

(No Model.)

4 Sheets—Sheet 1.

A. G. DONNELLY.
TYPE WRITING MACHINE.

No. 365,372.

Patented June 28, 1887.

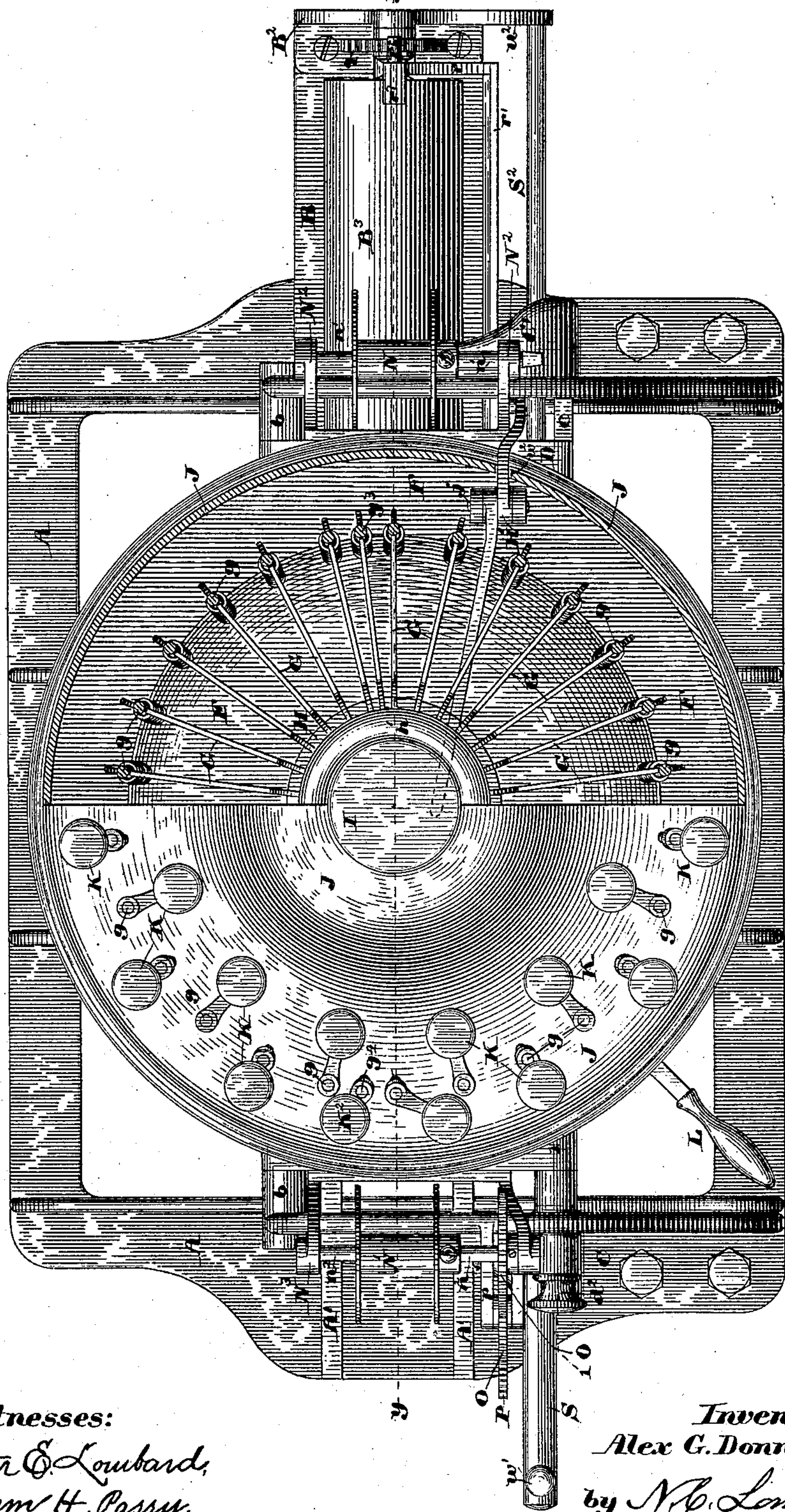


Fig. 1.

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William H. Parry,

Inventor:
Alex G. Donnelly,
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Attorney.

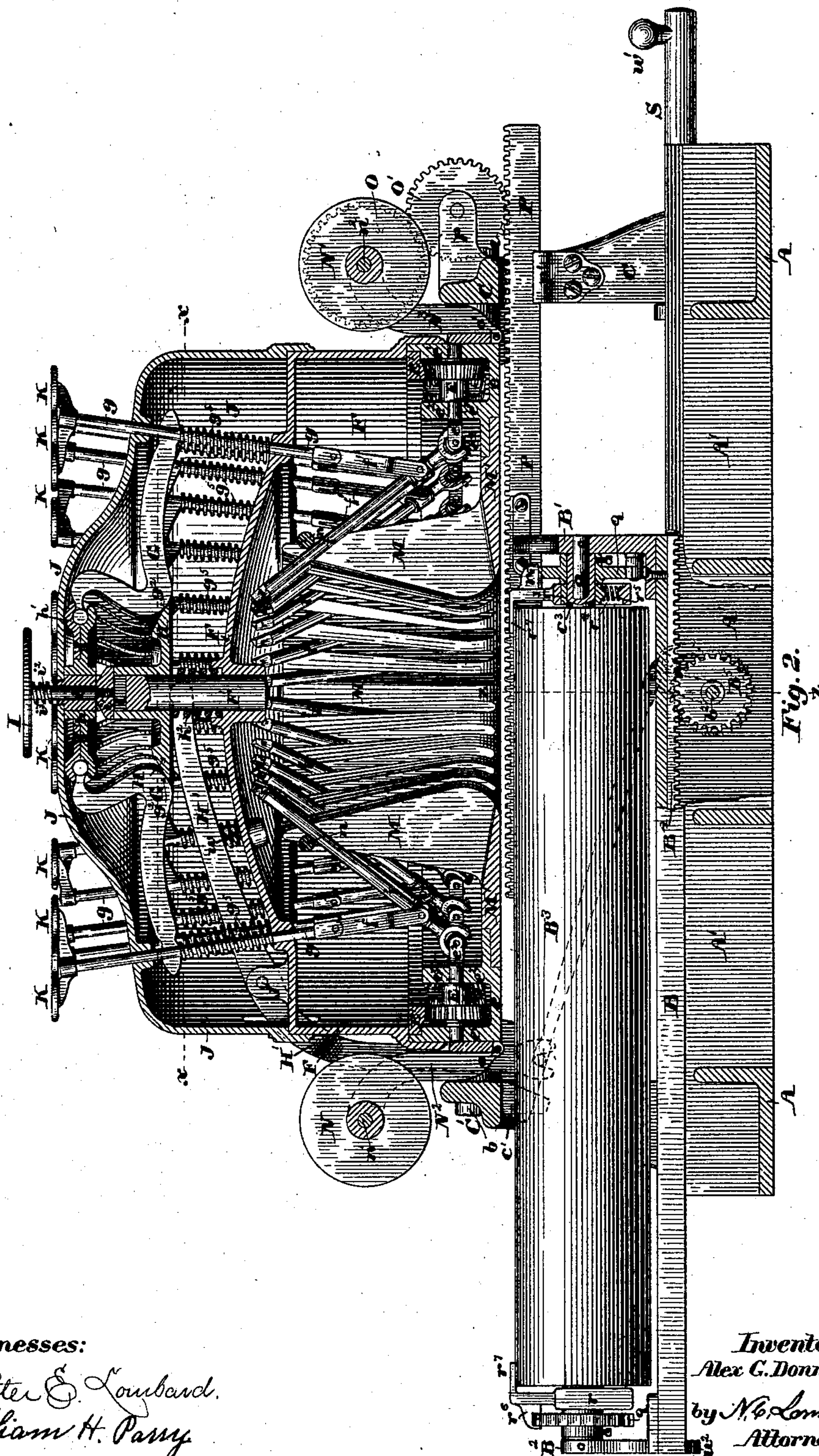
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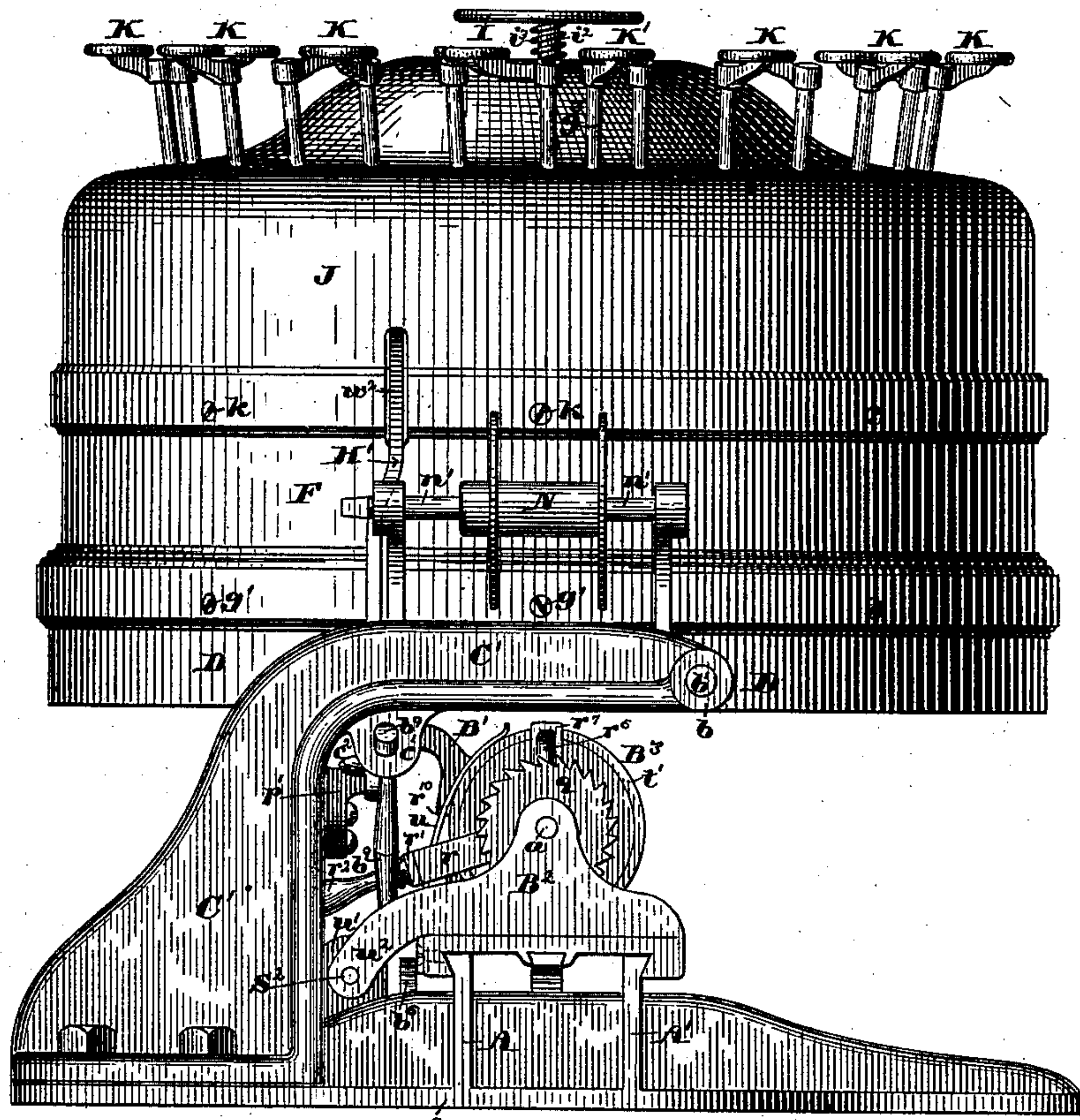


Fig. 3.

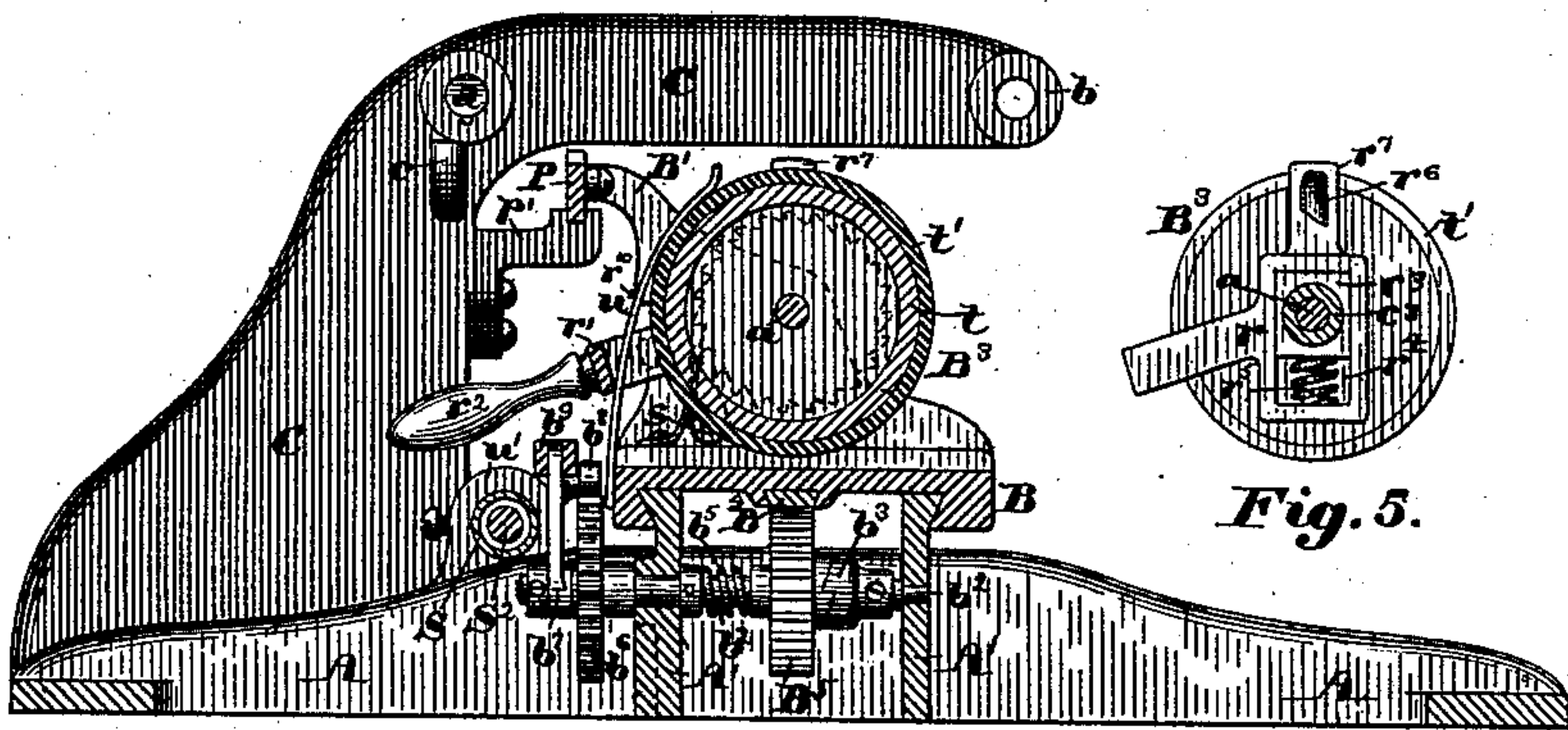


Fig. 4.

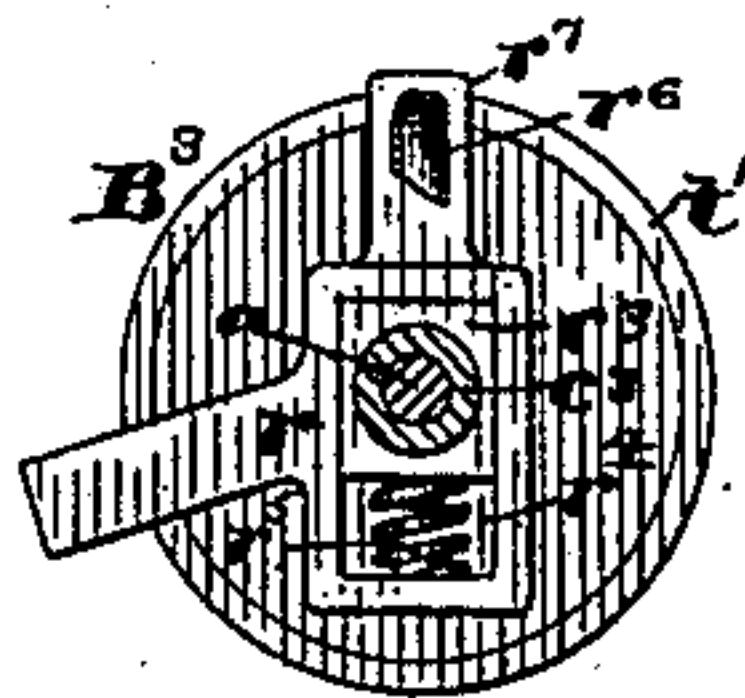


Fig. 5.

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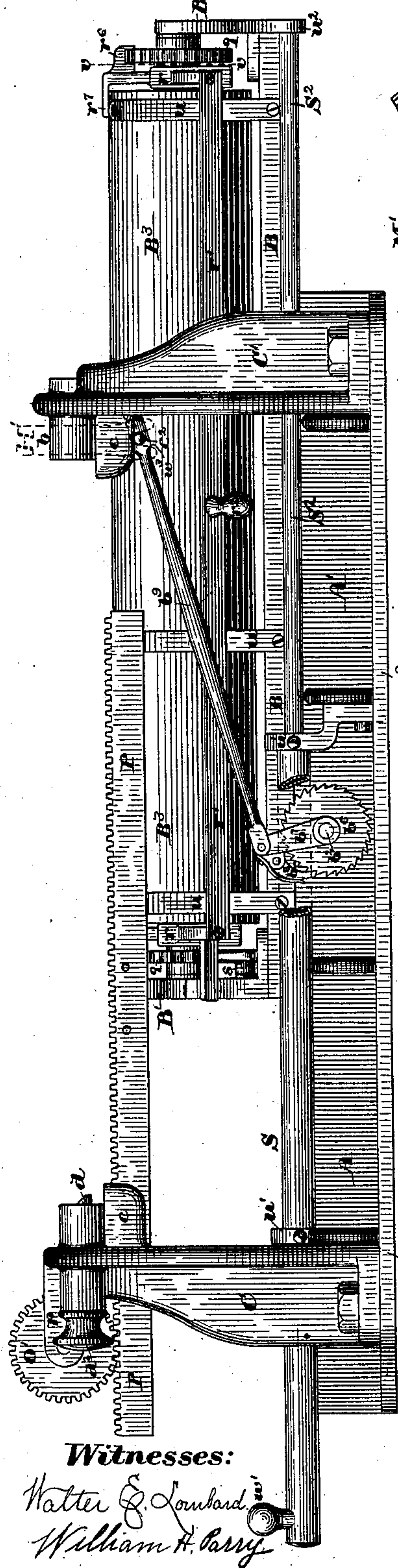
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Witnesses:

Walter E. Lombard.
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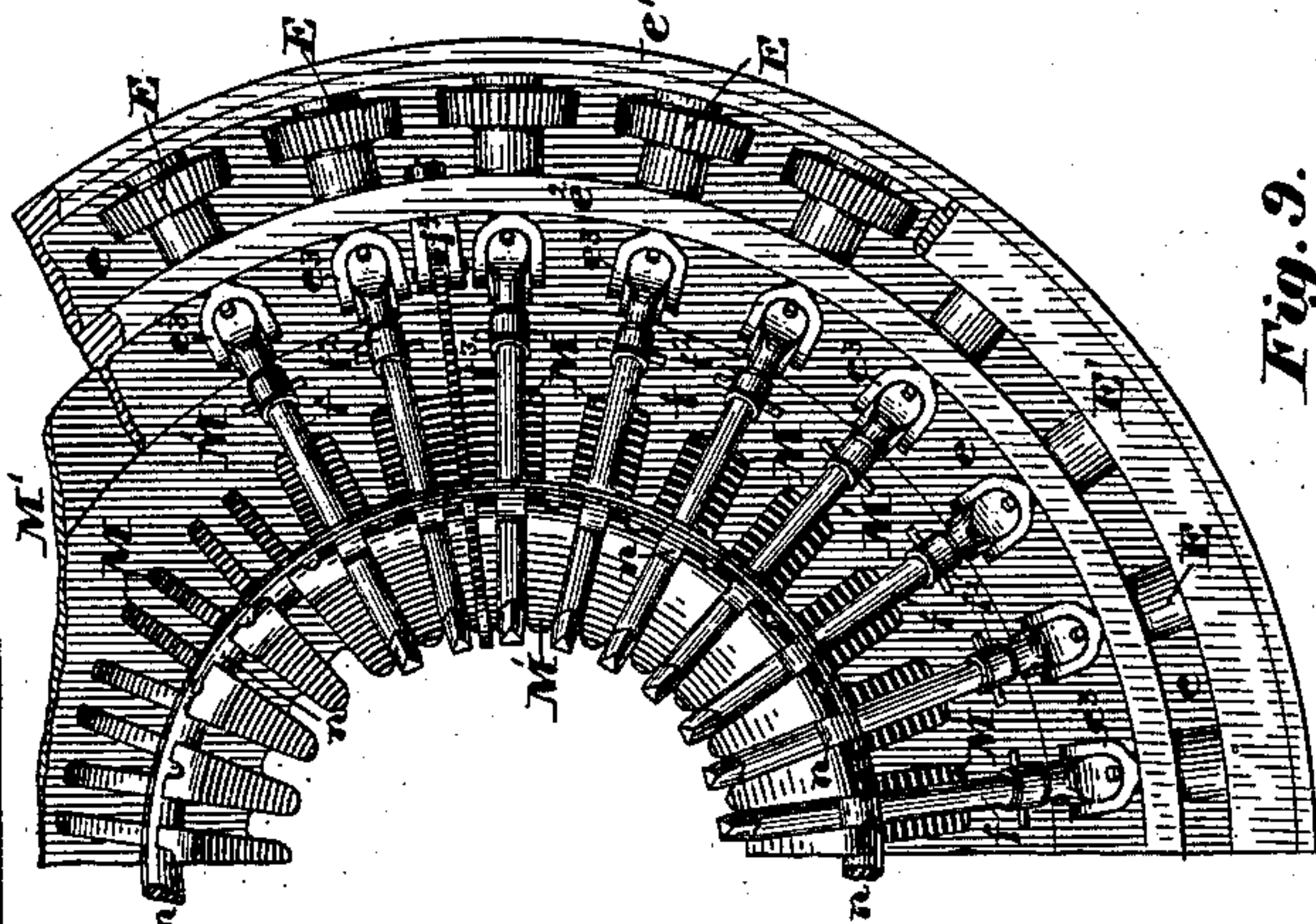


Fig. 9.

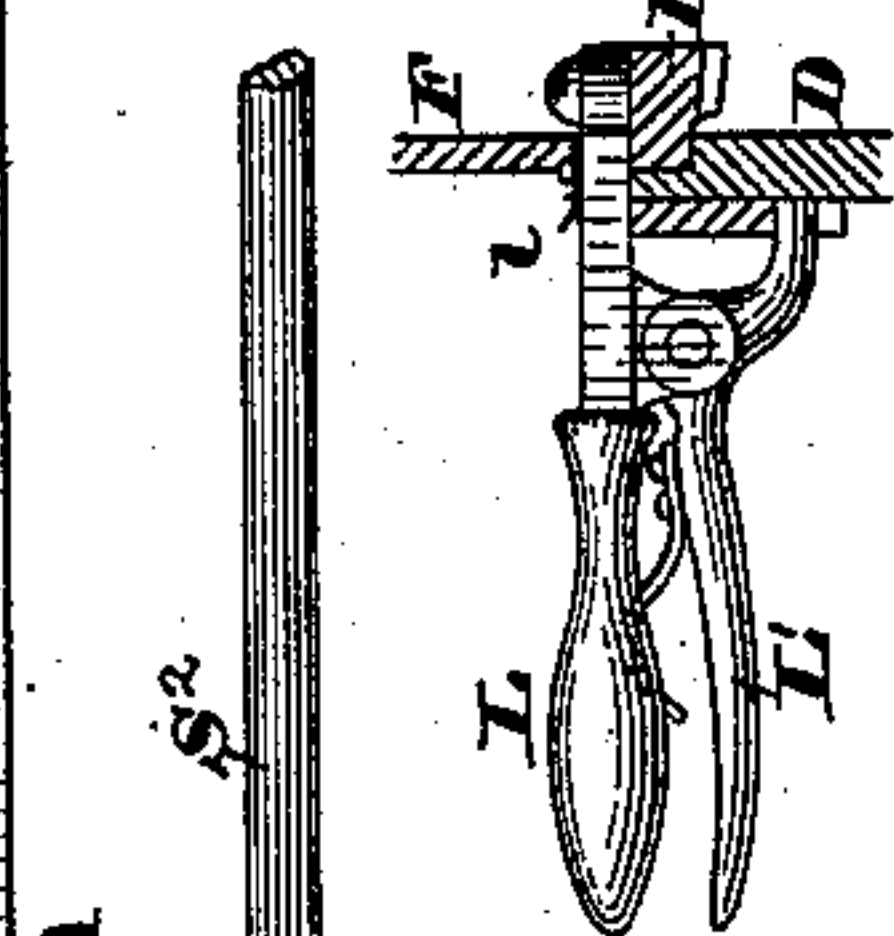


Fig. 11.

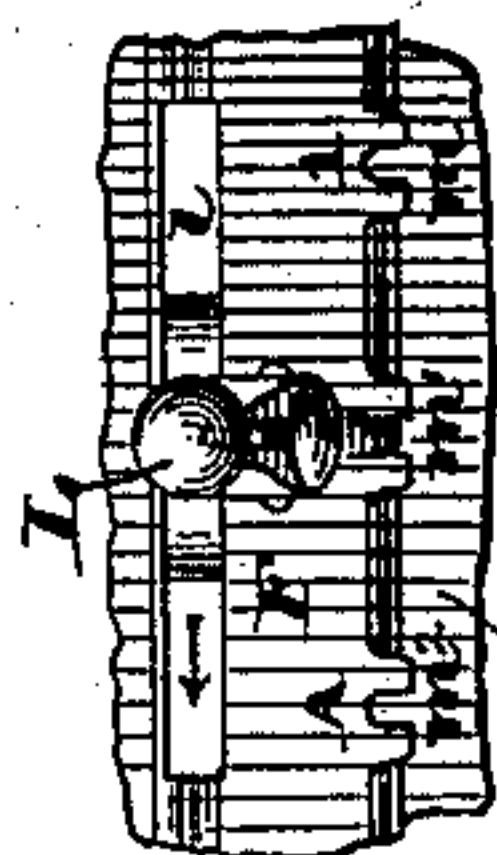


Fig. 10.

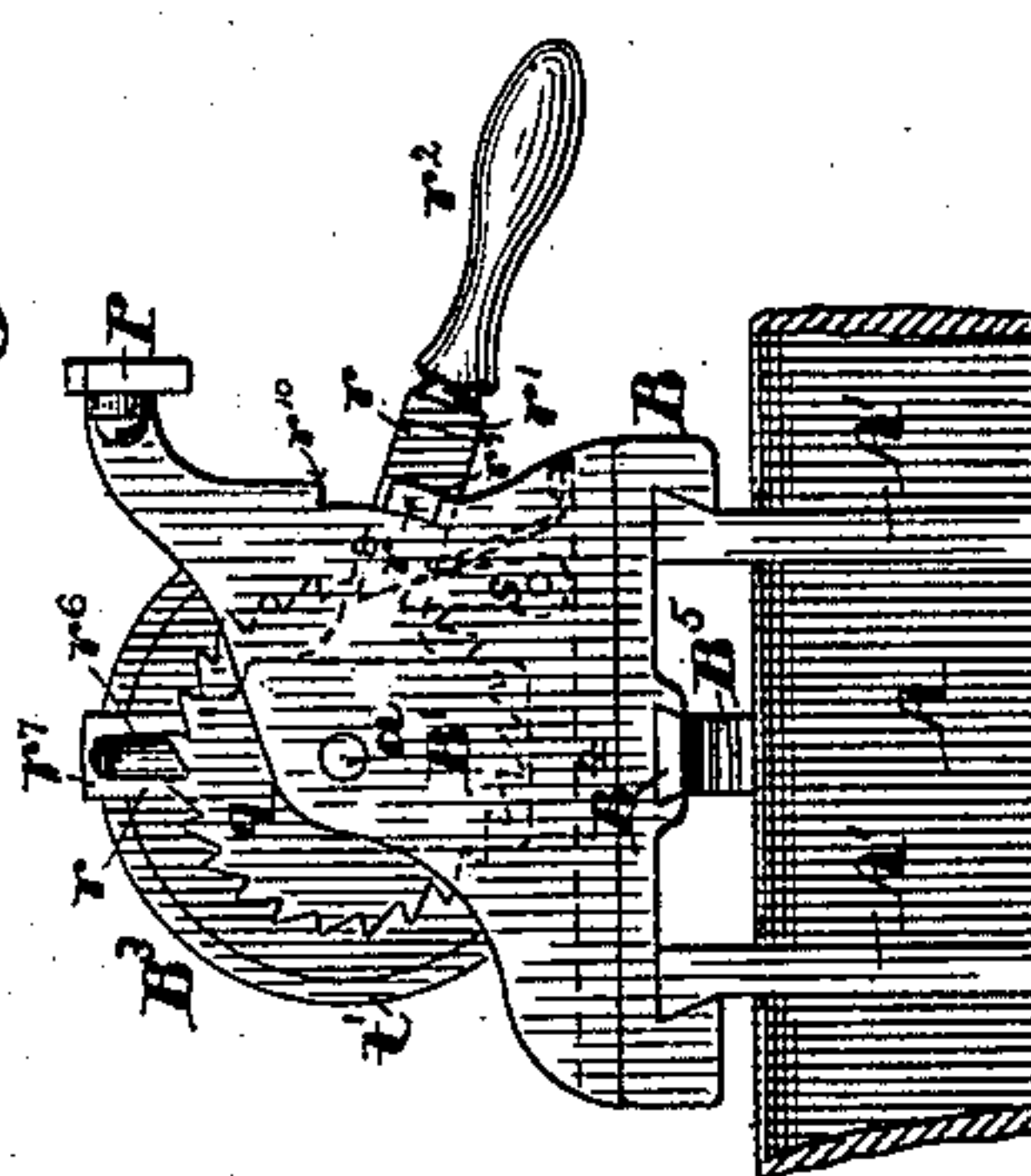


Fig. 6.



Fig. 20.

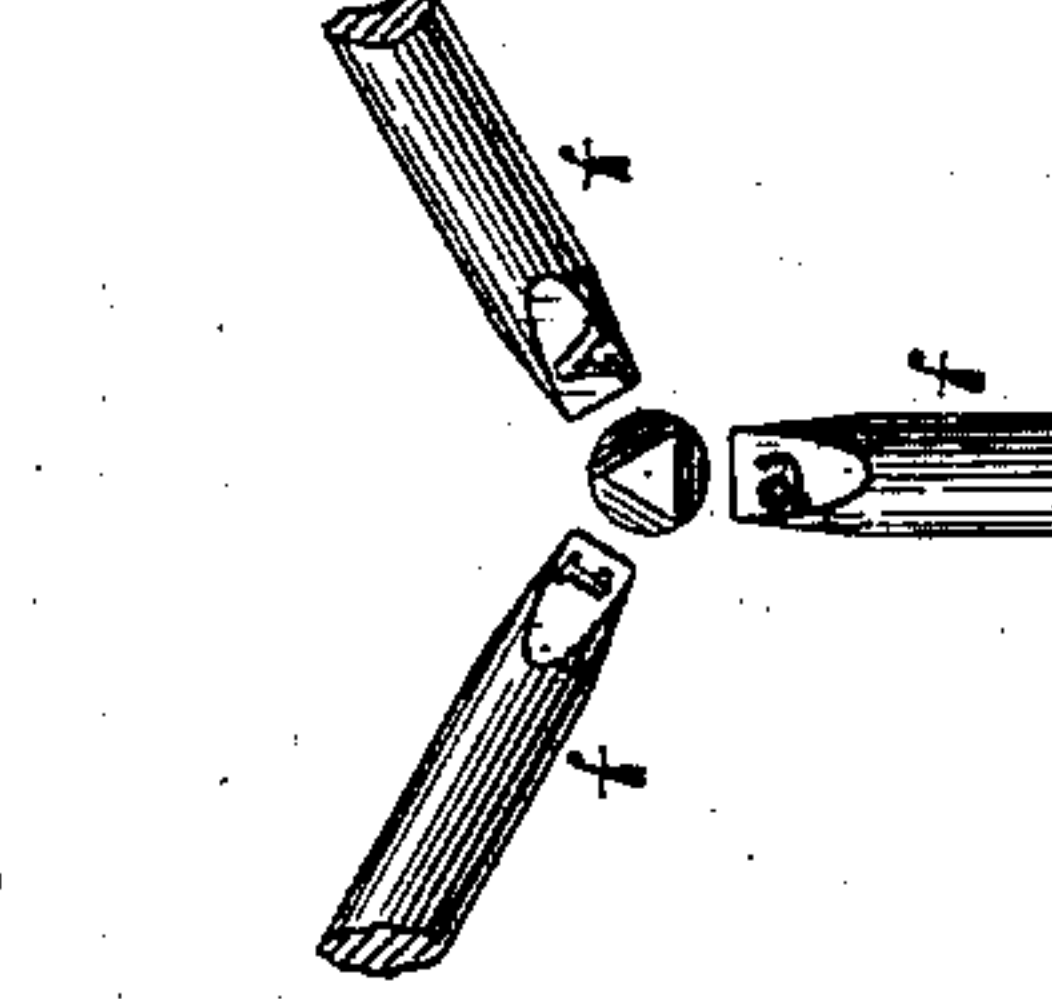
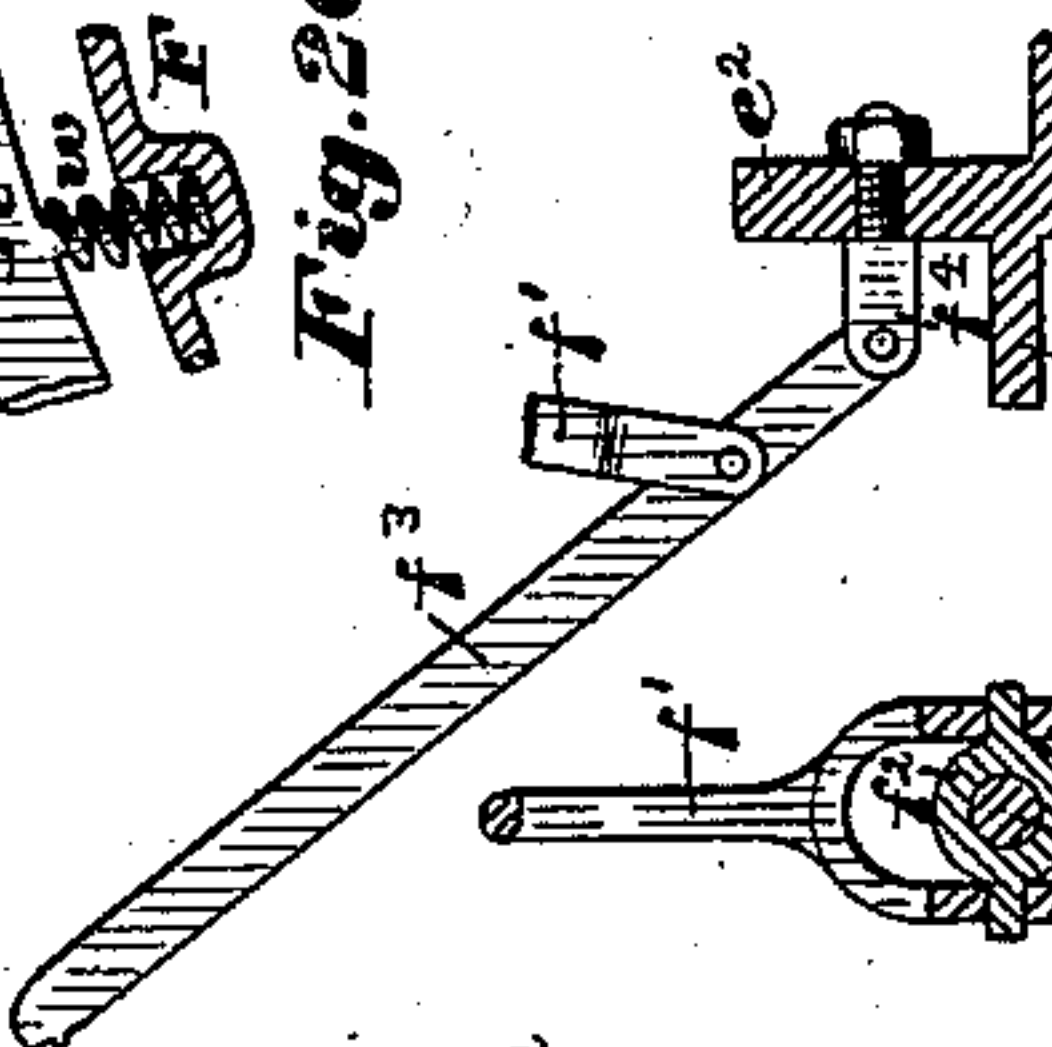


Fig. 19. Fig. 18. Fig. 17. Fig. 16.



Fig. 8.



Fig. 13.



Fig. 12.

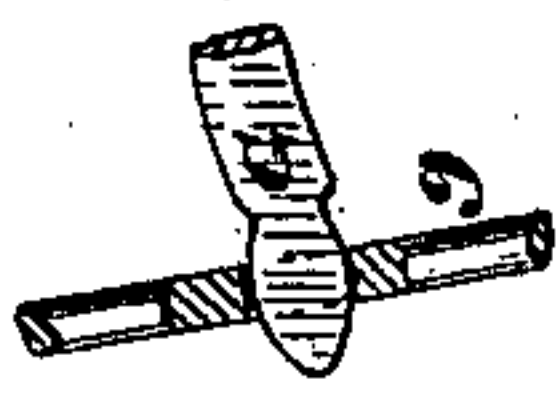


Fig. 15. Fig. 14.

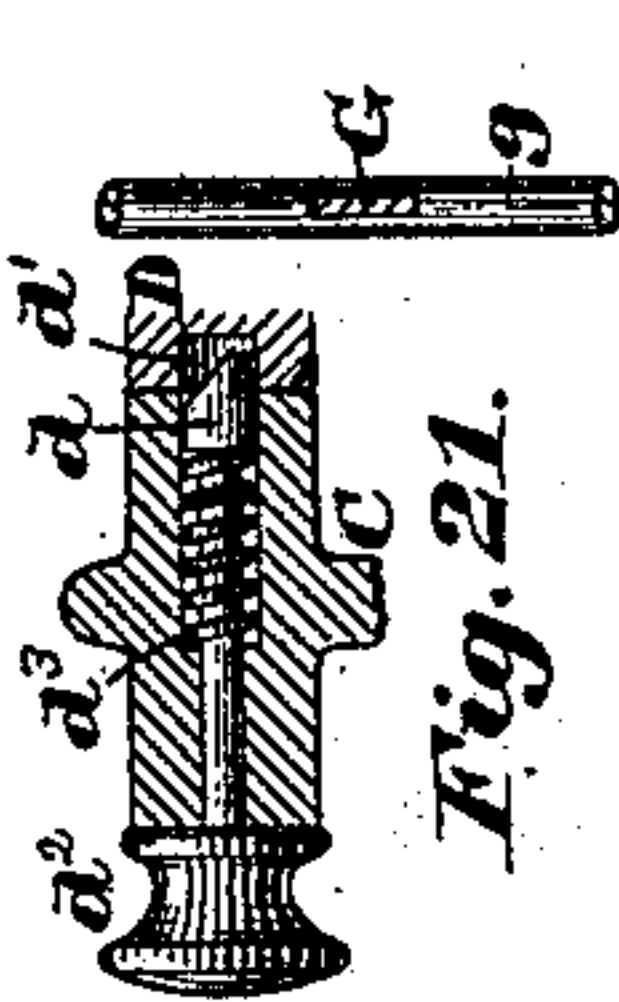


Fig. 21.

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UNITED STATES PATENT OFFICE.

ALEXANDER G. DONNELLY, OF NEW YORK, N. Y.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 365,372, dated June 28, 1887.

Application filed October 17, 1884. Renewed May 10, 1886. Again renewed December 1, 1886. Serial No. 220,387. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER G. DONNELLY, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Type-Writers, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention relates to type-writing machines, and has for its object a material increase of capacity for a given or limited number of keys; and it consists in certain novel constructions, arrangements, and combinations of devices, which will be readily understood by reference to the description of the drawings, and to the claims to be hereinafter given.

Figure 1 of the drawings is a sectional plan of a machine embodying my invention, the cutting-plane of the portion shown in section being on line $x x$ on Fig. 2. Fig. 2 is a vertical longitudinal section on line $y y$ on Fig. 1, and showing certain parts in elevation. Fig. 3 is an end elevation. Fig. 4 is a transverse vertical section of the base portion of the machine, the cutting-plane being on line $z z$ on Fig. 2. Fig. 5 is an end elevation of the paper-feeding roll with the grip-lever for rotating the same in position thereon, the hub of said roll being cut in section on line $v v$ on Fig. 7. Fig. 6 is an end elevation of the paper-feeding roll and its carriage, and the slides or ways upon which said carriage moves. Fig. 7 is a front elevation of the base portion of the machine. Fig. 8 is a horizontal section of the vacuum-cylinder for assisting the endwise feeding of the paper-feeding roll. Fig. 9 is a partial plan of the upper or pivoted portion of the machine with the inclosing-casings, operating-keys, and pinion-operating ring-gear removed. Figs. 10 and 11 are detail views illustrating the ring-gear-operating lever and its locking device. Figs. 12 and 13 are respectively an edge view and an inverted plan of a small section of the ring-gear for revolving the type-levers. Figs. 14 and 15 are details illustrating the manner of connecting the key-rods with levers for depressing the central disk which operates the space or word feed lever. Fig. 16 is a side elevation of one of the two non-revolving type-levers. Fig. 17 is a transverse section of one of the revolving type-levers at the point of connection of the link

by which it is connected to the key-rod. Fig. 18 is a longitudinal section of a portion of one of the revolving type-levers. Fig. 19 illustrates the formation of the inner end of one of the type-levers and the arrangement thereon of three different kinds of characters. Fig. 20 is a detail illustrating the arrangement of the spring for raising the space-feed-operating lever. Fig. 21 is a section through the stand C on line 1 1 on Fig. 1, and illustrating the construction and mode of operation of the locking-latch.

In the drawings, A is the bed or base of the machine, having cast upon its upper side the guideways A', upon which is mounted the carriage B, in such a manner that it may be moved endwise thereon, and provided at one end with the stand B', and at the other end with the stand B'', in which stands is firmly secured, so as not to revolve therein, the shaft a , upon which the paper-carrying roll B³ is mounted so as to revolve thereon.

The bed A has firmly bolted thereon the two goose-neck stands C and C', the arms of which extend over the paper-carrying roll B³, as shown in Fig. 4, and have formed upon their rear ends the bearing b , to receive the trunnions or journals b' , cast upon or set in the periphery of the base-ring D of the upper portion of the machine, whereby said upper portion of the machine is so pivoted that it may be moved from its normal position to an inclined position for the purpose of uncovering or exposing to view the work being done and for inserting or removing the sheet of paper.

The pivotal connections between the upper and lower portions of the machine are at the rear of the longitudinal center line of the machine, and in order to maintain the upper portion of the machine in its normal position, or in the position it must occupy when being operated for printing, each of the stands C and C' has cast upon its inner side a stop-bracket, c , in such position that the under surface of the base-ring D shall rest thereon at points in front of the longitudinal center line of the machine, and said upper portion of the machine is locked in said normal position by means of the spring-actuated latch d , which has its bearing in the stand C and engages with the hole d' , formed in the ring D, and from which it may

be retracted by pulling upon the knob d^2 and overcoming the tension of the spring d^3 , all as shown in Fig. 21.

The base-ring D of the upper portion of the machine is composed of the annular web or plate e and the two annular upwardly-projecting ribs e' and e'' , in which are formed a series of bearings, in which are mounted a series of twenty-six short horizontal shafts, e^3 , upon each of which is firmly secured a bevel-pinion, E, with which the teeth of the annular or ring gear E' engage to impart to all of said shafts e^3 a simultaneous rotation about their axes. The shafts e^3 are all arranged radially to the center or axis of the ring D, and have their inner ends bifurcated or forked, and are connected through the medium of balls e^4 to the forked outer ends of the type levers or hammers f , which in turn are connected, by means of the bifurcated links f' and the trunnioned sleeves f^2 , to the key-rods g . (See Figs. 2, 17, and 18.)

The inner ends of the type levers or hammers f are made triangular in cross-section, so as to form upon each three flat surfaces somewhat inclined to the axis of said levers, and upon said flat surfaces, on each lever or hammer, are formed in relief a capital letter, a small letter, and a figure, punctuation-point, or other character, said characters being so arranged upon said surfaces that whenever any particular lever or hammer is depressed its letter will be printed with its top toward the rear of the machine, and so that when one of the capital letters is upon the under side of said lever all of the capital letters shall be upon the under side, and the same shall be true in regard to the small letters or the figures and punctuation-points. The annular rib e' has formed in its inner upper corner a rabbet to receive the outer edge of the ring-gear E', which rests therein, as shown in Fig. 2.

F is a casing arranged to shut over and inclose the upper portion of the rib e' , to which it is secured by the screws g' , and serves to form the upper side of the annular groove in which the ring E' has its bearing. The casing F has its center portion crowned or made concavo-convex, and has firmly set in and projecting upward from its center the stud or spindle F', upon the upper end of which is rigidly secured the disk h , having formed in its upper surface near its outer edge an annular groove semi-circular in cross-section, in which rest the inner ends of the series of twenty-eight levers, G, the bearing for the same being completed by securing to said disk the annular cap h' , having in its under side a similar annular groove, the edges of the disk and cap being slotted to permit the passage of the neck of said levers G and allow a limited vibration of said levers about the center of said annular grooves. Another disk, H, having the outer portion of its upper surface inclined or conical, is fitted loosely upon the spindle F' and rests upon the spiral spring h^2 , by the tension of which it is held in its normal or extreme up-

ward position, with its conical or inclined surface in contact with the rounded elbows g^2 of the levers G, the movable ends of said levers G being at the same time in their extreme upward position, as shown in Fig. 2.

The spindle F' has a slot, i , cut transversely through its center, in which is placed the bar i' , into which is screwed the lever end of the stem i^2 of the central or space key, I, the lower edge of the bar i' resting upon the upper end of the hub of the disk H, so that a depression of the key I will cause a corresponding depression of the disk H, and thus impart a downward movement of the upper arm of the lever H', pivoted at j to ears projecting upward from the casing F, as shown in Fig. 2, the movable end of which lever projects under and is in contact with said disk H, as shown in dotted lines in Figs. 1 and 2. The key I, stem i^2 , and the bar i' are forced upward, when the finger is removed from the space-key I, by the reaction of the spiral spring i^3 , which surrounds the stem i^2 between the key I and the end of the spindle F'.

J is a second casing made somewhat in the form of an inverted cup and arranged to shut over and inclose the upper portion of the casing F, to which it is secured by the screws k .

K K are a series of twenty-six keys or buttons firmly secured to the top ends of the key-rods g , which rods are mounted in bearings formed in the casings F and J, in slightly-inclined positions, as shown in Fig. 2; and K' and K² are two special keys secured to the upper ends of rods g^3 and g^4 , which are also mounted in bearings in the casings F and J—one upon the right and the other upon the left hand side of the machine—and are connected by the links f^2 to the non-revolving type hammers or levers f^3 , one of which is shown in Fig. 9, said levers being each pivoted to a stud, f^4 , set in the annular rib e'' , intermediate between two of the shafts e^3 , all as shown in Figs. 9 and 16. These two levers f^3 have formed in relief upon their lower edges and near their inner or movable ends two of the most commonly-used punctuation-points—as, for instance, the comma and period, or comma and semicolon—one upon each lever.

Each of the rods g , g^3 , and g^4 is slotted transversely just inside of its bearing in the casing J, to receive the movable end of one of the levers G, which projects through said slot, as shown in Figs. 2, 14, and 15. The keys K, K', and K², the rods g , g^3 , and g^4 , the levers G, and the type-hammers f and f^3 are all maintained in their most elevated positions by the tension of the springs g^5 , surrounding said rods g , g^3 , and g^4 between the levers G and the casing F, as shown in Fig. 2. The ring-gear E' is moved about its axis by means of the handle L, firmly secured to the upper side of said gear and projecting outward therefrom through the horizontal slot l , cut through the casing F, as shown in Figs. 10 and 11.

The handle L has pivoted to its underside, and outside of the casing F, the spring-actuated

latch-lever L' , the short arm of which engages with one of three notches, m , m' , or m'' , formed in the lower edge of the casing F , for the purpose of locking the ring-gear firmly in the desired position, according as to whether capital letters, small letters, or punctuation-points are for the time being to be used.

The type-hammers f and f' are guided in their vibrations by the vertical and radial guides M , formed in one piece with the annular base-ring M' , which is firmly attached by suitable screws (not shown) to the ring D , and the upward motions of said type-hammers are limited by the rubber ring n , surrounding the upper ends of the guides M , and fitting into semicircular grooves formed in the outer edges thereof, as shown in Figs. 2 and 9.

N and N' are two spools adjustably mounted upon the shafts n' and n'' , respectively, which shafts are mounted in bearings in the stands N^2 and N^3 , respectively, which are firmly secured to opposite sides of the ring D , as shown in Figs. 1 and 2. These spools N and N' are designed to carry the inking-ribbon, (not shown,) which is first wound upon the spool N , when the outer end is drawn down beneath the small roll o , set in the lower end of the stand N^2 , and is then drawn horizontally beneath the upper part of the machine and partially around a similar roll, o' , set in the lower end of the stand N^3 , and is secured to the barrel of the spool N' .

The shaft n'' of the spool N' has firmly secured thereon the spur gear-wheel O , which engages with another spur gear-wheel, O' , mounted upon a journal having its bearings in ears p , cast upon the stand C , and in turn engages with the teeth of the rack P , secured to the stand B' of the carriage B , and having a further bearing in the stand p' , formed upon or secured to the stand C , all as shown in Figs. 1, 2, 4, 6, and 7.

The carriage B has secured to its under side the rack B^4 , with the teeth of which the spur-pinion B^5 engages to move said carriage and the roll B^3 endwise, to impart to the paper upon said roll what is termed the "letter-space feed." The pinion B^5 is fitted loosely upon the shaft b^2 , which has its bearings in the guideways A' , and has firmly secured thereon the clutch-hub b^3 , the teeth of which engage with corresponding teeth formed on the hub of the pinion B^5 when in its normal position, as shown in Fig. 4. The pinion B^5 is pressed into engagement with the clutch-hub b^3 by the spiral spring b^5 , which yields to permit the pinion B^5 to move endwise of the shaft b^2 , and revolve thereon independently of the clutch-hub b^3 , when it is desired to move the paper-carrying roll and its carriage to the right, after having printed a line, for the purpose of commencing a new line.

The shaft b^2 has secured upon its front end the ratchet-wheel b^6 , and also has loosely fitted thereon the lever b^7 , carrying the pawl b^8 , and connected at its outer or movable end to one end of the rod b^9 , the opposite end of which

has a bearing in the ear or lug c' , cast upon the stand C' , and has set in the front side thereof the conical-pointed pin c^2 , (see Figs. 3 and 7,) with which the forked lower end of the lever H' engages, as shown in dotted lines in Fig. 7, and by its vibrations causes an endwise movement of said rod b^9 , and a consequent vibratory movement of the lever b^7 and pawl b^8 , which, by virtue of its engagement with the ratchet-wheel b^6 , causes an intermittent movement of the shaft b^2 and pinion B^5 about their axes, and thereby a step-by-step endwise movement of the paper-carrying roll B^3 toward the left side of the machine.

The paper-carrying roll B^3 is provided at each end with the outwardly-projecting hub c^3 , upon the outer end of each of which is firmly secured a ratchet-wheel, q , by means of which and the three armed levers r , connected by the bar r' , having the handle r^2 , the roll B^3 may be intermittently moved about its axis to produce the "line feed" of the paper being printed upon.

The levers r are each provided with a rectangular slot, r^4 , in one end of which is fitted so as to be movable therein the box r^3 , which in turn is loosely fitted upon the hub c^3 , and is pressed toward the upper end of the slot r^4 by the spiral spring r^5 , interposed between said box and the lower wall of said slot, as shown in Figs. 2 and 5. Each of the levers r is provided with the outwardly-projecting lug or dog r^6 , which engages with the teeth of the ratchet-wheel q , and serves as a pawl to move said wheel, and with it the roll B^3 , about its axis when the levers r are moved by raising the bar r' and handle r^2 . The levers r are also each provided with a finger, r^7 , which projects over and presses upon the peripheral surface of the roll B^3 , so as to grip the edge of the paper and cause it to move with the roll when the bar r' and handle r^2 are raised. When the bar r' and handle r^2 are depressed, the dogs or pawls r^6 slide over a tooth of the ratchet-wheels q , and in so doing cause the levers r to be raised sufficiently to relieve the pressure of the fingers r^7 from the paper, the roll B^3 being prevented from moving backward by the stop-pawl s , which engages with one of the ratchet-wheels q , as shown, mostly in dotted lines, in Figs. 4 and 6.

The roll B^3 is preferably composed of a metal tube, t , with suitable heads, and has an outer covering of rubber, t' , against which the paper to be printed upon is pressed by the spring-fingers $u u$, secured at one end to the edge of the carriage B , as shown in Figs. 4 and 7.

S is a vacuum-cylinder fixed in the bearings $u' u'$ and provided with the piston S' , secured to one end of the rod S^2 , the opposite end of which is connected to an arm, u^2 , projecting from the stand B^2 , as shown in Figs. 3 and 7, the object of said cylinder being to assist in moving the carriage B and paper-carrying roll B^3 endwise after each impression is given. The area of the piston and cylinder must be such that the pressure of the atmosphere upon

said piston shall not be quite sufficient to move the carriage B and roll B³ unaided by the spring *w*, which is placed between the upper arm of the lever H' and the casing F, as shown in Figs. 2 and 20, and serves to raise said arm and keep it in contact with the under side of the disk H.

The cylinder S is provided at or near its closed end with an orifice, which may be closed by the inverted bulb or chamber *w'*, or by a plain plug, as may be desired. The bulb *w'* may be filled with oil for lubricating the cylinder; but before it is screwed into the orifice the piston S' is moved to the inner end of the cylinder to expel the air therefrom, and then the bulb or plug is screwed into the orifice to close it air-tight, when, if the piston be drawn toward the other end of the cylinder by a movement of the carriage B to the right, a vacuum will be formed in said cylinder, by virtue of which the pressure of the atmosphere will, assisted by the spring *w*, move the carriage B endwise a distance equal to the length of one of the teeth on the ratchet-wheel *b'* every time that a finger is removed from a key after having depressed it.

The lower arm of the lever H' extends through a slot, *w''*, cut through the casings F and J at their junction, as shown in Fig. 2, and has its lower end forked or provided with an open-ended slot, *w'''*, which engages with the pin *c'*, as shown in dotted lines in Figs. 2 and 7.

The upward and downward movement of the bar *r'*, handle *r''*, and lever *r* is limited by the lug *r'''*, formed upon and projecting outward from the lever *r*, and the shoulders *r'''* and *r''''*, formed on the front edge of the stand B', as shown in Fig. 6.

In Fig. 19 of the drawings is shown an end view and elevations of three sides of a single type-hammer for the purpose of showing the arrangement of the three sets of characters thereon.

The shaft *n'* of the spool N projects in front of the stand N², in which it has its bearings, and is squared to receive a removable crank for the purpose of winding the inking-ribbon upon said spool; or a crank may be fixed thereon, if desired.

The operation of my improved machine is as follows: The inking-ribbon having been wound upon the spool N and its outer end being connected to the spool N', as herein described, and the parts being in the positions shown in the drawings, the carriage B is moved to the left till the center of its length coincides substantially with the center of the machine, when the lock-latch *d* is drawn out by pulling upon the knob *d'*, and the upper or pivoted portion is tilted toward the rear, and the paper to be printed upon is inserted between the surface of the roll B³ and the springs *u u* and passed partially around and beneath said roll until the portion of the paper upon which it is desired to print the first line of matter is directly on the top of said roll, when the carriage B and roll B³ are again moved toward

the right until the point at which the first impression is to be made is reached, when the upper portion of the machine is again tilted into its normal or horizontal position, where it is locked by the latch or bolt *d*, when the machine is ready for printing; but as the type-hammers are shown in the drawings set to print small letters, and the first letter of any communication to be produced would naturally be a capital letter, the operator, before touching a key, would move the ring-gear E', by means of the handle L, in the direction indicated by the arrow till the latch-lever L' engages with the notch *m'*, which would cause all of the type-levers *f f* to be moved about their axes to the extent of one-third of a revolution, when a pressure upon the proper key K will cause an impression of the desired letter to be made upon the paper at the desired point, and at the same time the disk H will be depressed by the action thereon of the lever G, directly connected with the key depressed, and thereby move downward the upper arm of the lever H' against the tension of the spring *w*, and by a corresponding movement of the other arm of said lever H' the pawl *b''* is drawn backward over one tooth of the ratchet-wheel *b'*. When the finger is removed from the key, the type-lever *f*, lever G, and the key and its rod are moved upward by the recoil of the spring *g'*, and the disk H is raised by the recoil of the spring *h'*, and the recoil of the spring acting upon the lever H', assisted by the pressure of the atmosphere upon the piston S', causes a movement of the carriage B and roll B³ to the left a distance equal to one tooth of the ratchet-wheel *b'*, when, if the word to be printed is to be in capitals, another key is depressed, and these operations are repeated till the word is completed, when the key I is depressed to feed the roll without making an impression upon the paper. When it is desired to impress a comma or period, the key K' or K² is depressed. When it is desired to impress small letters, the handle L is moved to the position shown in Fig. 10; and when it is desired to impress figures or other characters than the capital or small letters or comma or period the lever L is moved to the right till the latch-lever L' engages with the notch *m*.

By the use of my jointed revolving type-hammer levers, each carrying three characters, I am enabled to avail myself of the use of eighty characters with only twenty-eight keys, which is a very important advantage.

At each step-by-step movement of the carriage B in the direction of its length, the rack P, acting upon and through the gears O' and O, causes a corresponding movement of the inking-ribbon, so that each blow of a type-hammer strikes upon the inking-ribbon in a new place. When a line has been completed, the upper portion of the machine is tilted back sufficiently to disengage the gear O from the gear O', when the carriage B is moved to the right and the bar *r'* and handle *r''* are raised to move the roll B³ around its axis, carrying

with it the paper thereon, gripped by the fingers r^7 , a distance equal to ordinary distance between the lines, when the operations may be repeated.

5 If a greater space is needed between the lines, two or more up-and-down movements of the handle r^2 may be made.

I disclaim the combination, broadly, with the carriage-actuating mechanism, of a series of levers constructed and arranged to be actuated by the key-levers and a universal lever arranged and constructed to be actuated by each and every lever of the series, as I am aware that the same is not my invention.

15 What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A type-hammer lever made of a single piece of metal pivoted by a ball or gimbal joint to a revoluble shaft, and having a portion of its free end made three-sided and having formed upon each of said sides a single letter or character in relief, substantially as described.

2. A series of type-hammer levers arranged radially to a common center and each having two or more characters formed in relief upon different sides thereof, in combination with a series of shafts, each connected to one of said type-hammers by a universal joint, mechanism, substantially as described, for imparting to each of said shafts and type-hammer levers a partial rotation, and a series of finger-keys, each connected to one of said type-hammer levers and adapted to impart thereto a vibratory motion, substantially as described.

3. The combination of a series of type-hammer levers, f , shafts e^3 , ball-joints e^4 , and pinions E , and the ring-gear E' , all arranged and adapted to operate substantially as and for the purposes described.

4. In combination with the type-hammer f , the shaft e^3 , the ball-joint e^4 , the pinion E , the ring-gear E' , the handle L , the latch-lever L' , and the casing F , having the detent-notches m , m' , and m^2 , all arranged and adapted to operate substantially as described.

5. The combination of the revoluble type-hammer f , pivoted by a universal joint, the sleeve f^2 , the link f' , the rod g , finger-key K , and the spring g^5 , all arranged and adapted to operate substantially as described.

6. The combination of the pivoted and revoluble type-hammers f and the guides $M M$, arranged and adapted to operate substantially as described.

7. The combination of the pivoted and revo-

luble type-hammer f , the guides $M M$, the sleeve f^2 , the link f' , the rod g , finger-key K , spring g^5 , and the annular stop n , supported by the guides $M M$, all arranged and adapted to operate substantially as described.

8. The combination of the carriage B , provided with the rack B^4 , the pinion B^5 , the shaft b^2 , the ratchet-wheel b^6 , the lever b^7 , the pawl b^8 , rod b^9 , lever H' , disk H , finger-key I , and springs i^3 , h^2 , and w , all arranged and adapted to operate substantially as described.

9. The combination of the carriage B , provided with the rack B^4 , the pinion B^5 , the shaft b^2 , the ratchet-wheel b^6 , the lever b^7 , the pawl b^8 , the rod b^9 , the lever H' , the disk H , the lever G , the rod g , the finger-key K , and the springs g^5 , h^2 , and w , all arranged and adapted to operate substantially as described.

10. The combination of the ribbon-spool N' , the shaft n^2 , the spur gear-wheels O and O' , the rack P , and the carriage B , all arranged and adapted to operate substantially as described.

11. The combination of the carriage B , carrying the fixed shaft a , the roll B^3 , provided with the outwardly-projecting hubs c^3 , the ratchet-wheels $q q$, fixed on said hubs, the boxes $r^3 r^3$, mounted loosely on said hubs, the slotted elbow-levers r , mounted upon said boxes and each provided with a dog, r^6 , and a grip-finger, r^7 , the spring r^4 , and the bar r' , all arranged and adapted to operate substantially as described.

12. In combination with the carriage B and mechanism, substantially as set forth, for imparting thereto an intermittent step-by-step endwise movement, the vacuum-cylinder S , its piston S' , fixed to the carriage B , and the rod S^2 , all arranged and operating as described.

13. The combination of the carriage B , shaft a , roll B^3 , ratchet-wheels $q q$, boxes $r^3 r^3$, the slotted elbow-levers $r r$, provided with the dogs r^6 and grip-fingers r^7 , the springs r^4 , the bar r' , the lug r^8 , formed upon one of the levers r , and the stop-shoulders r^9 and r^{10} , formed upon the stand B' of the carriage B , substantially as and for the purposes described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 13th day of October, A. D. 1884.

ALEX. G. DONNELLY.

Witnesses:

N. C. LOMBARD,

WALTER E. LOMBARD.