

(No Model.)

S. W. FRANCIS.
WRITING MACHINE.

2 Sheets—Sheet 1.

No. 18,504.

Patented Oct. 27, 1857.

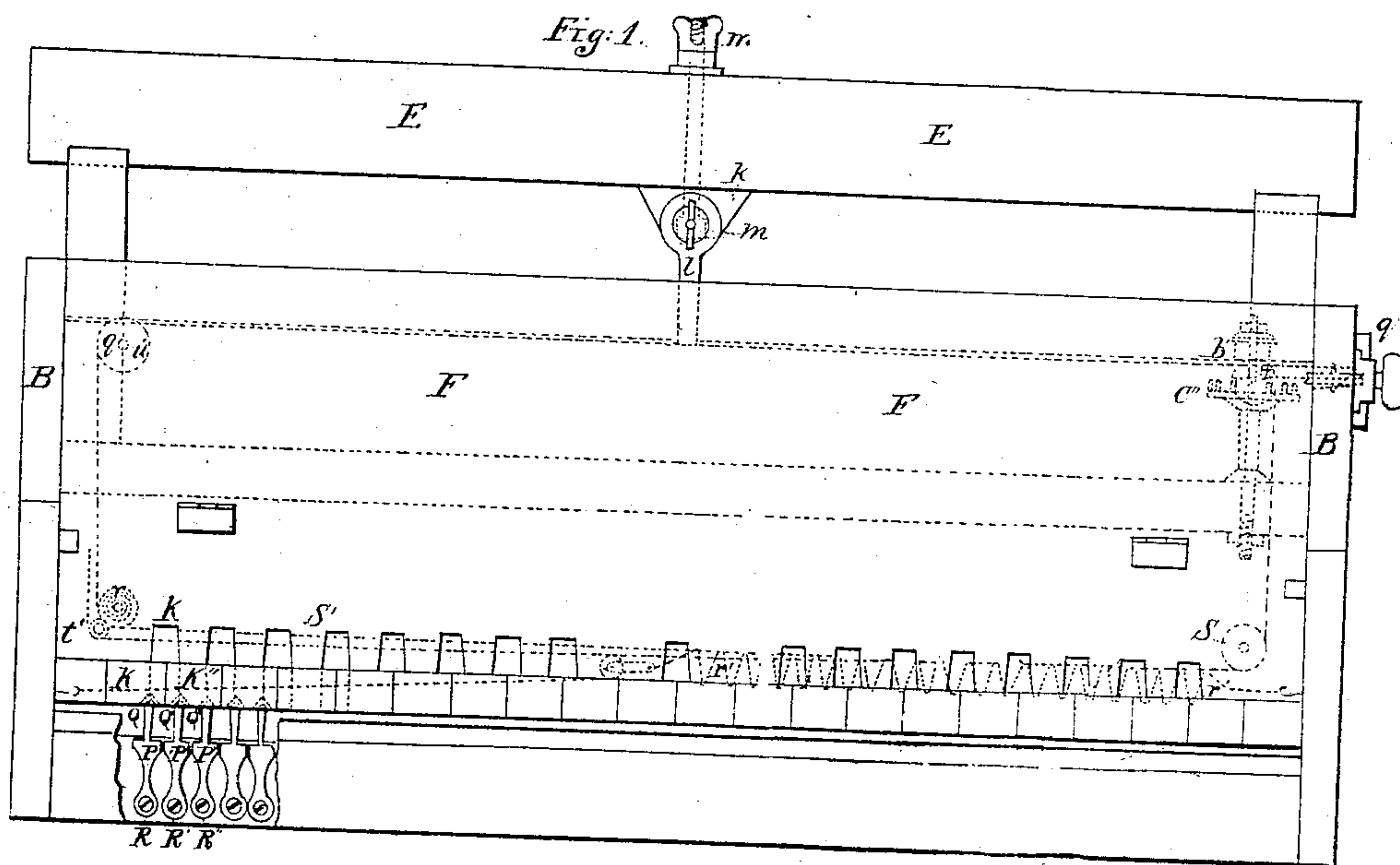
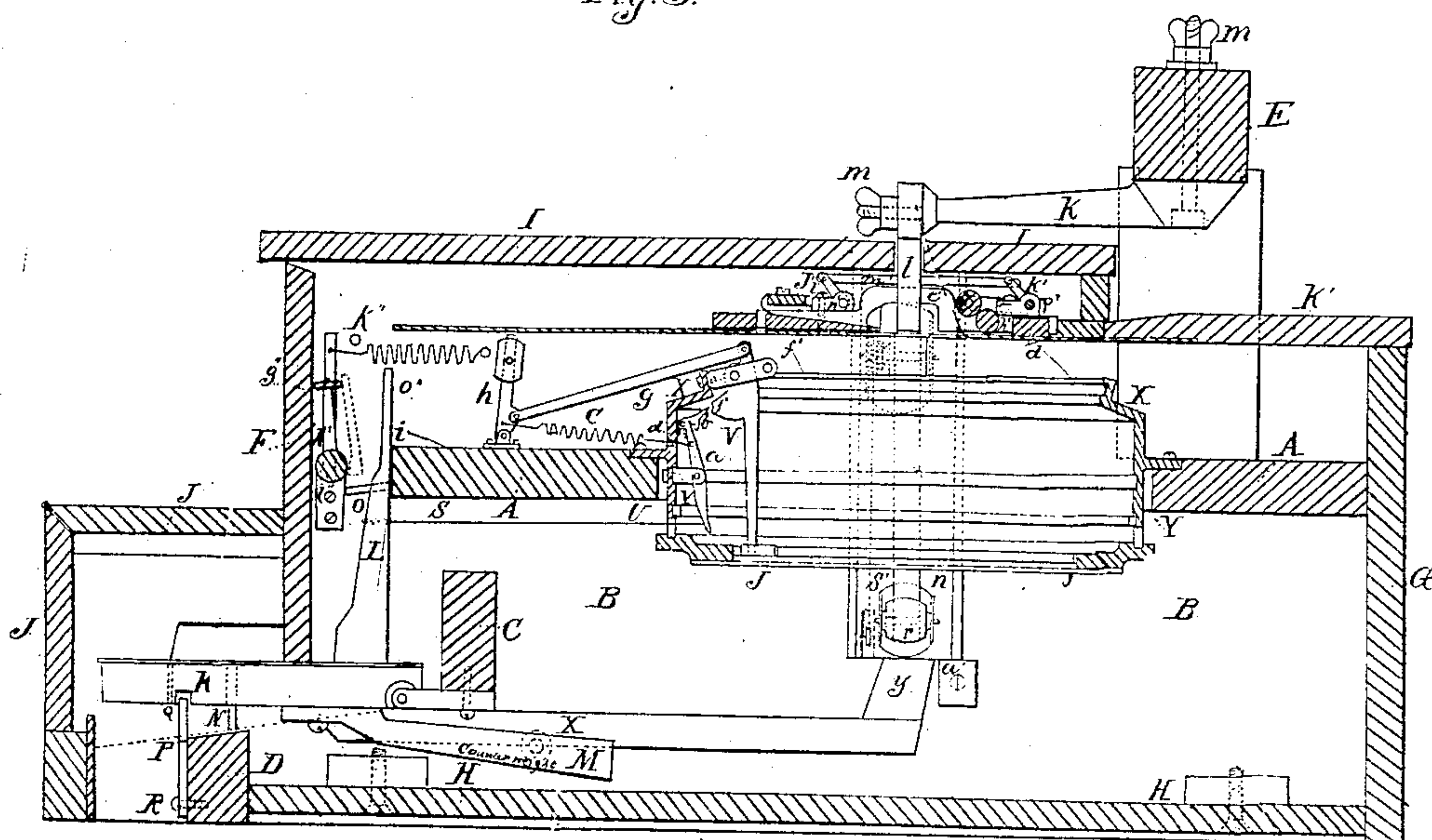


Fig:3.



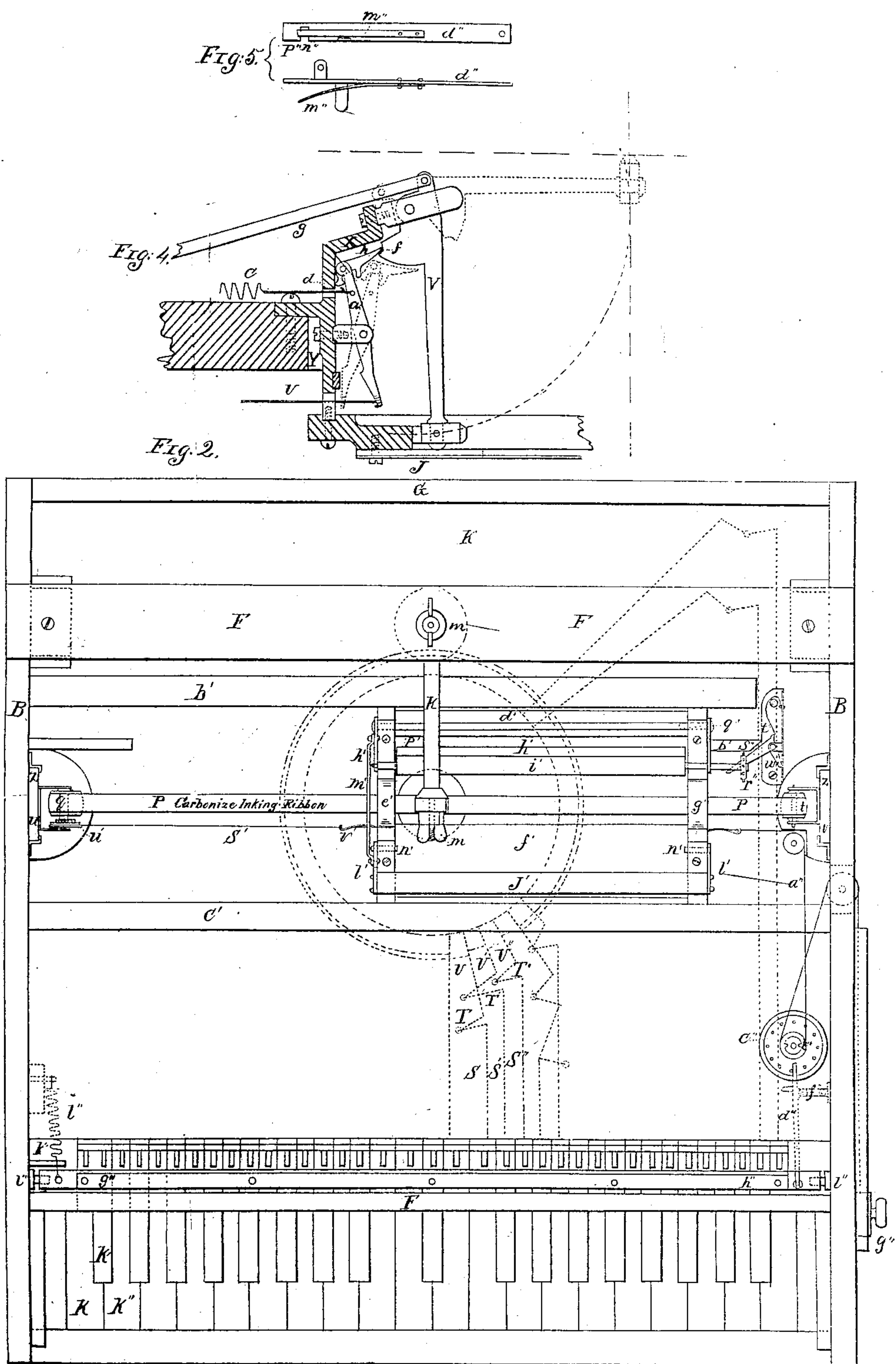
(No Model.)

2 Sheets—Sheet 2.

S. W. FRANCIS.
WRITING MACHINE.

No. 18,504.

Patented Oct. 27, 1857.



UNITED STATES PATENT OFFICE.

SAMUEL W. FRANCIS, OF NEW YORK, N. Y.

PRINTING-MACHINE.

Specification forming part of Letters Patent No. 18,504, dated October 27, 1857.

To all whom it may concern:

Be it known that I, SAMUEL W. FRANCIS, of New York, county of New York, and State of New York, have invented certain new and useful Improvements in Printing-Machines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being made to the annexed drawings, making a part of this specification, in which—

Figure 1 is a front view, Fig. 2 a top or plan view, Fig. 3 a longitudinal section, Fig. 4 a detailed view, of an action and hammer. Fig. 5 is a drawing of detail shown in Fig. 2; and similar letters indicate similar parts throughout.

The principal feature of my improvement consists in arranging a row of hammers in a circle, so that when put in motion they all will strike the same place, which is the center of said circle. The paper is moved along by means of a spring and a catch so connected with the keys that it shall move the paper the distance of one letter whenever a key is struck. On the face of each hammer a letter is cut in relief in such a position that its impression on the paper will be parallel with those of the other. At the end of each line the "car" which carries the paper is drawn back by hand. By this operation the spring is wound up for the next line, and the paper is moved the distance of two lines in a direction perpendicular to the line written by means of a catch hereinafter described. The keys are connected with actions somewhat similar to those used in pianos by means of wires and bell-cranks, which actuate the hammers. There is also an arrangement for rendering the simultaneous action of two hammers impossible. It is obvious that by causing two or more hammers to strike against each other serious injury would derive therefrom, rendering machines where key-boards are used practically useless.

A A is a horizontal board, which, together with the sides B B and cross-bars C, D, and E, forms the frame of the machine, to which all parts of the mechanism are secured. The whole mechanism is inclosed in a casing, of which B B forms the sides, F and G the front and back, H the bottom, K the top, and I I and J J the movable cars.

The keys K L K' L' are disposed in a lon-

gitudinal series under the cross-bar C. They all carry a counter-weight, M, which brings them by gravity to rest against the board A A. Their downward motion is checked by a cross-bar, D. There are two pins, N and O, which act as guides for each key. Under and between the keys a row of vertical stop-bolts, P Q P' Q', are pivoted by screws at R R' R'', and are in contact with each other by shoulders. The tops are beveled on both sides, and are lodged in corresponding recesses of and between the keys. These recesses are made twice as large as the top of the stop-bolts P Q P' Q', which enter them. By this arrangement it is impossible to bring down more than one key at the time, for, supposing a key being depressed, the stop-bolts P' Q, placed on the right side of the key, are all pushed simultaneously in the same direction. The same effect is produced on the left side of the key, where all bolts are pushed to the left. If, however, it is attempted to bring down two keys at once, all the stop-bolts between them, being equally pressed to the left and to the right, will keep their places directly under the spaces between the keys, whereby the two keys which are acted upon are prevented from coming down more than one-sixteenth of an inch. The keys are connected with the "actions" by means of wires U U' U'' S S' S'' and bell-cranks T T' T''. These actions and the hammers V V' are attached to a circular frame, X Y, which is fastened to the central opening of the board A A. Each action is composed of a rocker, a, movable on a fulcrum, of a pawl, b, having its fulcrum on the upper end of the rocker, and of a spring, c. When the key is in its normal position, the rocker a occupies the position drawn in black lines, (see Fig. 4,) and the rear end, d, of the pawl b being pressed against the frame by the spring c, the other end or cam of said pawl is raised to such a position as to catch the hammer in the notch f, if the key is brought down, and to throw it up in the position represented in red lines. When the rocker a is brought to the latter position, the end h' of the pawl b is brought down by its own weight, and thus clears the hammer when it springs back.

I found it advantageous to unite each hammer, by means of a rod, g, to a second hammer, h, which equilibrates the first in its va-

rious positions, much less power being required to move the two levers than to overcome gravity of one of them.

The spring *c* is attached on one end to the hammer *h*, which, operating in connection with another spring, *i*, brings both hammers to their respective places after each stroke. To the cross-bar *E* is attached a projecting arm, *k*, from which hangs a stud, *l*, against the end of which all the hammers are made to strike. The arm *k* and stud *l* are liable to be turned out of sight by occupying the position beneath the cross-bar. They are secured in the several positions by means of a screw and nut, *m* and *n*.

The inking is effected by a silk band, *p p*, which is carried on four pulleys, *q r s t*, secured onto two sliding brackets, *u v*. These brackets are elevated by pressing upon the first and last key of the key-board whenever the band is to be inked. It is again brought down to its proper position by pressing upon the sliding brackets at *z z*.

The paper is carried upon a car sliding between two rails, *b' c'*. The car consists of a quadrangular frame, *d' e' f' g'*, supporting a roller, *h'*, and the heavy flat bar *J'*, to which the latter is united, by means of levers *k' l'* and rod *m'*, in such a manner that when the bar *J'* is raised from the frame along a circle, the center of which is at *n'*, the roller *i* is equally raised by moving round the axes *p' q'*. The paper to be printed is first placed upon the roller *h'*. The roller *i'* is then brought down upon it, and the weight of the bar *J'* causes the rollers to hold together. This last may also be attained by means of a spring. Two or three light springs are soldered to the bar *J'* for the purpose of keeping the paper steady by pressing it against the frame of the car.

The car is propelled by a spring-power, which consists of a spiral or any other form of spring, *r'*, pulling steadily the car in a direction contrary to the lines to be printed. The spring is attached to the car by means of a spring, *s'*, which passes over pulleys *t'* and *u'*. To the opposite end of the car is attached a cord, which, passing over a pulley, winds around a barrel, *b''*. The latter is firmly mounted upon a round disk, *c''*, which is furnished with a row of pins near the periphery thereof. *d''* is a catch, a detail view of which is represented in Fig. 5. On the under side it has a notch, *n''*, through which the pins may pass in one direction only. This is effected by means of a spring, which covers the opening by the pressure of the pins against it, thus establishing a bar against the passage of the pins, hence against the revolution of the disk in that direction. The catch is connected by a proper system of leverage with the frame *e'' h''* and the side of the casing. The frame bears against a stud, *k''*, by means of a spring, *l''*; but when acted upon by either of the levers *L* it will also actuate the catch by withdrawing the spring from the side pressure of the pins. The spring thus released allows the

passage of one pin, but locks against the next following one. These are the means I employ to feed the car, and consequently the paper, the distance of one single letter, until the whole line is completed. I then pull the knob *q''*, so as to bring the stud *l* to bear against the first letter of the next following line. The moving of the paper in a direction perpendicular to the lines is effected by means of a spider-wheel, *r''*, made fast onto the shaft end of the roller *i*, and by means of a lever, *s''*, and spring *t''*. The object of the light spring *t''* is to make the lever *s''* turn till it rests against the frame by its projecting part *u''*. When the car is pulled to the right, one of the spokes of the spider-wheel *r''* is pressed against the inclined sides of the lever *s''* and turns the distance of two lines; but when the car goes back the spring *t''* plays and the position of the spider-wheel *r''* remains unchanged.

The pulley *u* is free on the shaft of the band-pulley *q*, and carries a ratchet so arranged in relation to a ratchet-wheel upon the shaft that when the car is moved to the right the pulley turns freely, and that when the car moves to the left the pulley *u* carries the pulley *q* along with it. The band is thus caused to follow the movement of the car, and every letter is struck in a different place. The band and the paper may be arranged in different ways. The band may be placed between the paper and the hammers. The most perfect impressions are thus produced, but it would be necessary to turn over the whole so as to enable the operator to read what he is printing. The band may also be placed between two kinds of paper, one opaque, the other transparent. In such case the types are cut so as to be read on the side of the paper which is opposite that of the impression. Two or more copies may thus be obtained, and the printed matter is read through the transparent paper, which is placed on the top. For representing capitals I use a conventional sign over ordinary letters. This sign is engraved on a separate hammer, the key of which is shorter than the others, so that the paper is moved when acted upon. This key must be struck before that of the letter which is to represent a capital.

Having now fully described my improvement, what I claim as my invention, and desire to secure by Letters Patent, is—

1. Connecting with the type-hammer a secondary hammer or counter-weight, *h*, by means of a spring and rod, *c*, substantially in the manner described, for the purpose of actuating with greater ease, and of maintaining the equilibrium of the type-hammer in its various positions.

2. The combination of spring-power mechanism with the paper-car when the former is made to propel said car in a direction contrary to the lines to be printed and when the car is guided in its course by rails, substantially as described.

3. The specific device herein described for holding the paper flush with the inking-band,

consisting of the roller *i*, connected to the heavy rule *J'* by a system of parallel-link frames, and holding the paper with gentle pressure upon and against the roller *h'*, substantially as set forth.

4. The combination, with the roller *i*, the spider-wheel, when arranged in relation to and operating in connection with the lever and spring, so as to feed the paper in a direction perpendicular to that of the printed line.

5. The combination of the movable frame with catch, spike-wheel, and barrel, when constructed and arranged as described, where-

by the car is made to move by the action of keys during the intervals of printing, substantially as set forth.

6. The combination, with a series of keys, of a series of stop-bolts, *P Q P' Q'*, constructed and arranged in the manner specified, whereby the simultaneous action of two or more keys, and consequently of two or more hammers, is effectually obviated.

S. W. FRANCIS.

Witnesses:

A. POLLAK,
N. BEAUMONT.