

**No. 702,950.**

Patented June 24, 1902.

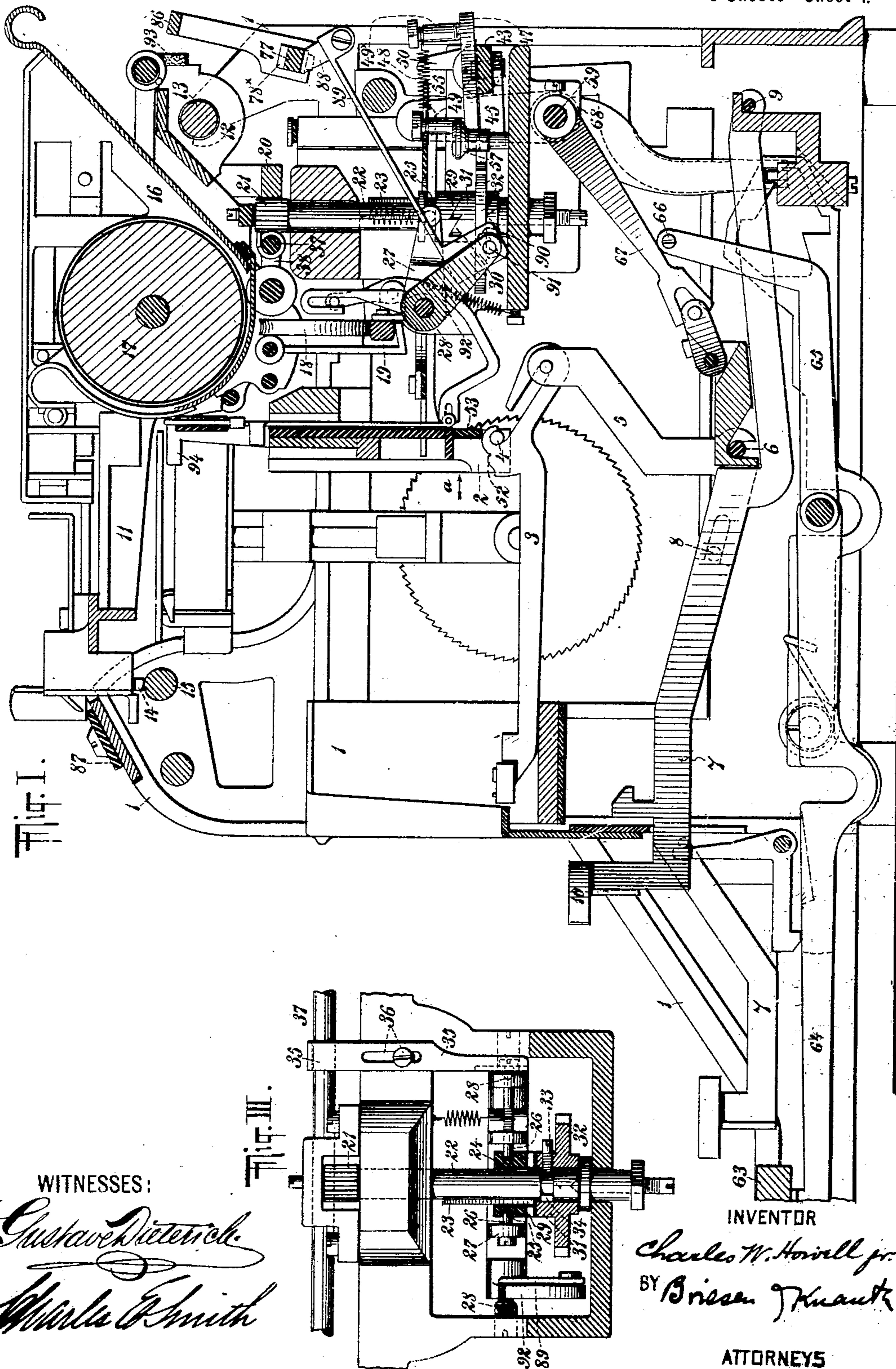
C. W. HOWELL, JR.

# CARRIAGE FEED MECHANISM FOR TYPE WRITING MACHINES.

(Application filed Feb. 21, 1901.)

(No Model.)

5 Sheets—Sheet 1.



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5 Sheets—Sheet 2.

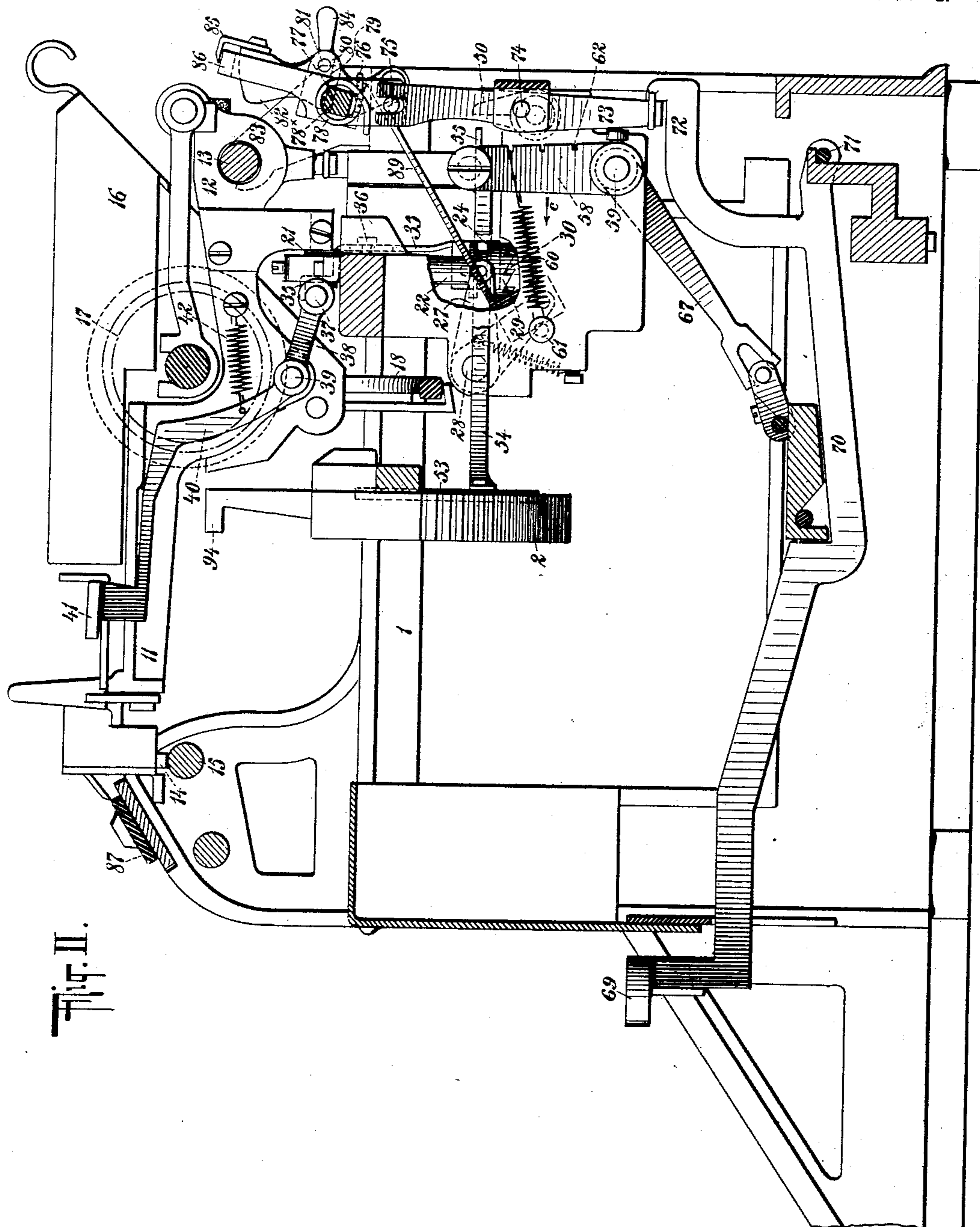


Fig. II.

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5 Sheets—Sheet 3.

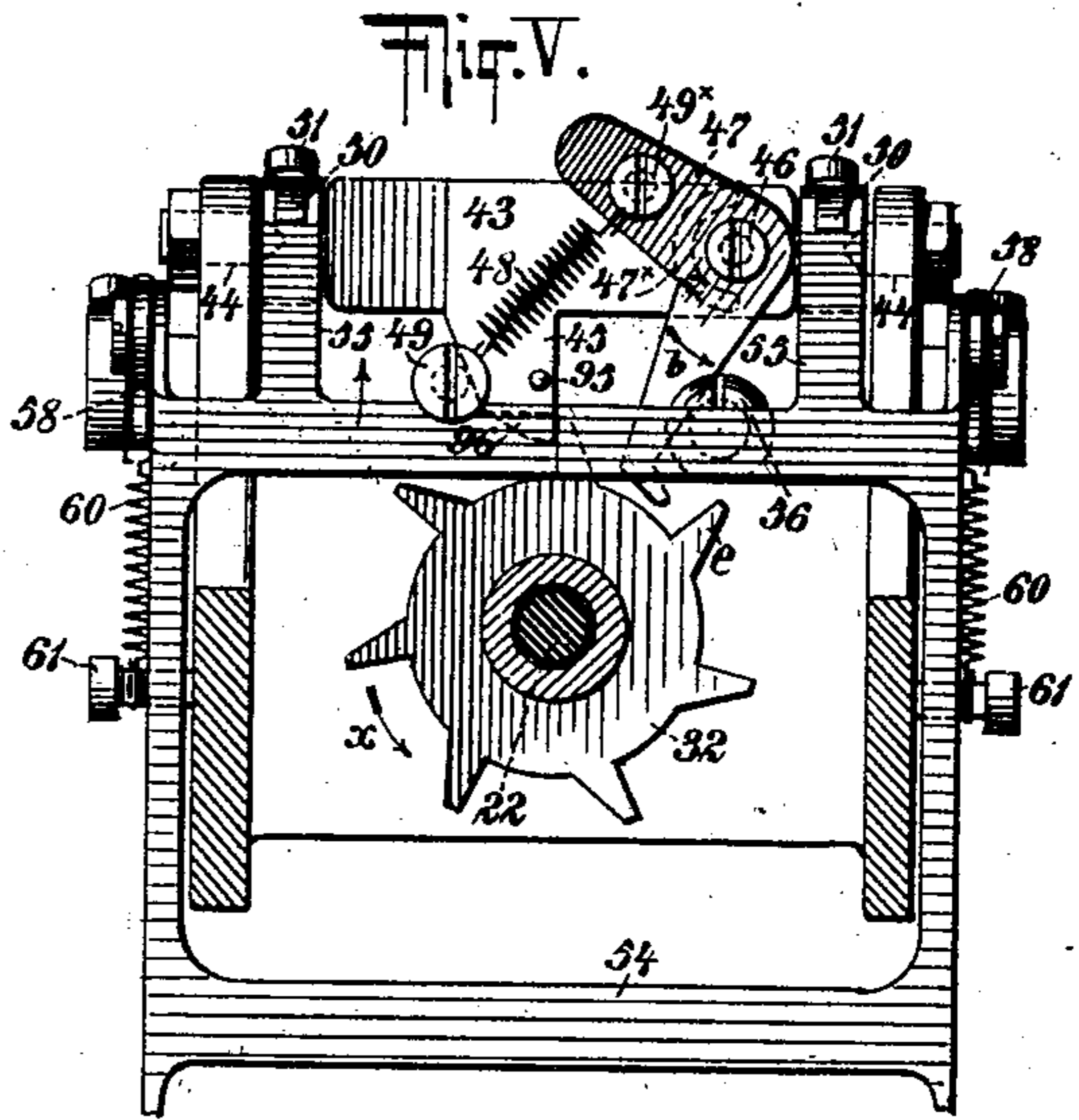
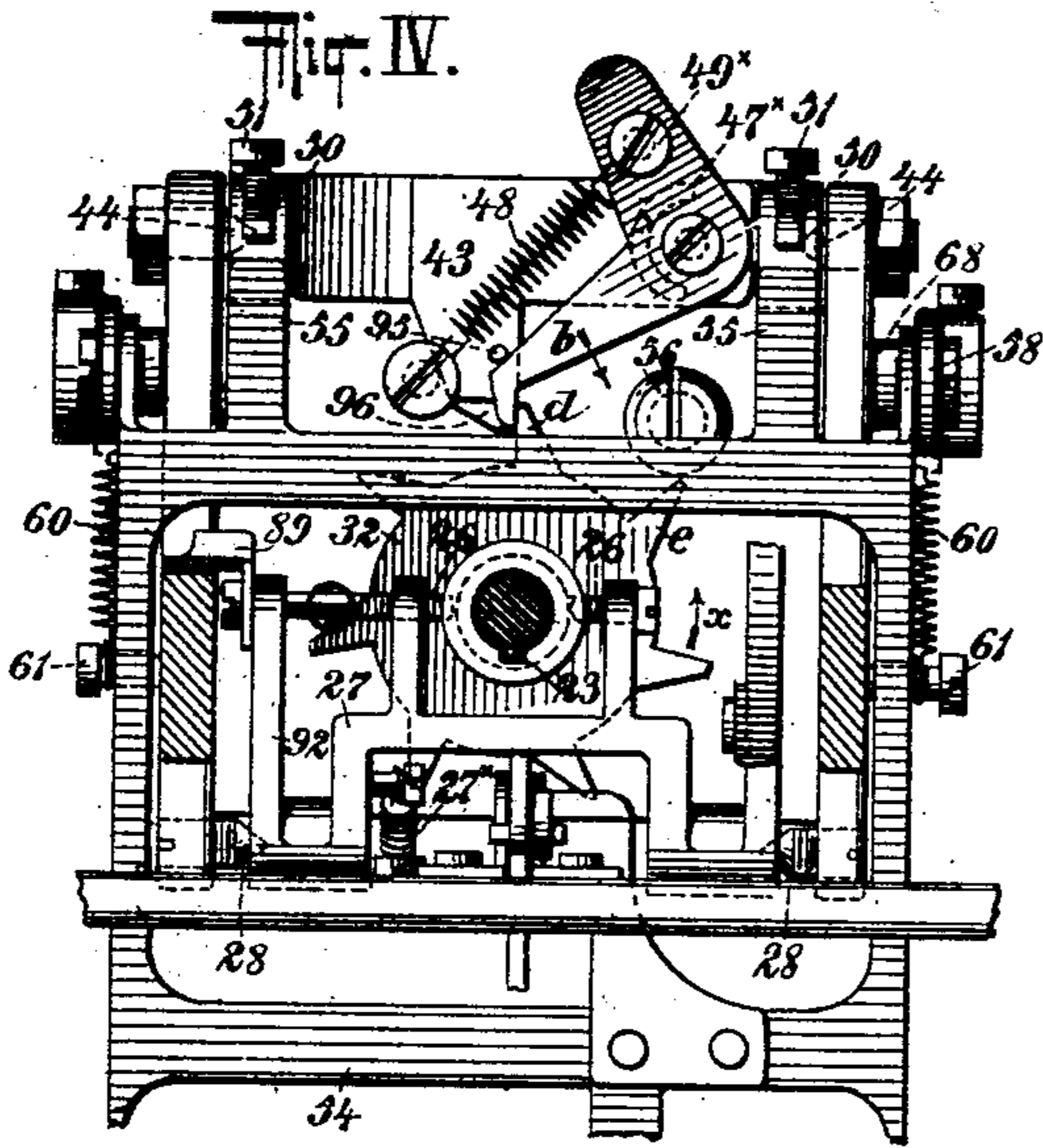


Fig. VI.

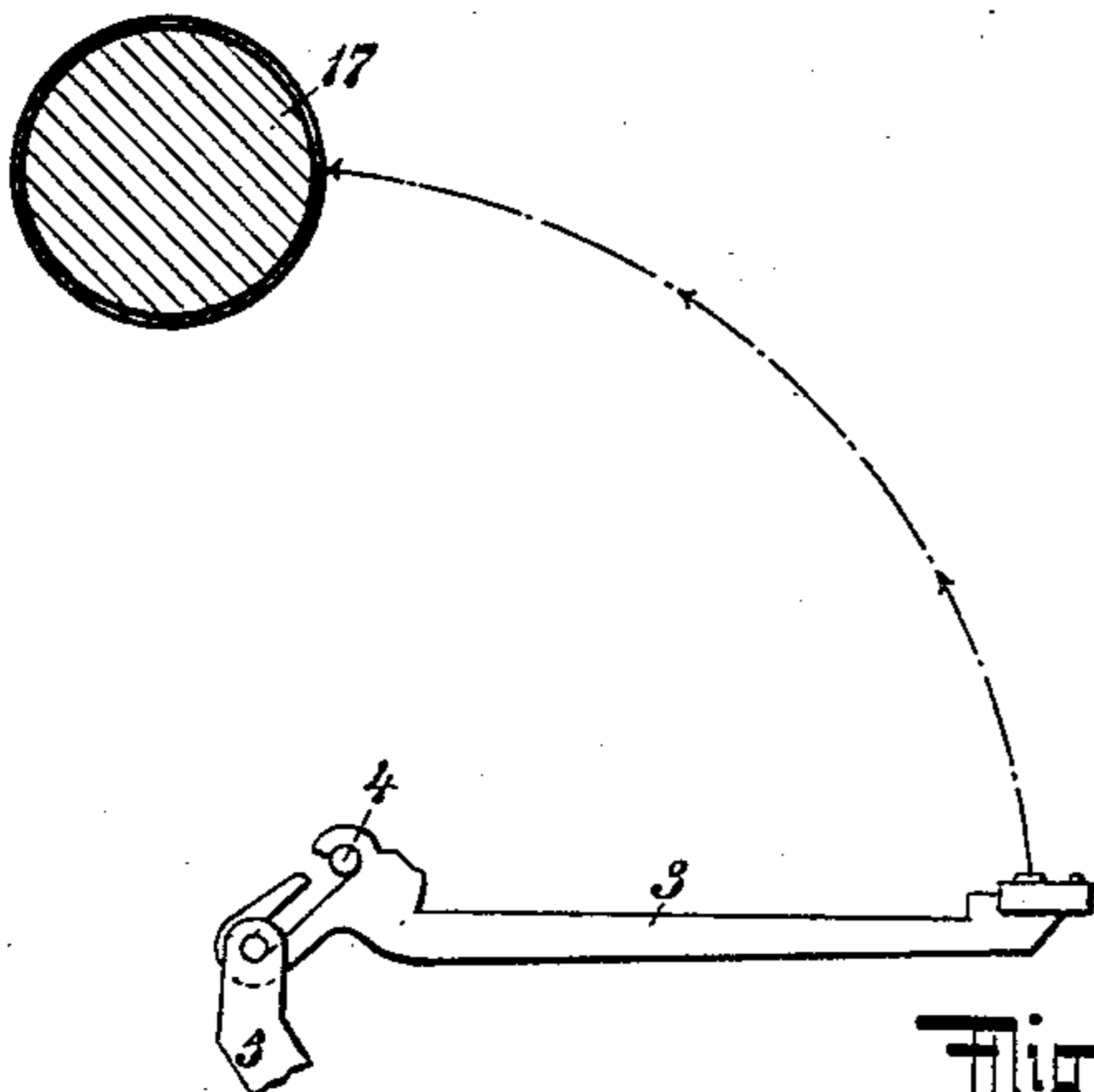


Fig. VII.

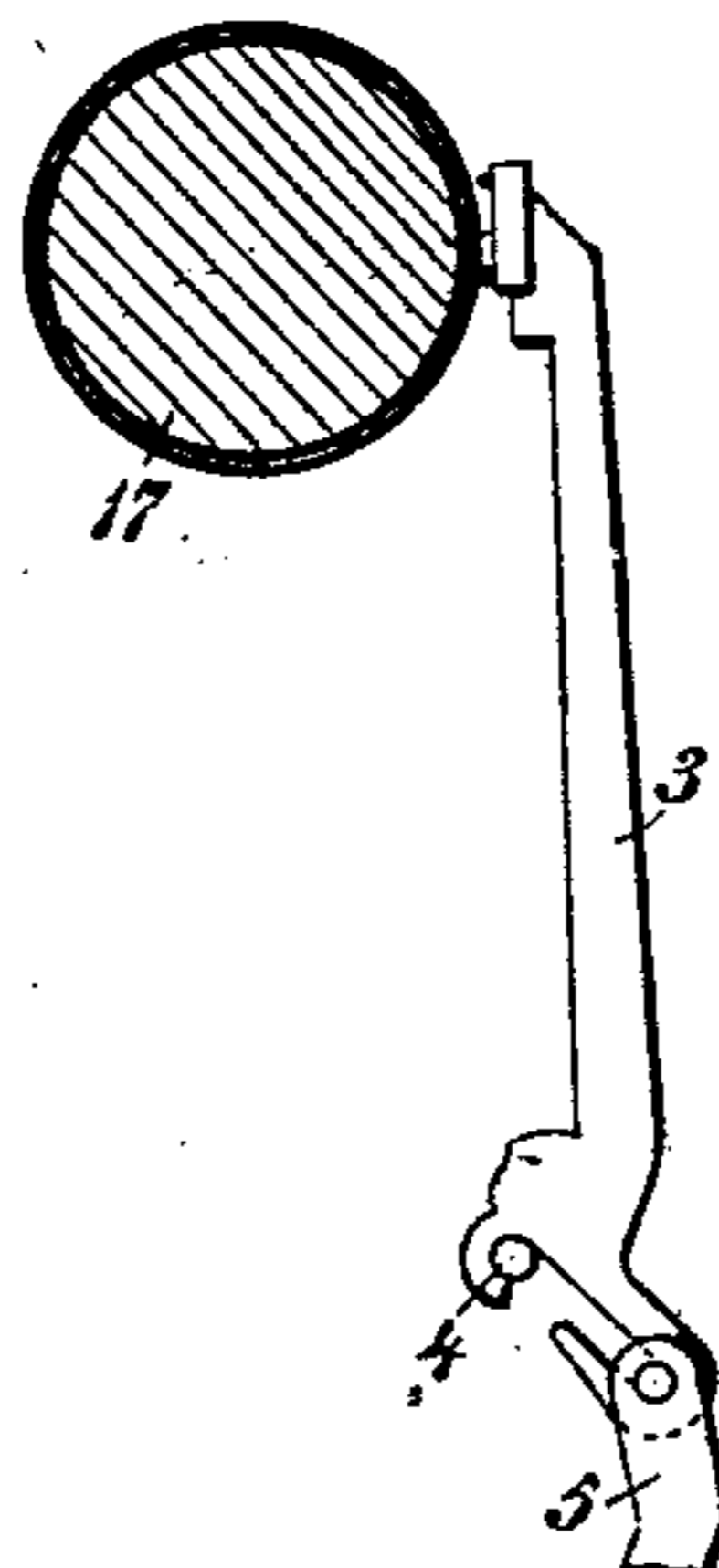
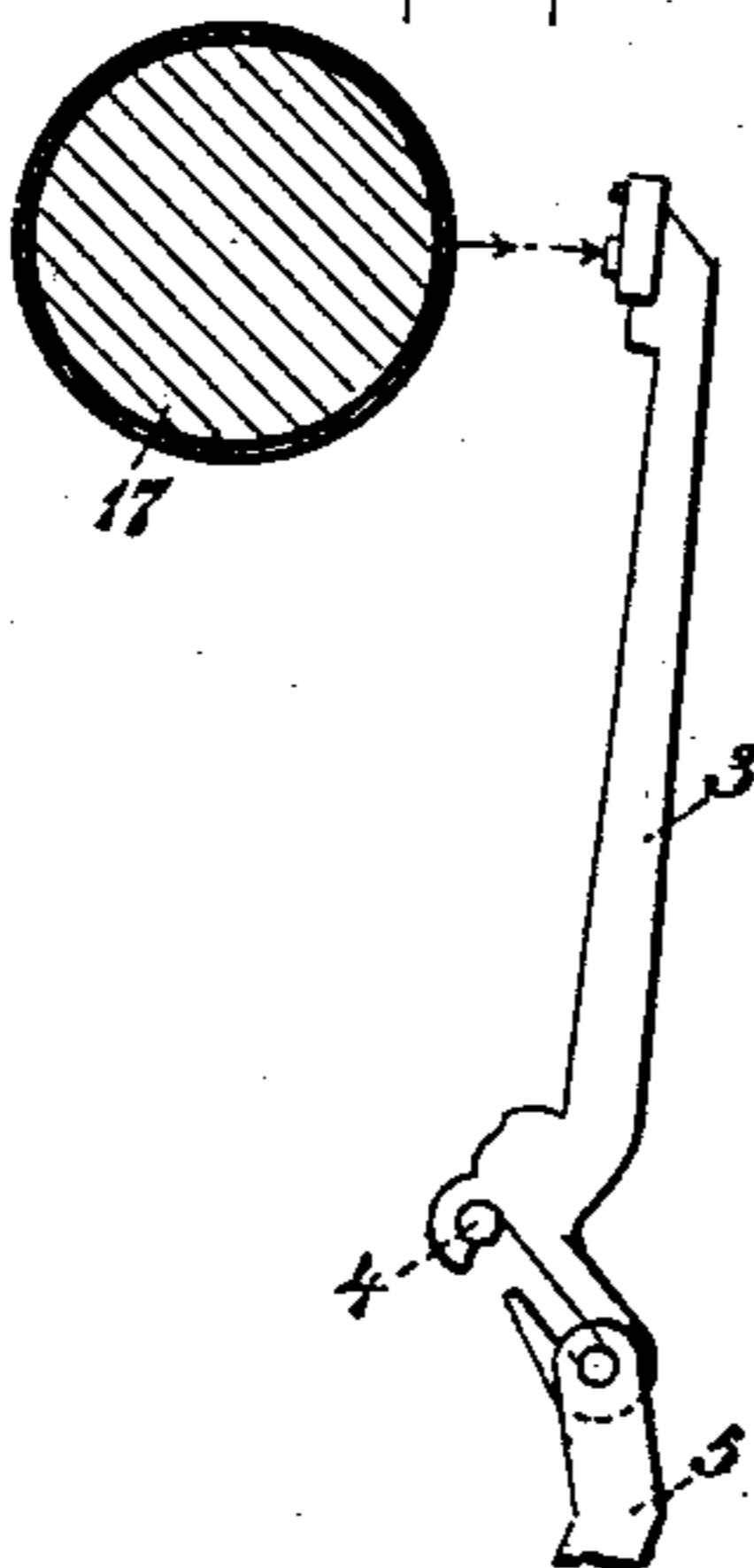


Fig. VIII.



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5 Sheets—Sheet 4.

Fig. IX.

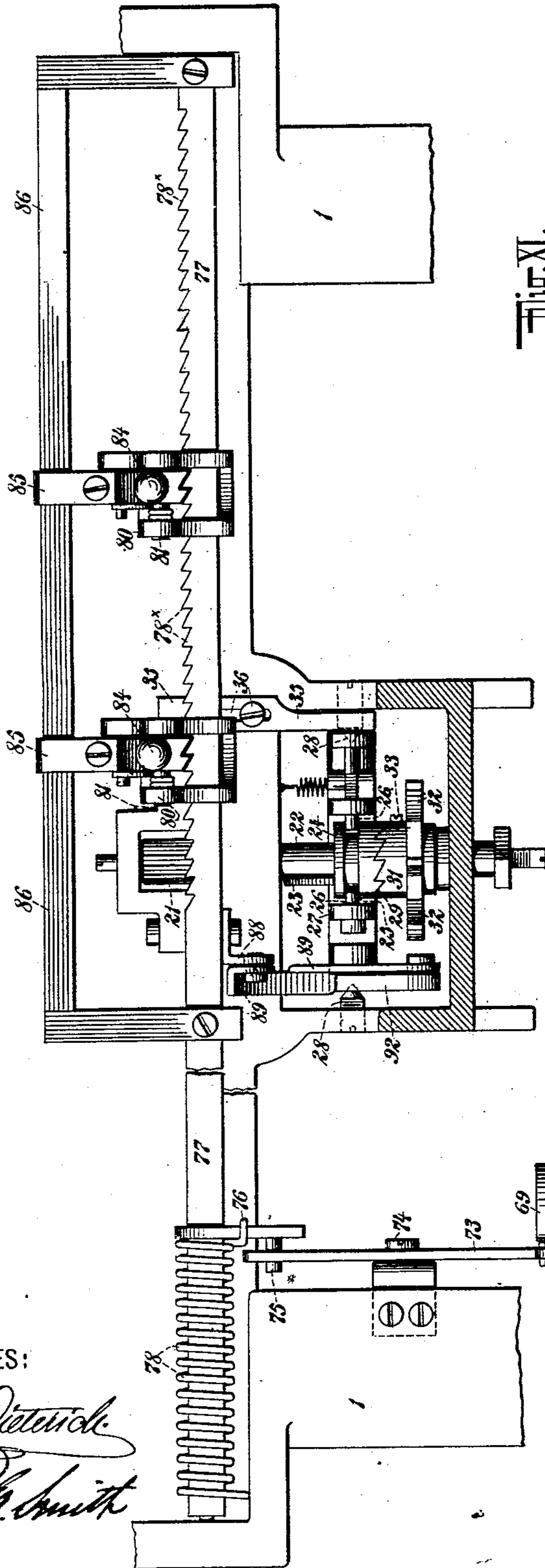


Fig. XI.

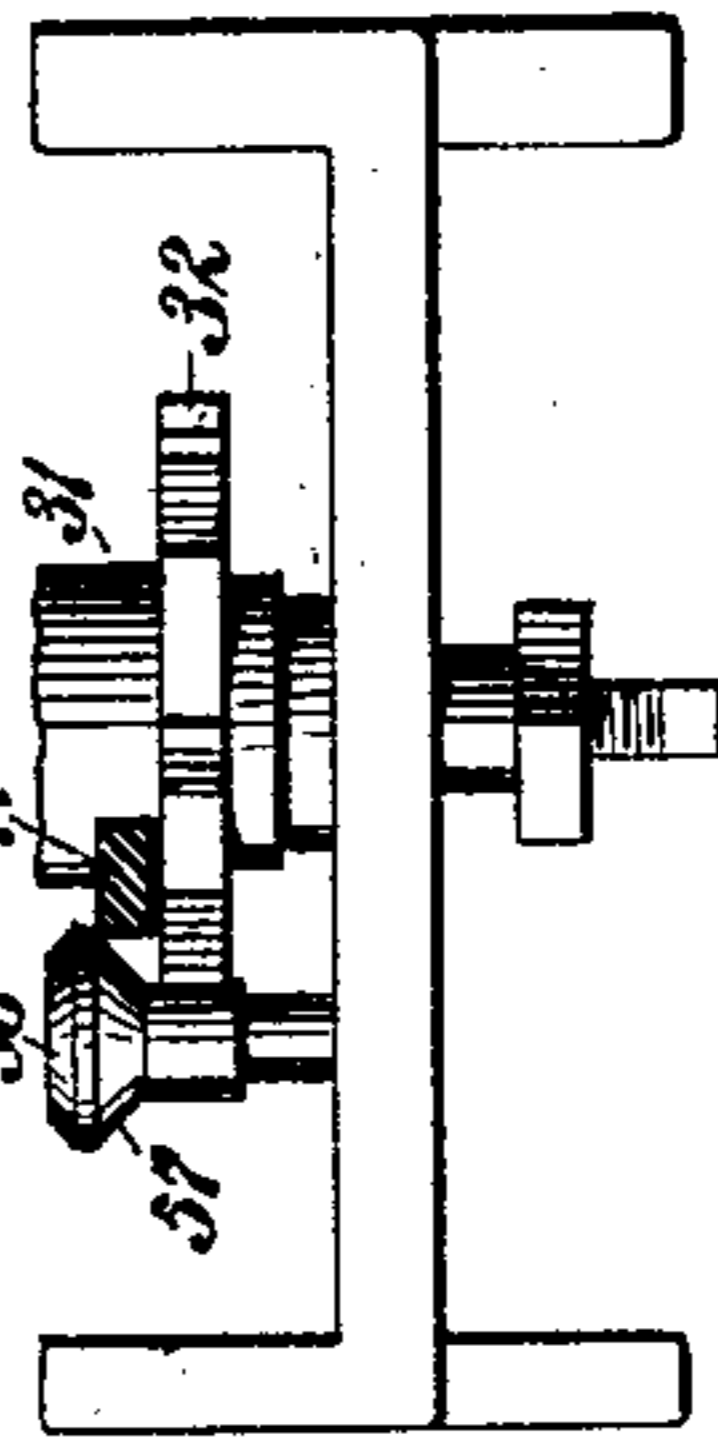
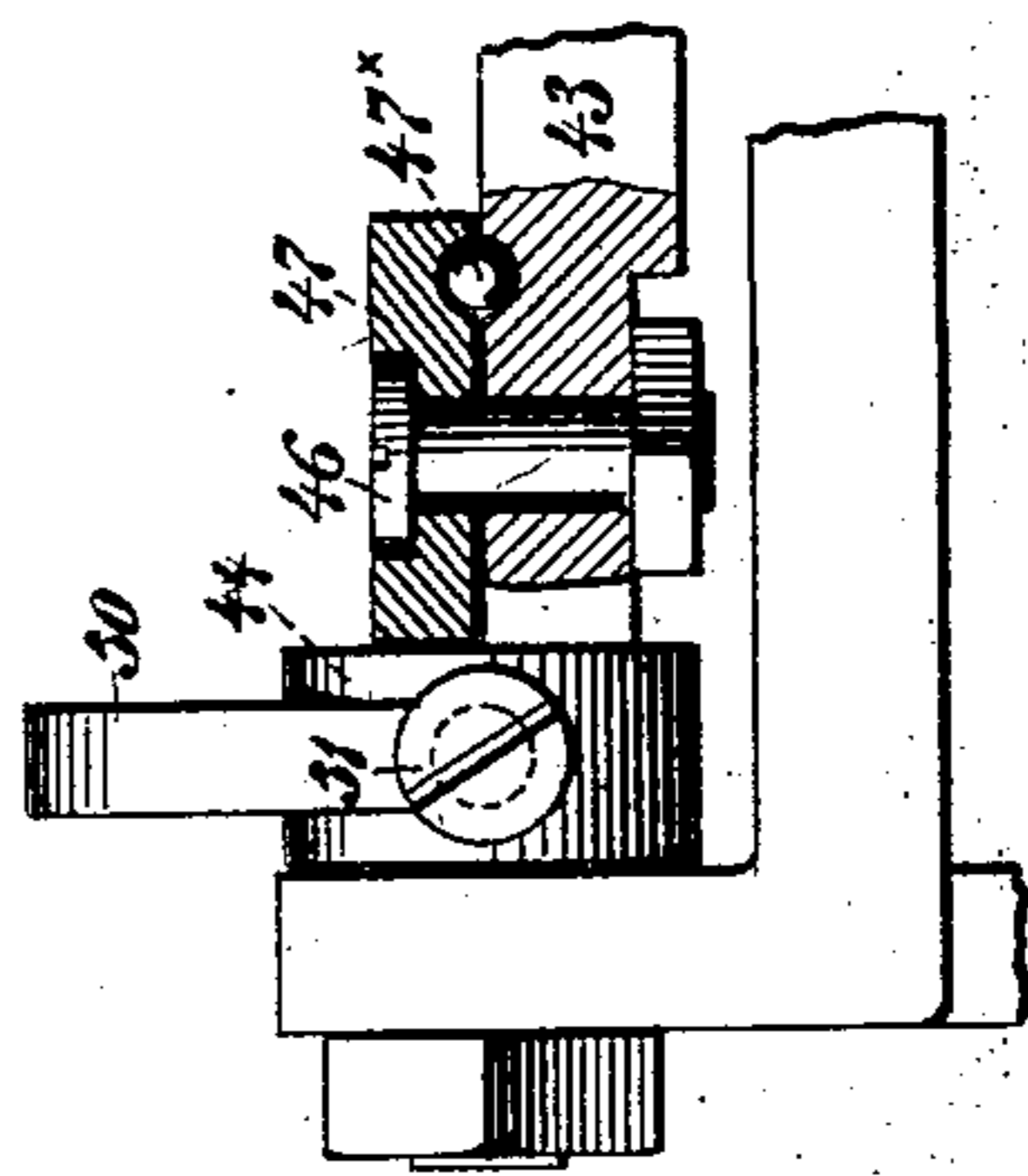


Fig. X.



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BY

*Brisson & Trauth*

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C. W. HOWELL, JR.

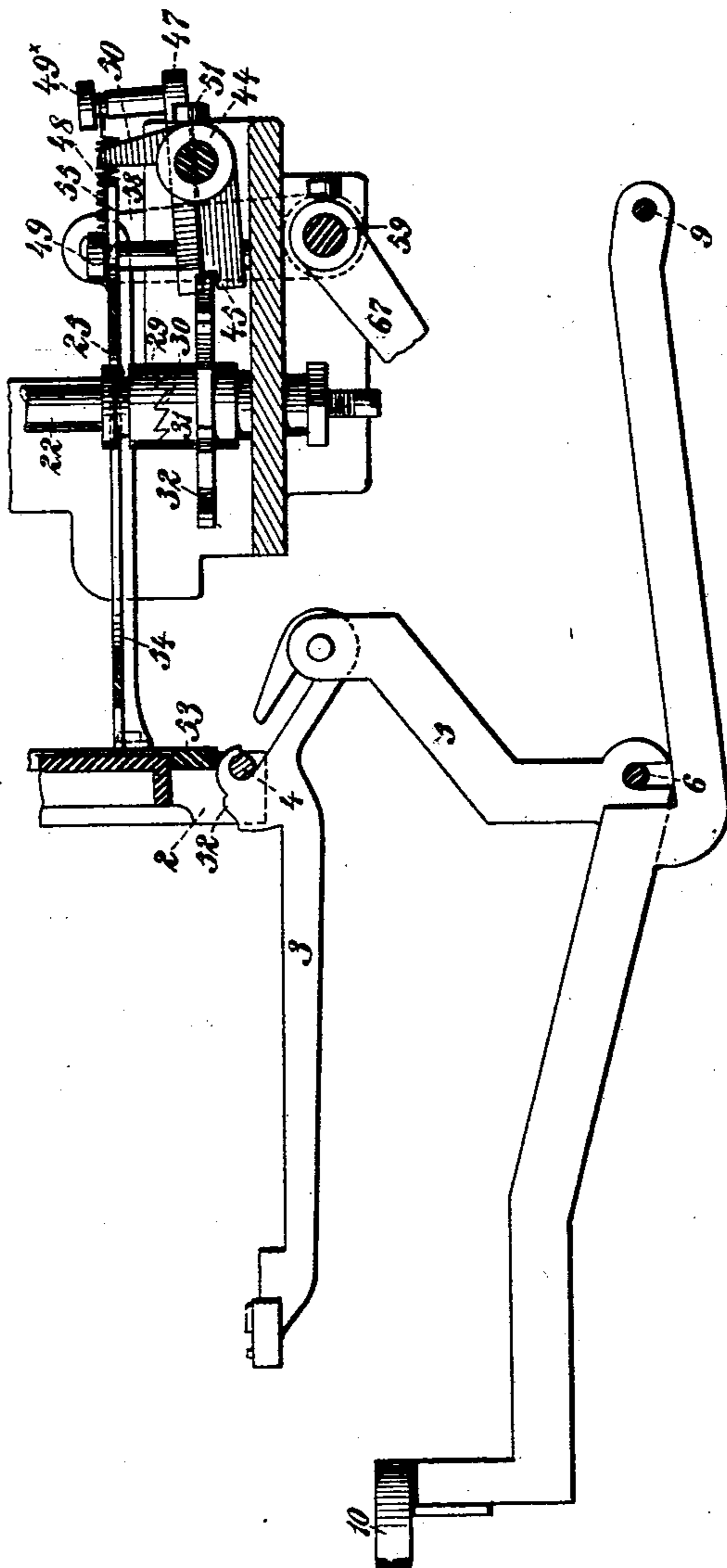
CARRIAGE FEED MECHANISM FOR TYPE WRITING MACHINES.

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(No Model.)

5 Sheets—Sheet 5.

Fig. XII.



WITNESSES:

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*Wm. E. Smith*

INVENTOR

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BY

*Briggs & Smith*

ATTORNEYS

# UNITED STATES PATENT OFFICE.

CHARLES W. HOWELL, JR., OF NEWARK, NEW JERSEY, ASSIGNOR TO THE  
WAGNER TYPEWRITER COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

## CARRIAGE-FEED MECHANISM FOR TYPE-WRITING MACHINES.

SPECIFICATION forming part of Letters Patent No. 702,950, dated June 24, 1902.

Application filed February 21, 1901. Serial No. 48,263. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES W. HOWELL, Jr., a citizen of the United States, residing at Newark, Essex county, State of New Jersey, have invented certain new and useful Improvements in Carriage-Feed Mechanism for Type-Writing Machines, of which the following is a specification.

My invention relates to type-writing machines, and more particularly to the carriage-feed mechanism in such machines.

Heretofore various escapements have been devised with a view to rendering the speed of the feed of the carriage commensurate with the capabilities of the most rapid operators to operate the keys of the machine, but it has been found impossible in practice to provide such a device even by the employment of the so-called "speed or reverse dog" arrangements which in theory meet the requirement, but which in practice have been found unavailable for the speediest operators, such operators writing more than one letter upon the same point before the carriage can be fed. It has also been found that extreme uniformity of rapidity of key stroke or depression must be developed by the operator using such devices in order to prevent blurring of the writing caused by the paper-carriage moving while the type are striking the paper to make the imprint, and also to maintain correct lateral alinement or equal spacing between the letters, as such devices are adjusted to release the carriage before the type have reached the paper or printing-point. It will readily be seen that such devices are limited to the use of the very speediest operators and are useless to the operators whose speed varies according to their familiarity with the matter to be written, and the efficiency of the machine is reduced, as the capabilities of different operators are rarely alike.

The principal objects of my invention are to overcome the difficulties above referred to, to provide a more rapid, durable, and efficient carriage-feed and escapement mechanism than has been heretofore devised and one that will be equally efficient when used by either the slowest or speediest operator, and one wherein it is impossible for the carriage to

accidentally skip or be accidentally released from the escapement during the operation of the machine.

In the accompanying drawings, wherein like reference characters indicate corresponding parts in the various views, Figure I is a central vertical view, taken from front to rear, of a type-writing machine embodying my invention. Fig. II is a like view of the same with parts broken away, the section being taken on a plane adjacent to one end of the machine and with the carriage moved to the opposite end. Fig. III is an enlarged detail vertical sectional view of a portion of the machine to be hereinafter described. Fig. IV is a plan view of the same. Fig. V is a view similar to that shown in Fig. IV, except that the parts are in somewhat different positions. Figs. VI to VIII, inclusive, are diagrammatic views for use in explaining the action of the feed mechanism. Fig. IX is a rear view of the carriage with parts in section. Fig. X is an end view of the frame carrying the feed-dogs, with parts in section, looking in the opposite direction to the illustration in Fig. I. Fig. XI is a like view showing one of the dogs with the escapement-wheel and the cam abutment which throws the dog-frame laterally; and Fig. XII is a sectional elevation of parts in the same position as in Fig. I with certain mechanism omitted, so as to show principally the escapement-wheel, the dog-carrying frame, the universal bar, and their connections.

In illustrating my present invention I have shown it applied to the well-known "Underwood" type-writing machine, though it should be understood that the mechanism constituting the invention is applicable to various characters of type-writing machines and may be applied to any type-writing machine wherein it is available.

In the machine shown in the accompanying drawings, 1 designates the framing of the machine, in which a segment 2 is mounted. The type-bars 3 are pivoted to the segment, as indicated at 4, and each type-bar is connected to a link 5, that is pivoted to a fixed portion of the machine, as indicated at 6. Each of these links is connected to a key-lever 7, as

may be seen at 8 in dotted lines in Fig. I. The key-levers are each pivoted to the framing of the machine, as shown at 9, while each of said levers is provided with the usual finger-key 10, thus providing hand-operated means for moving each of the type-bars or type-carriers 3.

A carriage 11 has lugs or ears 12, which surround a traverse-rod 13. The forward end of the carriage 11 is provided with a roller 14, which bears upon a traverse-rod 15. The carriage 11 supports a platen-frame 16, in which the platen 17 is carried. The platen-frame likewise supports a roller 18, that is adapted to bear upon a rail 19, that is adapted to be shifted vertically to bring about upper and lower case writing.

So much of the machine as has been thus far described constitutes part of the well-known Underwood machine.

The carriage 11 has rigidly secured thereto a rack 20, which extends substantially throughout the length of the platen, and this rack meshes with a pinion 21. This pinion 21 is connected to or may be integral with a vertically-disposed shaft 22, mounted in a suitable fixed portion of the machine, and is provided with a spline 23, which is seated in a spline-groove in one section 24 of a two-part clutch, so that the section 24 of the clutch is adapted at all times to rotate with the shaft 22, but is capable of moving independently of said shaft in a vertical direction. The clutch-section 24 is likewise provided with a peripheral groove 25, into which pins 26 project. These pins 26 are carried by a vibratory frame 27, which is pivoted at 28 for purposes which will hereinafter more fully appear. The lower edge of the clutch-section has ratchet-teeth 29, that are adapted to engage cooperating ratchet-teeth 30 on the sleeve 31, which constitutes the second clutch-section. This clutch-section is connected to or forms part of a star or escapement wheel 32. This escapement-wheel constitutes one of the feed members of the escapement mechanism and is in a sense a circular rack, with which the feed-dogs cooperate. A pin 33 extends through the sleeve 31 and projects into a groove 34 in the shaft 22, so as to permit a free rotary movement of the star-wheel and the clutch-section 31, but which prevents a vertical movement of these parts. The swinging frame 27, hereinbefore referred to, is normally maintained in the lowermost position by a spring 27<sup>x</sup>, so as to maintain the clutch-sections 24 and 31 in engagement with each other. The swinging frame 27 is, however, connected to a link 35, that is guided in its movement by a pin-and-slot connection 36 and is operatively connected at its upper end to a rod 37. This rod 37 is movably connected to the carriage and extends throughout the length thereof. The rod 37 is supported upon links 38, that are pivoted to each end of the carriage, as indicated at 39. One of these links 38 is connected to a lever 40, which is provided with a finger or

release key 41. (See Fig. II.) By depressing the key 41 the lever 40 will be moved against the tension of its spring 42, and the link 35 will be raised by the rod 37, thus disengaging the clutch-section 24 from its cooperating clutch-section 31, when the carriage is free to be moved by hand.

A swinging vibratory dog-carrying frame 43 is pivoted to a fixed portion of the machine, as indicated at 44. Carried by or formed integral with this dog-carrying frame 43 is a so-called "rigid" dog 45, and pivoted to the frame at 46 is the so-called "loose" or "movable" dog 47. This loose dog 47 is preferably supported by ball-bearings working in segmental recesses, as indicated at 47<sup>x</sup>, in order that it may move with the greatest freedom. This loose dog 47 is connected to one end of a spring 48, as indicated at 49<sup>x</sup>, the other end of said spring being connected to a pin 49, carried by a fixed portion of the machine. Projecting from the dog-carrying frame 43 are two abutments 50, which may be adjustably secured thereto by set-screws 51.

Motion is transmitted to the dog-carrying frame in order to operate the escapement in the following manner: Each of the type-bars 3 is provided with a cam 52, that is adapted to bear against a segmental universal bar 53 in the movement of the bar toward the printing-point. This contact of the cam on any one of the type-bars will force the universal bar 53 in the direction of the arrow *a*. (See Fig. I.) The universal bar has connected therewith a frame 54, which is adapted to partake of this movement of the universal bar, and the projecting fingers or abutments 55 of this frame are adapted to cooperate with the fingers or abutments 50, that are carried by the dog-carrying frame in the movement of the frame 54 in the direction of the arrow *a*. The contact between the abutments 50 and 55 will effect a movement of the dog-carrying frame around its pivotal center, thereby elevating or producing a lateral or vibratory movement of both the rigid and the loose dogs. From an examination of Fig. I of the drawings it will be observed that the pins 49 and 49<sup>x</sup>, which constitute the means for connecting the spring 48 to the loose dog and to a fixed portion of the machine, are of considerable height, so that the spring 48 is not only effective to move the dog in the direction of the arrow *b*, Figs. IV and V, but it is likewise effective in aiding to restore and maintain both the loose and rigid dog to and in the lowermost or normal position after the frame 54, connected to the universal bar, is permitted to move in a direction opposite to that indicated by the arrow *a*. (See Fig. I.) By making the abutments 50 on the dog-carrying frame adjustable in the manner described I am enabled to regulate the extent of lateral throw imparted to the dog-carrying frame and to the dogs carried thereby. Cooperating with the loose dog 47 or with a part carried thereby is an abutment 56, which abutment in the

present instance consists of a pin that is carried by a fixed portion of the machine and is provided with a cam-surface 57, (see Fig. I,) against which the loose dog is adapted to bear in its movement from the position indicated in Fig. IV of the drawings to the position indicated in Fig. V. In this longitudinal movement of the loose dog it first contacts with that portion of the cam which is nearest the periphery or outer circumference of the headed pin, and the force of the impact of the dog with the cam, together with the tension of the spring 48, will cause the loose dog, the rigid frame to which it is connected, and the fixed dog carried by the frame, to be deflected laterally. Thus the longitudinal movement of the loose dog is effective to produce the lateral movement of both dogs and the consequent escapement of the carriage, as will be shown later. Instead of the cam-surface on the abutment various means may be employed to laterally deflect the loose dog and its cooperating rigid dog by the longitudinal movement or throw of the loose dog; but for simplicity of construction I prefer this means. While various means may be employed to restore the frame 54 and the universal bar to which it is connected to the normal position, I have shown in the present instance the outer end of the frame pivotally connected to links 58, which links are in turn secured to a rock-shaft 59, which turns in a fixed portion of the machine. These links are each connected to a spring 60, which springs are each in turn connected to a fixed pin 61, so that the tension of the spring is exerted in the direction of the arrow c, Fig. II, to restore the frame 54 and the universal bar to the normal position. The links 58 may each be serrated along a side thereof, as indicated at 62, so that one end of each of the springs 60 may be made to engage its cooperating link 58 at variable distances from the pivot thereof in order to increase or decrease the tension of the spring.

In order that the escapement may be operated by the space-bar 63, the space-bar levers 64 have operatively connected therewith an arm 65. This arm 65 is provided with a laterally-projecting pin 66, which pin is adapted to bear against a crank-arm 67, connected to the rock-shaft 59, to which the links 58 are rigidly secured. It will thus be understood that a depression of the spacing-bar 63 will cause the pin 66 on the arm 65 to contact with the crank-arm 67, thus rocking the shaft 59 and transmitting a vibratory movement to the links 58, thereby causing the free ends thereof to be moved in a direction opposite to that indicated by the arrow c in Fig. II. This movement of the parts will cause the frame 54, which is connected to the links 58, to be moved in a like direction, thus causing the dog-carrying frame to be shifted around its pivotal center to bring about a feed of the carriage. Upon reference to Figs. I and II of the drawings it will be observed that in the normal

position of the parts there represented a considerable movement of the universal bar takes place before the frame 54 has been moved to a position where the fingers 55 thereof will be brought into contact with the abutments 50 of the dog-carrying frame. By reason of this fact the keys are relieved from all strain necessary to effect a movement of the feed mechanism until a type-bar has been moved to a position within a short distance from the printing-point. Prior to this time the cam 52 on a type-bar has been brought into contact with the universal bar 53 to shift it. Thus it will be understood that no strain to effect a movement of the feed mechanism is offered to a depression of the key until it has acquired considerable momentum and that after an opposing strain is exerted this strain is evenly distributed, by reason of the fact that the movement of the universal bar and the parts connected thereto takes place first and then the contact between the frame 54 and the dog-carrying frame. It will likewise be observed that by my invention there is no necessity for moving the feed-rack, which is carried by the carriage, out of engagement with its cooperating pinion in order to release the carriage, the pinion and rack being maintained in mesh at all times; nor is it necessary to move the circular rack or star-wheel 32, so that the star-wheel may at all times be maintained in position to cooperate with the feed-dogs, and a movement of the carriage back to the normal position at the beginning of a line can be effected without depressing the release-key 41, by reason of the beveling of the teeth of the clutch-sections 24 and 31. A movement of the carriage toward the beginning of a line will merely cause the clutch-section 24 to ride up on the teeth of the clutch-section 31 and against the tension of the spring of the upper clutch-section 24. As soon as the carriage starts to move in an opposite direction the clutch-sections will be again engaged and further movement of the carriage is prevented.

I will next describe the tabulating mechanism and the means whereby the escapement is automatically released on the operation of the tabulating device.

Reference being had specifically to Fig. II of the drawings, it will be observed that the tabulating-key 69 is connected to the tabulating key-lever 70, which is pivoted at 71, and is provided with an extension 72, that is adapted to bear against a lever 73, pivoted to a fixed portion of the framing of the machine, as indicated at 74. The opposite end of this lever 73 from that which is operatively connected with the extension 72 of the key-lever 70 is connected by a pin-and-slot connection 75 to a depending arm 76, connected to the rock-shaft 77. This rock-shaft 77 is pivoted to oscillate in the framing of the machine and extends throughout the length thereof and is normally maintained in the initial position by a coiled spring 78. (Represented in Fig II of the drawings.) This bar or rock-shaft 77 is

provided with teeth 78<sup>x</sup>, with which teeth the 79 on a movable stop 82 are adapted to be engaged. This stop is pivoted to a slide 80, as indicated at 81, and in the normal position 5 (shown in Fig. II) the stop 82 is adapted to project out of the path of the cooperating stop 83, carried by the carriage. The stop 83 in the present instance is formed as part of one of the ears 12, which surrounds the traverse-rod 13. The handle 84 constitutes hand-operated means by which the stop 82 may be vibrated around its pivot to release the teeth thereon from the teeth carried by the rock-shaft or bar 77. When this disengagement 15 takes place, the slide 80 is free to be moved along the bar or rod 77 to set the stop in the proper position to arrest the carriage at the desired point for column-work. The stop 82 is likewise provided with a pointer 85, which 20 cooperates with a longitudinally-extending bar 86, that is carried by the bar 77 and extends throughout the whole or a considerable extent of the framing of the machine. This bar 86 carries indices (not shown) which correspond to the scale 87 at the front of the machine. In this manner the stop may be set at any desired point for column-work.

While I have described but a single tabulating-stop, it is obvious that a plurality of 30 such stops may be employed.

By referring to Fig. I of the drawings, it will be observed that a depending arm 88 is carried by the rock-shaft 77, and pivotally connected to this depending arm 88 is a link 35 or ligament 89. This link 89 is provided with a slotted portion 90, into which projects a pin 91. This pin 91 is carried by a crank-arm 92, which is connected to and constitutes a portion of the rocking frame 27. The slot 90 40 in the link 89 is so proportioned that the end thereof will be brought into contact with the pin 91 before the link has received its full movement, so as to transmit motion to the crank-arm 92, and thus move the frame 27 45 around its pivot 28, thereby disconnecting the clutch-section 24 from the cooperating section 31. When this disconnection takes place, the carriage is free to move until it is stopped by the tabulating-stop 82. The oscillation of the 50 rock-shaft 77, just described, will at the same time convey the bar 86 into contact with a leather "brake-shoe" 93, so called, so as to retard the carriage in its free movement toward the stop. This same movement of the parts 55 carries the tabulating-stop 82 into the path of the stop 83 upon the carriage, and thus arrests the movement of the carriage. When the key 69 is released, the rock-shaft 77 and the parts connected thereto will resume their 60 normal position. (Represented by Figs. I and II of the drawings.) This movement of the parts to the normal position will cause the clutch-section 24 to be moved to the lowermost position, where it will engage the cooperating clutch-section 31, and thus prevent 65 a further movement of the carriage from right to left.

From the foregoing description it will be seen that the two-part clutch 24-31 can be disengaged by hand either by the depression 70 of the finger-key 41, carried by the carriage, or by an operation of the tabulating-key 69. It will likewise be understood that in the movement of the carriage by hand from left to right and without depressing the finger-key 75 41 the teeth of the sections of the two-part clutch 24-31 will ride over each other and will not form an obstruction to the free movement of the carriage in this direction. Again, it will be seen that irrespective of the manner 80 in which the carriage is moved, whether from left to right, without depressing the release-key 41 by depressing the tabulating-key 69 to permit the carriage to move from right to left or by depressing the hand-operated release-key 41 to permit a hand-operated movement of the carriage in either direction the star-wheel 32 and the cooperating dogs will always be maintained in the same position 90 with relation to each other. In other words, any movement which may be transmitted to the carriage other than by an operation of the keys may be performed without transmitting motion to the feeding mechanism.

By my invention I am enabled to construct 95 the parts which constitute the escapement mechanism in a very rigid and substantial manner without affecting the rapidity of movement of the parts or without in any way detracting from the speed or operativeness 100 of the parts or without in any way changing the character of the writing, whether the operator be slow or speedy. As a matter of fact, it will be found that the heavier certain of the parts of the escapement mechanism are 105 made the greater will be the speed attained. Thus, for instance, any increase in the size or weight of the loose dog 47 will cause a more rapid movement or lateral throw of the dogs, in view of the fact that the impact of the feed-dog 110 against its cooperating abutment 56 will be more efficient or more effective to displace both the rigid and loose dogs in a lateral direction.

In order to describe with greater clearness 115 the operation of the device forming the subject-matter of my invention, I have illustrated in Figs. VI, VII, and VIII three diagrams. The escapement, as illustrated in Figs. IV and V, will be explained in connection with these diagrams. The parts represented in Fig. IV of the drawings are illustrated in the normal position. This position corresponds to the normal position or position of rest of the type-bar, as represented in the 125 diagram in Fig. VI. When the operator depresses a key 10, the universal bar 53 will be moved by the cam or abutment 52 on the bar to move the frame 54. Before the type-bar 3 has reached the printing position represented in Fig. VII the fingers 55 on the frame 54 will reach contact with the abutments 50 on the dog-carrying frame 43 and will oscillate the same around its pivots. This move- 130

ment of the dog-carrying frame will cause the frame to be moved against the tension of its spring 48, and the fixed and movable dogs will be moved in an upward or lateral direction. The effect of this movement is to release the movable dog 47 from contact with the teeth *d* of the star-wheel and at the same time to bring the rigid dog 45 into contact with said tooth *d* before it has a chance to move in the direction of the arrows *x* in Figs. IV and V. When the loose dog 47 is released in the manner described, the tension of the spring 48 will cause said dog to be moved around its pivot and to be forced into contact with the abutment 56. This contact of the dog 47 with the abutment 56 will cause both of the dogs to be moved in a lateral direction opposite to that in which they were moved by the fingers 55 of the frame 54. This lateral movement of the dogs with the dog-frame 53 causes the movable dog 47 to be interposed in the path of the next adjacent tooth *e* of the star-wheel. This movement of the loose feed-dog will take place at about the time when the key 10 is fully depressed. This full depression of the key corresponds to the position of the type-bar represented in Fig. VII of the drawings, or, in other words, a full depression of a type-key will cause the type-bar to be moved to the printing position and will cause at about this moment the release of the loose dog in the manner described. Before the type-bar has had time to rebound to any considerable extent from contact with the paper on the platen, or before it has had time to pass out of the type-bar guide 94, the universal bar will be moved back toward the normal position sufficiently far to withdraw the frame 54, and the fingers 55 thereon, a sufficient distance to permit a slight movement of the dog-carrier on its pivotal center. This movement of the dog-carrier toward the normal position is effective to release the tooth *d* of the star-wheel from the rigid dog 45, thereby permitting the star-wheel to rotate in the direction of the arrow *x*, Figs. IV and V, one step, or, in other words, until the tooth *e* has attained the position of the tooth *d* in Figs. IV and V. The extent of movement of the type-bar back from the paper on the platen may be varied by an adjustment of the abutments 50 on the dog-carrier, but is approximately indicated by the diagram shown in Fig. VIII of the drawings. During the movement of the star-wheel from the position indicated in Fig. V to a position where the tooth *e* will attain the same position as the tooth *d* in Fig. IV of the drawings the loose dog 47 will be conveyed back against the tension of its spring to the position represented in Fig. IV, it being understood that the tension of the main spring of the carriage is sufficient to overcome the tension of the spring 48 in order to bring about this longitudinal movement of the loose dog. The loose dog 47 is limited in this backward or feed movement by a pin 95 and when arrested by this pin in the manner described

will prevent further rotation of the star-wheel until the escapement is again operated by a type-bar in the manner described. Upon reference to Figs. IV and V of the drawings it will be seen that the rigid dog 45 is cut away upon one side thereof, as indicated at 96, for the free passage of the teeth of the star-wheel when the rigid dog is moved laterally in a downward direction or when the tooth *e* moves to the position of the tooth *d* in Figs. IV and V. Upon reference to Fig. I of the drawings it will be seen that the space between the upper face of the rigid pawl 96 and the lower face of the loose dog is insufficient to permit a tooth of the star-wheel from escaping between the two dogs when said dogs are in the same vertical plane. For this reason it will be impossible for the star-wheel to move more than the distance between two teeth without vibrating the dog-carrier laterally.

From what has been said it will be understood that a feed of the carriage takes place and necessarily takes place the instant an imprint has been made and that it will be impossible to "pile up" letters upon the paper, because of the fact that the escapement is operated and the carriage fed before a type-bar is withdrawn from the type-bar guide.

While I have described with considerable detail one form or embodiment of my invention, I would have it understood that various changes in construction may be made without departing from the spirit of my invention. Thus, for instance, while I have referred specifically to the employment of a star-wheel or circular rack which coöperates with a plurality of feed-dogs, it should be understood that a plurality of racks and a single feed-dog may be employed instead. Then, again, it is obvious that the parts may be variously disposed in order to adapt the invention to various types of type-writing machines in which the subject-matter of the invention may be embodied.

I have likewise referred to the vertical and horizontal disposition of the various parts of the structure; but it should be understood that such reference is made for the purpose of clearer description and that there is no intention to confine myself to such disposition of the parts. So far as I am aware I am the first to employ the throw or longitudinal movement of a feed element to bring about the lateral movement thereof, and such I desire to claim broadly.

Reference will be made in the claims to "feeding" or "feed" elements, and by such terms I wish to be understood to designate any feed element or elements employed in a type-writing machine whether said element or elements be in the nature of a feed-dog, a rotary star-wheel, such as illustrated in the accompanying drawings, or a feed rack or racks of the character commonly employed in type-writing machines.

It will be observed that the escapement shown is such that it may be readily removed

as a whole from the machine without dismounting other portions of the machine.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a type-writing machine, the combination of a carriage, an escapement member operatively connected with the carriage, a second escapement member cooperating with the first-mentioned escapement member, key-operated mechanism for actuating said second member, a clutch controlling the connection of the escapement with the carriage, releasing mechanism connected with said clutch to release the carriage, said mechanism being carried by the framing of the machine and provided with an operating member, and hand-operated means carried by the carriage and provided with a part which during its movement with the carriage remains in operative relation to a part of the releasing mechanism.

2. In a type-writing machine, the combination of escapement mechanism, a universal bar normally out of contact with said mechanism so that said bar will have an independent movement before it engages and operates the escapement mechanism, a type-carrier arranged to operate the universal bar, means for operating such type-carrier at first independently of the universal bar and then in unison with said bar.

3. An escapement mechanism comprising a feed-rack, a movable dog-carrier, a fixed dog and a loose dog mounted on said carrier and arranged to engage the rack and to move transversely thereof, a spring connected with the loose dog and having a tendency to throw it longitudinally of the rack when said dog is disengaged from the rack by the transverse movement of the dog-carrier, and a stationary deflecting abutment against which the loose dog is thrown by the spring when said dog is released from the rack, said abutment acting to move the dog-carrier transversely in the opposite direction to its first movement so as to bring the loose dog in operative relation to the rack, and the fixed dog out of engagement therewith.

4. An escapement mechanism comprising a feed-rack, a dog-carrier movable transversely of the rack, a fixed dog on said carrier, a loose dog arranged on said carrier and movable relatively thereto lengthwise of the rack, means connected with the loose dog and having a tendency to throw it lengthwise of the rack when said loose dog is disengaged from the rack by a transverse movement of the dog-carrier, and a stationary deflecting abutment against which the loose dog is thrown by the longitudinal movement occurring automatically upon the release of said loose dog, said abutment acting to move the dog-carrier in the opposite direction to the movement which releases the loose dog, so as to again bring the loose dog in operative rela-

tion to the rack, and the fixed dog out of engagement therewith.

5. In a type-writing machine, the combination of a carriage, an escapement member operatively connected with the carriage, a second escapement member cooperating with the first-mentioned escapement member, key-operated mechanism for operating said second member, a clutch controlling the connection of the escapement with the carriage, releasing mechanism connected with said clutch to release the carriage, said mechanism being carried by the framing of the machine and provided with an operating member or link, and hand-operated means carried by the carriage and provided with an operating-rod extending parallel to the direction of the feed and in sliding engagement with the said link.

6. In a type-writing machine, the combination of a carriage, a member of an escapement operatively connected to said carriage, a second escapement member cooperating with the first-mentioned escapement member, key-operated mechanism for operating said second-named member, spring-pressed clutch mechanism for normally maintaining an operative connection between the escapement and the carriage and hand-operated means carried by the carriage and by the framing of the machine for disconnecting the clutch mechanism to release said carriage from the escapement.

7. In a type-writing machine, the combination of a carriage, a member of an escapement operatively connected to said carriage, a second escapement member cooperating with the first-mentioned escapement member, key-operated mechanism for operating said second-named member, spring-pressed clutch mechanism for normally maintaining an operative connection between the escapement and the carriage, hand-operated means carried by the carriage for disconnecting the clutch mechanism to release said carriage from the escapement and key-operated mechanism carried by the framing of the machine which key-operated mechanism is operatively connected to the clutch mechanism to disconnect the same and thereby free the carriage from the escapement.

8. In a type-writing machine, the combination of a carriage, a rack carried by said carriage, a pinion meshing with the rack, escapement mechanism operatively connected to the pinion, disengageable clutch mechanism interposed between the pinion and escapement, hand-operated mechanism carried by the carriage for disconnecting the clutch mechanism without effecting a disengagement of the rack and pinion or the members of the escapement, a tabulating-key and intermediate mechanism between said tabulating-key and clutch mechanism.

9. In a type-writing machine, the combination of a carriage, a rack carried by said

carriage, a pinion meshing with the rack, escapement mechanism operatively connected to the pinion, disengageable clutch mechanism interposed between the pinion and escapement, a tabulating-key, a movable tabulating-stop, intermediate connections between said stop and the tabulating-key and intermediate connections between the tabulating-key and clutch mechanism, whereby an operation of the tabulating-key will interpose a stop in the path of a cooperating stop on the carriage and will disconnect the clutch mechanism to release the carriage.

10. In a type-writing machine, the combination of a carriage, a rack carried by said carriage, a pinion meshing with the rack, escapement mechanism operatively connected to the pinion, disengageable clutch mechanism interposed between the pinion and escapement, hand-operated mechanism for disconnecting the clutch mechanism without effecting a disengagement of the rack and pinion or the members of the escapement, a tabulating-key, a movable tabulating-stop, intermediate connections between said stop and the tabulating-key and intermediate connections between the tabulating-key and clutch mechanism, whereby an operation of the tabulating-key will interpose the stop in the path of a cooperating stop on the carriage and will disconnect the clutch mechanism to release the carriage.

11. In a type-writing machine, the combination of a carriage, a rack carried by said carriage, a feed-rack, operative connections between said carriage and feed-rack, which connections comprise a disengageable clutch, means for disengaging said clutch, a laterally-vibrating feed-dog, a longitudinally-movable feed-dog which is likewise capable of vibrating laterally both of said dogs cooperating with the feed-rack and cooperating means for effecting a lateral movement of both dogs by the longitudinal movement of the longitudinally-movable dog.

12. In a type-writing machine, the combination of a carriage, a rack carried by said carriage, a feed-rack, operative connections between said carriage and feed-rack, which connections comprise a disengageable clutch, means for disengaging said clutch, a laterally-vibrating feed-dog, a longitudinally-movable feed-dog, which is likewise capable of vibrating laterally, both of said dogs cooperating with the feed-rack, cooperating means for effecting a lateral movement of both dogs by the longitudinal movement of the longitudinally-movable dog, a type-carrier, hand-operated mechanism for moving said type-carrier and means controlled by said hand-operated mechanism for moving the feed-dogs laterally.

13. In a type-writing machine, the combination of a carriage, a rack carried by said carriage, a feed-rack, operative connections between said racks, which connections comprise a spring-pressed disengageable clutch,

hand-operated means carried by the carriage for disengaging said clutch, a laterally-vibrating feed-dog, a longitudinally-movable feed-dog which is likewise capable of vibrating laterally, both of said dogs cooperating with the feed-rack, cooperating means for effecting a lateral movement of both dogs by the longitudinal movement of the longitudinally-movable dog, a type-carrier, hand-operated mechanism for moving said type-carrier, and means controlled by said hand-operated mechanism for moving the feed-dogs laterally.

14. In a type-writing machine, the combination of a carriage, a rack carried by said carriage, a pinion meshing with the rack, escapement mechanism operatively connected to the pinion, disengageable clutch mechanism interposed between the pinion and escapement, a tabulating device which is operatively connected to the clutch mechanism to disengage the clutch when the tabulator is operated and a brake which is controlled by said tabulator to retard the movement of the carriage when it is freed by the disengagement of the clutch.

15. In a type-writing machine, the combination of a carriage, a movable bar carried by said carriage, hand-operated means for moving said bar independently of the carriage, escapement mechanism, intermediate clutch mechanism between said escapement and the carriage to operatively connect the escapement to the carriage, a connection between the movable bar and the clutch mechanism whereby the clutch mechanism may be moved at will by the hand-operated means, tabulating mechanism and an intervening connection between the tabulating mechanism and the clutch mechanism whereby the clutch may be operated or disengaged either by the tabulating mechanism or the hand-operated means.

16. An escapement mechanism comprising a feed-rack, a vibratory dog-carrier, a fixed feed-dog and a loose feed-dog carried by said carrier, a spring connected to said loose dog and to a stationary part for operating the dog and the dog-carrier and an abutment with which the loose dog is adapted to contact when it is free to be moved by the spring, whereby the dog-carrier will be moved around its pivotal center.

17. An escapement mechanism comprising a feed-rack, a vibrating dog-carrier, a fixed feed-dog and a loose feed-dog carried by said carrier, a spring connected to said loose dog and to a stationary part for operating the dog and the dog-carrier, an abutment with which the loose dog is adapted to contact when it is free to be moved by the spring, whereby the dog-carrier will be moved around its pivotal center in one direction, a type-carrier and means operatively connected to the type-carrier for moving the dog-carrier in an opposite direction.

18. An escapement mechanism comprising

a feed-rack, a movable dog-carrier, a fixed dog and a loose dog mounted on said carrier and arranged to engage the rack and to move transversely thereof, a spring connected with  
5 the loose dog and having a tendency to separate it from the fixed dog in a longitudinal direction when said loose dog is disengaged from the rack by a transverse movement of the dog-carrier, and a stationary deflecting-  
10 abutment against which the loose dog is thrown by the spring when said dog is released from the rack, said abutment acting to move the dog-carrier transversely in the opposite direction to its first movement, so  
15 as to bring the loose dog in operative relation to the rack and the fixed dog out of engagement with the rack.

19. An escapement mechanism comprising a feed-rack, a vibratory dog-carrier, a fixed  
20 dog on said carrier, a loose dog pivoted to the carrier about an axis transverse to that of the carrier, a spring connected with the loose dog and having a tendency to separate it

from the fixed dog in a longitudinal direction, and a stationary deflecting-abutment against  
25 which the loose dog is thrown by the spring when said dog is disengaged from the rack, to deflect said dog and the dog-carrier transversely.

20. In a type-writing machine, the combination of a carriage, a fixed rack carried by  
30 said carriage, a pinion engaging the rack on the carriage, a splined clutch-section operatively connected to the pinion, hand-operated means carried by the carriage for moving the  
35 clutch-section, tabulating mechanism and an intervening connection between said tabulating mechanism and clutch-section, a loosely-mounted star-wheel, a second clutch-section carried by said star-wheel and cooperating  
40 feed mechanism engaging said star-wheel.

CHARLES W. HOWELL, JR.

Witnesses:

CHARLES E. SMITH,  
GEO. E. MORSE.