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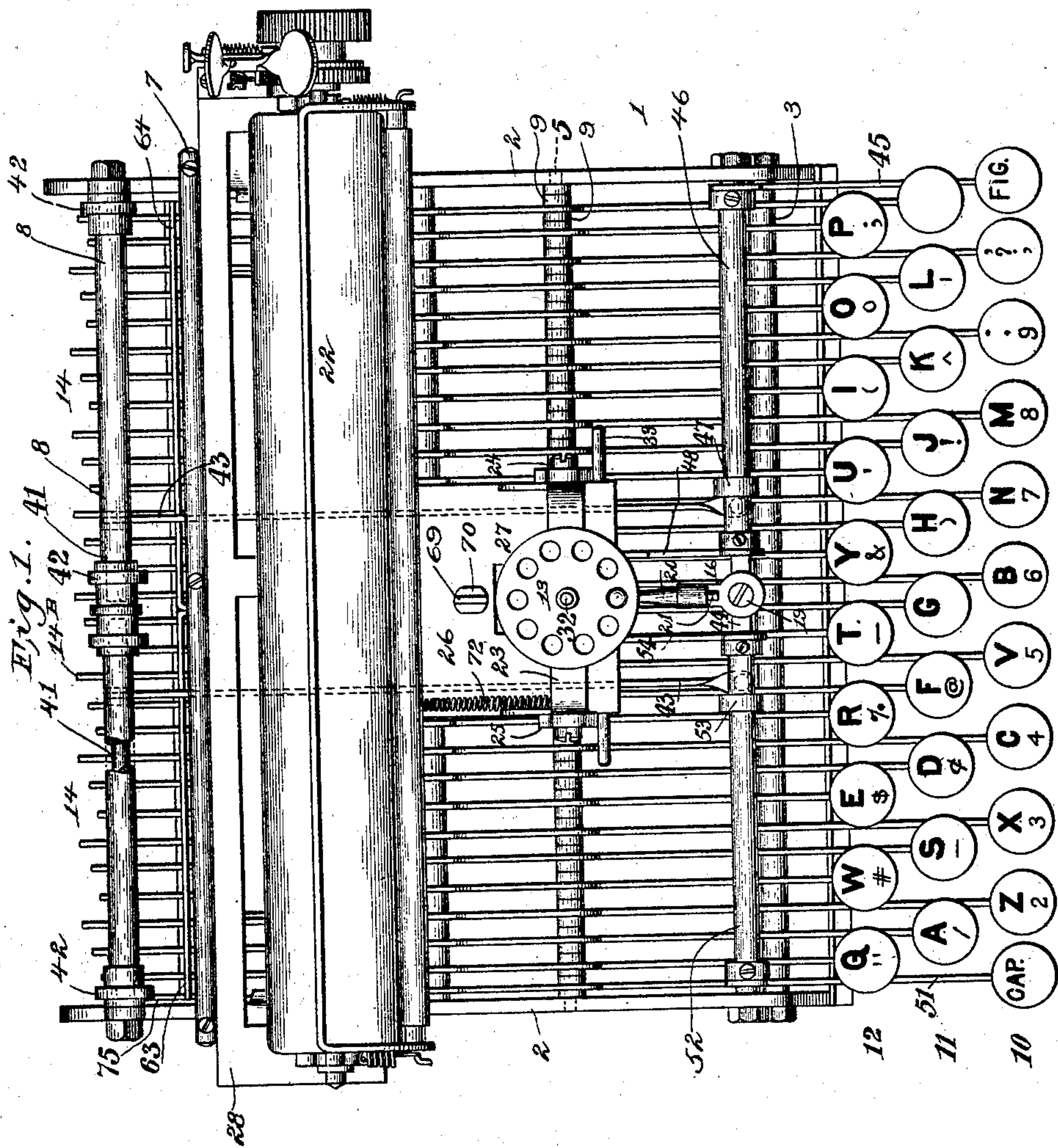
Patented July 29, 1902.

C. W. HOWELL, JR.
TYPE WRITING MACHINE.

(Application filed July 19, 1900.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses,
Bert C. Jones.
Ivan Konigsberg.

Inventor,
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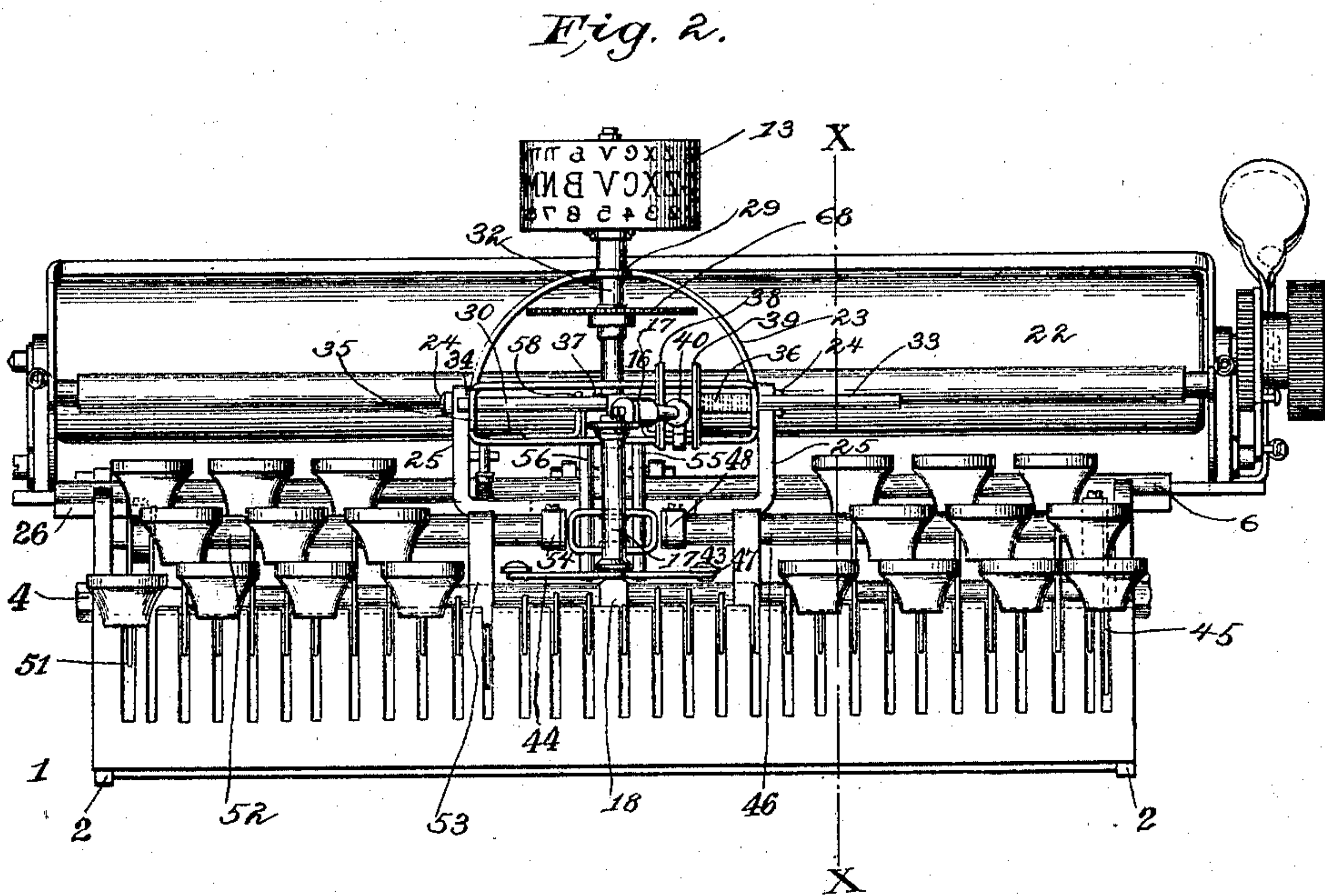
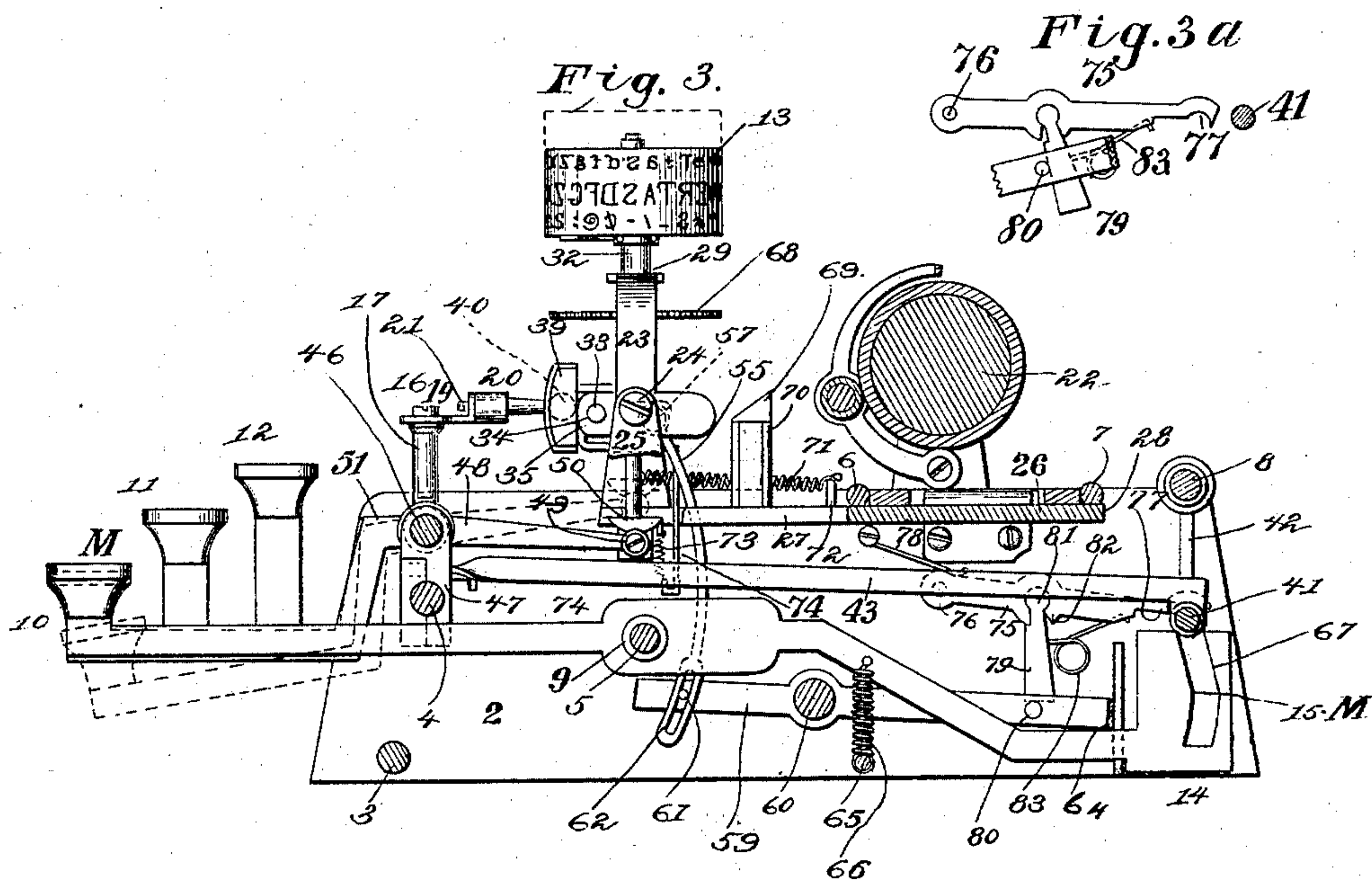
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3 Sheets—Sheet 2.



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3 Sheets—Sheet 3.

Fig. 4.

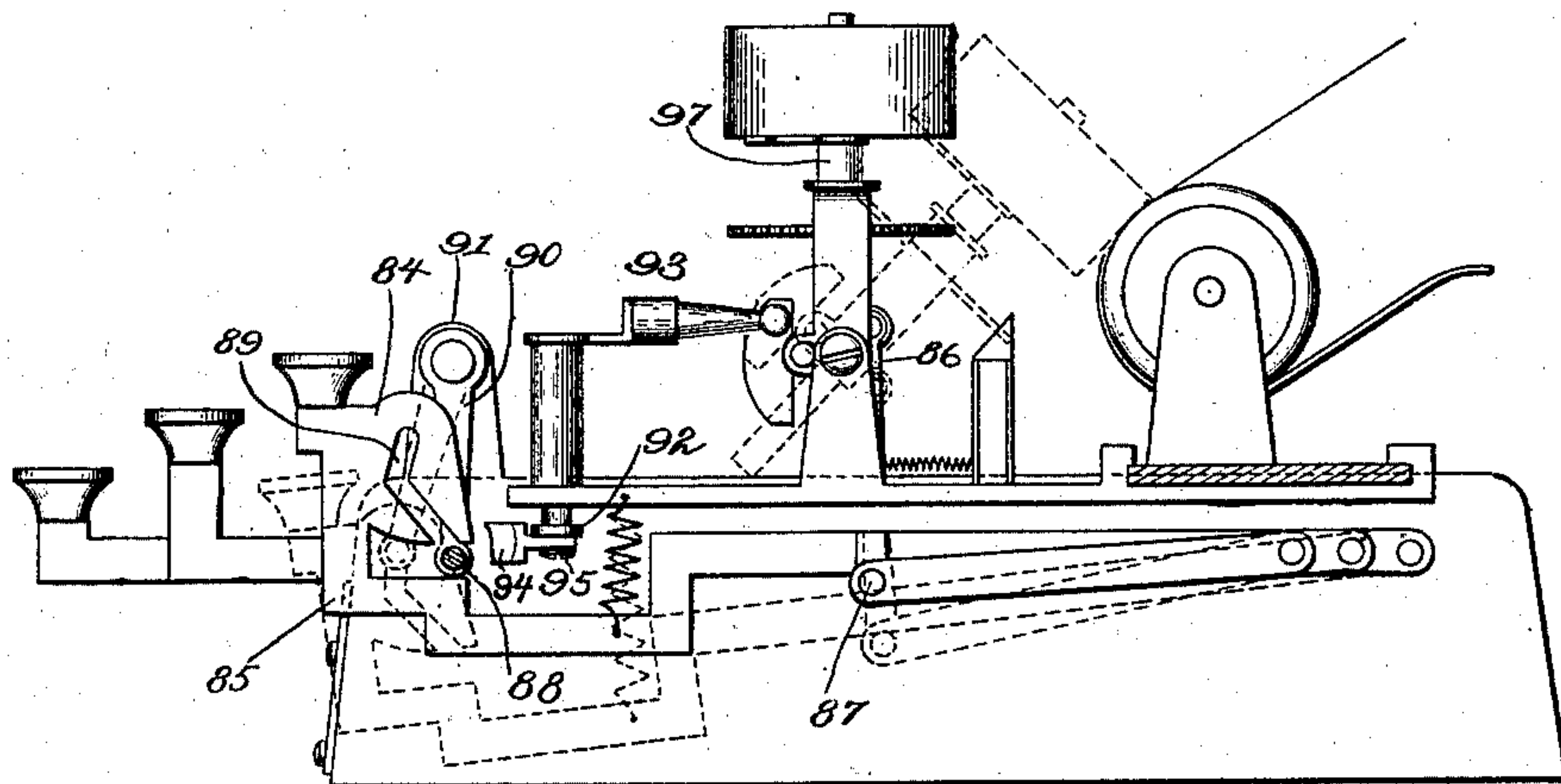
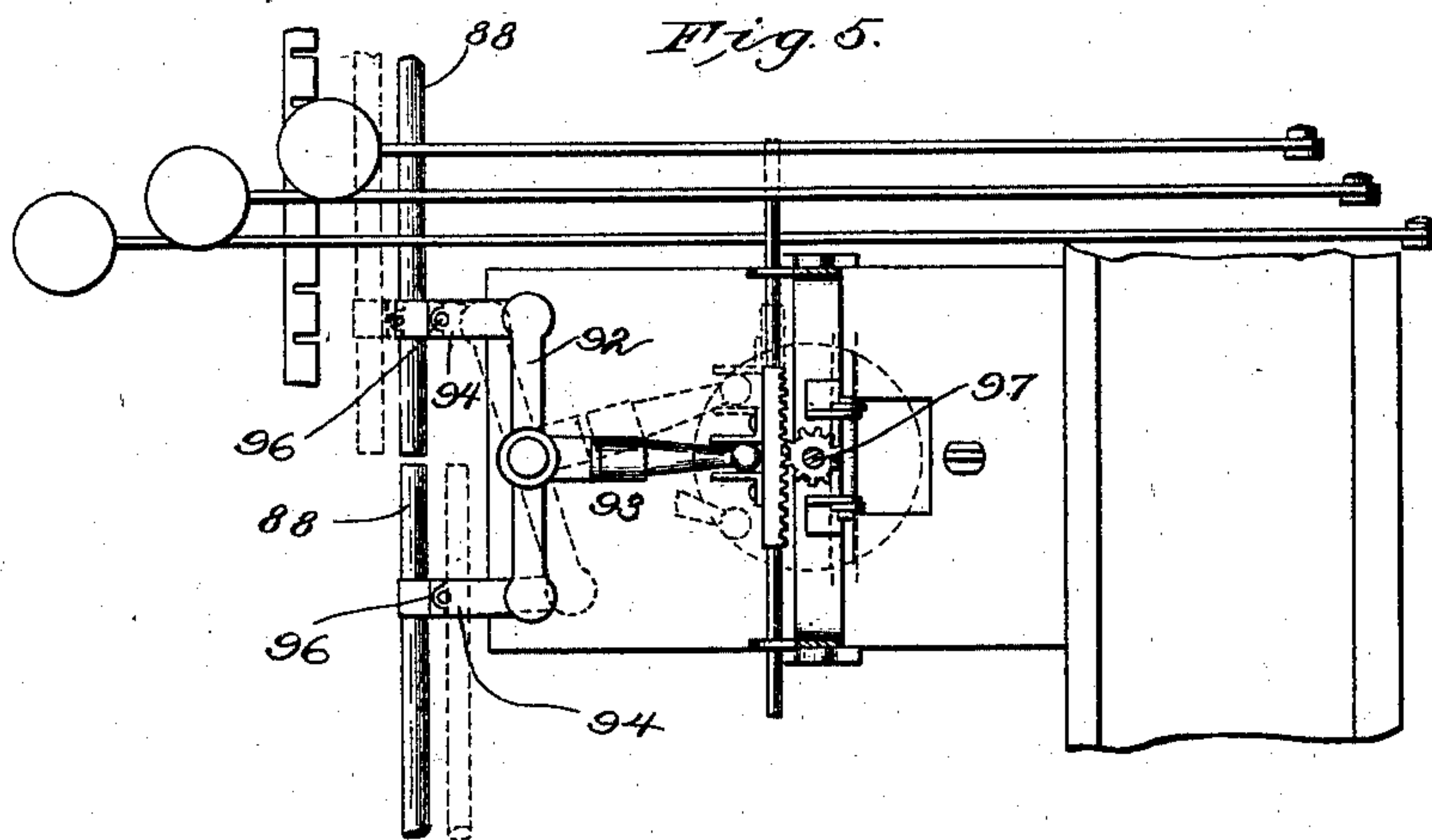


Fig. 5.



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UNITED STATES PATENT OFFICE.

CHARLES W. HOWELL, JR., OF NEWARK, NEW JERSEY.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 705,587, dated July 29, 1902.

Application filed July 19, 1900. Serial No. 24,193. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. HOWELL, Jr., a citizen of the United States, and a resident of Newark, county of Essex, State of New Jersey, have invented an Improvement in Type-Writing Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to type-writing machines, and while my improvements are of great utility in their application to machines having a type-wheel, or so-called "key-wheel" machines, I wish it understood that I do not limit myself to their employment in this connection, but contemplate their utilization in any field for use wherein they are adapted by their nature and may be of advantage.

Among other features of importance contributing toward simplicity of structure in my improved apparatus I have provided a device of novel arrangement, to be hereinafter described fully, and which I have termed a "selecting-lever," simplifying thereby the elaborate connections hitherto interposed between the key members and the character-bearing instrumentalities. In connection with this selecting-lever I utilize selecting devices in intimate connection with the key members, and thereby render possible absolute flexibility in the location of the latter, so that I am enabled to use on my machine a "standard" or "universal" keyboard, which has long been a desideratum in machines of this character. The means for insuring positive return of these instrumentalities to normal position after imprint is another feature of my invention, and so, also, novel means for insuring proper presentation of the few connecting means for engagement by and coöperation with the many devices actuated by the key members. These and the various other features of my invention will be illustrated and described fully in the accompanying drawings and specification and pointed out in the claims to be read in connection therewith.

In the drawings, Figure 1 illustrates in plan view sufficient portions of a type-writing machine to enable the nature of my improvements to be comprehended and the manner

of their application to be understood clearly. Fig. 2 is a view in front elevation of the same, and Fig. 3 a transverse sectional view in elevation, taken on the line $x x$, Fig. 2, looking from right to left; Fig. 3^a, a detail of a latch device to be described. In Fig. 4 is illustrated in a manner similar to Fig. 3 a modified arrangement of the selective devices connected with the key members, while Fig. 5 illustrates the operation of the selecting-lever, superimposed parts being broken away for the sake of clearness and the adjacent connections taking the form of the modification in Fig. 4.

In the embodiment of my invention selected for illustration and description as a convenient form of construction to enable full disclosure and a ready understanding of my improvements the parts designated generally by the numeral 1 constitute members of the frame of a key-wheel machine, and this frame may be of any suitable and desired material and arrangement; but when built up of lateral plates 2 and transverse connecting-rods 3 to 8, inclusive, in the novel manner devised by me will be found cheap and efficient. When thus constructed and if it be desired that the key members shall take the form of key-levers, though this is not essential, the latter, which for the sake of simplicity I shall hereinafter designate by their inscribed characters "A," "B," "C," &c., may find their fulcrum upon the transverse rods, as illustrated, with suitable collars or distance-pieces intervening, as at 9.

The form of the key-levers and their connection with the finger-keys or similar operating apparatus used may be of any usual or suitable construction, and as one convenient form I have illustrated levers of the first class arranged in horizontal series upon a rod 5, which, serving as a common fulcrum, passes through them at or near the middle point of each for the sake of a proper balance. These levers are illustrated as having at or near their forward extremities risers arranged in three banks (numbered 10, 11, and 12, respectively) to permit the presentation of the finger-keys in the arrangement known as that of the "universal keyboard," the character inscribed upon the finger-keys following this arrangement in the drawings. In Figs. 1 to

3, inclusive, I have illustrated these key-levers as provided, respectively, at their other ends with a form of selecting devices which in accordance with my invention enable the
 5 key members to control the operation of the character-bearing member, the latter taking in the instance illustrated the form of a type-wheel of well-known construction, (designated by the numeral 13.) These selecting devices may be of any suitable form, and their
 10 connection with the key members may be accomplished in any convenient or suitable manner, and I find that as one such convenient arrangement some advantages will be
 15 found in forming the individual selecting devices as heads integral with or forming part of a unitary structure with the respective key members which control them.

In Figs. 1 to 3 the selecting devices are designated by the general reference-numeral 14, since for the sake of uniformity and cheapness of construction I have illustrated them in this instance as similar in form.

The portion of the selecting device which
 25 has in the instance illustrated been chosen to act as the controlling-surface is constituted by a cam-slot which has a distinctive configuration in each member, the slots varying in configuration according to the requirements
 30 imposed by the number of different characters used in the machine. In the drawings I have designated these slots in general by the numeral 15, adding to the numeral the character corresponding to that particular selecting device—as, for example, 15^M.

Reverting to the type-carrier and the novel selecting-lever which I have provided for its operation, the position of the latter will be found to be indicated most clearly in Fig. 3,
 40 Figs. 1 and 2 aiding in understanding its operation, and also Fig. 5. This lever may take any suitable form, and I have found that illustrated at 16 to answer the requirements properly, the lever in this instance extending horizontally from an upright post 17, mounted to rotate about its longitudinal vertical axis in suitable bearings 18, carried by the cross-rods 4 of the frame. If desired, provision for adjustment of the lever with respect to the post
 50 may be provided in any suitable manner—as, for example, by the set-screw 19—and further adjustment of the lever relatively to the post may be accomplished, if necessary—as, for example, by making the lever with a separable head portion 20, connected to the body of
 55 the lever by a screw 21.

In accordance with my invention free play for the type-carrier relatively to the lever is to be permitted except the movement of rotation of the type-carrier about its axis, the control of which movement is the function of the selecting-lever. To facilitate this freedom of movement of the type-carrier and to permit its actuation for imprint of the selected character and for such other purposes
 65 as may be desirable, I have shown the type-carrier as mounted in what I will term a “nu-

tating rocker,” in which the type-carrier may be vibrated toward and away from the surface to receive the imprint—as, for example, a
 70 well-known form of cylindrical platen or paper-carriage 22, of which I have only shown enough to enable the operation of the type-wheel to be understood, not going into details of the construction of the platen nor of the
 75 mechanism for operating it. The nutating rocker may be of any suitable form and actuated by any suitable means, and as one such form I have shown an arc-shaped member 23 supported rotatively on suitable bearings, as
 80 the pintle-screws 24, mounted on upright arms 25, carried by the frame—as, for example, through the medium of the frame members or brackets 26, 27, and 28—or otherwise, as may be found convenient and suitable. As
 85 one convenient method of supporting the type-carrier in the rocker a bearing may be formed in the arc-shaped member, as at 29, and the material for the arc-shaped member may be carried across in the form of a chord, brace,
 90 or similar member 30, in the manner illustrated or as may be found desirable. Through the bearing 29 and a similar bearing in the chord member I have shown the spindle 32 of the type-carrier as extended, and to provide
 95 for its rotative operation by the selecting-lever any suitable connection may be adopted which will permit the rocker to swing through a long arc to enable high efficiency in manifold and also to permit the type-carrier to
 100 remain out of line of vision when at rest in order that the writing may be plainly seen at all times, this being an important feature of my invention. A very simple and effective means to enable rotation has been illustrated
 105 in the form of a rack-and-pinion device, which in the instance shown is provided by passing a horizontal sliding rod or member 33 through bearings 34 on lugs 35, extended from the rocker, this sliding member having a rack
 110 36 in proximity to the type-wheel spindle, on which is a pinion 37, cooperating with the rack, remaining in true mesh therewith during nutation of the rocker—an important improvement.
 115

The immediate connection between the selecting-lever and the rack-and-pinion device may be varied as desired and found suitable for the wide rocking movement above mentioned, and in the illustration I have shown
 120 highly-efficient means in the form of a vertical guide member projecting from the rack, with two guide-pieces 38 and 39, which enter the path of the selecting-lever and are separated to permit the latter to be embraced
 125 snugly between them.

It will be found of advantage to round the end of the selecting-lever into the form of a ball, as indicated at 40, since this permits free relative movement between the lever and
 130 guides when the latter are being actuated by the lever and since such a semi-universal joint is very simple and inexpensive to make, although it will be understood that I do not

limit myself to this specific form of means to permit the freedom of movement desirable at this connection, nor do I limit myself to the vertical elongation of the guide-pieces 38 and 39 for the purpose of retaining operative connection between them and the lever during nutative movement of the carrier for imprint of the selected character.

Returning now to the selecting devices 14, I will describe the illustrated form of connections between them and the selecting-lever, although it will be understood that the form illustrated may be varied as desired and found convenient.

At 41 I have shown a vibrating member supported in such position as to permit its co-operation with the cam-slots in the selecting devices, the support being accomplished by the use of arms 42, depending swingingly from a frame-rod 8. This vibrating member may take conveniently the form of a horizontal rod, as indicated, and, if desired, may be divided into two or more independent vibrating portions or devices, as illustrated, for a purpose to be hereinafter described. From the vibrating member (or members, as the case may be) suitable connections must be provided to transform its vibration into rotation of the selecting-lever, and various means to this end may be utilized, as found suitable. For example, a rod or rods 43 may be employed corresponding to and connecting the vibrating member or members with a suitable part of the selecting-lever. In the instance illustrated a lever 44, extending on each side from the post 17 of the selecting-lever, is connected operatively near its ends with the connecting-rods 43, respectively, and the operation of the apparatus will be understood readily when it is observed that upon depression of a finger-key—as, for example, that lettered M—the selecting device 14^M will be raised, the walls of the slot 15^M will be brought into engagement with the right-hand vibrating member 41, will force the latter rearward, drawing with it the left-hand connecting-rod 43, and turning the selecting-lever into the position shown in Fig. 2 will cause rotation of the type-carrier through the medium of the guide, rack-and-pin connection, and spindle until the outermost part of the cam-surface 15^M is reached, when the character “M” on the type-carrier will be opposite the platen, ready for motion to imprint. The slot beyond this should be on an arc about the fulcrum of the key-lever to insure presentation of the selected character in undisturbed selected position, and consequent perfect alignment and freedom from blurring—an evil of machines of this character heretofore.

Before passing to the means for effecting nutation or printing movement of the rocker and type-carrier I wish to observe that the operation of a finger-key upon the right-hand side of the machine—as, for example, “N”—will, acting through its corresponding select-

ing device 15^N and the right-hand vibrating member 41 and connecting-rod 43, cause movement of the selecting-lever and rotation of the type-carrier in the opposite direction, so that it is unnecessary to rotate the type-carrier through more than one hundred and eighty degrees. This division of the type-carrier into sectors, each having its group or field of predetermined characters to be controlled, respectively, by different groups of key devices through corresponding vibrating devices and connections arranged in suitable relation with the selecting-lever, may be varied, as will be obvious to any one skilled in the art, and accordingly I do not limit myself to the division into one hundred and eighty degrees, which is illustrated herein merely by way of example.

A further division of the type-carrier, in which the predetermined fields or groups of characters are arranged along circumferential lines differing in position along the axis of the type-carrier, is not uncommon, and it has its advantages, and as an example of this I have shown the small letters of the alphabet at the top of the type-carrier, with a separate band of capital letters beneath them, and still lower a band of numerals and punctuation-marks.

Any suitable construction may be adopted to provide for shifting the type-carrier to bring these bands of characters into position respectively, and as one convenient form of shifting device I have illustrated the spindle 32 of the type-carrier as capable of longitudinal movement in its bearings in the nutating rocker and have provided a controlling-lever for it, which lever is shown at the right-hand side of the machine, being designated by the reference-numeral 45. This lever in the instance illustrated is connected with a rock-shaft 46, mounted in stands 47, mounted on the frame-rod 4, while from the rock-shaft an arm 48 projects toward the path of the spindle, presenting an antifriction-roll or similar device 49 to coöperate with a foot 50 upon the lower end of the spindle and of a curvature proportioned to the arc of rotative movement. Upon depressing the shifting-key 45, as indicated in the dotted-line position, Fig. 3, the shaft will be rocked, the arm 48 raised, and with it the spindle and type-carrier, so that one of the lower bands of characters will be presented for the imprinting movement.

While it would be possible to accomplish the presentation of either of the lower bands by suitable depression of a single shifting-lever, nevertheless I prefer for the sake of convenience to utilize a plurality of shifting-levers, one for each of the lower bands of type, and accordingly I have indicated at 51 on the left-hand side of the machine another shifting key and lever connected, through the medium of a rock-shaft 52 in bearings 53 and an arm 54, with the spindle of the type-carrier through a properly-curved segmental foot in a manner

similar to that already described with reference to the shifting-lever on the right-hand side of the frame.

Any suitable means may be adopted to nutate the type-carrier and its carrier for the purpose of effecting imprint of the selected character, and as one convenient form of nutation device I have illustrated a pitman, or in the instance shown a plurality thereof, (designated by the numerals 55 56, respectively) and connected pivotally at their upper ends, as at 57 58, with the nutating rocker at the brace member 30 of the nutating rocker and depending therefrom freely, with their lower extremities near the base of the frame. To draw down these devices and effect nutation of the rocker through an arc approximating sixty degrees, to insure a good stroke, I have shown a lever 59, mounted rotatively upon a rod 60 on the frame, and having near one end a stud 61, entering a link member 62, with which each pitman is provided, and at its other end having a cross-head 64, running transversely with respect to the machine above the key-levers, so that upon operation of the latter the head will be lifted, the end 59 of the lever depressed, and the stud 61 will draw down its pitman and forward the type-carrier for imprint. By means of a link member on the pitman the nutative movement of the carrier is not initiated until the selecting device on the key-lever has caused rotation of the type-carrier to present properly its character, and the slot in the selecting device is so shaped that after this rotation shall have been accomplished the further rotation of the carrier is prevented and the selected character maintained in proper position. Obviously there may be a plurality of these levers coöperating with the pitman, and I have illustrated another lever corresponding with the lever 59, but coöperating with the pitman 56.

At 65 I have illustrated a rod from which a series of springs 66 extend, one for each of the key-levers, these springs insuring return of the key-levers to normal position, and it will be seen that the surface 67 of the cam-slots 15 in the selecting devices act upon the vibrating members 41 when descending to throw them forward and cause positive return of the type-carrier to normal position.

The star-wheel 68, mounted upon the spindle of the type-carrier, coöperates with the knife edge or wedge 69, presented by a post upon the frame, this being a common form of device to insure maintenance of the type-carrier in selected position as it nears the platen; but any similar or suitable device may be used, if desired, for this purpose, its use, however, not being indispensable.

The spring 71, or similar suitable device, connected with the spindle and with the frame or other suitable part, may be used to aid in return of the type-carrier to normal upright position, and so also the spring 73,

interposed between the lower part of the spindle and the bracket 74.

In Fig. 3 I have shown means to hold the vibrating member in normal inoperative position in such a manner as to insure its unfailing coöperative engagement by the cam-slots in the respective selecting devices when the key-lever is depressed, and this novel feature I claim broadly. The specific means illustrated comprises a latch member 75, mounted pivotally on the frame at 76 and having near its other end 77 (see Fig. 3^a) a notch to engage and determine the position of the vibrating member, the downward tendency of the latch being augmented, if desired, by a spring 78.

To insure disengagement of the latch from the vibrating member concurrently with the upward start of the cam devices, a depending strut 79 is interposed between the lever 59 and the latch 75, so that when the lever-head 64 is raised by the key-levers the latch will be also raised and will release the vibrating member, while to enable quick return the strut may be connected pivotally with the latch at 81 and may engage a stud 80 on the lever 59, and its position will be maintained normally by a spring 83, preferably enabling reengagement of the stud and latch from the tripped position shown in Fig. 3^a.

In a modification illustrated in Figs. 4 and 5 the selecting devices (designated as a series by the reference-numeral 84) are arranged toward the front of the machine, in the instance illustrated being formed as integral parts of key-levers 85 of the second class, the fulcra of the levers being at the rear, while the nutating pitman 86 is connected pivotally with a cross-rod 87, passing beneath the medial portions of the levers, respectively. The vibrating rods 88, of which two are shown, will of course in this modification be mounted to swing adjacent the cam-slots 89, the support illustrated comprising swinging arms 90, depending from stands 91, while the proximity of the vibrating rods to the under lever 92 of the selecting-lever 93 makes desirable the use of some form of swiveling connection therebetween, as at 94, where links are connected pivotally at 95 and 96 with the lever 92 and vibrating member 88, respectively. With respect to the operation of this modification its similarity to that of the construction already described renders further description unnecessary, and it will be noted that in Fig. 5 the manner of coöperation between the type-carrier spindle 97, selecting-lever 93, and their connecting parts is very clearly visible by reason of the omission of such superimposed parts as the type-carrier, arc member of the rocker, &c. This figure may be consulted in connection with Figs. 1 to 3 as an aid to the complete understanding of the corresponding parts in those figures.

In conclusion I wish it understood that I do not limit myself to the exact construction and

arrangement of parts illustrated and described, but consider myself entitled, broadly, to the features pointed out in the claims, taken in connection with the specification.

5 Having illustrated and described thus fully the nature of my improvements, what I claim, and that upon which I desire to secure protection, is—

1. In a type-writing machine; a type-carrier having rotating and nutating movements; nutating means therefor; means including a spindle and pinion to enable rotation of said type-carrier; and an independent selecting-lever to actuate said rotating means, and
15 jointed thereto by a loosely-moving intermediate connecting device in such a manner as to permit free nutative movement of said type-carrier.

2. In a type-writing machine; a rotatable type-carrier; key-levers provided with selecting devices; a selecting-lever operable by said key-levers through the medium of said selecting devices; and a rack-and-pinion connection intermediate said type-carrier
25 and selecting-lever said rack and pinion being respectively movable relatively to each other and to said selecting-lever, to enable imprint.

3. In a type-writing machine; a rotatable type-carrier; a nutating rocker therefor; a selecting-lever; and a rack-and-pinion device movable with said carrier and connected with said type-carrier, said device having a guide projecting into the path of said
35 lever and cooperating therewith to enable rotation of said type-carrier by said lever and to permit free nutative movement of said rocker at varying positions of said lever.

4. In a type-writing machine, the combination of a rotary type-carrier supported in a nutating frame or rocker, with a selecting-lever terminating in a ball and constructed to rotate the type-carrier.

5. In a type-writing machine; a rotatable type-carrier; a series of key-levers each having individual cam-slots to rotate the type-carrier positively to the desired character and positively back to normal position; vibrating members to be vibrated by the wall
50 of the cam-slots; and latches operating independently of the key-returning means to hold the vibrating members positively in a normal position of rest.

6. In a type-writing machine; a rotatable type-carrier mounted in a rocker; a rack-and-pinion rotating device having on one side a rack, and on the other side a slot, groove or guideway; a selecting-lever having at its free end a ball or rounded surface entering
60 or positioned cooperatively with respect to said slot, groove or guideway, to rotate the type-carrier through the rack-and-pinion rotating device and maintain same in selected rotative position during nutation for imprint.

7. In a machine of the class described; a frame, and a selecting-lever supported there-

by, said lever comprising an upright member rotatable about its longitudinal axis and an arm extended therefrom and moving in a horizontal path; means to permit adjustment of said arm upon said upright; and a head member connected with said arm and adjustable relatively thereto. 70

8. In a machine of the class described; a type-carrier having rotating and nutating movements; rotating mechanism for said type-carrier, including a member provided with a guide device; and a selecting-lever presenting toward, and to be embraced by, said guide device, a rounded member to actuate said type-carrier rotatively, and permitting free, nutative movement of said type-carrier. 80

9. In a machine of the class described; a type-carrier rotatable upon an upright spindle mounted in a nutating rocker; a rack mounted slidingly on said rocker intermeshing with a pinion on said spindle, and presenting a guide device to move in a horizontal path; and a selecting-lever rotatable about an upright axis adjacent said rack, and presenting a rounded end to cooperate with said guide device. 90

10. In a machine of the class described; a type-carrier; a selecting-lever; and operating connections therebetween, including a guide device having a plurality of parallel, upright guide members, and a ball-ended arm on said lever to enter between said guide members and engage the same universally, substantially as described. 95

11. In a machine of the class described; selecting devices; a vibrating member to cooperate therewith; means tending normally to return said vibrating member to a position adjacent said selecting devices; and means independent of said returning means to maintain said vibrating member, when inoperative, in position for immediate cooperative engagement by said selecting devices respectively, substantially as described. 105

12. The combination with a vibrating member; of a latch device comprising a pivoted latch member having a portion to engage and hold said vibrating member; an operating device for said vibrating member; and means intermediate said latch and operating members to enable release of the former by the latter, said means acting to permit return of said latch to position for engagement of said vibrating member before normal return of said vibrating member to position for such engagement. 115

13. In a machine of the class described; a vibrating member; a key member; a latch for said vibrating member; and means to operate said latch by said key member, to release said vibrating member, including a movable strut device arranged to permit escape of said latch from its operative connection with said key member before normal return of the latter. 120

14. In a machine of the class described; a 125

type-carrier and its nutating rocker having a throw approximating 60° (sixty degrees), key-levers; a pitman depending from said rocker at a point near the axis of the latter; an intermediate lever arranged to be operated by said key-levers at a point of wide arc of movement, and having its short arm connected with said pitman, to enable said rocker to be nutated or rocked by said key-levers and given a high momentum to secure distinct imprint of the characters presented by said type-carrier.

15. In a type-writing machine; a rotatable type-carrier mounted in a nutating frame or rocker; a plurality of pitmen or links having slots at their lower ends and operatively connected to said rocker; a plurality of universal bars or frames having at their shorter or forward ends studs engaging with said slots and operated by key members to nutate the rocker and type-carrier for imprint.

16. In a type-writing machine; a rotatable type-carrier; a selecting-lever mounted rotatively adjacent, and jointed to said type-carrier through the medium of a rack-and-pinion connection, to position said type-carrier rotatively; key-levers provided with selecting devices; a vibrating device adjacent and operable by, said selecting devices, respectively; and connections intermediate said vibrating device and selecting-lever to permit individual selective actuation of the latter by said key-levers respectively.

17. In a machine of the class described, a type-wheel mounted upon a spindle shiftable longitudinally in its bearings and having a nutative movement; and a key device provided with an arm projecting into the path of said spindle and movable to engage and shift said spindle in said path, said spindle having a segmental foot of a radius proportioned to the arc of nutative movement to be engaged by said operating-arm; and an anti-friction device intermediate said arm and foot.

18. In a machine of the class described, a type-carrier mounted upon a spindle shiftable longitudinally in its bearings and nutatable; key devices arranged respectively to control said spindle in different longitudinal positions; and connections intermediate said key devices and spindle, to shift the latter longitudinally, said connections including arms adjacent the path of said spindle member and a plurality of segmental members connected with said spindle and proportioned to different arcs of nutation thereof, to be engaged by said arms respectively to hold said spindle in selected longitudinal position regardless of the nutative position thereof.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES W. HOWELL, JR.

Witnesses:

LEE S. BURRIDGE,
J. GREEN.