

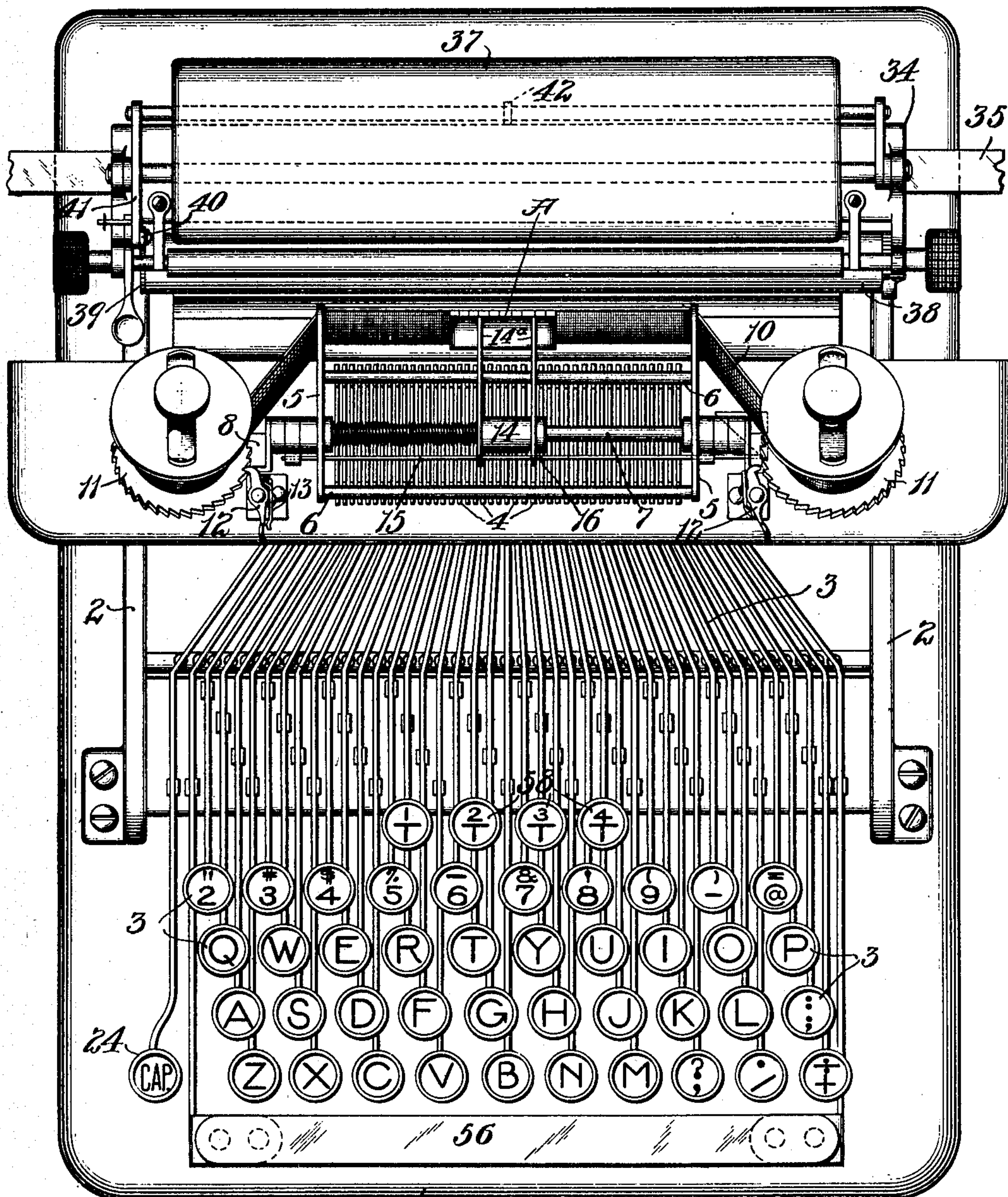
No. 860,215.

PATENTED JULY 16, 1907.

W. W. HOPKINS.
TYPE WRITING MACHINE.
APPLICATION FILED AUG. 15, 1906.

6 SHEETS—SHEET 1

Fig. 1.



Witnesses:

Geo. R. Ladson.
Edgar T. Farmer

Inventor,
William W. Hopkins.

By Bakewell Cornwall Att'ys.

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6 SHEETS—SHEET 2.

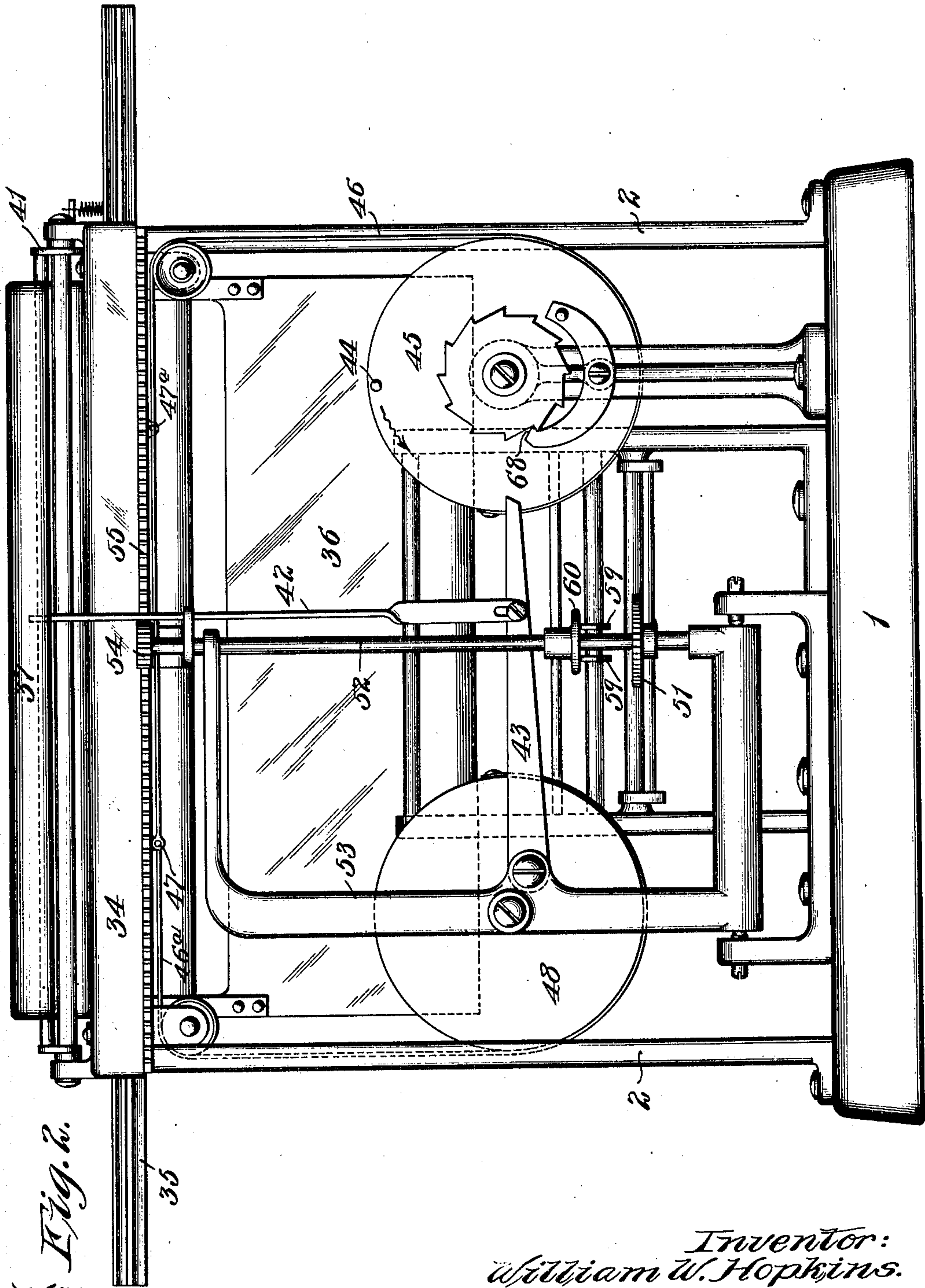


Fig. 2.
Witnesses:
Fred Beck.
Geo. P. Radson.

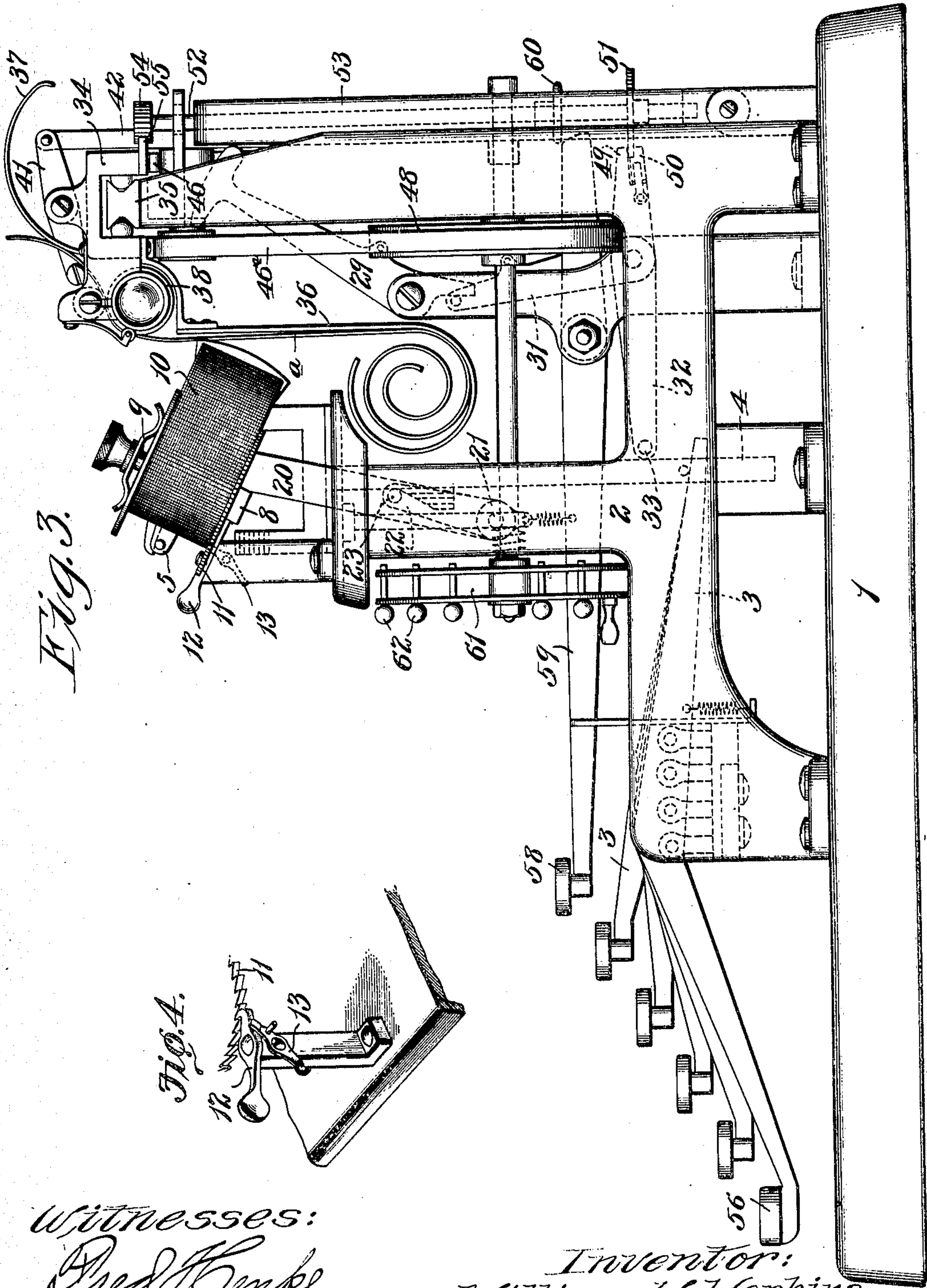
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6 SHEETS—SHEET 3.



Witnesses:
Fred Henck.
Geo. R. Radson.

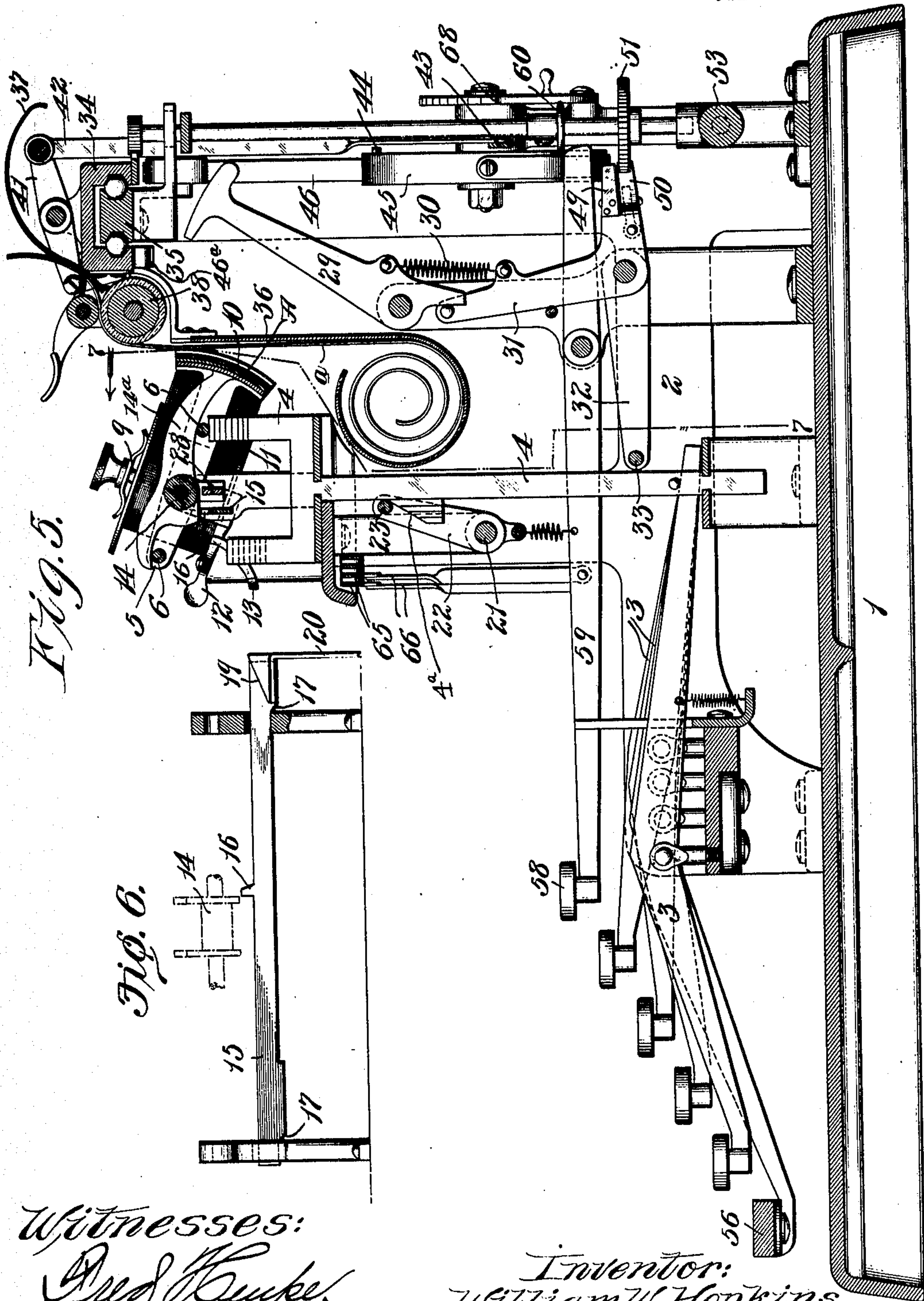
Inventor:
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6 SHEETS—SHEET 4.



Witnesses:
Fred Kunkel
Geo. R. Ladson.

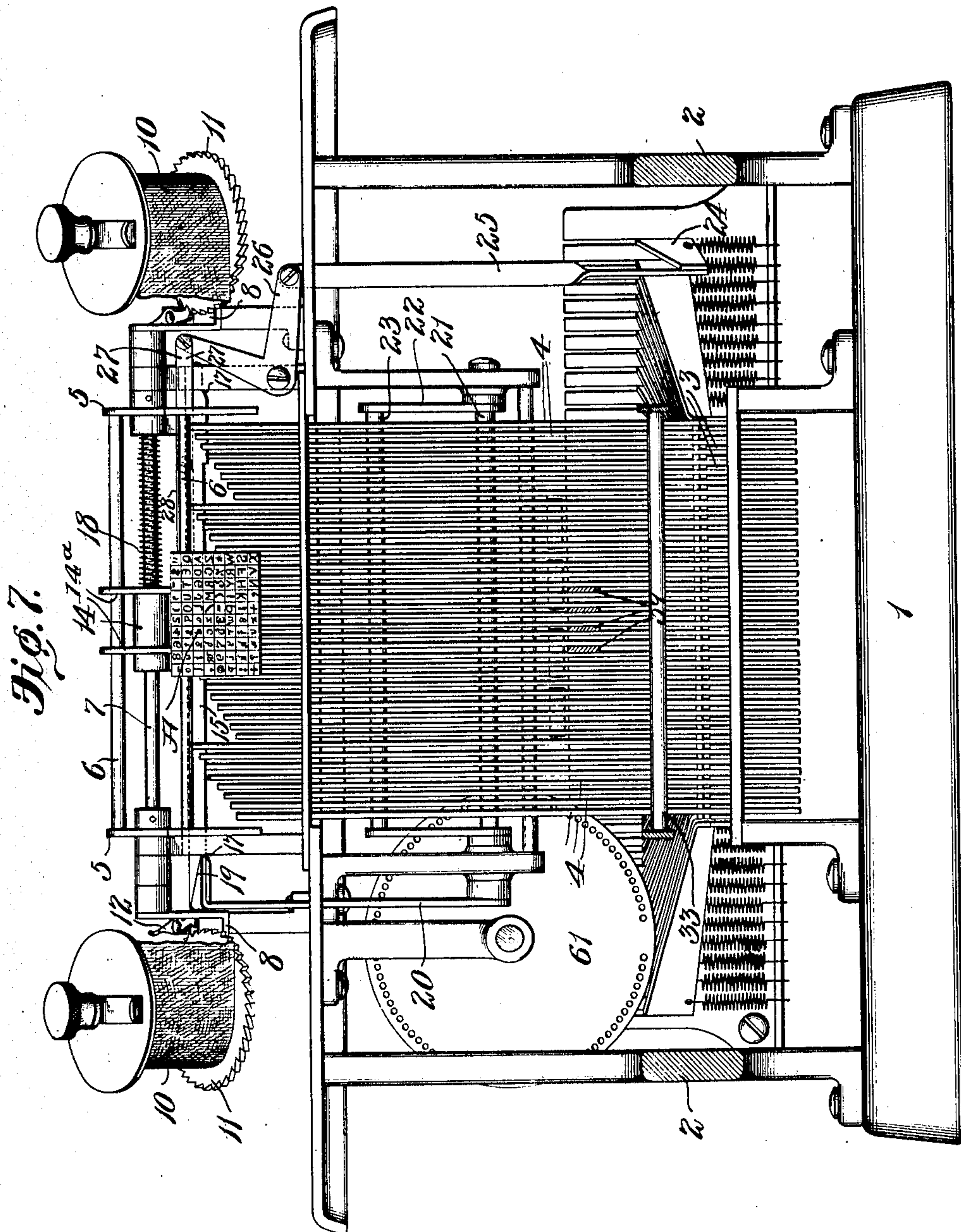
Inventor:
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6 SHEETS—SHEET 5.



Witnesses:
Geo. R. Ladson.
Edgar T. Farmer

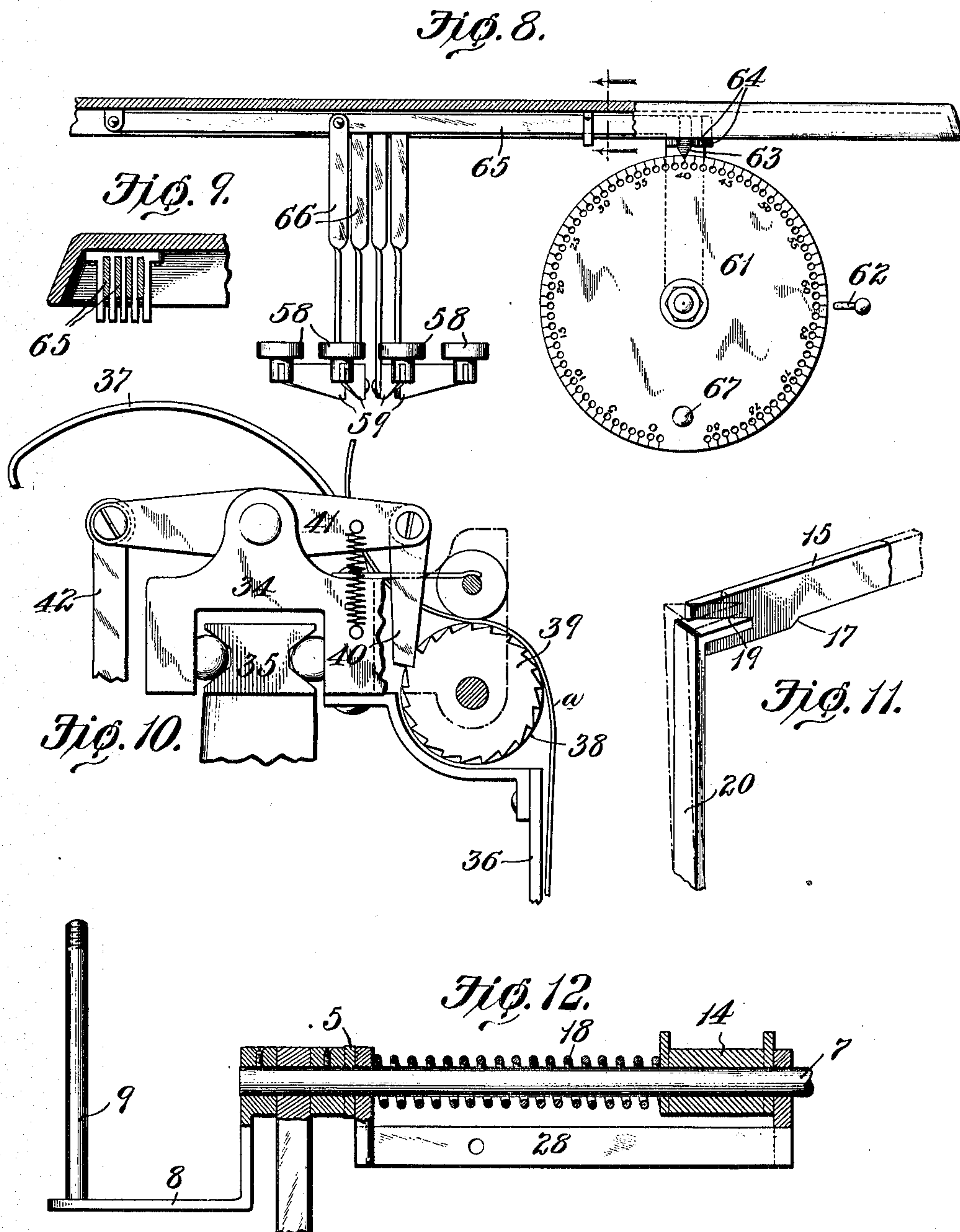
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W. W. HOPKINS.
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APPLICATION FILED AUG. 16, 1906.

6 SHEETS—SHEET 6.



Witnesses:
Geo. K. Ladson.
Edgar J. Farmer

Inventor,
William W. Hopkins.
By Bakewell Cornwall Atty's.

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 CORPORATION OF MISSOURI.

TYPE-WRITING MACHINE.

No. 860,215.

Specification of Letters Patent.

Patented July 16, 1907.

Application filed August 15, 1906. Serial No. 330,726.

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 top plan view of my improved type-writing machine; Fig. 2 is a rear elevational view of the same; Fig. 3 is a side elevational view; Fig. 4 is a detail view illustrating the pawl for operating the ribbon spools; Fig. 5 is a vertical longitudinal sectional view; Fig. 6 is a detail view illustrating means for shifting the type-carrier laterally; Fig. 7 is a vertical sectional view on the line 7—7 of Fig. 5 looking toward the forward end of the machine; Fig. 8 is a detail view of parts of the tabulating mechanism; Fig. 9 is a sectional view on the line 9—9 of Fig. 8; Fig. 10 is a side elevational view of the carriage; Fig. 11 is a detail view showing the cam for shifting the type-carrier laterally; and Fig. 12 is a detail view showing the shaft on which the type-carrier is mounted.

This invention relates to typewriting machines and particularly to that class which comprises a member provided with type or printing characters and means for moving said member to cause the individual characters thereon to be brought into alinement with a printing hammer which forces the sheet of paper and the inking ribbon into contact with the character.

Prior to my invention the typewriting machines of this class which had been in general use, were so constructed that the type member had to return to a certain position after a character had been printed before another character could be printed, thereby preventing the machine from being operated at a high speed. Furthermore, the characters were so arranged on said member that it had to be rocked or rotated in one direction to bring one-half the characters thereon into alinement with the printing hammer and in the reverse direction to bring the remaining characters into alinement with the printing hammer. Accordingly, if a key was depressed to cause a character of one group to be printed and then a key for one of the characters in the other group was depressed before the type member had returned to its given position, the machine would become locked and thus prevent the character from being printed as well as causing the loss of a great deal of time in restoring the parts to their normal position.

Another objectionable feature of said machines was that the wearing away of the part that actuated the type member would cause said member to fall short in

its movements so that the characters would not be printed in perfect alinement.

One object of my invention is to provide a typewriting machine which is so constructed that the type member does not have to be returned to any given position after it has been actuated to print a character, thereby enabling the machine to be operated at a high speed.

Another object of my invention is to provide a machine having a type member on which the characters are arranged in a single group and which is moved in the same general direction to cause each character thereon to be printed so that there is no liability of locking the machine in case any two keys should be depressed at the same time.

Another object of my invention is to provide a machine in which the wearing away of the parts will not affect the alinement of the printing characters. And still another object of my invention is to provide a machine in which the printing on the sheet of paper will be visible to the operator.

Other desirable features of my improved machine will be hereinafter pointed out.

In the drawings which represent the preferred form of my invention, 1 indicates the base of a machine upon which are arranged the side frame pieces 2. These frame pieces support the moving parts of the machine.

3 are the key levers whose forward ends are provided with the usual heads bearing characters corresponding to the printing characters controlled by each particular key lever. The rear ends of these key levers are arranged under lateral projections on the stems 4 of the positioning bars. These stems are guided vertically by suitable notched plates secured to the framing of the machine, and each stem carries a head at its upper end, which head is provided with contact faces for engagement with cradle bars on which the type carrier is mounted. The construction of this cradle or rocking frame is best seen in Figs. 1, 5 and 7, and consists of two end plates 5 which are extended rearwardly so as to support and guide the inking ribbon which moves therewith. These end pieces carry bars 6, which bars extend over the heads carried by the stems 4.

7 is a shaft journaled in posts rising from the top frame plate of the machine and the end plates 5 of the cradle are secured to said shaft. The shaft 7 carries at its ends two bent arms 8, see Fig. 12, which arms are provided with spindles 9 on which are arranged the ribbon spools. These spools are held on the posts or spindles 9 by suitable thumb nuts screwed on the upper ends of the posts and impinging against spring washers which bear upon the spools. The bent arms 8 are fixed to the shaft 7 and rock therewith. In this manner the inking ribbon designated at 10, where it

moves past the end pieces 5 of the cradle, is caused to rock with the shaft 7. The rocking motion of the ribbon spools is utilized to cause the feed of the ribbon from one spool to the other. Each ribbon spool has a ratchet 11 conjoined thereto with which is adapted to cooperate a pawl 12 (see Figs. 1 and 4). Pawl 12 is mounted on the upper end of the fixed post and may be held into and out of operative relation with its ratchet by means of a pivoted member 13. When the pivoted member is moved so as to cause one end thereof to engage the hooked end of pawl 12 said hooked end is held in the path of movement of the ratchet 11, and consequently when the ribbon spool carrying said ratchet is rocked each vibration causes the spool to wind up the ribbon a distance of one tooth of the ratchet. The member 13 is made of flexible metal so as to permit the pawl 12 to have sufficient play to ride over the teeth of the ratchet. When the position of the member 13 is reversed and the hooked end of pawl 12 held out of operative relation to its ratchet wheel 11, it is obvious that vibration of the ribbon spool will not produce the feed of the ribbon before described.

In operation one of the pawls 12 is arranged in an operative position and the other of said pawls 12 is arranged in idle position, and consequently the ribbon is wound upon one spool (the one co-acting with the active pawl) until the operator desires to reverse the winding motion, which is accomplished by rendering the active pawl idle, and the pawl which was formerly idle, active.

The type member A preferably consists of a segmental-shaped plate that is connected to the rear ends of arms 14^a which are fastened to a hub 14 loosely mounted on the shaft 7, said arms constituting a type plate carrier and resting on the bars 6 of the swinging frame or cradle, as shown in Fig. 5. The characters or type on said plate A are arranged in a plurality of vertical columns with a certain number of characters to each column, the small letters of the alphabet being in the columns on the left-hand half of the plate and the capital letters of the alphabet being in the columns on the right-hand half of the plate. A printing hammer is provided for forcing the sheet of paper and the inking ribbon into engagement with the character on said plate which is in alinement with the printing hammer, and means is provided for moving the type plate vertically and horizontally or transversely to bring each character thereon into alinement with the printing hammer. The type plate normally occupies such a position that when the keys are depressed said plate will be moved to cause the small letter characters to be brought into alinement with the printing hammer, but when a capital letter is to be printed it is necessary to first depress a key designated Cap., as hereinafter more fully described, to actuate mechanism which will bodily shift the type plate so that half thereof which is provided with capital letter characters will be moved into the position formerly occupied by that half of the type plate which contains the small letter characters. The means for rocking the shaft 7 to cause the type plate to be moved vertically consists of the heads on the stems 4 which cooperate with the bars 6 of the rocking frame on which the type plate is mounted. Each head has two projections constituting contact faces so related to each other that when the stem with

which said contact faces is connected is moved upwardly, one of the contact faces will first engage the rearmost bar 6 and swing the frame to move the type plate vertically to printing position. The type plate normally lies two spaces below printing position, and consequently if a key corresponding to the first character at the head of one of the columns of characters on the type plate is pressed, the rearmost contact face will engage its bar 6 and move the type plate vertically so that said character will be presented in the printing line. The forward projection or contact face is so related to the rearmost contact face that it engages the forward bar 6 at the proper time so as to properly locate the correct printing character in printing line. In this way, depending upon the key struck, the type plate is positively rocked vertically, and when the key reaches its fully depressed position the type plate is held rigidly in its adjusted position, in which position a printing character corresponding to the character on the depressed key will appear in the printing line.

It will, of course, be understood that the projections on the heads of the stems 4, which constitute the contact faces, vary in length, those which are actuated by the keys which correspond to the first character at the head of each column of characters on the type plate, being of the same length, those which are actuated by the keys which correspond to the second character of each column, being of the same length but a trifle longer than those for the first character of each column, and so on, thereby causing the type plate to be moved vertically the proper distance to bring each of the characters on the type plate into alinement with the printing hammer.

The means for moving the type plate transversely of the cradle on which it is mounted, consists of a bar 15 slidingly mounted in posts in which the shaft 7 is journaled, said bar, as shown in Fig. 6, having a projection 16 forming a shoulder which is designed to cooperate with one of the arms 14^a to which the type plate is connected. Bar 15 is movable vertically in its supports and adjacent said supports is provided with cam faces 17 whereby, when said bar is moving longitudinally (toward the left, Fig. 6), the cam faces cause the bar to rise in its bearings and the shoulder 16 will engage the arm 14^a and force the type plate longitudinally the shaft 7. 18 is a spring encircling the shaft 7, against which the type plate carrier is moved by the bar 15. When the bar 15 is released the spring moves the type plate carrier in the reverse direction. One end of bar 15 cooperates with a cam face 19 formed on the bent end of a rock arm 20. Arm 20 is mounted on a shaft 21, which shaft carries arms 22 supporting the bar 23 arranged in front of and against the stems 4. Certain of the stems 4, as shown in Fig. 5, are straight-faced opposite the bar 23, while other of said stems are provided with cam projections 4^a which are capable of rocking the shaft 21 to different positions and consequently the cam 19 is moved to different positions.

In operation, when a key is depressed and one of the stems 4 is raised, if said stem has no cam projection 4^a the shaft 21 will not be rocked and the only motion imparted to the type plate will be a vertical one, moving printing characters of the first vertical row of

small letters opposite the printing hammer, the first vertical row of small letters being located at approximately the center of the plate A. Should a key be depressed so as to elevate a stem having a cam projection 4^a this movement of the stem causes the cam 19 to actuate the bar 15 whose first motion is upwardly and laterally, the upward movement placing the shoulder 16 behind the arm which supports the type plate, and thus the type plate is moved laterally with the bar 15 and against the spring 18. The lugs 4^a on the stems 4 vary in shape in a similar manner to the variation in length of the extensions which constitute the contact faces on the heads of said stems, so that the type plate carrier will be moved laterally for varying distances, the stems which control the positioning of the characters in the second vertical column being provided with cams 4^a of the same shape, those for the characters in the third vertical column being of the same shape but different from those on the stems of the second column and so on.

As previously stated, the characters designating the capital letters are arranged at the right-hand half of the type plate, while the small letter characters are arranged at the left-hand half of the type plate. In ordinary operation, the small letter characters are printed upon the depression of a key. There is a key 24 (see Fig. 1) marked "Cap," which key, as shown in Fig. 7, is connected by a link 25 to a bell crank lever 26, said bell crank lever being in turn connected to the bar 28 by means of a link 27. Bar 28 is swung on the shaft 7 and contains between its end pieces the hub of the type plate carrier spring 18. Consequently, when the type plate carrier is shifted to move the right-hand half thereof into the position formerly occupied by the left-hand half, the spring 18 is moved with it and the tension on said spring with relation to the hub of the carrier remains the same in both shifted positions of said type plate. As shown in Fig. 6, the arm which supports the type plate normally lies above the shoulder 16, and consequently, when the type plate carrier is shifted said arm will be moved past shoulder 16, and the other arm of the carrier brought into operative relation with the shoulder 16, whereby when the carrier is shifted and a key is depressed said key will have the same action on the type plate, moving it vertically and laterally, to position the selected printing character at the printing point, as it had when printing lower case characters.

From the foregoing description it will be seen that I have produced a machine in which the type plate does not have to return to any given position after it has been actuated so that the machine can be operated at a high speed and without any liability of locking the machine or jamming any parts in case two or more keys are pressed simultaneously or substantially so. Furthermore, even if the rearmost extension or contact face on the head of stem 4 should become worn this will not affect the alinement of the printing characters for the forward contact face of said head determines the degree of rocking movement which the rearmost contact face imparts to the swinging frame or cradle and this contact face will wear away evenly with the rearmost contact face, due to the fact that they are both subjected to the same amount of work.

The paper to be printed upon is indicated at *a*, and

is mounted in a suitable carriage movable transversely the machine, said paper being forced against the type and the inking ribbon in front of the type by means of a printing hammer 29. This printing hammer is normally held retracted by a spring 30, but is moved forward to make a printing impression by means of an arm 31 forming one member of a bell crank lever of which the arm 32 is the other member. Arm 32 carries a bar 33 which extends over the rear ends of the key levers 3. Whenever any of the keys are depressed the rear ends of the key levers, when approaching the upper limit of their movement, will strike the bar 33, rock the bell crank lever above described and force the type hammer against the type which has been positioned at the printing point. Spring 30 will immediately recover the type hammer and restore the bell crank lever to normal position.

The paper carriage before referred to consists of a frame 34 mounted to move along a track 35. On this frame is arranged an apron 36 for receiving and supporting the lower end of a sheet of paper *a*. An overhanging guard 37 is provided for supporting the upper end of the sheet of paper.

38 is a rubber-faced feed roller on one end of which is arranged a ratchet 39.

40 is a paper feed pawl coöperating with ratchet 39 and mounted on the end of lever 41, upon whose opposite end is a link 42, which link, as shown in Fig. 2, is pivotally connected to an arm 43 whose end extends into the path of movement of a pin 44 on the drum 45 containing the motor spring for the carriage.

A cable 46 extends from this spring drum 45 over sheaves and is connected to the carriage at the point 47. Another cable 46^a is connected to a supplemental spring drum 48 and to the carriage at the point 47^a. Whenever spring drum 45, rotating in the direction of the arrow in Fig. 2, engages the arm 43 by means of pin 44, the paper feed pawl will be operated so as to line-space the paper. Pin 44 is so positioned on drum 45 that it strikes the arm 43 as the paper carriage is moved to the right to start a new line.

The bell crank lever 31—32 carries an escapement mechanism comprising a fixed tooth 49 and a yielding tooth 50, said teeth coöperating with an escapement wheel 51, which escapement wheel is mounted on shaft 52 journaled in the frame 53, and carries at its upper end a pinion 54 which normally meshes with a rack 55 carried by the paper carriage. Whenever a key is depressed the bell crank lever 31—32 is vibrated and the escapement wheel 51 permitted to rotate a distance of one tooth, which permits movement of the paper carriage a distance of one letter space.

56 indicates a space key, the rear ends of whose levers extend under the bar 33. The space key obviously does not lift a stem 4 as its only function is to letter-space the carriage.

58 indicates tabulating keys, the rear ends of whose bars 59 are beveled, as shown in Fig. 5. Whenever a tabulating key 58 is depressed the beveled end thereof engages a collar 60 on the shaft 52 and rocks frame 53 rearwardly so as to disengage the pinion 54 from the rack 55. When the paper carriage is thus disconnected under the restraining influence of the escapement mechanism, the motor spring in the spring barrel 45 moves the carriage toward the left. The spring in

barrel 45 is stronger than the spring in barrel 48, and consequently whenever the carriage is traveling toward the left a like spring in barrel 48 is being wound up in readiness, whenever the carriage moves toward the right, to take up slack in the cable and properly position a stop disk 61 fixed on the forward end of shaft which supports the spring drum 48.

Referring to Figs. 3 and 8, it will be observed that the stop disk 61 is composed of two plates having perforations adjacent to their periphery in which may be placed removable pins 62. These perforations are given numbers constituting a line scale. A pointer 63 coöperates with this scale or dial, as it might be called, and the operator by looking at the position of the dial with relation to said pointer may adjust the carriage or determine the exact position of the printing point in a line. This dial, when a pin or pins is inserted in the openings thereof, constitutes a stop disk by coöperating with the bent ends 64 of levers 65 connected by links 66 with tabulating keys respectively. When a tabulating key is depressed and the pinion 54 disengaged from the rack on the carriage, one of the stops 64 will be positioned in the path of movement of a pin 62, and the carriage will be arrested in the position thus determined by the pin. When the carriage is so arrested the tabulating key is released so as to restore engagement between the pinion 54 and rack 55. At the same time the projection 64 is raised out of engagement with the stop disk.

Four tabulating keys are provided for the purpose of arresting the carriage in four different positions without changing the position of the pin 62. The reason for doing this is to enable the operator to correctly position the numbers one under the other in proper column order in tabular work. For instance, in making out bills if the extension contains three figures the tabulating key marked "3" is depressed. If the extension contains only one figure the tabulating key marked "1" is depressed, and the carriage will be arrested so that when a printing impression is made after the operation of the "1" tabulating key the number printed will be in the column of lowest order. For a number containing four figures a tabulating key marked "4" is operated to correctly position the carriage so as to print tens of dollars, units of dollars, dimes and cents in their proper columns, if a decimal point is used; or thousands, hundreds, tens and units in their proper columns if no decimal point is employed. The stop disk 61 is provided with a handle 67 by which said stop disk and its connected parts may be rotated. By this method the spring drum 48 may be rotated and with it the spring drum 45. It is obvious that the only direction in which the stop disk can be rotated by the handle when the parts are in normal position is that permitted by the yielding escapement tooth 50, which direction is equal to the movement of the carriage to the right. Thus, if it was desired to print a column of numbers, the operator would strike an appropriate tabulating key so as to jump the carriage to proper position at which the number could be printed. Then the parts could be so adjusted that partial rotation of the stop disk would cause the line-spacing mechanism to operate and the carriage to be re-set to be jumped by the depression of another tabulating key.

If the stop pin 62 were so positioned as to cause the

carriage to be arrested in four different positions in its travel upon the depression of any one of the tabulating keys, it will be observed that the escapement mechanism will be disconnected from the driving mechanism a number of times, but this will not disturb the relation between the carriage and the spring drums 45 and 48 and their connected parts. The cables 46 and 46^a connected to the two drums are also attached to the carriage, and in this manner, regardless of the position of the carriage, the drums 45 and 48 will bear fixed relation thereto. Any ordinary means such as ratchet and pawl mechanism 68 may be employed for holding the spring in drum 45 under varying tensions.

I am aware that minor changes in the construction, arrangement and combination of the several parts of my device can be made and substituted for those herein shown and described without in the least departing from the nature and principal of my invention.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a typewriting machine, an oscillating frame, a type plate carrier mounted on said frame, key levers, and vertically disposed bars operated by said levers and provided at their upper ends with differential contact surfaces that engage said frame on opposite sides of its axis to position the type plate vertically; substantially as described.

2. In a typewriting machine, an oscillating frame, a type plate carrier on said frame, key levers, vertically disposed bars operated by said levers, and a yoke-shaped device at the upper end of each bar for engaging the frame on opposite sides of its axis to position the type plate vertically; substantially as described.

3. In a typewriting machine, an oscillating frame, a type plate carrier supported by said frame, key levers, all of which extend parallel to each other, and a vertically disposed bar operated by each lever and provided at its upper end with two differential contact surfaces that engage said frame on opposite sides of its axis to position the type plate vertically; substantially as described.

4. In a typewriting machine, an oscillating frame, a type plate mounted directly on said frame, key levers, vertically disposed bars operated by said key levers and provided with forked ends which engage said frame on opposite sides of its axis to position the type plate vertically, mechanism for moving the type plate transversely of said frame, and projections on said bars for operating said mechanism; substantially as described.

5. In a typewriting machine, a rocking frame, a type plate mounted thereon, key levers, vertically disposed bars actuated by said key levers and provided at their upper ends with differential contact surfaces that engage and actuate said frame to position the plate vertically, a member for engaging the type plate to move it longitudinally of said frame in one direction, differential contact surfaces on said bars for imparting movement to said member, and independent means for moving said member in the opposite direction; substantially as described.

6. In a typewriting machine, an oscillating frame, a type plate mounted thereon and provided with upper and lower case type printing characters, key levers, all of which are arranged parallel to each other, vertically disposed bars operated by said levers and provided with differential contact surfaces that engage said frame to position the type plate vertically, means actuated by said bars for moving the type plate transversely of said frame, and independent means for bodily shifting said type plate on said frame to bring a different set of characters into operative position; substantially as described.

7. In a typewriting machine, an oscillating frame provided with a horizontally arranged shaft, a type plate secured to a device that is loosely mounted on said shaft, key levers, vertically disposed bars actuated by said levers and provided with differential contact surfaces that engage said frame on opposite sides of its axis to move the type plate vertically, a member provided with arms one of which en-

gages the device to which the type plate is secured, a spring interposed between said device and the other arm of said member, and means actuated by said vertically disposed bars for moving said type plate device against the stress of said spring to move the type plate longitudinally of the frame; substantially as described.

8. In a typewriting machine, an oscillating frame provided with a horizontally arranged shaft, a type plate secured to a device that is loosely mounted on said shaft, key levers, vertically disposed bars actuated by said levers and provided with differential contact surfaces that engage said frame on opposite sides of its axis to move the type plate vertically, a member provided with arms one of which engages the device to which the type plate is secured, a

spring interposed between said device and the other arm of said member, means actuated by said vertically disposed bars for moving said type plate device against the stress of said spring to move the type plate longitudinally of the frame, and independent means for moving said member to bodily shift the type plate and said spring into a different position on the frame; substantially as described.

In testimony whereof I hereunto affix my signature in the presence of two witnesses, this thirteenth day of August 1906.

WILLIAM W. HOPKINS.

Witnesses:

LENORE WILSON,
GEORGE BAKEWELL.