

(No Model.)

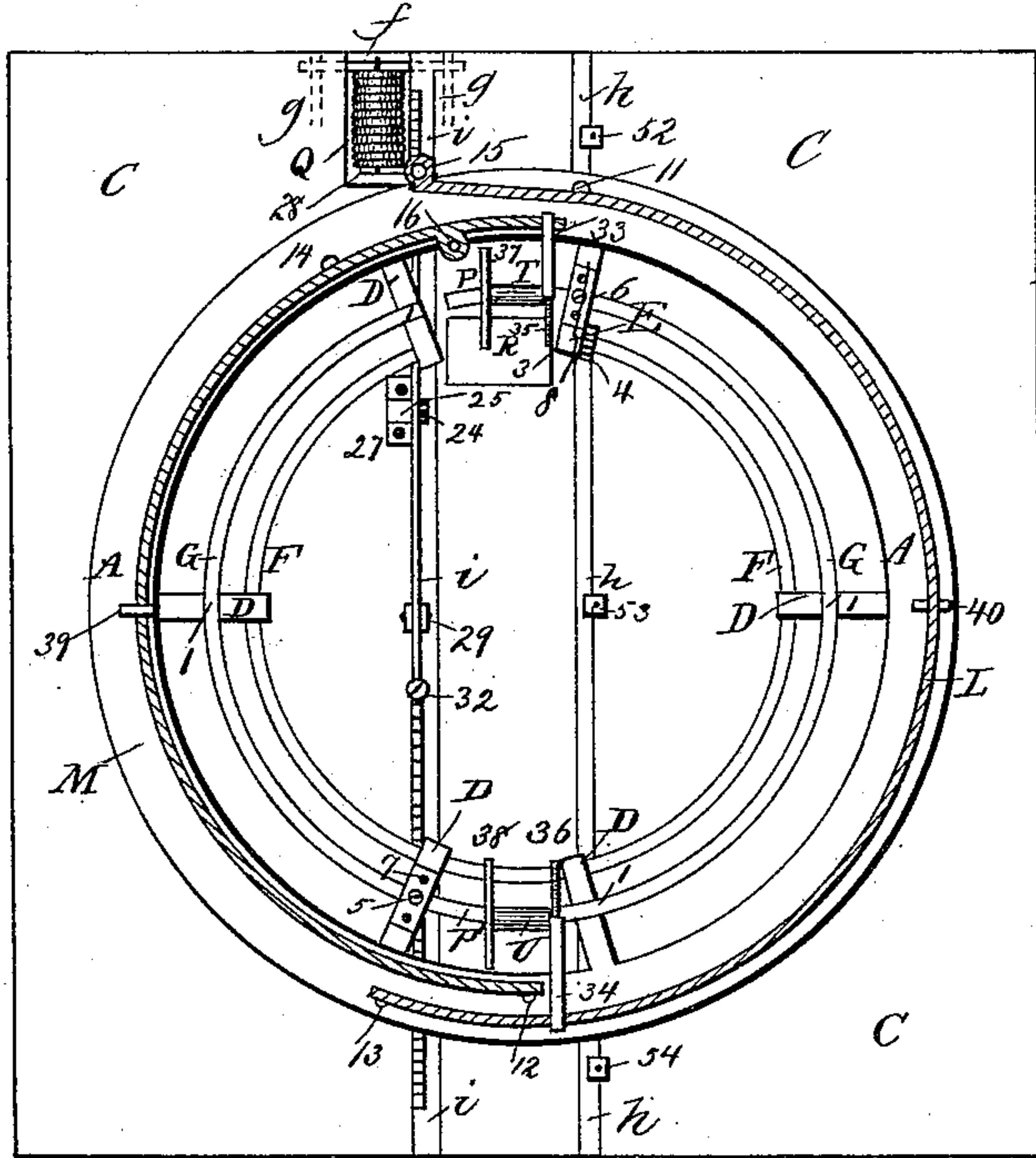
3 Sheets—Sheet 1.

M. HEARN.  
TYPE WRITING MACHINE.

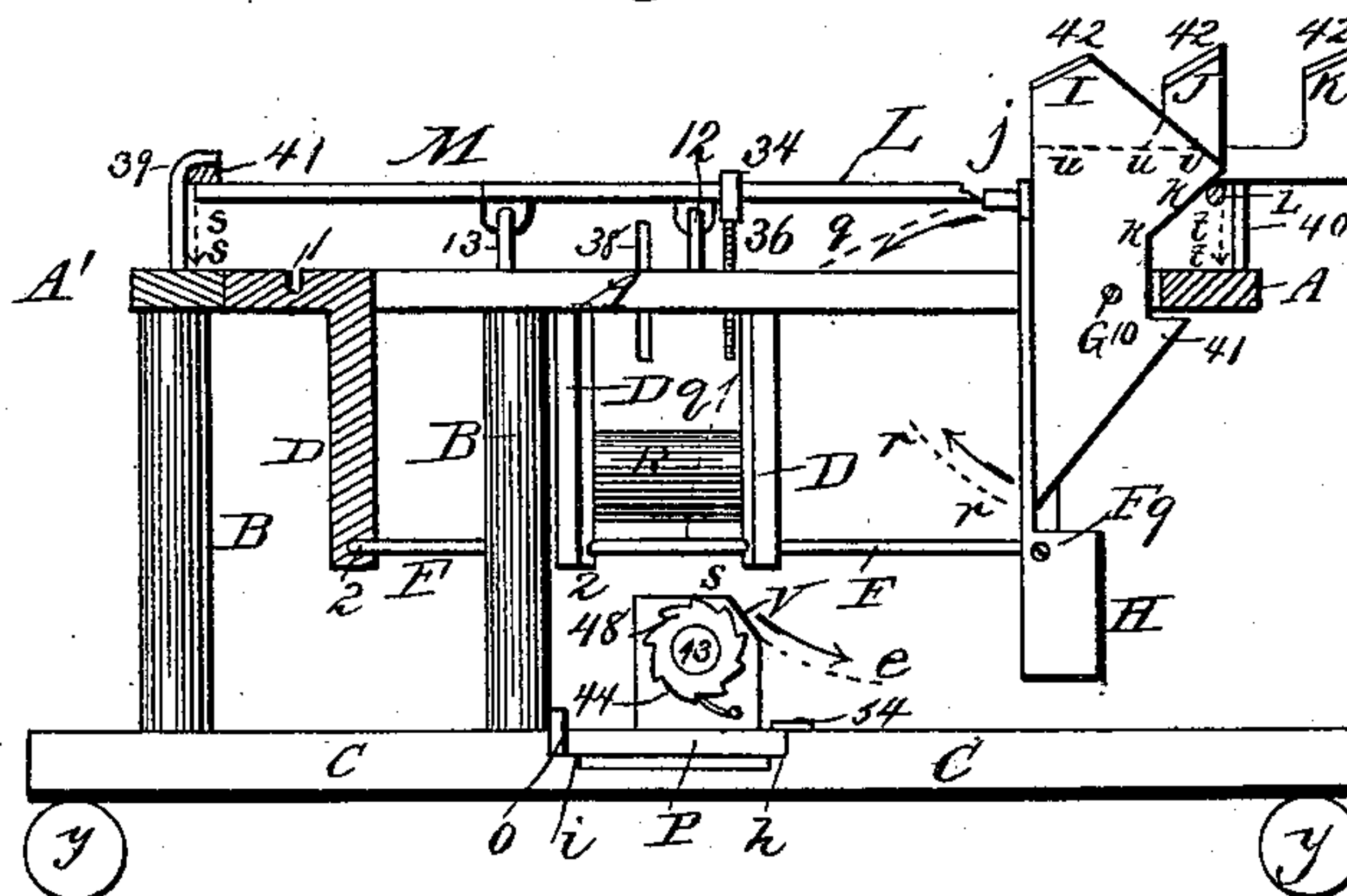
No. 453,240.

Patented June 2, 1891.

*Fig. 1.*



*Fig. 2.*



*Fig. 3.*

Witnesses  
Fred G. Dietrich  
Charles Dwight

48 47  
43 44  
50 P 51  
46 Inventor  
43 M. Hearn.  
45 By Munn & Co  
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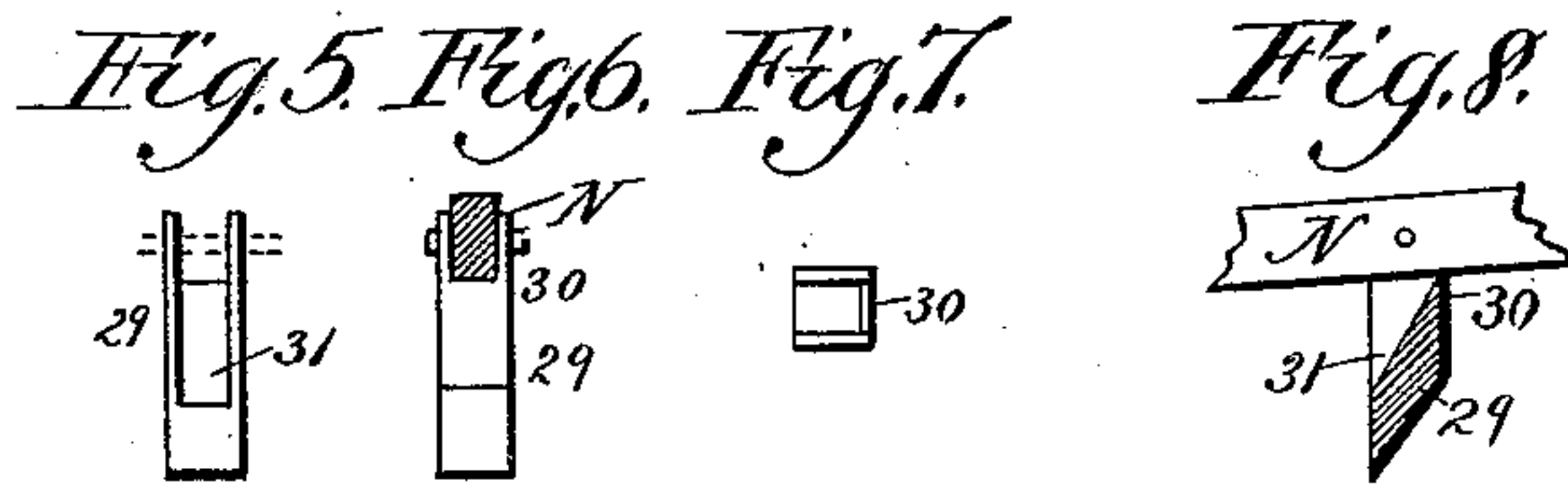
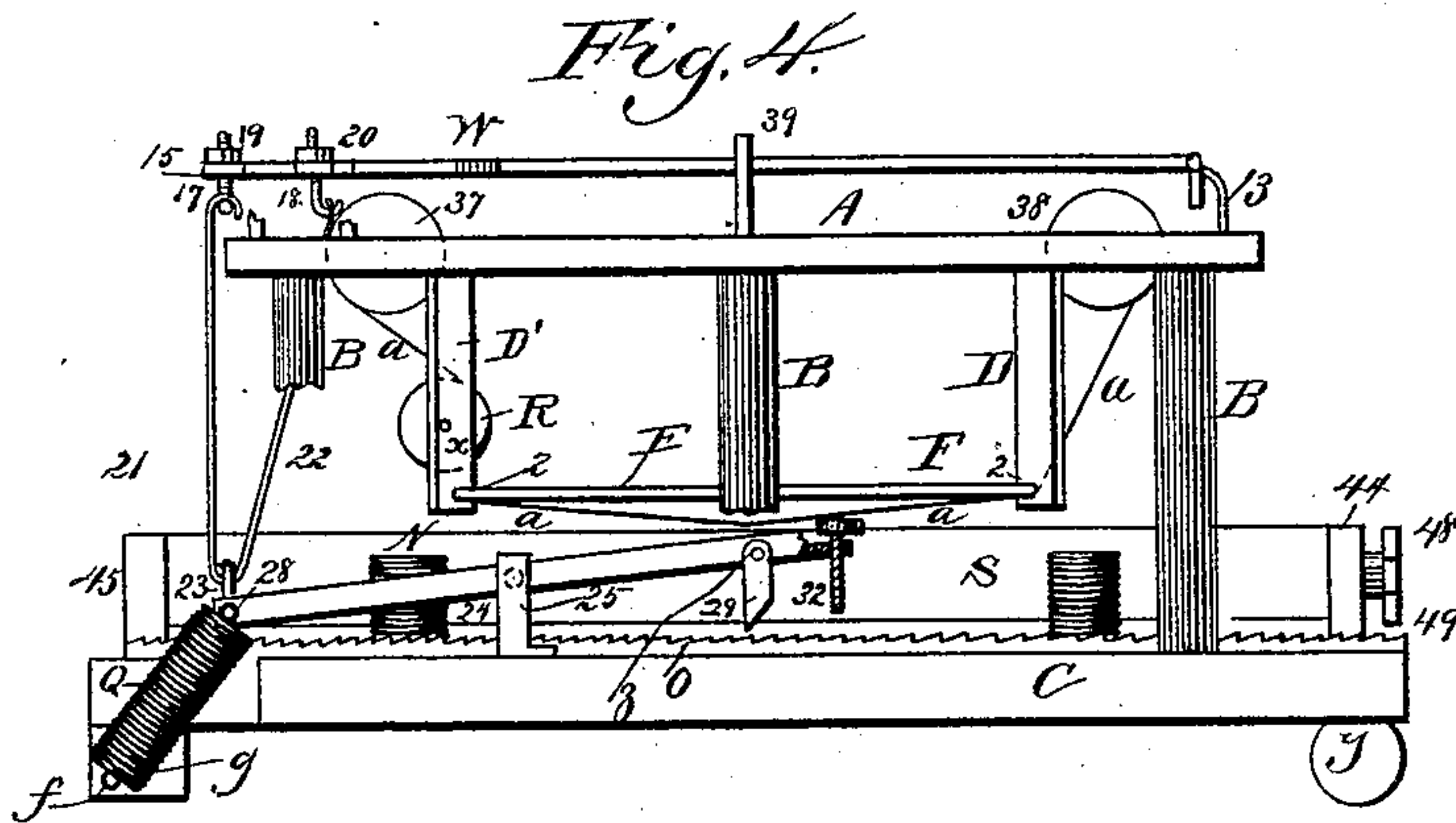
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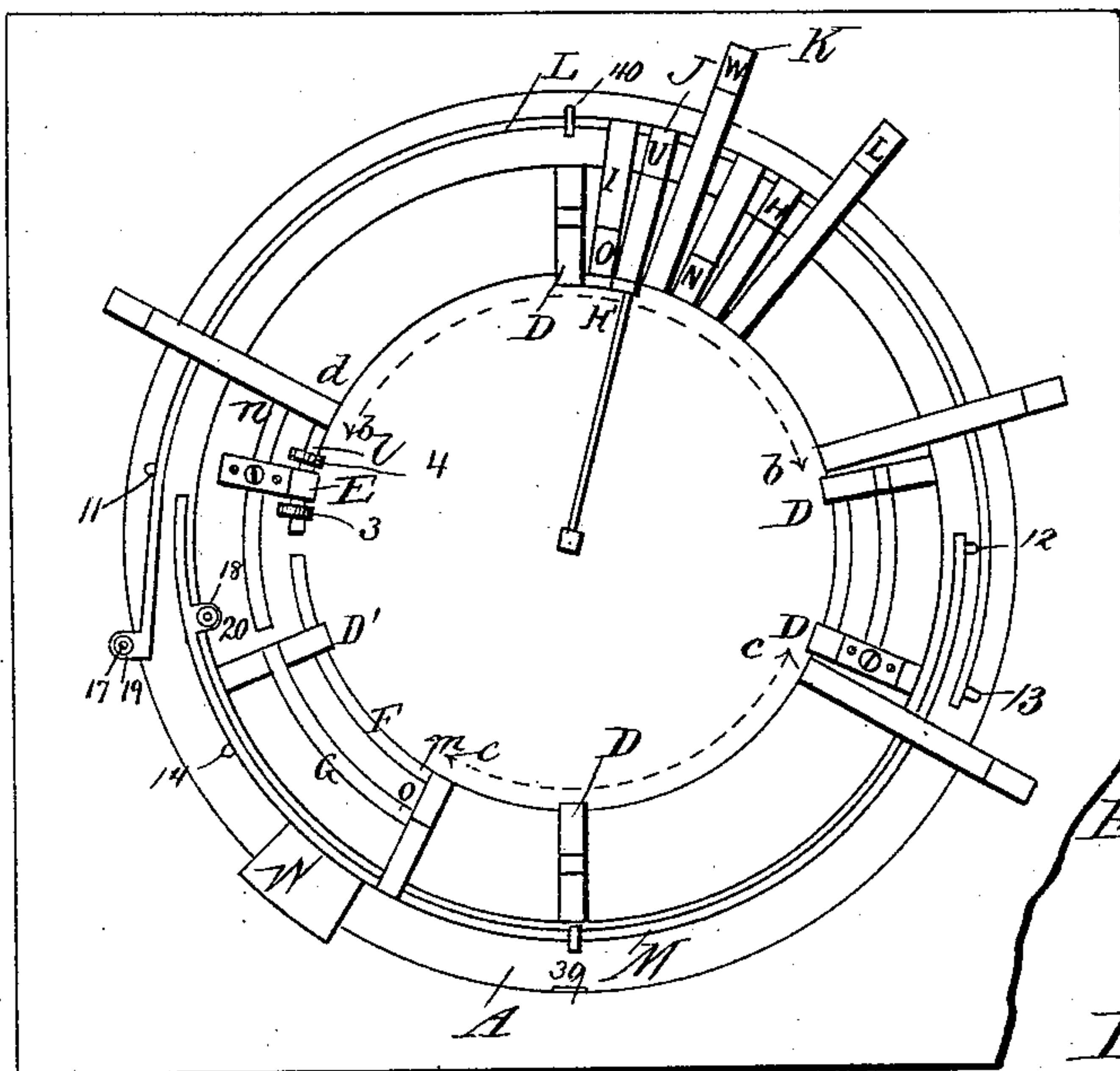
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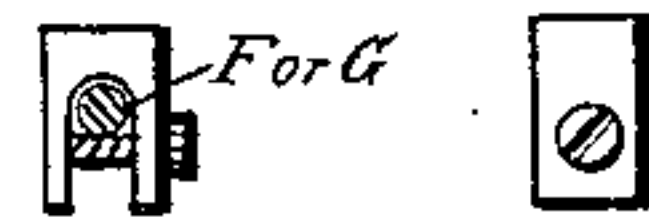
Patented June 2, 1891.



*Fig. 9.*



*Fig. 10. Fig. 11.*



Witnesses  
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Charles Wright

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attorneys

(No Model.)

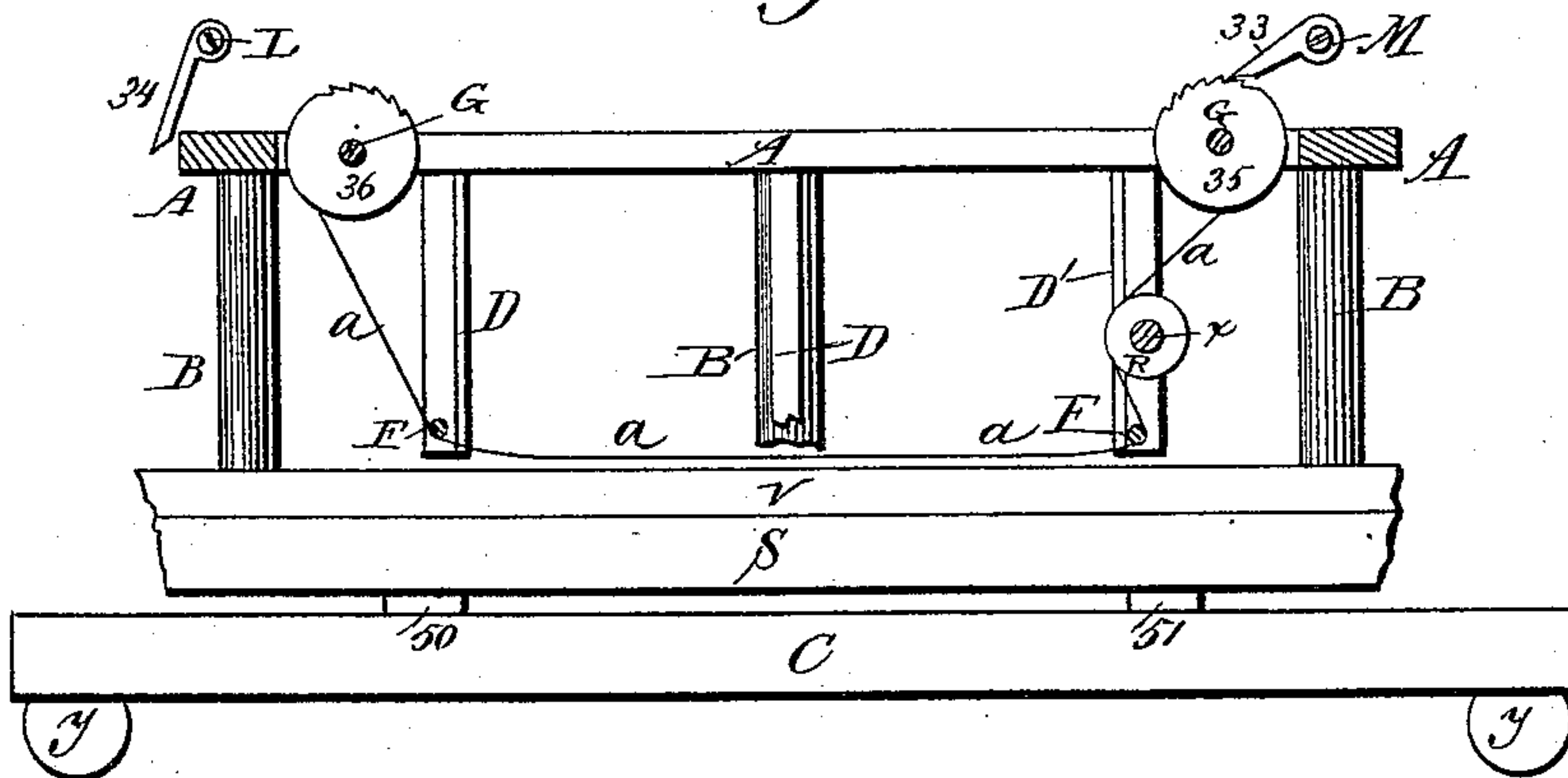
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M. HEARN.  
TYPE WRITING MACHINE.

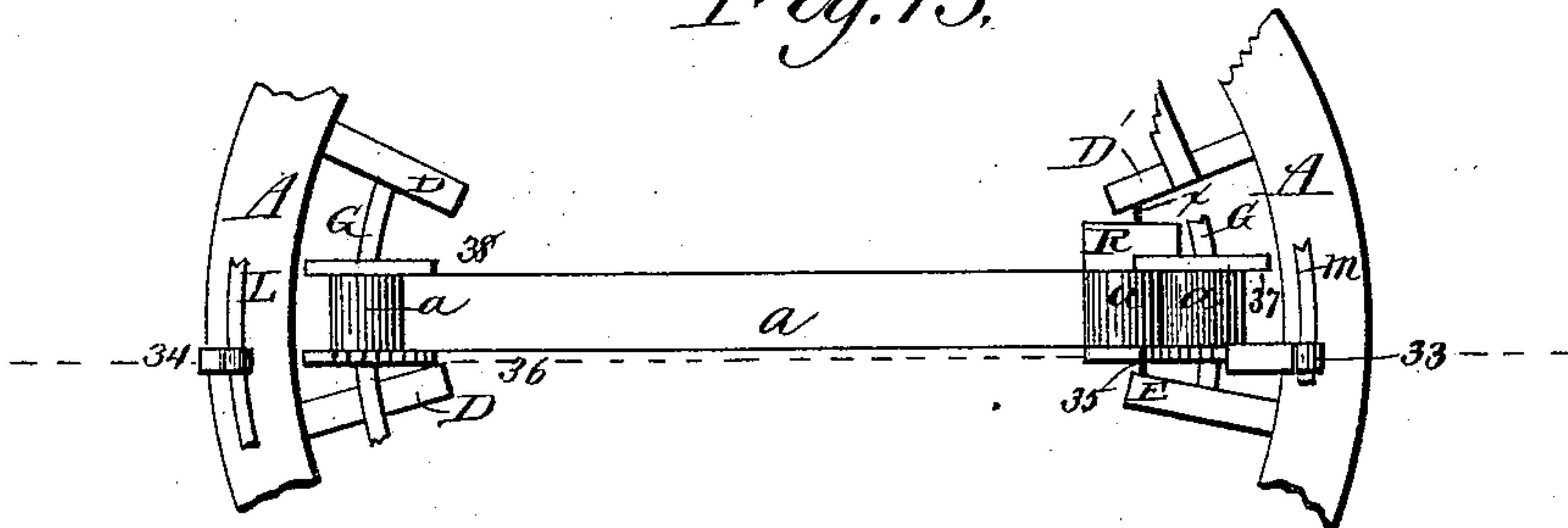
No. 453,240.

Patented June 2, 1891.

*Fig. 12.*



*Fig. 13.*



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Fred G. Dieterich  
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# UNITED STATES PATENT OFFICE.

MICHAEL HEARN, OF HAMPSTEAD, ENGLAND.

## TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 453,240, dated June 2, 1891.

Application filed June 1, 1886. Serial No. 203,882. (No model.) Patented in England November 16, 1885, No. 13,976.

*To all whom it may concern:*

Be it known that I, MICHAEL HEARN, a subject of the Queen of Great Britain, and a resident of 10 Gayton Road, Hampstead, in the county of Middlesex, England, have invented certain new and useful Improvements in Type-Writing Machines, (which has been patented in England, numbered 13,976, and dated November 16, 1885,) of which the following is a specification.

This invention relates to the construction of apparatus by means of which impressed or printed surfaces can be produced in a more simple and economical manner than has hitherto been practicable by those machines commonly known as "type-writers" and operated by keys; and in order that the nature of my present invention and the manner of carrying it into practical effect may be fully understood I proceed to describe the same by reference to the accompanying sheets of drawings.

Figure 1 is a plan or top view of so much of a machine according to my invention as is necessary to illustrate the same. Fig. 2 is a side view partly in section. Fig. 4 is a view at right angles to Fig. 2, also partly in section. Fig. 9 is a plan or top view necessary to illustrate the arrangement of the finger-keys, type-bars, and position of spacer. Figures 3, 5, 6, 7, 8, 10, and 11 are detail views and are hereinafter described. Fig. 12 is a section on the dotted line shown in Fig. 13. Fig. 13 is a top view or plan.

*a a* represent the ribbon. One of the levers 34 is shown disconnected with the ratchet-wheel, and the other 33 connected.

A is a perfectly-circular plate or frame supported on three circular posts B, which are fixed into the table or base-board C, resting on legs *y*. This circular-plate has six arms D, D, D, D, D', and E secured to it, Figs. 1 and 2, with slots cut at 1 and 2, Figs. 1 and 2, with the exception of arm E, which has a hole bored through it at its lower end to receive the ring F. The ring F is passed through or fitted into these slots and secured by two nuts 3 and 4 to the arm E, that part of the ring being threaded. Instead of slots, holes may be bored through these arms and the ring F may be passed through these holes.

The ring G is also passed through or fitted into slots 1 cut in the upper part of the four arms D and the arms D' and E and secured by means of screws 5 and 6, passing through plates 7 and 8, which are screwed on the top of arm E and on one arm D, as shown in Fig. 1. Both these rings F and G must be true circles and may be made with divisions. According to my present invention, on these rings are strung or pivoted the finger-keys and type-bars or levers carrying type or type-pieces, the finger-keys being strung on the upper ring G and the type-bars on the lower ring F.

II, Fig. 2, is the type-bar carrying a type-piece *j* and having a weighted or balanced end. This bar is pivoted on the ring F<sup>9</sup> and operated in one direction (shown by the dotted line *q q*) by the finger-key I and in the opposite direction by the force of its weighted end. The finger-key I is in like manner pivoted on the ring G<sup>10</sup>, Fig. 2, and is operated in one direction as shown by the dotted line *r r* and in the opposite direction by the action of the lever-arm L as it returns to position when the finger-key is not depressed, and which is hereinafter more fully described. The said type bars or levers, as will be understood from Fig. 9, are preferably arranged in a circle and, as shown, are so placed and arranged that each type-bar, when it is operated by the finger-key immediately behind it, shall strike at the same point.

In order to prevent confusion and to clearly indicate the construction and arrangement, only one of the type-bars H is shown, Fig. 2, each and all the other type-bars being similarly arranged, the type-bars resting, as shown, against the finger-key immediately behind it.

L and M are circular lever-arms pivoted on supports 11, 12, 13, and 14 and operated in one direction as shown by the dotted lines *s s* and *t t* and in the opposite direction by the action of the spring Q, to which they are connected. Flat pieces 15 and 16, Fig. 1, are secured to the lever-arms L and M, with holes, through which hooks 17 and 18, partly threaded, are passed, and the said hooks are held in position by nuts 19 and 20. These hooks are connected with the driving-lever N by pieces of



wire 21 and 22, Fig. 4, with hooked ends passing through an eye 23, attached to the lever N. These hooks 17 and 18 being screwed up or down serve to give the necessary tension in adjusting the circular lever-arms L and M for driving the rack O, which is attached to the paper-carriage P. The curved pieces of wire 39 and 40, Fig. 2, prevent the lever-arms L and M from rising above their level line as they return to their normal position.

41 and a piece similarly fixed under the curved wire 40 are pieces of india-rubber to deaden the sound as the lever-arms strike against the wires before mentioned.

The driving-lever N is pivoted at 24 on a pivot fixed into a post 25, the post 25 being secured to the base-board or table by a plate 27, through which two screws are passed. The driving-lever N is made with an arm 28, which is attached to the spring Q. This spring Q is attached by its other end to a bar *f*, Figs. 1 and 4, which passes through two supports *g g*, fixed under the base-board, as shown, a piece being cut out of the board to allow of the spring being passed through, as shown in Fig. 4. At the other end of the lever N is hinged at *z* the driving-tooth 29, cut as shown in Figs. 5, 6, 7, and 8.

Fig. 5 represents a view of the tooth with a slope cut into it; Fig. 6, a view on the opposite side to Fig. 5, showing the driving-lever N resting on the shoulder 30. Fig. 7 is a plan or top view; and Fig. 8 is a view, partly in section, showing the position of the lever-arm N when the lever is at rest. This tooth is cut with a shoulder 30, Figs. 7 and 8, in order to rest against the lever-arm N, Figs. 6 and 8, so as to offer the necessary resistance to the said lever N when it is operated to drive the paper-rack O. The slope 31 is required to allow of the tooth giving in the operation of driving, and being hinged permits it to return easily to its normal position when the lever-arm N is drawn down by the action of the spring Q, as will be readily understood.

At the extreme end of the lever N is fixed a screw 32, which passes through the lever-arm hereinafter described as the "spacing-screw." The object of this screw is to regulate the spacing, and it may be adjusted to the space required by being screwed closer to or farther from the rack O. The closer the adjustment to the rack the shorter will be the space, and vice versa.

The operation of the spacing-screw 32, Fig. 4, is as follows: When the lever-arm N is operated by the levers L or M, the rack O is moved by the tooth 29; but it is moved at unequal or varying spaces, according to the force with which the finger-keys are operated. This movement, however, is checked and the rack is made to move at equal spaces at each depression of a finger-key by the spacing-screw coming down on the rack with a regular motion and so preventing the paper-car-

riage from being driven beyond a certain fixed space each time. As before stated, it will easily be understood that the space will be longer or shorter, according to the adjustment of the spacing-screw 32.

To the circular lever-arms L and M are attached two hinged levers 33 and 34. These operate two ratchet-wheels 35 and 36, which, with the other wheels 37 and 38 and the hollow cylinders T and U, which connect them, form the reels on which the inking-ribbon is wound. These reels T U rotate on the ring G. While in operation only one of these levers 34 or 35 is connected with its ratchet-wheel, which causes the ribbon to be wound onto the reel to which it is attached. By this arrangement the inking-ribbon may be wound from one reel onto the other, and vice versa, as will be easily understood. These levers 33 and 34 are operated by the lever-arms L and M. Beneath the reel T and revolving on a bar secured transversely to the arms D' and E, Fig. 1, is placed the inking-roller R. The ribbon is wound over this roller R and the reels T U, as shown in Fig. 4 by the line *a a*, and is made to travel over it by the revolution of the reels before mentioned. The inking-roller R is supplied with ink whenever required, with which it inks the ribbon as it travels over it.

Having described the operation of the several parts of my present invention, the operation of the apparatus above described is as follows: Supposing the carriage P, carrying a sheet of paper or other material to be printed, to be in the position shown in Fig. 4, or that in which a line of words is about to be printed, then upon depressing a finger-key I a type-arm H, Fig. 2, carrying a type-piece *j*, is immediately moved downward to the common central point, causing an impression to be made through the ink-ribbon on the paper or material attached to the roller S. This depression of the finger-key also depresses both the lever-arms L and M, causing the upward action on the other side of their pivoted ends 11 and 14 to draw up the end of the driving-lever N, to which they are attached, as before described. This motion further causes the hinged tooth 29 to engage with the paper-carriage rack O, imparting a movement to it, which is regulated by the spacing-screw 32, hereinbefore described. Upon the pressure being removed from the finger-key I the type-bar returns to its normal position by the force of balance given in its weighted end, and the finger-key returns to its normal position by the return motion of the lever-arms L and M. The weight of the type-bar also pressing against the finger-key serves, in case of any tendency to a fall-back movement in the finger-keys J and K, to keep them in the upright position shown in Fig. 2. The circular lever-arms L or M at the same time work the ratchet-wheel 35 or 36 by means of the small hinged levers 33 and 34, as hereinbe-



fore described, and thereby causing the ribbon to travel, which imparts a rotatory motion to the inking-roller R. The finger-keys and type-bars are arranged as shown in Fig. 9 and within that part of the circle described by the dotted line *b b* on the one side and *c c* on the other, the object of so placing the finger-key *d* with relation to the support 11 being to allow of an easy working of the lever-arm L. The finger-keys, type-bars, and ribbon-reels are held in position on the rings F and G at *l, m, n, o, p*, and *p'*, Figs. 1 and 9, by a slotted piece, Figs. 10 and 11, which fits over the ring, and is then secured to it by a screw. It will be observed, Figs. 2 and 9, that there are three differently-shaped finger-keys I, J, and K, Fig. 2, the shape of the upper sides of the finger-keys J and K being shown by the dotted line *u u* for key J and *u u v* for key K, and in every case that side of the finger-key presented to the type-arm corresponds exactly with the width of the type-arm at its weighted end, as will be seen from Fig. 9. The sloped side of all the finger-keys shown by the line *k k* is determined by a line drawn from the center of *g*<sup>10</sup> to the upper part of the lever-arm, (in this case L,) and this sloped side must be sufficiently long, measured from the point where it rests on the lever-arm downward, to allow the finger-key to act freely while operating the lever-arms L or M. The finger-keys are also so cut at 41, Fig. 2, to steady them against the circular frame of the machine A and check any tendency to a fall-forward movement when the lever-arms L or M in its return motion strikes against them. For lightness these keys are preferably made of wood, and small pieces of ivory or bone 42, with the letters and characters engraved thereon, are fastened on the tops of the keys, as shown in Figs. 2 and 9.

On the circular lever-arm M is fixed a spacer W to give the necessary distance whenever a space or spaces are required. The spacer is depressed every time a space is required, and its operation, from the foregoing description of the operation of the lever-arms L and M, will be so easily understood that it is obvious no further explanation is necessary.

The paper-roller S, Fig. 3, is pivoted at 43 in supports 44 and 45, fixed to the paper-carriage P, and may have a casing of india-rubber with platens. Running the whole length of the roller and fixed in the supports 46 and 47 is a flat piece of tin V, which acts as a guide to the paper as it is rolled out, so as to keep it well under the keys as it is thrown out on the board C in the direction of the dotted line *e*. To one of the pivots of the paper-roller is attached a ratchet-wheel 48, cut with teeth corresponding in width to the distance apart of the lines on the paper to be printed. It is regulated by a spring 49, secured to the support 44, which checks its revolution to the distance required. The wheel is operated by the fingers of the operator. The paper is

held onto the roller by two springs 50 and 51, fixed to the paper-carriage P. The roller S, paper-carriage P, and supports 44 and 45 are shown as made of wood. The groove in which the paper-carriage P and rack O, which is attached to the paper-carriage slide is cut into the table or board C, as shown in Figs. 1 and 2, and the said groove runs the whole length of the board, as shown, *h h i i*, Fig. 1. Flat pieces of metal 52 53 54 are fastened to the board and project sufficiently over the grooved part to prevent any upward movement of the paper-carriage as it is drawn backward or forward in the groove above mentioned. If desired, a metal slide of similar construction may be used.

Having now particularly described the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a type-writer, the combination of a pivoted and counterbalanced type-lever and a key-lever pivoted in the rear of the type-lever to act upon it above its pivot, substantially as and for the purpose set forth.

2. In a type-writer, the combination of a pivoted and counterbalanced type-lever and a key-lever pivoted in the rear of and adjacent to the type-lever, with its pivot above the pivot of the said type-lever, substantially as described.

3. In a type-writer, the combination, with a carriage-operating lever, of a pivoted and counterbalanced type-lever, a pivoted key-lever for operating the type-lever, and a lever connected with the carriage-operating lever and adapted to be operated by the key-lever, substantially as herein shown and described.

4. In a type-writer, the combination, with a spring-actuated carriage-operating lever, of a pivoted and counterbalanced type-lever, a key-lever pivoted in the rear of the type-lever for operating it, a semicircular lever fulcrumed near its ends and adapted to be operated by the key-lever, and a connection between the semicircular lever and the carriage-operating lever, substantially as described.

5. In a type-writer, the combination, with a carriage provided with a rack and a pivoted and spring-pressed lever provided with a pawl engaging the rack, of pivoted and counterbalanced type-levers arranged in a circle, key-levers pivoted in the rear of the type-levers for operating them, semicircular levers pivoted near their ends and adapted to be engaged by the key-levers when they are depressed, and connections between the semicircular levers and the pawl-carrying lever, substantially as herein shown and described.

6. In a type-writer, the combination, with the paper-carriage and the inking-ribbon, of pivoted and counterbalanced type-levers arranged in a circle, key-levers pivoted in the rear of the type-levers, semicircular levers pivoted near their ends and adapted to be en-

gaged by the key-levers when they are de-  
pressed, and means for operating the carriage  
and inking-ribbon from the semicircular le-  
vers, substantially as herein shown and de-  
5 scribed.

In testimony that I claim the foregoing as  
my invention I have signed my name, in pres-

ence of two witnesses, this 12th day of May,  
1886.

MICHAEL HEARN.

Witnesses:

ALFRED CAPES,  
ANNIE SMITH.