(No Model.) 5 Sheets—Sheet 1.

T. F. BOURNE.

TYPE WRITING MACHINE.

No. 446,850. Patented Feb. 24, 1891.

Fig. 1.

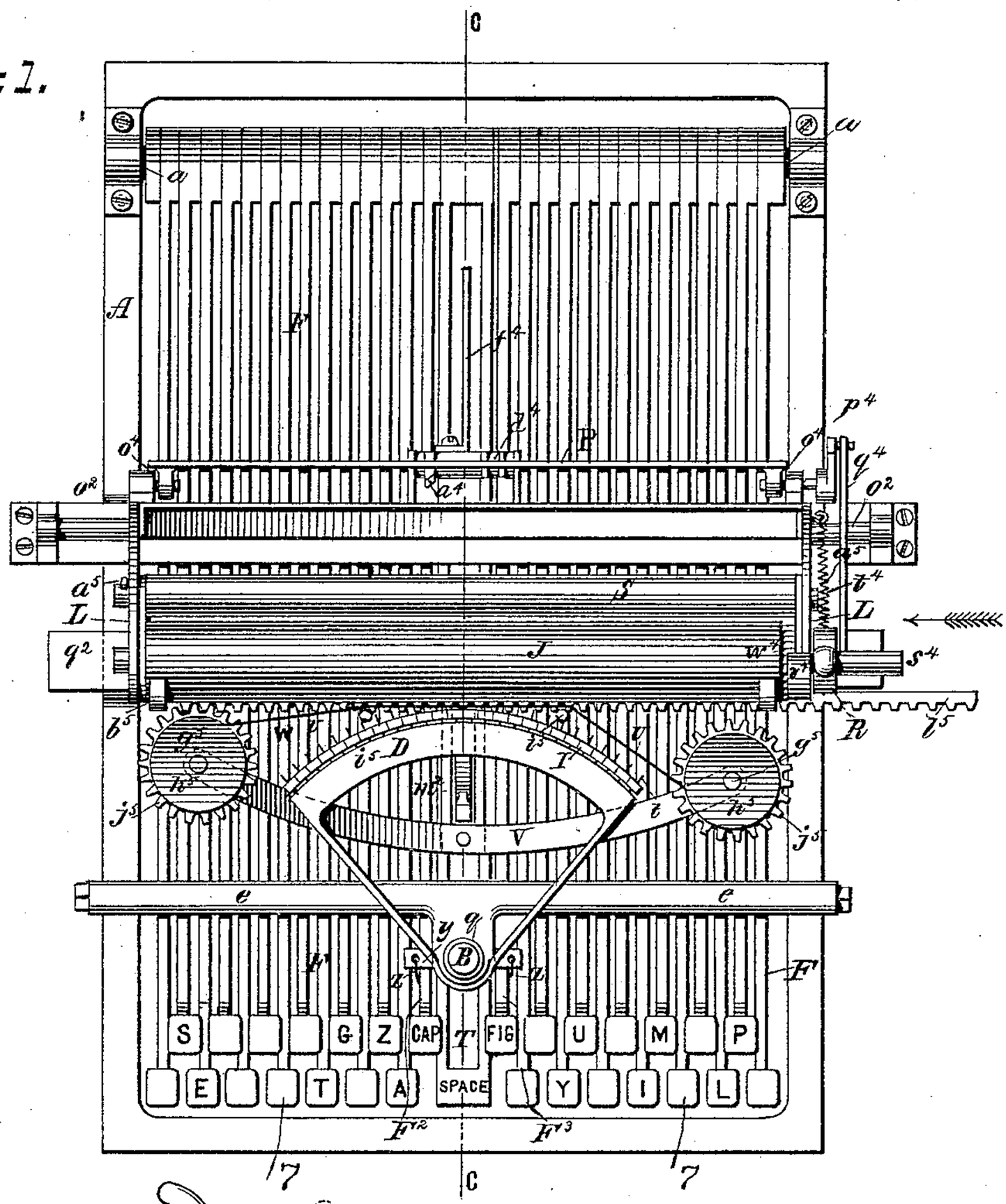
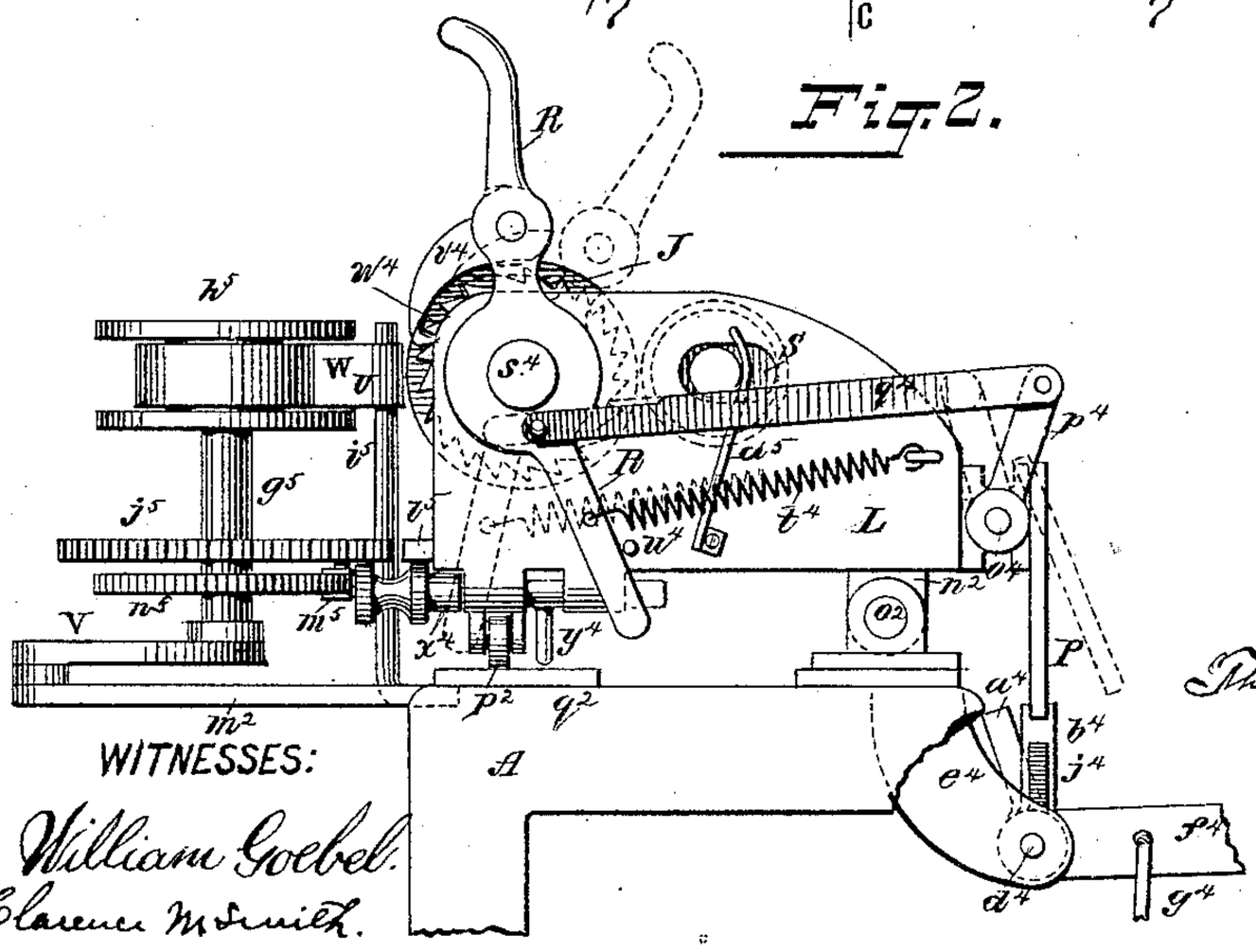


Fig. 2.



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Clarence McIntosh.

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(No Model.) 5 Sheets—Sheet 2.

T. F. BOURNE.

TYPE WRITING MACHINE.

No. 446,850. Patented Feb. 24, 1891.

Fig. 3.

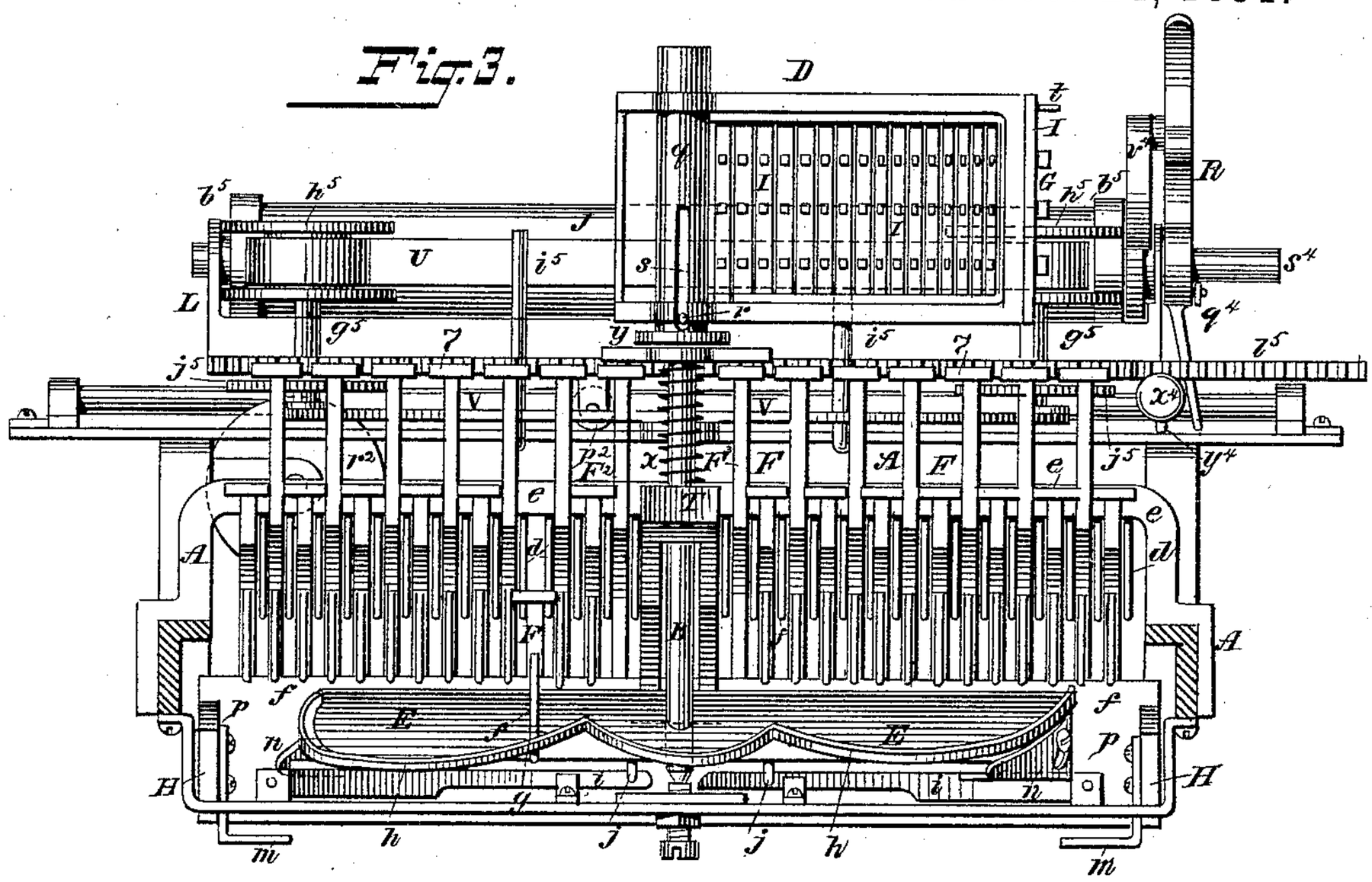


Fig. 4.

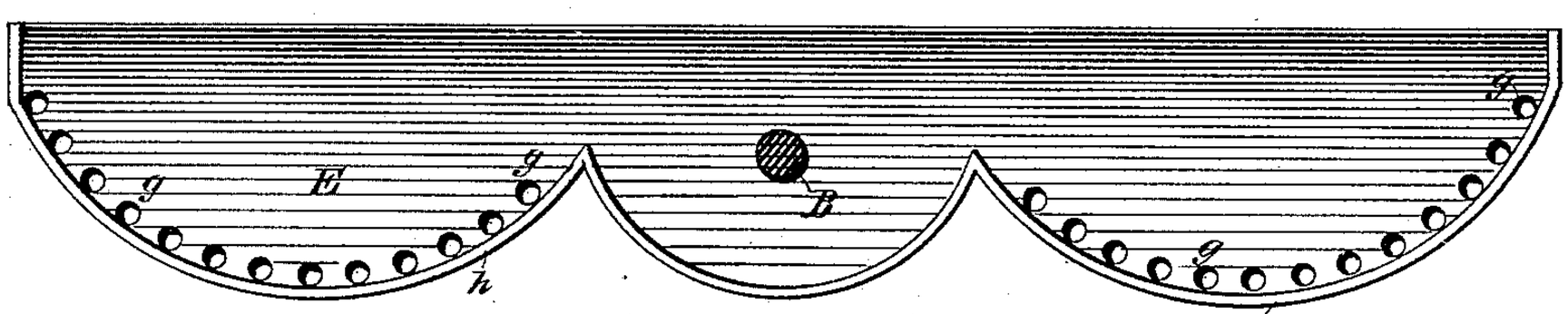
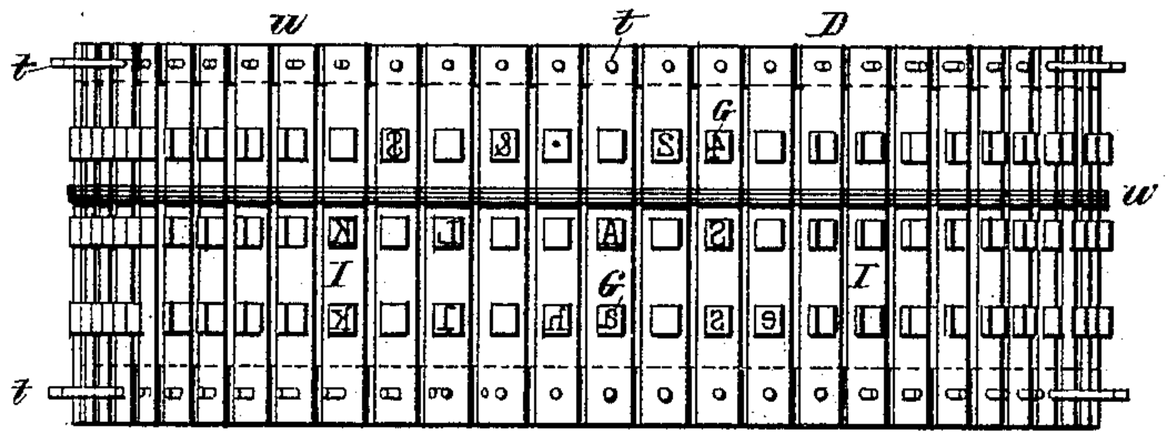


Fig. 5.

Fig. 6.



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(No Model.) 5 Sheets—Sheet 3.

T. F. BOURNE.

TYPE WRITING MACHINE.

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Fig. 7.

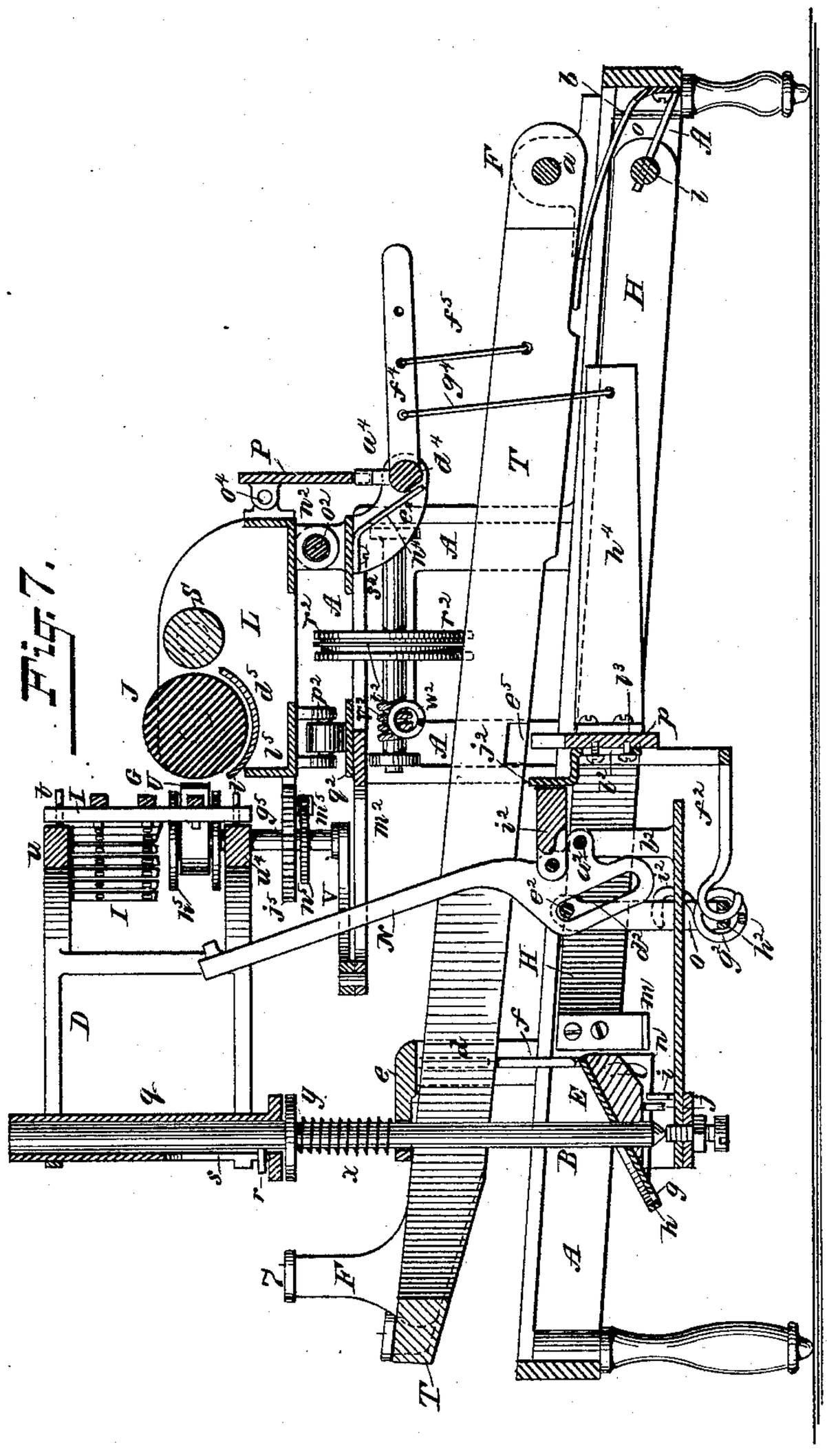
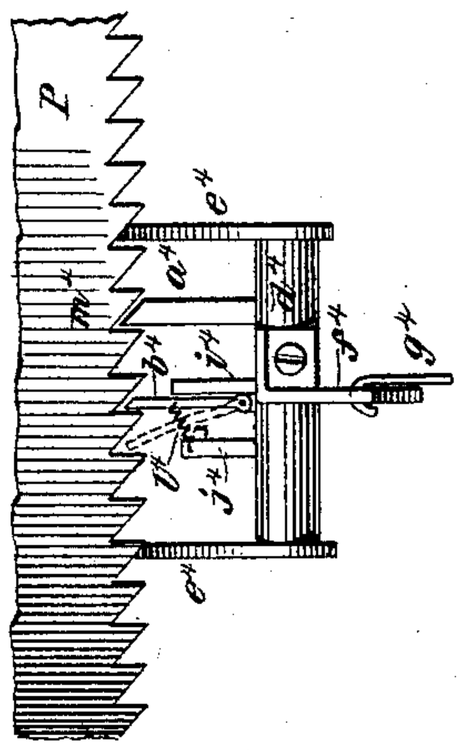


Fig. X.



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(No Model.)

5 Sheets—Sheet 4

T. F. BOURNE.

TYPE WRITING MACHINE.

No. 446,850. Patented Feb. 24, 1891.

Fig. 8.

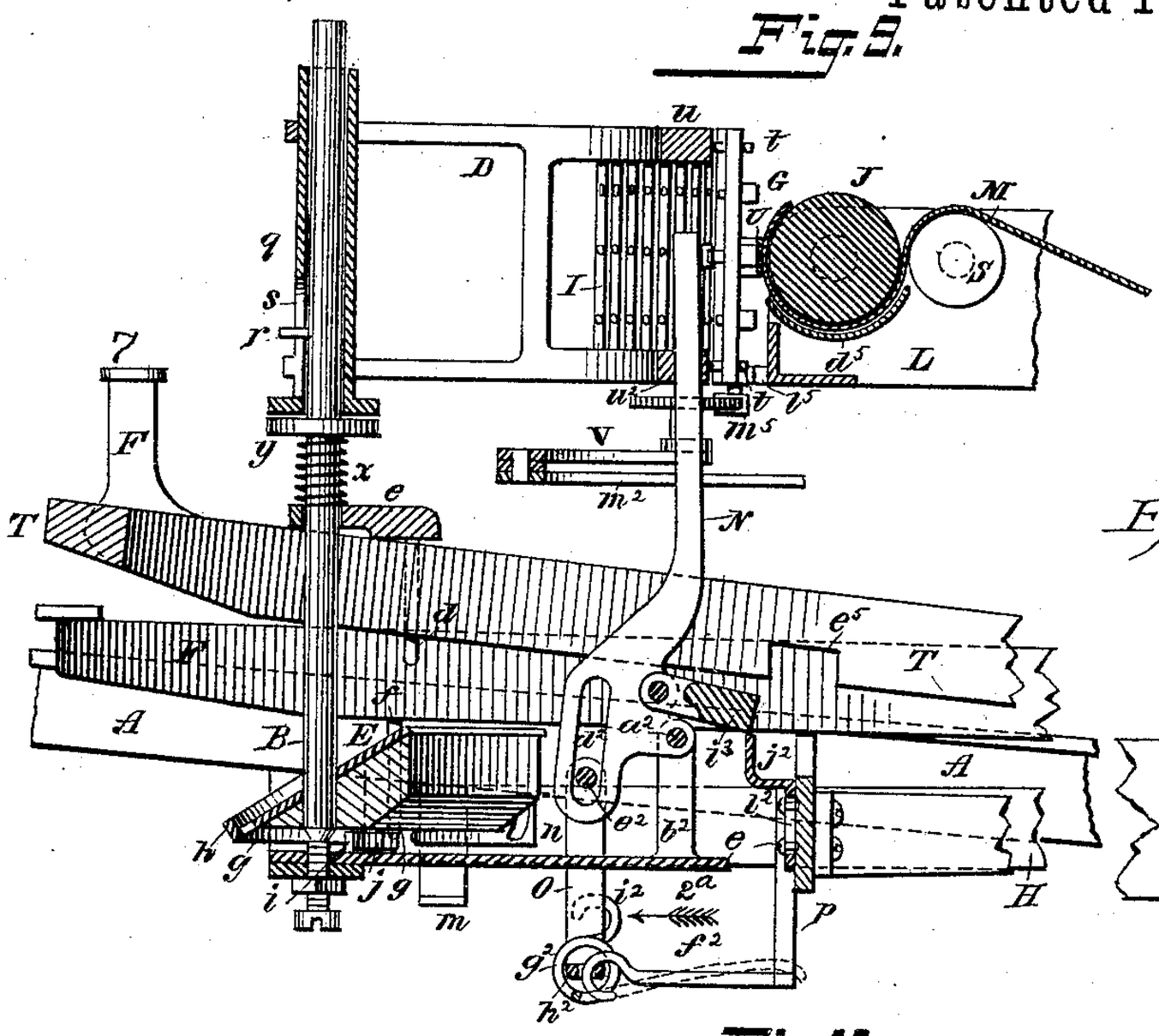


Fig. 9ª

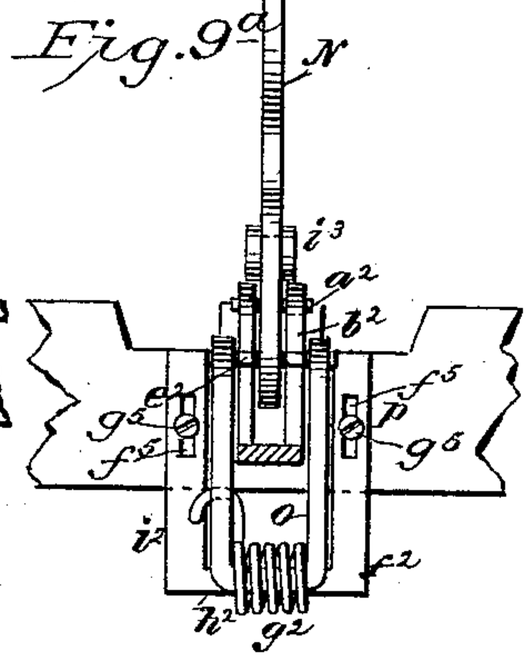
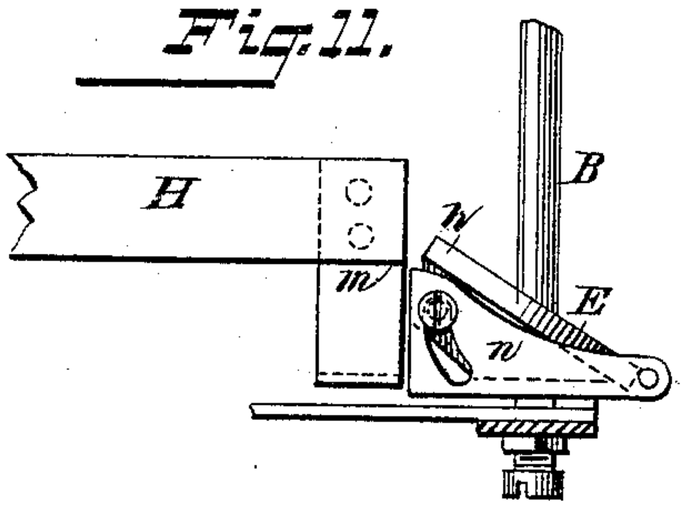


Fig. 10.

Fig. 11.



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T. F. BOURNE.

TYPE WRITING MACHINE.

No. 446,850. Patented Feb. 24, 1891.

Fig. 12.

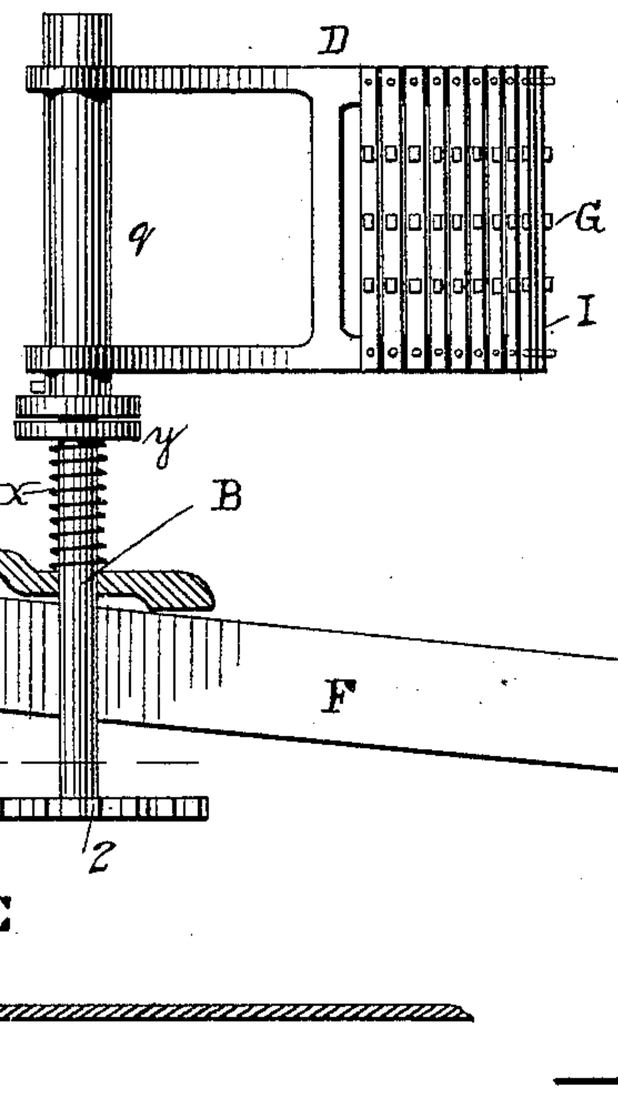
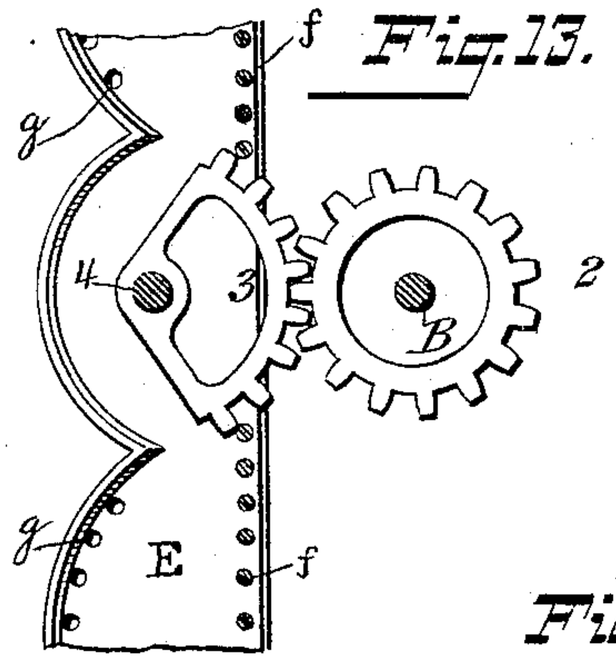


Fig. 13.



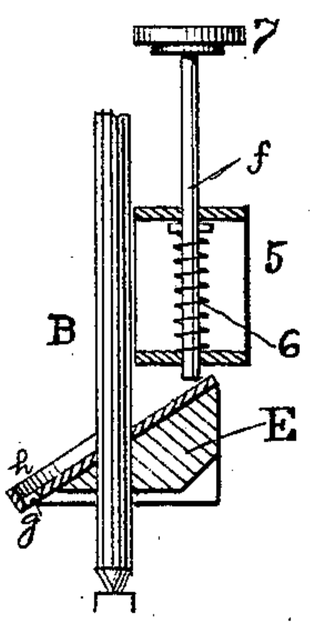
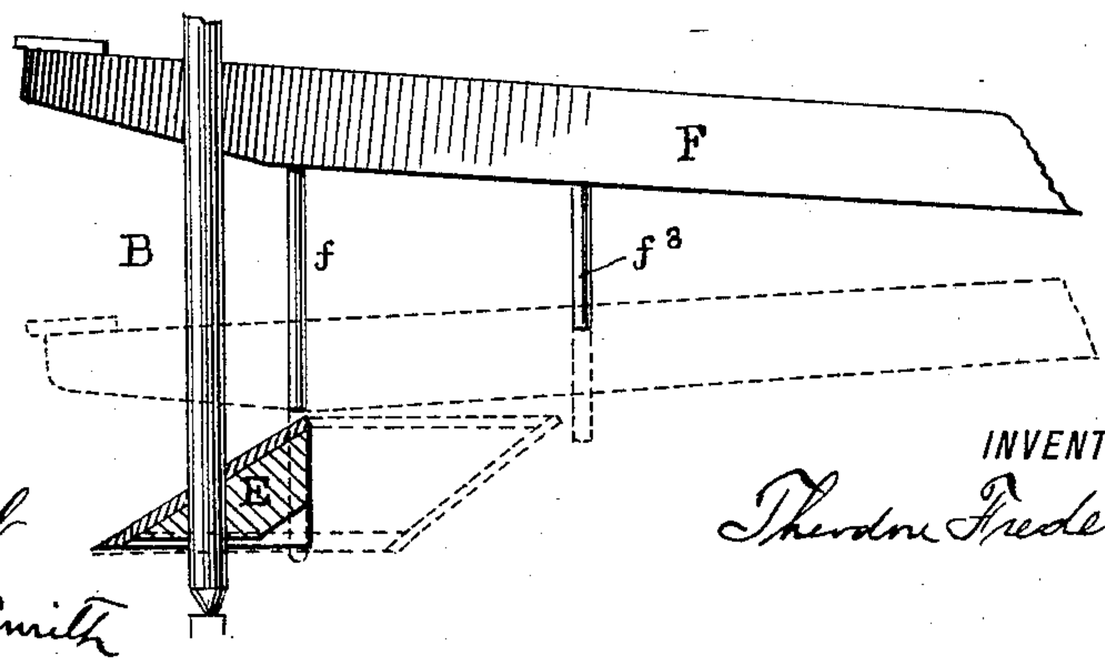


Fig. 14.



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Clarence M. Smith

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UNITED STATES PATENT OFFICE.

THEODORE FREDERICK BOURNE, OF CLIFTON, NEW YORK.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 446,850, dated February 24, 1891.

Application filed January 21, 1890. Serial No. 337,611. (No model.)

To all whom it may concern:

Be it known that I, THEODORE FREDERICK BOURNE, residing in Clifton, Richmond county, New York, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

My invention relates to that class of type-writers in which a series of keys or levers are actuated by both hands of the operator, and more particularly to the class wherein the types are carried on a segment or type wheel, and in which a hammer is used to cause an impression to be made on paper.

The object of the invention is to so simplify and improve the construction of a type-writing machine that comparatively few parts will be needed to produce a machine capable of being operated by both hands to effect fast writing, and in which the parts will not be likely to get out of order.

The invention consists in novel means for turning a type segment or carrier to bring the types into position for printing, as more fully hereinafter set forth.

Also in novel means for actuating a hammer to cause the types to produce impressions on paper, &c.

The invention further consists in the novel details of improvement and the combinations of parts that will be more fully hereinafter set forth, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming part of this specification, wherein Figure 1 is a plan view of a type-writing machine embodying my invention. Fig. 2 is a side elevation of the upper portion of the same, looking in the direction of the arrow in Fig. 1. Fig. 3 is a front elevation of the machine, one of the keys being shown depressed and the type-segment thereby turned to the right. Fig. 4 is a plan view, enlarged, of the bar or lever having the inclined face by means of which the type segment or carrier is turned. Fig. 5 is a face view, enlarged, of the type segment or carrier. Fig. 6 is a vertical sectional view of the type segment or carrier, showing how the types are supported. Fig. 7 is a vertical longitudinal sectional view on the plane of the line *c c*, Fig. 1. Fig. 8 is a detail view of the escapement for the paper-carriage. Fig. 9 is a detail sectional view on the plane of the line *c c*, Fig. 1, showing the parts in the position they assume when the type segment or carrier is turned and the hammer thrown by the depression of a key-lever. Fig. 9ª is an edge view of the hammer and its actuating connections. Fig. 10 is a detail front view of the paper-carriage and the mechanism for driving it. Fig. 11 is an edge view of the bar for turning the type segment or carrier, showing also the means for holding said bar in its normal position; and Figs. 12, 13, 14, and 15 are detail views of modifications, hereinafter more fully described.

Referring now to the accompanying drawings, the letter A indicates the frame of the type-writer, which may be of any suitable shape and construction.

B is a shaft shown in a vertical position, which shaft is journaled in suitable bearings in the frame A. The shaft B is adapted to support and actuate a type segment or carrier D, as hereinafter more fully stated. To the shaft B, preferably near its lower end, is secured a bar or lever E, by means of which the shaft B is turned on its longitudinal axis in opposite directions. The bar or lever E extends outwardly on opposite sides of the shaft B, or, in other words, the shaft B projects from about the central part of the bar or lever E. One face or side of the bar or lever E is inclined, as shown, so that when a pin or rod is pressed upon said incline said bar or lever will be moved or turned on its pivot to turn the shaft B.

F are a series of key-levers that are suitably pivoted or hung on a rod *a*, carried by the frame A, or they may be otherwise suitably pivoted in the frame. The key-levers F extend over the bar or lever E and at about right angles thereto when the latter is in its normal position. (See Fig. 7.) The key-levers F are supported so as to have free up and down movement at their outer or free ends by springs *b*, one for each lever F, said springs *b* being suitably secured to the frame A. (See Fig. 7.) The key-levers F, at their outer ends, pass between suitable guides *d*, which act to prevent lateral movement of said key-levers, and the latter are held up against a suitable cross bar or stop *e* on the frame A, which limits their upward movement.

Each key-lever F carries a projection or pin *f*, that is situated above the inclined face of the bar or lever E. (See Figs. 3, 7, and 9.) When a key-lever F is depressed, its projection *f* is forced or pressed against the inclined face of the bar or lever E, and as said bar or lever is pivotally carried by the shaft B it will move or swing under the advancing projection *f*, and thereby the shaft B will be turned. As some of the key-levers F are on one side of the shaft B and some are on the opposite side, the shaft will be turned either to the right or to the left, according to which side the key-lever that is moved to actuate the bar E is on. (See Figs. 3 and 9.)

In order to check the movement of the bar or lever E, and thereby the shaft B, and to hold said shaft or bar firmly while the type is being impressed on paper, as hereinafter shown, I provide a series of holes or apertures *g* in the bar or lever E, each of which holes is adapted to receive a corresponding projection *f*, as indicated in Figs. 3 and 9.

In Fig. 4 each series of holes *g* on opposite sides of the shaft B is shown arranged in the arc of a circle, the arrangement of the projections *f* and apertures or holes *g* being such that the nearer they are situated to the shaft B the more the bar or lever E, and thereby the shaft B, will be turned, and the farther they are away from the shaft B the less it will be turned; or, in other words, when the bar or lever E is in its normal position or at about right angles to the key-levers F the type G at about the center of the type segment or carrier in Fig. 1 is in position to be impressed upon paper. When now the key-lever at the extreme right or left is depressed, the bar E will be turned slightly to bring the type next to the center type into position to be struck, and the type-carrier will then be moved but slightly; but if the key-lever next to the shaft be depressed the bar E, and thereby the type-carrier, will be swung around to bring the type nearest the outer edge of the carrier into position to be struck, and so on for all the key-levers, the type-carrier D being turned more or less according to the distance the key-lever that is depressed is from the shaft B. After the projection *f* has passed along the inclined face of the bar or lever E sufficiently far to turn the shaft B the distance desired to bring the desired type into position for printing, said projection *f* will pass into or through its corresponding aperture or hole *g*, and thereby will automatically lock and hold the bar or lever E from further movement until the projection is withdrawn from said aperture.

In order to insure that the projection *f* will positively pass into its corresponding hole *g* in the bar E and not ride past it, I place an upturned ledge *h* in front of and about in line with the outer edge of the holes *g*. By this means, when the projection *f* has passed along the inclined face of the bar E sufficiently far, and thus turned the bar, the projection will be arrested by the ledge *h* and will then pass through the hole *g* to lock the bar E. By arranging the holes *g* in the proper places on the bar E the movement of said bar for each projection *f* of the key-levers F can be regulated, whereby each key-lever regulates the distance the type-carrier shall be turned in either direction. After the bar or lever E and shaft B, and thereby the type-carrier, have been turned to bring the desired type into the printing position, and after the impression has been made, (as hereinafter shown,) the bar E and type-carrier D should be returned to their normal position ready to be moved again. This can be accomplished by means of a spring or springs suitably arranged for the purpose. In the drawings I have shown two spring-arms *i i*, one on each side of the shaft B, and suitably secured to the frame A. (See Fig. 3.) Each spring *i* is adapted to press against a corresponding pin *j* or the like, one on each side of the shaft B, the tendency of said springs being to return the bar E (and thereby the shaft B) to its normal position, or at about right angles to the key-levers F. The bar or lever E should be held in its normal position until a key-lever is struck, and should be instantly stopped on its return movement when it reaches its normal position. I prefer to effect the above as follows: H H are two levers, shown extending about parallel with the key-levers F, and preferably rigidly secured to a rock-shaft *l*, suitably hung in the frame A, so that both levers H will move in unison. The levers H carry projections or stop-pieces *m*, each of which is adapted to be engaged by a pivoted dog or the like *n* on opposite ends of the bar or lever E. (See Figs. 3, 7, 9, and 11.) The levers H should be held up in position for the dogs *n* to engage the projections *m*, Fig. 7, by a suitable spring. A spring-rod *o*, passing through the shaft *l* and resting against the frame A, as in Fig. 7, will answer. Each time a key-lever F is depressed the levers H, and thereby the projections *m*, should be lowered to free the dogs *n* from the projections *m*, and to thereby permit the bar or lever E to freely turn under the advancing projection *f*. This is or may be effected by means of a cross-bar *p*, secured to the levers H and extending across the machine beneath the series of key-levers F. (See Figs. 3 and 7.) When now a key-lever F is depressed, it engages the cross-bar *p* and depresses the levers H, thereby moving the projections *m* below the dogs *n* on the bar or lever E, whereby said bar is now free to be moved by the advancing projection *f*, as before shown. When the key-lever F is released, it rises under the influence of its spring *b*, the levers H H also then rising, thereby returning the projections *m* to their upper or normal position, so that as the bar or lever E is returned by its spring *i* the dogs *n* will encounter the projections *m*, and thus the bar or lever E will be brought to rest in its normal position.

The projections *f*, toward the outer sides of the series, will reach their corresponding holes *g* sooner than the projection nearer the shaft B; but this will not affect the bar *p*, as the levers F must all be depressed the same or a certain distance to cause the bar *p* to be depressed the desired distance. If the projection *f* passes into the hole *g* before the bar *p* is depressed the desired distance, it can simply pass freely through until the lever F or bar *p* is depressed the desired amount.

The type segment or carrier D is shown in the form of a three-cornered open frame, having at one corner a tube *q*, into which the shaft B projects, whereby the type-carriers D can be moved up and down on said shaft. A pin and slot *r s* between the tube *q* and shaft B causes the type-carrier to be turned with and by the shaft B, while permitting up-and-down or longitudinal movement of the type-carrier on said shaft. The outer side of the type segment or carrier D, or the side opposite the tube *q*, is shown curved or in the arc of a circle described from the shaft B. On this curved edge of the type-carrier D are a series of outwardly-projecting pins *t*, there being one series of such pins *t* on the upper part *u* and a corresponding series of pins on the lower part u^2 of the type-carrier, as in Figs. 3, 5, 6, 7, and 9. The types G are carried on bars I, that are provided with apertures *v* to receive the pins *t*, whereby said bars are hung on the type-carrier D and are permitted movement on the pins *t*. (See Fig. 6.) The bars I are shown extending parallel on the outer side of the curved part of the type segment or carrier D, and the types G on the several bars are arranged in rows and in alignment, so that all the types of each row will be in perfect line. Three rows of types are shown, (see Fig. 5,) the small letters being in the lower row, the capitals in the middle row, and the figures and punctuation-marks, &c., being in the upper row; but the above arrangement of types can be varied as desired.

The types G on the type-carrier D are arranged in proximity to a roller or platen J on a paper-carriage L, that is suitably guided on the frame A. The bars I, and thereby the types G, are adapted to be pressed forward, so that the types can make an impression on paper M, that passes over the roller J. (See Fig. 9.) The bars I may be moved back on the pins *t* by a suitable spring or spring-band *w*, which also acts to hold the bars I against the type segment or carrier. (See Figs. 5 and 6.) Said spring-band *w* may be made of rubber—an elastic band, for instance—and extend around the type-carrier and press against the bars I to hold them in position.

The type segment or carrier D is preferably normally held elevated, so that the lower row of type G will be in line with the paper-roller J. (See Fig. 7.) This is or may be accomplished by means of a spring *x*, coiled around the shaft B and resting at one end against the stop-bar *e* and at the opposite end against the tube *q* or a swiveled plate or bar *y* on the tube *q*.

When the capitals or the figures or punctuation-marks are to be struck, the type-carrier D should be drawn down to bring the desired row of types in line with the roller J. By means of a connection *z*, extending from one side of the swiveled plate *y* to a lever F^2, the type-segment will be drawn down to bring the row of capitals in line with the roller J by depressing the said lever. So, also, by a connection *z'*, extending to the lever F^3, the type segment or carrier D will be drawn down to bring the upper row of types in line with the roller J. The spring *x* acts to return the type-carrier D to its normal position when the lever F^2 or F^3 is released.

To cause an impression of the types to be made on paper, I provide a hammer that is adapted to strike the inner side or shank of the type to drive it forward. I have devised a very simple arrangement for causing the hammer to strike a type and then to be reset to strike the next type, and so on. N is a hammer adapted to strike a type or the bar that carries it. (See Fig. 9.) The hammer N is pivoted, as at a^2, to a suitable standard b^2, carried by the frame A, (see Figs. 7 and 9,) and it is adapted to have pressure exerted upon it on opposite sides of its fulcrum for moving it in opposite directions. For this purpose said hammer is shown having a slot or groove d^2 extending both above and below the pivot a^2, as shown. O is an arm or bail that has a side projection or bar e^2, (shown passing into or through the slot d^2,) said projection or bar being adapted to slide along the slot or groove d^2 from the position shown in Fig. 7 to that shown in Fig. 9, and thereby to exert pressure on the hammer. The arm or bail O is pivotally carried so as to have an up-and-down motion, and is preferably pivoted to an arm f^2 on the cross-bar *p*, so as to move up and down with the movement of said cross-bar. The arm or bail O has an outward spring tendency in the direction of the arrow 2^a, Fig. 9, and for this purpose I prefer to coil a spring g^2 around the part h^2 of the arm or bail O and to cause one end i^2 of said spring to press against the arm or bail O and its other end against the arm f^2, (see dotted lines, Fig. 9;) but of course the spring for moving the arm or bail O in the direction of the arrow 2^a could be otherwise arranged, if desired.

The above parts operate as follows: When the parts are in their normal position, the bar e^2 of the arm or bail O will be near the upper part of the slot or groove d^2, and as that point is above the pivot a^2 the action of the spring g^2 will throw the upper part of the hammer N outward, as in Fig. 7, or away from the types G. When now a key-lever is depressed, the cross-bar *p* will be lowered, and thereby the bar or projection e^2 will be drawn down through the slot or groove d^2 until it passes below the pivot a^2, when the

action of the spring g^2 will throw the lower end of the hammer N in the direction of the arrow 2^a, thereby throwing the upper end of said hammer forward, causing it to strike a type and drive it forward to print. When the key-lever F is released, the cross-bar p will rise, thereby carrying up the bar or bail O, causing the projection or bar e^2 to pass up in the slot or groove d^2, and when it passes above the pivot a^2 it will throw the upper end of the hammer backward or in the direction of the arrow 2^a. From the above it will be seen that the single spring g^2 tends to move the hammer in two directions—that is to say, forward to strike the type and backward into the normal position, ready to be driven forward again.

The hammer coacts with the type segment or carrier D as follows: When the key-lever F is depressed, its projection f rides on the inclined face of the bar or lever E, and thus turns the type-segment to bring the desired type in front of the paper-roller J, while at the same time the arm or bail O is lowered to draw the part e^2 along the slot or groove d^2. After the projection f reaches and passes into its corresponding aperture or hole g in the bar E, to hold the type carrier in the proper position the part e^2 of the arm or bail O is sufficiently far below the pivot a^2 to cause the upper part of the hammer N to be moved forward to strike the type held in line with it; but the hammer N should not be thrown until after the projection f has entered its corresponding aperture g in the bar E. When the key-lever F is released, the parts all return to their normal positions, as before shown.

In order to insure that the hammer N will not be thrown until after the type to be struck is brought to the proper position, I may pivot to said lever a dog i^3 above the pivot a^2, the outer end of which dog comes against a projection j^2 on the cross-bar p, as in Fig. 7, or it could rest directly against the cross-bar p. The projection j^2 is adjustable up and down, so as to regulate the time at which the dog i^3 shall slip over said projection when the cross-bar p is lowered. By means of a slot l^2 in the projection j^2 and a screw l^3 passing through said slot and into the cross-bar p the projection j^2 can be adjusted vertically on the bar p. The above parts are to be so adjusted that the projection j^2 will remain in front of the dog i^3 until after the projection f of the key-lever F has passed into its respective aperture g in the bar or lever E and the proper type G has thus been brought into position to be struck by the hammer. Then when the projection f passes farther into the aperture g the projection j^2 will pass below the dog i^3, thus permitting the hammer N to be thrown by the bail O and spring g^2, all as before clearly stated and as shown in Fig. 9. The upper end of the hammer N is preferably guided in a slotted projection or arm m^2, carried by the frame A, as shown in Figs. 1, 7, and 9. By this means the hammer is guided to insure its striking at the proper point.

The paper-carriage L is adapted to move step by step as the several types are struck, as well known in type-writing machines.

The paper-carriage may be of any suitable construction and actuated in any desired manner. I have shown one means for this purpose, as follows: The paper-carriage L (shown in the drawings) consists of a suitable frame, which is provided at one corner with suitable eyes or sockets n^2 n^2, that slide freely on a guide-rod o^2, suitably supported on the frame A. The opposite side or corner of the paper-carriage is shown provided with a roller p^2, that travels on the part q^2 of the frame A.

By the above means the carriage L is supported and guided. To drive the paper-carriage to the left, I have shown a roller r^2 secured to a shaft s^2, suitably hung in bearings in the frame A. A cord or other suitable connection t^2 is connected at one end to the carriage L and at its other end to the roller r^2, so that as the roller r^2 turns it will wind up the cord t^2, and thus propel the carriage. To turn the roller r^2 to drive the carriage, I have shown a cord or the like v^2, that at one end is secured to the shaft s^2 and adapted to be wound on the same and at its other end it is connected to a spring w^2, secured to the frame A. When the carriage is moved to the right by the operator, it turns the roller r^2 and shaft s^2, thereby winding the cord v^2 on the shaft s^2 and distending the spring w^2; but when the carriage is released the spring w^2 retracts, and thus turns the shaft s^2 and roller r^2 in the opposite direction, thus winding the cord t^2 on the roller r^2 and moving the carriage to the left. By securing the spring w^2 to an adjustable hook or the like w^3 the tension of said spring may be regulated.

The paper-carriage is adapted to move step by step, and for this purpose I have provided the following arrangement: P is a rack carried by the paper-carriage L and adapted to be engaged by a stationary dog a^4 and a movable dog b^4. (See Fig. 8.) Said dogs are carried by a rocking bar d^4, that is hung in suitable bearings in brackets e^4, suitably supported by the frame A. (See Figs. 2, 7, and 8.) The rocking bar d^4 carries a crank-arm f^4, that is connected by suitable links g^4 h^4 with the cross-bar p, so that as the said bar p is moved the bar d^4 will be rocked. The dog b^4 is pivoted so as to swing between two stops i^4 j^4 on the bar d^4 and it is drawn toward the stop j^4 by a spring l^4. (See Fig. 8.) The upper or outer ends of the dogs a^4 b^4 are partially or wholly out of line, as in Fig. 2, the arrangement being such that when the crank f^4 is drawn down by the depression of the bar p the dog a^4 will pass between two teeth m^4 on the rack P, thereby moving the dog b^4 from between two teeth m^4 and to one side of the rack P and permitting the spring l^4 to draw the dog b^4 back the distance of one

tooth, as in dotted lines in Fig. 8. When now the cross-bar p rises, the bar d^4 will rock back, causing the dog a^4 to pass out of its tooth-space m^4 and also carrying the dog b^4 between two teeth, (see Fig. 2,) the spring w^2 now acting or being permitted to draw the carriage L, which moves the dog b^4 from the dotted position to the full-line position in Fig. 8, said dog abutting against the stop i^4. Each time the crank f is moved down and up the carriage will be fed forward one step or the distance between two teeth m^4, the dog a^4 always acting to hold the carriage, while the dog b^4 is moving back to engage the next tooth to feed the carriage. It will be seen that the two feed-dogs a^4 b^4 do not pass between the same teeth m^4 at the same time, but each passes between a different set of teeth, and that said dogs are situated at a distance from each other along the rack P. A suitable spring n^4 may be used to turn the bar d^4 back after it has been moved by the downward motion of the bar p, or the link g^4 can move the bar d^4 in both directions.

When the carriage L is to be moved to the right in Fig. 1 to commence a new line of writing, the rack P should be disengaged from the dogs a^4 b^4. I pivot said rack P to the carriage L, as at o^4, so that it can swing outwardly free of said dogs, as in dotted lines in Fig. 2. One pivot o^4 of said rack P is shown connected by a crank p^4 and link q^4 with a lever R, that is hung on the shaft s^4 of the roller J. When the lever R is turned on its pivot, it draws on the link q^4 and crank p^4, thereby rocking the rack P on its pivot free from the dogs a^4 b^4, all as in dotted lines, Fig. 2. A spring t^4, connected at one end to the lever R and at its other end to the carriage L, draws the lever R against a stop-pin u^4, thereby holding the parts in their normal position. The lever R also carries a dog v^4, that engages a ratchet-wheel w^4, connected with the paper-roller J, so that when the lever R is turned it will turn the paper-roller. The parts are so arranged that the moving of the lever R to roll the paper M for another line-space will also and simultaneously move the rack P out of engagement with the dogs a^4 b^4 to permit the carriage to be moved to the right ready for another line to be written. In order to regulate the distance between lines, I have provided a rod x^4, that is adapted to turn in bearings on the carriage L, said rod carrying a pin y^4, that is adapted to come in line with the lever R to limit its movement.

S is a roller parallel with the roller J, hung in suitable bearings in the carriage L. Suitable springs a^5 at the ends of the roller S tend to press it against the roller J. The paper M is passed between the rollers J and S and is carried around the roller J by friction. Suitable curved guides b^5, carried by the carriage L, cause the paper M to lie close to the front of the roller J. A suitable curved guide d^5 beneath the roller J causes the paper M from between the rollers J S to be properly guided. (See Fig. 9.)

T is a space-key lever for making the spaces between words, and it is shown as extending parallel with the key-levers F and situated at about the center of the series of key-levers. In order that the space-key T will not actuate the cross-bar p to operate the hammer N, I cut away part of said space-key over the cross-bar p, (or cut away the cross-bar p, one or both, as shown,) as at e^5. The space-key T is connected by a link f^5 with the crank f^4, so that when the space-key is depressed the carriage will move along a step to make a space without a type being struck.

The inking-ribbon U is to pass between the type G on the type-carrier D and the roller J, so as to be pressed by the type on the paper M. Said ribbon may be carried and actuated in any suitable manner. The means I have shown for this purpose is as follows: V is a bar pivoted to the support m^2, said bar V at its ends carrying rotary uprights g^5. h^5 are ribbon-spools that are removably carried on the uprights g^5, the inking-ribbon U being wound around said spools, as in Fig. 1. Said ribbon is passed over guide-posts i^5, carried by the frame A, said posts being arranged to guide the ribbon between the type and roller J. As shown in Fig. 1, the ribbon U passes over the side of one spool h^5 next the roller J, while said ribbon passes over the outer or opposite side of the other spool. Said spools are turned to actuate the ribbon as follows: Each upright g^5 carries loosely a gear-wheel j^5, that is adapted to mesh with a rack l^5, carried on the carriage L. The gear-wheel j^5 carries a pawl m^5, that engages a ratchet-wheel n^5, fast on the upright g^5. (See Fig. 2.) When the gear-wheel j^5 on the left is in gear with the rack l^5 and the carriage moves to the left, the upright g^5 and spool h^5 will, by the pawl m^5 and ratchet n^5, be turned, and thus wind up the ribbon U and unwind it from the opposite spool. When the carriage is moved to the right, the pawl m^5 slips on its ratchet, thus permitting the spool to stand still. When it is desired to have the spool on the right in Fig. 1 turn to wind the ribbon, the bar V is turned on its pivot, which moves the gear-wheel j^5 on the right into mesh with the rack l^5 and draws the gear j^5 on the left out of mesh with said rack. The winding of the ribbon is effected, as shown above, on the other spool.

Of course I do not wish to confine myself to the precise means shown for carrying out my invention, as said means can be modified or changed without departing from the spirit of my invention. Instead of the type segment or carrier D and the inclined bar E being on the same shaft, they may be on separate shafts and connected together, so that one will actuate the other by means of suitable gearing. Such an arrangement is illustrated in Figs. 12 and 13, wherein the shaft

B carries a toothed wheel 2, that gears with a toothed segment or the like 3, carried by a shaft or arbor 4, that supports the inclined bar E. The arbor 4 is suitably guided in the frame A, and as the pins *f* descend to turn the inclined bar E the segment 3 will be turned, and thereby the shaft B and type-carrier D.

In Fig. 14 I have shown a modification of the means for locking and holding the inclined bar or lever E when it is turned. This consists of a pin f^8, carried by the key-lever F and at a suitable distance from the pin *f*, so that when the bar or lever E has been turned a suitable distance to bring a certain type into printing position said bar will encounter the pin f^8 and stop further movement of said bar, whereby the latter will be held in the desired position.

In Fig. 15 the pin *f* for actuating the inclined bar E is separated from the key-lever F and is guided in bearings 5, suitably carried in the frame A. A spring 6 tends to keep the pin *f* elevated and to return it to its upper normal position after it has been depressed to turn the inclined bar E.

Of course it will be understood that suitable finger-keys 7 are to be placed on the levers F, (or on the pins *f*, Fig. 15,) as usual, which keys may be provided with suitable letters or symbols, as in Fig. 1.

It will be seen from the preceding description that the bar or lever E is turned in a plane at about right angles to the plane of movement of the pins *f*, whereby the described effects are produced. It will be found that when the pins *f* turn the inclined bar or lever E they pass over its surface in the arc of a circle, because the pivot of said bar or lever is at one side of the pin *f*.

Other means than that described for arresting the bar or lever E and for holding it in its normal position may be used, if preferred.

The type-bars I could be supported and carried on the type segment or carrier D otherwise than by the pins *t*, if desired, so that they can have lateral movement, as before shown.

By placing the spring g^2 as shown its tension remains even on the bail or arm O, so that whether the arm O is raised or lowered the tension hardly varies; but said spring can be otherwise suitably arranged. The support f^2 for the bail or arm O may be made adjustable on the cross-bar *p* by means of slot f^6 and screw g^5 (see Fig. 9^a) to regulate the passage of said bail in the slot d^2 of the hammer N, or with reference to the pivot of said hammer.

Having now described my invention, what I claim is—

1. A vertical shaft adapted to actuate a type-carrier and a bar or lever secured to said shaft and extending at about right angles to said shaft and projecting on opposite sides of said shaft, said bar or lever having an inclined face on one side, combined with a series of pins or projections for moving said bar or lever by riding on its inclined face, said series of pins or projections extending in a substantially straight line substantially parallel with said bar or lever, substantially as described.

2. A shaft or support and a bar or lever secured to said shaft and having an inclined face on one side, combined with a series of substantially parallel levers extending at right angles to the inclined bar or lever, said levers having pins or projections adapted to ride on the inclined face of said bar or lever to turn the latter more or less on its pivot, said pins or projections extending in a line substantially parallel with said bar or lever, substantially as described.

3. A vertical shaft adapted to actuate a type-carrier, and a bar or lever carried by said shaft and projecting from opposite sides thereof and at about right angles thereto, said bar or lever having one side inclined, combined with a series of substantially parallel levers extending over said inclined bar or lever, and the pins or projections *f* on said levers extending about parallel to said shaft and adapted to be depressed upon the inclined side of said bar or lever to turn the latter on its pivot, said pins or projections extending in a line substantially parallel with said lever, substantially as described.

4. A shaft or support and a bar or lever secured to said support and having one side inclined, and a series of holes or apertures in said bar or lever at varying distances from said shaft, combined with a series of pins or projections, one for each of said holes, and adapted to ride on said inclined side of said bar or lever to actuate it and to pass into or through their respective holes or apertures to arrest said bar or lever and hold it stationary, substantially as described.

5. A shaft and a type-carrier supported thereby and a bar or lever having an inclined face on one side for actuating said shaft, combined with a series of levers having pins or projections placed in a line substantially parallel with said bar or lever to ride on said incline to actuate the bar or lever, and thereby the type-carrier, and with a series of holes in the inclined face of said bar or lever to receive said pins for arresting the movement of said bar or lever and for holding it stationary, said holes being arranged in the arc of a circle to regulate the amount of movement of the bar or lever for each pin, substantially as described.

6. A shaft for supporting a type-carrier, and a bar or lever E, having an inclined face, combined with a series of pins or projections *f* for actuating said bar, and with means, substantially as described, for carrying said pins, said pins being interposed between their support and said bar, whereby after said bar has been turned said supports may have further movement without engaging said bar, substantially as specified.

7. A shaft for supporting a type-carrier and a bar or lever E for turning said shaft, said bar or lever having one side inclined, com-

bined with a series of pins or projections to ride on the inclined side of the bar or lever E for actuating said bar or lever, and means, substantially as described, connected to said bar or lever for holding it in its normal position and for releasing it to permit it to be turned, substantially as described.

8. A type-carrier and means, substantially as described, for supporting the same, and a bar or lever E, having one side inclined, for actuating said type-carrier, combined with a series of pins or projections for riding on said inclined side of said bar or lever for actuating said bar or lever, means, substantially as described, for arresting its motion and holding it stationary, and with means, substantially as described, connected to said bar or lever for holding it in its normal position and for releasing the same to permit it to be turned, substantially as described.

9. The pivoted bar or lever E, having an inclined face, apertures *g*, and ledge *h* at said apertures, combined with pins or the like *f* for riding on said bar and for passing through said apertures to lock the bar or lever E, said ledge guiding the pin into the aperture, substantially as described.

10. The pivoted bar or lever E and means, substantially as described, for turning it, combined with the lever H and with connections intermediate said lever H and the bar or lever E for holding the lever E stationary and releasing the same, substantially as described.

11. The pivoted bar or lever E, having the pivoted dogs *n* at its ends, and means, substantially as described, for turning it, combined with the levers H, having the stop-pieces *m*, against which said dogs abut, all arranged for operation substantially as herein shown and described.

12. The bar or lever E, having an inclined face, its shaft or support, and the pivoted dogs *n* on the ends of said bar, combined with the levers F, having pins or projections *f*, the levers H, actuated by the levers F, stop-pieces *m* on said levers H, against which said dogs *n* abut, and springs for returning the bar to its normal position, substantially as described.

13. The shaft B and means, substantially as described, for turning it, combined with the levers F, levers H, and cross-bar *p*, connecting said levers H and adapted to be actuated by the levers F to depress the levers H, and means, substantially as described, between the bar or lever E and the levers H for holding and arresting the inclined bar or lever E, substantially as specified.

14. The shaft B, bar or lever E, levers F, and pins or projections, combined with the levers H, cross-bar *p*, rock-shaft *l*, connected to the levers H, stop-pieces *m*, and dogs *n*, substantially as described.

15. The type-carrier D, combined with the parallel bars I, supported on said carrier, each having independent lateral movement bodily, and with type G, carried on said bar one above the other, whereby either type can be impressed by the lateral movement of said bars, substantially as described.

16. The type-carrier D, having the pins *t*, combined with the parallel bars I, having apertures *v*, that receive said pins, whereby said bars are supported on said type-carrier D to have movement on said pins, substantially as described.

17. The type-carrier D, having pins *t*, and the parallel bars I, hung on said pins and carrying types G and having independent lateral movement, combined with a hammer for actuating said bars and type, substantially as described.

18. A pivoted hammer, combined with a spring-actuated arm or bar for pressing against said hammer, and means, substantially as described, for shifting the point of application to the hammer of said arm or bar on opposite sides of the fulcrum of said hammer to throw the hammer in opposite directions, substantially as specified.

19. A pivoted hammer having a slot or groove that extends on opposite sides of said pivot, combined with a spring-pressed bail or arm for engaging said slot, and means, substantially as described, for moving said arm or bail on opposite sides of said pivot, whereby when the pressure is exerted on the hammer on one side of said pivot the outer end of said hammer will be moved in one direction and when the pressure is exerted on the opposite side of said pivot the outer end of the hammer will be moved in the opposite direction, substantially as described.

20. The hammer N, having a pivot a^2, and a slot or groove d^2, that extends both above and below said pivot, combined with a bail or arm O to engage said slot or groove d^2, and a spring for exerting a pressure on said bail or arm, and means, substantially as described, for raising and lowering said bail or arm, substantially as described.

21. The hammer N, pivot a^2, and slot or groove d^2, combined with the bail or arm O to engage said slot or groove d^2, a support f^2 for said bail or arm, cross-bar *p*, a spring for said bail or arm, and means, substantially as described, for supporting and actuating said cross-bar, as specified.

22. The hammer N, pivot a^2, and slot or groove d^2, combined with the bail or arm O to engage said slot, support f^2 for said bail or arm, and a spring that presses at one end against the bail or arm and that is carried by said bail or by its support, and means, substantially as described, for raising and lowering said bail or arm, substantially as specified.

23. The hammer N, pivot a^2, and slot or groove d^2, combined with the adjustable support f^2, bail or arm O, and spring g^2, substantially as described.

24. The hammer N, pivot a^2, and slot or groove d^2, combined with the bail or arm O, support f^2, to which said bail or arm is pivoted, spring g^2, coiled around part of said bail

and pressing at one end only against said bail, substantially as described.

25. The hammer N and means, substantially as described, for actuating it, combined with the dog i^2 and cross-bar p, whereby the dog i^2 prevents the hammer being thrown until the cross-bar p is sufficiently lowered, as specified.

26. The hammer N, combined with the dog i^2, cross-bar p, and adjustable projection j^2, substantially as described.

27. The pivoted bar V, uprights g^5 at opposite sides of its pivot, spools h^5, and gears j^5, combined with the rack l^5 and paper-carriage L, all arranged for operating substantially as described.

28. The pivoted bar V and uprights g^5, carried on opposite sides of its pivot, combined with the spools h^5 on said uprights and ribbon U, said ribbon passing over one side of one spool and over the opposite side of the other spool, whereby both spools are turned in one direction and the ribbon wound in opposite directions, substantially as described.

29. The lever F^2, combined with the type-carrier D, tube q, swiveled plate y, connection z between said plate and lever, shaft B, and spring x, substantially as described.

30. The rack P, pivoted, as at o^4, on the carriage L, so as to rotate on its longitudinal axis, crank p^4, rod q^4, and lever R, combined with dogs to engage said rack to feed it along, said rack being moved in a line substantially parallel to the feeding movement of said dogs to disengage it from the dogs, substantially as described.

31. The rack P, pivoted to the carriage L, as at o^4, crank p^4, rod q^4, and lever R, combined with the spring t^4, stop u^4, and with dogs to engage the rack P, substantially as described.

32. The roller J, ratchet w^4, dog v^4, and lever R, combined with the rack P, pivoted to the carriage L, as at o^4, crank p^4, rod q^4, and dogs to engage with the rack P, whereby as the lever R is moved to turn the roller J the rack P will be turned on its pivot o^4 to release it from the dogs, substantially as described.

33. The rollers J S, guide d^5 below the roller J, and guides b^5 on the front side of the roller J, all combined together, substantially as described.

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