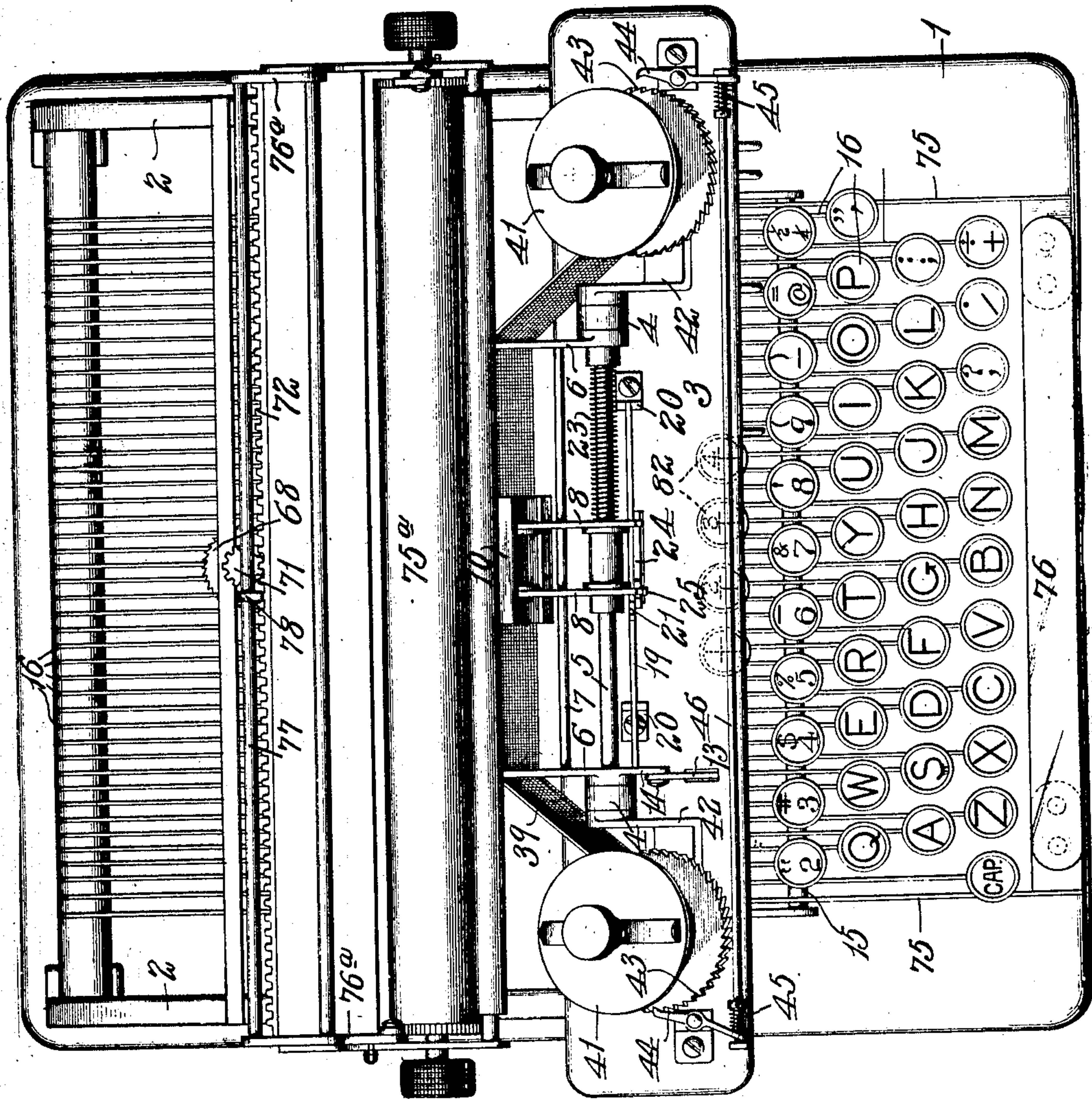


No. 860,296.

PATENTED JULY 16, 1907.

W. W. HOPKINS.
TYPE WRITING MACHINE.
APPLICATION FILED DEC. 4, 1906.

5 SHEETS—SHEET 1.



Witnesses:
Geo. R. Ladson.
Nels L. Church.

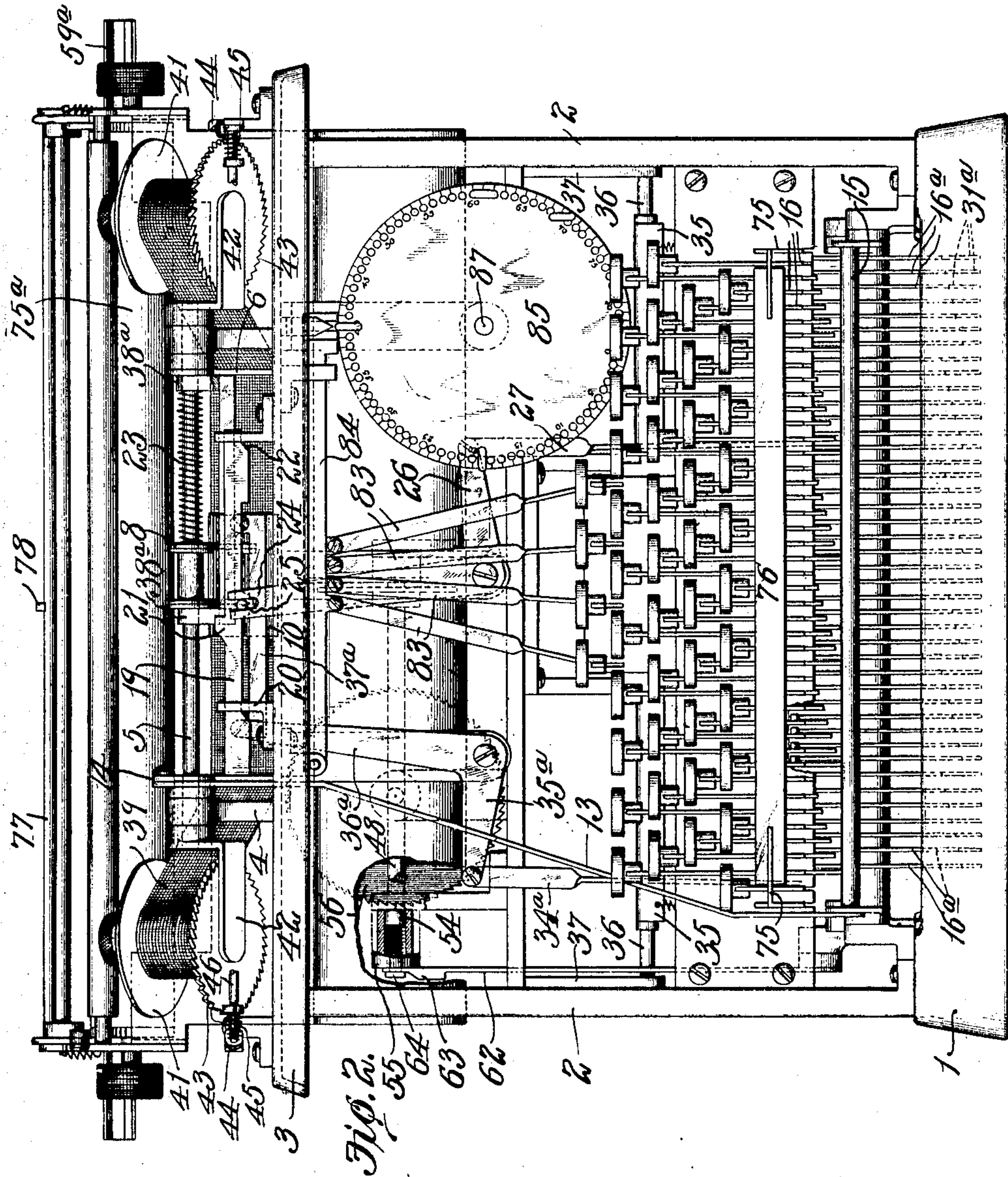
Inventor:
William W. Hopkins.
By Baker & Carnwall Attys.

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5 SHEETS—SHEET 2.



Witnesses:

Geo. R. Radson.
Melb L. Church

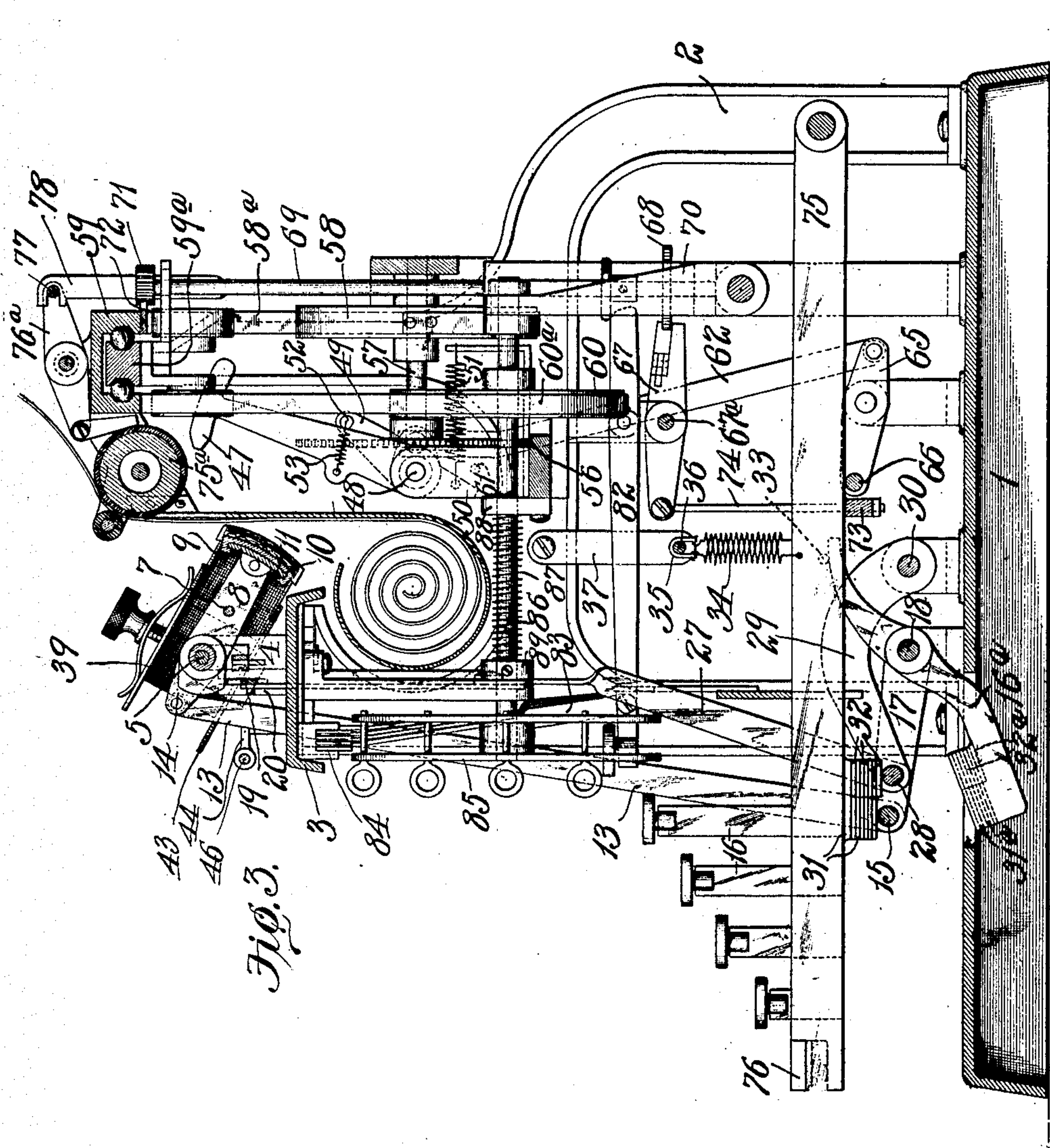
Inventor,
William W. Hopkins.
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6 SHEETS—SHEET 3.



Witnesses:
Geo. R. Radson.
Melb. L. Church.

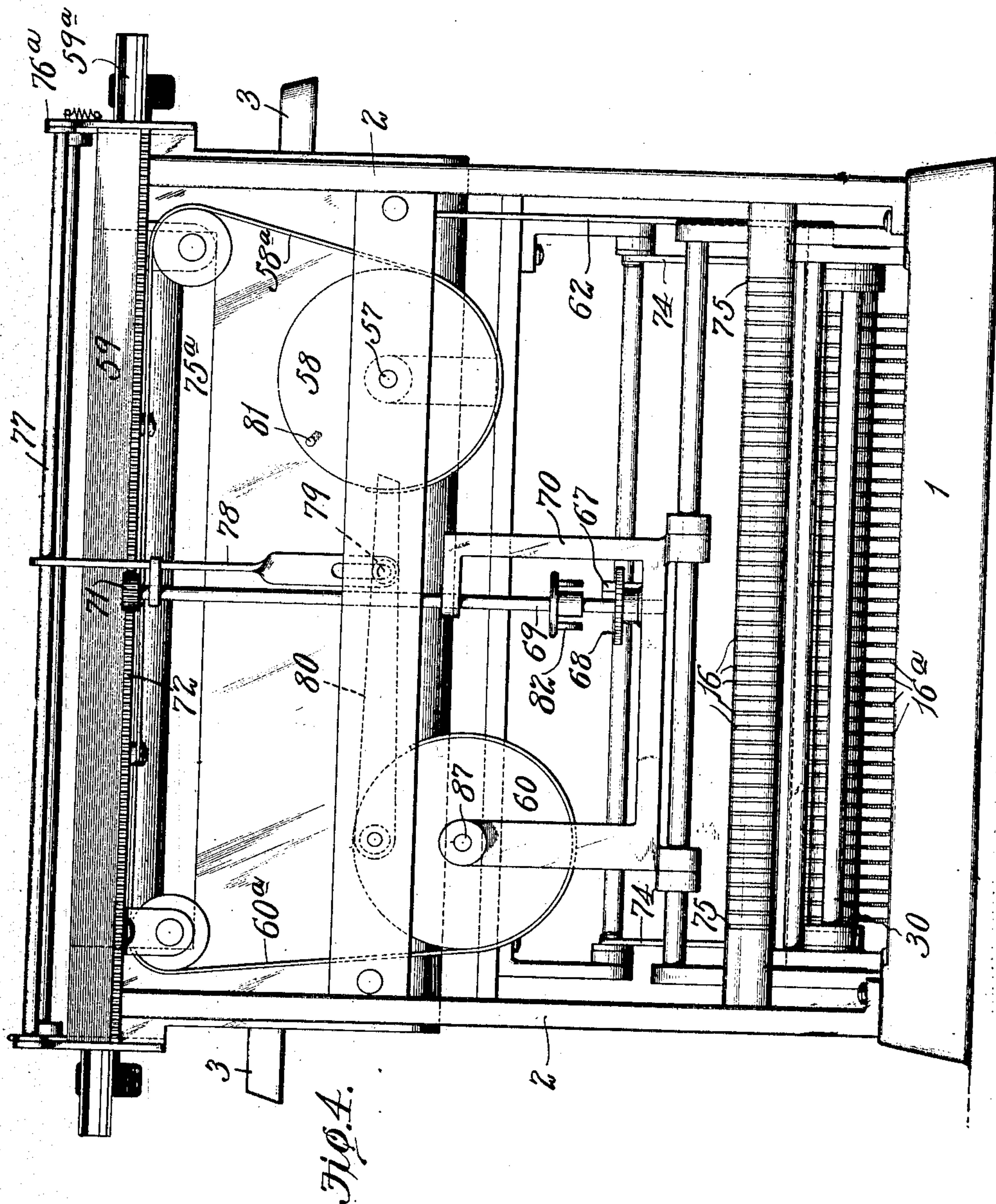
Inventor,
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6 SHEETS—SHEET 4.



Witnesses:
Geo. R. Kadosh.
Melb L. Church.

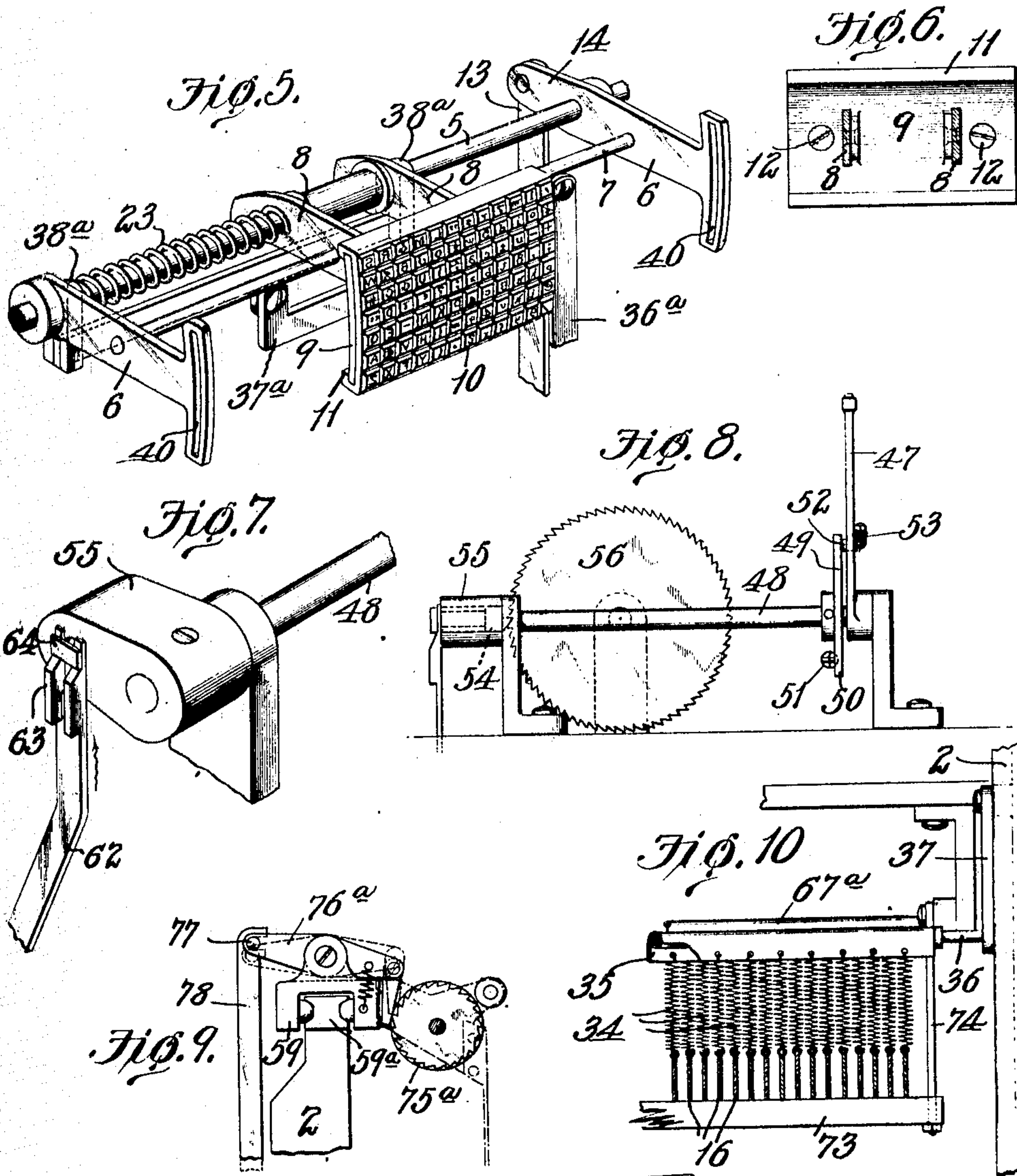
Inventor,
William W. Hopkins
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5 SHEETS—SHEET 5.



Witnesses: *Geo. R. Hadson.*
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Inventor,
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UNITED STATES PATENT OFFICE.

WILLIAM W. HOPKINS, OF ST. LOUIS, MISSOURI, ASSIGNOR, BY MESNE ASSIGNMENTS, TO
THE MOON-HOPKINS BILLING MACHINE COMPANY, OF ST. LOUIS, MISSOURI, A CORPO-
RATION OF MISSOURI.

TYPE-WRITING MACHINE.

No. 860,296.

Specification of Letters Patent.

Patented July 16, 1907.

Application filed December 4, 1906. Serial No. 346,270.

To all whom it may concern:

Be it known that I, WILLIAM W. HOPKINS, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Type-Writing Machines, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a plan view of a machine embodying the features of my invention; Fig. 2 is a front elevation of same; Fig. 3 is a vertical transverse sectional view; Fig. 4 is a rear elevation; Fig. 5 is a detail perspective view of the type plate carrier and the mechanism for bodily shifting it laterally; Fig. 6 is a detail view showing the manner of connecting the type plate to its carrier; Figs. 7 and 8 are detail views of parts of the mechanism for locking the shaft on which the printing hammer is mounted; Fig. 9 is a detail view of the paper feeding roll and its actuating mechanism; Fig. 10 is a detail view showing the manner of mounting the returning springs for the key levers; and Fig. 11 is a detail view showing the key levers and their cooperating stops.

This invention relates to typewriting machines and particularly to that type of machines which comprises a plate provided with raised characters consisting of numerals and the letters of the alphabet and means for moving said plate vertically and transversely to position the characters thereon in alinement with a printing hammer which is actuated to force the sheet of paper, together with an inking ribbon into contact with the characters on the plate in alinement with the hammer.

One object of my invention is to provide improved means for moving the type plate so as to accurately position the characters thereon in alinement with the printing hammer and thus insure perfect alinement.

Another object is to provide improved means for actuating the printing hammer so that it will strike the characters on the type plate with a yielding and uniform pressure irrespective of the force with which the keys of the machine are pressed downwardly. And still another object of my invention is to provide a machine comprising few parts and which is so constructed that there are very few parts arranged in front of the sheet of paper being operated on, thereby enabling the operator to readily see what is being written. Other desirable features of my machine will hereinafter be pointed out.

Referring to the drawings which represent the preferred form of my invention, 1 designates the base of the machine to which the side frames 2 are connected,

and 3 designates a cross piece fastened to the side frames. Said cross piece carries supports 4 in which a rock shaft 5 is journaled and fastened to said shaft are arms 6 that are connected together by a rod 7 to form a rocking frame on which the type plate carrier is slidably mounted. Said type plate carrier is shown clearly in Fig. 5 and consists of two arms 8 loosely mounted on the shaft 5 and connected at their outer ends to a head piece 9, the rod 7 of the rocking frame extending through openings in said arms. The type plate 10 is removably mounted on its carrier, so that plates provided with different kinds of type can be used, and said type plate is provided with flanges 11 that partially incase the head piece 9, thereby forming practically a dove-tailed connection between these two members which prevents the type plate from shifting vertically, said plate being prevented from longitudinal movement by means of screws 12.

The characters on the type plate herein shown consist of the small and capital letters of the alphabet together with eight numerals and numerous punctuation marks arranged in twelve vertical columns comprising seven characters to a column, the capital letters forming part of the six columns at the left-hand half of the plate (looking at Fig. 5) and the small letters forming part of the six columns at the right-hand half of the plate. A printing hammer cooperates with the type plate to force the paper and inking ribbon into contact with the individual characters on said plate and accordingly it is necessary to move said plate vertically and transversely to bring the different characters into alinement with the printing hammer.

When the type plate is in normal position, the first vertical row of small letters; namely, the seventh row of letters from the left-hand end of the type plate looking at Fig. 5, will be in alinement with the printing hammer so that when said type plate is moved toward the left, looking at Fig. 5, the other vertical rows of small letters will be brought into alinement with the printing hammer. The vertical and transverse movements of the type plate are produced by the depression of the key levers which act on devices that oscillate the swinging frame on which the type plate carrier is mounted and also shift said carrier transversely of the frame. The device for oscillating the swinging frame consists of a link 13 connected at its upper end to a forwardly extending portion 14 of one of the arms 6, see Fig. 3, and at its lower end to a bar 15 extending transversely underneath all of the key levers 16 and carried by arms 17 connected to a rock shaft 18.

The means for moving the type plate carrier transversely of the swinging frame, to the left of Fig. 5, consists of a bar 19 slidably mounted in guides 20 on the cross piece 3 and provided with an upwardly project-

ing lug 21 that coöperates with the forwardly extending end of one of the arms 8 of the type plate carrier. When the bar 19 is in its normal position its lug 21 will lie in a lower horizontal plane than the arms 8 of the type plate carrier but as said bar is moved transversely, the inclined surfaces 22 thereon cause said bar to raise high enough to bring its lug 21 into engagement with the arm 8 and thus move the type plate carrier to the left, looking at Fig. 5, so as to bring the second, third, fourth, fifth and sixth vertical rows of small letters into alinement with the hammer, said carrier being returned to normal position by means of a spring 23 surrounding the shaft 5 between an abutment and one of the arms 8.

The means for actuating the bar 19 consists of a bell crank lever of which the arm 24 is provided with a bifurcated end that receives a pin 25 on bar 19, the other arm 26 of said lever being fastened to a link 27 secured at its lower end to a transversely extending bar 28 arranged under the key levers and carried by arms 29 fastened to a rock shaft 30.

In order that the type plate carrier can move various distances vertically and horizontally to permit each character on the type plate to register with the printing hammer I have provided means for causing the links 13 and 27 to be moved for varying distances. Said means consist of pairs of extensions or lugs 31 and 32 on the underneath sides of the key levers 16 arranged over the bars 15 and 28, respectively, to which the links 13 and 27 are connected. The lugs or extensions on the key levers vary in length, some of them, for example, the lugs 32 on the key levers which correspond to the characters in the lower horizontal row of the type plate, being of the same length because the type plate must move vertically the same distance every time one of the characters in the lower row is printed. Said plate, however, must be moved transversely a different distance to bring each character in said lower row into alinement with the printing hammer and accordingly the lugs 31 on said lower row key levers must be of different lengths, thereby causing the link 13 to be moved a different distance each time one of said key levers is operated while the link 27 is moved the same distance each time one of the key levers for the lower row is operated. A stop 16^a is provided for each key lever to control its downward movement, said stops being pivotally mounted on the shaft 18 and arranged intermediate the key levers. At the forward end of each stop are two lugs or extensions 31^a and 32^a which correspond in length to the lugs or extensions on the key lever with which said stop coöperates, the lug 31^a on the stop corresponding in length to the lug 32 of the key lever and the lug 32^a on the stop corresponding in length to the lug 31 on the key lever. Each key lever is provided with a laterally projecting pin 33, which when the key lever is depressed, engages the rear end of the stop for said lever and thus swings the front end of said stop upwardly until its lugs 31^a and 32^a have come into contact with the bars 15 and 28 which are being forced downwardly by the stops or projections on the key lever. Further downward movement of the key lever is prevented by the stop and as the bars 15 and 28 are clamped securely between said coöperating stops, the type plate will be locked in its adjusted position.

Another advantage of a construction of this character is that the type plate is moved both transversely and vertically by positively actuated links, thereby insuring an accurate alinement of the characters and printing hammer.

The key levers are returned to normal position by means of springs 34 which are connected alternately to the opposite legs of a U-shaped device 35 resting on a rod 36 carried by links 37 pivoted to the side frames of the machine, this construction being inexpensive to manufacture and also enabling repairs to be made easily.

The printing of the capital letters and also some of the punctuation marks is effected by bodily shifting the type plate to the right of Fig. 5 so that portion of said plate which carries the capital letters and also some of the punctuation marks; namely, the left-hand half of said plate looking at Fig. 5, will occupy the position formerly occupied by the right-hand half of said plate, the small and capital letters occupying the same relative positions on each half of the type plate. This bodily shifting of the type plate toward the right, to bring the capital letters into operative position, is produced by depressing the capital key, the lever of which is connected by means of a link 34^a to the arm 35^a of a bell crank lever. The other arm 36^a of said lever is connected by means of a link 37^a to the cross piece of a frame comprising arms 38^a between which the type plate carrier and its returning spring 23 are located, one of said arms acting as the abutment for the spring 23, as shown in Fig. 5.

The inking ribbon 39 extends across the face of the type plate and through guides 40 on the ends of the arms and is wound on spools 41 rotatably mounted on brackets 42 secured to the opposite ends of the rock shaft 5. Each spool is provided with a ratchet 43 that coöperates with a pawl 44 pivotally mounted on the cross piece 3 and forced into engagement with its ratchet by a spring 45. Only one pawl is in operative position at a time so that the ribbon will be fed one step forward each time the rocking frame for the type plate carrier is actuated, thereby causing the inking ribbon to be wound from one spool onto the other spool. When the spool has become filled its pawl is moved into an inoperative position and the pawl for the other spool is moved into operative position so that the ribbon will be automatically rewound onto said spool.

I do not herein claim this ribbon mechanism as it forms the subject-matter of my pending application Serial No. 346,271, filed December 4, 1906.

A bar 46 is provided for governing the positions of the pawls for the ribbon spools and said bar is connected at its opposite ends to the pawls 44 so that movement of the bar in one direction will cause one pawl to become operative and the other pawl inoperative. The printing hammer 47 is loosely mounted on a shaft 48 and rigidly connected to said shaft adjacent the printing hammer, is an arm 49 provided at its lower end with a tail 50 carrying a pin to which one end of a coiled contraction spring 51 is secured, the other end of said spring being fastened to a stationary support. At the upper end of the arm 49 is a laterally projecting pin 52 which is held normally in engagement with the rear edge of the shank of the print-

ing hammer by means of a coiled spring 53 connected to said hammer and pin 52, as shown in Fig. 3.

Means is provided for locking the rock shaft 48 to hold the printing hammer in inoperative position away from the type plate. Said means consists of a spring-actuated plunger 54 mounted in an arm 55 connected to the left-hand end of the shaft 48 and cooperating with a ratchet toothed wheel 56, as shown in Figs. 2 and 8. This ratchet toothed wheel is fastened to the shaft 57 of the spring motor 58 which is connected by a band 58^a to the paper carriage 59 for moving said carriage from right to left, said carriage traveling transversely of the machine on the track 59^a and being of substantially the same construction as shown in my pending application Serial No. 346,272, filed December 4, 1906.

Referring again to the locking means for the shaft 48 on which the printing hammer is mounted, Fig. 3 shows the printing hammer in its inoperative position and at such times the arm 55 on the end of the shaft 48 will occupy the position shown in Figs. 7 and 8 due to the force which the ratchet toothed wheel 56 exerts on the arm 55 by means of the spring-pressed plunger 54, thereby securely locking the shaft 48. Whenever the locking dog 54 is withdrawn from engagement with the ratchet toothed wheel 56 the shaft 48 will be unlocked and the spring 51 connected to the tail end of the arm 49, will then rock said shaft in the direction of the arrow in Fig. 3 to cause the pin 52 at the upper end of the arm 49 to engage the shank of the printing hammer 47 and move it toward the printing plate. The forward movement of the arm 49 is suddenly arrested by a fixed stop 61 which engages the tail 50 on the end of said arm before the printing hammer has struck the character on the type plate but the momentum will cause said hammer to continue its forward movement and strike the character on the type plate a quick sharp blow, the hammer being then moved out of engagement with said character by means of the spring 53, the printing hammer not being returned to normal position, however, until the key is released.

The great advantage of a construction of this character is that it causes the hammer to strike the character on the type plate with a substantially yielding pressure which is always the same irrespective of the force with which the operator strikes the keys on the key levers 16. The locking plunger 54 is withdrawn from engagement with the ratchet toothed wheel 56 by means of a link 62 provided at its upper end with a wedge 63 that extends underneath a head 64 on the end of said plunger, as shown in Figs. 2 and 7, the lower end of said link being connected to a rock arm 65. A rod 66 is connected at one end to the rock arm 65 and at its other end to a rock arm at the other side of the machine, and said rod extends underneath all of the key levers so that whenever one of said levers is depressed the link 62 will be elevated to cause the plunger 54 to be moved out of engagement with the ratchet toothed wheel. As soon as the shaft 48 has been rocked forwardly by the means previously described, the locking plunger will be released from engagement with the wedge on the end of the link 62 due to the fact that the arm 55 has rocked upwardly and said plunger will then move into engagement with

a different tooth on the wheel 56. When said wheel rotates; namely, when the paper carriage moves one step laterally, the movement of the ratchet toothed wheel will rock the shaft 48 in the reverse direction to that indicated by the arrow in Fig. 3 and thus return the printing hammer to its inoperative position away from the type plate. The key levers 16, as previously described, are returned to normal position by means of springs 34 and the weight of the link 62 causes it to drop down to its normal position as soon as the key levers pass out of contact with the rod 66.

As previously stated, the paper carriage is moved transversely of the machine by means of the spring motor 58, a step-by-step movement being given to the carriage by means of an escapement mechanism which may be of any preferred design. I have herein shown an escapement mechanism which consists of a rock arm 67 provided with a fixed tooth and a yielding tooth that cooperate with an escapement wheel 68 on a vertical shaft 69 mounted in an oscillating frame 70 at the rear of the machine, the shaft 69 being provided at its upper end with a pinion 71 that meshes with a rack 72 on the paper carriage when the oscillating frame is in normal position. A bar 73 is connected by means of links 74 to arms on the rock shaft 67^a to which the arm 67 is secured, and said bar extends underneath all of the key levers and also underneath the levers 75 of the spacing key 76 so that when the spacing key or any of the type keys are depressed the arm 67 will be rocked and thus permit the shaft 69 to rotate so as to move the paper carriage a distance of one letter space.

The paper carriage is provided with an apron against which the sheet of paper lays and with a paper feeding roll 75^a of the same construction as shown in my pending application Serial No. 346,272, above referred to, said feeding mechanism comprising a rock lever 76^a provided with a pawl which cooperates with a ratchet wheel on the end of the feed roll, said rock lever being connected to a transverse rod 77. A link 78 is fastened to said rod and is provided at its lower end with an elongated slot which receives a pin 79 on the end of a lever 80 pivotally connected to a stationary member, the free end of said lever extending into the path of a projection 81 on the drum 58 so that said lever will be automatically actuated to pull the link 78 downwardly and thus actuate the feeding pawl when the drum 58 reaches a certain position, preferably, when the paper carriage reaches the end of its transverse movement.

The machine herein shown is also provided with mechanism for arresting the paper carriage at certain positions in its lateral movement to enable tabular work to be performed but as said mechanism is substantially the same as that shown in my pending application Serial No. 346,273, filed December 4, 1906 a detailed description of same is not deemed necessary. Briefly stated, said mechanism comprises tabulating keys 82, the levers of which are connected by means of links 83 to stop levers 84 that cooperate with stop pins on a disk 85 secured to the front end of the shaft 86 of a spring drum 60 having a weaker spring than the motor 58 and being connected by a band 60^a to the paper carriage, the oscillating frame being actuated to move the gear on the escapement shaft out of con-

tact with the rack on the carriage, by the ends of the tabulating key levers which engage a cam on the escapement shaft. In the construction herein shown the escapement shaft oscillating frame can also be actuated by pressing the disk 85 rearwardly, the shaft 86 of the drum 60 being secured at its rear end to one of the arms of the oscillating frame 70, as shown in Figs. 3 and 4. As soon as the disk 85 is relieved from pressure the oscillating frame 70 will be returned to normal position so as to bring the pinion 71 on the escapement shaft into mesh with the rack on the paper carriage by means of a spring 87 surrounding the shaft 86 between a stationary abutment 88 and a collar 89 on said shaft.

15. Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A typewriting machine comprising a type plate, key levers provided with differential contact surfaces, members adapted to be actuated by said contact surfaces for moving the type plate vertically and horizontally, and means arranged oppositely to said contact surfaces and in vertical alinement therewith to engage the opposite sides of said members and thus lock them in the positions to which they have been moved by the key levers; substantially as described.

2. A typewriting machine comprising a type plate carrier, key levers provided with differential contact surfaces, members adapted to be actuated by said surfaces for moving the type plate carrier vertically and transversely, and means movable relatively to said key levers and arranged oppositely to said contact surfaces to cooperate therewith for controlling the degree of movement imparted to the members that move the type plate carrier; substantially as described.

3. A typewriting machine comprising a type plate carrier, key levers provided on their lower sides with contact faces, members arranged underneath said contact faces and adapted to be actuated thereby, for moving the type plate carrier vertically and transversely, and means arranged under said members and adapted to be actuated by the key levers for limiting the movement imparted to said members by the contact surfaces on the key levers, said means being separate and distinct from the key levers and being movable relatively thereto; substantially as described.

4. A typewriting machine comprising a type plate, key levers provided with differential contact surfaces, members adapted to be actuated by said surfaces for moving the type plate vertically and transversely, and stops provided with differential surfaces which cooperate with those on the key levers for governing the movements of said members; substantially as described.

5. A typewriting machine comprising a type plate carrier, key levers provided on their under sides with differential contact surfaces, members arranged underneath said key levers and adapted to be actuated by the differential contact surfaces thereon for moving the type plate carrier vertically and transversely, pivotally mounted stops provided with differential contact surfaces which cooperate with those on the key levers to clamp said members, and means on the key levers for actuating said stops; substantially as described.

6. A typewriting machine comprising a type plate carrier, key levers, a member arranged under said levers and adapted to be actuated thereby, a positive connection between said member and carrier, thereby insuring the same degree of movement being imparted to the carrier that is imparted to said member, and movable stops located underneath said member and adapted to be actuated by the key levers for controlling the limit of movement of said member; substantially as described.

7. A typewriting machine comprising a type plate carrier, an oscillating frame on which said carrier is mounted, key levers, all of which are arranged parallel to each other and provided with differential contact surfaces, parallel members extending across all of said levers and adapted to be actuated by said contact surfaces, a link con-

necting one of said members to the oscillating frame for moving the type plate vertically, a device for moving said type plate carrier transversely of its frame, a bell crank pivotally connected to said device, and a link connecting said bell crank to the other member which the key levers actuate; substantially as described.

8. A typewriting machine comprising a paper carriage and means for moving it, a type plate, a cooperating hammer, a rock shaft on which said hammer is loosely mounted, a yielding connection between said shaft and hammer, key levers, means for locking said shaft to hold the hammer in an inoperative position, means actuated by the depression of the keys for releasing said shaft, means for rocking the shaft to actuate the hammer, and means actuated by the carriage moving means for rocking the shaft in the opposite direction to return the hammer to its normal position; substantially as described.

9. A typewriting machine comprising a paper carriage and means for moving it, a type plate, a cooperating hammer, means for moving it toward the type plate, a rock shaft on which the hammer is mounted, means for transmitting the movements of said arm to the hammer, and a toothed wheel actuated by the carriage moving means for engaging an arm on said rock shaft to return the hammer to normal position; substantially as described.

10. A typewriting machine comprising a paper carriage, a spring drum for imparting movement to same, a type plate, a cooperating hammer, a rock shaft provided with an arm for engaging and moving said hammer toward the type plate, means for actuating said shaft, an arm connected to said shaft and having a plunger mounted therein, and a ratchet toothed wheel secured to the shaft of the spring drum and cooperating with said plunger to return the rock shaft to normal position and lock it; substantially as described.

11. A typewriting machine comprising a type plate, a hammer cooperating therewith, mechanism for moving the hammer towards and away from the type plate, a locking device for retaining the hammer in an inoperative position consisting of a spring-actuated plunger cooperating with a member that moves step by step with the paper carriage of the machine, key levers, a member actuated by said key levers, and a link connected to said member for moving the plunger into an inoperative position to release the hammer; substantially as described.

12. A typewriting machine comprising a paper carriage provided with a rack, an escapement shaft provided with a pinion which meshes with the rack on the carriage, an oscillating frame in which said escapement shaft is mounted, spring drums for actuating said carriage, one of said drums comprising a horizontally disposed shaft which at its rear end is connected to the oscillating frame, a coiled spring surrounding said shaft between a stationary abutment, and a collar on the shaft for holding the oscillating frame in normal position, a stop disk secured to the front end of said shaft, and movable stops cooperating with the stop on said disk; substantially as described.

13. A typewriting machine provided with key levers, a rod extending transversely of said key levers, a U-shaped device mounted on said rod, and coiled springs secured to said U-shaped member and to the key levers, some of said springs being connected to one leg of said member and the other springs being connected to the other leg of said member; substantially as described.

14. A typewriting machine comprising key levers, a transversely extending rod arranged over said levers, links for supporting said rod, a U-shaped member mounted on said rod, and coiled springs connected to the U-shaped member and to the key levers, some of said springs being connected to one leg of said member and the other springs being connected to the other leg of said member; substantially as described.

In testimony whereof I hereunto affix my signature in the presence of two witnesses, this twenty seventh day of November 1906.

WILLIAM W. HOPKINS.

Witnesses:

WELLS L. CHURCH,
GEORGE BAKERWELL.