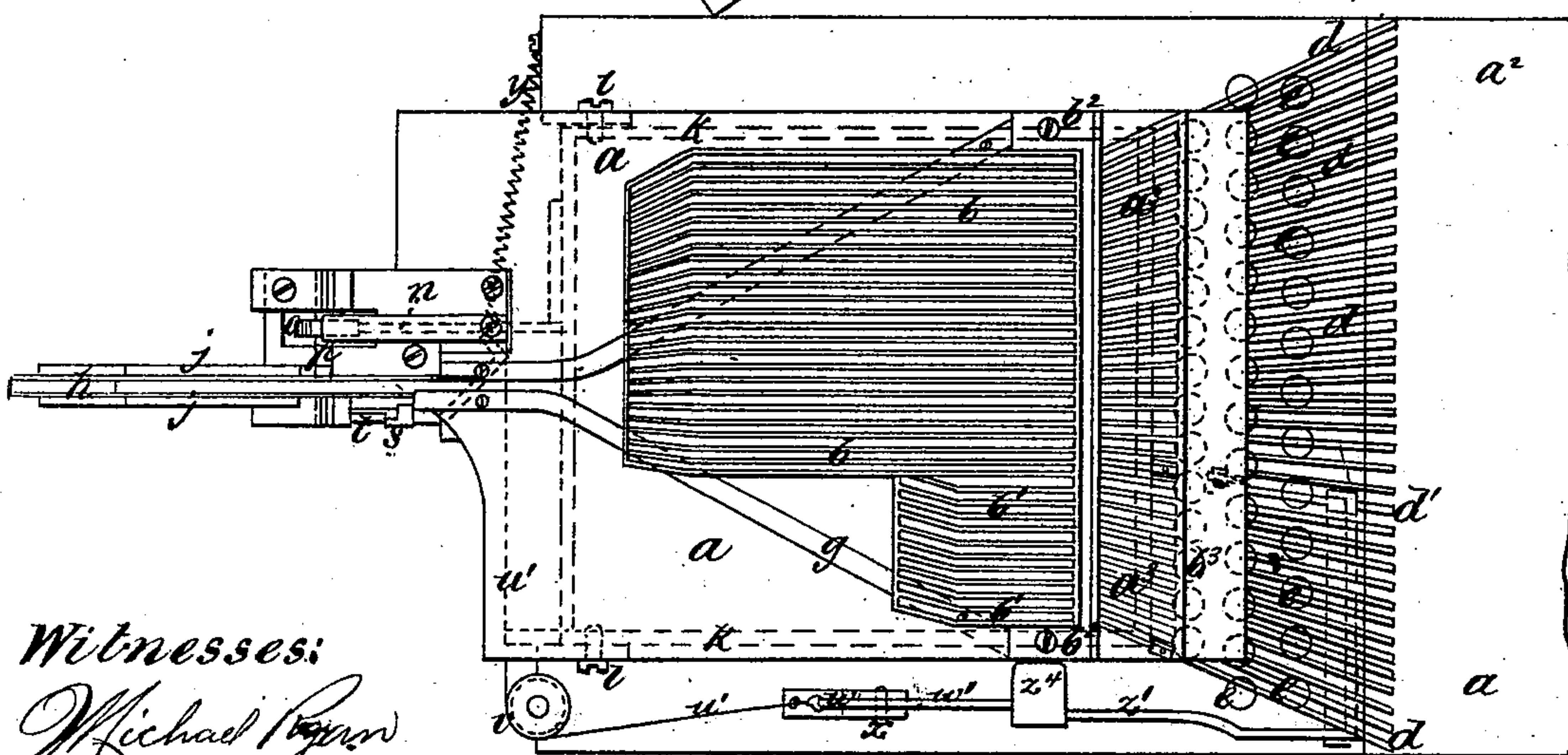
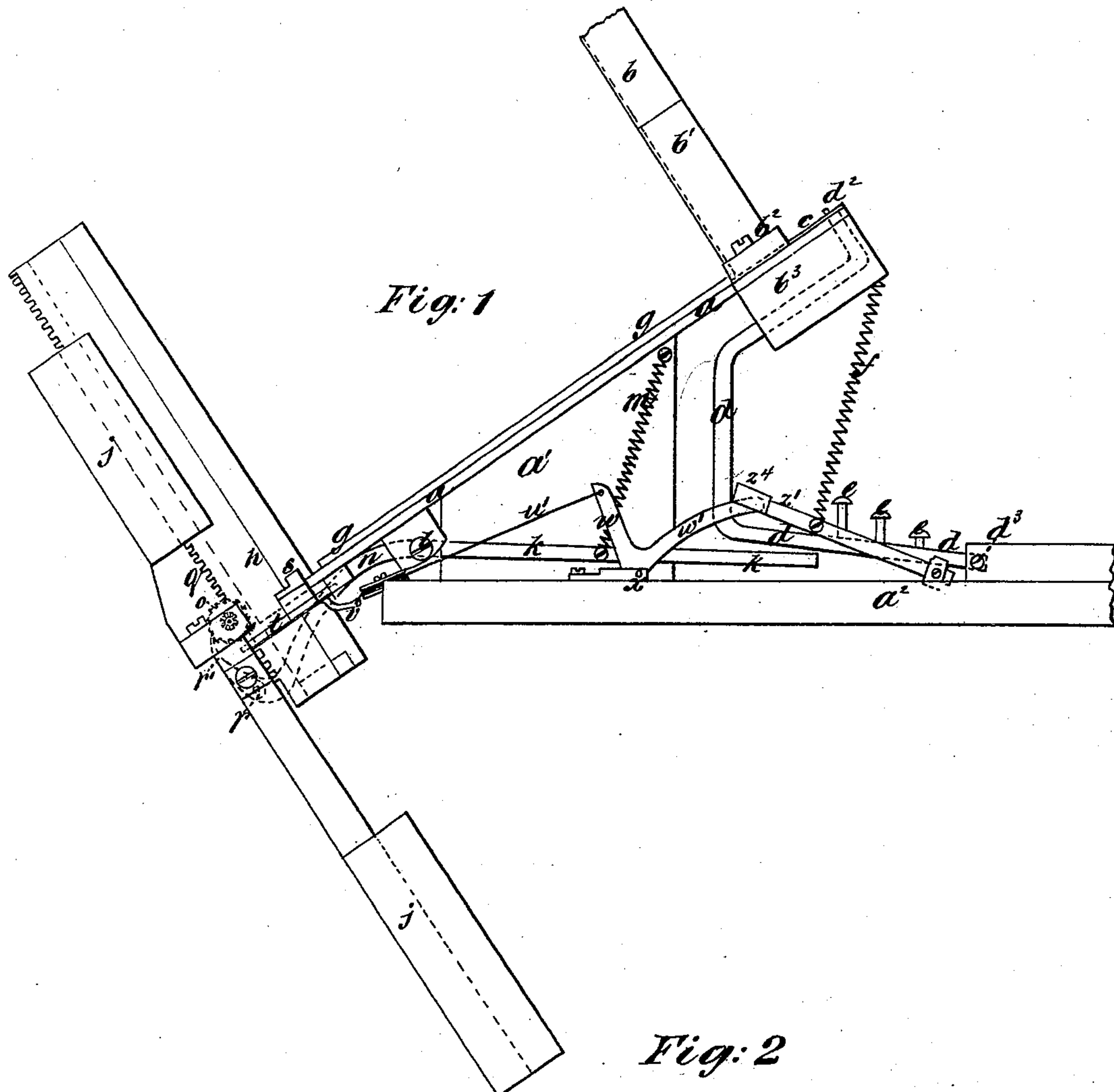


**A. MILLAR.**  
**Type-Setting Machine.**

No. 168,044.

Patented Sept. 21, 1875.



*Witnesses:*

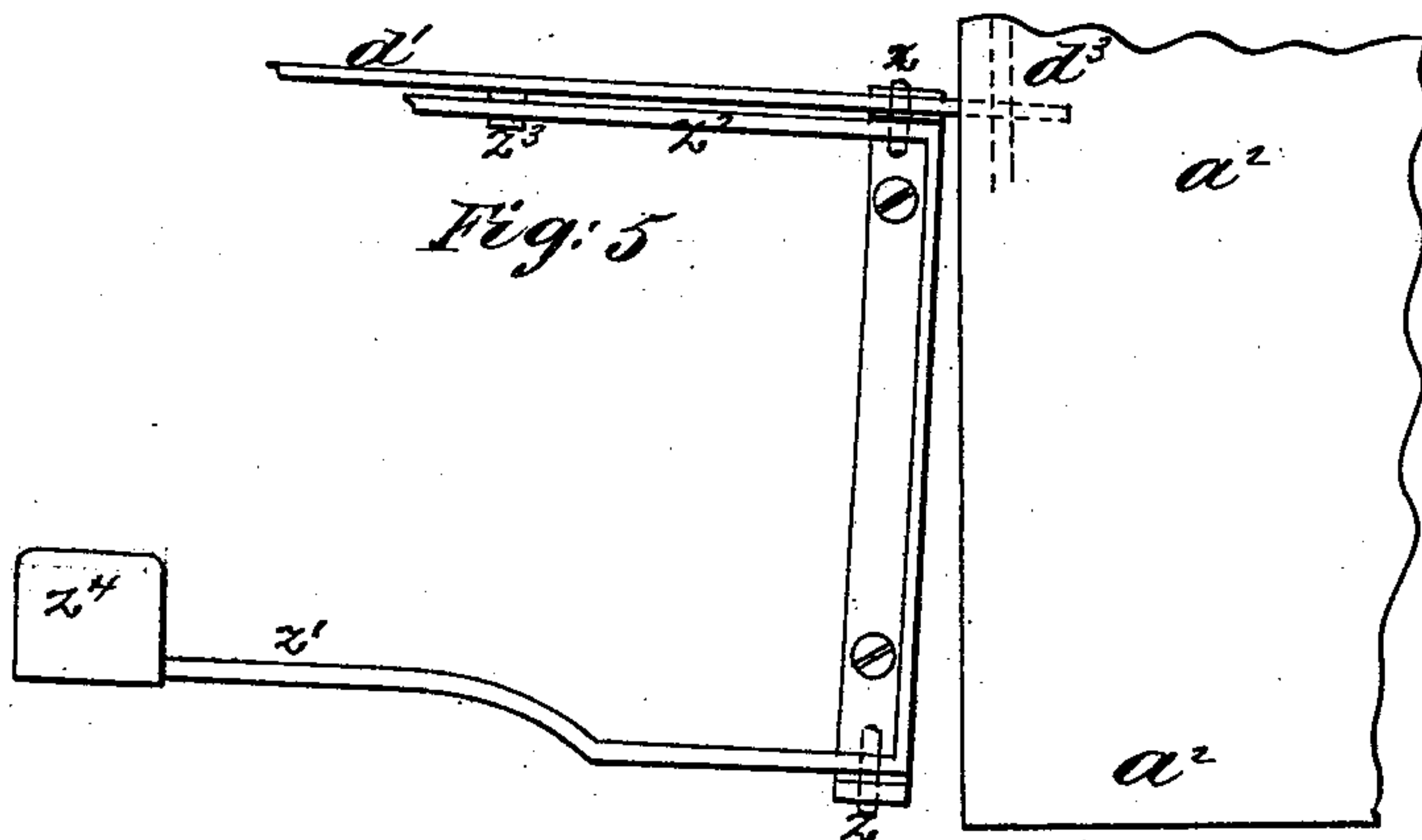
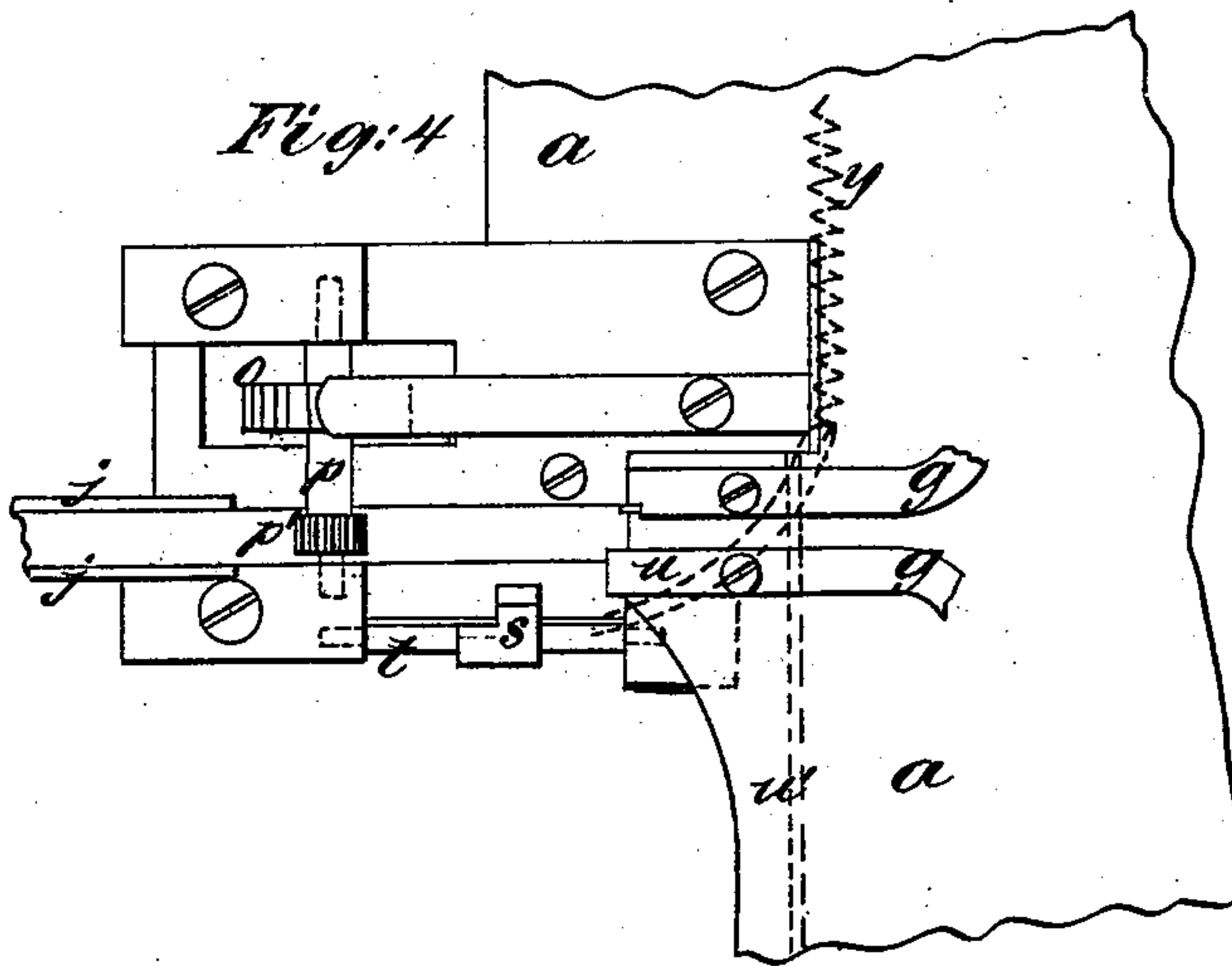
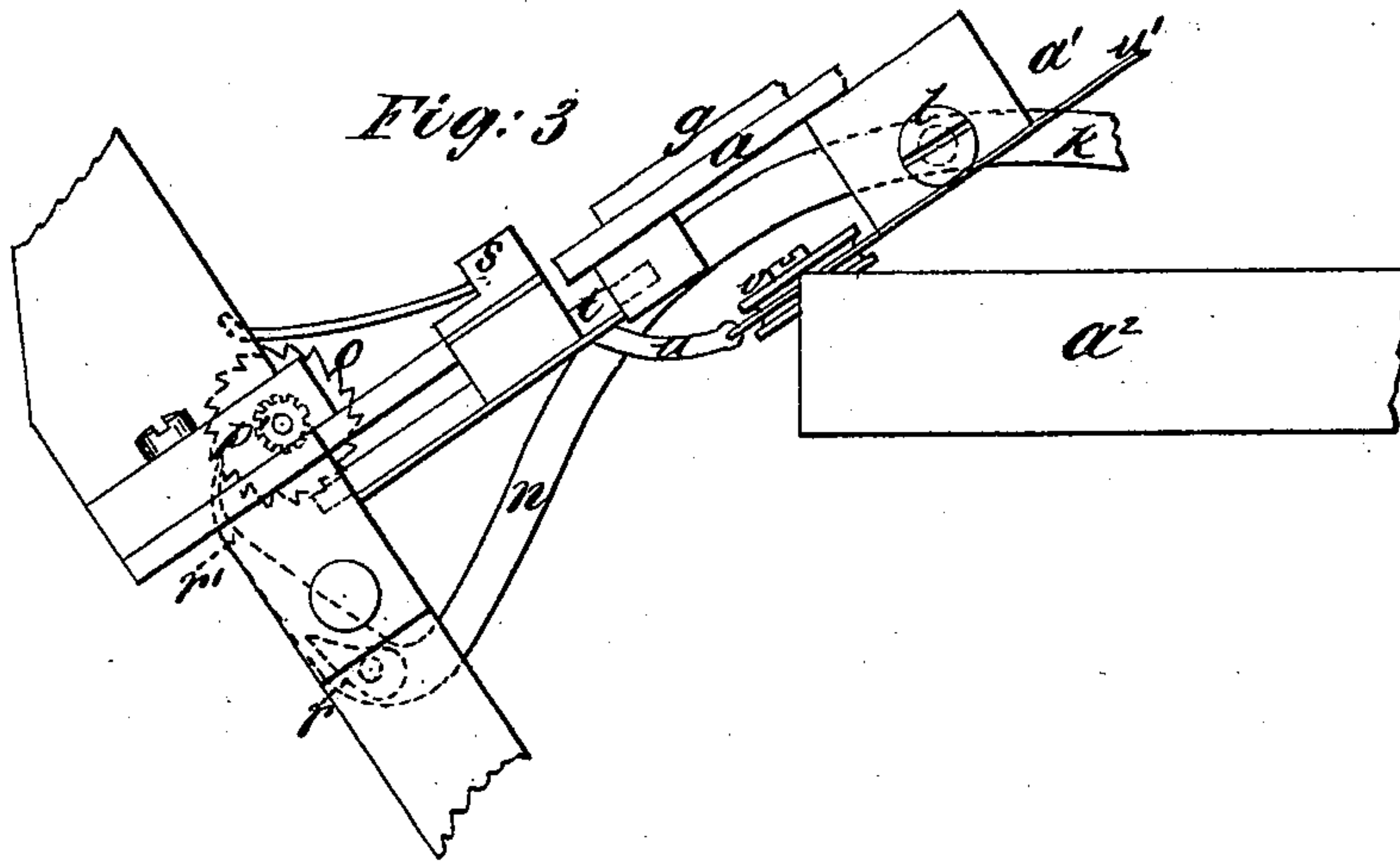
Michael Rynn  
Fred. Haynes

John Miller  
by his attorneys  
Brown & Allen

**A. MILLAR.**  
**Type-Setting Machine.**

No. 168,044.

**Patented Sept. 21, 1875.**



Witnesses:  
Michael Ryan  
Fred. Harnes

Adam Mullar  
by his Attorney  
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# UNITED STATES PATENT OFFICE.

ADAM MILLAR, OF HOLBORN, ENGLAND.

## IMPROVEMENT IN TYPE-SETTING MACHINES.

Specification forming part of Letters Patent No. **168,044**, dated September 21, 1875; application filed November 2, 1874.

*To all whom it may concern:*

Be it known that I, ADAM MILLAR, of 9 Brooke street, Holborn, in the county of Middlesex, England, mechanician, have invented certain Improvements in Apparatus for Composing Type, of which the following is a specification:

In order that my improved apparatus or composing-machine may be in a compact form and simple in its mechanism, according to my improvements I limit the compass of the composing apparatus or machine to the letters of one alphabet only, with the proper complement of spaces and marks of punctuation—say, forty characters, or thereabout.

The apparatus or machine is so arranged that letters other than those selected by the machine may be selected by the operator from ordinary type-cases placed or arranged adjacent to the machine, such additional or independent types being introduced from time to time by the operator, and passed through the machine or apparatus in the order in which they occur in the "copy" to be set up.

And in order that my improvements may be clearly understood and readily carried into operation, I will proceed to describe the drawings of the machine or apparatus hereto annexed.

Figure 1 shows a side elevation, and Fig. 2 a plan, of a composing apparatus or machine arranged and constructed in accordance with my invention.

The apparatus consists of an inclined plane,  $a$ , of polished metal or other suitable material, fixed on the block  $a^1$  of the base  $a^2$ . At the lower end of the inclined plane  $a$  the apparatus for receiving the type, equivalent to a "composing-stick," is placed, and at the upper end the various types to be selected or operated upon are placed. The types are arranged in columns or files, resting upon the inclined plane  $a$ , being kept in position by a series of open-ended troughs,  $b\ b^1$ , standing endwise on the inclined plane  $a$ , and at right angles, or thereabout, to its surface. The series of troughs  $b\ b^1$  are arranged in such positions that the types which they contain are all directed toward a common center, which is a few inches from the lower end of the in-

clined plane  $a$ . Each trough  $b\ b^1$  has an opening at the back, close to the surface of the inclined plane  $a$ , through which opening the undermost type of the column is pushed by means of a piston,  $c$ , acted upon by a lever,  $d$ , each trough  $b\ b^1$  having its own piston  $c$  and lever  $d$ . Attached to each lever  $d$  is a knob or button,  $e\ e$ , on which the operator presses with his fingers to select the particular letter or character required, the levers  $d\ d^1$  being brought back to their normal positions by the spiral springs  $f\ f$ . The series of the troughs  $b\ b^1$  are kept in their proper position by being inserted into a base-plate,  $b^2$ . A series of shallow grooves or channels are formed in the lower side of the base-plate  $b^2$ , through which the pistons  $c\ c$  work when discharging the types from the troughs  $b\ b^1$ . The pistons  $c\ c$  are supported by the inclined plane  $a$ , which is prolonged beyond the base-plate  $b^2$  for that purpose. A series of guide-slots,  $a^3$ , are formed in the prolonged part of the inclined plane  $a$ , in which the free ends of the levers  $d\ d^1$  work. A rail,  $b^3$ , around the end of the inclined plane  $a$  prevents the levers from going beyond the end of the guide-slot  $a^3$ . Each piston  $c$  is geared to its lever  $d$  by means of a pin,  $d^2$ , (formed on the free end of the lever  $d$ ), passing through a hole or eye in the piston  $c$ . The levers  $d\ d^1$  move upon a joint,  $d^3$ , on the base  $a^2$ , and, instead of leading in a straight line to the ends of the pistons  $c$ , they are shaped in such a manner as to occupy a nearly-horizontal position for some distance from the joint  $d^3$ , and then lead to the end of the guide-slots  $a^3$  by several bends, as clearly shown in Fig. 1. The buttons or knobs  $e\ e$  are fixed to the horizontal part of the levers  $d\ d$ , so that a vertical pressure on the knobs  $e\ e$  produces a movement of the free ends of the levers  $d\ d$  in a direction nearly parallel to the line in which the pistons  $c\ c$  move. The buttons or knobs  $e\ e$  are arranged in three straight lines, the second line of knobs being higher than the first, and the third line higher than the second, as shown in Fig. 1.

In working the machine the operator will stand at the end of the machine, so as to have the selecting-levers  $d\ d$  in front of him; and, in order that he may have a better view of the



lower end of the inclined plane *a*, the troughs *b*<sup>1</sup>, containing those types or characters which are less frequently used, are placed at the left hand of the operator, and are made much shorter than the other troughs *b*, so that he can easily see over them and have a better view of the receiving apparatus.

The types are guided into the composing-stick, arranged in combination with the machine or apparatus, by means of two guides, *g g*, fixed upon the surface of the inclined plane *a*, so as to form a narrow channel at the lower end, and spreading outward at the upper end, so as to embrace the space occupied by the lower ends of the whole series of troughs *b b* containing the types.

The arrangements for receiving the types as they slide from off the inclined plane *a* consist of a composing-stick, *h*, in the form of a trough closed at the lower end, and mounted in a position opposite the end of the narrow channel previously mentioned, the composing-stick *h* being supported by a race or slide, *j*, supported at right angles to the surface of the inclined plane *a*. The composing-stick *h* has a downward movement in the race or slide *j* produced by the depression of the selecting-levers *d d*<sup>1</sup> acting through the following mechanism, part of which is shown on an enlarged scale in Figs. 3 and 4. *k k* is a rectangular frame, having a vibratory motion on the pivots *l l*, which pass through the lower end of the frame *k k*. The upper side of the frame *k k* passes under the series of levers *d d*<sup>1</sup>, and is kept close up to them by the spiral spring *m*. To the lower side of the frame *k k* a bent arm, *n*, is fixed, which acts as a driver to the ratchet-wheel *o* carried by the shaft *p*, which shaft *p* also carries a small pinion, *p'*, working in the middle of the race or slide *j*, and in gear with a rack, *q*, fixed to the back of the composing-stick *h*. The end of the arm *n* is jointed at *r*, and carries a spring which keeps the driver or jointed part *r'* in contact with the ratchet-wheel *o*.

The distance which the composing-stick *h* travels for each time that one of the knobs *e* is depressed is equal to the average thickness of the types as they occur in their various degrees of frequency—as, for instance, if twelve inches of a line of type contain, on an average, one hundred and forty-four types, then the rack and pinion and the ratchet-wheel should be so proportioned to each other that for each movement of the levers *d* the composing-stick *h* should travel one-twelfth part of an inch. But in order that no stoppage or interruption to the working of the machine should occur when the collective thickness of the series of types forming a word exceeds the average, as already described, a downward movement is communicated to the composing-stick *h*, independently of the action of the levers *d d*, by means of the arm *s* on the axis *t* being pressed down upon the uppermost

type of the column in the composing-stick *h*, and pushing the column along, with the composing-stick *h* downward, until the top of the column is at the proper height.

The mechanism for producing this movement of the arm *s* consists of a curved arm, *u*, also fixed to the axis *t*, from which curved arm *u* a cord, *u'*, leads over the pulley *v* to the shorter arm *w* of the lever working on the axis *x*. The depression of the longer arm *w'* of the lever pulls the cord *u'* and depresses the arm *s*. A spiral spring *y* is connected to the curved arm *u*, and brings the arm *s* back to its normal position.

In order that there may be no loss of time in working this supplementary apparatus, it is made to act in conjunction with the lever *d*<sup>1</sup>, which belongs to the trough *b*, in which the spaces or blanks which are used to separate the words from each other are arranged. The arrangement for effecting this joint movement consists of a forked lever, *z*<sup>1</sup> *z*<sup>2</sup>, (Fig. 5,) working on pivots *z* near the axis *d*<sup>3</sup> or joint of the levers *d d*, one limb, *z*<sup>2</sup>, of the fork bearing upon a stud, *z*<sup>3</sup>, in the lever *d*<sup>1</sup>. The other limb, *z*<sup>1</sup>, of the forked lever terminates in a broad plate, *z*<sup>4</sup>, and rests on the end of the lever-arm *w'*. The depression of the plate *z*<sup>4</sup> depresses the lever *d*<sup>1</sup>, and thereby discharges a spacing-type into the composing-stick *h*. At the same time the lever *w'* is also depressed, and, acting by the cord *u'*, brings the arm *s* to bear upon the types in the composing-stick *h*, if the column of composed types should at that moment be higher than the proper height.

When capitals, italics, or other types than those in the machine occur in the copy the operator selects them by hand from ordinary type-cases placed adjacent to the machine, and lays them on the surface of the inclined plane *a*, with a slight impetus downward, so as to glide into the composing-stick *h*. A downward movement of the composing-stick *h* should then be made, either by depressing the rectangular frame *k k*, or by making a movement of the arm *w'* of the supplementary apparatus independently of the forked lever *z*<sup>1</sup> *z*<sup>2</sup>.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The composing-stick *h*, arranged within the fixed race *j* at right angles to an inclined plane, *a*, and having the rack *q* on its edge, in combination with the ratchet-wheel *o*, pinion *p'*, rectangular frame *k k*, having the bent end *n* and pawl *k'*, and the pivoted levers *d*<sup>1</sup> *d*<sup>1</sup> for vibrating the frame *k k* in order to operate the ratchet-wheel and impart a downward movement to the composing-stick, substantially as herein set forth and illustrated.

2. In combination with the pivoted lever for discharging the types, the pivoted forked



lever  $z^1 z^2$ , lever  $w w'$ , cord  $w'$ , arm  $s$ , and composing-stick  $h$ , substantially as and for the purpose herein set forth and shown.

3. The trough-shaped composing-stick  $h$  arranged at right angles to the inclined plane at the lower end thereof, in combination with the supplementary apparatus for moving the stick downward, independently of the levers for discharging the types, the same con-

sisting of the pivoted arm  $s$ , the cord  $w'$ , pulley  $v$ , and the pivoted lever  $w w'$ , substantially as herein specified.

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