

(No Model.)

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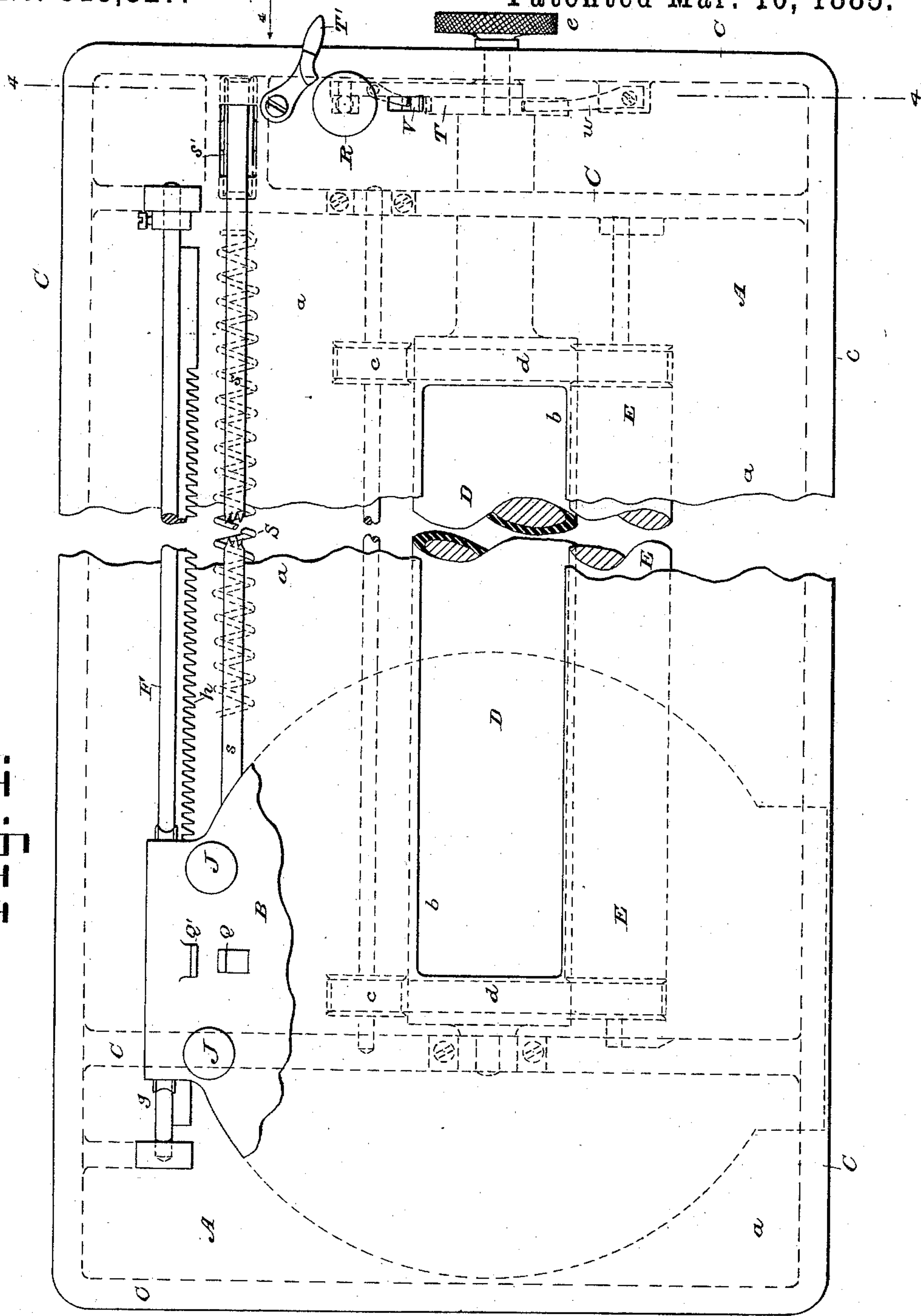
G. LUCAS.

TYPE WRITING MACHINE.

No. 313,827.

Patented Mar. 10, 1885.

Fig. 1.



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Fig. 2.

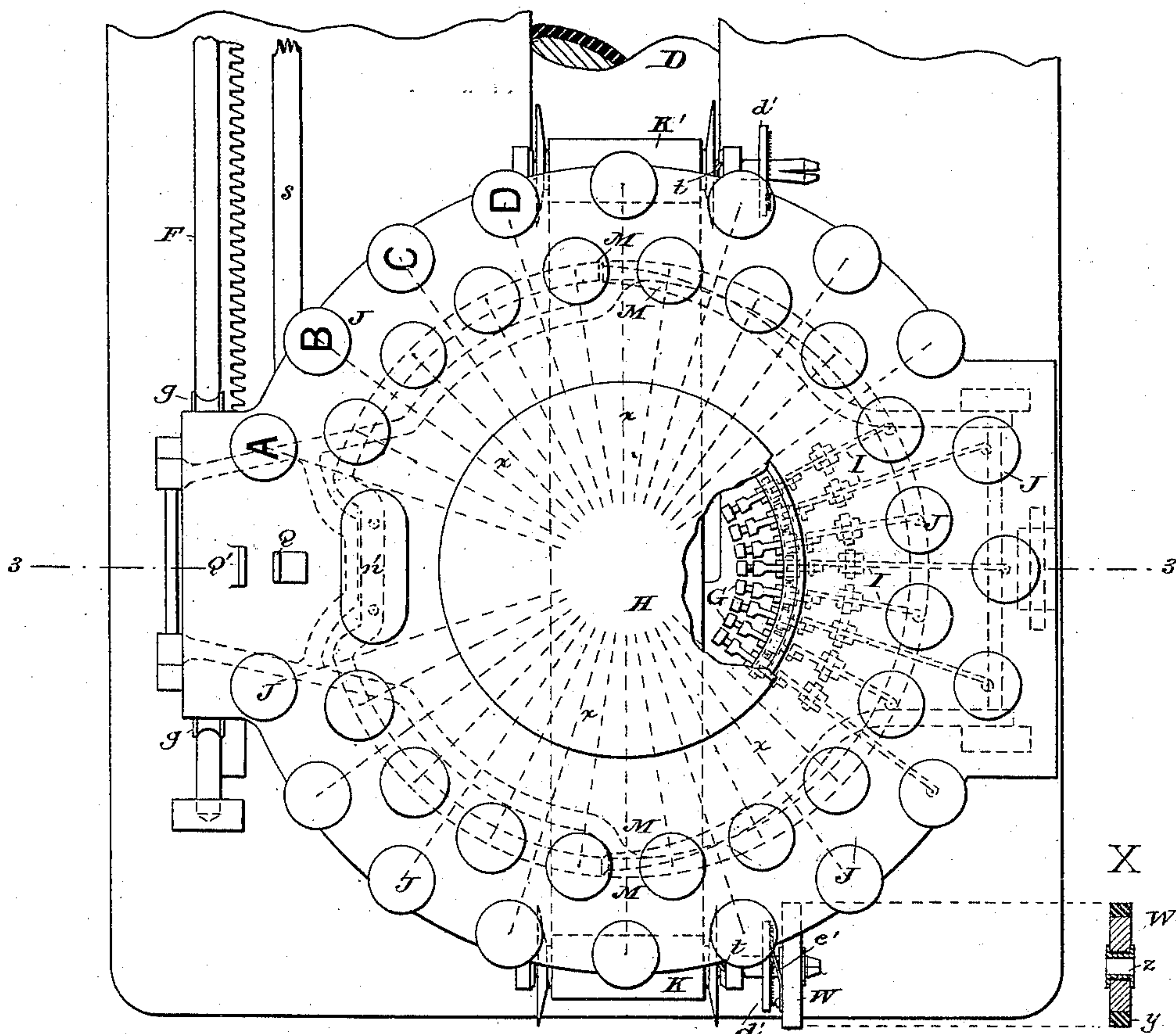
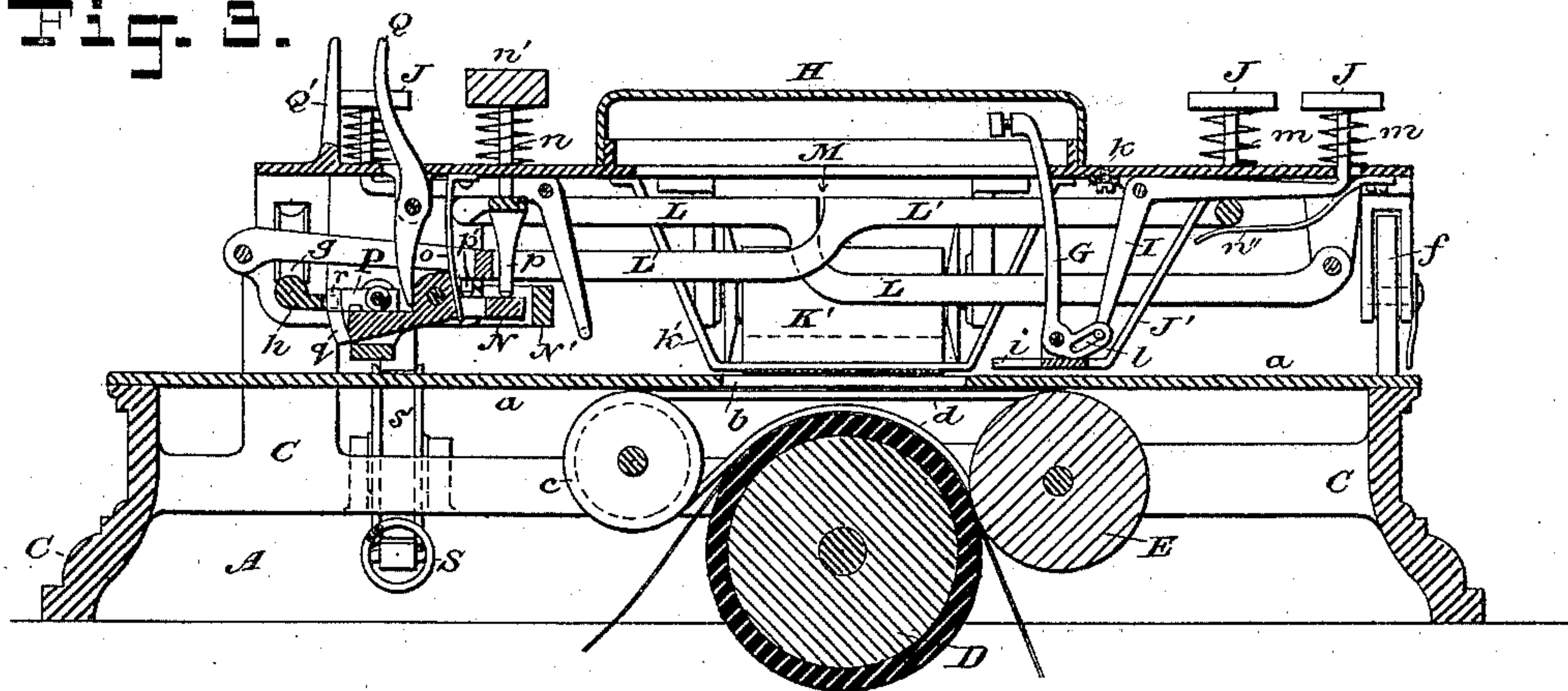


Fig. 3.



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Fig. 4.

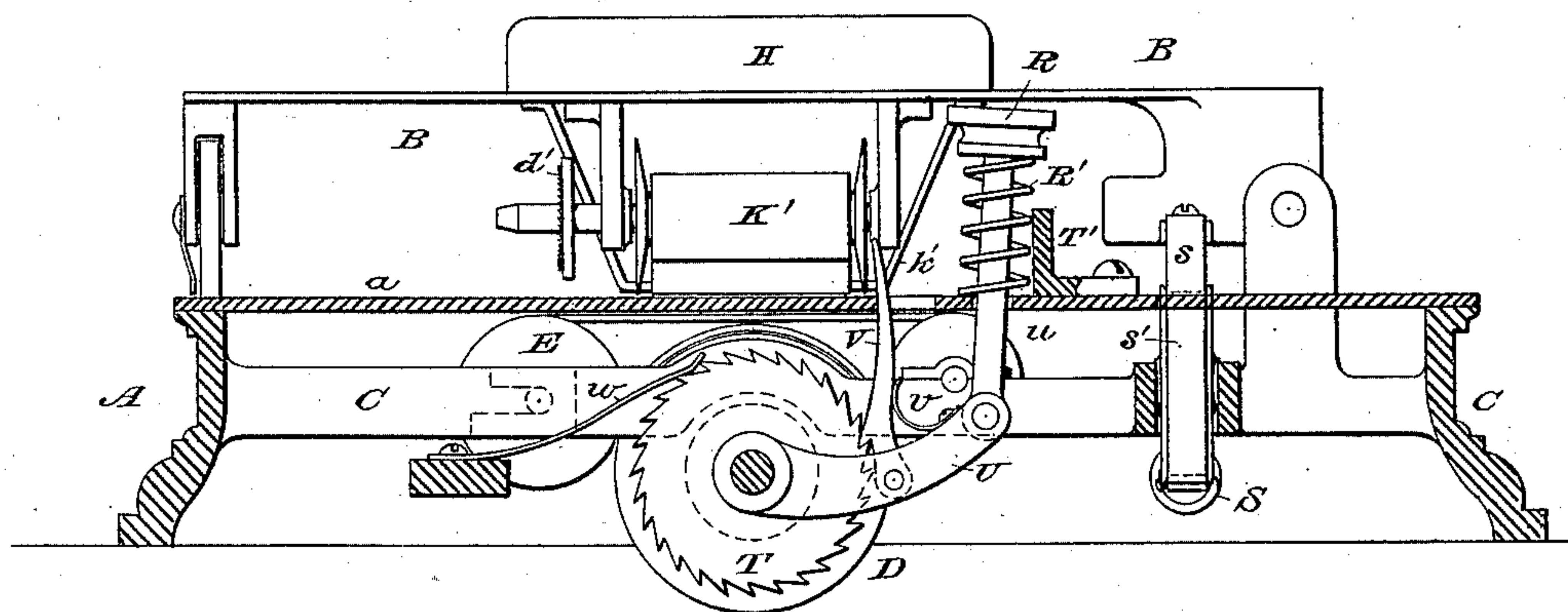
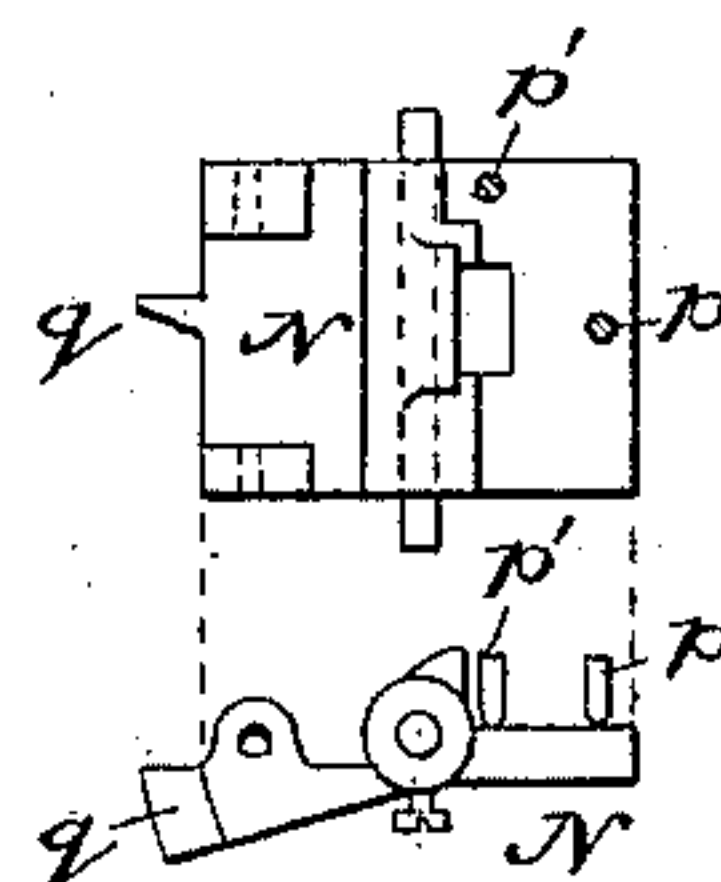
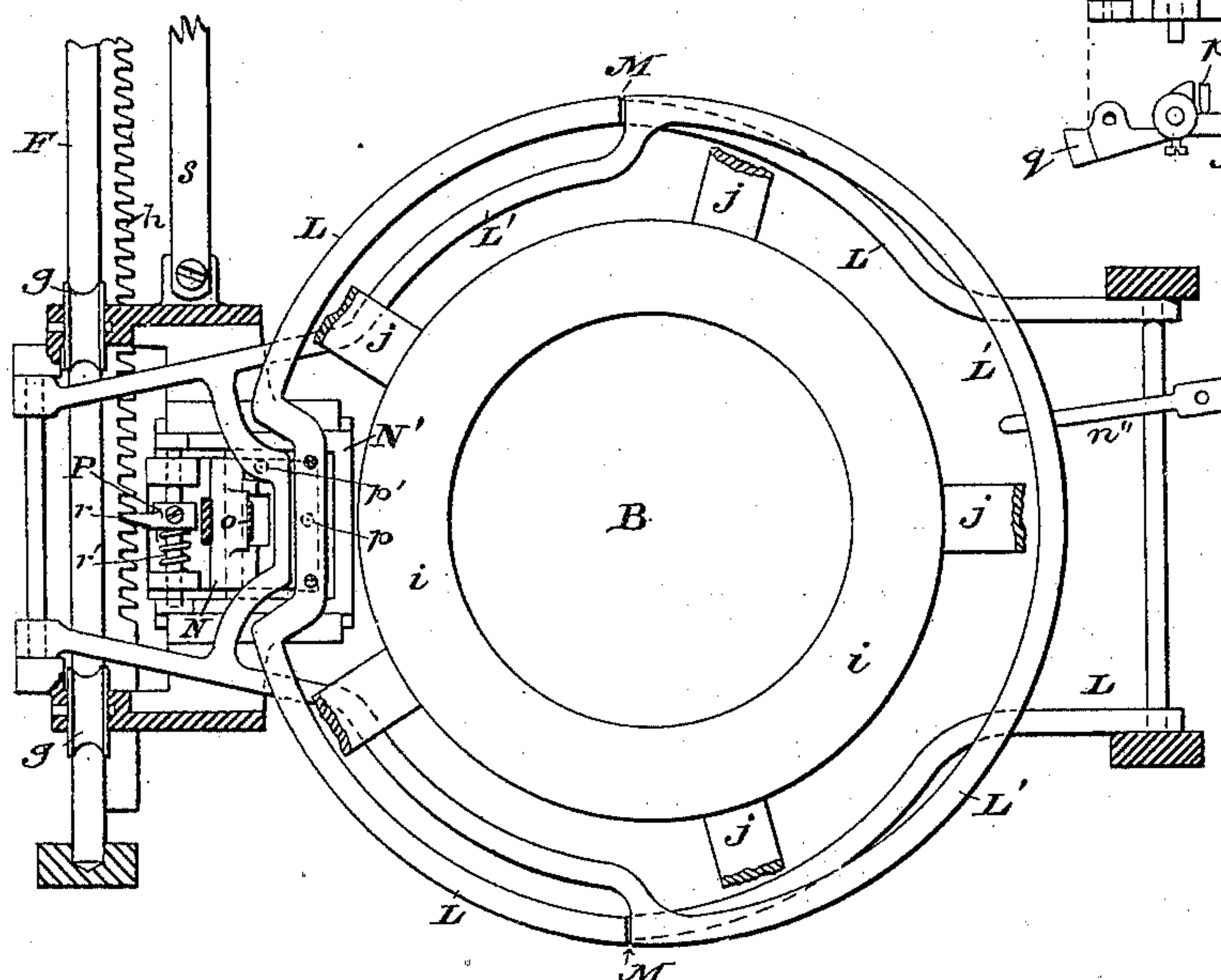


Fig. 6.



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Fig. 7.

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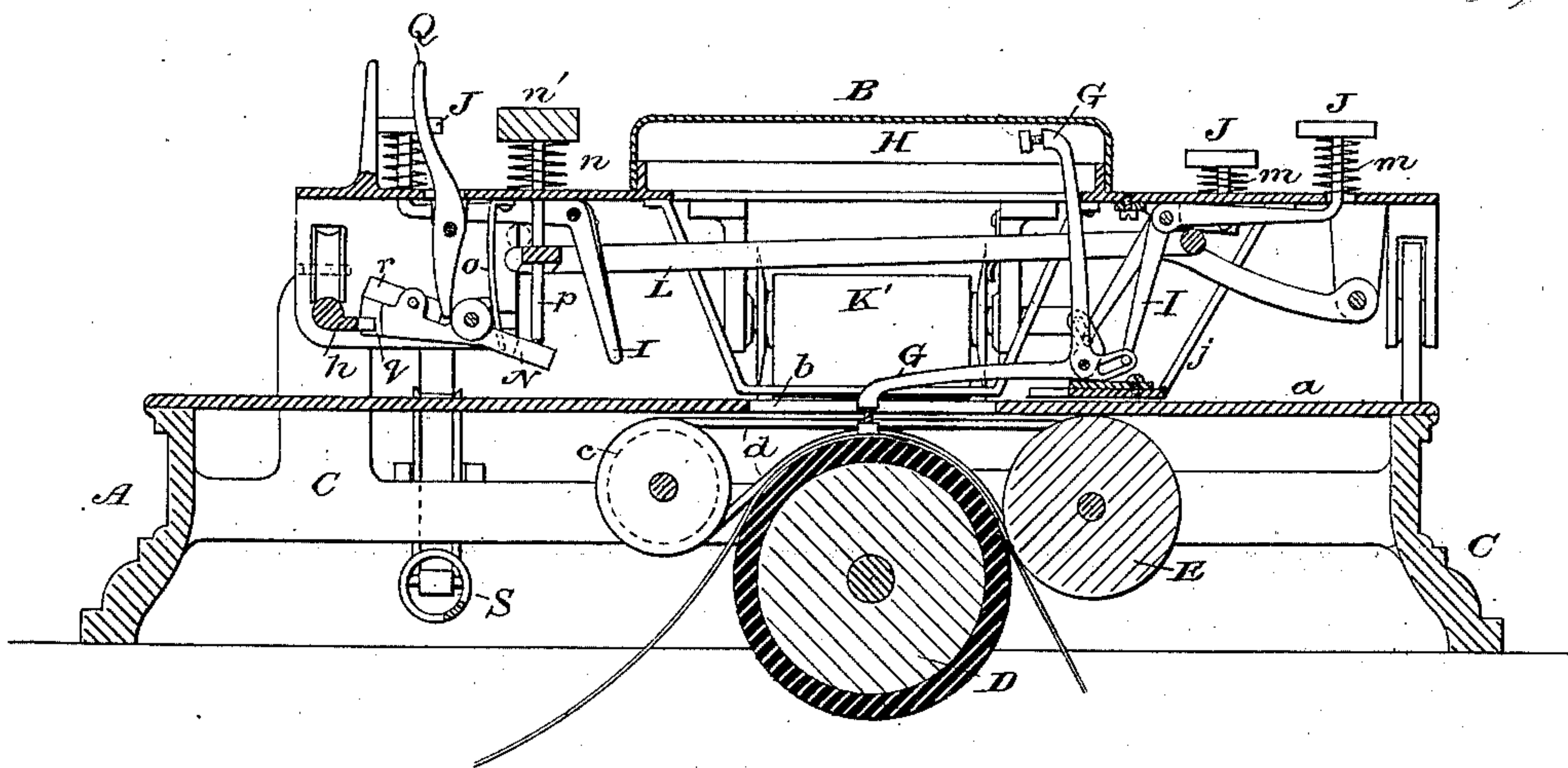
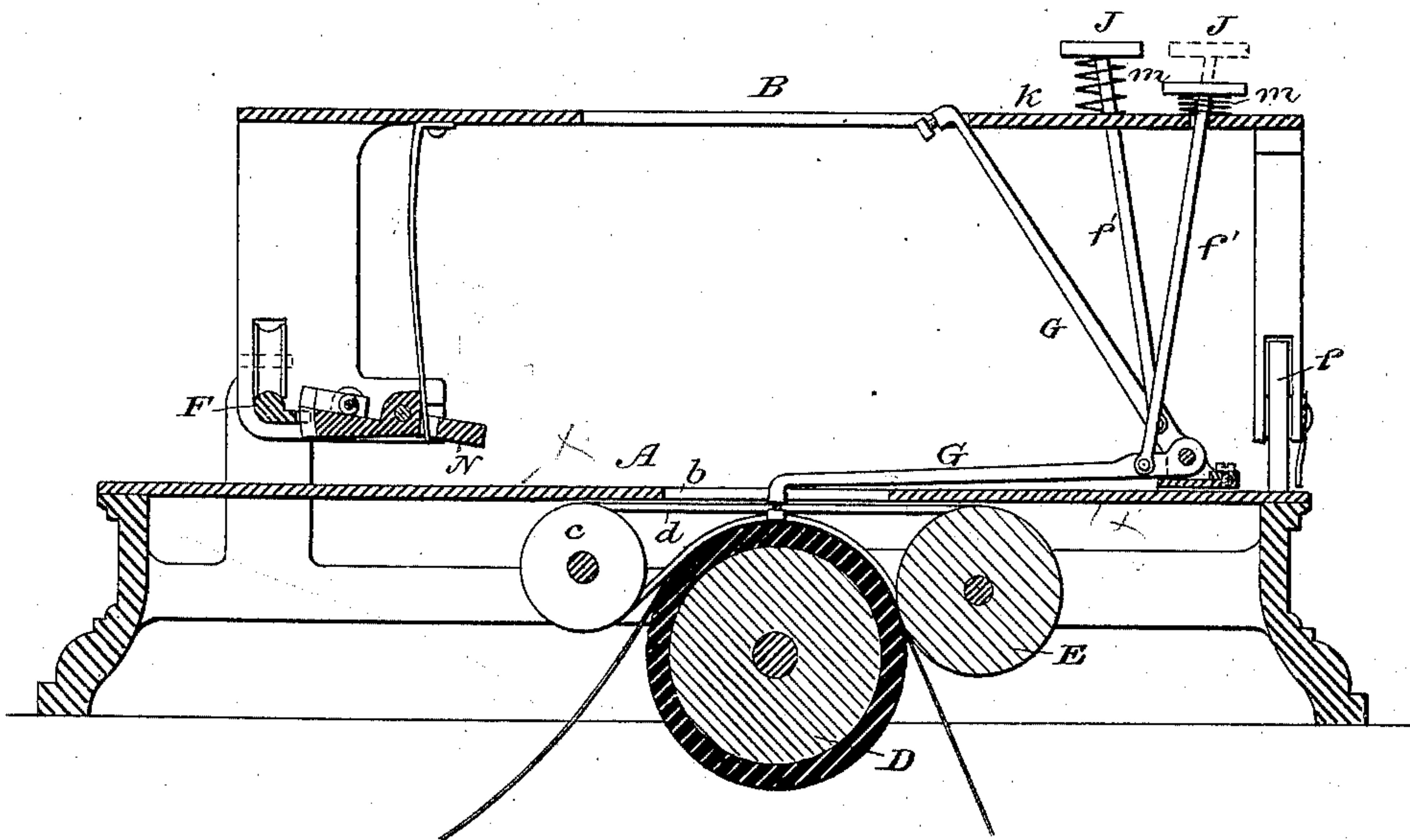


Fig. 8



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UNITED STATES PATENT OFFICE.

GEORGE LUCAS, OF NEW YORK, N. Y.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 313,827, dated March 10, 1885.

Application filed January 29, 1884. (No model.)

To all whom it may concern:

Be it known that I, GEORGE LUCAS, a citizen of the United States, and a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Type-Writers, of which the following is a specification.

My improved machine relates to that general class of type-writers employing a series of type-levers arranged radially, so that their types shall all strike in the same spot, and to that special class wherein the paper is held stationary and the type levers and keys are mounted in a traveling carriage which traverses the paper.

In the accompanying drawings, Figure 1 is a plan view of the bed or table of my machine, the carriage being broken away. Fig. 2 is a plan of the carriage and bed, the latter being broken off. Fig. 3 is a vertical mid-section cut along the line 3 3 in Fig. 2. Fig. 4 is a transverse section of the table, cut along the line 4 4 in Fig. 1 and looking in the direction of arrow 4. Fig. 5 is a fragmentary plan, partly in horizontal section, showing the feeding mechanism beneath the carriage. Fig. 6 is a plan and side view of the feed-lever removed. Fig. 7 is a vertical section similar to Fig. 3, showing a modification of the feeding mechanism; and Fig. 8 is another similar section, showing a modified construction of the type-action.

Let A designate the table or base, and B the type-carriage. The table A (shown best in Figs. 1, 3, and 4) is or may be constructed of a cast-metal frame, C, and a metal or other top plate, *a*. Beneath the plate *a* a roller, D, is mounted, its axis extending longitudinally of the table, and its journals having bearings in the frame C. This roller should have a surface of dense and firm but slightly yielding rubber for the types to strike against. Directly over the roller D is a long slot or opening, *b*, in the plate *a*. In front of the roller D is a roller, E, and behind it are two small wheels, *c c*. Two rubber or rubber-faced belts, *d d*, pass around roller E and wheels *c c* and cross the roller D near its ends and just beyond the ends of the opening *b*. The paper is pushed up between the rollers D and E, its edges coming beneath the belts *d d*, and being by them held against the roller D. By then

turning the roller D by means of the hand-wheel *e*, Fig. 1, the paper is carried through as far as may be desired before commencing to print upon it.

The carriage B consists of a suitable frame carrying the type levers and keys, the ink-ribbon, and the feed mechanism, and adapted to travel over the table longitudinally, its types printing through the opening *b*. It is supported on a wheel, *f*, at the front and on a bar, F, at the rear, two small wheels, *g g*, being provided to roll thereon and so reduce the friction. This bar F is mounted rotatively in bearings at its ends, so that the carriage may be turned back, the bar turning with the carriage. It is formed with a toothed rack, *h*, along its front edge.

The carriage B is in general of circular form, its center coming over the middle of the opening *b*. Around this center the type-levers G G are arranged, their action being radial, as denoted by the dotted radii *x x* in Fig. 2. Several of these levers are shown in Fig. 2 in plan, and one is shown in Fig. 3 in elevation. They are fulcrumed in bearings on a ring, *i*, Figs. 3 and 5, which is hung by brackets *j j* from the top plate or frame, *k*, of the carriage. The levers are thus fulcrumed low down, and they normally stand erect, as shown in Fig. 3, their type ends being uppermost. When any one of the numerous type-levers is depressed, Fig. 6, its type strikes exactly in the center of the carriage. In the construction shown the levers, when retracted, project above the plate *k*, a central opening being formed therein to admit them, and this opening being closed by a cap, H. The type-lever action consists of a lever, I, fulcrumed to the under side of the plate *k*, and a key or button, J, arranged above the plate *k*, and connected with one arm of the lever, while the other arm thereof is connected to the type-lever G. The latter connection is made either by forming a slot, *l*, in the short arm of the lever G, in which works a pin or projection on the end of the lever I, as shown, or by interposing a small wire link, as preferred. The keys or buttons J J are arranged alternately in two concentric circles, as shown in Fig. 2, and beneath each is a spring, *m*, which presses it up, and serves to retract the type-lever and hold it normally erect. The buttons J of the outer circle are or may be fixed

directly upon the upturned ends of the levers I, which project up through holes in the plate *h*. Those of the inner circle, however, being so much nearer the fulcrum of the levers, should
 5 be mounted on stems which connect with the levers by a joint, allowing some freedom of movement. The keys of the outer and inner circles may be given a uniform "touch" by providing them with springs of different tension, or by fulcruming the levers I of the inner circle nearer the center of the carriage than those of the outer circle, so that their leverage shall be equal to that of the levers bearing the outer circle of keys; or if, as shown,
 10 the leverage is unequal, mounting the light-faced types—such as I J L T and the punctuation-marks—on the levers G, connected to the inner circle of keys, and those letters requiring a heavier blow to impress them, as M W R, &c., on the levers connected with the outer circle of keys. As each key is struck and its character printed on the paper the type-carriage B must move to the right far enough to make room for the next letter to be printed.
 20 This movement must be effected during the retraction of the key and type-lever. The carriage B is given a tendency to move to the right by means of a strap, *s*, Figs. 1 and 5, which extends to the right, passes down around a sheave, *s'*, Fig. 1, and is connected to a spring, S, beneath the plate *a*, Figs. 1 and 3. This tendency of the carriage is resisted by an escapement borne by the carriage, which is vibrated to permit the carriage to advance one
 30 space at a time by means of the mechanism which I will now describe.

Referring particularly to Fig. 5, L is a spacing-lever of ring form, which is fulcrumed at the front of the carriage, and extends around
 40 beneath the levers I I, its portion back of the points M M being arranged in a high plane close beneath and in contact or practically so with the horizontal arms of the levers I I, as shown in Fig. 3, and its portion forward of
 45 M M extending in a lower plane. Two pins, *n n*, are fixed to the back portion of this lever, project up through the top plate, and bear a spacing key or bar, *n'*, on their upper ends. A pin or leg, *p*, projects below the lever and
 50 rests on one arm of a lever, N, Figs. 3 and 6, forming part of the vibrating feeding-escapement, the opposite arm of which bears a tooth, *q*, which engages a rack, *h*, Fig. 7. The lever N is normally held, as shown in Fig. 3, by a
 55 leaf-spring, *o*, which presses against a projection formed on it. When in this position, the tooth *q* is below the rack *h*, and a sliding tooth, *r*, is in engagement therewith, Figs. 3 and 5. This tooth *r* is part of a sliding spring-bolt,
 60 P, which is mounted on the lever N, as shown in Fig. 5, and pressed to the right by a spring, *r'*. When any of the keys J J back of the points M M are depressed, their levers I I press down the lever L, the foot *p* of which tilts the
 65 lever N, as shown in Fig. 7, thus lifting the tooth *r* out of the rack *h* and the tooth *q* into it. The tooth *r* is immediately pressed for-

ward by its spring *r'*, and stands over the next space on the rack *h* in advance. When the key is released, the lever L rises, the lever N
 70 is tilted back, the tooth *r* passes into the rack and tooth *q* out of it. The carriage is then held from moving to the right only by the tension of spring *r'*, and, as the tension of spring S is greatly superior, the carriage moves to the
 75 right one space, compressing spring *r'*. Obviously the same result follows if the space-key *n* be depressed instead of same key J, except that then no letter is printed. To enable the keys J J in front of the points M M to operate the feed, I provide another spacing-lever, L', which is fulcrumed at the back of
 80 the carriage, and the portion of which in front of M M comes up close beneath the levers I I, while its rear portion is carried back on a lower plane to its fulcrum. This lever is sustained by a spring, *n''*, at the front, and has a pin or leg, *p'*, which extends down to the lever N in the same manner as the leg *p*, but is placed nearer the fulcrum of the lever N,
 90 because of the less movement of the lever L' at this point, than of the lever L, owing to the leg on the former coming much nearer the fulcrum of the lever. By this difference in the positions of the legs *p p'* the lever N is
 95 tilted to the same extent, whether the lever L or the lever L' be depressed.

In Fig. 7, a slight modification is shown, only one lever, L, being used, and this lever, being in the form of a complete ring, coming close beneath all the levers I I. As the levers I I at the front are many times nearer the fulcrum of the lever L than the levers I I at rear, the lever L would be depressed much farther by the action of the front than of the rear keys, except that
 100 the arrangement is such, by placing the ring portion of the lever L eccentrically, that at the front it touches the levers I I near their fulcrum, and at the rear its contact with them is remote from their fulcrum, the difference being just sufficient to compensate for the difference in leverage, so that the lever N is tilted to the same extent by all the keys.

The operator commences to print a line when the carriage is at the left, and after printing
 115 each letter it moves one space to the right. At the end of each word he presses the space-key *n'*. When the end of the line is reached, (the carriage being then at the right,) it is necessary to move the carriage back to the left
 120 ready for the next line, and also to feed the paper forward the distance of one line. The former operation is accomplished by pressing back a lever, Q, which disconnects the carriage from the rack, and then moving the carriage
 125 to the left by means of that lever, keeping the latter pressed back until the carriage is brought to the starting-point and then releasing the lever. This should be done with the left hand, while with the right the operator presses
 130 down a knob, R, at the right-hand end of the table, and thereby feeds forward the paper.

I will now describe in detail the mechanism for accomplishing these two purposes.

Referring to Fig. 3, the lever Q is fulcrumed just below the plate *k* to the carriage, and its lower end comes against the front of a projecting portion of the lever N. This lever is fulcrumed in a sliding frame, N', (best shown in Fig. 5,) which frame is mounted in horizontal guide-ways formed in the frame of the carriage. The spring *o* keeps the lever N and frame N' pressed back against the lever Q; but when the latter is pressed its bottom end pushes the lever N and frame N' toward the front until the teeth *q r* are entirely clear from the rack *h*. The carriage is then free and may be moved to the left.

To facilitate the movement of the lever Q, a fixed post, Q', is formed on the carriage, so that by pressing these together between the thumb and finger the feed may be disconnected.

The paper-feeding mechanism is shown in Figs. 1 and 4. On the spindle of roller D is fixed a ratchet-wheel, T, the teeth of which are so spaced that a movement of two teeth will move the paper the proper distance between the lines. The knob R is mounted on a stem, *u*, which passes down through the table, and is pivoted to a lever, U, which is fulcrumed on the roller-spindle or elsewhere, and to this lever is pivoted a pawl, V, the prolonged end of which projects up through a slot in the top plate, *a*. This pawl is pressed toward the ratchet by a light spring, *v*, and a spring, R', is provided to press up the knob R. When this knob is pressed down as far as it will go, the lever U and pawl V are pressed down far enough to advance the wheel T the distance of two teeth, and when released it springs back to the position shown, while the ratchet T is held from turning back by a spring-pawl or wipe, *w*. When it is desired to print the lines close together, or "half-spaced," a pivoted stop, T', is turned under the knob R, so that the latter can be pressed down only half the usual distance. When the operator desires to turn the paper backward for any purpose, he presses back the projecting upper end of the pawl V, thereby freeing it from the ratchet, and turns the roller D (and ratchet T) by means of the hand-wheel *e*. The ink-ribbon is carried on two spools, K K', mounted in bearings on the right and left sides of the carriage, and unwinds from one spool onto the other as the carriage moves. The ribbon extends from one spool down beneath a guide, *k'*, thence across under the ring *i*, beneath the other guide, *k'*, and up to the other spool. Both spools are fixed on their spindles and provided with tension-springs *t t*, Fig. 2, and each has fixed to its spindle, outside its front bearing, a notched disk, *d'*. A traction-wheel, W, having a frictional periphery, is slipped onto one or the other of the spindles, being held thereon by the splitting of the end of the spindle, as shown, so that it binds against the bore of the wheel. This wheel is shown in section at X at the right of Fig. 2, where *y* is its frictional tire, and *z* is a bushing on which the wheel freely turns. This bush-

ing may turn with the spindle, while the wheel turns independently. On the rear side of the wheel is a light leaf-spring, *e'*, which serves as a pawl, and engages the teeth on the disk *d'*. When the carriage is traveling to the right the wheel W rolls on the table, and turns the disk *d'* through the medium of the spring-pawl *e'*, and thus turns one of the spools, and winds the ribbon onto this spool and off from the other. When the carriage is being run back to the left, the pawl *e'* does not turn the disk *d'*. When all the ribbon is wound onto one spool, the operator will pull the wheel W off the spindle of that spool and slip it onto the spindle of the other spool, after which the ribbon will wind in the opposite direction.

Fig. 8 shows a modified type-lever action. The intermediary levers, I I, are omitted, and the buttons J J are mounted on rods *f' f'*, which extend directly downward, and are jointed to the type-levers. This construction necessitates a higher carriage and longer type-levers, but is somewhat simpler than the other.

In common with other machines of its special class, my improved type-writer has the advantage that the paper which is being printed upon lies face uppermost and does not move, the printing mechanism moving over it from left to right, as when writing with a pen.

Whenever the operator desires to view his work, he has only to turn back the type-carriage, when the line being printed and several preceding lines are exposed. If an alteration or erasure is necessary, the fact of the paper being face uppermost on a fixed table is of great advantage, and much facilitates the operation.

A modification of which my invention is susceptible, and which will retain certain of its advantages, consists in making the carriage B stationary and causing the table or roller D, or whatever part carries the paper, to travel beneath the carriage from right to left, instead of the carriage moving over the paper from left to right. The carriage may then be turned back at any time to expose the writing, for the purpose of verifying the work or making corrections.

I claim as my invention—

1. In a type-writer, the combination of a stationary table, a rack extending longitudinally along the same, a carriage adapted to travel over said table longitudinally, guided by said rack, and capable of being turned back on the pivotal axis thereof, the type-levers and keys borne by said carriage and printing downward, and a feed mechanism, substantially as described, borne by said carriage, engaging said rack, and adapted to cause the carriage to move the space of one tooth after each depression of any key, substantially as set forth.

2. In a type-writer, the combination, to form a type-action, of a series of type-levers arranged to strike downwardly all at one point,

the keys for operating them arranged circularly, a series of intermediate levers arranged radially and connected at opposite ends to said keys and type-levers, and a series of retracting-springs adapted to raise said keys and levers, substantially as set forth.

3. A type-action for a type-writer, consisting of a series of type-levers, G G, arranged to strike downward all at one point, and formed each with a slot, l, a series of levers, I I, arranged radially and one end of each engaging said slot in the corresponding type-lever, a series of keys, J J, connected with the opposite ends of said levers I I, respectively, and a series of springs, m m, adapted to retract said levers and keys, substantially as and for the purposes set forth.

4. The combination of a stationary table, A, rack h thereon, type-carriage B, the type-action borne by said carriage, with the type-levers arranged to print downward all at one point, annular spacing-lever L, and an escapement-feed engaging said racks, and consisting of feed-lever N, vibrated by said lever L, and having fixed tooth q, elastically-mounted tooth r, borne by said lever, and spring o, for retracting said lever, substantially as set forth.

5. In a type-writer, the combination, with

a traveling type-carriage and its type-action, and a stationary rack, of an escapement-feed engaging said rack and operated from said type-action, a sliding frame, N', mounted in slideways in the carriage and bearing said escapement-feed, and a spring normally pressing said frame toward the rack, substantially as set forth.

6. In a type-writer, the combination of a stationary table, a traveling type-carriage, and ink-ribbon carried upon spools borne by said carriage upon opposite sides thereof, a traction-wheel adapted to be connected to either of said spools, and thereby to rotate the same to wind up the ribbon as the carriage advances, and a ratchet and pawl interposed between said wheel and spool, to free the wheel from the spool while the carriage is being moved back, thereby preventing the unwinding of the ribbon, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

GEO. LUCAS.

Witnesses:

ARTHUR C. FRASER,
HENRY CONNETT.