2 Sheets—Sheet 1.

H. CONRAD.

TYPE WRITING-MACHINE.

No. 183,905. Patented Oct. 31, 1876.

FIG. I

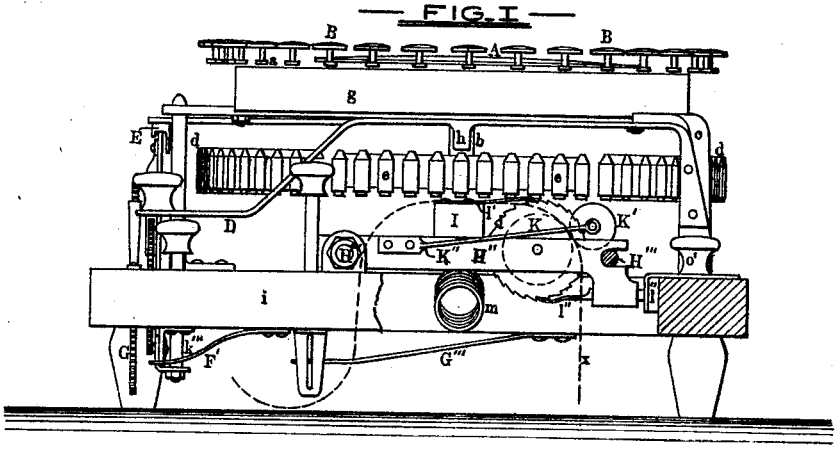
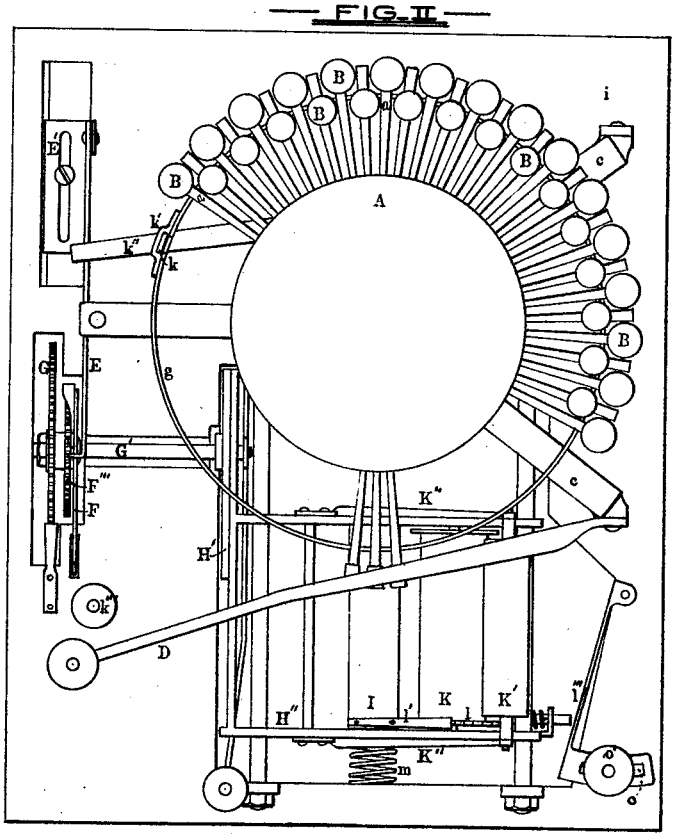


FIG. II



WITNESSES.

Wm. H. Towson

W. N. Wharton

INVENTOR.

Hiram Conrad,

by G. H. & W. J. Howard,
his Attys.

2 Sheets—Sheet 2.

H. CONRAD.

TYPE WRITING-MACHINE.

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FIG. IV.

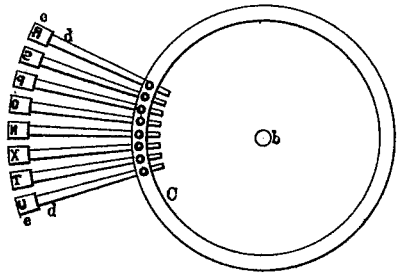


FIG. V.

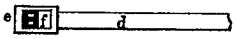


FIG. VI.

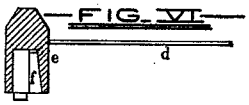


FIG. III.

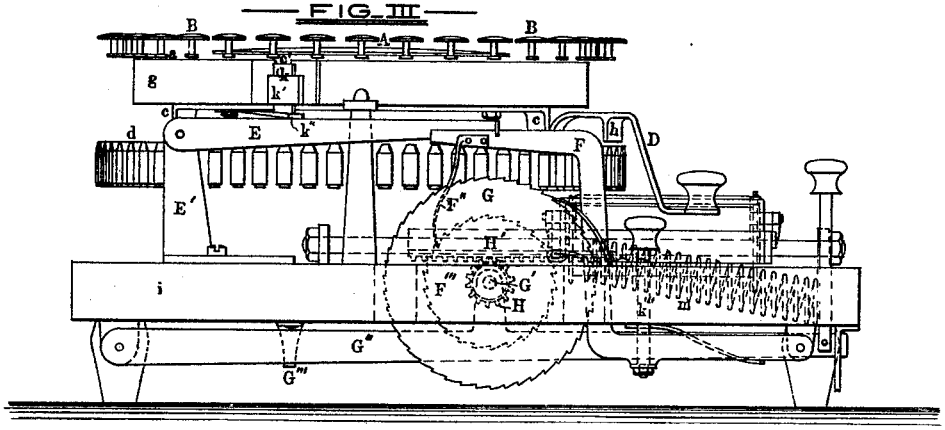
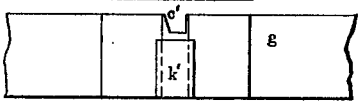


FIG. VII.



WITNESSES.

Wm. W. Towson

A. W. Wharton

INVENTOR.

Hiram Conrad,

by G. H. & W. T. Howard
his Attys.

UNITED STATES PATENT OFFICE.

HIRAM CONRAD, OF SHREWSBURY, PENNSYLVANIA, ASSIGNOR OF ONE-HALF HIS RIGHT TO BENJAMIN F. KOLLER, OF SAME PLACE.

IMPROVEMENT IN TYPE-WRITING MACHINES.

Specification forming part of Letters Patent No. **183,905**, dated October 31, 1876; application filed February 28, 1876.

To all whom it may concern:

Be it known that I, HIRAM CONRAD, of Shrewsbury, in the county of York, State of Pennsylvania, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification; and I do hereby declare that in the same is contained a full, clear, and exact description of my said invention, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention relates to certain combinations of parts in a machine in which letters, figures, punctuation-marks, &c., are indicated by or represented upon keys or knobs, and which knobs, when depressed, operate in connection with other parts of the machine to transfer to paper impressions from type corresponding to the letters, figures, &c., depressed, the spaces between the letters, figures, &c., being regulated by the sizes of the keys to suit the peculiar formation of the characters which they represent, irrespective of their widths. The spaces between the letters, however, may be increased or diminished by means of certain adjusting devices forming a portion of the said machine, and manipulated independently of the said keys and type and the feed which regulates the longitudinal spaces, or those between the lines of letter-press, as hereinafter described.

In the further description of the machine embodying my invention reference must be had to the accompanying drawing, forming a part of this specification, and in which—

Figure 1 is an end view of the machine, and Fig. 2 a plan of the same. Fig. 3 is a front view of the machine, and Fig. 4 an under-side view of a portion of the same. Figs. 5, 6, and 7 represent portions of the machine on an enlarged scale.

Similar letters of reference indicate similar parts of the invention in all the views.

A is a disk, from the edge of which project radially keys *a*. The keys are made of material having sufficient elasticity to allow of their outer ends being depressed in the printing operation hereinafter described, and the necessary resiliency to cause them to assume their original position when the depressing-weight is relieved. B B are knobs secured to the outer ends of the keys, and are engraved or otherwise marked with letters, numerals, punctuation-marks, &c., which are duplicated in the form of type attached to another portion of the machine, and from which impressions are made upon paper in the said printing operation. The disk A, with the attached keys and knobs, is fastened to a shaft, *b*, adapted to revolve within a bearing on the frame *c* of the machine. C is a circular plate, also fastened to the shaft *b*, and to which the radial springs *d* are connected. The outer ends of the springs *d* terminate in the type-sockets *e*, into which the type are keyed. A uniform radial distance for the type from the center of the revoluble shaft *b* is attained by keeping the type against the outer side of the sockets *e* by means of the keys *f*. The relative position of a knob, B, bearing a certain character, to a type representing a similar character, is such that, upon the key to which the said knob is fastened being depressed and made to enter a cavity or slot, *c'*, of peculiar construction, in the annular rim *g*, secured to the frame *c*, the said type is brought directly over that part of the paper upon which the desired impression is to be made, and to accomplish which impression it is only necessary to force the type downward by means hereinafter described.

The means whereby the type is depressed in the printing operation consists of a spring-lever, D, rigidly connected to the frame *c*, and provided with a projection, *h*, on the under side thereof, which occupies a position immediately above the type to be used. The outer or free end of the spring-lever D is fitted with a knob by means of which the projection on the lever is sprung into contact with the type-socket containing the type. The frame *c*, with the parts above described, is hinged to the bed-plate *i*, and may be elevated and removed from the remaining parts, to allow of the insertion of the paper to be printed to the feed-rollers, and admit of various manipulations of the said parts, as hereinafter described.

The feed-motions in this invention are of two kinds—the lateral, or that giving the distances between words and letters, transversely of the paper, and the longitudinal feed, or

that which regulates the distance between the lines or transverse rows of words and letters. In the first case the spaces between the letters forming words depend entirely, after an average space has been determined upon and arranged for by means of certain adjustable features forming a part of the mechanism, upon the degree of depression of the keys into the slot c' in the annular rim g before alluded to.

In order to regulate the spacing between the letters to suit their different widths and peculiarities of construction, each key has a width peculiar to the letter which it represents, and enters the slot to a certain depth. This slot is tapering, but provided with one vertical side, in order that the difference in the degree of depression of the keys shall not cause any variation in the positions of the various letters longitudinally of the paper when printed. The medium of communication between the keys a and the feed mechanism proper consists in a bolt, k, adapted to slide vertically in a pocket, k', formed on the outside of the annular ring g, and a spring-bar, k'', fastened to the frame, with its outer end extending over and resting upon the lever E of the feed mechanism proper.

The lever E is pivoted to the movable fulcrum E′, with the outer or free end resting upon a bent lever, F, pivoted to the bed-plate, and retained in an elevated position by means of a spring, F′. To near the outer end of the bent lever F is attached a spring-pawl, F″, which engages with the ratchet-wheel F‴. G is a second ratchet-wheel secured, together with the one F‴, to the shaft G′. One end of the shaft G′ is supported within a bearing on the bed-plate i, and the other by a projection on the lever G″. The normal position of the lever G″, or that which it occupies to place the shaft G′ in a horizontal position, is at its extreme elevation, such elevation being caused by the resiliency of a spring, G‴. H is a pinion fastened to the shaft G′, and adapted, in connection with the rack H′, to cause the lateral movement of the carriage to which the paper to be printed is attached. This carriage consists of a frame-work, H″, constructed to move in a lateral direction upon guides H‴. I is a pad secured to the frame-work H″, and upon which the portion of the paper to be printed is drawn over by rollers K K′, revolved by mechanism hereinafter described. The roller K is supplied with a toothed disk, l, and spring-pawl l', which admits of the revolution of the said roller in a single direction only, the said revolution being obtained through the medium of a second spring-pawl, l''. The outer end of the spring-pawl l'' comes into contact, in a certain movement of the carriage hereinafter described, with an inclined plane faced with a plate, l''', by means of which plate the said pawl is forced in and the roller revolved. The roller K′ is pivoted to springs K″, and is an idler, its office being merely to keep the printed paper in contact with the roller K.

The parts of the machine not yet referred to will be described, together with their uses, in the description of the operation of type-writing which follows: Supposing that the paper, which is represented in the drawing by x, be placed over the pad I and held thereto by means of threads, with the upper end confined between the rollers K K′, and that the words to be printed on the paper are "Patent Office," the first step is to move the carriage to the extreme right. The impression-paper, which is stretched between rollers revolving in a frame, is then placed over the paper. The rollers are adapted to offer some resistance to rotation by means of springs placed between the ends of the rollers and the frame to which they are pivoted. The knob representing the letter "P" is then brought into position and pressed down, and the key to which it is attached thus made to enter the slot c'. The spring-lever D is next depressed, which forces the type-socket, containing a type bearing upon its under end the letter "P," upon the impression-paper, causing its outlines to be transferred to the paper below. The disk A is then partially revolved until the knob representing "a" is in such position as will allow of its key being forced into the slot c'. In printing the first letter the feed mechanism accomplished nothing, although operated; but in the depression of this knob the attached key, when brought into contact with the bolt k connected to the spring-lever k'', causes the lever E to be depressed. It must be understood that this movement, in addition to placing the type representing the letter "a" in position for printing, causes, through the lever E and the connecting mechanism before described, the lateral feed, which in the present instance is equivalent to only the distance between the letters "P" and "a." After the letter "a" is printed the remaining letters in the word "Patent" are transferred to paper in a similar manner, the spaces being automatically regulated by the width of the keys. The feed which establishes the width of space between the words "Patent" and "Office" is obtained by the direct transmission of movement to the bent lever F by means of a knob on the upper end of a rod, k''', connected therewith, and which movement is made variable by altering the height at which the said knob projects above the bed-plate. This alteration is attained by having the lower end of the rod k''' threaded and adapted to turn in a nut secured to the bent lever F. The letters in the word "Office" are printed in the same manner as is described in connection with the word "Patent." In printing, when the end of a line is reached the lever G″ is thrown down by means of a knob connected thereto, thereby disconnecting the pinion H from the rack H′, and allowing the carriage to return to its original position through the agency of the spiral spring m, connecting the carriage with the bed-plate. The movement of the carriage to its original position, as de-

scribed, is also used to give the longitudinal feed before alluded to in the following manner: The outer end of the spring-pawl *l''* in the said movement comes into contact with the inclined or angle plate *l'''*, and is forced inward, thus partially revolving the feed-roller K, and carrying the paper longitudinally forward. The distance moved forward by the paper is regulated by angle of the angle-plate with regard to the adjacent part of the bed-plate, the said angle being maintained by means of a circular slot, *o*, and set-screw *o'*. The spaces between the letters may be increased or diminished through the medium of the movable fulcrum E' without interfering with the proportions of the spaces to suit different letters, as this proportion depends, as before mentioned, upon the relative widths of the keys.

Two or more copies of the printed matter may be obtained by placing alternate sheets of impression and ordinary paper between the rollers K K'.

Having thus described my invention, what I claim as new, and wish to secure by Letters Patent of the United States, is—

1. In combination with and fixed upon a central revolving shaft, a series of elastic radial keys, having at their ends knobs marked with letters, numerals, and other printing characters, and a series of lower elastic radial keys corresponding in number with the upper series, each key having at its end a type the letter or character of which is indicated on the knob of the corresponding key of the said upper series, substantially as herein specified.

2. In a type-writer, the disk A, with keys *a* extending radially therefrom, and provided with the knobs B, in combination with the annular rim *g* and frame *c*, substantially as shown.

3. The annular rim *g*, provided with the slot or cavity *c'*, constructed as described, in combination with the bolt *k*, held loosely within the pocket *k'*, and spring-bar *k''*, substantially as specified.

4. The spring-bar K'', operated as described, in combination with the lever E, adjustable fulcrum E', bent lever F, supported by the spring F', ratchet-wheels F''' G, pawl F'', and shaft G, substantially as described.

5. The bent lever F, in combination with the rod *k'''*, provided with a finger-knob, the said rod being adjustable in operative length by means of its threaded end and nut secured to the lever F, substantially as set forth.

6. The rack H', carriage frame-work H'', guides H''', pad I, feed-roller K, toothed disk *l*, and spring-pawls *l' l''*, combined with the bent lever F, lever E, spring-lever *k''*, bolt *k*, rim *g*, having the slot *c'*, and revoluble system of elastic radial indicating-keys *a*, provided with knobs B, substantially as herein specified, and for the purpose set forth.

7. In a rotary type-writer having its type and type-indicating devices arranged concentrically, as described, the shaft G', self-adjusting lever G'', and its knob, operated from above the bed-plate, combined as herein described, and for the purposes specified.

In testimony whereof I have hereunto subscribed my name this 7th day of January, A. D. 1876.

HIRAM CONRAD.

Witnesses:
CHAS. W. EATON,
BLANCHE R. MEYERS.