuated by a suitable source of power, such as a compressed-air apparatus.

One of the principal features of the present improvements is the provision of improved means for automatically returning the carriage to begin a new line concomitantly with the actuation of said general operator and the computing wheels.

I preferably provide a pneumatic device which may be in the form of a piston working in a cylinder and connected to the carriage, the cylinder provided with a valve which is automatically called into action when a digit is written in the units place in the column on the work sheet.

I also illustrate keys for independently causing the general computing operator to be power-driven without returning the carriage, or for causing the carriage to be returned without actuating said general operator, at will.

Other features and advantages will hereinafter appear.

In the accompanying drawings, Figure 1 is a diagrammatic side elevation of a combined typewriting and computing machine similar to that shown in said pending application, in which the Underwood typewriting machine is secured upon a Hanson computing machine; such combined ma-

chines being well known in the art. In this figure the parts are shown in normal positions.

Fig. 2 is a detail view showing the block which is operated by the carriage to automatically open the carriage valve and return the carriage at a predetermined point in the travel of the carriage.

Fig. 3 is a part sectional rear elevation of the machine seen at Fig. 1.

Fig. 4 is a rear view showing how the movement of the carriage to units place in the column, effects a connection between the pneumatic carriage returning device and the general operating device of the computing machine.

Fig. 5 is a rear view showing the carriage being returned by the pneumatic devices.

Fig. 6 is a side elevation similar to Fig. 1 but showing the type striking the platen and also showing the piston of the pneumatic device for actuating the general operator at nearly the opposite end of its stroke from Fig. 1; the interponent having been operated by the key which is shown depressed at this figure, and the valve of the pneumatic device having been thereby opened, and the piston thrust forwardly to the right of this figure by the admission of compressed air into the cylinder.

Fig. 7 is a longitudinal elevation from front to rear showing the principal members of the computing mechanism.

In the Underwood machine, alphabet keys 1 and numeral keys 2 (said keys usually including a zero key), are mounted on levers 3, operating through bell cranks 4 to swing type bars 5 upwardly and rearwardly to strike against a platen 6 mounted on a carriage 7. Said carriage is driven by a spring barrel 8, connected thereto by a strap 9, and the carriage has a rack 10 to mesh with a pinion 11, the latter connected to an escapement wheel 12. Engaging this wheel are dogs 13, 14, operated by a universal frame 15 carrying a universal bar 16, which is driven backwardly at every key stroke by a heel 17 on the type bar; said universal bar and frame being partly supported by rock-arms 18. Thus the carriage 7 is constantly under the control of the keys 1, 2, and is

caused to feed a letter-space at each operation of a key.

Each numeral key 2 is connected to means for determining the extent of rotation of a gang of computing wheels 19; the several keys having means for depressing any one of several index pins or devices 20 which are carried by bars 21 extending from front to rear of the machine, and movable forwardly and having on their forward end racks 22 to mesh with pinions 23 loose on the computing wheel axes, and connected to the computing wheel by ratchets and pawls (not shown). From each numeral key 2 drops a linkage 24, the lower end of which depresses an arm 25, each arm operating a rod or link, one part of which 26 is in the form of a link or bar adapted to engage and depress the corresponding index pin 20, of which there are usually eighty-one. The rack bar 21 has to be lifted to enable the pins to be depressed by the various links 26; and this lifting is effected by the paper carriage 7 of the typewriter, the rack-bars being lifted one after another as the carriage progresses in letter-feeding direction.

Upon a rod 27 fixed upon the carriage 7, are adjustably placed one or more blocks 28, each carrying a pivoted wiper cam 29, in position to engage and lift (as the carriage moves in letter-feeding direction) a series of jacks 30 pivoted at 31 upon the framework, and at their rear ends bearing upon the tops of rods 32, which extend down to the computing base of the machine. The lower ends of the rods are pivoted at 33 to the rear ends of levers 34, the latter fulcrumed at 35 and extending forwardly to engage transposition linkages 36, said linkages carrying upstanding projections 37, one for each of the rack-bars 21, to lift the latter. When, therefore, the paper carriage 7 arrives in position to write a numeral in the hundreds place, for instance, the wiper cam 29 lifts the hundreds jack 30, depresses the hundreds rod 32, vibrates the hundreds lever 34, operates the hundreds linkage 36, and lifts the hundreds rack-bar 21, so that one of its pins may be depressed by a key 2. At the next letter feeding movement of the carriage, the next jack, rod, lever, linkage and bar are similarly operated, and so on.

In said Underwood-Hanson typewriting and computing machine, the rack bars 21, after one of the pins 20 on each thereof has been depressed or set, are driven forward bodily and simultaneously by means of a transverse horizontal bar 38, which is moved forward and striking the depressed pin on each bar carries the bar forward, said racks turning the computing wheels 19, each to an extent predetermined by the position of the pin 20 which was set by the key 2. Said transverse bar 38 forms part of a general operator; and it will be understood that

many other devices in said machine are also connected to or operated by said operator; said other parts being omitted from the drawings for the sake of clearness. The movement of the entire operator, including the rack-driving transverse bar 38, is a reciprocating one; and said movement has been usually manually effected by means of a rock-shaft 39, having a segment 40 engaging a pinion 41 meshing with a rack 42 on a bar 43, forming part of the operator.

To the rack or bar 42 of the operator, which drives the computing wheels, is fixed, by means of an arm 44, the end of a piston rod 45, the latter secured to a piston 46, working in a cylinder 47 and forming part of the pneumatic device whereby the operator 43 is actuated and the computing wheels 19 are turned.

In the preferred form of the invention, the carriage 7 coöperates with the keys 2 to bring the pneumatic device into operation. The connections extend from said co-operating parts to a valve of the pneumatic device, but this connection is normally broken; it includes an interponent 48, which is normally ineffective or inoperable by the keys. The carriage, at a certain point or points in its run, moves said interponent to a position where it can be operated by the keys, to enable the latter to control the pneumatic device.

The universal bar frame 15 on the typewriting machine, which is driven backwardly every time that a numeral key 2 is operated, so as to vibrate the carriage-feeding dogs 13, 14, is adapted to press back the rod or interponent 48, whenever the latter shall have been caused to drop from the normal silenced position at Fig. 1, to its operative position at Fig. 6; this drop of said interponent being effected by the carriage 7 in a manner now to be explained. When the interponent rod is pressed back by any type key, it causes the pneumatic device to operate.

Said interponent 48 is connected by a link 49 to the rear end of the units jack 30, so that when the forward end of said jack is lifted by the wiper 29, and the rear end thereof is consequently depressed, the link 49 drops, and permits the interponent 48 also to drop into the effective Fig. 2 position; said interponent 48 being supported at its rear end in a bracket 50, and the link 49 being connected to the interponent between the ends of the latter. The link 49, it will be understood, is connected only to the units jack, so that the movement of the interponent 48 to the Fig. 6 position will occur only when the machine is ready for the writing of a number in the units place in any column of the work sheet. The carriage, by its movement from tens place to units place, causes the aforesaid adjustment of the parts,

which permits any key 2, when writing in the units place, to cause the pneumatic device to operate.

Upon the interponent 48 is fixed a lug 51, which may be in the form of an adjustable nut, to engage an arm 52 of a bell crank; the other arm 53 of which is connected by a pendent link 54 to an arm 55, pivoted at its lower end upon a stud 56 secured upon the framework. The point of connection of the link 54 to the arm 53 may be varied by adjusting the confining nuts 57 along said arm, so as to give more or less throw to the link 54.

It will be understood (Fig. 3) that the arm 52 may be in the form of an eye or loop pendent from a horizontal rock-shaft 52^a, from the right-hand end of which projects rearwardly the arm 53.

Fixed upon the arm 55 is a dog 58, which normally engages a tooth or shoulder 59 upon a disk or head 60, forming part of a three-way valve inserted between a supply pipe 61, and an inlet pipe 62 provided upon the end of the cylinder 47; said pipe 61 leading to a tank 63 containing compressed air. In the bottom of the valve seat, is an outlet 64, which normally communicates with the interior of said cylinder 47 through the valve, which is of the three-way form, as seen at 65; communication being closed between the pipe 61 and the cylinder, so that the source of power is normally idle.

The lifting of the link 54 swings the dog 58 to release the shoulder 59 and the valve head 60, whereupon a spring 66, normally in a state of compression, forces toward the left a slide 67, the latter having an arm 68 provided with a pin 69, loosely engaging a slot 70 in a crank or arm 71 fixed to the valve or the valve-head 60, so that the valve is rotated from the closed position at Fig. 1 to the open position at Fig. 6, and compressed air is therefore admitted into the cylinder, driving the piston 46 to the right, as seen at Fig. 6. This movement of the piston advances the operator 42, and consequently the transverse bar 38 on said operator drives forward such of the rack-bars 21 as have key-depressed pins thereon, said bars driving their respective pinions 23 to turn the corresponding computing wheels 19.

At Fig. 6, the forward movement of the piston 46 is not quite finished; but it will be understood that the piston is finally arrested, together with the operator 42, by the stop usually placed in the Hanson adding machine for arresting the initial or forward stroke of the computing operator.

The movement of the valve and valve head 60 under the power of the spring 66 is arrested by the engagement of the pin 69 with the top of slot 70 in the arm 71; and in this position the valve is locked by a dog 73, which is snapped by a spring 74 beneath

a shoulder 75 on the valve head. This dog 73 holds the valve open, and is particularly useful when the spring 66 (which is coiled around a horizontal rod 76 and is fixed at one end to the slide 67 and at the other end to the rod 76), is expanded and tensioned by the movement of the rod 76 to the right, Fig. 6. Said rod 76 extends rearwardly from an arm or stem 77 which is fixed to the piston rod 45 (or to the arm 44), so as to travel with the piston; the slide 67 being in the form of a sleeve mounted upon said rod 76. The spring 66 is intended first to press slide 67 rearwardly (while rod 76 is stationary) so as to open the valve, and then to pull said slide 67 forwardly, from the Fig. 6 position to the Fig. 1 position; said spring 66 being for this latter purpose caught at its ends in a manner already explained, so as to be pulled out and tensioned by reason of the movement of the piston rod 45 to the position at Fig. 6. The dog 73 holds the valve from returning during the tensioning of the spring 66 in this manner. At the concluding portion of the forward stroke of the piston 46, a chain 78, connected at one end to arm 77 and at the other end to the dog 73, releases said dog from the valve head 60, and permits the spring 66 to snap the valve from the open position at Fig. 6 to the closed position at Fig. 1; thereby closing the piston to the air supply 61 and opening it to the exhaust 64, to permit the piston 46 to return to normal position. This movement of the piston, as well as of the operator 42 fixed thereto, is effected by a spring 79, which is provided for returning the operator and its connected parts to normal positions. It will be understood that spring 79 is sufficiently powerful to restore the spring 66 to its normal condition of compression, as seen at Fig. 1.

Fine adjustment of the operation of the dog 73 may be secured by means of a screw 80, to which the rear end of the chain 78 is attached, said screw threaded into said dog and secured by one or more set nuts 81. By adjusting the screw in or out, the release of the valve head 60 may be timed to occur at or close to the completion of the forward stroke of the operator 42, so that a full operation of the computing wheels 19 is assured. When the piston 46 returns to normal position, the dog 58 reengages the shoulder 59 on the valve head 60.

The blocks 28 are adjustable along the rod 27 on the carriage, and each block has a tooth 83 (Figs. 4 and 5) to engage a rack 84; these blocks being disposed in position to correspond with the usual column stops of the Underwood tabulating mechanism (not shown).

The usual handle 85 may be placed upon the operating rock shaft 39; and, if desired, a key 86 may be provided for operating the

pneumatic device, said key projecting from a rock shaft 87 extending from the keyboard backwardly to the rear of the machine, and carrying at its rear end a horizontal arm 88 to thrust up a link 89, the upper end of which is connected to an arm 90 provided upon the link 54, thereby lifting said link and releasing the dog 58, and causing the pneumatic actuation of the operator 42 in the manner already described; the parts again returning to normal positions, as set forth. A light spring 91 may be connected to the arm 90 and attached to a fixture, for returning the link 54 to normal position, as well as the parts connected thereto. Each of the jacks 30 is returned to normal position by means of a suitable spring (not shown). During the return of the carriage 7 to begin a new line, the wiper-cams 29, being pivoted, ride idly over the jacks.

At Fig. 4, the pneumatic devices which return the carriage to begin a new line are shown in position to be actuated at the next movement of the general computing operator 42; and at Figs. 5 and 6, certain of these carriage-returning devices are shown as having been actuated or controlled at the movement of said general operator.

In a cylinder 100, mounted horizontally at the back of the machine near the paper carriage 7 and parallel therewith, works a piston 101, having a rod 102, the latter connected by a rod or link 103 to a rock-arm 104, whereby the line-spacing of the paper is effected at the return movement of the carriage; said rock-arm 104 extending upwardly from a rock-shaft 105 mounted on the paper carriage and extending forwardly and carrying at its forward end an upstanding rock-arm 106 in position to engage and operate the line-spacing lever 107 usual on the Underwood typewriting machine; said lever operating through a pawl 108 to turn a ratchet 6^a, which is rigid with the platen 6.

The admission of compressed air through a pipe 108^a to the cylinder 100, is controlled by a valve 108^b (Figs. 4 and 5), to which is fixed an operating arm 109, whereby the valve may be turned from the closed position at Fig. 4, (in which the cylinder 100 is in communication with the atmosphere, and out of communication with the pipe 108^a) to the open position at Fig. 5, in which the cylinder is closed to the atmosphere, and compressed air is admitted through the valve or shiftable device 108^b to the cylinder.

Movements of arm 109 to control the valve may be automatically effected. An opening movement thereof is effected by the paper carriage 7. The first block 28 on said carriage engages a projection 110^a provided on a slide 110, which is mounted on a rod 111, and, during the letter-feeding movement of the carriage, moves said slide from

its normal position at Fig. 3 to the position at Fig. 4, against the tension of a returning spring 112. This slide 110 is joined by a connecting member or connection 113 to a hook or link 114, which is pivoted at its upper end to the valve arm 109; and during the movement of the slide 110 to the Fig. 4 position, said hook 114 is allowed to drop, so that its lower end 115 swings under a lever 116, the latter being pivoted between its ends at 117 upon the framework, and at its forward end having a cam portion 118 in the path of the member 44 which forms a rigid connection between the piston rod 45 and the general operator 42 of the computing wheels; so that when the general operator is actuated, that is, when it is moved to the Fig. 6 position, the lever 116, 118 is swung to draw down the hook 114, and through the arm 109 to turn the valve 108^b to open position at Fig. 5; whereupon the compressed air, being admitted to the cylinder 100, pushes the piston 101 back (or to the left at Fig. 5), and through the rods 102, 103 operates the line-spacing mechanism and also returns the carriage to position to begin a new line of writing.

After the general operator has been actuated, it is returned to normal position by spring 79; and upon the return movement of the carriage 7, the spring 112 returns the slide 110, and through the member 113 the latter draws up the hook 115 out of the path of the lever 116, so that the general operator 42 may be actuated by the piston 46 without causing the carriage to return.

The adjustable block 28, which operates the slide 110, as aforesaid, may have a cam or lifter 29 to operate the jacks 30, etc.; and when a flexible or loose connection 113 is employed between said slide and the hook 114, considerable latitude of adjustment is allowed the block 28 relatively to the block seen at Fig. 5 in engagement with the jack which controls the member 49; so that several blocks 28 may be employed, to permit several columns to be written and computed on the work sheet, while the carriage will return only at the completion of the writing of a number in the last column on each page; although the general operator 42 will be automatically actuated once for every column. However, the cam 29 upon the block 28 which operates the slide 110 may be omitted if desired.

A key 119 may also be provided at the keyboard, for the purpose of returning the carriage any time independently of the computing mechanism; said key connected to the forward end of a rock-shaft 120, having at its rear end an upstanding arm 121, connected by a link 122 to an arm 123 also provided upon the three-way valve 108. When said key 119 is operated, the valve turns (the hook 114 swinging idly down), and the

paper is line-spaced, and the carriage returned to the beginning of a line, or as far as the operator desires. A spring 124 is provided to return the valve to normal closed position at the relief of the key 119 from pressure, or at the return of the lever 116 to normal 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 typewriting and computing machine, the combination of a letter-feeding typewriter carriage; computing devices; a general operator for said computing devices; a motor connected to return said carriage and provided with a controller; and means operable automatically by or with said general operator for concomitantly actuating said controller.

2. In a typewriting and computing machine, the combination of a letter-feeding typewriter carriage; computing devices; a general operator for said computing devices; a motor connected to return said carriage and provided with a controller; and means extending from said general operator to said controller to concomitantly actuate the latter.

3. In a typewriting and computing machine, the combination of a letter-feeding typewriter carriage; computing devices; a general operator for said computing devices; means for actuating said general operator; a carriage-returning device; and means dependent upon said carriage-movement to effect a connection between said actuating means and said carriage-returning device, thereby to cause the latter to operate concomitantly with said general operator.

4. In a typewriting and computing machine, the combination with a carriage and a pneumatic device for returning the carriage, including a valve, of computing devices, a general operator for said computing devices, and means connected to said general operator for operating said valve to return the carriage.

5. In a typewriting and computing machine, the combination with a carriage and a pneumatic device for returning the same, including a valve, of computing devices, a general operator for said computing devices, a normally broken connection between said valve and said general operator, and means dependent upon the movement of the carriage for moving said connection to effective position, so that at the movement of the operator the valve shall open and the carriage return.

6. The combination with a carriage and a prime mover for returning said carriage, of a shiftable device for controlling said prime

mover, computing devices, a general operator for said computing devices, and means for connecting said general operator to said shiftable device to control the latter.

7. The combination with type keys, a carriage, a prime-mover for returning said carriage, and a carriage-feeding mechanism, of a shiftable device for controlling said prime mover, computing devices, a general operator for said computing devices, a normally broken connection between said shiftable device and said general operator, and means dependent upon the movement of the carriage for moving said connection to effective position, so that at the movement of the operator the shiftable device shall shift and the carriage return.

8. In a typewriting and computing machine, the combination with a carriage and a device for returning the carriage, including a controller, of computing devices, a general operator for said computing devices, and a hook or connection extending from said controller and controlled by said carriage and normally inoperable by said general operator, but movable at the letter-feeding movement of the carriage to a position to be operated by or concomitantly with said general operator, to operate the controller and cause the carriage to be returned.

9. In a typewriting and computing machine, the combination with a carriage and a device for returning the carriage, including a controller, of computing devices, a general operator for said computing devices, a hook or connection extending from said controller and controlled by said carriage and normally inoperable by said general operator, but movable at the letter-feeding movement of the carriage to a position to be operated by or concomitantly with said general operator, to operate the controller and cause the carriage to be returned, and a lever intervening between said general operator and said hook or connection, for causing the latter to be actuated by or with said general operator.

10. In a typewriting and computing machine, the combination with a carriage and a device for returning the carriage, including a controller, of computing devices, a general operator for said computing devices, a hook or connection extending from said controller and normally inoperable by said general operator, a slide or member movable by said carriage, a connection from said slide or member to said hook or connection, to cause the latter to move to a position to be actuated by or with said general operator, and means on said carriage to move said slide or member.

11. In a typewriting and computing machine, the combination with a carriage and a device for returning the carriage, including a controller, of computing devices, a

general operator for said computing devices, a hook or connection extending from said controller and normally inoperable by said general operator, a slide or member
 5 movable by said carriage, a connection from said slide or member to said hook or connection, to cause the latter to move to a position to be actuated by or with said general operator, means on said carriage to move
 10 said slide or member, and a spring for returning said slide or member to normal position.

12. In a typewriting and computing machine, the combination with a carriage and
 15 a device for returning the carriage, including a controller, of computing devices, a general operator for said computing devices, a hook or connection extending from said controller and normally inoperable by said
 20 general operator, a slide or member movable by said carriage, a connection from said slide or member to said hook or connection, to cause the latter to move to a position to be actuated by or with said general operator, and a block adjustable on said carriage
 25 and in position to engage a part on said slide or member, to determine the point in the run of the carriage at which said hook or connection shall be moved to effective position.

30 13. In a typewriting and computing machine, the combination, with a typewriter carriage; of computing devices; a general operator for said computing devices; a motor connected to return the carriage but normally ineffective; and means brought into
 35 operation automatically on movement of said general operator, to render said carriage motor effective.

40 14. In a typewriting and computing machine, the combination, with a carriage, and a motor for returning it, said motor normally inactive; of computing devices; a general operator therefor; a normally broken train of connections between said general operator and said motor; and means operable
 45 automatically substantially at the conclusion of computation for completing said train, so that at the ensuing movement of said general operator said motor will be rendered
 50 active.

15. In a typewriting and computing machine, the combination, with a carriage, and a motor for returning it, said motor normally inactive; of computing devices; a
 55 general operator therefor; a normally broken train of connections between said general operator and said motor; and means dependent upon the movement of said carriage for automatically completing said train, so that at the ensuing movement of said
 60 general operator said motor will be rendered active.

16. The combination with a typewriting mechanism including a traveling carriage,

of a computing mechanism including a general operator, a series of members carried by said carriage for intermittently causing the operation of said general operator, mechanism for returning said carriage, and means to enable one only of said members
 65 to control said carriage-returning mechanism concomitantly with the causing of an operation of said general operator by another of said members.

17. The combination with a computing
 75 mechanism including a general operator, of a traveling carriage, driving means for traversing said carriage, independent of origin from said general operator, and starting means for said driving means controlled
 80 from said general operator and independent of drive therefrom.

18. The combination with a computing mechanism including a general operator, of a traveling carriage, driving means for re-
 85 turning said carriage, said driving means being controllable from said general operator, and automatic means controlled from said carriage for rendering said driving means operable by said general operator or
 90 not according to the position of said carriage.

19. The combination with a computing mechanism, of a traveling carriage, returning means for said carriage, and a plurality
 95 of elements carried by said carriage, each of which controls a computing zone for said computing mechanism, and solely one of which controls the action of said returning means, to bring said carriage to the start
 100 of a new line.

20. The combination with a computing mechanism including a general operator, of a traveling carriage, a plurality of elements carried by said carriage and arranged to successively control actions of said general operator, and returning mechanism for said carriage, one of said elements also operating to control said returning mechanism.

21. The combination with a computing
 110 mechanism, of a general operator for said computing mechanism, denominational selecting mechanism for said computing mechanism, a traveling carriage, returning mechanism for said carriage, and a single carriage-carried element for controlling denominational selections of said computing mechanism, the action of said general operator and the return of said carriage.

22. The combination with type keys, a
 120 carriage, carriage-feeding mechanism, and a pneumatic device for returning the carriage, including a valve; of a shiftable valve-operating member; computing devices; a general operator for actuating said computing devices and said valve, said valve-operating member being normally ineffective for actuation by said general operator; and means

dependent upon the movement of the carriage for moving said valve-operating member to effective position with relation to the general operator, so that at the movement of the operator said valve-operating member shall be actuated and the carriage returned.

23. In a computing machine, the combination, with a paper carriage, and printing mechanism; of computing mechanism associated with said carriage; means connected to drive said computing mechanism; a motor connected to return said carriage for a new line of printing; and means for automatically operating the carriage returning means from said driving means.

24. In a computing machine, the combination, with a paper carriage, and printing mechanism; of computing mechanism associated with said carriage; a motor connected to drive said computing mechanism; a motor connected to return said carriage for a new line of printing and provided with a controller; and means connected to automatically actuate said controller from the first-named motor.

25. In a computing machine, the combination, with a paper carriage, and printing mechanism; of computing mechanism associated with said carriage; means connected to drive said computing mechanism; a motor connected to return said carriage for a new line of printing and provided with a controller; a normally broken train of connections between said controller and the driving means to actuate the latter from the former; and means for automatically completing said train under control of said typewriter carriage.

26. In a computing machine, the combination, with a paper-carriage, and printing mechanism; of computing mechanism; a motor connected to drive said computing mechanism; a motor connected to return said carriage for a new line of printing; means for automatically operating the second-named motor from the first-named motor; a normally broken connections between said two motors whereby both said first-named and

second-named motors may be operated at will.

27. The combination, with computing mechanism; of a traveling carriage; automatic means for effecting a plurality of successive actions of said computing mechanism during a single run of the carriage, so as to effect cross-computation; carriage-returning means; and means controlled automatically by the first-named means for operating said carriage-returning means solely at the conclusion of the last computation during such run.

28. The combination, with computing mechanism; of a traveling carriage; a normally-inactive motor for returning said carriage; and a plurality of elements carried by said carriage, each of which controls a computing zone for said computing mechanism, and solely one of which controls the starting of said motor, to bring said carriage to the start of a new line.

29. The combination, with computing mechanism, and a motor for driving it; of a traveling carriage; a normally-inactive motor for returning said carriage; and a plurality of elements carried by said carriage, each of which controls the activity of the first-named motor, to effect an operation of said computing mechanism, and solely one of which controls the activity of the second-named motor, to bring said carriage to the start of a new line.

30. The combination, with computing mechanism, and a motor for driving it; of a traveling carriage; a motor for returning said carriage; automatic means for effecting a plurality of successive operations of said computing mechanism by the first-named motor during a single run of the carriage; and automatic means for effecting the return of said carriage by the second-named motor substantially at the conclusion of the last computation during such run.

FRED F. MAIN.

Witnesses:

HARLAND V. MAIN,
RAY F. MAIN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."