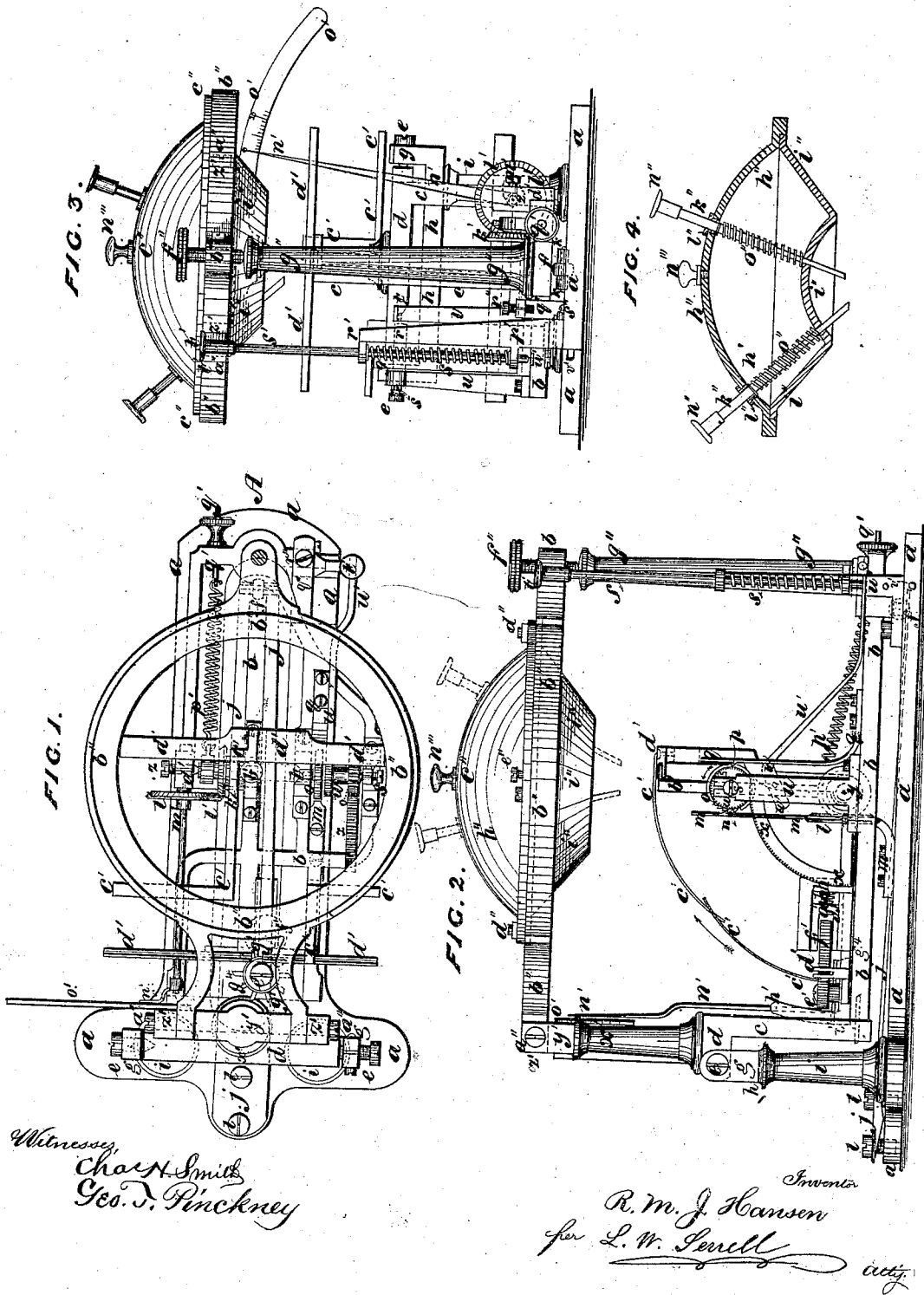


R. M. J. HANSEN.  
Type-Writing Machine.

No. 168,898.

Patented Oct. 19, 1875.



Witnesses,  
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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN TYPE-WRITING MACHINES.

Specification forming part of Letters Patent No. **168,898**, dated October 19, 1875; application filed September 17, 1875.

*To all whom it may concern:*

Be it known that I, RASMUS MALLING JOHAN HANSEN, of Copenhagen, in the Kingdom of Denmark, have invented certain Improvements in Instruments for Writing or Printing, of which the following is a specification:

According to this invention the so-called "writing-ball" described in the specification of a United States patent granted to me on the 22d December, 1874, is applied in a novel manner, and, by preference, also in an improved form, all as hereafter described.

Figure 1 of the accompanying drawings is a plan of an apparatus constructed according to this present invention, but with the writing-ball proper removed. Fig. 2 is a side elevation of the apparatus. Fig. 3 is an end elevation of same, and Fig. 4 is a section through the writing-ball constructed according to this invention.

*a* is the fixed foundation-plate of the apparatus. *b* is a movable bed-plate of the apparatus proper, which, during the operation of writing, rocks up and down, this movement being limited by stops *s''* and *r''*, respectively, on the foundation-plate *a*, and on a low bracket, *q''*, on the said foundation-plate. The movable bed-plate *b* is suspended in centers *e* at the cross-bar *d*, on the upright prolonged part *c* of the movable bed-plate *b*, the other end of which rests on a small roller, *f*. The centers *e* pass through lugs *g* on a cross-bar, *h*, which rests on two columns, *i*, on the fixed foundation-plate *a*. The said roller *f* is on a spindle, which rests in two lugs, *k*, on the outer free end of a long flat spring, *j*, which latter is attached to the foundation-plate *a* by means of two set-screws, *l*. On the foundation-plate *a* is fastened the upright spring *m*, which is formed with a pawl-tooth, *n*, gearing into a pawl-wheel, *o*. On the movable bed-plate *b* is fastened a similar upright spring, *p*, which is formed with a pawl-tooth, *p*, gearing into the opposite side of the said pawl-wheel *o*. The spindle *r* of the latter turns on the points *s* and the gudgeon *t*, (see Figs. 1 and 3,) respectively, in the standards *u* and *v* on the movable foot *b*. The spindle *r* also carries a tooth-wheel, *w*, which gears with a tooth-sec-

tor, *x*, that is fixed on the spindle *y*, one end of which has its bearing in the standard *u*, while the other runs on the point *z* in the lug *d'*.

The spindle *y* passes through an aperture formed in the standard *v*, and through an aperture formed in the anvil *b'*, which is fixed to the movable foot *b*. This anvil receives a blow or pressure each time a piston is struck during the operation of writing. The writing-ball, Fig. 4, is, by preference, made as shown here—that is, consisting of an upper part, *h''*, and a lower part, *i''*, made light and thin, as shown, joined by flanges, recessed into one another, and held together by screws. The ball has the required number of type-pistons, having knobs *n''*, and the upper part *h''* of each passing through a screwed ferrule, *l''*, and each having a shoulder, which is held up against the ferrule *l''* by means of a spiral spring, *o''*. The lower part of each piston is formed square or otherwise, so as not to turn in its correspondingly-formed hole in the part *i''*. There is also a blind or fixed piston-knob, *n'''*, by preference, in the center. It serves for the depression of the ball and the other movable part of the apparatus. The frame *b''* of the writing-ball is at one end, by the centers *a''*, jointed to the lugs *z'* on the cross-bar *y'* on the top of the column *x'*, which again rests on the aforesaid cross-bar *d*. The frame *b''* can thus be swung right up or back out of the way. The writing-ball rests in a recess in its supporting-frame *b''*, and is fastened thereto by means of screws *d''* tapped therein, and it can be leveled and adjusted by means of screws *e''*, tapped through the flange of the writing-ball, and abutting against the supporting-frame *b''*. Another means of adjustment is afforded by the screw *f''*, which is tapped through the outer end of the frame *b''*, and abuts against the column *g''*, that is fastened to the movable bed-plate *b*.

*c'* is a sector-shaped frame, which may be made with an entire arc, or with two arc-pieces, as shown. It is fastened on its central spindle *y*, and provided with a groove, clamp, or clasp, *d'*, at the end of each of its arms, which extend from the axle *y*. These two grooves *d'* serve to hold each side of the paper to be written upon. Any other suitable

paper-holding appliance may be used. Two rollers,  $e'$  and  $f'$ , (or it might be other equivalent yielding or gripping appliance,) take hold of the paper at some part of its lower edge, at which place the nipping or guiding groove  $d'$  is cut through, as shown at Fig. 1. The gudgeon of the roller  $e'$  has its bearings in a sliding block,  $g^1 g^1$ , which is pressed forward by a spiral or other spring,  $h h$ . The roller  $e'$  has spokes  $g^2$ , and on the movable foot  $b$  there is a tongue or horn,  $h'$ , Fig. 2, which, in its normal position, is slightly out of the vertical. It turns on a pin,  $i'$ , and, when the pressure is released which brought it into a vertical position, it falls back into its slanting position. The spiral spring  $p'$  is at one end attached to a hook on the spindle  $y$ , and at the other end to a screw,  $q'$ , on or in the movable foot  $b$ , whereby its tension can be so regulated as to allow that part of the sector  $c'$  which carries the two rollers  $e'$  and  $f'$  a slight overbalancing or excess weight. The spindle  $y$  carries a bevel-wheel,  $k'$ , Figs. 1 and 3, which gears into another bevel-wheel,  $l'$ , on one end of a spindle,  $m'$ , the other end of same carrying a hand,  $n'$ , the point of which during the writing glides along the scale  $o'$ , Figs. 1 and 3.

It is necessary that there should be an appliance for throwing the pawl-teeth  $n$  and  $p$  out of gear with the pawl-wheel  $o$ . I have here shown a convenient mode and means of doing it, although it is obviously only one out of many that might be used. On the foundation-plate  $a$  there is a standard,  $r'$ , through which passes a rod,  $s'$ , with a knob,  $t'$ . A spiral spring holds it up. When depressed, the lower point of this rod presses the arm  $u'$  against the stop  $v'$ , and thereby twists the cross-piece  $w'$  on the arm  $u'$  round the fulcrum of same in the two standards  $u$  and  $v$ , thereby bringing the said cross-piece  $w'$  into a more horizontal position, and forcing the two pawl-springs  $m$  and  $q$  apart, and their pawl-teeth  $n$  and  $p$  out of gear with the pawl-wheel  $o$ . When the pressure on the knob  $t'$  is released, the spiral spring throws the rod  $s'$  and teeth  $n$  and  $p$  into their normal position.

The mode of operation is as follows: The sector or paper-carrying frame  $c'$  being in the position shown, the operator, placing himself at A, Fig. 1, turns the writing-ball back, and pushes a sheet of writing-paper, with a superposed sheet of carbonized paper, from the right—that is, at the top of Fig. 1—into the two nipping or guiding grooves  $d'$  and  $d'$ , till one edge of the paper comes between the rollers  $e'$  and  $f'$ , for which purpose the roller  $e'$  is pushed back with the finger first. The writing-ball is then let down into the position shown, and the writing can commence. To write, or, rather, print a letter, the knob marked with it is depressed, whereby the type on its piston is pressed against the carbonized paper and writing-paper, the pressure being received by the anvil  $b'$  below same, the paper thus receiving the impression of the type.

The pressure of the finger on the piston, and thereby on the anvil, causes, however, also a slight depression of the whole movable part of the apparatus, either, as here shown, swinging on a hinge and depressing the spring  $j$  so far as the stop  $s''$  permits, or, as it might be done, though not, I believe, so advantageously, by going down bodily. As the spring-pawl  $m$  does not partake of this movement its tooth  $n$  will be pushed out of the tooth in the ratchet-wheel  $o$  and glide into the next higher tooth-space. When the operator then lets go the piston-knob its spiral spring will raise it into its former normal position, and the whole movable part of the apparatus will ascend into its normal raised position, here shown limited by the stop  $r''$ ; but as the pawl-tooth  $n$  holds the ratchet-wheel  $o$ , this latter is turned one tooth round in the direction of the arrow, Fig. 2, and the pawl-tooth  $p$  is forced out of its tooth-space and slips into the next lower tooth-space in the moment that the ascending movement of the movable part of the apparatus is arrested by the stop  $r''$ . The movement of the ratchet-wheel  $o$  causes a corresponding movement of the tooth-wheel  $w$  on the same spindle  $r$ , and thereby also a movement of the sector-rack  $x$  and sector-frame  $c'$  in the direction of the arrow on Fig. 2, the paper on the sector-frame  $c'$  partaking of the same motion, and thus sliding a slight distance, which is the type-space. The number of letters printed can be read off on the scale  $o'$ .

When a word has been printed, and a space is desired before printing the next word, the blind knob  $n'''$  on the writing-ball is pressed on, causing the depression of the ball, the column  $g''$ , and the rest of the movable part of the apparatus, and causing thereby a turning of the sector-frame  $c'$ , and paper thereon, as before described, but without printing anything on the paper. When a line has been printed, and the sector-pawl  $c'$ , consequently, is in the raised position indicated by the arrow, the operator presses on the knob  $t'$ , whereby, as before described, the cross-piece  $w'$  is twisted round, and the pawl-teeth  $n$  and  $p$  forced out of gear with the pawl-wheel  $o$ . The weight of the rollers  $e'$  and  $f'$ , and parts connected therewith, will then cause the sector-frame  $c'$  to fall back into its normal position, shown here. During this movement, however, one of the spokes  $g'$  on the roller  $e'$  will strike the slanting tongue-piece  $h'$ , and gliding down the same, the roller  $e'$ , and thereby also the roller  $f'$ , will obtain a slight turning movement, thereby propelling the paper, and carbonized paper held between the said rollers, a slight distance—namely, the width of a line-space. When the sector-frame  $c'$  has thus come into its normal position again, the finger is taken off the knob  $t'$ , and the pawl-teeth  $n$  and  $p$  will then fall into gear with the ratchet-wheel  $o$ . The printing of the new line can now commence. During the gradual movement of the sector-frame  $c'$  in the direction of the ar-

row, the tongue-piece  $h'$  will gradually be raised into the vertical position by one of the spokes  $g'$ , till the latter at last lets go the piece  $h'$ , which then falls back into its normal slanting position.

It will be obvious to any one conversant with mechanical construction that the just-described invention may be carried out in a great many different ways. Thus the whole framing of the apparatus may be arranged differently. Instead of a swinging movement, the movable part of the apparatus might, with a different arrangement of springs and stops, be made to rock or move bodily up and down, although I prefer the movement here set forth. Instead of an open sector-frame, a more or less open circular table might be employed, which might be made so strong as even to dispense with the anvil; but I find that the less inertia these moving parts have, the better for expeditious writing and certainty of action. The details of the paper-gripping, paper-moving, motion-indicating, and sector-frame-releasing mechanisms may also be made very different to what I have here set forth, without departing from the essential features of this my invention.

I claim as my invention—

1. The writing-ball formed of a thin outer shell,  $h''$ , and inner shell  $i''$ , united together,

in combination with the keys or type-pistons  $k''$  and springs  $o''$ , as and for the purposes set forth.

2. The plate  $b$ , sustained by and swinging upon the centers  $e$ , and carrying the type-writing and paper-moving mechanism, in combination with stationary spring-pawls, that operate the paper-moving mechanism.

3. The paper-holders  $d'$  and sectors  $e'$ , swinging upon the spindle  $y$ , in combination with the sector  $x$ , pinion  $w$ , ratchet-wheel  $o$ , and spring-pawls  $n p$ , as set forth.

4. The lever  $w'$  and pusher  $s'$ , in combination with the spring-pawls  $n p$  and paper-holder, for the purposes set forth.

5. The rollers  $e' f'$  and spokes  $g'$ , in combination with the paper-holders  $d$  and inclined tongue or horn  $h'$ , for the purposes and as set forth.

6. The index-hand  $n$  upon the shaft  $m$ , connected with the spindle  $y$ , in combination with the paper-holder  $d$ , ratchet  $o$ , and pawls  $n p$ , as set forth.

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