

No. 690,714.

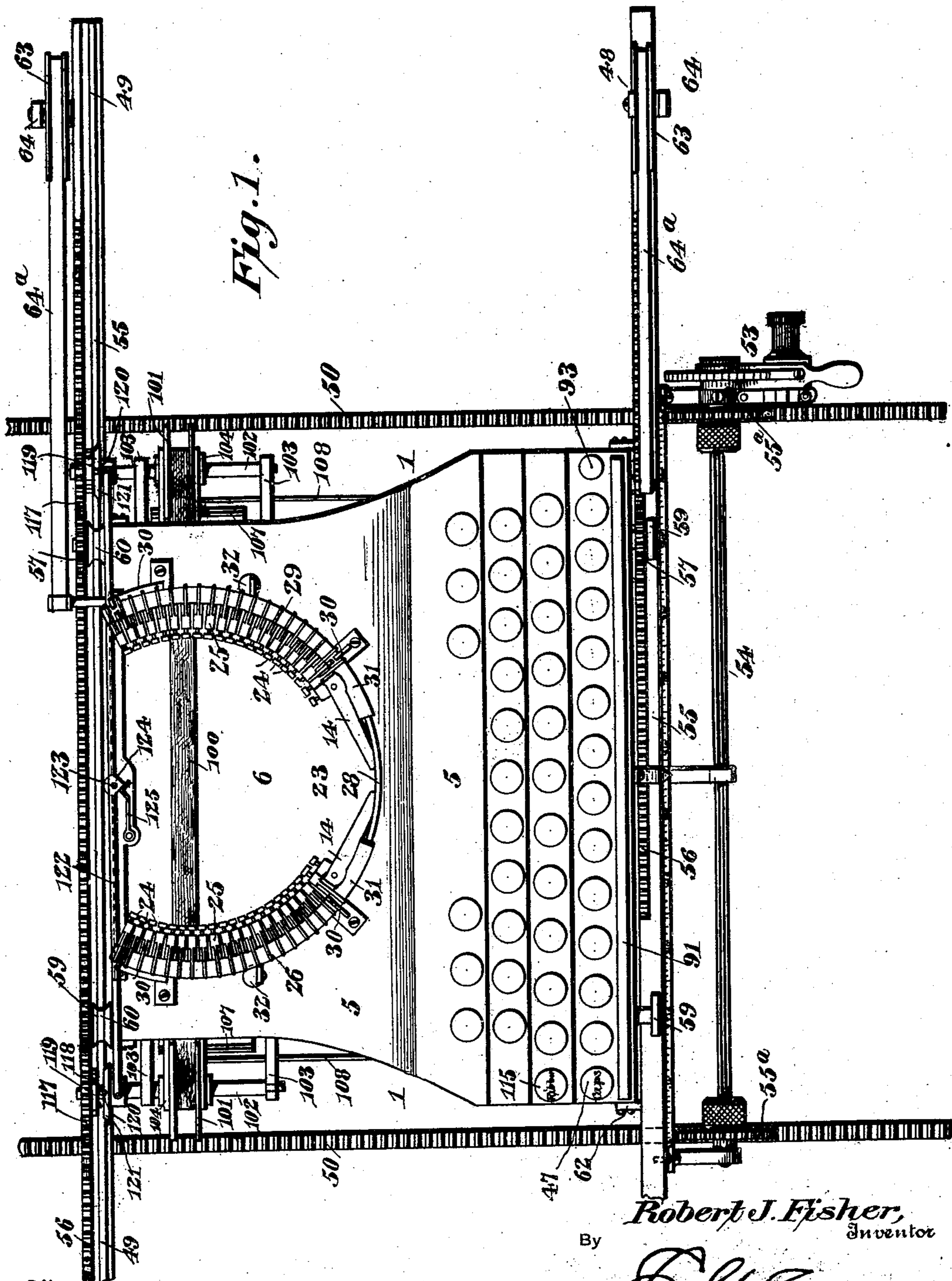
Patented Jan. 7, 1902.

R. J. FISHER.  
TYPE WRITING MACHINE.

(Application filed June 22, 1900.)

(No Model.)

7 Sheets—Sheet 1.



Witnesses  
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7 Sheets—Sheet 2.

Fig. 2.

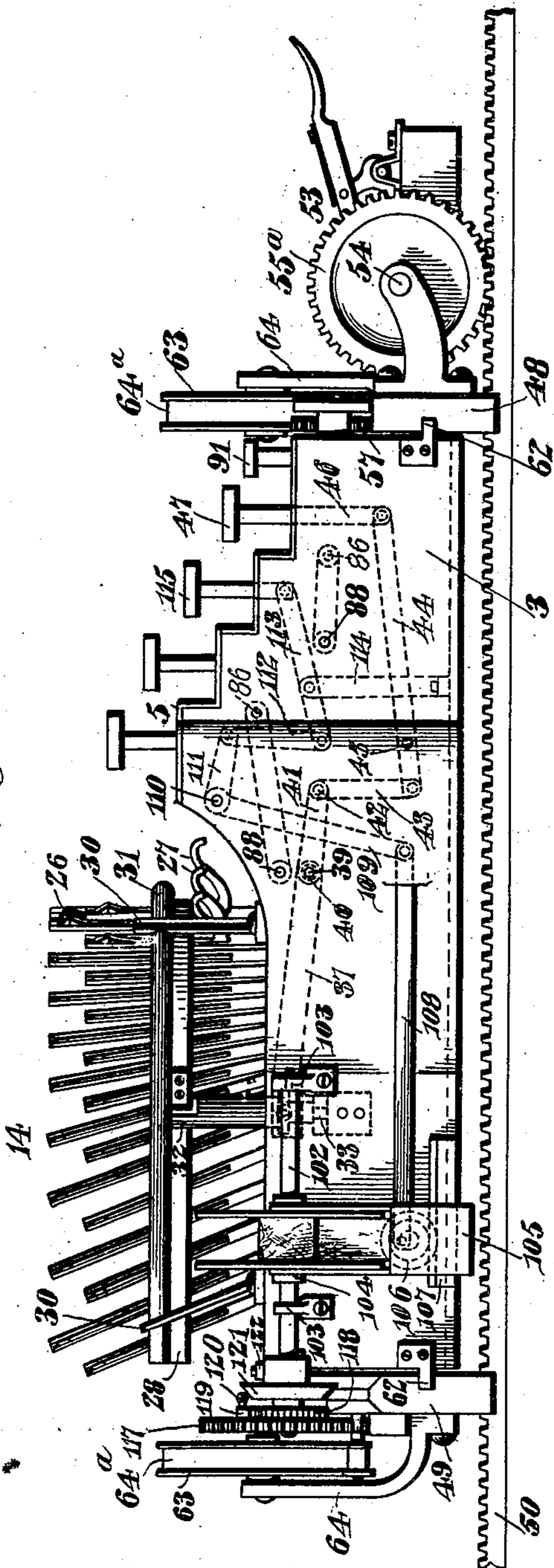
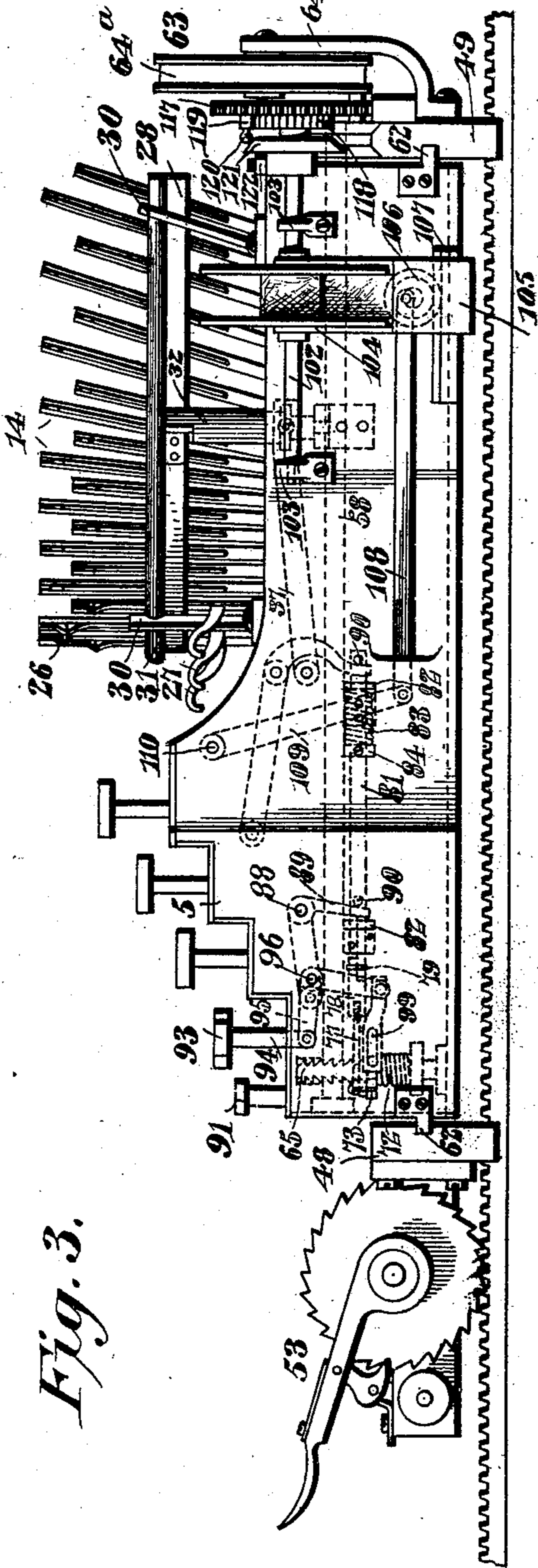


Fig. 3.



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7 Sheets—Sheet 3.

Fig. 4.

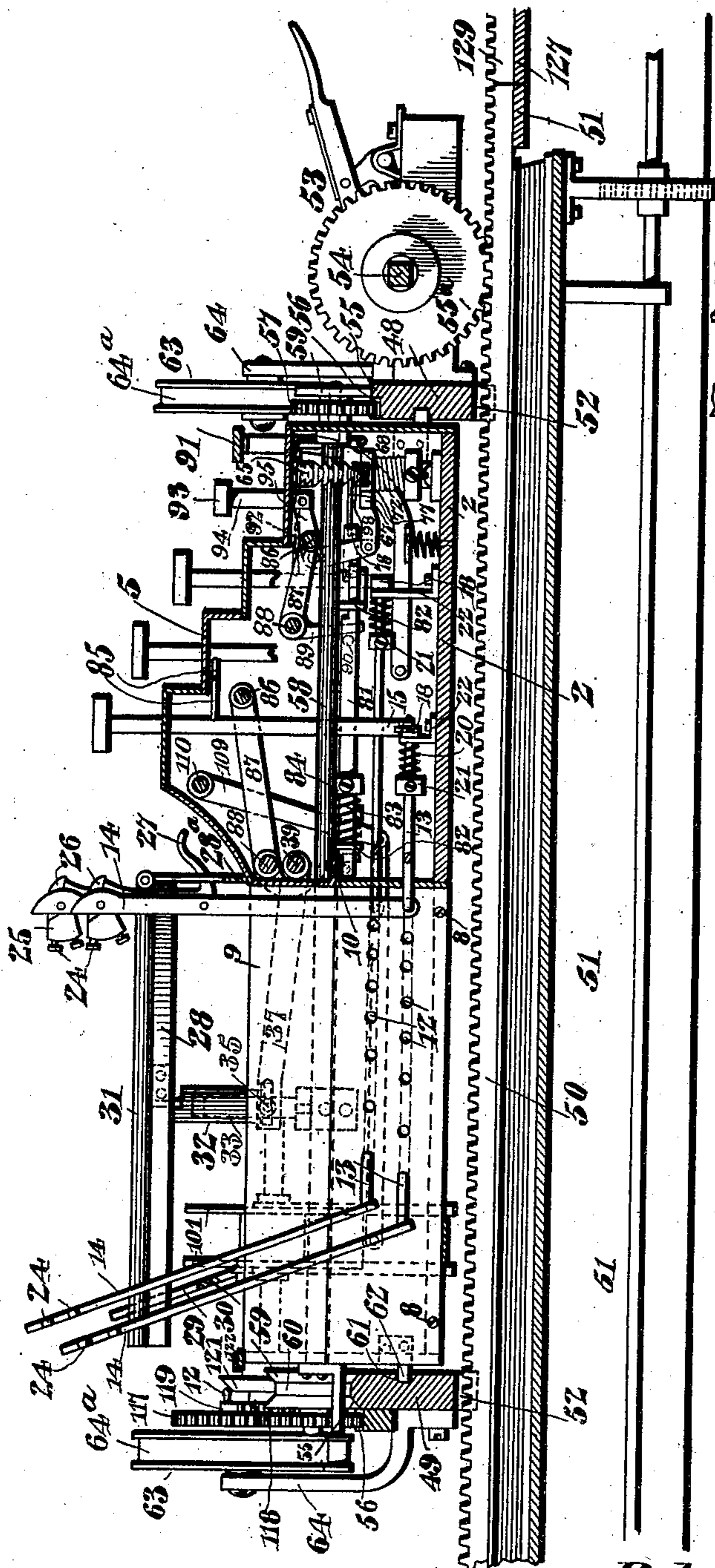


Fig. 10.

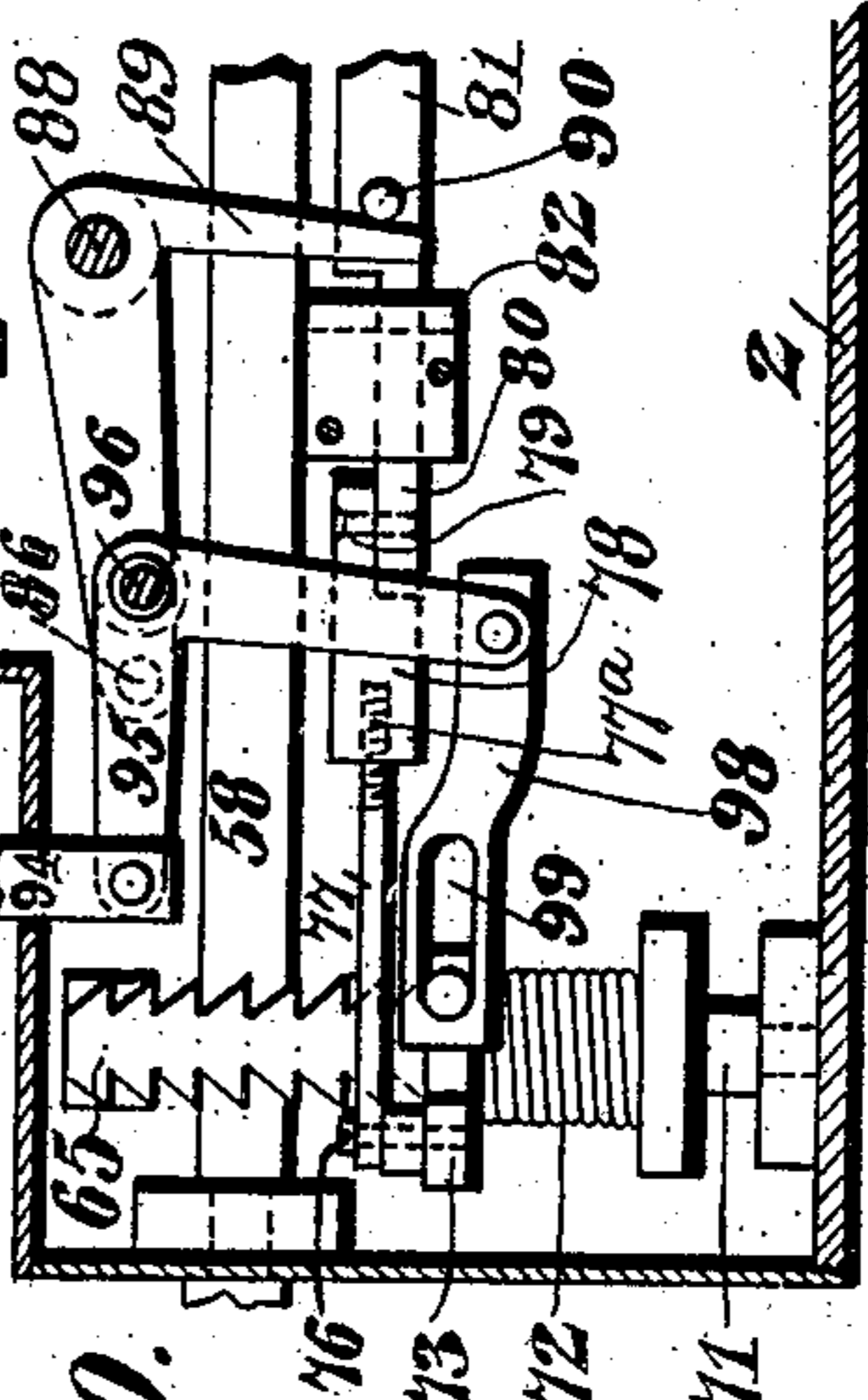


Fig. 9.



Witnesses

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7 Sheets—Sheet 4.

Fig. 5.

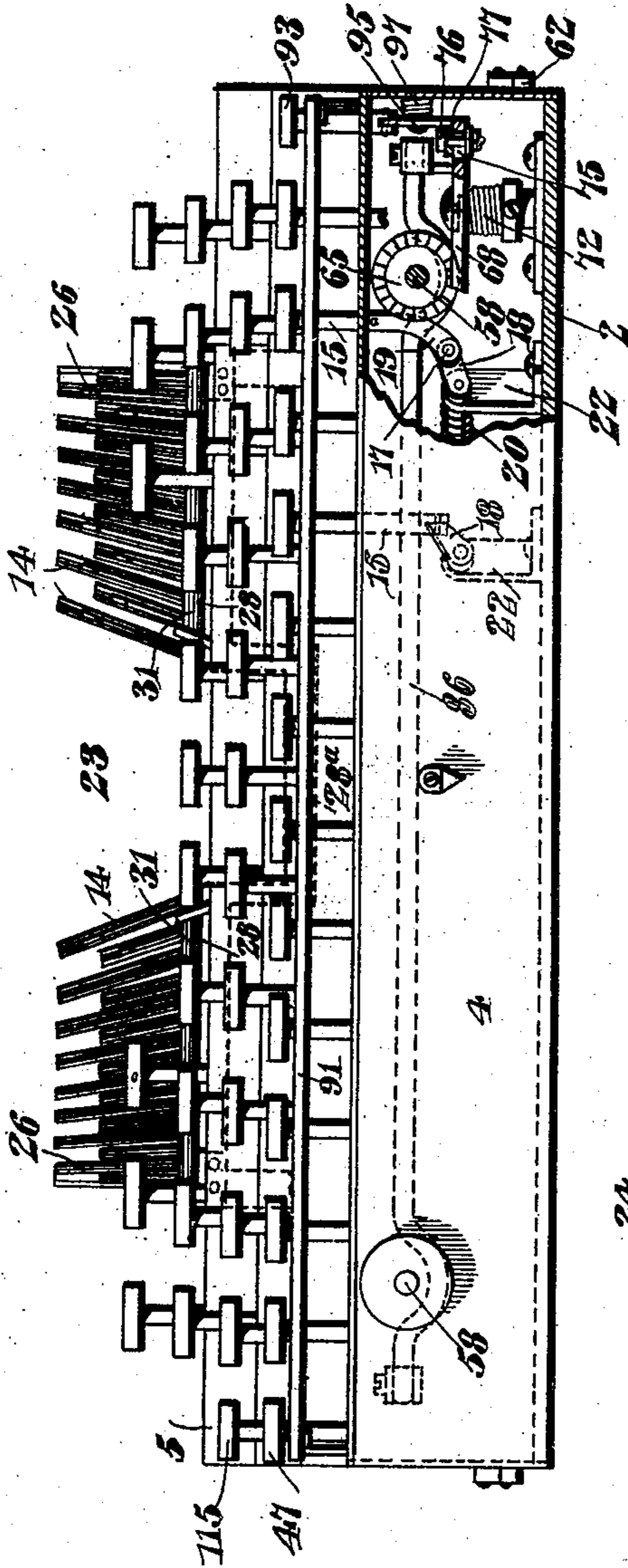
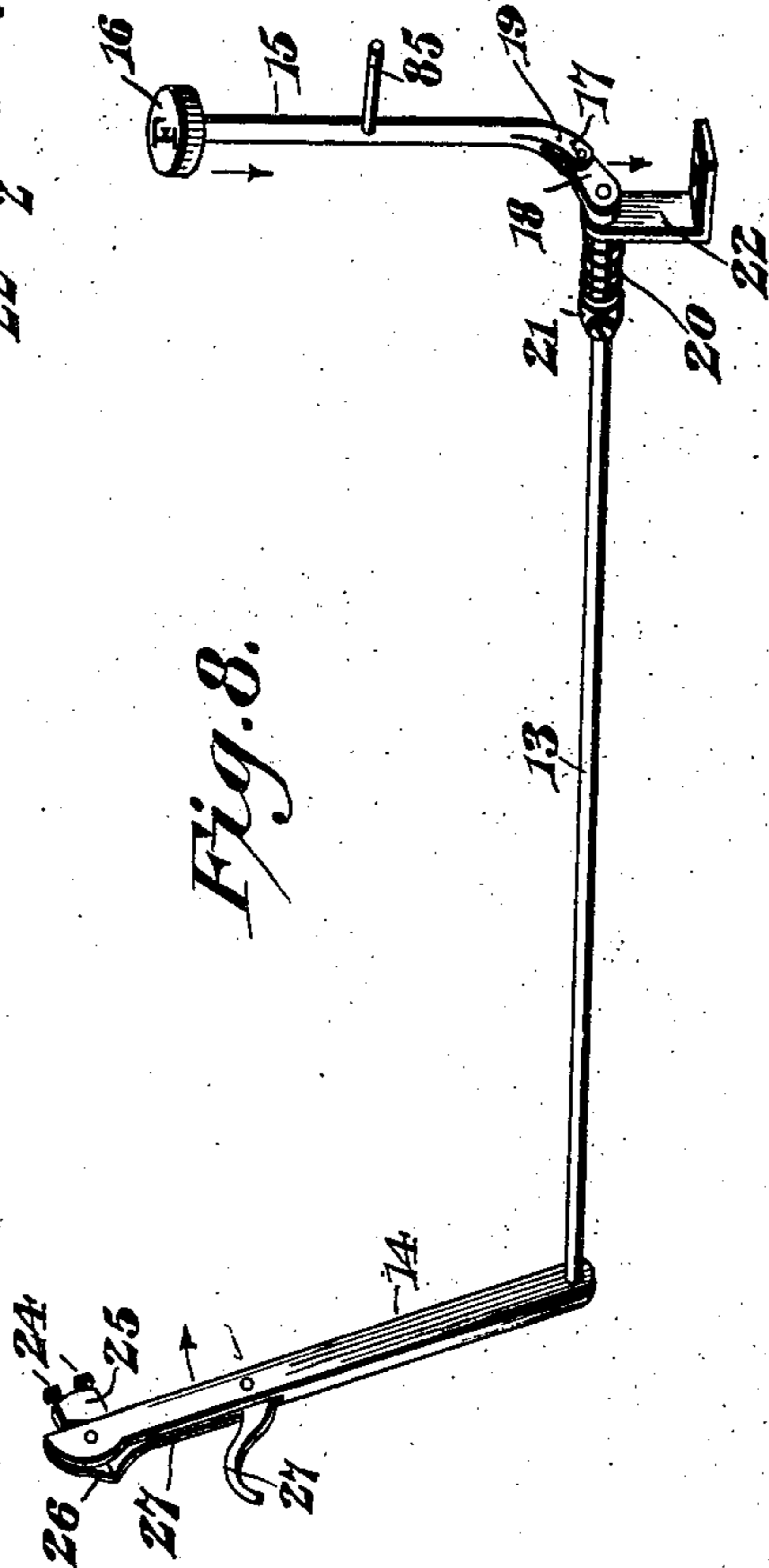


Fig. 8.



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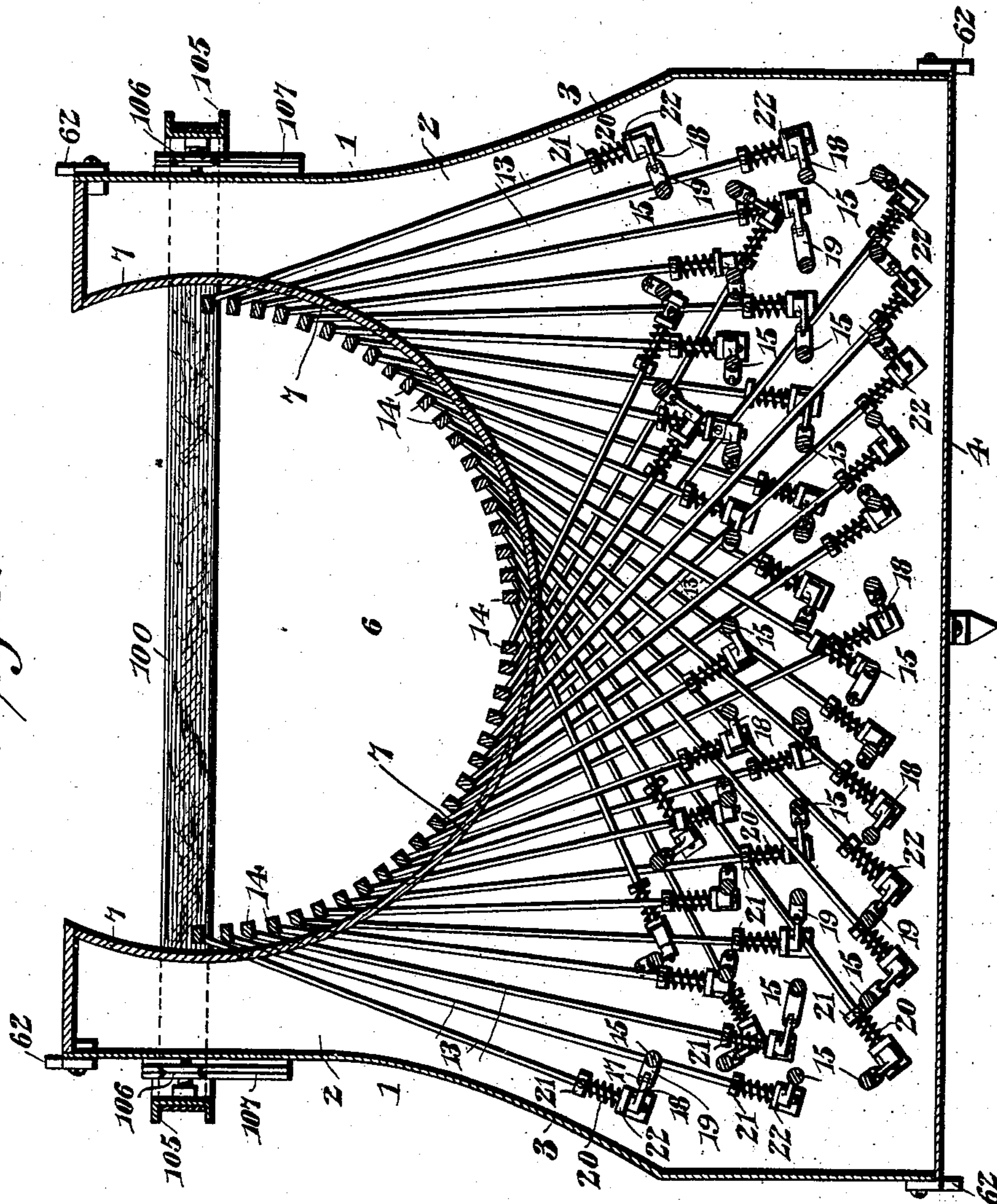
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7 Sheets—Sheet 5.

Fig. 6.



Witnesses

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7 Sheets—Sheet 6.

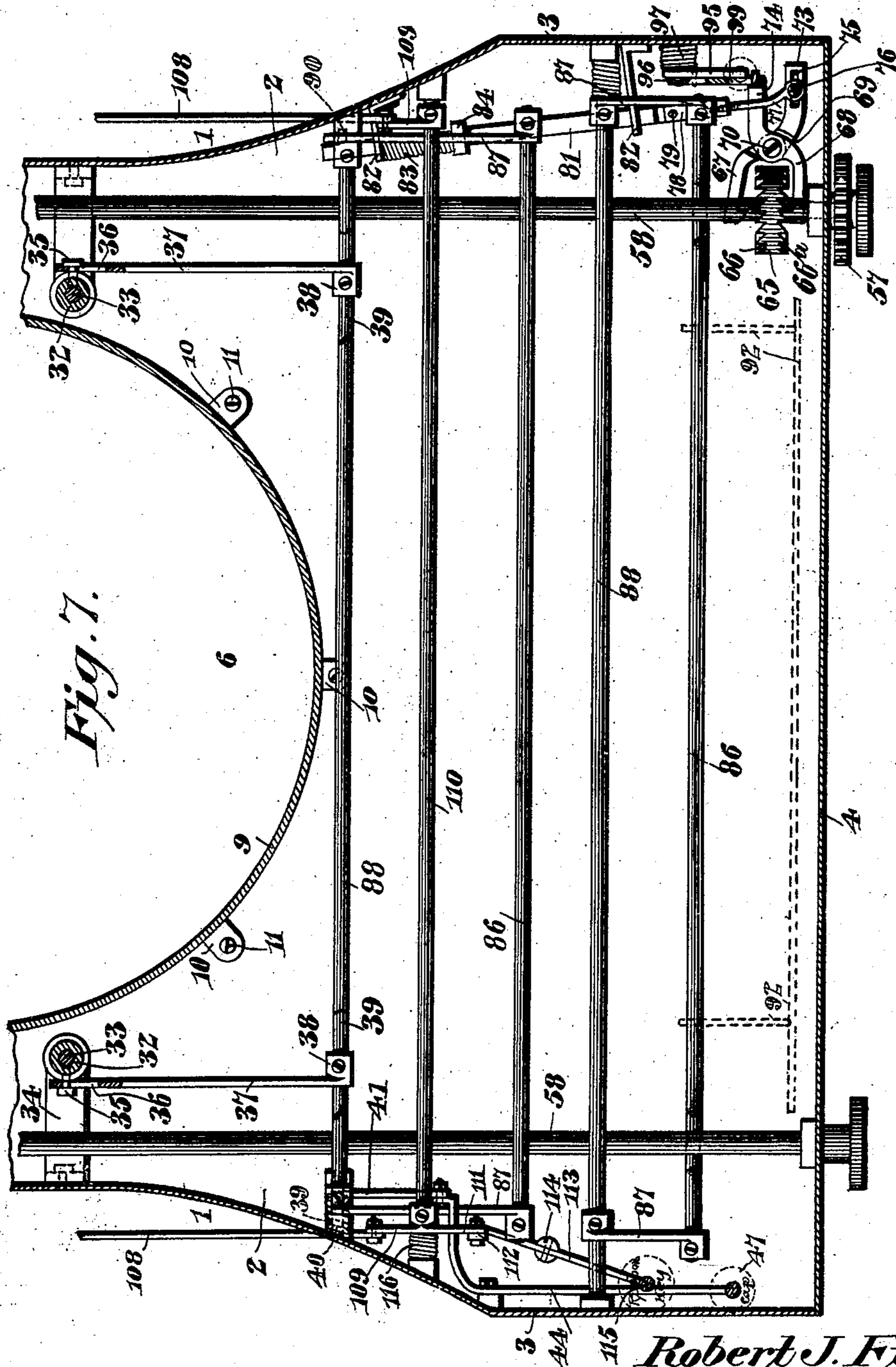


Fig. 7.

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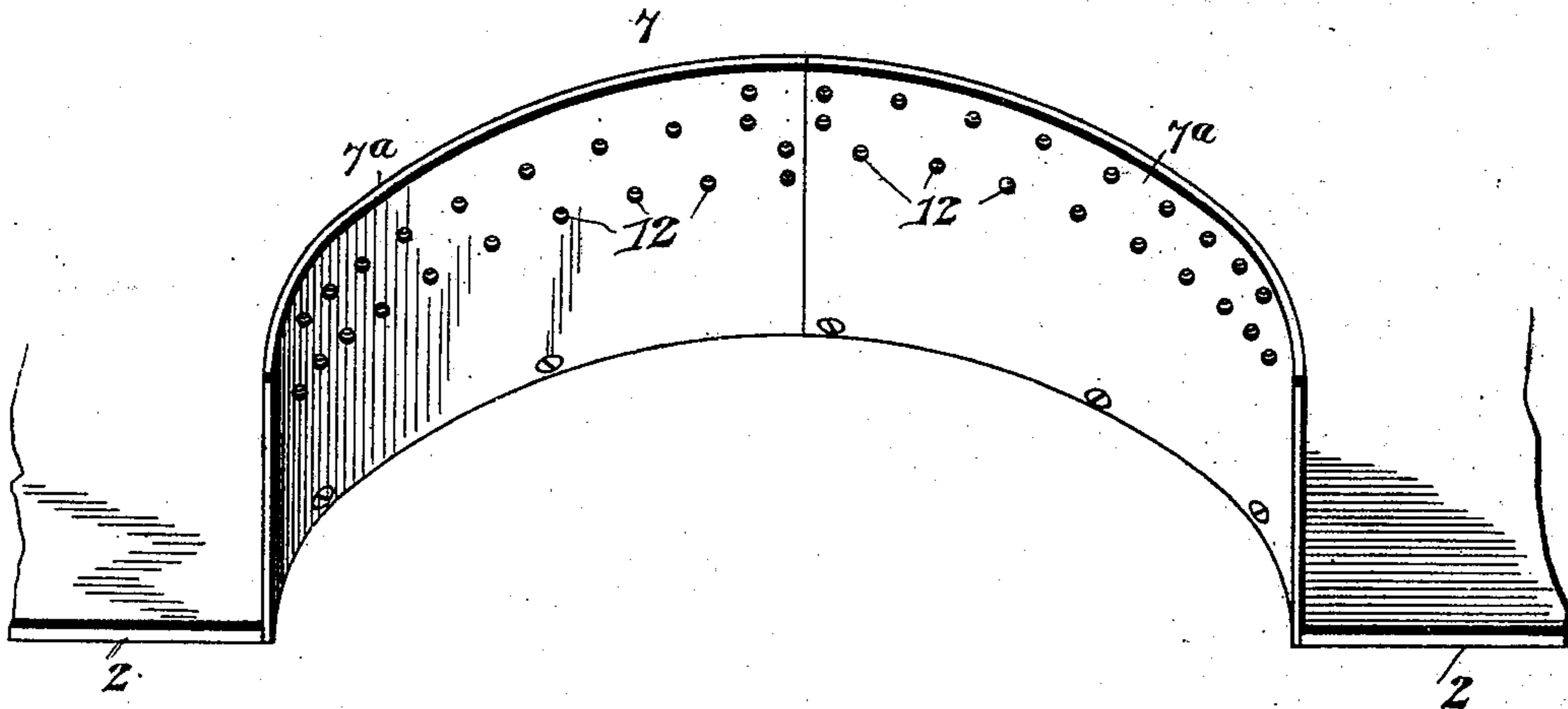
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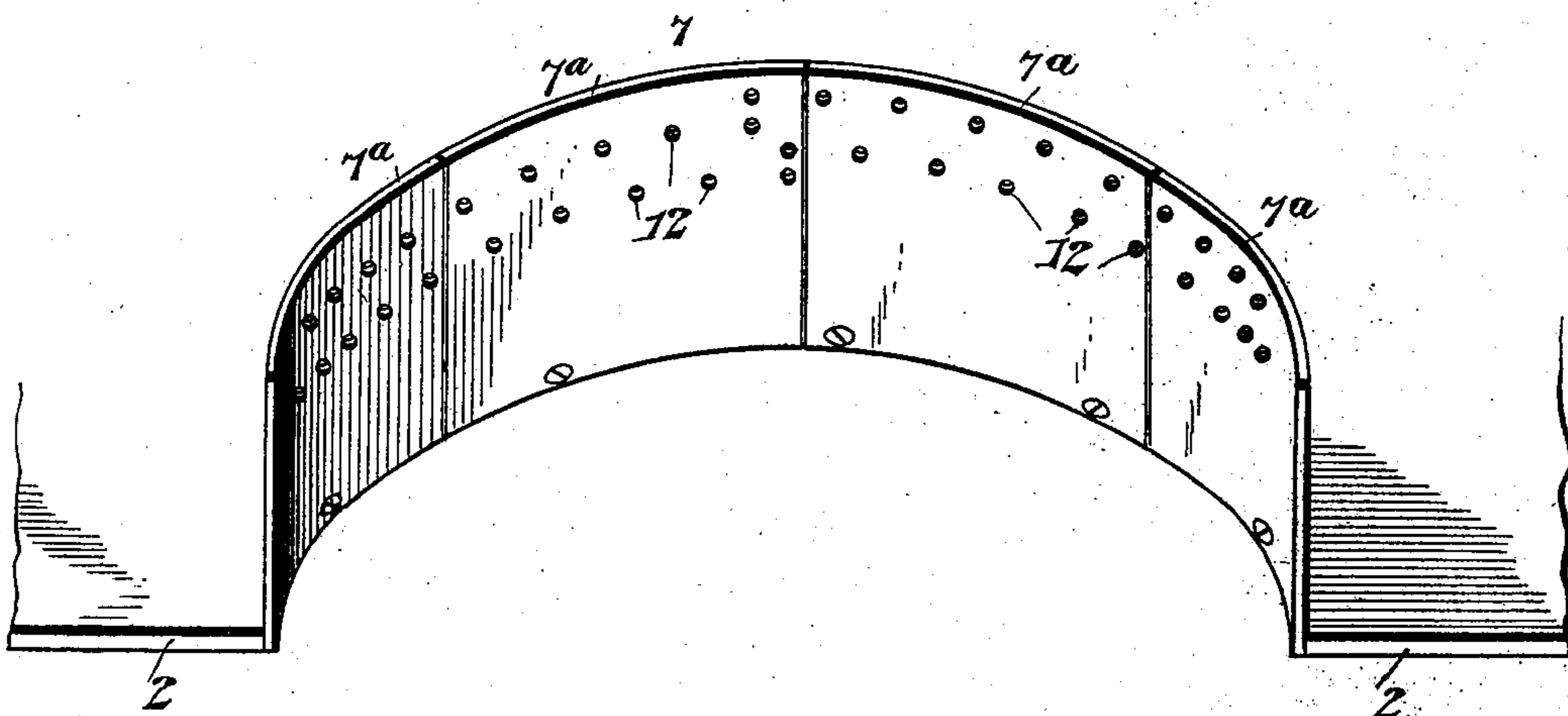
(No Model.)

7 Sheets—Sheet 7.

*Fig. 11.*



*Fig. 12.*



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# UNITED STATES PATENT OFFICE.

ROBERT JOSEPH FISHER, OF ATHENS, TENNESSEE.

## TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 690,714, dated January 7, 1902.

Application filed June 22, 1900. Serial No. 21,206. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT JOSEPH FISHER, a citizen of the United States, residing at Athens, in the county of McMinn and State of Tennessee, have invented a new and useful Type-Writing Machine, of which the following is a specification.

This invention relates to type-writing machines, and has special reference to certain improvements in machines of this character whereby there may be secured a low keyboard, visible writing, and a permanent alignment of the type, with a minimum number of operating parts and low cost of construction.

To this end the invention primarily has in view the construction and arrangement of the type-bars in such a manner as to entirely dispense with the usual hanger ring or support for the type-bar bearings, besides providing a substantially direct operating connection between the type-bar proper and the key-stem associated therewith. It is by reason of this important improvement that means are provided for compactly grouping or assembling the type-bars and their operating connections in the lowest possible position with reference to the writing plane, thus securing a very low keyboard.

A further object of the novel construction and arrangement of the type-bars is to permit of the grouping thereof in such a way as to leave an unobstructed writing space or area, besides a work-vista, to permit of a view of the writing from the front of the machine.

A special object of the invention, as already stated, is to provide a construction and arrangement of type-bars involving great simplicity and a minimum number of parts and also to provide type-bar bearings of a considerable length whereby under the most abnormal conditions the play of the type-bars at the striking ends thereof will be so infinitesimal as not to appreciably affect the alignment of the type.

A further object of the invention is to provide improvements which are capable of use in connection with an ordinary letter type-writing machine, or in connection with that class of machines known as "book" typewriters. In this latter application of the invention the same possesses special utility when associated with some of the improved

features of that type of machines known as the "Fisher" type-writing machine and the general nature of which is exemplified by several former patents to the present applicant, notably Patents No. 569,491, dated October 13, 1896, and No. 573,868, dated December 29, 1896. In carrying out the invention along these lines the same provides an arrangement of the type-bars whereby the latter may strike backward through an open space in rear of the carriage, thus gaining in reach the distance between the striking-point of the type-bars and the front keys of the keyboard and bringing the latter down to close proximity to the writing plane.

The invention also has in view the provision of an improved bearing member for the type-bars common to all of the same and so designed as to materially reduce the cost of construction of the ordinary type-bar bearings, besides obviating the difficulties usually attending the very accurate construction of such bearings.

The invention also contemplates improvements in the letter-spacing mechanism and other minor parts of the machine which will render the same more efficient and durable and will contribute to the practical use of the type-bar improvement forming the fundamental feature of the application.

Furthermore, the invention contemplates as a novel feature thereof a traveling type-carriage movable upon a carriage-supporting frame and comprising a base-plate, frame, or support located intermediate of the rails of the carriage-supporting frame and in a plane below the upper edges thereof, the dropping of the carriage-base between the rails serving to locate the key-actions supported by the base in exceedingly close proximity to the writing-surface, inasmuch as the key-actions carried by the base comprehend type-bars normally upstanding above the base and having operating-shafts extending from their lower ends and operatively related to the stems of the operating-keys.

With the foregoing and many other objects in view, which will readily appear to those familiar with the art, the invention consists in the novel construction, combination, and arrangement of parts hereinafter more fully described, illustrated, and claimed.

The essential features of the invention are necessarily susceptible to a wide range of modification without departing from the spirit or scope thereof; but the preferred embodiment of the improvements is shown in the accompanying drawings, in which—

Figure 1 is a top plan view of the machine. Fig. 2 is a side elevation of the machine from one side. Fig. 3 is a similar view of the opposite side of the machine. Fig. 4 is a vertical longitudinal sectional view of the machine. Fig. 5 is a front elevation, partly in section, of the carriage. Fig. 6 is a horizontal sectional view illustrating the preferable manner of grouping and arranging the type-bar-operating shafts and omitting the other parts of the machine for the purpose of clearly exposing the construction. Fig. 7 is a view similar to Fig. 6, omitting the type-bars and their operating-shafts, so as to expose the operating connections respectively for the letter-spacing mechanism, for the vertically-movable trip-ring, for the type-heads, and for the ribbon-shifting device. Fig. 8 is a detail in perspective of one complete type-bar, comprising the type-bar or arm proper and its operating-shaft, the view also including the key-stem connection for the type-bar. Fig. 9 is an inner elevation of the type-bar bearing-plate, illustrating the ends of the type-bar-operating shafts to expose the grouping thereof in different planes respectively at opposite sides of the transverse center of the ring. Fig. 10 is an enlarged detail elevation of the letter-spacing mechanism with the parts arranged in the positions shown in dotted lines in Fig. 3. Fig. 11 is a detail in perspective of a modification of the crescent bearing-plate. Fig. 12 is a similar view of another modification of the crescent bearing or bearing-plate.

Like numerals of reference designate corresponding parts in the several figures of the drawings.

The fundamental feature of the present invention resides in the construction and arrangement of the type-bars and the manner of mounting the same in conjunction with their operating rock-shafts, and specific reference will first be made to this part of the machine, as the remaining improvements are subsidiary thereto and have been associated therewith for the purpose of providing a complete book type-writing machine. It will be obvious as the invention is more fully understood that the construction of the type-bars and the mounting thereof and their operating connections are necessarily susceptible to embodiment in almost any form of type-writing machine, whether for ordinary letter-work or for book and record work, such as the Fisher type-writing machines disclosed in the patents hereinbefore referred to.

In carrying out the invention the type-action, including the type-bars and the operating parts therefor, may be used in different classes of machines—for instance, with such

machines as have a stationary writing mechanism and a movable writing plane or workholder, as well as with machines in which a vertical writing plane is employed instead of the usual horizontal writing plane. It is obvious to those familiar with the art that the type-action, *per se*, could be employed in any of these relations; but for illustrative purposes the said type-action has been shown in connection with a book type-writing machine involving the employment of a traveling type-carriage, (designated by the numeral 1.) The form of type-carriage shown consists of a shallow or low casing provided with a flat base or floor 2, the inclosing side and front walls 3 and 4, respectively, and the top cover 5, of the usual stepped formation, to provide for the usual keyboard arrangement. To provide for the proper arrangement of the type-bars in accordance with the present invention, the shallow traveling type-carriage casing 1 is provided within its rear side with the reentrant crescent or approximately semicircular type-basket opening 6, within which the type-bars constituting the basket are arranged in a rearwardly-opening crescent-shaped series, whereby said type-bars are permitted to strike rearwardly, thus disposing the entire keyboard in front of the line of writing and enabling the carriage to be advanced forwardly or downwardly from the line of writing as the work progresses instead of traveling over it, as is the case in some forms of type-writing machines.

The reentrant crescent or approximately semicircular type-basket opening 6 may be formed in a practical manner by cutting away the rear edge of the carriage base or floor 2, as shown in the drawings, and in connection with the said opening 6 there is designed to be associated one of the important features of the invention—namely, a common bearing member 7 for the entire series of type-bar-operating rock-shafts, to be described. This dispenses with a separate or individual bearing member for each rock-shaft and obviating the hanging of the type-bars and their bearings upon hanger-rings or equivalent supports, such as are commonly employed in many forms of type-writing machines. The said common bearing 7 may of course be constructed in a variety of ways and still preserve its general characteristic of constituting a single bearing or support for the entire series of rock-shafts. It is usually and preferably made of a single strip of sheet-steel, case-hardened, if desired, which is bent into an approximately semicircular or crescent form, so as to conform to the contour of the type-basket opening 6 within the rear side of the carriage-casing. An integral formation of the bearing or bearing-plate 7 is the simplest construction; but it is obvious that the same result could be accomplished by making the said bearing 7 of two or more sections, as illustrated in Figs. 11 and 12 of the drawings. In Fig. 11 of the drawings the common bear-

ing or bearing-plate 7 for the operating-shafts of the type-bars is shown as consisting of a pair of duplicate sections 7<sup>a</sup>, which are arranged in flush relation and in circular alinement, so as not to disturb the continuity or general configuration of the bearing, while in Fig. 12 of the drawings the same is shown as consisting of a greater number of sections 7<sup>a</sup>, which maintain the relation described. In both of these modifications, while the bearing or bearing-plate 7 is shown as made up of two or more sections, still the same is, properly speaking, a common or single bearing element and is contradistinguished in this respect from a plurality of individual bearings for the type-bars or the operating-shafts therefor.

Other modifications may be resorted to without departing from the scope of the invention.

Any approved means may be resorted to for fitting the common sheet-metal bearing 7 in position, as it is only necessary to rigidly fit the same to the carriage-body. This may be accomplished in a simple way by means of screws or equivalent fasteners 8, as shown in Fig. 4 of the drawings.

In the horizontal form of machine where the type-bars strike downwardly upon a horizontal writing plane the single sheet-metal crescent bearing stands upright and arises above its point of connection with the base or floor of the casing, and to provide for filling out the height of the carriage-casing there may be utilized in connection with the bearing-plate 7 a crescent casing plate or ring 9, which surmounts the plate 7 and is arranged flush therewith to constitute a back wall for the rear portion of the carriage-casing. The back casing-plate 9 and the bearing-plate 7 may be secured together by any suitable means, and conveniently so by providing the meeting edges of the said plates with a plurality of offset ears 10, connected by screws or equivalent fastenings 11, as plainly shown in Figs. 5 and 8 of the drawings.

The common bearing or bearing-plate 7, whether of integral or sectional formation, is simply drilled with a series of bearing-openings 12, which are designed to receive therein the rear end portions of the straight operating rock-shafts 13 for the swinging type-bars 14, grouped within the type-basket opening 6 in close proximity to the wall of said opening, which is bounded in part by the aligned bearing and casing plates 7 and 9. In carrying out the invention each type-bar 14 and its operating rock-shaft 13 is preferably constructed in one piece, which may be effected in various ways, one of which is to weld the type-bar directly to its operating-shaft. By reason of this construction each type-bar, mechanically speaking, is in the form of a swinging bar or arm portion 14, having direct and in this instance integral connection with an operating rock-shaft 13, which elements move in unison and said operating rock-shaft being designed to

have a practically direct connection with the key-stem. By reason of this substantially direct key-stem connection with each operating rock-shaft 13 the present invention obviates a plurality of operating connections between the type-bar and the key therefor, such as are usually employed in ordinary type-writing machines. This part of the invention contemplates a direct motion being transmitted to each type-bar-operating shaft from a vertically-moving key-stem 15, extending upward through the top cover of the carriage-casing, and provided at its upper end with the usual character-bearing key 16, constituting an element of the key-board. Each vertically-moving key-stem 15 has a pivotal connection at its lower end, as at 17, with a crank-arm 18, rigid with one end of the type-bar-operating shaft 13 associated therewith and, in order to secure the regular spacing of the keys in rows, it may be found desirable to provide some of the key-stems with curved or deflected portions 19 at their lower ends, where the same connect with the crank-arms 18 of their respective type-bar-operating shafts 13. This constitutes a single direct key-stem connection, and it will therefore be readily seen that the invention provides a simple form of type-bar and operating means therefor which dispenses with the large number of parts which usually go to make up the type-action of ordinary type-writing machines, as already stated. At this point it may be noted that all of the type-bar-operating shafts must leave the type-bars "crescent," by which is meant the crescent-shaped series of type-bars at the same angle, in order to prevent conflict of the type-bars when at rest, and it may therefore be desirable in the practical construction of the machine to slightly bend some of the shafts to allow the key-stems to reach or connect with the crank-arms 18. Such bending of some of the shafts, however, would not disturb the general or substantially straightaway formation of said shafts, which may be properly said to be of a substantially straight or straightaway formation from one bearing-point to the other.

The construction described permits of a simple and effective arrangement of the resetting or retracting springs 20, as it is only necessary to coil or twine the said springs upon the type-bar-operating shafts and connect the same at their opposite ends, respectively, with collars 21 on the shafts and fixed points of support 22, which are preferably the inner bearing-brackets for the shafts, as plainly shown in Fig. 8 of the drawings. The springs 20 exert a torsional action and have sufficient tension to provide for returning the type-bars to their normal upright positions after the type has been struck and the pressure of the finger removed from the key. The arrangement of springs described, however, is not essential to the proper carrying out of the invention, but is illustrative of the convenience with which the springs may be

mounted and utilized in the most effective way.

The key connections are all alike, and the keys are arranged to form the keyboard in the usual way—that is, being arranged in separate parallel rows at different elevations to secure the usual stepped order of the keys—so further reference to this part of the machine is unnecessary; but special attention is directed to the novel manner of mounting and grouping the type-bars and their operating-shafts 13 with reference to the crescent bearing 7 and the inner bearing-brackets 22, which are mounted directly upon the base or floor of the carriage-casing.

In adapting the type-bars and their operating-shafts to the horizontal type of machine such as shown in the drawings the said operating-shafts are all arranged in substantially horizontal planes parallel with and in close proximity to the base or floor of the carriage-casing, thereby dropping the entire type-action in exceedingly close relation to the writing plane, whereby an exceedingly-low keyboard may be maintained in carrying out the invention. In the first place, it is to be observed that the front bearing-brackets 22 for the type-bar-operating shafts 13 may simply consist of short plates or arms extending upwardly from the base or floor of the carriage-casing and drilled with bearing-openings to receive the inner extremities of the type-bar-operating shafts, and in the construction shown each type-bar-operating shaft finds a bearing in one of said brackets 22 and in one of the drilled bearing-openings 12 of the crescent bearing 7. These bearings for each operating-shaft are arranged in direct alinement, though in widely-spaced relation, whereby a very wide or long bearing is secured for each type-bar-operating shaft, thus reducing the possible play thereof to a minimum. In order to secure the closest possible grouping of the type-bars and their operating-shafts, while at the same time preserving the straightaway formation of the shafts, so that they will extend in a straight line from one bearing to the other, the type-bars may be said to be arranged in separate side banks or groups respectively at opposite sides of the center of the common bearing 7, and each type-bar 14 extends obliquely from its operating-shaft 13, or, in other words, is disposed obliquely to the axis of rotation of its operating-shaft. There is a twofold advantage in this obliquity of the type-bars, and that is, first, to permit of straight operating-shafts 13 being employed in connection with a pair of bearings arranged in direct alinement, and, second, to provide for disposing the type-bars in each side bank when in their “at-rest” position, oblique to a vertical plane, with the bars of the opposite banks inclined, respectively, in opposite directions, whereby there is formed at the center of the type-basket between the separate side banks or groups of the type-bars a widened and upwardly-flaring central work-

vista 23, which enables the operator to look directly within the type-basket opening 6 upon the writing or printing. This is a very advantageous feature of the separated oblique arrangement of the side banks of type-bars, inasmuch as visible writing is provided for.

In further explanation of the compact arrangement and grouping of the entire type-action directly within the bottom portion of the carriage-casing it is to be noted that the series of operating rock-shafts 13 for one side bank of type-bars extend forwardly from the bearing 7 in divergent relation and are disposed in one general direction, while the said operating-shafts for the opposite side bank of type-bars bear a similar divergent relation as they extend from the bearing 7, but are disposed in an opposite direction, whereby all of the operating-shafts will be bunched as closely toward the central portion of the carriage as possible, while at the same time maintaining the straightaway formation of the rock-shafts and the direct alinement of the bearings therefor. It will thus be observed that the divergently-arranged operating rock-shafts for the opposite banks of type-bars will necessarily cross each other, but this crossing occurs in different horizontal planes, so that there is no interference between the shafts and their connections. To secure the crossing of the opposite sets of rock-shafts in different horizontal planes, it is of course necessary to drill the bearing-openings 12 in the bearing 7 in corresponding planes, as is plainly shown in Fig. 9 of the drawings. Referring particularly to this figure of the drawings, it will be seen that the rear extremities of the operating rock-shafts, which project through the bearing-openings in the bearing or bearing-plate 7, respectively, project in opposite directions for opposite banks of type-bars, and the bearing-openings for opposite sets of operating-shafts are necessarily arranged in different planes, whereby the different series of bearing-openings may be said to be arranged in a staggered relation. This is plainly shown in Figs. 9, 11, and 12 of the drawings and provides for the crossing of the opposite sets of operating-shafts in different horizontal planes.

To secure uniformity throughout the entire type-action and in order that the type-bars may stand parallel with each other to avoid conflicting, the bearing-openings in the common bearing or bearing-plate 7 are all drilled at corresponding or uniform tangents, and all of the inner bearing-brackets 22 individually maintain the same relation to the curvature of the said common bearing or bearing-plate 7. It may be further observed at this point that the front bearing-brackets are spaced as far from the common bearing 7 as the arrangement of the keys and the width of the carriage will permit in order to secure a maximum length of bearing for the individual type-bars. These bearings, as also the operating rock-shafts, vary in length, and by

reason of the fact that most of the operating-shafts are longer than the type-bars proper the play of the latter is necessarily infinitesimal upon a slight play of the shaft, and material disalignment of the type is obviated. It should also be explained that many difficulties were encountered in the practical development of this invention. First, it was highly desirable to make the type-bars rigid with the operating rock-shafts in order to eliminate most of the costly delicate parts of type-bar type-writing machines—such as the type-ring, the usual type-bar bearings, the pivots, draw-wires, turnbuckles, &c—and to get as long bearing as possible for the type-bar in order to secure permanent alinement of the types. Second, it was highly desirable to adhere to the standard or universal keyboard, because it has been demonstrated that only such a keyboard is popular. Third, it was also highly desirable to keep the keyboard as low as possible, because a great many operators object to a high keyboard, and, fourth, the axis of movement of the type-bars should be as near the writing-surface as possible, because the types keep their alinement better than when the axis of movement of the bar is located farther from the writing-surface.

In order to meet the first requirement of type-bars rigid with their operating rock-shafts, it was found that to get a practical simple construction it was necessary to have the operating rock-shafts lead away or project from the type-bar opening at a uniform tangent in order that the type-bars should stand substantially parallel when at rest to avoid conflict between the bars. Inasmuch as the operating rock-shafts should be practically straight to secure the most practical simple construction, a great difficulty was encountered when it was found that there was not sufficient room for the requisite number of rock-shafts where they converge at the type-bar opening and that there was a conflict between the rock-shafts at this point; in other words, that there was only sufficient room at the type-bar opening for about one-fifth the number of rock-shafts, and consequently type-bars, that would be needed for the ordinary characters of a type-writing machine. At this stage it was found that if the rock-shafts were placed oblique to their type-bars about one-half the required number of rock-shafts could be used without interference at the type-bar opening. A very obtuse angle between the bars and rock-shafts could not be used, however, without scattering the keyboard or spreading it in a lateral direction to too great an extent. It was then decided to stagger the rock-shafts where they converge at the type-bar opening, or, in other words, alternate the rock-shafts by placing those from each side of the opening in two horizontal planes in order to get in the requisite number of rock-shafts without interference at this point. Inasmuch as a standard or universal keyboard, with its compact reg-

ular rows of keys, necessitated the bunching of the rock-shafts at the front of the machine, it was found that those rock-shafts projecting from one side of the type-bar opening should project in a different or reverse direction from those rock-shafts projecting from the other side of the opening, but that the tangent of all the rock-shafts should be the same. At this point it was found that the rock-shafts projecting from one side of the opening for the type-bars would soon meet and conflict with the rock-shafts projecting from the other side of the type-bar opening. In order to overcome this difficulty, the rock-shafts coming from one side of the type-bar opening were placed in different horizontal planes from those projecting from the other side of the opening, so that the rock-shafts in one plane could pass those in another plane, the distance between the planes of the rock-shafts being as little as could be used, as it was desired to keep the axes of movement of the type-bars as close to the writing-surface as possible.

To meet the second primary requirement of a standard or universal keyboard with its keys in regular rows substantially equidistant, involved additional difficulties. The rock-shafts, as stated, must be bunched at the front of the machine, thus throwing the rock-shafts in close proximity to each other. Now in order to be able to reach those rock-shafts occupying lower horizontal planes with their respective key-stems it was found to be necessary to have those rock-shafts in the highest horizontal plane the shortest, those in the next lower plane the next shortest, those in the next lower plane next shortest, while those in the lowest plane must project farthest to the front to reach the bank of keys nearest the operator. This formation was substantially adhered to. Then another difficulty was encountered here. Inasmuch as the position of the rock-shafts could not be altered and inasmuch as it was desired to space the keys uniformly in rows, another difficulty was encountered in getting a connection between the rock-shaft and its respective key-stem. After considerable experimenting it was found that the rock-shafts could be connected to their respective key-stems by bending the latter, and that, too, not to such an extent as would interfere with the touch or nice operation of the keys. The universal arrangement of the keyboard precluded, it was seen, the use of a full ring or circular type-bar opening, because the use of a circular series of type-bars would necessitate substantially a circular keyboard if the rock-shafts were to be rigid with the type-bars. This crescent-shaped series of type-bars materially limited the space for the rock-shafts where they converged at the opening.

To secure the third primary requisite—namely, to keep the keyboard as low as possible—the base of the frame of the type-carriage, with its attendant rock-shafts or type

system, was mounted between the frame of the machine upon which the type-carriage travels and in a plane below the top of the last-mentioned frame.

5 In order to secure the fourth primary requisite, the rock-shafts are mounted very near to the base of the frame of the type-carriage, those rock-shafts in the lowest horizontal plane being only sufficiently removed from the  
10 base of the carriage to permit them to rock. In fact, they are so close to the base that the base is cut out beneath the bell-cranks on these rock-shafts to give the cranks the necessary movement. Those rock-shafts in  
15 higher planes are mounted only sufficiently higher to permit the shafts to cross without conflict. In this way the axis of movement of the type-bars was kept as close to the writing-surface as possible.

20 Inasmuch as visible writing is very desirable in a type-writing machine and inasmuch as it would be difficult for the operator to see the writing being done when at the top of a page of the book or sheet by looking over the  
25 top of the series of type-bars, it was decided to leave out an arm at the immediate front of the machine in order to create a work-vista in a line between the operator and the work being done.

30 While the improvements already described are necessarily applicable to different forms of machines and the type-bars may be utilized in connection with different means for printing upper and lower case characters, still in  
35 carrying out the invention it is preferred to provide each of the type-bars proper, 14, at the swinging or striking end thereof, with a pair of type 24, whose printing-faces are disposed at an angle to each other, said type re-  
40 spectively bearing upper and lower case characters, and although any form of type-bearing head may be arranged for use with the novel form of type-bar and operating-shaft therefor, yet for purposes of illustration each  
45 type-bar is shown in the drawings as being fitted with a type-bearing head 25, carrying the pair of type 24, said type-bearing head being pivotally mounted upon the type-bar and having a heel end 26 cooperating with a  
50 pivotal trigger or latch 27, also mounted upon the type-bar and serving to lock the type-head in one position, but which when released from the heel 26 permits the type-head to turn on its pivot under centrifugal force  
55 and strike one of the characters. This centrifugal type-bearing head and the trigger 27 associated therewith are fully disclosed in my former patent, No. 578,554, and as no specific claim is made herein thereto further description thereof is unnecessary. It  
60 may be explained, further, that in view of the centrifugal action of the type-heads 25 and the locking and unlocking action of the triggers 27, associated therewith, it is necessary to  
65 equip the complete machine shown in the drawings with a vertically-movable trip-ring 28. This trip-ring may perhaps be more prop-

erly termed a "semiring," and is arranged outside of the path of movement of the type-bars, but is adapted to be moved to an interfering  
70 position with relation to the triggers 27 when it is designed to release the triggers from the type-heads to permit of the printing of upper-case characters. This action of the trip-ring is the same as that described in my  
75 former patent, No. 578,554, but in the present invention the ring is necessarily arranged in a somewhat-different position, being disposed parallel with and above the crescent bearing  
80 7 and arranged to work in the guide-slots 29 formed in the upstanding supporting-brackets 30, which are extended upwardly from the top of the carriage-casing at the top of the  
back casing-plate 9 and have fitted thereto the cushion or rest ring 31 for the backs of  
85 the type-bars in their upstanding or at-rest positions, said cushion or rest ring 31 subserving the usual function of arresting and cushioning the return movement of the type-bars as they swing upwardly and backwardly from  
90 the printing-point. The said trip-ring 28 is formed intermediate its ends with a central depressed portion 28<sup>a</sup>, which skirts below the work-vista 23, so as to not obstruct the view  
95 therethrough, as may be seen from the dotted line in Fig. 5 of the drawings.

The vertically-movable trip-ring 28 for the type-heads has vertical play in the guide-slots 29 of the brackets 30 and is suitably fastened  
100 to the upper ends of adjusting-sleeves 32, arranged, respectively, at opposite sides of the type-basket opening 6, and having a vertically-sliding movement upon the guide-posts 33, arranged inside of the carriage-casing  
105 within the rear portion thereof and sustained in position by the supporting-arms 34, which may be secured fast to an adjacent part of the carriage-casing, preferably to the side walls thereof, as shown in Fig. 7 of the draw-  
110 ings. The vertically-movable adjusting-sleeves 32, which are secured at their upper ends to the trip-ring 28, have fitted thereto the connecting pins or studs 35, with which are loosely engaged the rear slotted ends 36  
115 of the swinging adjusting-arms 37, which are secured fast at their opposite ends by means of collars 38 or otherwise to a transverse rock-shaft 39, arranged transversely of the carriage-casing in rear of the type-basket opening and journaled in suitable bearings at its  
120 ends. The said transverse adjusting rock-shaft 39 has suitably fitted thereto a pressure-spring 40, the normal tension of which is sufficient to elevate the trip-ring 28 to an inactive non-interfering position, so that in the  
125 normal action of the machine the triggers 27 will pass beneath and clear the said ring, and thereby permit of the continuous printing of lower-case characters until it is desired to print an upper-case character, whereupon the  
130 proper key upon the keyboard is manipulated to actuate the shaft 39, and thereby provide for swinging the arms 37 downwardly, with a consequent downward movement of the ad-

justing-sleeves 32 and the ring 28 carried thereby.

To provide for the necessary oscillation of the adjusting rock-shaft 39, the same has  
5 fitted thereto at a suitable point, preferably near one side of the carriage-casing, a short rock-arm 41, to the swinging extremity of which is pivotally connected, as at 42, one end of the link 43, the other end of which link is  
10 pivotally connected to one arm of the oscillatory lever 44, pivotally mounted intermediate its ends, as at 45, within the carriage-casing and having the end opposite its connection with the link 42 pivotally connected to the  
15 lower end of the key-stem 46, extending through the top cover of the carriage-casing and bearing a shift-key 47, commonly termed the "cap-key," which is pressed when it is desired to print an upper-case or capital letter.  
20 A depression of the cap or shift-key 47 oscillates the lever 44 in a direction to provide for the movement of the trip-ring previously referred to. The necessary step-by-step movement of the carriage is accomplished through  
25 the medium of the "letter-spacing" or "escapement" mechanism, as it is sometimes called, and the present invention embodies certain novel improvements over the type of escapement mechanism disclosed in my former  
30 patent, No. 573,868. As the operation of the letter-spacing mechanism is intimately associated with the movement of the type-carriage in the form of machine herein described, reference will be first made to the mounting of  
35 the carriage to permit of a traveling movement with reference to the work. It has already been explained that the carriage is designed to be arranged in close proximity to the writing-plane, and to permit of it travel-  
40 ing transversely across the writing-plane the same is supported for travel by the front and rear carriage-rails 48 and 49, respectively, which rails practically constitute the carriage-supporting frame, which is designed to move  
45 longitudinally upon the main toothed track-rails 50, which are arranged longitudinally upon the book or other work and are associated with a suitable type-writing-machine support.

50 It may here be noted that an important feature of the invention resides in the dropping of the base 2 of the carriage between the carriage-rails 48 and 49 and below the upper edges thereof and in mounting the key connections close  
55 to this base and preferably directly thereon, so that the axes of movement of the type-bars will be closely adjacent to the writing-surface. In the Fisher type-writing machine now in commercial use the casing of the carriage is mount-  
60 ed wholly above the carriage-supporting rails of the traveling machine-frame, and from the casing depends the type-basket. Where the type-basket is employed, it may be dropped to a point close above the platen, so as to pre-  
65 sent the type-bar bearings close to the writing-surface. It will be understood, however, that in the present invention the pendent

type-basket is entirely eliminated and the type-action is supported upon the base of the carriage proper or carriage-casing, and there-  
70 fore one important feature of the invention, as heretofore stated, resides in the dropping of this casing or carriage between the carriage-supporting rails, so as to bring the type-actions very close to the surface of the platen.  
75 The said carriage-rails 48 and 49 are provided at their under sides with notches 52, slidably fitting over the main track-rails 50 and in substantially the same manner as the carriage-supporting frame shown in my for-  
80 mer patents—for instance, Nos. 569,491 and 573,868. In this connection it may be observed that the carriage-supporting frame, consisting of the front and rear rails 48 and 49, is designed to be propelled longitudinally  
85 upon the main track-rails through the medium of the line-spacing mechanism 53, which is mounted at the front side of the front rail 48 and includes the transverse propelling-shaft 54, supported at the front of the car-  
90 riage-carrying frame and fitted with the spaced pinions or wheels 55<sup>a</sup>, meshing with the teeth of the main track-rails 50, and said line-spacing mechanism is of substantially the same construction and operates in the  
95 same manner as the line-spacing mechanism disclosed in several of the patents referred to. No claim is made in the present application to the said mechanism.

In carrying out the present invention it is  
100 preferable to provide both the front and rear carriage or frame rails 48 and 49, which extend transversely across the main rails 50, with plain and toothed portions 55 and 56, re-  
105 spectively, the toothed portions 56 of said rails constituting racks to receive the pinions 57, mounted on opposite extremities of one of the carrying-shafts 58, which extend trans-  
110 versely across the carriage, respectively, at opposite sides of the type-basket opening 6 thereof. Both carrying-shafts 58 are jour-  
115 naled in suitable bearings at the front and rear sides of the carriage and have fitted thereto the plain traveler-wheels 59, which ride upon the plain portions of the carriage-  
120 rails, said traveler-wheels 59 at the rear extremities of the carrying-shafts 58 being peripherally grooved, as indicated at 60, to fit the correspondingly-shaped portion of the carriage-rail 49, and thereby assist in preventing  
125 the lateral displacement of the carriage.

To prevent vertical displacement of the carriage, it is preferable to provide the front and rear rails 48 and 49 with longitudinal  
130 guiding-grooves 61 at their inner sides, said grooves receiving the gibs or keys 52, fitted to the carriage-casing, although any other expedient for slidably interlocking the carriage with the rails may be resorted to.

To render the letter-spacing or escapement  
135 mechanism effective, the carriage is normally drawn in one direction by the carriage-actuating devices 63, which are supported on suitable brackets 64, attached to the front and

rear carriage-rails beyond the extreme limit of movement of the carriage, and said carriage-actuating devices 63 may be of the same construction as shown in my former patent, No. 573,868, and simply consist of spring-actuated drums having pulling-tapes 64<sup>a</sup>, connected with the carriage at suitable points of attachment. Said actuating devices 63 tend to normally strain or pull the carriage in the direction of its advance in printing; but this movement is checked by the letter-spacing or escapement mechanism, to which I will now revert. This letter-spacing or escapement mechanism is associated directly with one of the carrying-shafts 58 and includes as an essential element thereof a double escapement wheel or disk 65, which is mounted fast on one of the shafts 58, preferably contiguous to the front side of the carriage-casing, and provided, respectively, upon opposite sides thereof with the lateral ratchet-faces 66 and 66<sup>a</sup>, whose teeth are disposed in the same direction and with which respectively cooperate the operating and holding dogs 67 and 68. These dogs are pivotally connected by a "scissors-joint" 69, including a pivot-pin 70, holding the dogs pivotally upon the upper end of the supporting-post 71, mounted on the base or floor 2 of the carriage-casing and terminating short of the shaft 58, carrying the escapement wheel or disk 65, so as to dispose the dogs 67 and 68 below the said shaft to engage with the ratchet-faces 66 and 66<sup>a</sup> at the lower edge of the escapement wheel or disk. The scissors-joint 69 referred to and, in fact, the construction and general operation of the two dogs are very similar to that disclosed in my former patent, No. 573,868, it only being necessary to explain in the present case that the shoulders of the scissors-joint between the two dogs are such that upon a movement of the operating-dog 67 toward the ratchet-face 66 of the escapement-wheel the two dogs become locked together, and the dog 68 is carried out of engagement with the ratchet-face 66<sup>a</sup>, while the said dog 68 is permitted a slight independent play for individual disengagement when the release-key is operated to release the carriage and permit of it being run along the rails in either direction. The said dogs 67 and 68 of the letter-spacing mechanism are properly held in their at-rest positions through the medium of the holding-spring 72, coiled upon the supporting-post 71 and suitably connected with the dogs at their under sides, and both of said dogs are provided at one side of their pivotal connections 69 with the oppositely-arranged arms 73 and 74, respectively. The arm 73 of the dog 67 is provided with a slot 75, which adjustably receives therein the pivot-screw 76, which connects one end of the link 77 with the arm 73. The other end of said link is threaded or otherwise adjustably connected, as at 77<sup>a</sup>, with a block 78, which is pivoted at 79 to the flattened reduced stem 80 of the reciprocatory actuating-

bar 81, mounted to work in the guide-brackets 82, projecting inwardly from one side wall of the carriage-casing, the forward of said brackets nearest the front of the casing having therein an opening with a flattened side corresponding to the flattened reduced stem 80 of the actuating-bar 81 to prevent turning thereof. The said sliding actuating-bar 81 is normally moved in one direction through the medium of the return-spring 83, coiled thereon and bearing at one end against one of the brackets 82, and at its other end against a collar 84 on the bar.

To provide for operating the letter-spacing or escapement mechanism, it is simply necessary to move the actuating-bar 81 in a direction opposed to the force of the spring 83, and a brief reference will now be made to the preferred means for transmitting motion to the said actuating-bar from any of the keys of the keyboard. A practical way of accomplishing the result referred to is shown in the drawings and consists in providing the vertically-movable key-stems 15 with off-standing engaging pins or projections 85, which are designed to normally lie above and engage upon a depression of the keys with a universal or yoke bar 86, extending longitudinally across the carriage-casing to cooperate with the series of keys associated therewith. To effect the desired operation of the letter-spacing mechanism with the use of a minimum number of parts, it may be found preferable, as shown in the drawings, to utilize a single universal or yoke bar 86 with two rows of key-stems by having the engaging pins or projections 85 of the stems in such rows projecting in a direction toward each other, so as to overlies the universal or yoke bar, as may be plainly seen from Fig. 4 of the drawings. Each of the universal or yoke bars 86, which extend longitudinally across the casing, is fitted at its opposite ends to the carrying-arms 87, suitably fitted at one end upon the supporting rock-shaft 88, also extending longitudinally of the carriage-casing and journaled at its extremities in suitable bearings at the sides thereof, and each supporting rock-shaft 88 for the universal or yoke bars 86 has fitted thereto at suitable points a swinging tappet-arm 89, pendent from the shaft and adapted to engage with a pin or similar projection 90 on the reciprocatory actuating-bar 81 for the letter-spacing mechanism. It will thus be seen that upon a depression of any key of the keyboard one of the universal or yoke bars 86 will be depressed, thereby rocking its supporting-shaft 88 and forcing the tappet-arm 89 against one of the pins or projections 90. This action causes the backward movement of the actuating-bar 81, which thereupon oscillates the operating-dog 67 in a direction which carries it toward the ratchet-face 66 of the escapement-wheel 65 and at the same time moves the holding-dog 68 out of engagement with the opposite ratchet-face of said disk. This

permits the carriage-actuating device or devices 63 to advance the carriage a letter-space. Of course when the pressure of the finger is removed from the key the dogs of the letter-spacing or escapement mechanism assume their normal positions, and it is really in this operation that the advance of the carriage the distance of a letter-space is effected, such operation being similar in all respects to the operation of the letter-spacing mechanism disclosed in my former patent, No. 573,868. The space-bar 91 has an operative connection 92 with one of the universal or yoke bars 86, so that the word-spacing may be effected in the usual way. The release of the carriage from this letter-spacing or escapement mechanism is effected through the medium of the release-key 93, arranged as a part of the keyboard and whose stem 94 is connected to one arm of the bell-crank lever 95, pivotally mounted on the pivot-post 96, fitted to one side of the carriage-casing and having associated therewith a coiled resetting-spring 97, arranged on the said pivot-post. The other arm of the said bell-crank lever has pivotally connected thereto one end of an operating-link 98, having a slotted end 99 loosely engaging with one extremity of the arm 74 of the holding-dog 68. By depressing the release-key 93 the bell-crank 95 serves to draw upon the holding-dog 68 and release the same from the escapement-wheel without moving the dog 67, whereupon the carriage may be moved back and forth over the rails to the position desired.

The ribbon mechanism forms no part of the present invention and is not claimed herein; but a brief reference will be made to the preferred type of ribbon mechanism which is utilized in connection with the machine illustrated in the drawings and especially for the purpose of showing the relation thereof to the open-top basket at the rear side of the carriage-casing. The inking-ribbon 100 is arranged to extend transversely across the type-basket opening 6 and is designed to be shifted transversely to expose the line being written when this is desired. The said ribbon is designed to wind and unwind upon the oppositely-arranged ribbon-spools 101, located, respectively, at diametrically opposite sides of the rear portion of the carriage-casing, and each of said spools is slidably mounted or feathered on the rotatable spindle 102, journaled in suitable bearings 103, fitted to the carriage-casing and spaced a sufficient distance apart to accommodate the play of the spools. Each spool is loosely embraced by a shifting yoke 104, also sliding upon the spindle 102 and provided below the plane of the spool with the ribbon-guide 105, projecting slightly beneath the carriage-casing to direct the ribbon thereunder and across the type-basket opening 6, and each of the ribbon-guides 105 has mounted therein a supporting-traveler 106, riding upon a short rail-section

107, fitted to the contiguous side of the carriage-casing. Each of the shiftable ribbon-guides 105 has connected thereto at one end one end of the shift-bar 108, the other end of which is pivotally connected with the lower end of the rock-arm 109, carried by a rock-shaft 110, arranged transversely within the carriage-casing in front of the type-basket. The said rock-shaft 110 carries the arms 109 for both of the shift-bars 108, respectively, at opposite sides of the casing, and at a suitable point within the casing, preferably near one side thereof, the said ribbon-shift rock-shaft 110 is provided with an actuating-arm 111, which has a link connection 112 with one end of the oscillatory lever 113, pivotally supported on the post 114 within the carriage-casing and having connected to its opposite end the vertically-movable stem of the ribbon-shift key 115. A spring 116 is coiled on the shaft 110, preferably at one end, to normally hold the ribbon in the printing position.

The spool-spindles 102 have loosely mounted on one end thereof the pinions 117, which travel upon the rack portion 56 of the rear carriage or frame-rail 49, and at one side of the pinions 117 the spool-spindles 102 have fixedly mounted thereon the ratchet-wheels 118, with which cooperate the dogs 119, normally held in engagement with the ratchet-wheels 118 and provided with lateral release-buttons 120, adapted to be engaged by the beveled release-disks 121, slidably mounted upon the spool-spindles 102. The sliding release-disks 121 upon the opposite spool-spindles 102 have respectively pivoted thereto the opposite ends of the releasing-lever 122, which is pivotally supported intermediate its ends, as at 123, and is provided at such point with a beveled catch projection 124, with which cooperates a locking-spring 125, adapted to engage with the catch projection 124 in either position of the lever 122. When the lever 122 is in one position, one of the release-disks 121 is necessarily out of engagement with the button 120 of the adjacent dog 119, and consequently permitting the said dog to operatively connect the adjacent pinion 117 and ratchet-wheel 118 together, so that as the carriage is moved along the spindle 102 connected with said elements will be rotated to provide for winding up the ribbon. At the same time the directly-opposite release-disk 121 holds the adjacent dog disengaged, so as to permit the pinion 117 associated therewith to idly rotate as it travels on the rack of the rail 49 without actuating the spool at that side of the machine for winding up the ribbon. The action of the mechanism may be reversed by simply swinging the reversing-lever to its opposite position. A further description of the ribbon mechanism is unnecessary, as it is simply disclosed for illustrative purposes and not as a part of the application.

In the foregoing description the invention

has been set forth in its preferred aspect; but the essential features of construction, especially those centering around the construction and mounting of the type-bars, are necessarily adapted for use in connection with almost any type of type-writing machine, and it should therefore be understood that various changes in the form, proportion, and minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

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

1. In a type-writing machine, the combination with a frame, and a rearwardly-opening crescent-shaped series of type-bars having a common printing-point, of operating rock-shafts directly connected to the type-bars, and keys connected to said rock-shafts and located at the front of the frame.

2. In a type-writing machine, the combination with a frame, and a rearwardly-opening, crescent-shaped series of type-bars having a common printing-point, of operating rock-shafts directly connected to the type-bars and disposed out of parallel, all of said rock-shafts extending toward the front of the frame, and keys for operating said rock-shafts.

3. In a type-writing machine, the combination with a series of upstanding type-bars arranged in crescent formation, of operating rock-shafts rigidly connected to the type-bars, and keys disposed above the rock-shafts and operatively connected therewith.

4. In a type-writing machine, the combination with a frame, of a series of keys disposed adjacent to one side thereof, a series of upstanding type-bars disposed adjacent to the opposite side thereof and arranged in crescent formation, and a series of operating rock-shafts rigidly connected to the type-bars and extended forwardly into operative relation with the keys.

5. In a type-writing machine, the combination with a frame, of a keyboard at one side thereof, a series of upstanding type-bars disposed at the opposite side thereof and arranged in crescent formation, and a series of operating rock-shafts directly connected with the type-bars and extended under the keyboard.

6. In a type-writing machine, the combination with a frame, of a rearwardly-opening, crescent-shaped series of upstanding type-bars having a common printing-point, a series of keys, and a series of rock-shafts having direct connection with the type-bars, said rock-shafts being disposed in the interval between the type-bars and keys and having operative connection with said keys.

7. In a type-writing machine, the combination with a series of upstanding type-bars having a common printing-point, of operat-

ing rock-shafts rigidly connected to the type-bars and disposed obliquely thereto, and having substantially direct connection with the type-bars.

8. In a type-writing machine, the combination with the keys, and a crescent-shaped series of type-bars, of operating rock-shafts directly connected to the type-bars and disposed obliquely thereto, said rock-shafts being disposed in a plane or planes below the keys.

9. In a type-writing machine, the combination with a rearwardly-opening, crescent-shaped series of normally-upstanding type-bars having a common printing-point, of operating rock-shafts rigidly connected to the type-bars and disposed obliquely thereto, and keys located at points removed from the type-bars, said rock-shafts being extended beyond the type-bars for operative connection with the keys.

10. In a type-writing machine, the combination with a bearing member, of a series of operating rock-shafts journaled therein and extended beyond opposite sides thereof, a series of type-bars rigidly connected to the rock-shafts at one side of the bearing member, and arranged in a rearwardly-opening, crescent-shaped series, and keys operatively related to the rock-shafts.

11. In a type-writing machine, the combination with a series of operating rock-shafts disposed in staggered relation, of a series of upstanding type-bars directly connected to the shafts, and keys disposed above the rock-shafts for operating the same.

12. In a type-writing machine, the combination with a crescent-shaped series of type-bars, of operating rock-shafts disposed in staggered relation and rigidly connected to the type-bars, and keys disposed above and connected to said rock-shafts.

13. In a type-writing machine, the combination with a frame, and a crescent-shaped series of type-bars adjacent to one side thereof, of a series of type-keys adjacent to the opposite side of the frame, and operating rock-shafts disposed in staggered relation and rigidly connected to the type-bars, said rock-shafts being extended into operative relation with the keys.

14. In a type-writing machine, the combination with a series of operating rock-shafts in staggered relation, of upstanding type-bars rigidly connected with the rock-shafts and bearing oblique relation thereto, and keys for operating the rock-shafts.

15. In a type-writing machine, the combination with a series of staggered operating rock-shafts, and type-bars rigidly connected thereto, of keys disposed above the rock-shafts and connected therewith.

16. In a type-writing machine, the combination with a series of type-bars having a common printing-point, and operating-keys therefor, of a series of divergently-related

rock-shafts directly connected to the type-bars below the upper ends thereof, and extended into operative relation with the keys.

17. In a type-writing machine, the combination with a crescent-shaped series of up-  
5 standing type-bars, and operating-keys therefor, of a series of staggered, divergently-related operating rock-shafts rigidly connected to the type-bars and extended in operative  
10 relation with the keys.

18. In a type-writing machine, the combination with a crescent-shaped series of type-bars, and operating-keys therefor, of operating rock-shafts rigidly connected to the type-  
15 bars and extended into operative relation with the keys, said rock-shafts being disposed in oblique relation to the type-bars and in divergent relation with each other.

19. In a type-writing machine, the combination with a crescent-shaped series of type-bars, and operating-keys therefor, of operating rock-shafts rigidly connected to the type-  
20 bars and extended below the keys for operative connection therewith, said rock-shafts  
25 being disposed in oblique relation to the type-bars and in divergent relation to each other.

20. In a type-writing machine, the combination with a crescent-shaped series of type-bars, and operating-keys therefor, of operating rock-shafts in staggered and divergent  
30 relation, said rock-shafts being rigidly connected to the type-bars and disposed obliquely thereto, and a connection between the keys and rock-shafts.

21. In a type-writing machine, the combination with a crescent-shaped series of up-  
35 standing type-bars, of operating-keys therefor, and operating rock-shafts rigidly connected to the type-bars and extending tangentially from the type-bar crescent and into  
40 operative relation with the keys.

22. In a type-writing machine, the combination with a crescent-shaped series of up-  
45 standing type-bars, and operating-keys therefor, of operating rock-shafts connected to the type-bars and extending from the type-bar crescent at uniform tangents, and connections between the type-bars and keys.

23. In a type-writing machine, the combination with a crescent-shaped series of type-  
50 bars, and operating-keys, of operating rock-shafts rigidly connected to the type-bars and disposed obliquely thereto, said rock-shafts extending from the type-bar crescent at uni-  
55 form tangents and disposed in operative relation with and below the keys.

24. In a type-writing machine, the combination with operating mechanism, of a crescent-shaped series of type-bars composed of  
60 separate groups, the bars of said groups being reversely inclined normally to define a work-vista of upwardly-increasing width.

25. In a type-writing machine, a support for the type-action, and separate groups of  
65 type-bars having operating rock-shafts rigid therewith, the rock-shafts for each group of

type-bars extending from the latter in divergent relation.

26. In a type-writing machine, the combination with a series of type-bars, and operat-  
70 ing-keys therefor, of operating rock-shafts rigidly connected to the type-bars and disposed in angularly-related groups, and connections between the keys and shafts.

27. In a type-writing machine, the combination with a series of type-bars, and operat-  
75 ing-keys therefor, of operating rock-shafts connected to the type-bars and keys respectively and disposed in groups, the shafts of each group being reversely inclined with re-  
80 spect to the shafts of the other group.

28. In a type-writing machine, the combination with a crescent-shaped series of type-bars, and operating-keys therefor, of operat-  
85 ing rock-shafts connected to the type-bars and extending at uniform tangents from the type-bar crescent, said shafts being divided in separate groups disposed in different horizontal planes.

29. In a type-writing machine, the combination with a crescent-shaped series of type-  
90 bars, and operating-keys therefor, of operating rock-shafts connected to the type-bars and extending tangentially from the type-bar crescent, said shafts being composed of separate  
95 groups in reverse relation.

30. In a type-writing machine, the combination with a crescent-shaped series of type-  
100 bars, and operating-keys therefor, of operating rock-shafts extending at uniform but reverse tangents from the type-bar crescent.

31. In a type-writing machine, the combination with a crescent-shaped series of type-  
105 bars and operating-keys therefor, of operating rock-shafts rigidly connected to the type-bars and composed of separate groups, the rock-shafts of each group being disposed at uniform tangents from the type-bar crescent, this tangential disposition of the shafts of one  
110 group being the reverse of the tangential disposition of the shafts of the other group.

32. In a type-writing machine, the combination with a frame, of a rearwardly-opening, crescent-shaped series of type-bars having a  
115 common printing-point, a series of keys, and a series of operating rock-shafts having rigid connection with the type-bars and extended to a position below the keys for operative connection therewith.

33. In a type-writing machine, the combination with a frame, of a rearwardly-opening, crescent-shaped series of type-bars hav-  
120 ing a common printing-point, a keyboard, and a series of operating rock-shafts having direct connection with the type-bars and extended under the keyboard.  
125

34. In a type-writing machine, the combination with a frame, and a rearwardly-opening, crescent-shaped series of type-bars hav-  
130 ing a common printing-point, of a keyboard in front of the series of type-bars, and divergently-related operating rock-shafts rig-

idly connected to the type-bars and extended under the keyboard.

35. In a type-writing machine, the combination with a frame, of a rearwardly-opening, crescent-shaped series of type-bars having a common printing-point, a keyboard located in front of the type-bars, and operating rock-shafts directly connected to the type-bars and disposed tangentially to the type-bar crescent, said operating rock-shafts being extended under the keyboard.

36. In a type-writing machine, the combination with a frame, of a rearwardly-opening, crescent-shaped series of type-bars having a common printing-point, a keyboard located in front of the type-bars, and operating rock-shafts directly connected to the type-bars and extended under the keyboard, said rock-shafts being divided into separate angularly-related groups.

37. In a type-writing machine, the combination with a frame, of a rearwardly-opening, crescent-shaped series of type-bars having a common printing-point, a keyboard located in front of the type-bars, operating rock-shafts directly connected to the type-bars and extended under the keyboard, the type-bars being divided into separate groups, the bars of one group being disposed in angular relation to the bars of the other group.

38. In a type-writing machine, the combination with a frame, of a rearwardly-opening, crescent-shaped series of type-bars having a common printing-point, a keyboard in front of said type-bars, and a series of operating rock-shafts directly connected to the type-bars and extended under the keyboard, said type-bars being divided into separate groups, the bars of one group being angularly related normally to the bars of the other group, and said operating rock-shafts being divided into separate angularly-related groups.

39. In a type-writing machine, the combination with a frame, of a rearwardly-opening, crescent-shaped series of type-bars having a common printing-point, a keyboard disposed in front of the type-bars, and operating rock-shafts directly connected to the type-bars and extended under the keyboard, said rock-shafts being arranged in separate groups disposed in different planes.

40. In a type-writing machine, the combination with a frame, of a rearwardly-opening, crescent-shaped series of type-bars having a common printing-point, a keyboard disposed in front of the type-bars, operating rock-shafts directly connected to the type-bars and extended under the keyboard, said rock-shafts being arranged in separate angularly-related groups disposed in different planes.

41. In a type-writing machine, the combination with a frame, of a rearwardly-opening, crescent-shaped series of type-bars having a common printing-point, a keyboard disposed in front of the type-bars, and operating rock-shafts directly connected to the type-

bars and extended under the keyboard, the rear ends of adjacent shafts being disposed in different planes.

42. In a type-writing machine, the combination with a frame, of a rearwardly-opening, crescent-shaped series of type-bars having a common printing-point, a keyboard located in front of the type-bars, and operating rock-shafts directly connected to the type-bars and extended under the keyboard, said rock-shafts being divided into separate groups located in different planes, and the alternate type-bars only of each group being located in the same plane.

43. In a type-writing machine, the combination with a frame, of an operating rock-shaft, a key-stem connected to the rock-shaft at one side of its axis, and a type-bar directly connected to said shaft and disposed in oblique relation thereto.

44. In a type-writing machine, the combination with a frame, of an operating rock-shaft, an arm extending laterally from the shaft, a key-stem having direct connection with said arm, and a type-bar directly connected to the rock-shaft and disposed in angular relation thereto.

45. In a type-writing machine, the combination with a frame, and a rearwardly-opening, crescent-shaped group or series of type-bars having a common printing-point, of a series of vertically-disposed key-stems located in front of the type-bars, and operating rock-shafts provided with arms directly connected with said key-stems, said rock-shafts being rigidly connected to the type-bars.

46. In a type-writing machine, a support for the type-action having a type-basket opening, the swinging type-bars provided with operating rock-shafts rigid therewith, a bearing-support about the type-basket opening for the shaft ends contiguous to the type-bars, separate bearings for the end portions of the shafts remote from the type-basket opening, and the keys having their stems connected directly to a fixed part of said shafts contiguous to the last-mentioned bearings.

47. In a type-writing machine, the combination of a common crescent bearing element, and a crescent-shaped series of type-bars having operating rock-shafts rigid therewith and mounted in the bearing element, certain of said shafts extending from one side of said element, and in divergent relation to certain others extending from the opposite side thereof.

48. In a type-writing machine, the combination of a common crescent bearing element, and type-bars having operating rock-shafts rigid therewith and mounted in said bearing element, certain of said shafts extending from opposite sides of the bearing element and arranged in crossing relation.

49. In a type-writing machine, the platen and movable carriage, a common crescent bearing element carried by the carriage, type-

bars having operating rock-shafts rigid therewith and extending from the crescent bearing element toward the front of the carriage, and operating-keys.

5 50. In a type-writing machine, a crescent bearing element, and type-bars having operating rock-shafts mounted in said bearing element and disposed in a substantially tangential relation thereto.

10 51. In a type-writing machine, a crescent bearing element, and type-bars having operating rock-shafts rigid therewith and all extending from the crescent bearing element toward the front of the machine at a uniform  
15 tangent.

52. In a type-writing machine, a support for the type-action having a type-basket opening, a crescent-shaped series of type-bars grouped within the type-basket opening and provided  
20 with operating rock-shafts rigid therewith, a common bearing element for all of the rock-shafts contiguous to the type-bars, and individual bearings for said shafts remote from the common bearing element.

25 53. In a type-writing machine, a support for the type-action having a crescent-shaped type-basket opening, a plurality of type-bars having operating rock-shafts rigid therewith, a common crescent-shaped bearing element  
30 bounding said opening and receiving all of the operating-shafts contiguous to the type-bars, and bearings for the operating rock-shafts remote from the common bearing element.

35 54. In a type-writing machine, a support for the type-action having a crescent-shaped type-basket opening, a series of type-bars grouped within the opening and provided with rock-shafts rigid therewith, a crescent-shaped common bearing element bounding said opening  
40 and constituting a bearing for the end portions of all of the shafts contiguous to the type-bars carried therewith, bearings for the shafts remote from the common bearing element, and keys having their stems connected  
45 with a fixed part of the rock-shafts.

55 55. In a type-writing machine, a support for the type-action having a type-basket opening, a plurality of swinging type-bars grouped  
50 within said opening and having operating rock-shafts rigid therewith, a common bearing element provided with a multiplicity of bearings and constituting a common bearing-support for the ends of all of the shafts contiguous to the type-bars, and individual bearings for said shafts remote from the common bearing element.

56. In a type-writing machine, a support for the type-action having a crescent type-basket  
60 opening, a plurality of type-bars grouped within said opening and having operating rock-shafts rigid therewith, a single crescent bearing element bounding said opening and constituting a common bearing-support for the ends of the rock-shafts contiguous to the  
65 type-bars, and bearings for said shafts remote from the single bearing element.

57. In a type-writing machine, a support for the type-action having a crescent type-basket opening, a series of swinging type-bars  
70 grouped within said opening and provided with operating rock-shafts rigid therewith, bearings for the rock-shafts about said opening, separate bearings for the rock-shafts remote from said opening, and keys having their  
75 stems connected with a fixed part of the rock-shafts.

58. In a type-writing machine, a support for the type-action, and a series of type-bars having operating rock-shafts arranged in cross-  
80 ing relation.

59. In a type-writing machine, a support for the type-action, a series of type-bars having operating rock-shafts rigid therewith, certain of said rock-shafts being arranged to cross in  
85 different planes.

60. In a type-writing machine, a support for the type-action, and a series of type-bars having operating rock-shafts rigid therewith, and arranged to cross at different elevations.  
90

61. In a type-writing machine, a support for the type-action, and a plurality of swinging type-bars arranged in separate groups and provided with operating rock-shafts rigid therewith, the operating-shafts for each group  
95 of type-bars extending from the latter in divergent relation, and certain of the shafts for the opposite groups of type-bars being arranged to cross each other at different elevations.  
100

62. In a type-writing machine, a support for the type-action having a type-basket opening, a plurality of swinging type-bars grouped within the type-basket opening and provided with operating rock-shafts rigid therewith,  
105 said type-bars being grouped in opposite banks with the operating-shafts of each bank of type-bars extending from the latter in divergent relation, and reaching toward the transverse center of the support for the type-  
110 action, certain of the operating-shafts for opposite banks of type-bars crossing each other at different elevations.

63. In a type-writing machine, a support for the type-action having a type-basket opening,  
115 a plurality of type-bars grouped within said opening, and provided with operating rock-shafts rigid therewith, a single bearing element for the rock-shafts contiguous to the type-bar, said single bearing element being  
120 provided with a plurality of rows of bearing-openings to receive the rock-shafts, said rows of openings being disposed respectively in different planes to permit of the crossing of the shafts.  
125

64. In a type-writing machine, a support for the type-action having a type-basket opening, a series of type-bars grouped within the opening and provided with operating rock-shafts rigid therewith, and bearings about the open-  
130 ing for the ends of the rock-shafts contiguous to the type-bars, said bearings being arranged in different planes to permit of the crossing of the rock-shafts at different elevations.

65. In a type-writing machine, a support for the type-action having a type-basket opening, the type-bars provided with operating rock-shafts rigid therewith, a single bearing-plate surrounding the basket-opening and provided with a multiplicity of bearing-openings receiving the ends of the rock-shafts contiguous to the type-bars, and bearings for the rock-shafts remote from the said bearing-plate.

66. In a type-writing machine, a support for the type-action provided with a type-basket opening, a single metallic crescent bearing-plate surrounding the said opening and provided with a multiplicity of drilled bearing-openings, a plurality of type-bars grouped within the type-basket opening at one side of the bearing-plate, and provided with operating rock-shafts rigid therewith, said rock-shafts having their end portions contiguous to the type-bars extending through and working in the openings of the plate, and bearings for the rock-shafts remote from the plate.

67. In a type-writing machine, a support for the type-action having a crescent type-basket opening, a plurality of swinging type-bars grouped within said opening and provided with operating rock-shafts rigid therewith, a metallic bearing-plate fitted to the edge of the type-basket opening and provided with a multiplicity of bearing-openings receiving the ends of the shafts contiguous to the type-bars, and separate bearings for the ends of the rock-shafts remote from the bearing-plate, each separate bearing being arranged in direct alinement with the complementary bearing in the plate.

68. In a type-writing machine, a support for the type-action having a crescent type-basket opening, a plurality of swinging type-bars grouped within the basket and provided with operating rock-shafts rigid therewith, a single crescent bearing-plate fitted to the edge of the type-basket opening and provided with a multiplicity of bearing-openings receiving the ends of the rock-shafts contiguous to the type-bars, and separate bearings for the ends of the rock-shafts remote from the bearing-plate, each separate bearing being disposed in direct alinement with the complementary bearing-opening in the bearing-plate, said operating rock-shafts of the type-bars extending from the bars in a straight line through both of the bearings therefor.

69. In a type-writing machine, the platen and movable type-carriage provided within the rear portion thereof with a crescent type-basket opening, a single crescent bearing-plate bounding said opening and provided with a multiplicity of bearing-openings, a plurality of swinging type-bars grouped within the type-basket opening outside of the bearing-plate, and provided with operating rock-shafts rigid therewith, and extending through the bearing-plate into the carriage, and bearings within the carriage for the ends of the rock-shafts remote from the bearing-plate.

70. In a type-writing machine, the combination with a series of type-bars and operating rock-shafts directly connected therewith, of key-stems directly connected to a fixed part of said rock-shafts at one side of the axis thereof.

71. In a type-writing machine, the combination with a series of type-bars, of operating rock-shafts directly connected to said bars and provided with crank-arms, and key-stems directly pivoted to said arms.

72. In a type-writing machine, the combination with a series of type-bars and operating rock-shafts directly connected therewith, of resetting-springs connected to the shafts, and operating-keys likewise connected to the shafts.

73. In a type-writing machine, a support for the type-action having a type-basket opening, swinging type-bars grouped within said opening and provided with operating rock-shafts rigid therewith, bearings about the type-basket opening for the rock-shafts, bearings for the ends of the shafts remote from the type-basket opening, said remote ends of the rock-shafts being provided with short crank-arms, vertically-movable key-stems pivotally connected with said crank-arms, and resetting-springs coiled upon the individual operating-shafts.

74. In a type-writing machine, the carriage provided within the rear side thereof with a crescent type-basket opening, a plurality of type-bars grouped within said opening, and provided with operating rock-shafts rigid therewith, said type-bars being arranged oblique to the axis of rotation of their operating-shafts and normally standing in substantially upright positions within the type-basket opening.

75. In a type-writing machine, the carriage provided within the rear portion thereof with a crescent type-basket opening, and the swinging type-bars grouped within said opening in opposite side banks, the type-bars in each bank thereof being disposed obliquely to a vertical plane, to provide a flaring work-vista at the center of the basket between the separate banks of type-bars, said work-vista exposing the interior of the type-basket opening from the front of the carriage.

76. In a type-writing machine, the traveling type-carriage provided at the rear portion thereof with a crescent-shaped type-basket opening, and a crescent-shaped series of type-bars having operating rock-shafts rigid therewith and extending within the type-carriage from said opening in a plane below the keyboard.

77. In a type-writing machine, the traveling type-carriage provided at the rear portion thereof with a type-basket opening, a crescent bearing element bounding said opening, and type-bars having operating rock-shafts supported by said bearing element and extending therefrom toward the front of the carriage.

78. In a type-writing machine, the traveling type-carriage provided within the rear portion thereof with a type-basket opening, a plurality of swinging type-bars grouped within the type-basket opening and provided with operating rock-shafts extending forwardly into the carriage-casing, all of the said operating-shafts being arranged in horizontal planes in close proximity to the base or floor of the carriage-casing, and the vertically-movable key-stems having operative connections with the said shafts.

79. In a type-writing machine, the type-carriage provided within the rear portion thereof with a type-basket opening, a single crescent bearing-plate partly bounding said opening, a similarly-shaped back casing-plate surmounting the said bearing-plate, a plurality of type-bars provided with operating rock-shafts rigid therewith and extending through the single bearing-plate and forwardly within the carriage-casing, and the key-stems having connections with said operating rock-shafts.

80. In a type-writing machine, the carriage provided at the rear portion thereof with a type-basket opening, the swinging type-bars grouped within said opening and bearing type-heads and triggers or latches therefor, said type-bars being arranged in side banks to leave an intervening central working vista, and a suitably-operated trip-ring arranged to cooperate with said triggers for the type-heads and provided with a central depressed portion skirting beneath the central work vista.

81. In a type-writing machine, the casing provided at its rear portion with a type-basket opening, the type-bars grouped within the said opening and bearing type-heads and triggers or latches associated with such heads, a type-bar rest-ring sustained above the type-basket opening, a vertically-movable trip working beneath the said rest-ring and co-

operating with the trigger for the type-heads, stationary guide-posts mounted within the carriage-casing, adjusting-sleeves slidably fitted upon the said posts and connected with said trip-ring, and a key-actuated rock-shaft carrying swinging arms operatively connected with said adjusting-sleeve.

82. In a type-writing machine, a series of type-bars arranged in a crescent relation and having rock-shafts rigid therewith, certain of the rock-shafts crossing each other at different elevations.

83. In a type-writing machine, a series of type-bars arranged in a crescent grouping, the opening or mouth of said crescent being at the rear of the machine, and type-bars having rock-shafts rigid therewith and extending toward the front of the machine, certain of said rock-shafts crossing at different horizontal planes.

84. In a type-writing machine, the combination with a series of type-bars and operating rock-shafts therefor, of key-stems having connection with said rock-shafts and provided with laterally-deflected portions.

85. In a type-writing machine, the combination with a type-bar, of an operating rock-shaft therefor, and a crooked key-stem having connection with the rock-shaft.

86. In a type-writing machine, the combination with a plurality of type-bars and operating rock-shafts for said bars, located in different planes, of key-stems connected to said rock-shafts and having laterally-deflected portions to prevent interference between the stems and rock-shafts.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

ROBERT JOSEPH FISHER.

Witnesses:

J. LUTHER EMERSON,  
JAMES D. WILLIAMS.