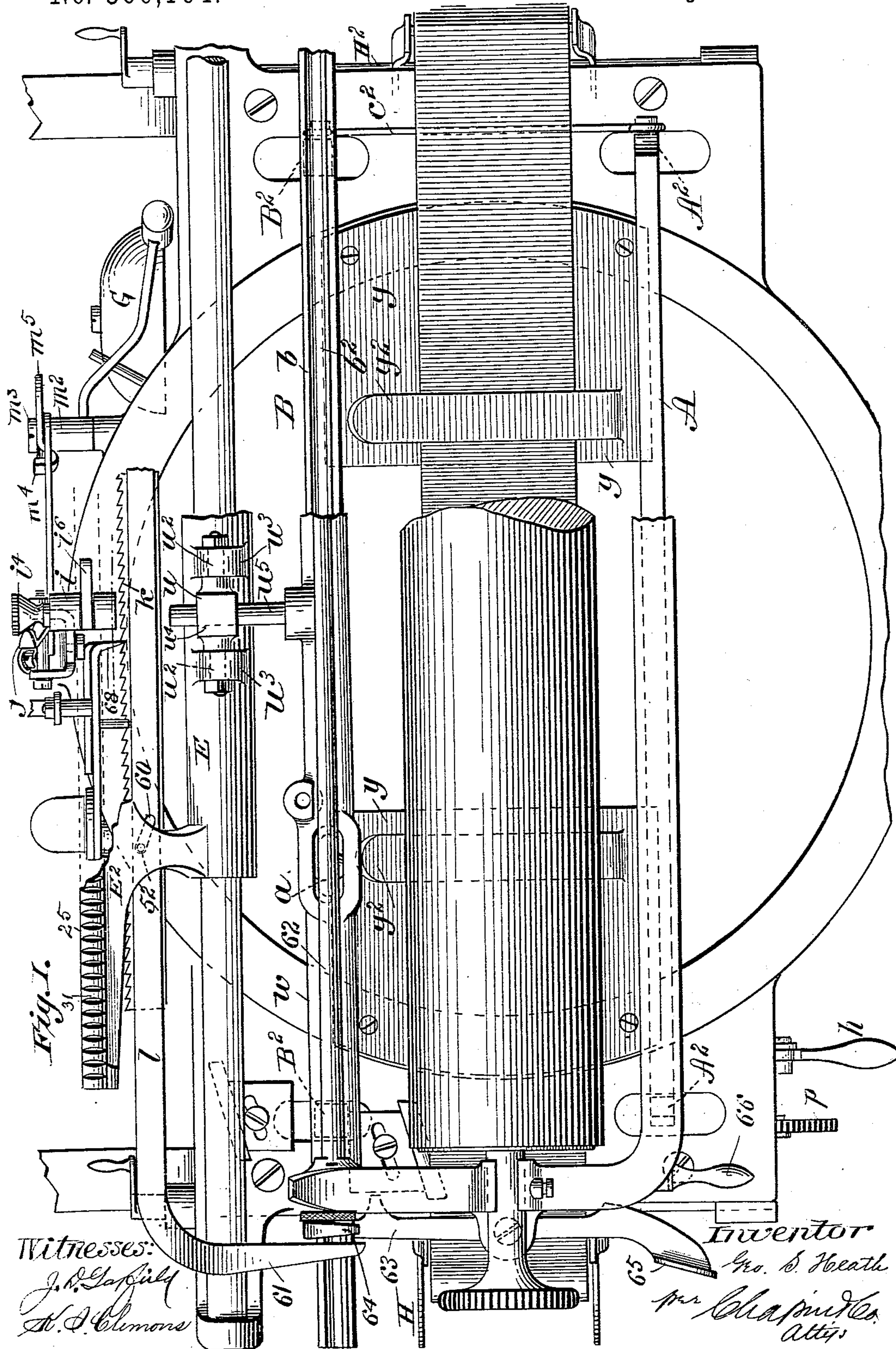


4 Sheets—Sheet 1.

No. 560,164.

Patented May 12, 1896



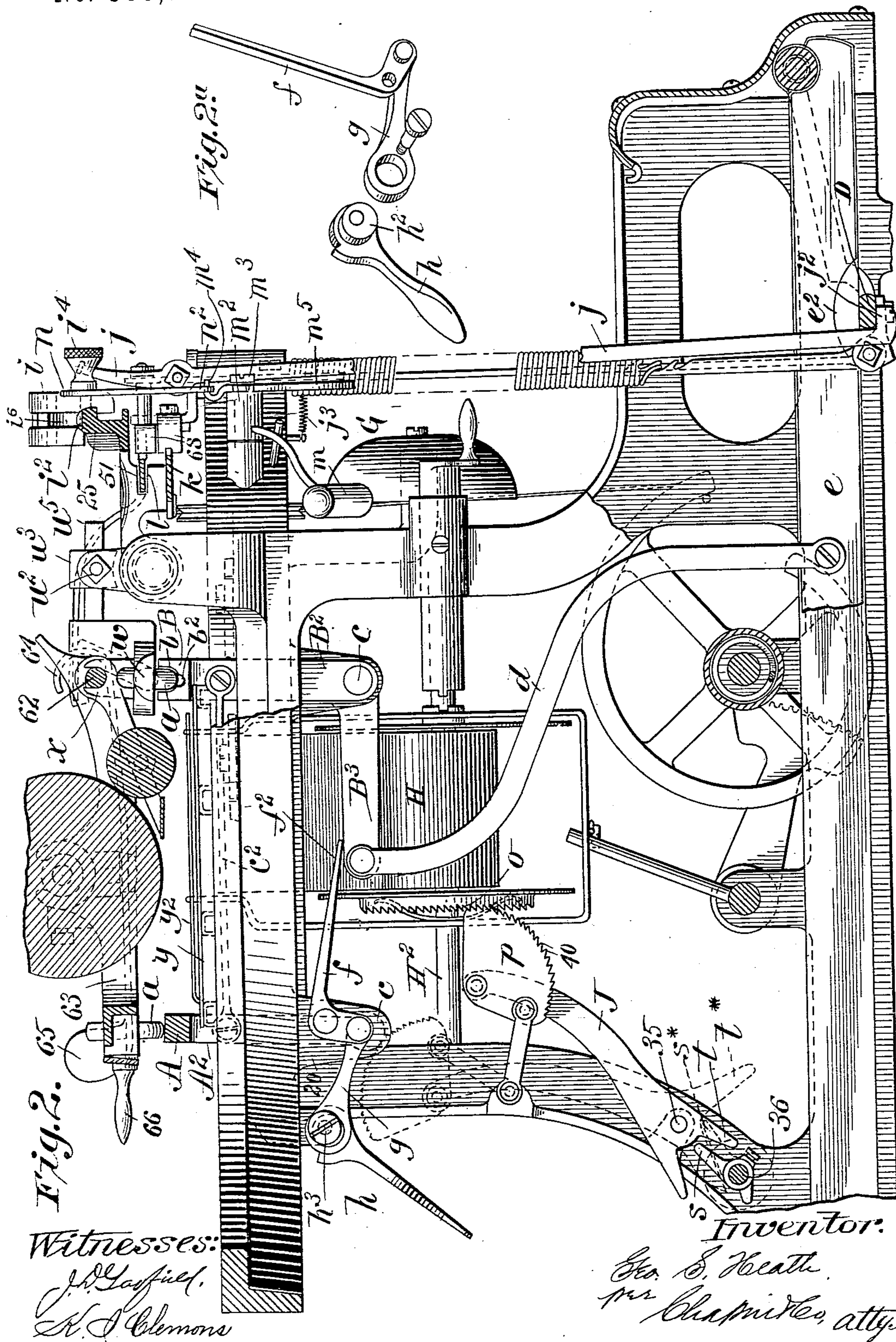
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4 Sheets—Sheet 2.

G. S. HEATH.
TYPE WRITING MACHINE.

No. 560,164.

Patented May 12, 1896.

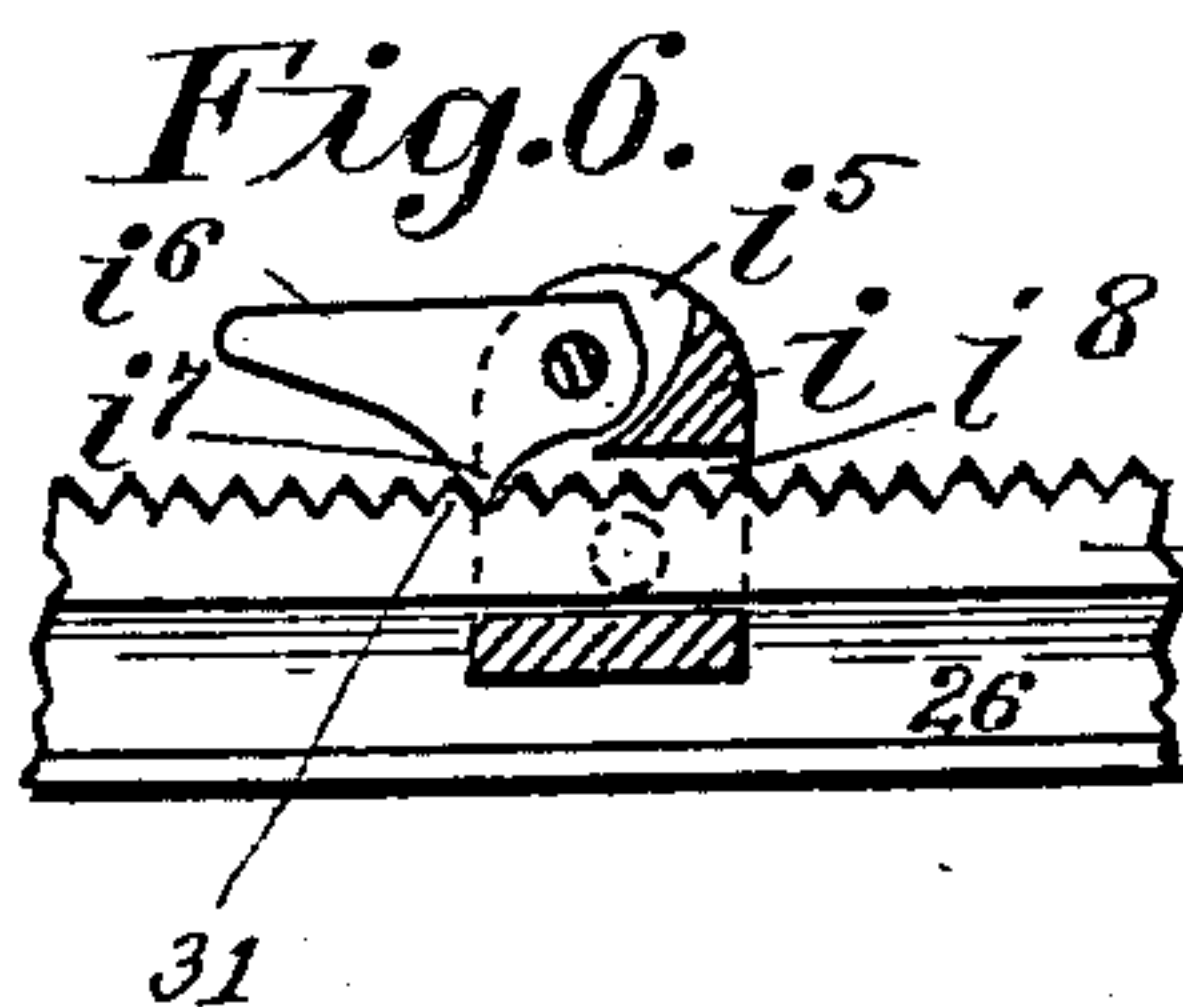
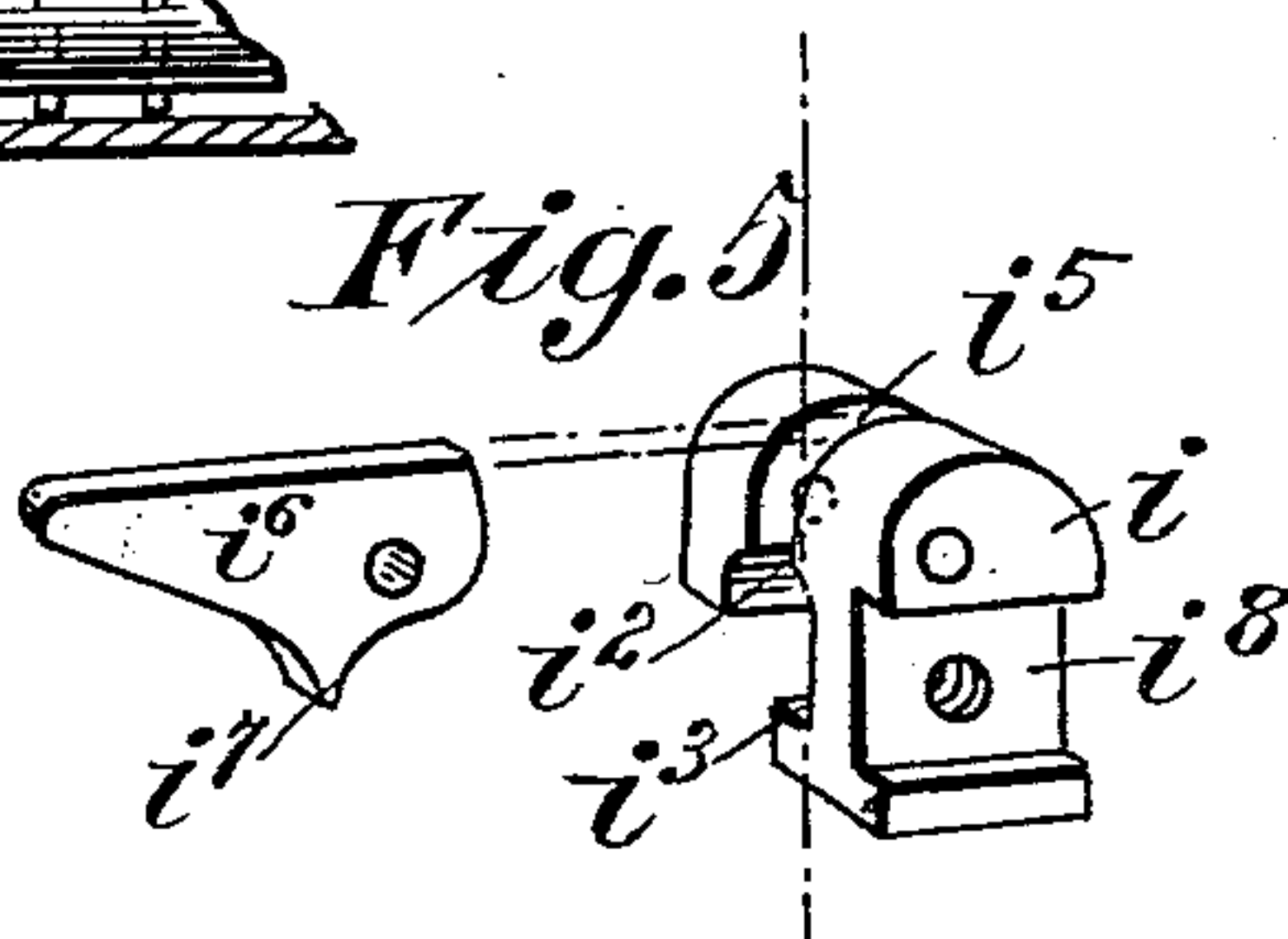
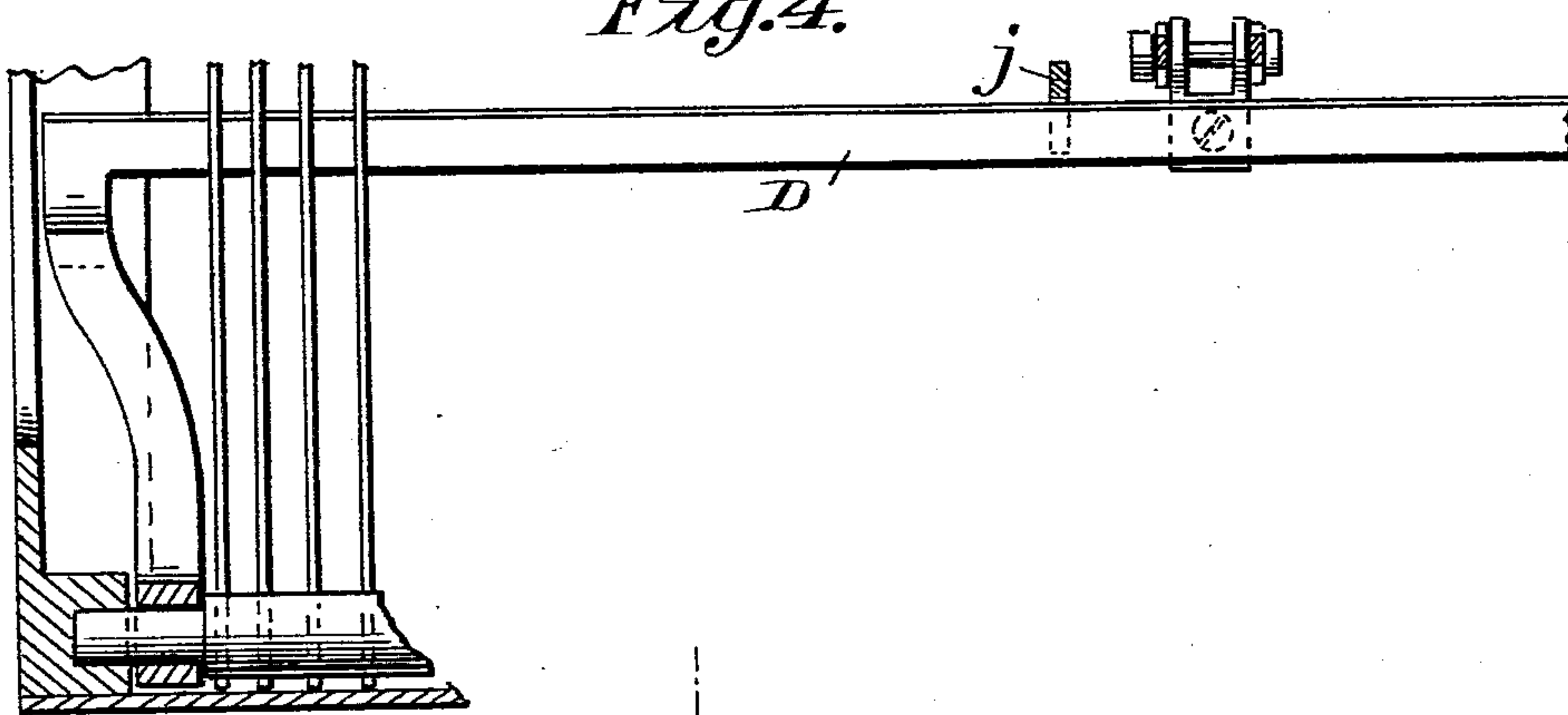


ANDREW B. GRAHAM, PHOTO-LITHO, WASHINGTON, D C

4 Sheets—Sheet 3.

No. 560,164.

Patented May 12, 1896.



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Inventor,

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(No Model.)

4 Sheets—Sheet 4.

G. S. HEATH.
TYPE WRITING MACHINE.

No. 560,164.

Patented May 12, 1896.

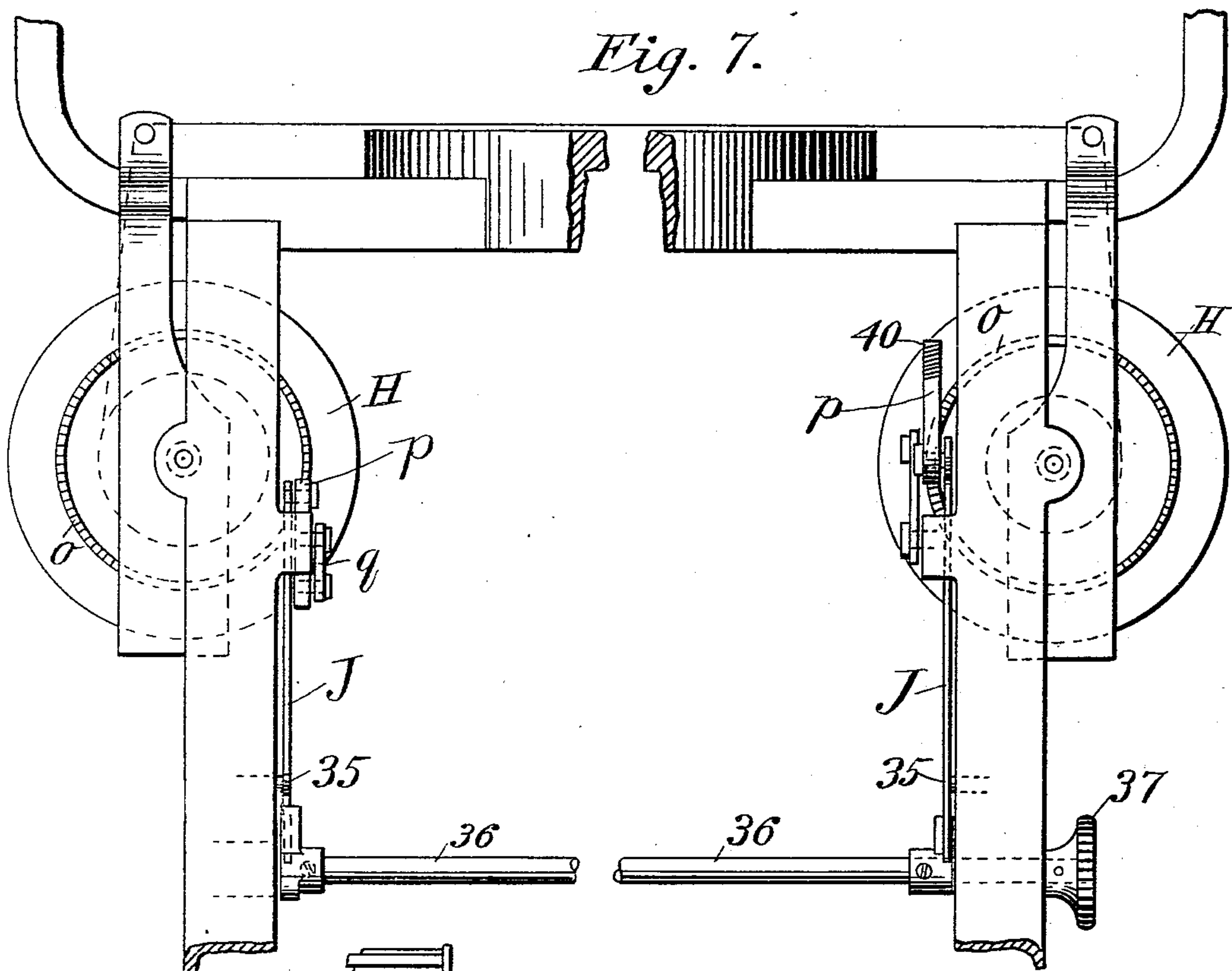


Fig. 8.

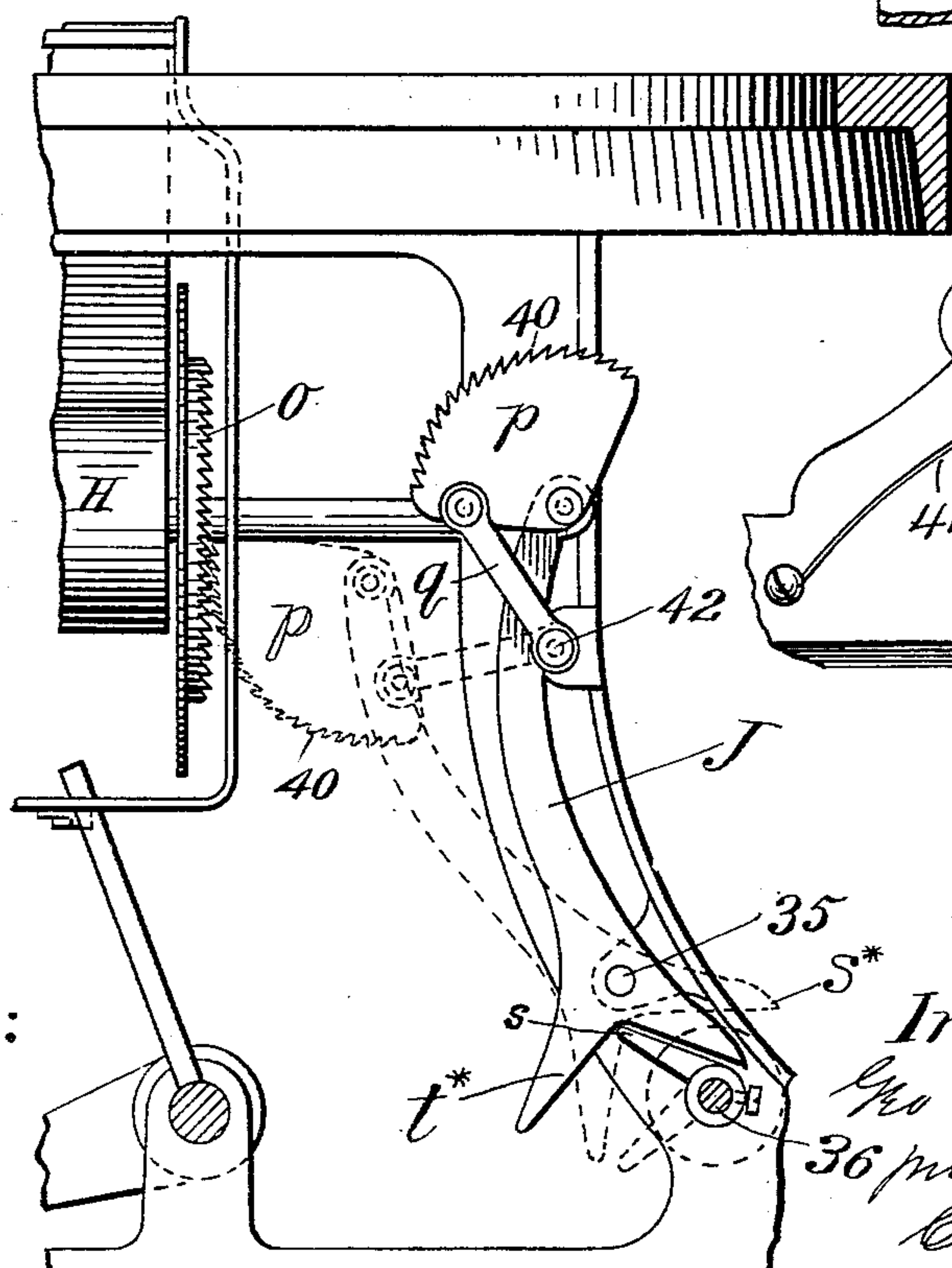
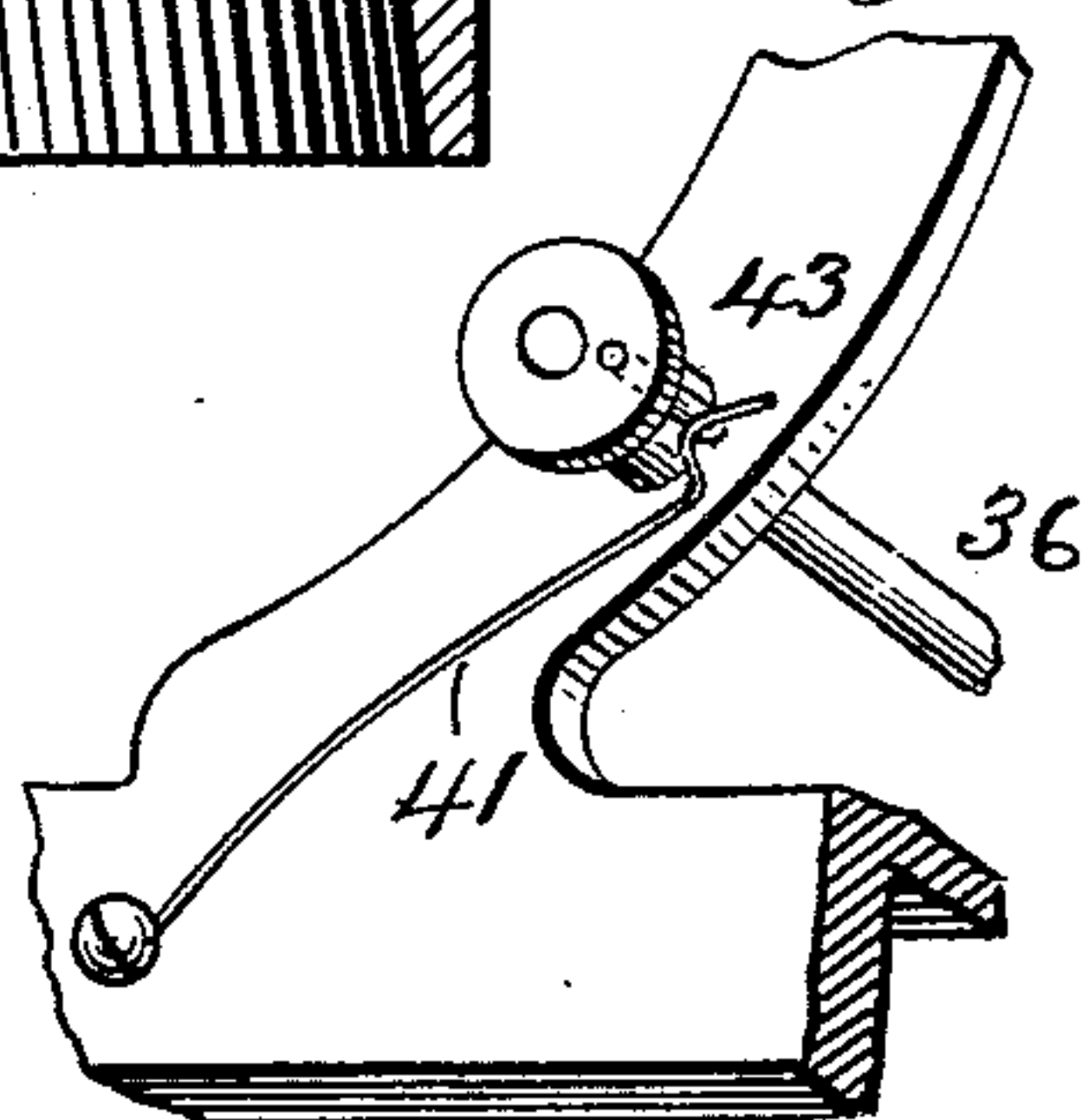


Fig. 9.



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UNITED STATES PATENT OFFICE.

GEORGE S. HEATH, OF SPRINGFIELD, MASSACHUSETTS, ASSIGNOR TO
CHARLES F. HOWE, OF BOSTON, MASSACHUSETTS.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 560,164, dated May 12, 1896.

Application filed October 4, 1893. Serial No. 487,202. (No model.)

To all whom it may concern:

Be it known that I, GEORGE S. HEATH, a citizen of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Type-Writing Machines, of which the following is a specification.

This invention particularly relates to improvements in the mechanism for shifting the carriage fore and aft for upper and lower case printing; to an improved adjustable marginal stop or device for arresting the carriage before it has run so far as to bring the end portion of the platen to the type-impact point, in combination with mechanism for preventing the operation of the key-levers after the carriage has reached the end of its run; to improvements in the bell-ringing device; to improvements in the automatic ribbon-feeding mechanism and supporting devices for the portion of the ribbon running between the two ribbon-rolls, and, furthermore, to other features of construction which will be hereinafter referred to.

The invention consists in constructions and combinations of parts, all substantially as will appear from the following description and be pointed out in the claims.

In the accompanying drawings, Figure 1 is a plan view of the frame of the type-writing machine with the carriage and the present novel devices. Fig. 2 is a sectional elevation of the machine, taken through the center thereof from front to rear. Fig. 2^a is a view in detail of portions of the carriage-shift device. Fig. 3 is a rear elevation of a part of the machine for the purpose of showing the improved marginal stop, the bell-ringing device, and a part of the locking mechanism for preventing the operation of the keys. Fig. 4 is a horizontal sectional view of a lower part of the frame and a plan view of a part of the universal bar and key-levers and the locking device in engagement therewith. Fig. 5 is a perspective view of the adjustable marginal stop with the parts thereof detached one from the other. Fig. 6 is a central vertical sectional view of the marginal stop shown as in its engagement upon the toothed bar of carriage therefor. Fig. 7 is a front elevation of parts of the frame of the machine,

showing the novel ribbon-feed mechanism. Fig. 8 is a view taken at right angles to Fig. 7, showing the portion of the ribbon-feeding mechanism at one end of the machine, the dotted lines representing the changed position thereof. Fig. 9 is a perspective view illustrating a detent device for the rock-shaft which shifts the ribbon-feed.

In the drawings, A and B represent the parallel front and rear horizontal longitudinal supports or rails, on which the carriage C runs. The carriage is provided with wheels or rollers *a a*, those at the rear of the carriage running in a groove *b* therefor. Within the base of this groove *b* is a subgroove *b*², into which dirt or dust collected in the main groove may fall to leave the runway always clear. The said horizontal rails or supports A B have at their ends the depending members A² B², which by their lower ends are pivotally mounted, as indicated at *c c*, upon upper parts of the frame of the machine, so that the said carriage-support rails may move forward and backward in unison for "upper-case" or "lower-case" printing, as insured by the rod *c*², which ties them together.

One of the depending members B² of the carriage support-rail has the forwardly-extended arm B³, with which the curved connecting-rod *d* has, by its upper end, a pivotal connection, while the lower end of this connecting-rod has a pivotal connection with a special key-lever *e*, which is known as the "carriage shift-key." It will be perceived that this key-lever is recessed, as seen at *e*², on its under side adjacent the universal bar D, so that this particular key-lever, unlike all of the others of the machine in its operation, will not move the universal bar to operate the letter-spacing escapement. This key *e* may be depressed and so held to shift and hold momentarily the carriage from its normal position forward, so that one, or perhaps several, capitals may be printed; but for continuous capitalizing the shifted relations of the parts may be maintained by the locking device which will be now described as follows: On the support-lug 20 of the machine-frame is pivoted, at its elbow, an angular lever *f*, one arm of which—that bears on the aforesaid arm B³—is very much longer

than the arm to which the link g is connected. The link has its circularly-apertured end to embrace a boss h^2 , which projects sidewise from the end portion of a lever h . This lever
 5 is pivotally supported on a suitable member of the frame, the pivot screw or stud h^3 passing eccentrically through the aforesaid boss h^2 . The lever swinging upwardly causes, through the cam action of the boss, an end-
 10 wise draft upon the link to swing the lever f , insuring the downswinging of the arm B^3 and the shifting of the carriage. The parts will remain in their so-shifted positions until purposely reshifted, because of the fact that
 15 as the lever is swung the eccentric-boss is turned slightly by the "dead-center" just after the limit of downward movement of the arm B^3 has been reached, the long arm f^2 of the angular lever having slight springing ca-
 20 pabilities to permit the passage of the eccentric by the dead-center, as stated. The dead-center just mentioned is found when the center of the aperture in the lever h and the center of the eccentric are in line with the
 25 length of the link.

The improved marginal stop is fully and clearly illustrated in Figs. 2, 3, 5, and 6, and is applied upon the rear horizontal longitudinal rail 25 of the part F^2 of the carriage.
 30 Said rail 25 has a rounded top and a groove 26 along its rear side. The rounded top of the said rail has a series of alternating cross V notches and ribs with blunt points. The separation of the grooves corresponds to the
 35 letter-spacing of the machine, which is determined by the distance between the teeth of the ratcheted bar k for the escapement mechanism. The marginal stop consists of a block i , which is formed at its under side
 40 with an aperture i^2 to fit the rounded top of the said rail 25 and, with the depending and forwardly turned lug i^3 , to engage in said groove 26. The set-screw i^4 , passing through said lug i^3 and against the rail, confines the
 45 block in place on the rail. The block i has the longitudinal recess i^5 vertically therein, within which is pivoted the pawl or dog i^6 , with the tooth i^7 at its lower part. A projection of this dog is shown, which serves as a
 50 handle-lever for swinging it out of engagement with the notches of the rail 26. By having the notches of the said rail of equal length with and properly adjusted to the ratchet-teeth of the escapement-bar k the
 55 setting of the stop-block i , through the pawl or dog i^6 in engagement with one or the other of the notches, will insure the arrest of the carriage just at the end of a letter-space feed movement thereof, as plain. By having the
 60 teeth on ribs 31 between the notches approximately in the form of equilateral triangles, preferably with blunted apexes, the stop-block i may, when the set-screw i^4 has been released, be slid inwardly without lifting the
 65 pawl i^6 . It will also be noticed on reference to Fig. 6 that the tooth i^7 of the pawl has a firm bearing against and throughout the en-

tire area of the inner face of the tooth 31, so that the impact by the marginal stop against the abutment-piece which is provided there-
 70 for is absolutely resisted, no giving of the stop longitudinally being permitted after being repeatedly struck by the carriage. Furthermore, by providing the form of notches shown throughout the length of the said rail 25
 75 a marginal stop similar to the one shown may be used at or toward the other end of the rail, its recess i^5 and the pawl therein being in this provision arranged with the block toward the right instead of toward the left, and all so as
 80 to similarly resist the rightward movement of the carriage, it being free on the loosening of its set-screw to be slid to the left without taking the trouble to lift its pawl. The position of the stop farther from or nearer to the end of the
 85 rail 25 determines the time of locking the universal bar for preventing the further operation of the key-levers and the consequent end-wise movement of the carriage. This locking of the universal bar is through means of the
 90 lever j , which is pivotally hung toward its upper end for a swinging movement in a vertical plane fore and aft of the machine, and which is transversely of the length of the universal
 95 bar D . The upper end of the lever is projected into the path of movement of the set-screw i^4 of the marginal stop, and the lower end of the lever has the angular foot j^2 , and the position of the lever is normally such as
 100 to have the foot swung free from under the universal bar, as insured by the spring j^3 . The projecting part of the set-screw i^4 is tapered, as seen in Figs. 1 and 2, so that the impingement thereby against the upper ex-
 105 tremity of the lever j imparts the forward movement to the upper end and the rearward movement to the lower end thereof to lock the universal bar against being depressed. This locking preventing the operation of the
 110 escapement devices as well as the depression of any key-lever consequently prevents a type from being thrown against the platen after the marginal stop has come to the limit of its run, as predetermined. It is designed
 115 to ring the bell previous to the last several possible operations of the key-levers preceding the arrest of the carriage and locking of the universal bar, as aforesaid, no matter what may be the position of the marginal stop. The bell G is mounted in a usual position at
 120 the rear of the machine, and the hammer m is carried upon the end of a radial arm extended from the hub m^2 , which is mounted for a rocking movement upon the stud m^3 , there being projected from the hub angu-
 125 larly the trip arm or lug m^4 and opposite thereto the weight m^5 .

Adjustably secured upon the marginal stop-block i is the horizontal longitudinally-slotted bar n , with the depending lug or ex-
 130 tension n^2 , in the path of travel of which is the aforesaid trip-arm m^4 of the striker. The slotted bar n is set within a recess i^8 therefor in the back of the block i , all so that as the

position of the marginal stop is changed the bar n may be correspondingly changed, whereby the tripping of the bell-hammer performed thereby may take place at the instant properly previous to the limitation of movement, as aforesaid, by the marginal stop.

In this machine the ribbon rolls or spools $H H$ are mounted on horizontal shafts H^2 , which extend horizontally from front to rear of the machine under the top of the frame, these rolls having endwise movements imparted thereto as the machine is operated, so that a crosswise feed is given to the ribbon, whereby the type will not successively strike upon the same place. The means for this crosswise movement of the ribbon-spools need not be herein described in detail, as it has already been described in various applications for patents and is well known to those skilled in the art. Upon the forward end of each ribbon-spool is a circular ratchet-wheel o . At the front of the machine, opposite a portion of each ribbon-spool which is toward the center of the machine from the axis, is a lever J , pivoted near the lower end, as seen at 35, upon vertical members of the side framing. Each lever has pivotally hung at its upper end a pivoted segment p , the arc edge of which is ratchet-toothed, as seen at 40, for engagement with the circularly - arranged ratchet-teeth on the head of the ribbon-spool. Each of the segments p has connected to a suitable point thereof off from its pivotal connection with the lever J one end of a link q , the other end of which is pivoted, as seen at 42, to a stationary lug or member of the framing. As the lever J is swung toward the head of the ribbon-roll, the segment is, by the link q , constrained to have a movement through about a quarter of a circle—for instance, going from the position seen in full lines, Fig. 8, to that seen in the dotted lines in said figure, or vice versa as the lever is reversely swung. Of course it is understood that with one of the segments in working engagement with the ratcheted head of the one spool (the other segmental pawl being thrown out) as the spool runs toward the pawl-carrying lever, and the lever being forced thereby approaches the vertical position, the pawl-carrying lever causes the ribbon-roll to be turned around the extent of quite a number of the ratchet-teeth.

Below the levers $J J$ and running horizontally and longitudinally of the machine is a rock-shaft 36, with the thumb-knob 37 at its end for convenience for imparting thereto its partial rotary movement. This rock-shaft has near each end a lever-arm s , one for engaging the arm t of the adjacent lever J . These arms $s s$ are not set exactly opposite each other, nor are the arms $t t$ of the levers $J J$, nor are said arms of the same pattern; but they vary, especially in arrangement, as seen by the comparison between the full lines and the dotted lines at the lower left-hand part of Fig. 2, all so that as the rock-shaft is

turned in one direction one of the levers J is caused to be swung to carry its ratcheted segment or pawl into engagement with the circular ratchet of the adjacent ribbon - spool and the other to be carried in the reverse direction and out of engagement, or vice versa. Therefore, on noting in the illustration of said parts in Fig. 2, it will be remembered that the dotted lines represent one pawl-carrier and the rock-shaft arm for operating it, while the full lines represent the set of corresponding parts at the other end of the machine. Now it will be seen that the position of the rock-shaft is such that the arm s (shown by full lines) is so freed from member t of pawl-carrier that the said carrier is, by its gravity action, permitted to swing to its working position, while the end of arm s^* is so positioned that its end prevents the inward swinging of the adjacent pawl-carrying lever, because the part of its member t^* near the pivot is in abutment against the end of the arm s^* . Now on turning the rock-shaft to the right both arms $s s^*$ move in unison, the one, s , forcing the pawl-carrying lever out of its working position by impinging against the arm t , while the arm s^* at the other end moves clear from the adjacent pawl-lever arm and allows the pawl-lever to move into its working position. The working position now assumed by the latter pawl-carrying lever is seen in the dotted lines in Fig. 8, as well, also, as the then relative position of the rock-shaft arm s^* . The movement of arm s^* from the position shown by dotted lines, Fig. 8, to that shown by full lines causes the impingement by said arm against the member to swing the pawl-carrying lever out from its position of working engagement. The rock-shaft is held in either position desired, and consequently, also, the lever t and pawls p , by reason of the application of the detent-spring 41 and shoulder 43. (See Fig. 9.) A peculiarity of the arrangement of the pawl-carrier members and rock-shaft arms is that the arm s has its initial impingement near the pivot of the pawl-carrying lever, the swinging of the latter proceeding as the arm moves away from said pivot, while, as regards the parts at the other end of the machine, the rock-shaft arm s^* has its initial impingement, Fig. 8, at the edge of arm t^* , near its outer end, the swinging of the pawl-carrying lever proceeding as the arm moves toward the pivot thereof. As the carriage-supports $A B$ have their fore-and-aft shifting movements, the centers of shifting movements of which are at $c c$, as aforementioned, the rails $A B$ and carriage do not move strictly in a horizontal and straight line; but their movement is in the course of an arc of comparatively large radius. In order, therefore, that the fore-and-aft shifting movement may be permitted without any bind at the connection between the carriage and the part E^2 , means are provided for such connection between the carriage and said part E^2 , which consist of the

block u , having the journal-studs u^2 , which are fitted in vertical and suitably-separated ear-pieces u^3 of the part E^2 . The block, which therefore is capable of a rotational movement, has transversely through it the socket u^4 , through which plays the closely-fitted dowel u^5 , which is extended rearwardly from the frame of the carriage proper. Therefore any departure which the dowel has in its fore- and-aft movement from the rectilinear line is accommodated by the slight swiveling movement of the apertured block u .

What has hereinbefore been referred to as the carriage proper in this design of construction consists of a longitudinally-arranged bar w , upon which the aforementioned wheels which run in the groove-way b are mounted. This bar has near each end upwardly-extended ear-lugs x , in which the rear round rods constituting the rear longitudinal member of the carriage or platen frame are mounted, so that the carriage-frame may be swung upwardly upon the carriage proper for exposing the type-written work, as usual in many machines. In order that the carriage as a whole, with all the paper-feeding devices thereon, may be moved longitudinally any distance desired, even while the carriage-frame is upwardly swung, as aforesaid, I provide upon the carriage-frame a peculiarly formed and arranged lever, which operates the shifting-bar l for the escapement. This bar is seen in Fig. 1 and has diagonally-arranged slots 60 at different portions along its length, only one thereof being shown in this view, because a portion of the length of the bar is understood as broken away. This bar is set in recesses therefor at the back of the carriage proper, so that it may move longitudinally and also rearwardly, its position being just above and parallel with the ratcheted escapement-bar k on the carriage. It will be here mentioned that the form of the escapement-pawl employed in this machine is substantially that used in the well-known Densmore type-writing machine and which was described in Letters Patent of the United States granted to me May 17, 1892, No. 475,057, the operating-pawls 68 of which are mounted for a bodily-swinging movement rearwardly away from the ratcheted bar k . Therefore as the said bar l is moved endwise it has also a transverse movement as insured by the stationary studs 52 of the carriage, exerting a cam action of the said diagonal slots 60. This bar l has an arm 61, horizontally extended right-angulantly to its length forward into proximity and just outside of one end of the rod 62, which forms the rear member of the carriage-frame, and which constitutes the fulcrum bearing or connection thereof on the carriage proper. Upon the carriage-frame is intermediately pivoted the horizontal lever 63 for a swinging movement in a horizontal plane. The rear end of this lever is curved or coiled around, as indicated at 64, this curved part being described, substan-

tially, about a center which is coincident with the said fulcrum-rod 62 of the carriage-frame, and it lies next to the extremity of the aforesaid arm 61 of the escapement shift-bar l . This lever has at its forward end the up-turned finger-lug 65, opposite which on the carriage-frame is the abutment extension 66, against which a thumb may rest while the forefinger bears upon the said finger-lug to force it toward the said extension. It will be manifest that no matter whether the carriage-frame is swung upwardly or not the aforesaid end of the lever curved about the line of the fulcrum will never be moved out of position of engagement for forcing the shift-bar endwise.

The ribbon is supported between the two ribbon-rolls by the horizontal plates y , which are secured on the top ring of the frame by screws and which have their inner edges at suitable distances to each side of the center of the ring up to which the type-bars come. An upset horizontal transverse tongue y^2 , with which each plate is provided, overlies the ribbon and assists in preventing any displacement thereof. This tongue is of such length as to permit the required transverse movement of the ribbon as insured by the axial movement of the spools. The tongues of the ribbon-supporting plates may be struck up from the plates themselves, or they may be separately formed and riveted or otherwise attached to the plates.

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

1. In a type-writing machine, the combination with a shifting support on which the carriage runs, having the lever-arm B^3 , of the angle-lever, f , pivotally mounted and having one arm in engagement with said lever-arm, the handle-lever, h , pivotally mounted, and having the eccentric-boss, and the link, g , having one end pivotally connected to an arm of the angular lever and its other end in engagement with said eccentric-boss, substantially as and for the purpose set forth.

2. In a type-writing machine, the combination with the shiftable support for the carriage having the lever-arm, B , of the key-lever, e , the link, d , connected thereto and to the said lever-arm, the angle-lever, f , pivotally mounted and having one arm in contact with said lever-arm, the handle-lever, h , pivotally mounted and having the eccentric-boss and the link, g , having one end pivotally connected to an arm of the angular lever, and its other end in engagement with said eccentric-boss, substantially as and for the purposes set forth.

3. In a type-writing machine, the combination with the universal bar and the locking-lever, j , of the carriage and the marginal stop-block adapted for confinement adjustably along the length of the carriage and having the part to contact with said lever, the bell and striker and a part for tripping the

striker which is adjustable upon the adjustable stop-block, substantially as described.

4. In a type-writing machine, the combination with the universal bar, the locking-lever, 5 *j*, the carriage and the marginal stop-block adjustable along the carriage, and having the recess, *i*⁸, of the bell, *G*, and pivoted striker therefor having the trip-arm, *m*⁴, the longitudinally-slotted bar, *n*, set in said recess and 10 having the depending extension, *n*², and the set-screw for holding the slotted bar adjustably on the said stop-block, substantially as shown.

5. In a type-writing machine, in combination, the carriage proper and a part to the 15 rear thereof which is movable longitudinally in unison therewith, and with relation to which the carriage has a fore-and-aft shifting movement, and means for permitting such 20 latter movement between said parts without binding which consists of a block mounted for a rotational movement about a longitudinal axis on one of said parts, and having a transverse socket, and a stud or dowel transversely extended from the other of said parts 25 and having an engagement for lengthwise play through the transverse socket of said swiveling block, substantially as described.

6. In a type-writing machine, the combination with the carriage-frame having the rear- 30 wardly-extended dowel, of the part, *E*², to the rear of the carriage having the escapement-

rack and having the two earpieces, the block having the transversely-bored hole there- 35 through, for the engagement therein of said dowel and having the journals mounted for rotational movement in the said earpieces, substantially as and for the purposes set forth.

7. In a type-writing machine, the combination with the carriage having the carriage- 40 frame fulcrumed to be swung thereon, and the escapement shift-bar mounted on the carriage having an arm extended into proximity to the fulcrum, and a lever-arm pivoted on the carriage-frame and having an arm ex- 45 tended into proximity to the shift-bar arm, and one of said arms having its extremity turned about a line coincident with the fulcrum, between the carriage and carriage-frame, substantially as and for the purpose 50 set forth.

8. In a type-writing machine the combination with the ribbon-spools, pawls, and pawl- 55 carrying levers, *J*, and the rock-shaft having the arms for engaging members of the pawl-carrying lever substantially as described, and having the shoulder 43, and the spring having a detent engagement with said shoulder, substantially as described.

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Witnesses:

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M. J. MANNING.