

No. 606,743.

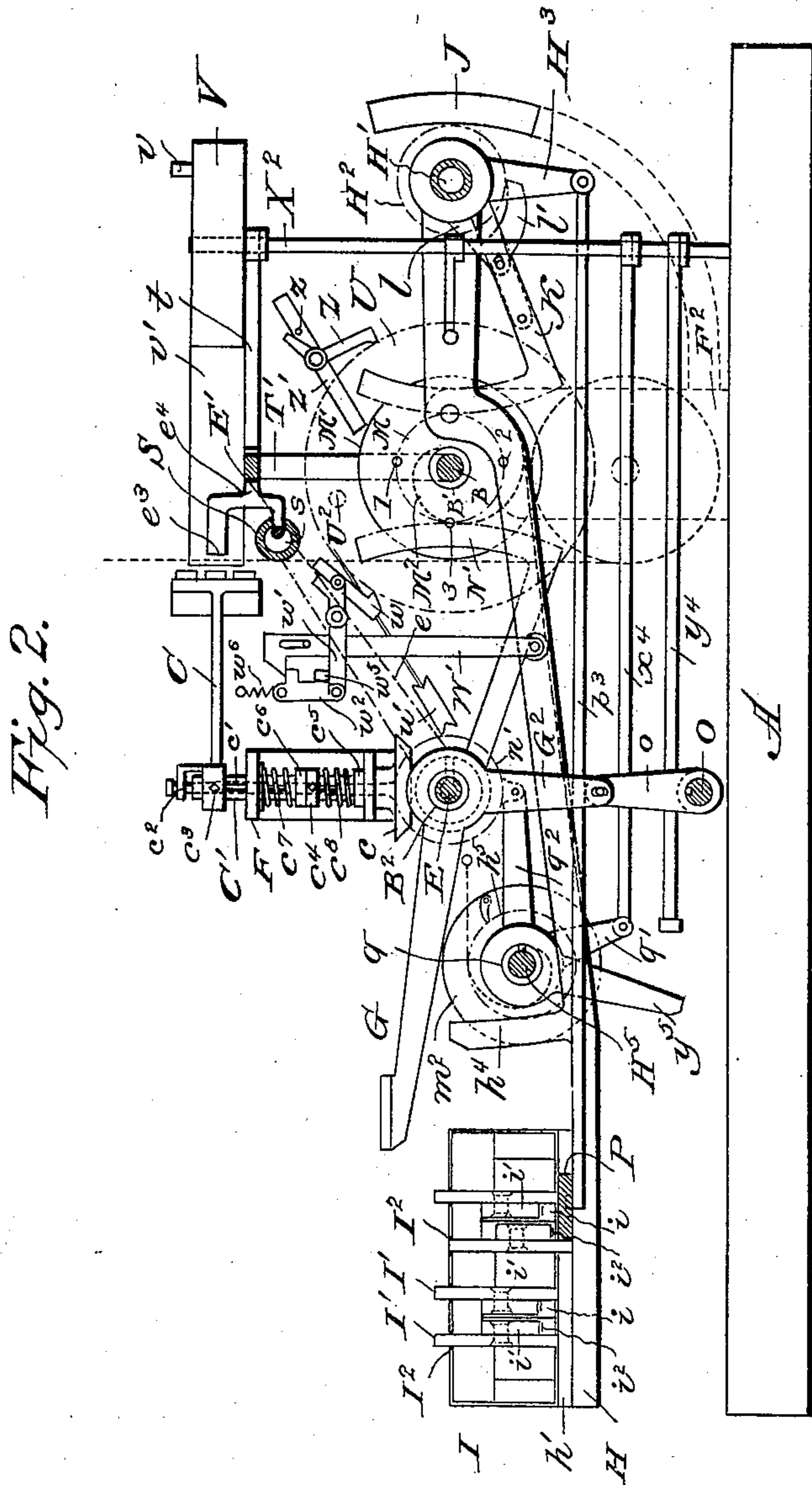
Patented July 5, 1898.

F. G. STALLMAN.
TYPE WRITING MACHINE.

(Application filed Mar. 27, 1897.)

(No Model.)

5 Sheets—Sheet 2.



Witnesses:
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Fig. 4.

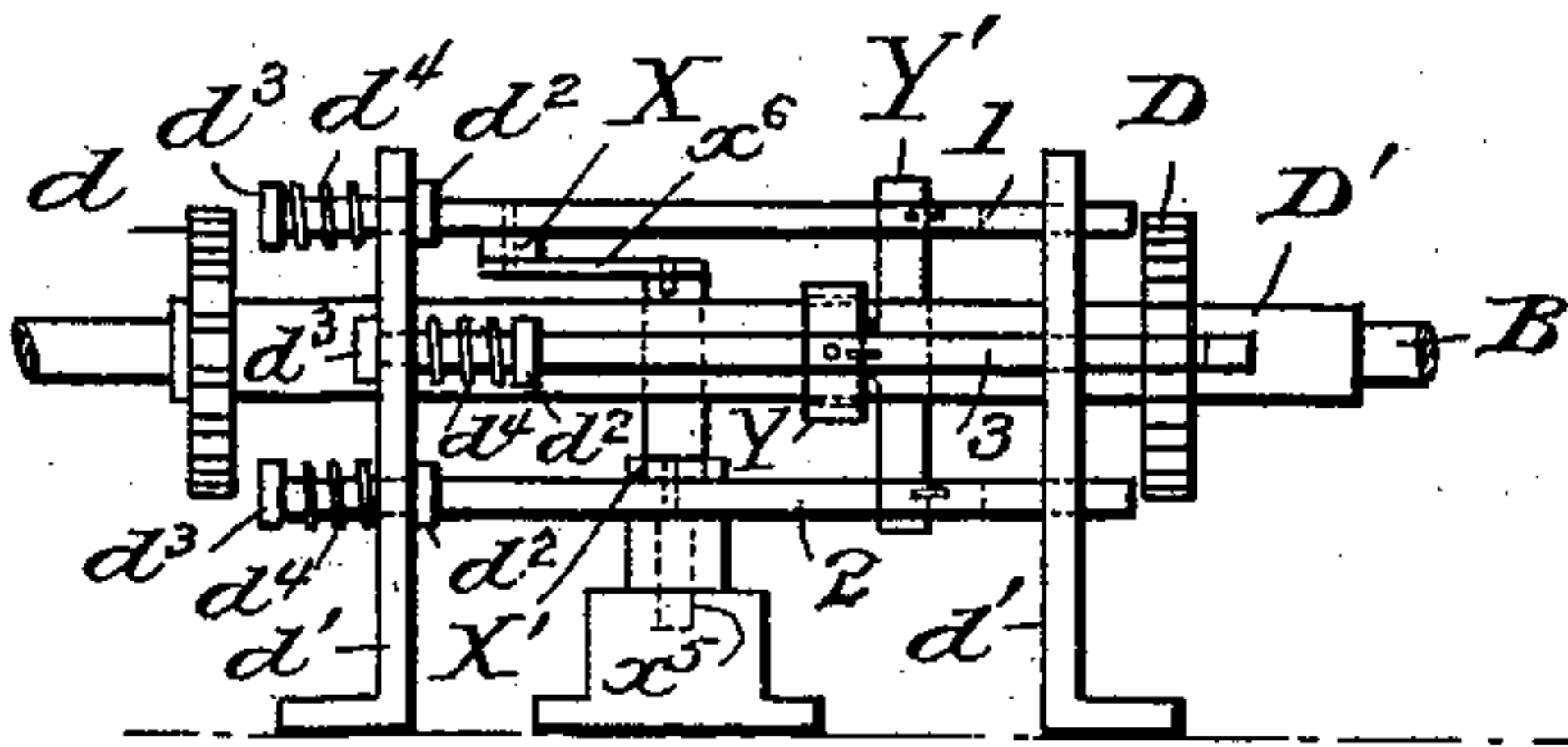


Fig. 5.

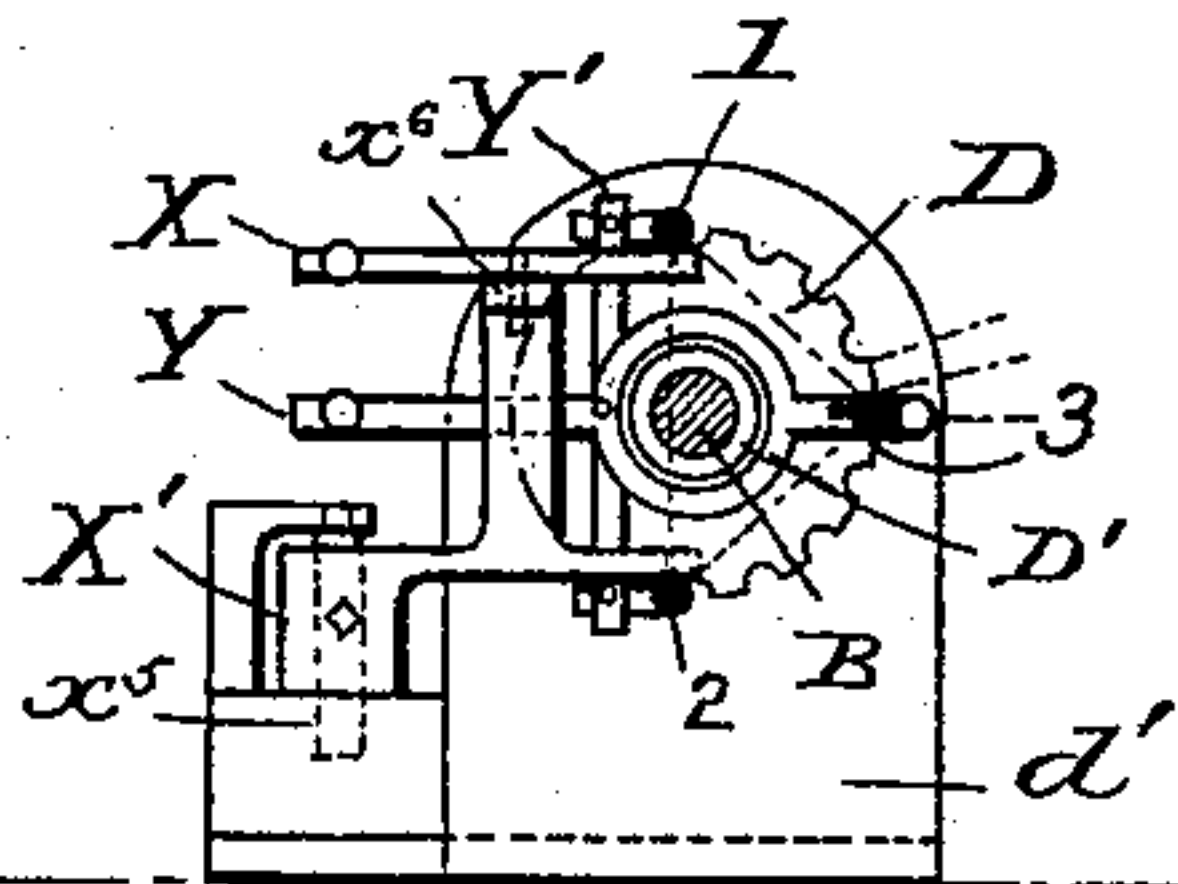


Fig. 3.

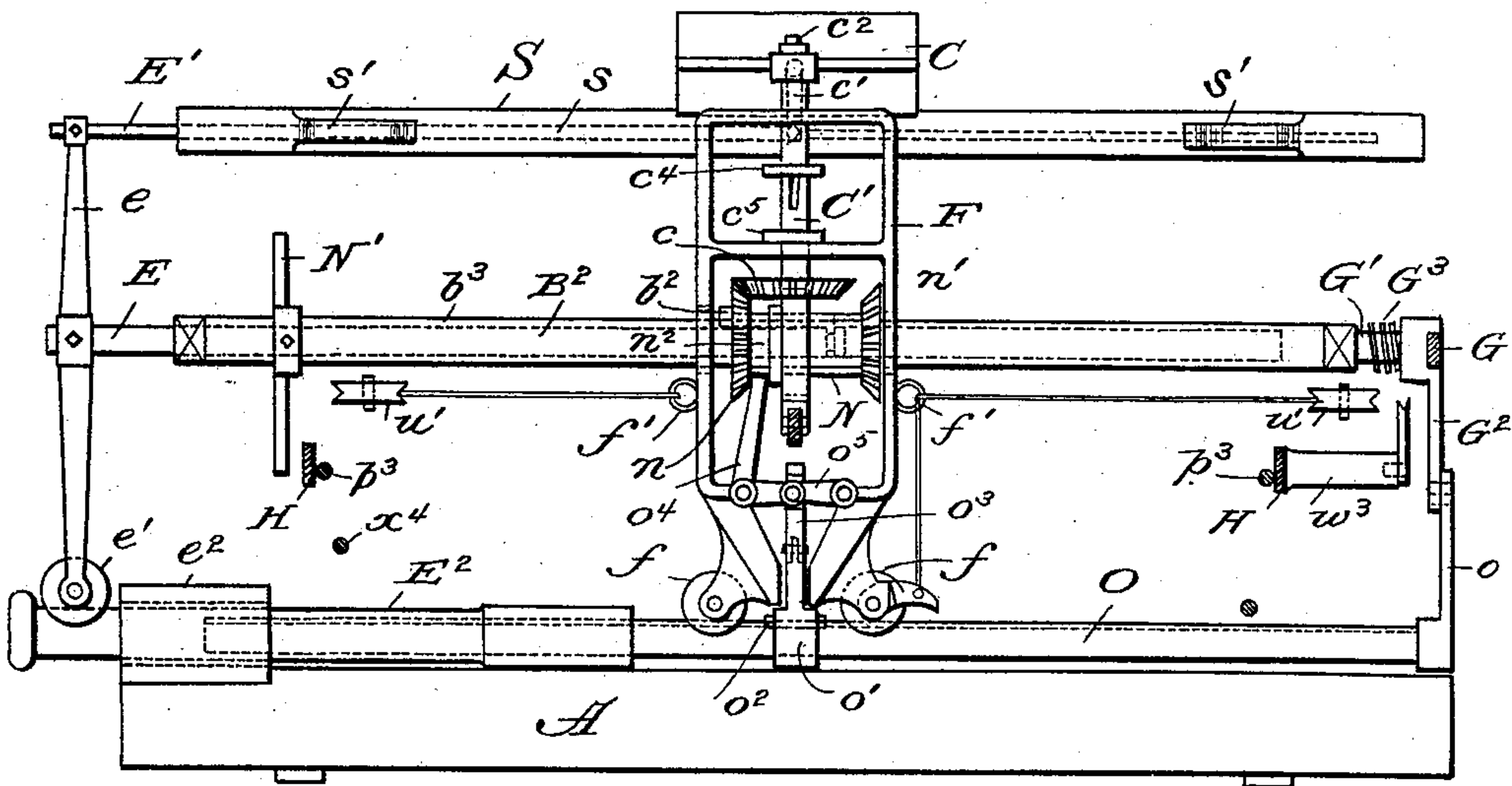


Fig. 6.

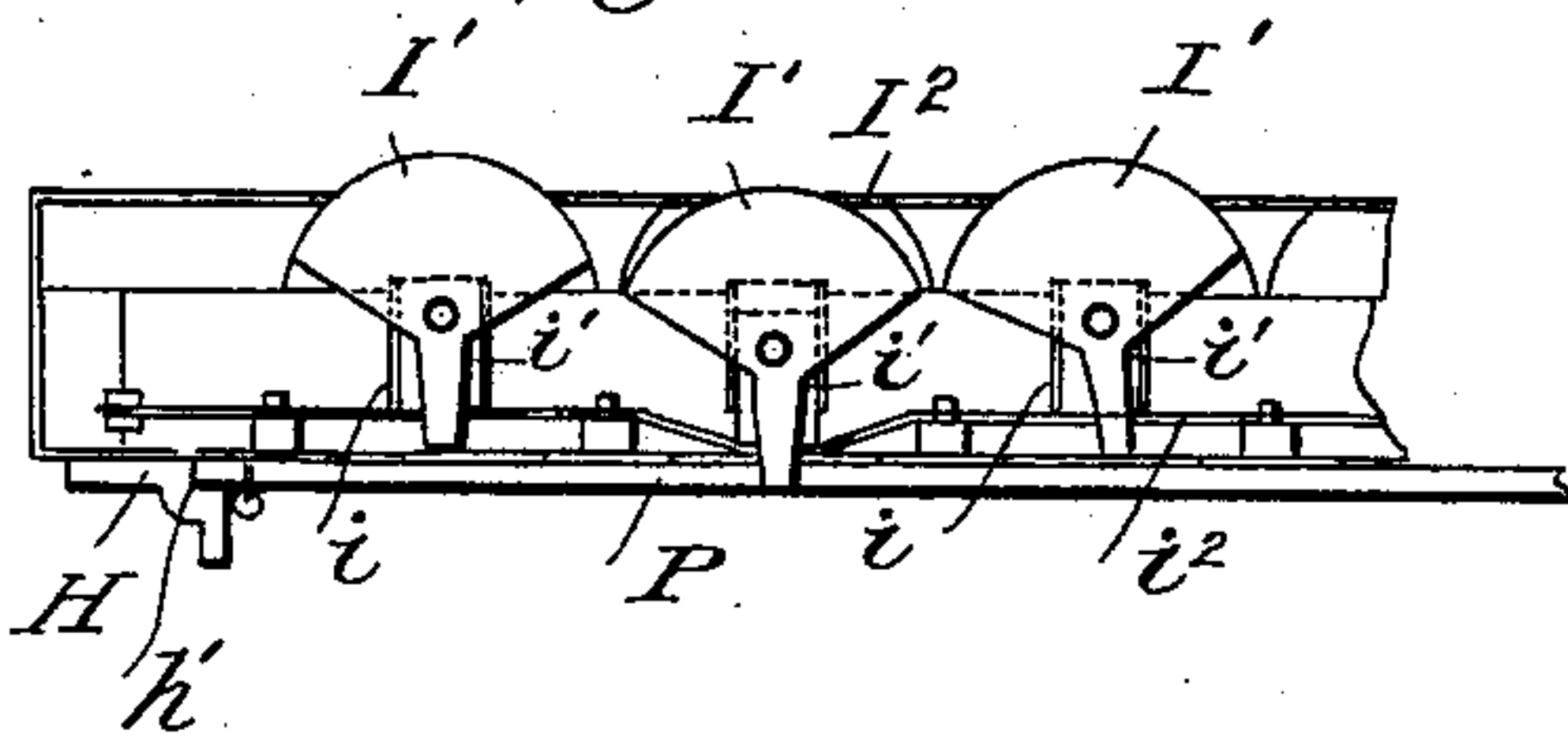
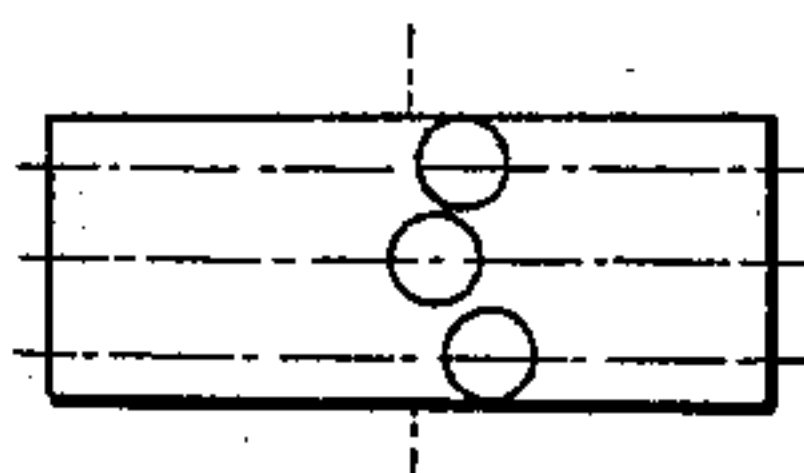


Fig. 7.



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5 Sheets—Sheet 4.

Fig. 8.

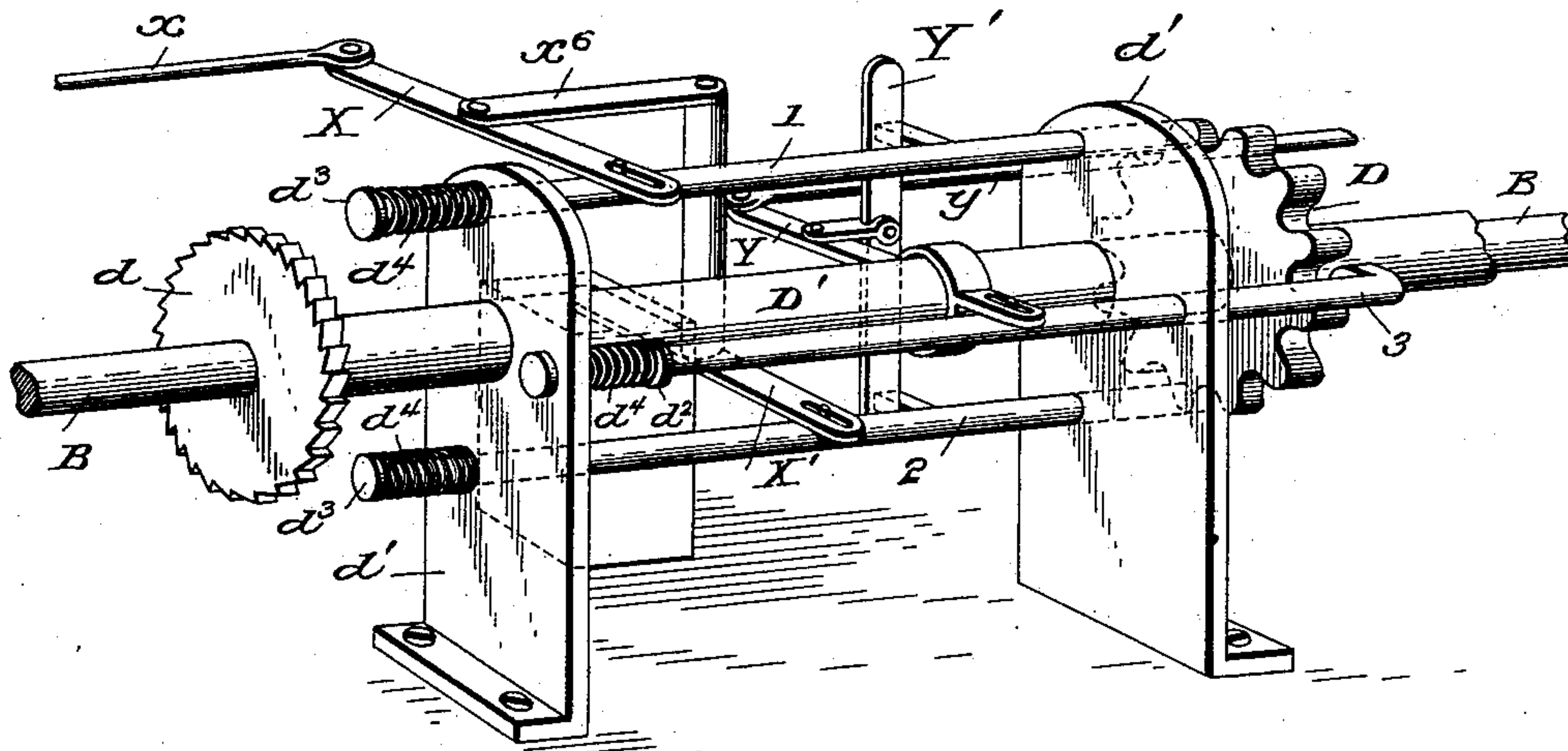
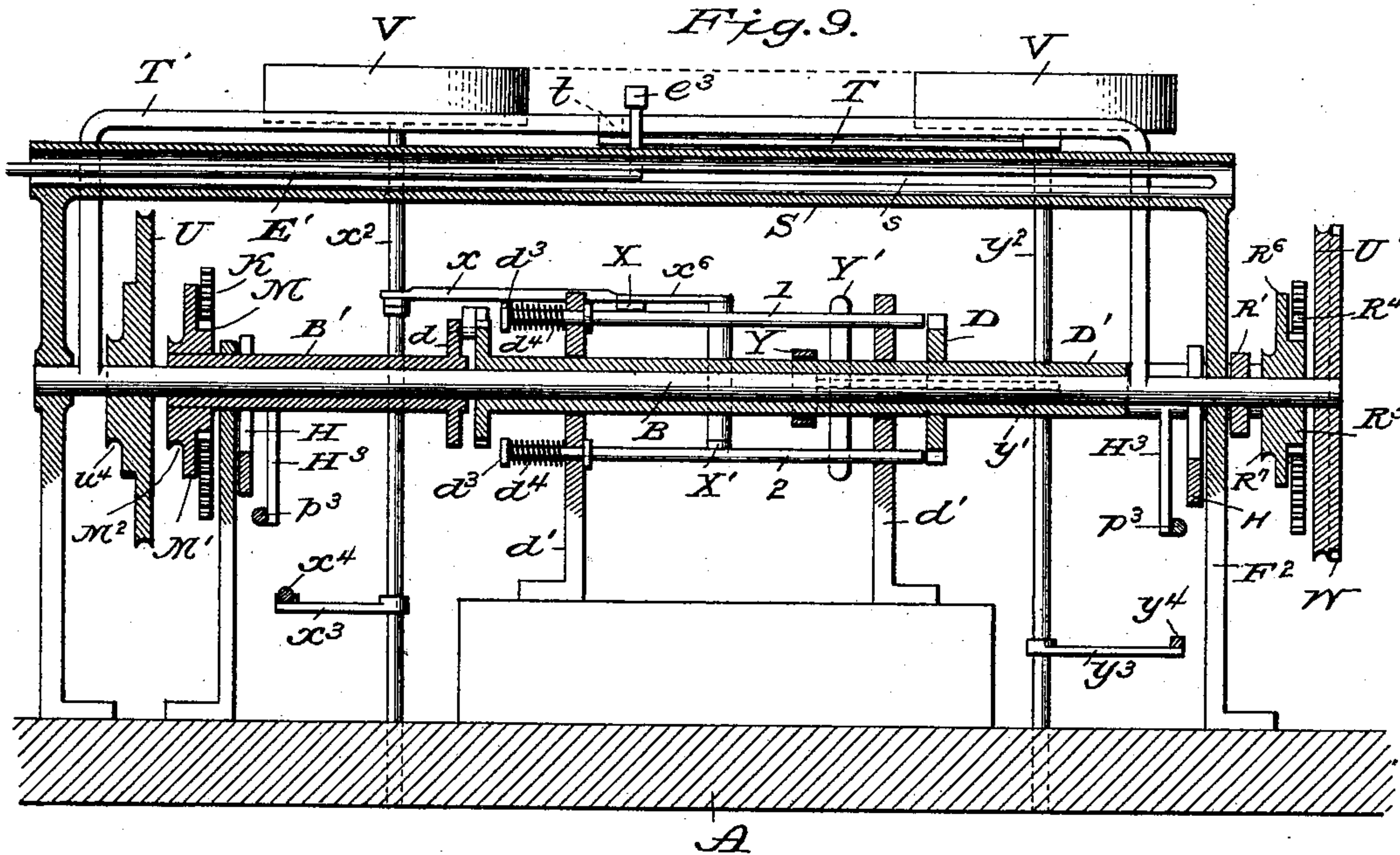


Fig. 9.



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Fig. 10.

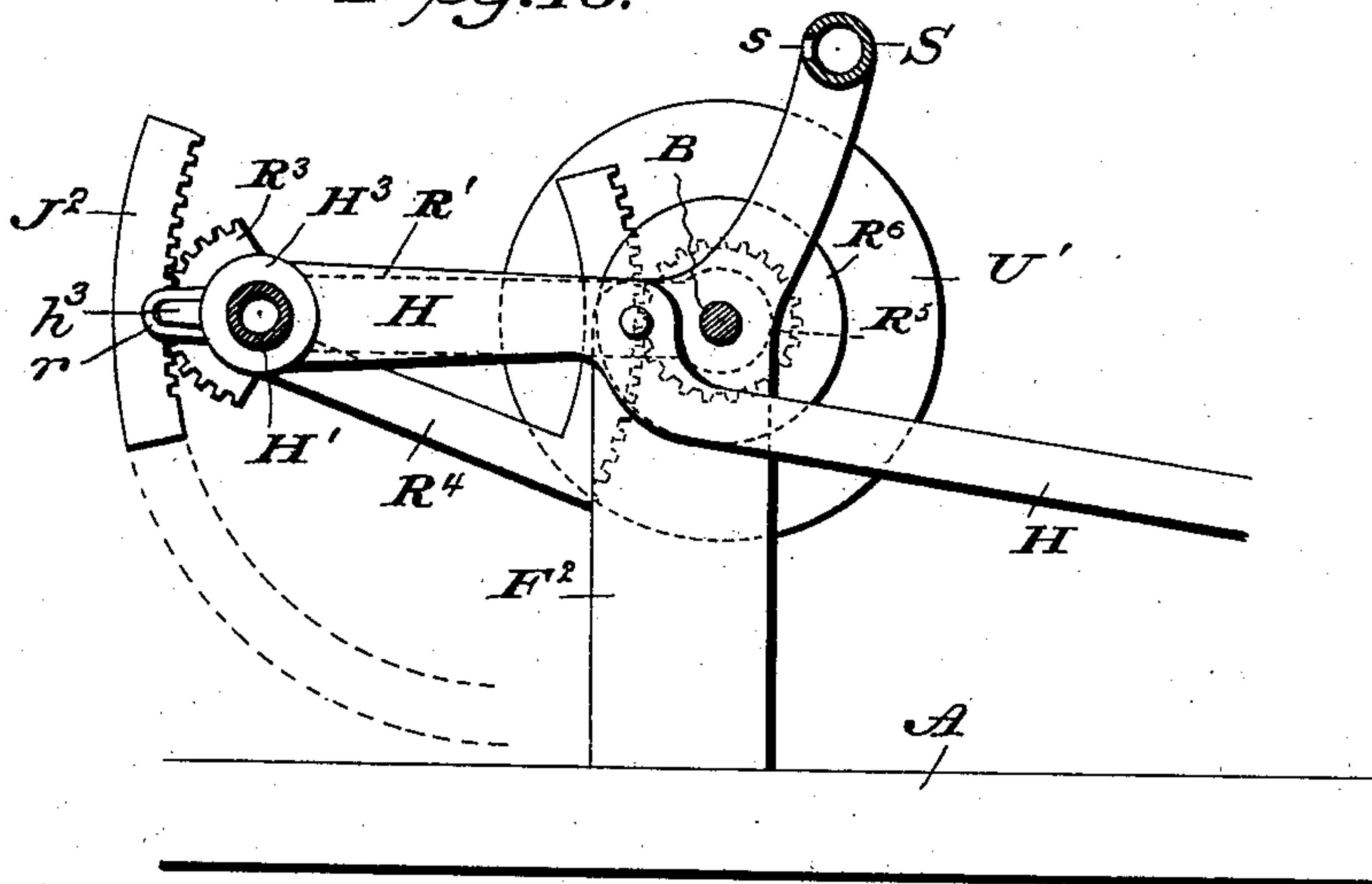
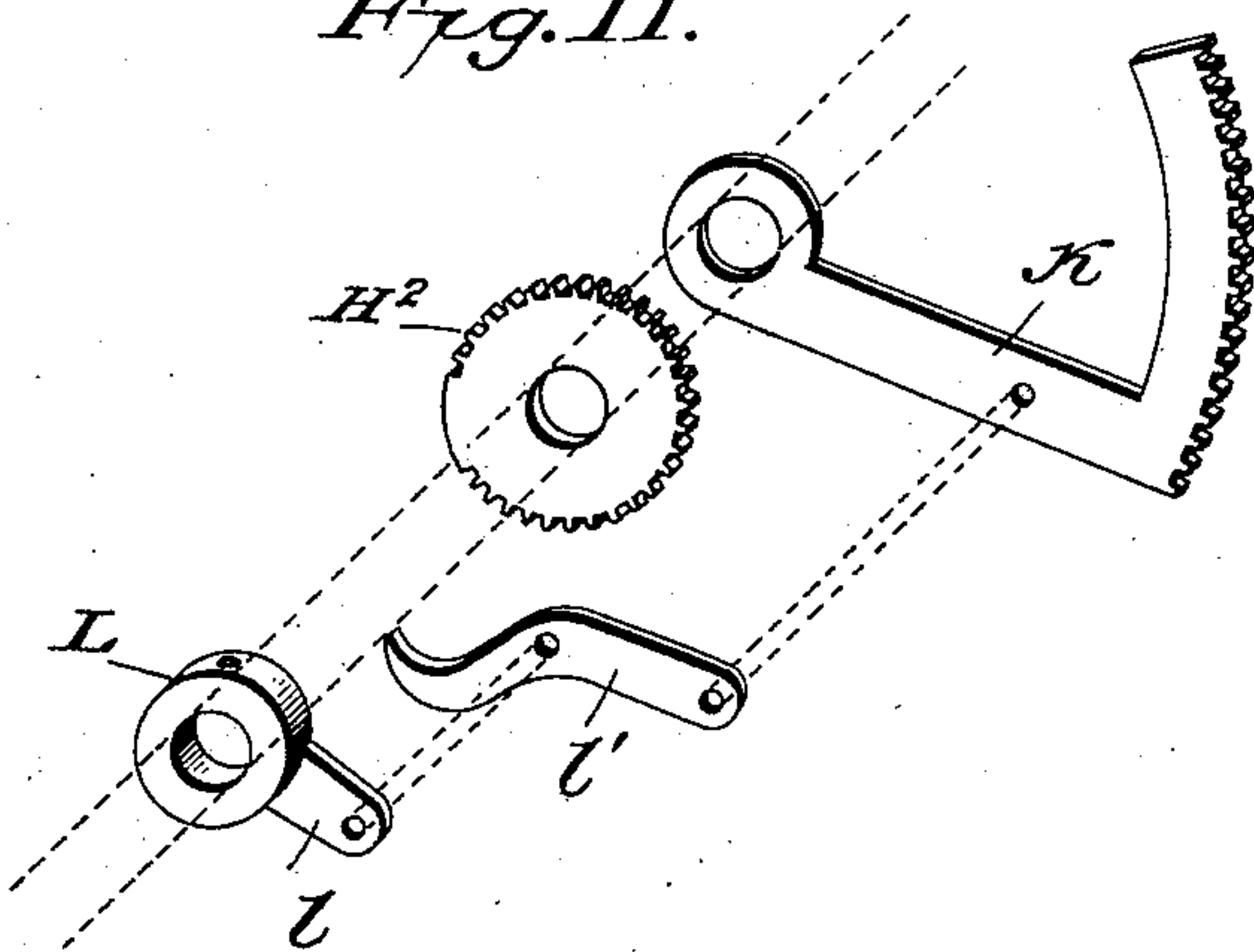


Fig. 11.



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UNITED STATES PATENT OFFICE.

FERDINAND G. STALLMAN, OF PHILADELPHIA, PENNSYLVANIA.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 606,743, dated July 5, 1898.

Application filed March 27, 1897. Serial No. 629,606. (No model.)

To all whom it may concern:

Be it known that I, FERDINAND G. STALLMAN, a citizen of the United States of America, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Type-Writing Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to a type-writing machine having a keyboard-lever with a series of stops or keys mounted or girdered thereon as a substitute for independent key-levers in type-writing machines of the usual construction, so that the depression of a key carries with it the keyboard and controls the movement of a type-segment to bring the segment into position with respect to the key actuated for printing and to effect an impression therefrom; and in such connection the invention relates particularly to the general construction and arrangement of the parts of such a machine.

The principal objects of my invention are, first, to provide an efficient, reliable, and comparatively inexpensive type-writing machine adapted to meet the requirements and perform the functions of a first-class type-writer; second, to provide a keyboard-lever with a series of keys closely arranged in rows throughout the breadth of the keyboard, so that the pressure in writing will be applied within a small space to maintain a simple and equal leverage, thereby permitting of an equal movement throughout the breadth of the keyboard-lever, the said lever being adapted to be guided to permit of equal movement throughout the length thereof; third, to provide a keyboard-lever and type-segment with a resisting force and in imparting certain movements to the type-segment with means controlled through the keyboard and certain levers for regulating the said movements and resisting force, so as to maintain an equal tension for each stroke and of any part or of each key with the keyboard

throughout its entire depression; fourth, to provide a keyboard-lever and type-segment with its mechanism so arranged and constructed of light material, the type-segment having the characters most in use so grouped and arranged as to permit of easy movement of the said keyboard-lever still maintaining simple movements of the said segment; fifth, to simplify the construction of such a machine, including the keyboard, and to arrange the stops or keys so that the position of their lower extremities or depending stems may be changed in order to accurately adjust the type-segment to the end that the type may be brought into the exact position to effect a sharp and distinct impression therefrom upon the paper; sixth, to provide means for printing and spacing a letter or character laterally and in alinement at each single successive stroke of the keyboard; seventh, to provide the upper surface of the keyboard with a lettered sheet, over which is secured a transparent covering to preserve cleanliness, both being perforated to fit over the keys; and eighth, to generally improve and simplify the construction, arrangement, and operation of a type-writing machine.

It may be stated for the sake of convenience that the machine is divided into five classes—viz., first, the keyboard-lever and its tension mechanism; second, the type-segment and its shafts; third, the reversing mechanism; fourth, the carriage-feed-gear mechanism; fifth, the disk or checking-wheel and controlling mechanism.

My invention consists of a type-writing machine provided with a keyboard-lever supporting a transverse shaft, said keyboard consisting of a casing with girders and carrying a series of adjustable keys, with depending stems supported in guides upon said girders and arranged closely in rows, and keys projecting through the slots at top and bottom, the said shaft having a changeable quadrant-lever provided with a spring acting upon its front or tooth end through a cam pinion-wheel, cord, and ratchet grooved disk, the said pinion-wheel acting as a driver for a type-segment, and said quadrant-lever is provided with another spring acting upon its extreme rear end or swinging point along the shaft through the lug-finger, quadrant, cam pinion-wheel,

cord, and ratchet grooved disk. The said quadrant-lever is connected by a pawl through a pinion upon the shaft to a stationary rack and is also connected by the same
 5 pawl through the pinion and shaft, its arms, and rods to a slanted-edge sliding plate in three sections beneath the said keyboard and said keyboard-lever connected to a guiding-gear.

10 My invention further consists of a type-writing machine provided with a type-segment and its shafts, said segment mounted upon a frame and actuated by and connected to the keyboard-lever by slotted shafts and tooth
 15 members having an equalized lateral and rotary movement and a movement at right angles to said rotary movement (I prefer this to be known as the "shift" movement in the case) which is connected to and governed au-
 20 tomatically by checking mechanism, and the face of said segment being curved and having characters fixed thereon, capitals on one side throughout the breadth, small letters,
 25 &c., on the other side throughout the breadth and arranged in a series of rows, an inner and two outer rows, respectively, and said characters deviating throughout the breadth
 30 of face, so that each outer character will follow an inner, one after the other, and the said rotary movement and shift movement are controlled through the keyboard and change-
 35 able swing and check levers, and the segment having a connection to independent helical springs for relieving the weight of same, so that arm q^2 will slide freely and return to
 normal position, one of the springs holding the segment against a fixed point on its shaft and traveling therewith.

40 My invention further consists of a type-writing machine provided with a reversing mechanism consisting of a pair of bevel-tooth members secured to the ends of a grooved
 45 sleeve adapted to be rotated by the keyboard-lever and governed by and connected to an independent key-lever on the side of the machine by means of a slotted shaft and a
 50 toggle mechanism so arranged as to shift the tooth members in either direction horizontally independent of that of the type-segment, thereby causing either member to be engaged
 55 to the type-segment pinion and locked in place, according as to whether a capital or small letter is to be printed, and the said mechanism adapted to move step by step with the
 type-segment across the machine.

60 My invention further consists of a type-writing machine provided with a carriage-feed-gear mechanism consisting of a laterally-movable frame supporting a type-segment
 65 and mounted by a roller on a shaft and actuated by the keyboard-lever, said carriage connected to transverse telescopic extension-shafts, one within the other, and forming a
 U-shape slide adapted to straddle the paper, said slide having a type-hammer guided by a
 transverse support or bar, said paper held in place by means of springs against such a sup-

port, and said slide having an extension arm and roller and supported upon a telescopic extension-tube adapted to be drawn out manu- 70
 ally to fit within a socket.

My invention further consists in providing a carriage with the means for moving it across the machine, consisting of a spring connec- 75
 tion on one side of the machine from the frame of carriage by a cord through a pulley and cam sheave and ratchet grooved disk adapted to equalize the tension of the spring, and a rack-tooth connection on the other side 80
 from said frame, and the said teeth adapted to be acted upon by a keyboard-lever for moving the carriage step by step through the
 intervention of a double pawl-feed lever having a lug for each pawl for controlling the step-
 by-step movement and by a sliding bar and 85
 auxiliary pawl-lever and the handle or projection traveling with the rack-teeth adapted to control the release of the carriage, and thereby return it to its normal position.

90 My invention further consists of a type-writing machine provided with a checking or controlling mechanism consisting of a per-
 forated disk mounted on a shaft and having holes or openings parallel to its axis all around the circumference and rotated by and 95
 connected to the keyboard-lever mechanism by means of a pawl and ratchet-wheel, and also connected to the type-segment and checked by its same means and at the same
 time, and having rods, three in number—viz., 100
 upper, lower, and side rods—said rods guided in supports and having springs to return them to their normal position, and said rods hav-
 ing a sliding movement adapted to be gov- 105
 erned by said disk and to penetrate the same independent of one another in such a man-
 110 ner that when two are checked the other is brought into play. Said rods are connected on one side of the machine to the type-segment through a lever, bell-crank, rods, and
 a slotted shaft having a sliding extension-arm and connected on the other side of the ma-
 115 chine to the keyboard-lever by changeable swing and check levers, bell-crank rod, and guiding gear-shaft having an arm, and the
 said connections adapted to shift and control the type-segment in a direction at right
 angles to the plane of its rotary movement, and the latter bell-crank having an extension-
 arm and rod adapted to strike the hammer 120
 against the type through the intervention of a rectangular swinging frame or rock-shaft.

My invention further consists of a type-writing machine provided with ribbon-rolls suitably supported upon bed-plate and hav- 125
 ing an inking-ribbon adapted to be held by pins in way of the full length of a line of printing and adapted to be struck by the ham-
 mer to create an impression upon the paper, and said rolls may be actuated manually 130
 after a line of printing has been completed.

In the accompanying drawings, Figure 1 is a plan view of a type-writing machine constructed in accordance with my invention.

Fig. 2 is a side elevation in section, looking to the left and showing the driving mechanism. Fig. 3 is a transverse front elevation showing the carriage and reversing mechanism. Fig. 4 is a front elevation of controlling or shift mechanism. Fig. 5 is an internal side elevation or section looking to the right of said disk or shift mechanism. Fig. 6 is a detail sectional view longitudinally through a portion of the keyboard, and Fig. 7 is a view showing the arrangement of the character on the type-segment. Fig. 8 is a perspective view of the checking mechanism and parts connected therewith. Fig. 9 is a sectional view taken through the line 9 9 of Fig. 2, looking toward the rear of the machine. Fig. 10 is a sectional view on the line 10 10 of Fig. 1, looking in the direction of the arrow. Fig. 11 is a view of one of the segment-racks at the rear of the machine, showing the parts which operate in connection therewith.

A designates the bed-plate of the machine, which carries the operating mechanism in any suitable manner, so that the parts will be maintained in the positions shown in Figs. 1, 2, and 3 of the drawings.

H H designate the side members of the main keyboard-levers, which are fulcrumed or pivoted to the upper part of the supports F^2 at a point where the pitch-circle of pinion coincides with quadrant-lever, so as to allow the keyboard-lever to pursue its downward movement after the driving-pinion has been checked, making this intersection the swinging point or pivot of the quadrant-lever, as hereinafter described, said pivot-point being on a line with the main driving-shaft B' , said members H being curved to pass beneath the main driving-shaft, as shown in Fig. 2, and to the forward ends of these members or levers H is secured the keyboard I, consisting of two parts, the upper part being provided on its upper surface with a series of transverse slots or grooves I^2 , in which the finger-keys I' are located, said keys being pivoted to short guide-pieces i' , of hard rubber, which are let into shallow recesses i in the keyboard and rest upon rubber strips or bands i^2 , adapted to return the keys to their normal position after being depressed. The upper part of the finger-keys I' are semicircular and extend partially through the slots I^2 in the upper part of the keyboard, while their lower ends depend into recesses in the lower part of the keyboard, so that when a key is depressed it will extend below the keyboard and form a stop to arrest the sliding movement of a plate hereinafter referred to. By forming the upper part of the finger-keys semicircular the position of the lower ends thereof can be changed without changing the contour of the upper end or presenting a different touch-surface. The keys are held to the rubber guide-pieces i' by frictional contact therewith, so that the position of the lower ends of said keys can be readily changed.

As the position of the lower extremities of

the keys are changed in relation to the slanted edge of a plate P it will effect or adjust the extent of its movement in such a manner that when its position is changed to come opposite a lower or higher point of contact along the edge the extent of the movement of said plate will be greater or less accordingly, and therefore if the plate P is thus effected and being properly connected to the type-segment it will regulate the printing position of the type.

The plate P, hereinbefore referred to, has a rear straight edge, and the front edge is beveled to provide three inclined faces or edges p , p' , and p^2 , as shown by dotted lines on Fig. 1, the inclinations being of the same angle, but deviating throughout the breadth of the plate to divide the keys of the keyboard in three sections, which correspond to the respective edges or faces which form the points of contact, or checking-points, of the plate P with the keys. Each outer point of contact will follow an inner point of contact of the same relation, one after the other, so that if a key of the inner section is depressed with the keyboard it engages the edge of the plate P, arrests the same and the checking-wheel or controlling mechanism, so that the slide-rod 3, which will penetrate the checking-wheel, will effect the spring but not the type-segment. Should a key of the outer section to the left be operated, it will check or hold the checking-wheel in such a position as to allow the upper rod 1 to penetrate it, and thereby shift the type-segment in one direction, and the operation of any key of the outer section to the right will operate the lower rod 2 the same way. Therefore each edge of the plate has a rod to correspond. The pitch of the different points of contact or checking-points of the plate and disk in the direction of their movement is in proportion or corresponds with the pitch of the characters on the type-segment in the direction of its rotary movement.

Upon the upper side of the keyboard is placed a sheet of paper or other material having printed thereon the characters corresponding with the type-segment, and over said sheet is placed a transparent sheet, as celluloid, to preserve cleanliness.

The rear ends of the side levers H of the main keyboard-lever are provided with bearings for a transverse shaft H' , having a pinion H^2 loosely mounted thereon and in mesh with a segment-rack J, rigidly secured to the bed-plate A, and upon the shaft to one side of the pinion H^2 is loosely mounted a quadrant-lever K, while upon the other side of said pinion the shaft carries rigidly connected thereto a collar L, having a forwardly-projecting arm l , to which is pivoted a pawl l' , adapted to engage the pinion H^2 . The pawl is provided with a projecting end, which is connected to the quadrant-lever, so that when the quadrant is in engagement with the pinion and the pinion is turned by the segment-rack the said

quadrant-lever will be turned therewith. The front end of the quadrant-lever is provided with teeth which mesh with the pinion M, mounted upon a transverse driving-shaft having a pawl-arm, said pinion M being rigidly secured to a disk or wheel M', having an involute or cam M², together forming a cam pinion-wheel, to which a cord or flexible connection *m* is attached, which extends to a grooved disk *m*², having a ratchet on one side and a spring *m*' on the other side.

By connecting the helical spring to the involute or cam a uniform tension upon the pinion M is maintained, and as said pinion is in mesh with the quadrant-lever K and the quadrant-lever is connected to the pinion on the shaft of the main keyboard-lever II by the pawl *l'* the tension of the spring will be conveyed by the said lever II and maintained until such connection is broken by the sliding plate P contacting with key of keyboard-lever, after which a supplemental tension or equalizing device, hereinafter described, will come into play.

N designates a toothed sleeve, either one of the toothed members *n* and *n'* being adapted to be brought in mesh with a pinion *c*, secured to the shaft C', which carries the type-segment C, and the toothed sleeve N is provided with a groove *n*² for the reception of a bell-crank arm *o*⁴, acting as a guide, which is supported on a frame F, said toothed sleeve having a feather *b*² to fit in the slot *b*³ of the shaft B², the sleeve being adapted to slide thereon. The shaft B² has a segment-rack N', the teeth of which mesh with the driving-pinion M, so that when the quadrant-lever is rotated the toothed sleeve will turn the beveled pinion *c* against or with the sun, according as to which toothed member *n* or *n'* is in mesh therewith, and as the pinion *c* is secured to the type-segment shaft C' the type-segment will be rotated. The toothed member to the left of the sleeve is normally in engagement with the pinion *c*, and when the said pinion is turned thereby the type-segment is turned to bring the small letters and figures into printing position. When the toothed member to the right is thrown in mesh with the pinion, the capitals and punctuation-marks are brought into printing position. The position of the toothed sleeve N is changed by means of a key-lever G, which swings on a stationary stub-shaft G' at the side of the machine, the same having a depending arm G² and a spring G³ to keep it in its normal position. The arm G² is connected to an arm *o* on the end of a slotted reversing-shaft O, said shaft having a short arm *o*' with a feather *o*², which is adapted to slide thereon. To the short arm is connected a link *o*³, the arm and link forming a toggle. To a bell-crank lever *o*⁴ is connected a link *o*⁵, engaging with a keyway or longitudinal recess in the lever *o*³, such connection forming another toggle. The two toggles are so connected that when one is on dead-center, as shown in Fig. 3, hold-

ing the left-hand toothed member *n* in a normal position the other, *n'*, is off the center, and vice versa, according as to whether a small or large letter is to be printed. The crank-lever *o*⁴ and link *o*⁵ have their bearings upon the frame F, which is open at the bottom to straddle the short arm and to act as a spring for the crank-lever toggle as a resisting force for the said toggle and sleeve, the spring of the key-lever acting as the resisting force for the other toggle.

The shaft C' is provided with a longitudinal recess *c*', and within the shaft is a connecting-rod *c*², secured at one end through the keyway of the hub of the type-segment by a pin *c*³ and near the middle through the keyway to a loose collar *c*⁴, which encircles the shaft C'. The other end of the connecting-rod *c*² is formed into a ring to encircle the shaft B² in order to connect with an extension-arm *q*². The shaft C' has a collar *c*⁵ to support the same against the frame F, and it has another collar *c*⁶ fixed thereon which is adapted to cause the type-segment C through the intervention of the shaft C' to receive an independent resistance of a helical spring *c*⁷ in one direction. A similar spring *c*⁸ supplies the resistance for the inner rod, and as the inner rod is connected to the type-segment it will shift the segment downward without moving the shaft C' and without acting upon the other spring, thereby permitting an independent spring action for each direction of movement.

When the keyboard is depressed, it will turn the type-segment through the intervention of the mechanism hereinbefore described, and in order to arrest the turning of said type-segment to bring the characters or type in printing position I employ in connection with the finger-keys I' a sliding diagonal or slanted edge-plate P with three deviating edges of the same angle, which plate moves back and forth beneath the keyboard, moving in grooves *h*', formed by the members II II in conjunction with the keyboard. To this sliding plate are connected rods *p*³ *p*², which extend rearward therefrom and are pivoted at their rear ends to depending arms II³, rigidly connected to the shaft II', carried by the main keyboard-levers. By this arrangement when one of the finger-keys is depressed and the keyboard is lowered by pressure thereon the pinion II² will be turned by engagement with the segment-rack J, and the quadrant K being connected to said pinion by a pawl *l'* will be turned thereby, this movement continuing until the sliding plate P is arrested by the depressed finger-key, when the rotation of the shaft II' will be stopped and the pawl thrown out of engagement with the pinion, thus changing the check and swing of the quadrant-lever K from one end to the other and checking the operation of the mechanism which turns the type-wheel and thereby leaving the type corresponding with the depressed key in a printing position.

The quadrant-lever is capable of a change-

able swinging and checking point operation at each of its extreme ends and is connected at each end to equalized springs, its rear end held in check to a rack J and connected thereto by a pawl through a pinion, its front end connected to the type-segment and an indicator or governor and adapted to rotate the same, and the quadrant-lever connected by the pawl through the pinion, arms, shaft, and rods to the slanted edged plate P, located beneath the keyboard, and a pawl adapted to maintain the connection by means of springs pulling against one another. The rack J is adapted to serve as the swinging-point of the rear end of the quadrant-lever K and the teeth of the quadrant-lever as the swinging-point of its front end. The changeable swing and check operation occurs when the plate P contacts with a key, disconnecting the pawl and affecting the quadrant-lever K in such a manner that when one end is checked thereby checking the type-segment, indicator, and the spring acting on its front end through the cam pinion-wheel M², cord m, and ratchet grooved disk m², and bringing into play the spring acting upon its rear end or swinging-point from the other side of the machine, the connection passing along the shaft through the finger, lug, quadrant, cam pinion-wheel, cord, and ratchet grooved disk to the helical spring, the cam on the pinion-wheel being adapted to equalize the tension of the spring, whereby the changeable equalized spring action will maintain equal resistance for each stroke of the keyboard-lever throughout its entire depression.

It will be noted that when the quadrant-lever K ceases to turn the pinion M the tension of the spring m', which acts on the front end of the quadrant-lever, is relieved, and in order to continue the same tension throughout the depression of the keyboard I provide a supplemental tension device consisting of a stub-shaft R, supported by an arm R', projecting from a collar R², loosely mounted on a rock-shaft at the right-hand side of the machine, and said arm is provided at its rear end with an apertured lug r, with which engages a finger h³, projecting from the arm H³, rigidly connected to the shaft H', forming a pivoting-point.

Upon the stub-shaft R is loosely mounted a pinion R³, in mesh with a stationary rack J², secured to the bed-plate A, and to the pinion is attached a quadrant R⁴, the teeth at the front end of which mesh with the pinion R⁵, attached to a disk or wheel R⁶, having an involute or cam R⁷, forming a cam pinion-wheel which is similar to the corresponding parts at the other side of the machine, which are connected in a like manner to a helical spring r² by a cord r³, the spring being attached to a ratchet grooved disk, said ratchet adapted to be turned manually to wind or regulate the strength of tension. The quadrant R⁴ and pinion R³ are held upon the stub-shaft R by means of a collar r⁸. The tension

device just described is brought into play by the lug r when the rotation of the shaft H' is checked by the sliding plate, as hereinbefore mentioned, for when the shaft H' is rotating the shaft R will remain stationary.

An even movement of the keyboard is provided for by means of racks h⁴ h⁴, which project from the members H H of the main keyboard-lever and mesh with pinions h⁵ h⁵, keyed to a transverse shaft H⁵, journaled in suitably-supported bearings.

The mechanism for moving the type-segment and carriage step by step across the machine to provide for the proper spacing of the letters upon the sheet consists of two sheaves U and U', mounted on a rock-shaft B, one of the sheaves having a handle U². The sheaves are connected to each other by a cord or flexible connection u, which passes therefrom around suitable guide-pulleys u', connected at an intermediate point to the carriage, having rollers, said carriage being mounted on the transverse reversing-shaft O. One of the sheaves is provided with a tension device for equalizing the step-by-step winding movement of a spring during each stroke of the main lever and to return the type-segment at the end of a line of printing, and the same is similar to the tension device used for giving proper tension to the main keyboard-lever and consists of a cord u², extending from a spring u³, which is attached to a ratchet grooved disk u⁵ and connected to a cam u⁴ to one side of the sheave, which is mounted on the shaft B. It will be understood that in operation the cord u is wound upon one of the sheaves and paid out or unwound from the other and that as the carriage or moving frame is connected to the cord the type-segment and parts carried thereby will be moved back and forth across the machine as the sheaves are turned. In order to move the type-segment step by step as the main keyboard-lever is depressed, the sheave U' has a rack-tooth rim W secured thereto, which is engaged by a pawl w, fulcrumed on a bracket secured to the bed-plate and provided at its forward end with a pawl w², which bears against a lug w⁵, a lever, and having also a projecting portion with which the sliding bar W' engages, said bar being connected to the main keyboard-lever by a horizontal member w³, Fig. 3. The lever w' is provided with a lug w⁴, which is adapted to engage the projecting end of the pawl w to trip the same or throw it out of engagement with the rack-teeth of the sheave at the proper time. At the other side of the sheave U' is a pawl Z for preventing backward rotation of said sheave when the pawl w is out of engagement therewith. The pawl Z may be pivoted to a bracket secured to the base-plate A, and the pivot-pin also carries a trip-lever Z', having a lug z, which is adapted to engage the projecting end of the pawl when the said lever is moved by handle or stud U², which projects from the side of the sheave U', the handle or stud being so located that the

pawl Z will be tripped to allow the sheaves and cord to move the type-segment back to its normal position after a line of printing has been completed, thus providing an automatic movement for this purpose, and in order to relieve the jar that is likely to occur when the type-segment flies back I may place a cushion in way of stud to receive the impact. It will be understood that the rack-tooth rim W or sheave U' is turned or moved a short distance at each depression of the main keyboard-lever, said lever being connected to the sliding bar W', which when moved downward bears upon the pawl w^2 and depresses the forward end of the lever w' , the rear end of which carries the pawl w , that operates the sheave U', and when said lever is tripped at each stroke of the keyboard-lever by the pawl w^2 moving out of engagement with the sliding bar just previous to the completion of the stroke of the keyboard-lever the projection w^1 will contact with the projecting end of the pawl w and move the catch portion thereof out of engagement with the rack-teeth, so that the pawl Z will hold the sheave, the said operation producing the step-by-step action. The lever w' is returned to its normal position by a spring w^6 .

F (see Fig. 3) designates a rectangular frame which serves as a support for the type-segment and is adapted to move laterally step by step across the machine, it having cross-pieces for the bearings of the type-segment shaft C', and said frame is open at the bottom, so that its sides will form springs for the toothed sleeve N. The bottom ends form bearings for grooved rollers f , which are adapted to run on the reversing-shaft O, and the bottom ends of the frame are adapted to straddle short arms o^2 , so as to cause it to move laterally with the frame, the frame also having eyebolts f' for attachment of the cord hereinbefore described. Within the shaft B² is positioned a sliding shaft E, having a circular groove at one end and connected to the frame by means of a feather b^2 , the groove serving to allow the feather to work therein while the sleeve is being rotated with the shaft B². The said connection is for the purpose of dragging the striking-point e^3 of the hammer with the type-segment, as it is connected to the sliding shaft by an extension-rod E' and an arm e , thus forming a U-shaped slide. The arm e carries a grooved roller e' , which is adapted to run on an extension-tube E², which encircles the reversing-shaft O and slides thereon. When the machine is to be operated, the tube E² is drawn outward manually, it fitting tightly within a socket or bearing e^2 , so as to form a support for the U-shaped slide. The extension-rod E' passes through a stationary or fixed tube S, mounted so as to lie across the machine, and one end of the rod E' is bent at right angles and passes through and slides in a longitudinal recess s of the tube S, which is adapted to guide the same therein. The rod E' is further bent in the

shape of the letter U, so as to form a projection or striking-point e^3 and bring it in proper position for striking the type-segment. The rear end of the member e^3 has a projection e^4 , adapted to be struck by mechanism as will be hereinafter explained. The stationary or fixed tube S is provided with leaf-springs s' at each end for holding the paper in a position for printing, and when a line of printing has been completed the paper may be shifted manually.

D designates a disk or controlling wheel which is adapted to be rotated and checked with the type-segment through the keyboard, the disk having openings or spaces and teeth around its circumference, the same being secured at one end of a shaft D', which rotates upon the rock-shaft B. The other end of the shaft D' has a ratchet-wheel d secured thereto, which ratchet-wheel is revolved by a pawl b' . Between the disk D and ratchet-wheel d , at suitable distances apart, are located two supports d' d' , which straddle the shaft D' and have apertures to form bearings for guide-rods 1, 2, and 3. The three rods 1, 2, and 3 are adapted to engage the recesses of the disk D, and the upper and lower rods are connected to the type-segment while the other or side rod 3 acts as a supplemental tension device. The rods are so operated that when two are checked the other will be brought into play, thereby maintaining equal tension for each stroke of keyboard and regulating shift movement of segment-lever according as to whether the inner or outer section of keys of the keyboard is to be operated upon. The rods having a sliding movement parallel to the shaft D' are each provided with collars d^2 d^3 and helical springs d^4 , which are connected to the supports, so that the rods will be kept thereby in their normal positions. The rod 3, which extends beyond the disk D, has a projection on its extreme end, and said rod engages the disk D from its outer face, while the rods 1 and 2 engage or penetrate a recess from the inside at certain times, according as to which key happens to be depressed. Behind the keyboard is located a tube q , which is mounted loosely upon the guiding gear-shaft II⁵ of the keyboard-lever, and said tube has collar with an arm q' , to which are connected the upper and lower rods 1 and 2. The tube q is adapted to rotate loosely in either direction independent of the shaft II⁵, and the tube q has a horizontal arm q^2 with a feather or key, and the same is adapted to slide upon the tubular shaft q and is connected to the bottom of the internal spindle of the type-segment C for shifting said segment in either direction. The arm q^2 is adapted to be drawn laterally with the type-segment, the feather running in the longitudinal recess of the tube, thereby causing the arm q^2 to rotate with the tube q . The upper rod 1 is connected to the tube-shaft by a reversing changeable check or top lever X through the rods x and x' , upright shaft x^2 ,

arm x^3 , forming a bell-crank, and rod x^4 , which is connected to the arm q' . The lower rod 2 is also connected to the tubular shaft q by a lever X' , having its fulcrum upon a fixed pin x^5 , and said lever is connected to the lever X at its middle by a link x^6 . The front ends of levers X X' may be termed joints, respectively, of the rods 1 and 2, or swinging-points which are pivoted to the rods, and when the upper rod 1 is checked the front end of lever X will also be checked. Assuming that the upper rod is held in check, then the joint thereof will be checked, and when the lower rod is operated upon by the keyboard to penetrate the disk and being pivoted to the lever X' will cause the same to swing to the right, and as the lever X' is connected by a link x^6 to the reversing-lever X it will cause its middle joint and rear end to swing to the right, and as the rear end is connected to the type-segment, as hereinbefore described, it will shift the said segment downward, so as to bring the type of one of the outer rows, as described, in front of the hammer. When the lower rod is in check and the upper one comes into play, the operation will be reversed, for as the lower rod is checked the bottom lever X' and the link x^6 will also be checked. When the upper rod is operated to penetrate the disk, the front end or swinging point of lever X will move to the right, said end being checked or held during the previous operation. The check of the swinging point or front end is therefore changed to the middle joint, and as the front end of lever X moves to the right its rear end will move to the left, and as the rear end is connected to the type-segment it will shift the same upward. To the side rod 3 is pivoted the front end of a changeable swing and check-lever Y , adapted to encircle the shaft D' , the same being pivoted at its middle to an upright changeable swing and check-lever Y' at the side of the shaft D' , the top end of which is pivoted to a projection on the upper rod 1, and its lower end is pivoted to a similar projection on the lower rod 2. The rear end of the center lever Y is connected to the keyboard-lever through the intervention of the rod y , the upper arm y' , upright shaft y^2 , and lower arm y^3 , forming a bell-crank, rod y^4 and arm y^5 , secured to the guiding-gear shaft H^5 , and as the guiding-gear is operated by the keyboard-lever the arm y^5 will strike the rod y^4 , and it will transmit the movement to the center lever Y near the end of each stroke after the desired type has been brought into printing position. The arm y^5 does not strike the end of rod y^4 until the keyboard has nearly completed its stroke, and when the pressure is applied to the rear end of the center lever Y will operate the rods independently, according to the position of the disk. As has been explained, when two rods are checked the other comes into play. Assume that the lower and side rod is checked. Then the bottom end of the upright lever Y' and

front end of lever Y will also be checked, and as the rear end of lever Y is moved to the right when acted upon its middle joint will act upon the upright lever Y' , and as the bottom end has been checked, as stated, the top will come into play, and as the top end is pivoted to the upper rod it will transmit the movement to the type-segment in one direction, and, again, when the upper and side rods are held in check the top end of the upright lever will also be checked, and when the same operation of lever Y occurs it will move the lower rod and therefore transmit the movement to the type-segment in the opposite direction, presenting the other outer row of type. Therefore the check of the upright lever Y' has been changed from top to bottom. Again, when the upper and lower rods are held in check the top and bottom ends of upright lever Y' and the middle joint of the center lever Y will also be checked, and when the rear end of the center lever is acted upon to move to the right and its middle joint being checked, as described, such action will cause the front end of the center lever Y to move to the left, the projection of the side rod penetrating the disk from the outside and the rod acting upon the helical spring as to supplemental tension. The type-segment is therefore not shifted in this third operation and the inner row of type will remain presented in a printing position, the check of the center lever Y having been changed from the front end to the middle joint. The rods are so situated in relation to the teeth and openings in the disk that a line drawn from the center of one rod end to the other would form a triangle, two of the sides being equal, the position of the rods deviating in relation to the openings, so that when one rod is directly opposite an opening, such as the side rod 3 in Fig. 5, the other two will come opposite a tooth at different points of contact or striking points, as shown in dotted lines.

To the upright shaft y^2 is secured an arm T , having an arm t , adapted to bring the striking-point e^3 of the hammer against the type through the intervention of a rectangular swinging frame T' , forming a portion of the rock-shaft B . The frame is shown in dotted lines in Fig. 1, and the same frame strikes the hammer at different points of contact on the frame as said hammer moves step by step across the machine.

At each side of the machine, at its rear end, are located two ribbon-rolls V V' , which are adapted to revolve upon the upright shaft x^2 and y^2 , each roll having handles v , which may be used to turn the same manually, the rolls carrying an inking-ribbon v' , which passes around pins v^2 . The ribbon lies across the machine between the type and the paper, and when a line of printing is completed the ribbon is wound from one roll to the other sufficient for another line of printing. If desired,

the pins v^2 may be placed upon the swinging frame T', so that the ribbon will move therewith.

In operation the type-segment is normally held so that a middle type of the inner row is opposite the hammer-point and one of the gears of the sleeve is held normally in engagement with the pinion of the type-segment.

Assuming that a small letter of an outer row is to be printed, the operation is as follows: After the telescopic support has been extended the operator moves the auxiliary lever Z, releasing its pawl from the sheave, so that the type-segment may assume its normal position at the left of the machine. A finger-key of one of the outer rows first moves the stem thereof in the path of the sliding plate P, and its downward movement with the keyboard will rock the levers II II and move the shaft II' upwardly. The pinion II² thereon, engaging the tooth-rack J and being engaged by the pawl l, will turn said shaft, as well as the quadrant-lever K, which, being in mesh with the driving-pinion M, will turn the type-segment in one direction through the intervention of the shafts and tooth members, the driving-pinion also turning the disk D through the intervention of the pawl and ratchet-wheel b. When the sliding plate has reached the depressed key, its movement will be arrested, throwing the pawl l out of engagement with the pinion II², thereby releasing the hold of the quadrant-lever from the rack J and changing its check from the rear end to the front end and the swing from the front to the rear end, thereby checking the type-segment and bringing the type of the outer row corresponding to the depressed key in way of its printing position ready to be shifted. The checking operation of the quadrant-lever will also check the disk D, so as to bring any opening directly opposite an outer rod, (which is either an upper or lower rod,) the said quadrant-lever will also hold in check the resisting force acting on its front end and act upon the other resisting force applied to its extreme rear end transmitted from the other side of the machine. At the same time during the depression of the keyboard-lever the feed-lever w' is being acted upon through the intervention of the sliding bar W', so as to move the type-segment and hammer through the sheave and its pawls for the spacing of a letter or character. At the time when the keyboard-lever has nearly completed its stroke the feed-lever w' will have swung itself out of engagement with the sheave and sliding bar by means of the lugs w^4 and w^5 , the auxiliary pawl z' holding the type-segment against its step-by-step resisting force. At the same time the arm y^5 on the shaft II⁵ will have struck the rod y^4 , acting upon the disk D or tooth-wheel mechanism and transmitting the movement to the lower rod, and thence to the type-segment, moving it downward and bringing the desired type of an outer row into

its proper printing position. The required movement is also transmitted to the hammer through the intervention of the swinging frame T' in order to make an impression of the type upon the paper, and the complete depression of the keyboard-lever holds the hammer against the paper until it begins its upward movement, during which time the sliding bar W' will again engage itself with the feed-lever ready to repeat the same operation when a word has been printed, the space that follows, to separate it from the next word, is produced by the depression of any part of the keyboard without the use of the keys, the mechanism will be actuated, but the type-segment will present a blank. Therefore no impression will be made. When a line of printing has been completed, the stud of the sheave will strike the auxiliary lever Z, releasing its pawl and returning the type-segment to its normal position to commence another line of printing.

When a character of the inner row of the type-segment is to be printed, the inner keys are operated upon, but the shifting operation of the type-segment is not effected, the side rod penetrating the disk D, so as to substitute a resistance in order that equal tension may be maintained for each stroke of the keyboard-lever. When a capital letter is to be printed, the independent key-lever G is depressed, thereby changing the gear through the intervention of the toggles in order that the turning movement of the type-segment may be reversed, at which time the same operation is repeated.

The depression of a finger-key first moves the stem thereof in the path of the sliding plate P, and its downward movement with the keyboard will rock the levers II II and move the shaft II' upwardly and the pinion II² thereon, engaging the toothed rack J and being engaged by the pawl l', will turn said shaft, as well as the quadrant-lever K, carried thereby, which being in mesh with the driving-pinion M will turn the type-segment in either direction through the intervention of the segment, intermediate shaft, and bevel-gears, according to which toothed member is in mesh with the type-segment, the movement of the type-segment being checked at the proper time by the sliding plate P engaging the depressed key to throw the pawl l' out of engagement with the pinion II², thereby changing the swing and check from one end of the quadrant-lever to the other and cause the tension of the main lever to be taken up by the supplemental tension device, as described. The complete depression of the keyboard-lever operates the rock-shaft through the intervention of mechanism, including arms and rods, said connection holding the hammer retracted until the main keyboard-lever begins its upward movement. When the hammer is projected, it will cause contact of the type with the paper, which has been placed in proper printing position. The

depression of the main keyboard-lever also operates the rack-teeth to feed the type-segment laterally one step through the intervention of the sliding bar W' , which is connected to said lever and actuates the pawl w , this operation occurring previous to the operation of the hammer and simultaneous with the movement of the type-segment to bring the character corresponding with the depressed key in proper printing position. This operation is repeated until a line of printing is completed, when the stud U^2 of the sheave U' trips the lever Z' and disengages the pawl Z , so as to allow the type-wheel to fly back in position to commence another line, the paper being shifted or moved manually.

The keyboard and certain operative mechanism should be constructed of light material for an easy movement, and I therefore prefer to make such parts of aluminium.

It will be noted that the type-segment is mounted on a shaft and slides thereon when it is shifted downward. The rod, being connected to its hub, pulls it down by means of the arm q^2 and acts upon the lower spring, its shaft remaining stationary, and during the upward shift the arm q^2 pushes both shafts upward through the bevel-pinion, which has a keyway, the arm acting upon the upper spring only, said springs being adapted to hold the segment in its normal position.

Having thus described my invention, I do not wish to be limited to the precise construction and arrangement of the parts as shown, but reserve the right to change or modify such construction within the spirit and scope of my claims.

I claim—

1. In a type-writing machine a keyboard mounted on pivoted levers, means controlled by said levers for actuating a hammer and a type-segment including means for returning the type-segment to its normal position after the hammer has acted upon the paper, and two equalized resisting devices coacting with the hereinbefore-mentioned instrumentalities, substantially as shown.

2. In a type-writing machine, a lever and its shaft having two equalized resisting forces, a type-segment adapted to be rotated by a quadrant-lever, the type-segment having changeable movements, a finger-board, a pinion carried by the quadrant-lever shaft, and means for controlling said pinion through the keyboard so as to check through the pinion and quadrant-lever the movement of the type-segment at a certain time in order that a required letter, character or type may be brought into printing position substantially as shown and for the purpose described.

3. In a type-writing machine, a type-segment, a finger-board, a quadrant-lever and its shaft having two resisting forces, a pinion meshing with a rack and secured to the quadrant-lever shaft, a pawl-arm and connecting-rods, and a slide carried by the connecting-

rods and contacting with a stop of the finger-board, to check the type-segment, substantially as set forth.

4. A type-writing machine provided with a type-segment, a finger-board, equalized levers upon which one end of the finger-board is supported, toothed racks and pinions connected to the levers, a quadrant-lever having two resisting forces, a hammer actuated by said finger-board and its lever, and means for governing the movement of the type-segment through the finger-board, its levers and quadrant-lever, substantially as and for the purpose described.

5. A type-writing machine provided with a type-segment, a finger-board supported on one end of the double-sided lever and movable therewith, a quadrant-lever and its accessories fulcrumed to the other end of the double-sided lever and means for actuating and controlling the extent of movement of said type-segment through said finger-board its lever and quadrant-lever, substantially as and for the purpose described.

6. In a type-writing machine a type-segment capable of a pivotal movement and a movement at right angles thereto, a hammer adapted to move toward the pivotal point and to be held against the type of the type-segment, a finger-board mounted on one end of the fulcrumed lever, a rack and pinion connected therewith, a quadrant-lever and its accessories, and means for checking and controlling through said finger-board the range of movement of the type-segment, substantially as shown and for the purpose set forth.

7. In a type-writing machine a type-segment having a reversible oscillating movement and a movement changeable at right angles to the same, a laterally-movable frame, a hammer operating on a line with the pivotal point of the type-segment, means for raising and lowering the type-segment automatically, and a finger-board having a sliding plate and controlling mechanism governed thereby when the key of the finger-board is depressed, substantially as set forth.

8. In a type-writing machine, a type-segment, a gear mechanism therefor, a fulcrumed lever having on one side a finger-board and on the opposite side of the fulcrum a shaft, the lever being fulcrumed directly opposite a point where the pitch-circle of one gear coincides with that of another, substantially as shown.

9. In a type-writing machine, a type-segment, a main lever, provided at one end with a finger-board and at the other end with a shaft, the lever being provided with racks located adjacent to the finger-board and meshing with pinions carried by a shaft, together with arms or projections for throwing into gear the segment, controlling mechanism, and hammer substantially as shown.

10. In a type-writing machine, a type-segment, a lever supporting a finger-board having keys which are adjustable upon said fin-

ger-board and capable of a vertical movement, the projecting ends of the keys when depressed extending beyond the finger-board and a sliding plate carried by the finger-board to control the position of the type-segment substantially as shown.

11. A type-writing machine provided with stops or keys adapted to be turned upon fulcrums therefor, the keys being carried by a keyboard having recesses therefor, a sliding plate carried by the keyboard together with a type-segment mounted on a vertical shaft and means for imparting different movements to the type-segment, one of the movements being limited by the stops or keys, substantially as shown and for the purpose set forth.

12. A type-writing machine provided with a finger-board having stops or keys, said keys or stops having a vertical and an oscillating movement, the latter for adjustment; together with a sliding plate having three beveled edges, said plate being carried by the keyboard, substantially as shown.

13. In a type-writing machine, a keyboard, a series of keys mounted thereon so as to be normally projected above the face of the keyboard, each key being fulcrumed so that its lower projecting end can be shifted; together with a sliding plate which is adapted to engage with a depressed key, for the purpose set forth.

14. In a type-writing machine, a finger-board provided with stops or keys having semicircular upper faces or edges, said stops or keys having a vertical movement in the finger-board and a movement to change the normal position of the lower ends thereof, the keys being arranged as shown, levers upon which the keyboard is mounted, a sliding plate carried by the keyboard and levers; together with a movable type-segment, a hammer, and means controlled by the stops of the finger-board, and sliding plate for governing the type-segment and its hammer, substantially as shown.

15. In a type-writing machine, a finger-board provided with keys susceptible of a vertical and a rocking movement in the finger-board, a lever to which said finger-board is secured, a hammer, ribbon-rolls, a type-segment having different ranges of movement, the hammer, ribbon-holder and type-segment being actuated and controlled by the depression of a key and the finger-board, substantially as shown and described.

16. In a type-writing machine provided with a type-segment an oscillating finger-board, a quadrant-lever controlled by the keys in the movement of said finger-board and having two resisting forces, said quadrant-lever meshing with a pinion to check the type-segment at a certain time during the downward movement of the finger-board in order that the required character of type may be left opposite the impression end of a hammer, substantially as, and for the purpose set forth.

17. A type-writing machine provided with a type-segment, a finger-board mounted on one end of parallel levers, keys arranged close together and movable vertically in said finger-board, a quadrant-lever having two resisting forces, and a pinion, the quadrant-lever meshing with said pinion to check the type-segment by the travel of the finger-board, said quadrant-lever being afforded changeable movements to check the movement of the type-segment, a pawl, an arm and connecting-rod, said pawl adapted to release said quadrant-lever automatically through said arm and connecting-rod, substantially as and for the purpose described.

18. A type-writing machine provided with an oscillating finger-board, a main lever, a vertically movable and oscillating type-segment, a quadrant-lever controlled by said finger-board and having two resisting forces, a pinion, the quadrant-lever meshing with said pinion to check the type-segment during the travel of the finger-board so that characters or type may be left in the printing position before said finger-board has completed its travel, two sets of pinions, a set on each side of the machine, a pawl carried by the quadrant-lever, an arm and a rod connected with a slide engaged by a stop or key of the finger-board, said pawl adapted to release said quadrant-lever automatically through said arm and connecting-rod, the same causing the fulcrum of the quadrant-lever to be changed from a point of the pitch-circle of one pinion to that of another, one of the pinions being connected to the driving-shaft, an involute secured to one of each set of pinions, the same having a spring and a cord, the cord being attached at the widest part of said involute and connected at its other end to a spring, whereby is equalized the power of said spring as its force relaxes through the diminution of the tension by the gradual diminishing of the resistance of the cord and through its increased distance from the axis of the involute imparting its resisting force to the quadrant and then to said main lever to maintain equal pressure throughout upon the finger-board, substantially as shown and for the purpose set forth.

19. A type-writing machine provided with a feed-gear comprising a frame, a type-segment, a cord attached to said frame and to a sheave having a lug or handle, a complementary sheave attached to the other end of said cord and provided with an involute and spring for resisting the force applied to the handle or lug of the opposite sheave, a main lever, a finger-board supported at one end thereof, a lever provided with a pawl adapted to contact with the main lever and feed the complementary sheave automatically, substantially as and for the purpose described.

20. In a type-writing machine, a finger-board mounted on the ends of parallel levers, the finger-board being provided with stops or keys arranged in rows close together, each

key being fulcrumed so as to be independently adjustable, means controlled by said finger-board for governing and actuating a type-segment and imparting rotary and lateral movement thereto, and automatically return the type-segment to its normal position after printing, substantially as set forth.

21. In a type-writing machine, a finger-board having flat, thin semicircular stops or keys arranged close together and adapted to move vertically and be independently adjustable upon a fulcrum, a type-segment, a ribbon-holder, and ribbon-rolls, means controlled by said finger-board and the keys when depressed for actuating the type-segment and imparting a rotary or a vertical movement thereto and automatically returning the type-segment to its initial position after printing a line, substantially as described.

22. In a type-writing machine, a double-sided lever carrying the finger-board and having racks meshing with pinions secured to a rod or shaft, said shaft having bearings at the sides of the machine and forming a guiding-gear to maintain uniform pressure upon the finger-board, a shaft loosely mounted in end bearings and adapted to counterpoise said main lever and weight of the finger-board, substantially as described.

23. In a type-writing machine, a rotary type-segment, a finger-board provided with keys or stops having a vertical and an oscillating movement therein, a double main lever pivoted to the side of the machine and carrying said finger-board at one end, a slide carried by the double lever adapted to check the type-segment and controlled by the movable stops or keys, substantially as described.

24. In a type-writing machine, a finger-board mounted on a double main lever and provided with stops or keys arranged in a straight line, the semicircular upper surfaces of which extend over the finger-board, said keys or stops being provided with fingers or stems to have a vertical movement in said finger-board and adjustable upon their fulcrums, a bottom plate located under the said finger-board and traversed by the stems or fingers of said stops, and a plate sliding beneath said plate and abutting against the fingers of said stops when the same are depressed, substantially as shown and for the purpose set forth.

25. In a type-writing machine, a quadrant-lever shaft afforded a vertical movement and rotary movement, a finger-board, two arms keyed to the shaft and connected to rods, said rods having a sliding plate with slanted edges located under said finger-board, the finger-board being provided with stops or keys arranged close together in a straight line, the ends of said sliding plate running in grooves at the ends of the finger-board and contacting with a stop or key to limit the movement of the sliding plate, substantially as shown and for the purpose set forth.

26. In a type-writing machine, a type-seg-

ment mounted on a shaft and afforded different movements by means of a keyboard, a quadrant-lever and its shaft, two pinions geared to each other substantially as shown, one of the pinions being mounted on the driving-shaft in mesh with the quadrant-lever and the other on the quadrant-lever shaft, substantially as shown and for the purpose set forth.

27. In a type-writing machine, a grooved keyboard, stops or keys consisting of thin, flat semicircular pieces and downwardly-projecting fingers or stems, guides having a range of vertical movement in the grooves of the keyboard, pins securing the guides to the stops or keys, and springs placed beneath the guides to normally support the same in the keyboard, all arranged so that the keys or stops are afforded a range of vertical movement in the keyboard against the tension of said springs, and a turning movement about the pins securing the keys to the guides, substantially as shown and for the purpose set forth.

28. In a type-writing machine, a main lever, a finger-board supported at one end thereof, stops or keys arranged close together and in a straight line in said finger-board, guides secured to the keys or stops, a slotted bottom plate secured to said finger-board, fingers depending from the keys or stops, springs located under the guides and adapted to support the keys or stops in the finger-board, all arranged so that when the keys or stops are depressed against the springs the fingers will traverse the slotted plate, substantially as shown and for the purpose set forth.

29. In a type-writing machine, a double-sided lever, a finger-board supported at the free end thereof, stops or keys having a vertical movement and its lower extremity a shift movement in said finger-board, a slotted bottom plate secured to the finger-board and traversed by the keys or stops when vertically moved in the finger-board, springs supporting the keys or stops normally above the slotted plate, a slide moving in and carried by the double-sided lever, fingers on the stops or keys controlling the movement of the slide, arms connected to the slide and carried by a shaft, a quadrant-lever mounted on said shaft, a rotary type-segment controlled through said quadrant-lever and shaft, the parts being organized substantially as shown and for the purpose set forth.

30. In a type-writing machine, a rotary and laterally-movable type-segment, a double-sided lever, a finger-board supported at the free end thereof, stops or keys having a vertical movement in the finger-board, a slotted bottom plate secured to the finger-board and traversed by the stops or keys, a slide movable in and carried by the double-sided lever, said slide beneath the slotted plate being limited in its movement under the same by the stops or keys, mechanism controlled by the slide for rotating the type-segment, a

hammer movable toward the type-segment, and means for actuating said hammer at right angles to the horizontal movement of the type-segment for effecting an impression from the type-segment substantially as shown and described.

31. In a type-writing machine, the combination with an oscillating type-segment, of a movable keyboard, double-sided levers upon which the keyboard is mounted, a series of vertically-movable keys carried by the keyboard, said keys being susceptible of a side-wise movement with respect to the keyboard, a slide having three slanted edges of the same angle said slide being movable beneath the keyboard and controlled in its movement by the keys and mechanism controlled by the slide for actuating the type-segment, substantially as shown and for the purpose set forth.

32. In a type-writing machine, a type-segment mounted upon a shaft adapted to be actuated by gear mechanism, a keyboard provided with thin semicircular stops or keys, said keyboard being mounted on a double-sided lever whose fulcrum is opposite a point where the pitch-circle of one gear coincides with that of another, said double-sided lever being adapted to actuate said gear mechanism when depressed, substantially as shown and described.

33. In a type-writing machine, a type-segment mounted upon a shaft, a quadrant-lever mounted upon a shaft with special mechanism for operating said type-segment shaft, an equalizing tension device for said quadrant-lever, said quadrant-lever and shaft being capable of vertical and rotary movements and the said lever capable of being locked and unlocked automatically from said quadrant-lever shaft by means of pawls, substantially as shown and described.

34. In a type-writing machine, a shaft, a carriage riding thereon, a cord secured to the carriage and adapted to slide the same upon the shaft, an oscillating and vertically-movable type-segment, a type-segment shaft therefor, a sheave mounted on a stub-shaft and secured to one end of the cord actuating the carriage, an involute secured to said sheave, said involute controlling tension of a spring, a second sheave mounted at the other side of the machine and secured to the other end of the cord actuating the carriage to act as the driver for said carriage, substantially as shown and for the purpose set forth.

35. In a type-writing machine, a shaft, a carriage riding thereon, a cord secured to the carriage and adapted to slide the same on the shaft, an oscillating and vertically-movable type-segment, a type-segment shaft, a sheave mounted on a stub-shaft and secured to one end of the cord actuating the carriage, an involute secured to said sheave, said involute controlling tension of a spring, a second sheave having rack-teeth and a handle,

mounted on a stub-shaft at the other end of the machine and connected to the carriage, whereby the carriage can be shifted manually by said handle, substantially as and for the purpose described.

36. In a type-writing machine, a type-segment and gear mechanism for operating the same, a quadrant-lever meshing with said gear mechanism and rotating with its shaft, said shaft being provided with a resisting force or tension device consisting of a complementary quadrant and a pinion meshing therewith normally under the influence of an involute and spring, substantially as shown and described.

37. In a type-writing machine, a segment provided with type, a keyboard provided with a series of stops or keys, each having a finger or stem and arranged close together in rows, and a sliding plate having three slanted edges, the slanted edges of said plate allowing said series of stops or keys to be arranged in a straight groove of the keyboard, and said stops or keys being arranged to adjust the movement of said plate by the change of position of the fingers or stems, the adjustment of said plate also permitting of a sharp and distinct impression being effected by means of said stops or keys, thus regulating the position of the type of the machine, substantially as described.

38. In a type-writing machine, a double-sided main keyboard-lever having a shaft journaled in its rear end, a quadrant and pinion mounted on said shaft and connected to each other and in engagement with the pinion, a second pinion mounted on a stub-shaft and provided with a tension device consisting of an involute, a cord secured to said involute, a helical spring attached to the other end of the cord, and grooved disk, substantially as shown and for the purpose set forth.

39. In a type-writing machine, a double-sided main keyboard-lever having a shaft journaled in its rear end, a quadrant and pinion mounted on said shaft and connected to each other by an arm and pawl, a segment-rack secured to the main frame and in engagement with the pinion, a second pinion mounted on a stub-shaft and provided with a tension device; together with a supplemental tension device consisting of a quadrant and pinion mounted on a shaft connected to the shaft of the main keyboard-lever, connecting said quadrant and pinion, a pinion in mesh with said quadrant, an involute formed on the latter pinion, a cord attached to said involute, and a spring connected to the other end of the cord, substantially as shown and for the purpose set forth.

40. In a type-writing machine, the combination with a keyboard-lever having a series of movable keys girdered or fulcrumed thereon, of means for actuating a type-segment and a hammer, and imparting independent movements to said segment, means controlled by lugs for regulating a feed movement of

said segment and hammer; together with means controlled by the keys through the intervention of sliding-plate levers for regulating the oscillating movement and a movement at right angles thereto independent of the said feed movement and for maintaining an equal tension throughout the entire depression of each stroke and of each key with the keyboard, said segment having independent springs to return it to its normal position, the lever having means adapted to cause a reversible toothed member to travel horizontally with the segment substantially and for the purpose set forth.

41. In a type-writing machine, the combination of a keyboard, its keys and a slide, the movement of which is limited by engagement with a key of the keyboard, a quadrant-lever, a type-segment, springs, and connecting means, the springs supplying tension for the keyboard-lever and the type-segment, substantially as shown and for the purpose set forth.

42. In a type-writing machine, the combination with quadrant-levers for the purpose set forth of springs coacting therewith to effect an equal tension for each stroke of the keyboard, substantially as shown.

43. In a type-writing machine, the combination with a type-segment supported so as to be susceptible of three movements in both directions, of springs acting upon said type-segment so that a single spring is brought into play for each movement one at a time, for the purpose of maintaining an equal tension for each stroke of the keyboard-lever, substantially as shown and set forth.

44. The combination in a type-writing machine having a keyboard and means for connecting said keyboard with a type-segment, of a type-segment having means for imparting thereto an equalized horizontal resistance; together with the controlling and actuating mechanism for said type-segment, substantially as shown and for the purpose set forth.

45. A type-writing machine having a feed-lever, a pawl and rack-teeth with which the pawl engages, a keyboard-lever and type-segment, in combination with a supplemental lever having a pawl, lugs which engage with the pawl to exchange its hold upon the teeth of the feed-lever pawl, and means whereby the supplemental lever is acted upon at a certain time to effect the automatic return of the type-segment, substantially as set forth.

46. The combination in a type-writing machine, of a keyboard and supporting-levers therefor, a vertically-movable and oscillating type-segment, a toothed governing-wheel mounted on a shaft, bars controlling the rotation of said wheel and shaft and connections between the governing-wheel, type-segment and keyboard, substantially as shown.

47. The combination in a type-writing machine having a shaft the movement thereof being controlled by the keys and a sliding

plate carried by the keyboard, of a quadrant-lever, a type-segment and controlling mechanism therefor including a toothed wheel and locking-bars which are spring-actuated in one direction to provide an equal tension for each stroke of the keyboard and control the vertical movement of the type-segment substantially as, and for the purpose set forth.

48. In a type-writing machine provided with a keyboard and supporting-levers therefor, in combination with controlling mechanism, a pawl, a ratchet-wheel, and connecting mechanism organized to permit the rebound of the ratchet-wheel previous to the release of the controlling mechanism for the purpose set forth.

49. The combination in a type-writing machine provided with a keyboard-lever and an open-ended sliding frame, which in conjunction with a swinging frame operates a hammer in two directions, the sliding frame being connected to a type-segment to cause the same to travel laterally therewith, a telescopic extension-tube adapted to be drawn out manually as a support for the sliding frame, said frame having a step-by-step movement, a spring and means for maintaining an equal resistance for each stroke of the keyboard-lever; together with pawl controlled by lugs which engage with rack-teeth; the tension of said spring being released automatically at the end of a line of printing to bring the type-segment back to its normal position substantially as and for the purposes described.

50. In a controlling mechanism for the type-segment of a type-writing machine the combination of a rotary controlling-wheel, levers whose ends are adapted to be held against a fixed point, and said ends actuated alternately to maintain an equal resistance and regulate the shift movement of the type-segment substantially as described.

51. The combination in a type-writing machine of a lever whose ends are adapted to be held against a fixed point and controlled through the keyboard of a sliding plate having slanted edges and a pawl for regulating the extent of the movement of said lever.

52. The combination in a type-writing machine provided with a lever whose ends are held against a fixed point, said ends being actuated alternately, and controlled through the keyboard by the intervention of a slanted triple-edge sliding plate, of a pawl and a controlling wheel or governor for shifting a segment in opposite directions and regulating the said shift, and the said edges of the sliding plate being of the same angle but deviating throughout the breadth of plate one of each outer edge following an inner, one after the other, substantially as set forth.

53. In a type-writing machine, the combination with a shaft or cross-bar, a sleeve mounted to slide thereon and provided with a projecting arm and carriage, of a type-segment supported by said carriage and mem-

bers depending from the carriage having rolls to engage the cross-bar, substantially as shown and described.

54. In a type-writing machine, the combination with its keyboard of a slanted edge plate a type-segment and a series of vertically-movable stops or keys fulcrumed in the keyboard and held in an adjusted position by frictional contact, said keys when depressed
10 extending in the path of the slanting edge plate, substantially as shown and described.

55. A type-writing machine provided with a type-segment mounted on a shaft and adapted to slide thereon, and to have a movement
15 with the shaft, the two movements being in opposite directions independent of one another, in combination with independent springs for each movement to bring the type-segment or its shaft normally against a fixed
20 point, substantially as shown.

56. The combination in a type-writing machine provided with a controlling-wheel and locking-bars, each having an equal resisting force of keyboard-lever for actuating the controlling-wheel and its locking-bars, for the
25 purpose set forth.

57. The combination in a type-writing machine having a type-segment of an equalized tension and means for operating said segment
30 and tension device by the depression of the keyboard, substantially as shown.

58. In a type-writing machine, the combination with a type-segment having characters arranged in line horizontally and out of
35 line vertically; of actuating-keys therefor, a slide having three faces for controlling the position of the type-segment so as to bring one of the type thereof in printing position.

59. In a type-writing machine, the combi-

nation with mechanism for controlling a type- 40 segment by an independent key-lever, said key-lever actuating the type-segment and means to effect a movement of the mechanism so as to bring the caps or large letters into printing position when said lever is depressed. 45

60. In a type-writing machine the combination with a sliding frame open at one end of means for connecting thereto the paper to be printed upon and hold the same stationary; together with a transversely-movable ham- 50 mer and type-segment and means for effecting a step-by-step movement thereto.

61. In a type-writing machine, the combination of a transversely-movable carriage carrying a type-segment, a hammer also mounted 55 to move in unison with the type-segment, of an open-ended frame and means for connecting the paper to be printed upon thereto; together with ribbon-rolls mounted on fixed supports so that the ribbon and paper holder 60 will remain stationary during the travel of the type-segment and its hammer substantially as shown.

62. In combination with a keyboard having three groups of keys, a slide P, having three 65 deviating edges and a type-segment having three sets of characters arranged in a horizontal series so as to be out of line with each other vertically; together with the controlling mechanism having three checking-rods for 70 the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

FERDINAND G. STALLMAN.

Witnesses:

E. E. DAWES,

W. C. COBB.