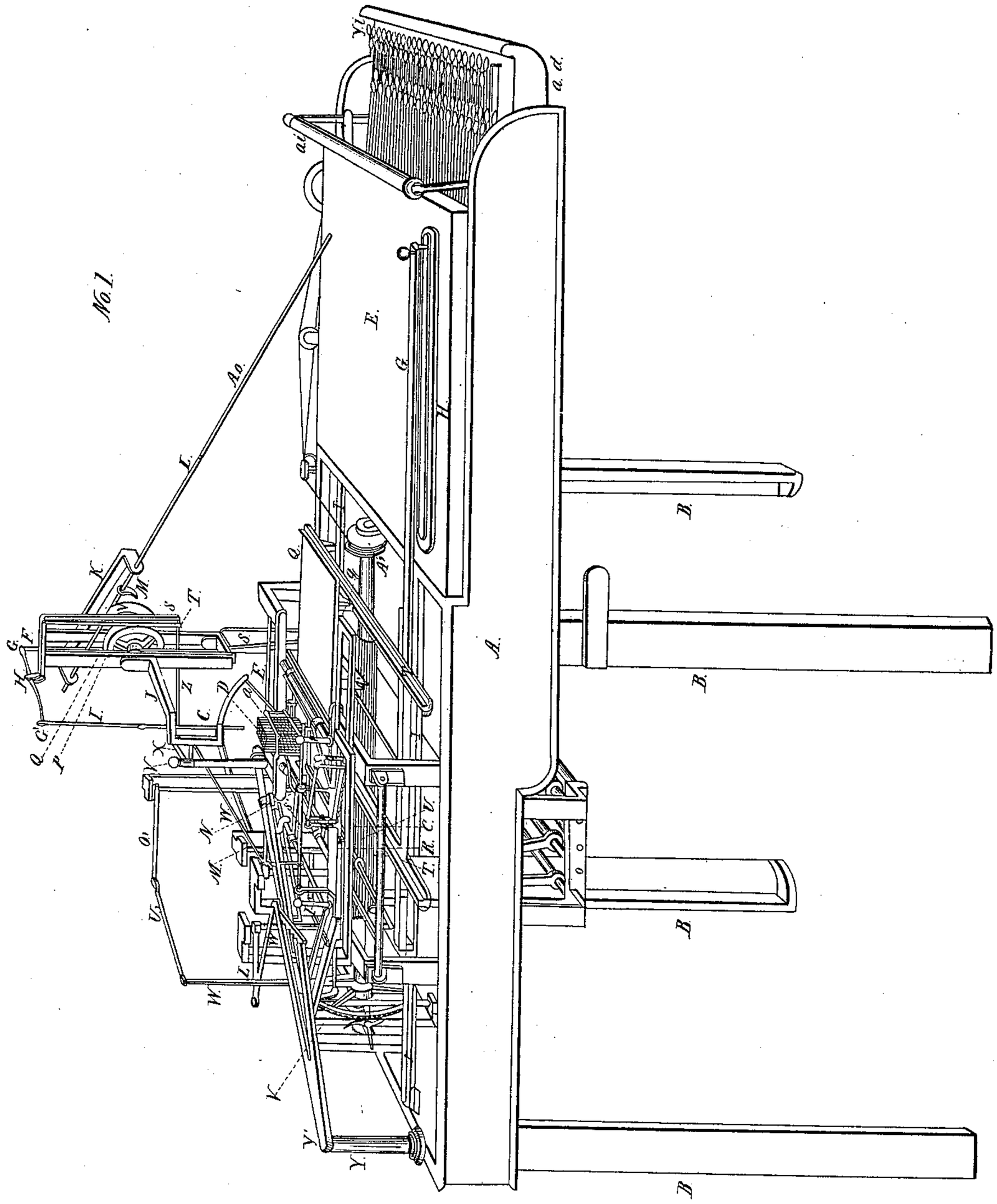
5 Sheets—Sheet 1.

O. T. EDDY.

PRINTING MACHINE.

No. 7,771. Patented Nov. 12, 1850.

No. 1.



5 Sheets—Sheet 2.

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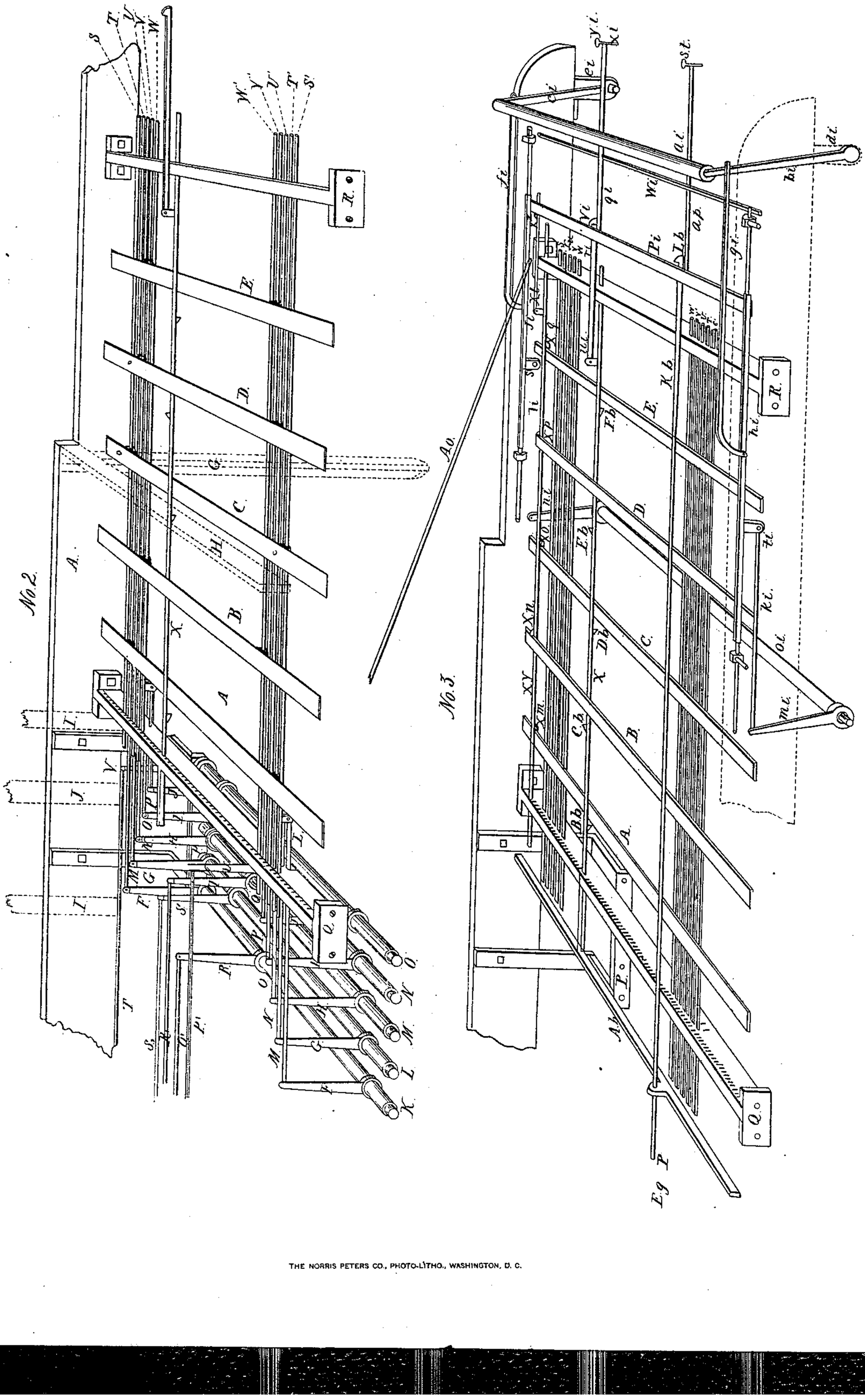

5 Sheets—Sheet 3.

O. T. EDDY.

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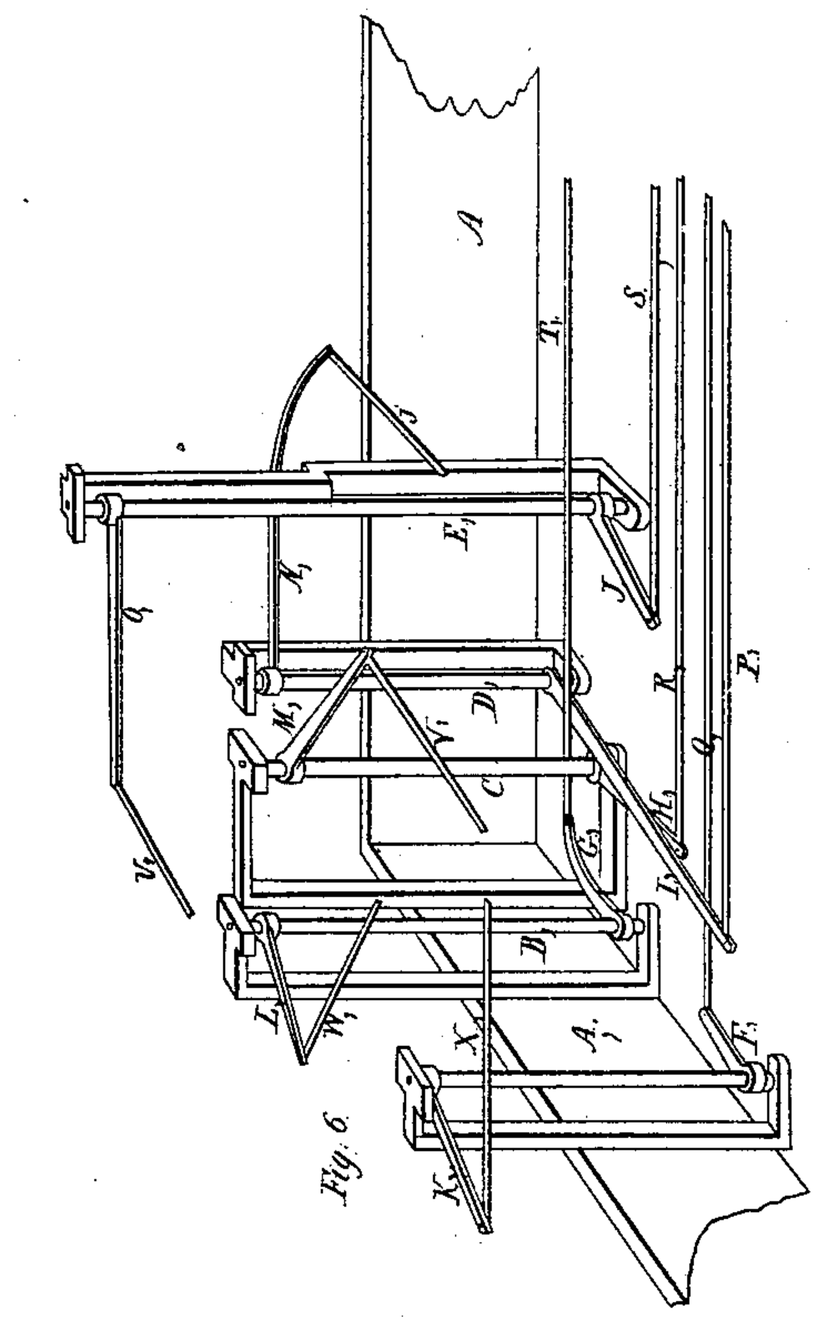

Fig. 6

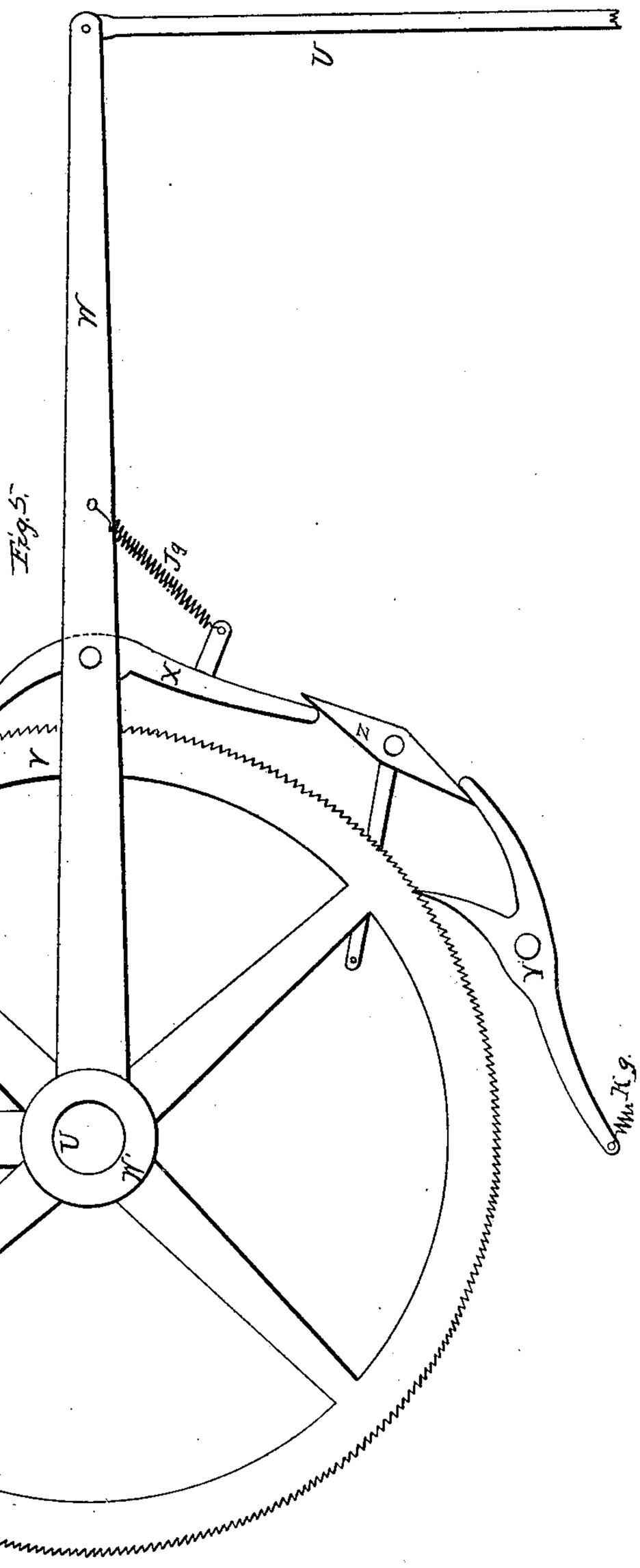

Fig. 5.

5 Sheets—Sheet 4.

O. T. EDDY.

PRINTING MACHINE.

No. 7,771. Patented Nov. 12, 1850.

Fig. 7.

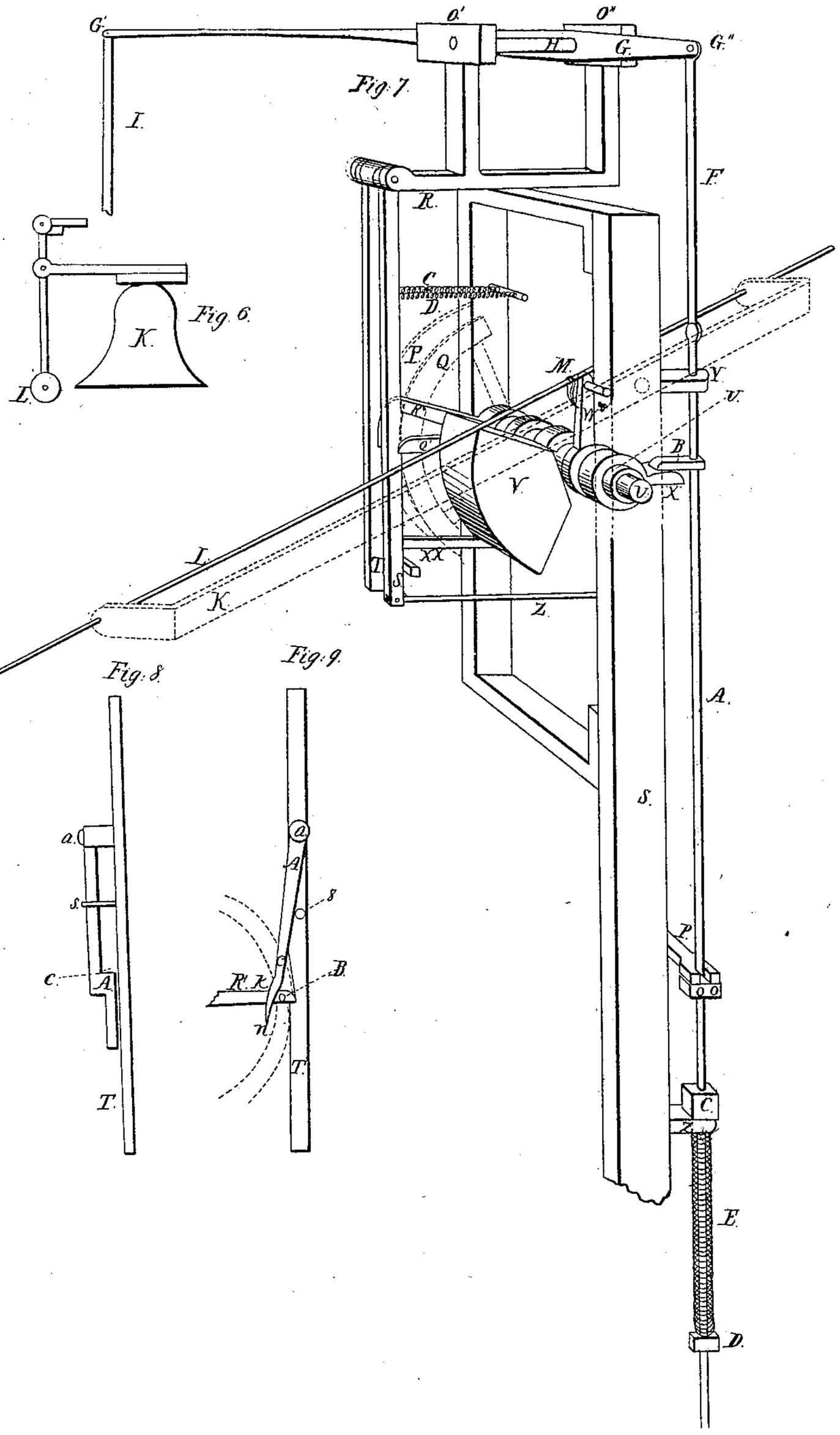

Fig. 6.

Fig. 8.

Fig. 9.

5 Sheets—Sheet 5.

O. T. EDDY.

PRINTING MACHINE.

No. 7,771. Patented Nov. 12, 1850.

Fig. 2.

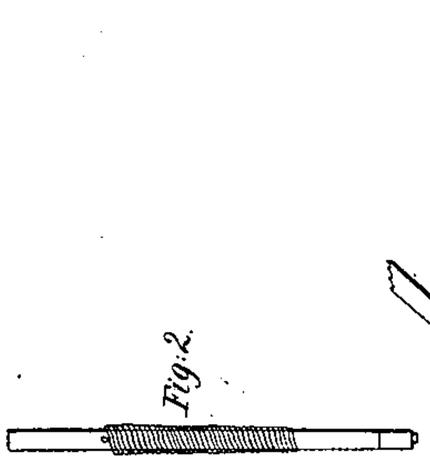

Fig. 4.

UNITED STATES PATENT OFFICE.

OLIVER T. EDDY, OF BALTIMORE, MARYLAND.

IMPROVEMENT IN PRINTING-MACHINES.

Specification forming part of Letters Patent No. 7,771, dated November 12, 1850.

To all whom it may concern:

Be it known that I, OLIVER T. EDDY, of the city of Baltimore, in the State of Maryland, have invented a new and useful machine by which printed letters and signs may be substituted for written ones and machinery be substituted in place of the pen in the transactions of every-day business; and I do hereby declare that the following is a full and complete description of my said invention.

In ordinary printing the types are set separately, and the form when prepared produces at each impression the entire matter to be printed, multiplying the same *ad libitum*. In my invention I aim at the production of but a single printed sheet as a substitute for a written one, and instead of there being as many types as there are letters in the printed matter the same type makes all the letters corresponding to it in succession as they occur. My form of types, therefore, instead of being a counterpart of the printed matter, is but an assemblage of the letters of the alphabet and such figures and signs as I require, of the proper size and so arranged that they may be applied separately and in succession, as in the process of writing.

In ordinary printing the paper, brought in contact with the face of the form of types, receives from it the impression of the entire matter to be printed; but in my invention, where the letters and figures are printed in succession, it is necessary that the paper should be moved laterally, so as to receive such successive impressions on the same line and longitudinally in view of printing successive lines. In ordinary printing the form is inked by rollers or other contrivance passing over its face and then leaving it free to make its impression on the paper. In my invention the inking is done by a plate suitably prepared, which remains at all times between the face of the types and the paper, the impressions of the letters, as required, being made in succession through a hole in the inking-plate large enough to allow the free passage of the largest type, the only motion of the inking-plate being a vertical one within narrow limits to bring its surface, as required, in proper contact with the face of the type; and inasmuch as each type in making its impression has to pass through the same hole in the inking-plate, the type-form must be capable of all the motions required to bring any required type at the proper time over the hole and under the contrivance employed to press it upon the paper.

From the foregoing it will be seen, therefore, that my invention must consist of four principal contrivances, to wit: first, to enable any given type to be brought into position to make an impression; second, to ink the types; third, to move the paper as required; fourth, to give the proper pressure to the type when brought into position, all of which contrivances must be under the control of the operator. I propose to describe them in the order in which they are enumerated, and then to describe the mode of operating them, premising, by way of a general description of the machine, that No. 1 represents its general appearance and conveys a good idea of the framing to which its various parts are attached. The description of these parts will involve the detailed description of the entire machine.

First, to bring any given type into position to make the impression.

The type-form.—In the present machine the number of types is seventy-eight, arranged in the form in six rows of thirteen each. The form consists of two horizontal steel plates, one above the other, one and three-fourths inch apart, and firmly connected by columns at the angles. The top plate, *a*, and the places of the columns *b b b b* are shown at the angles in No. 4. The types are soldered to the ends of flat steel bars about three and one-half inches long, as wide as the type, and passing freely but not loosely through corresponding openings pierced accurately and at exact equal distances in the plates aforesaid. In each bar there is a pin-hole about one inch from the top, and the bar, being inserted from the under side of the lower plate, passes through a spiral spring just wide enough to receive it and through the upper plate, when a pin inserted in the hole rests on the top of the spring, which thus sustains the bar and keeps the pin pressed against the lower side of the upper plate. The spring may be made of No. 20 wire, and when relaxed should be about three-eighths of an inch longer that the space between the plates. The faces of the types in the form are thus kept when at rest in exactly the same place to which the springs restore them after the pressure, hereinafter described,

on the upper ends of the bars to which they are soldered.

In No. 1, *a* represents the type-form, and Fig. 2, No. 4, represents a single bar and type with the spring and pin.

The carriage of the type-form.—To permit the horizontal movements necessary to be given to the type-form, it is placed upon a carriage whose construction is exhibited in No. 4 in Fig. 1, where *d d* represent two slides attached to the under side of the bottom plate of the type-form and connected with the forked arm *k*, by which they are made to move to and fro on the slide-rods *e* and *e*, which slide-rods are attached, as represented, to the side pieces, *e'* and *e''*, having the slides *g g g g* at their extremities, and, being connected with the connecting-rod *j*, are moved to and fro on the slide-rods *f* and *f*, which unite the opposite parts of the scaffold or frame-work *r s q n o p*. These motions, which I call "lateral" and "longitudinal," respectively, when combined produce a diagonal motion.

Motions of the type-form.—The means to regulate the motions of the type-form are also represented in No. 4, where *m* is a slide-rod attached at one end to *n*, with it forms an angle of about twenty degrees, and at the other end to the horizontal diagonal brace *t*, which is bolted to *r*. The wedge-shape frame *w u v l* is attached to the slide-rod *m* by the slides *w'* and *w''*, which permit it to move to and fro. The part *l* of this frame is itself a slide-rod parallel to the longitudinal motion of the type-form and embraced by the slide on the fork *k*, through which, as already said, the type-form is moved laterally to and fro. It will be seen that the movement of the frame *w u v l* on the rod *m* toward F will draw the type-form toward *m*, the slide on *k* sliding on the rod *l*, and that the movement of the frame in the opposite direction will have an opposite effect, the result being illustrated by the well-known process of ruling parallel lines with a triangle and straight-edge. *t'* is an arm projected from the brace *t* to support the frame *w u v l*. When the machine is at rest, the slide *w'* is in contact with F. To regulate the extent of motion outward from F of the frame *w u v l* on the slide-rod *m*, and so control the lateral motion of the type-form, there is what I call the "oscillating gage," Y, No. 4, Fig. 1, moving horizontally on the pivot *y'* on the top of the column Y'', No. 1, across the fork of which is the notched bar *x*. In this bar there are as many notches as there are rows of types running lengthwise of the type-form, and the depth of each notch is so adjusted by calculation as to be proportional to the distances apart of each row running lengthwise of the type-form. Thus when the catch *z* on the frame *w u v l* is changed from notch 5, as represented in No. 4, Fig. 1, to notch 6, the type-form is nearer to *e''* the exact lateral distance between the longitudinal rows of types. To produce a given motion of the type-form laterally, the operator must have the power to regulate at the same instant the position of the oscillating gage and the motion along the guide-rod *m* of the frame *w u v l*.

Longitudinal motion of the type-form.—The longitudinal motion of the type-form is produced directly by the connecting-rod *j*, the extent of which motion in the direction of *j* is regulated by the catch A on the check-rod *i* and by what I call the "reciprocating gage," H, No. 4, Fig. 1, moving horizontally at right angles with the check-rod *i* and furnished, as shown, with notches corresponding in number with the rows of type running crosswise of the type-form, whose depth, respectively, is the exact distance between such rows. Thus upon a change of the catch A from notch 8 to notch 9 the type-form would be nearer to *o* the exact longitudinal distance between the rows of types. To produce a given motion of the type-form longitudinally, therefore, the operator must have the power to regulate at the same instant the position of the reciprocating gage H and the motion of the connecting-rod *j*, and where a diagonal motion composed of any two lateral and longitudinal motions is required the operator must be able to regulate at the same instant the position of both the oscillating and reciprocating gages and the motion of the frame *w u v l* and the connecting-rod *j*. How the control of these is given to the operator will be described hereinafter.

The position of the type-form when at rest, and always prior to moving it with a view to an impression from it, is represented by the dotted lines around R, No. 4, Fig. 1.

To ink the type.—The inker I, which is immediately below the type-form, is represented in No. 4, Fig. 1, and consists of an oblong plate of metal, turned up on two sides about one-fourth of an inch, and inclosed at the ends by the bars J J', to which it is made fast by soldering in a manner to form a pan, and filled with a composition of glue and molasses—such as used by printers—and having an oblong rectangular hole through its center large enough to admit the largest type of the form. It is fastened, as described, to the bars J J', which rest in grooves in the lifting-bars K K', so as to permit it to be withdrawn by the shank I' for the purpose of receiving from time to time a due supply of ink. K K' are connected to the rock-shafts M M' by the arms and pivots L L L L. The simultaneous motions of the rock-shafts are secured by the vertical arms, about four inches high, at O O', which are connected by the connecting-rod N. P in the same figure represents an arm fastened to the rock-shaft M', the lifting of which raises the inker and brings it in contact with the face of the types. The mode of lifting this arm will be described hereinafter. It will be seen that all the types except the one over the hole in the inker, which, except where the same letter is to be repeated, has been already inked,

are inked at the same time, although it is only intended to use one of them; but this is of no disadvantage.

To move the paper —The paper is placed on the platform Q, No. 1, which is a plate of iron covered with cloth and supported on four feet, one of which is seen at *q*, No. 1, grooved to allow them to slide on the guide-bars T T, which in their turn slide on the guide-bars I I. The platform is thus made susceptible of both lateral and longitudinal motion. To move the paper in the direction of the lines of printing, a rack is fastened to the under side, the end of which is represented at *q'*, No. 1, and which is worked by the pinion U, No. 1. The teeth or grooves of this pinion are as long ac the platform, so that it may operate as well in printing the bottom as the top lines of the sheet. At the farthest end of the pinion-shaft U is fastened the ratchet-wheel V, No. 1, and represented in full size in No. 5, alongside of which is the arm W, projected from the collar *w'*, which works on the shaft U, and carrying the dog X, which, catching into the teeth of V, causes the arm W to turn the shaft U, and consequently to move the platform Q, as required, for the successive impressions of the letters. The dog Y, No. 5, is intended to retain the ratchet-wheel in position while the arm W and the dog X are drawn back. The arm A*g* and the dog B*g* operate on the ratchet-wheel V to produce the spaces between the words, as hereinafter to be described. The spiral springs I*g*, J*g*, and K*g*, No. 5, retain the dogs X, Y, and B*g* against the ratchet-wheel V. To move the paper so as to print line after line, the operator pushes the tooth of the bar G from hole to hole in the divided plate H, No. 1, the distances between the holes corresponding to the distances between the lines. The bar G being attached to the carriage T, the latter is thus moved along the guides I I. To prevent the operator from overrunning the lines on which he is printing, an arm attached to the carriage T is made to ring a bell, K, No. 7, Fig. 6, by means of a wiper attached to the platform Q, No. 1, when the line is nearly out, and the operator, by looking at a scale and index immediately before him, which shows the exact distance from the last letter printed to the place which he has established for the end of his lines, is enabled to calculate the amount of space between the words required to terminate the line at the end of a word or syllable, or, in printers' language, to "digest" the lines. When a line is terminated, the operator pulls a knob which is connected by a wire to the dogs X and Y, by which means they are disengaged from the ratchet-wheel V, No. 5, when a weight, operating by a cord around the pulley A', No. 1, gives a reverse motion to the pinion-shaft U and carries back the paper-platform, so as to be in readiness after the bar G, No. 1, has been pushed into the next hole in the divided plate H to begin another line.

To give the pressure to the type.—The pressure is given to the types directly by the plunger C, (shown in No. 1 immediately above the type-form,) and which is made to act by the following contrivance:

In No. 1 and in No. 7 S is a standard bolted to the frame, the upper part of it being an oblong rectangular frame so constructed as to support the horizontal shaft U, and having across the top of it the projecting arm R, which sustains the standards O' O'', which are the boxes of the shaft H-, which shaft is the fulcrum of the lever G-, the long end of which is connected with the plunger C, No. 1, by the connecting-rod I-, and the short end of which lever G- is connected with the lifting-rod A- by the connecting-rod F-. The arm R, besides sustaining the uprights O' O'', sustains the pendent catch-bars S and T, whose use will be presently described.

On one side of the shaft U, No. 7, Fig. 7, will be seen the bob V, to the weight of which is due the pressure on the particular type. On the opposite side of the same shaft is seen the lifter X, in contact with the foot B-, fastened to the lifting-rod A-. It will also be seen that the two arms R' and Q' also project from the shaft U, and that the arm Q' rests in a notch in the pendant S, both pendants being kept within reach of the arms by the spiral springs -C and -D.

x x is a bar extended from the frame S, against which the pendants S and T are drawn by the springs -C and -D when S and T are at rest.

Segments like those shown by the dotted lines in the drawings at P Q, No. 7, Fig. 7, may be used instead of the arms R' and Q'. I prefer the latter.

Suppose, now, that the arm Q' is released from the notch in the pendant S. The weight of V causes it to fall (the catching of R' on the notch below it being prevented, as hereinafter to be described) and the shaft U to turn, and the rod A- is raised by the lifter X acting on the foot B-, thus compressing the spring E, and by raising G'' and lowering G' causing the plunger C to strike the head of the type below it and make its required impression. The bob V having fallen, its natural tendency is to swing back as a pendulum, in which it is aided by the spring E, which causes the foot B- to press on the lifter X, and it accordingly swings back until the arm R' catches in the notch in the pendant T, which thus prevents the bob V from further vibration, and which is its especial object. Before another pressure can be given, however, the bob must be raised higher and until the arm Q', as represented in No. 7, falls into the notch in the pendant S. This is effected by the hook M- on the rod L-, which is supported by the guide-frame K-, and connected by the connecting-rod A*o*, No. 1, and partly represented in No. 7, Fig. 7, with the attachments of the brake *ai*, No. 3, by which, as is hereinafter described, motion is imparted to the machine. This hook M-, when L- is pushed forward, catches the pin on the arm

w, and, turning the shaft U, raises the bob and the arms Q' and R' until Q' falls into the notch in the pendant S. To cause the bob to fall, the pendant S has to be pressed outward from the shaft U, and to restore Q' to the notch in the pendant S the rod L-, as already said, has to be pushed forward. How this is done will be explained hereinafter. As is apparent from the drawings in No. 7, Fig. 7, if Q' was released from the notch in the pendant S, R' would, as the bob fell, catch in the notch below it in the pendant T, and no pressure would be given to the type. This is prevented, however, in the following manner: The fender -A is attached by the pivot *a* to the pendant T, No. 7, Figs. 8 and 9, which represent the front and side view, respectively. The arm R' is represented in the notch. When the bob is raised so that the arm Q' falls into the notch in the pendant S, the pin -B on the arm R' throws forward the fender -A, on the under side of which it presses until it passes the shoulder *c*, when the fender falls back and rests, as at first, against the pin 8. When the arm R' falls, which it does when Q' is released from the notch in S, the pin -B strikes on the outside of the fender -A, Fig. 9, and passes over the surface *e k n*, and thus, by pressing the fender -A against the pin 8, pushes the pendant T out of the reach of the arm R' until the point *n* is passed, when the pendant, drawn in by the spring -C, resumes its position against the bar *xx*, Fig. 7, in readiness to catch the end of the arm R' on the vibration of the bob, as described.

Having thus described the four principal contrivances of my invention, I now proceed to describe the manner in which I bring them all into action for the end required.

To make the impression of a letter the following conditions are required:

First. The proper type must be immediately over the hole in the inker. This has to be accomplished by the combined action of the arm *k*, the connecting-rod *j*, moving the type-form laterally and longitudinally, and of the two gages regulating the extent of the action of the same, involving, as has been explained, four distinct movements in various degrees and in combinations equal in number to the number of types.

Second. The paper must be in a proper position to receive the impress. This is accomplished by one movement of the arm W, acting on the ratchet-wheel V, Nos. 1 and 5, varying in degree according to the width of the type.

Third. The inking of the types.

Fourth. The pressure of the types. These being mere repetitions are made to result from one of the other movements of the machine. The pressure on the type varies in degree according to the amount of surface of the type to be pressed, which is accomplished by a small variation in the length of the stems of the types, the stems being shortest to those having the least surface.

Before explaining how I produce the combinations required by each type, I will describe the arrangement for the movements that have afterward to be combined. To move the type-form there are four movements; to move the paper, one.

In No. 2, A represents one side of the main frame, -G one of its legs, (the cover E, which is represented in No. 1, being supposed to be removed.) -R and -Q are horizontal bars, perforated to serve as guides for a succession of sliding rods, corresponding in number to the number of types in the type-form, of which rods -X is represented in the drawings. (See Nos. 2 and 3.) As they all act on the same principle, -X will serve to explain the operation of the whole. -R and -Q likewise serve as guides for the rods -S -T -U -V -W and -S' -T' -U' -V' -W'. These rods are connected with the opposite ends of five rock-shafts, -K -L -M -N -O, by the arms F. G. H. I. J. and F. G. H. I. J. and the connecting-rods M. N. O. P. Q. and M. N. O. P. Q., and the rock-shafts transmit their motions through the five arms R. S. T. U. V. and the connecting-rods P,. Q,. R,. S,. T,., which, as will be presently described, transmit, in their turn, motion to the paper and the type-form by means, respectively, of the ratchet-wheel and the arms and gages already described.

The rock-shafts are moved, respectively, by the slats A- B- C- D- E-, each of which, it will be seen on inspection, is attached to a pair of sliding rods, -S -T -U -V -W and -S' -T' -U' -V' -W'. The slat A- is attached to the rods -T and -T', and moves the paper-platform B- to -W and -W', and moves the oscillating gage C- to -S and -S', and moves the reciprocating gage D- to -U and -U', and moves the type-form laterally, and E- to -V and -V', and moves the type-form longitudinally. The rock-shafts and pairs of sliding rods are used in connection to secure uniformity and perfect parallelism of motion in the slats wherever the moving power may be applied to them on their edges, as hereinafter explained.

Following, now, the connecting-rods P,. Q,. R,. S,. T,. to No. 6, we find them connected with the horizontal arms F,. G,. H,. I,. J,. on the lower ends of the vertical rock-shafts A,. B,. C,. D,. E,., at the upper ends of which are the horizontal arms K,. L,. M,. N,. O,. Of these last, O,. is connected by the connecting-rod U,., Nos. 1 and 6, with the arm W, Nos. 5 and 1, which arm works on the pinion-shaft U, No. 1, that moves the paper, whose motion is thus connected with the slat A-, No. 2. N,. is connected by the connecting-rod *j*, Nos. 1, 6, and 4, with the carriage of the type-form, which it moves longitudinally when the slat E- is moved. M,. is connected by the connecting-rod V,., Nos. 6 and 4, with the frame *w u v l*, No. 4, which it moves along the slide-rod *m*, No. 4, producing, as already explained, the lateral motion of the type-form, which is due, therefore, to the slat D-. L,. is connected by the connecting-rod W,., Nos. 6 and 1, with

the oscillating gage Y, Nos. 1 and 4, so that the regulation of the lateral motion of the type-form is due to the slat B-. K,. is connected by the connecting-rod X,., Nos. 6 and 4, with the reciprocating gage H, No. 4, so that the regulation of the longitudinal motion of the type-form is due to the slat C-. Having thus shown how these five motions may be made, I proceed to show how they may be made by the operator at the same instant in such combinations as the type to be impressed requires.

It will be seen that as the type-form is at rest at R, No. 4, prior to each impression of a type the distance to which it must move must be suited to each letter. Thus to bring the corner type at G', No. 4, over the hole in the center of the inker I, a greater lateral and longitudinal motion of the type-form would be required than to bring the letter at G in the diagonal corner over the same hole. In other words, the motions of the controlling-slats D- and E- would have to be made greater in one case than in the other, and the motions of the slats B- and C-, controlling the reciprocating and oscillating gage-bars, would have to be correspondingly less. So in making the letter "m" the paper would have to be moved more than in making the letter "i," and the movement of the slat A-, which controls the motion of the paper, should be greater in the first case than in the last.

Turning, now, to No. 3, which represents the same view nearly as No. 2, we see the slats and rods, already fully described, and a rod, -X, which is one of the seventy-eight rods, being one to each type, passing through the apertures in -R and -Q, which are represented in the latter. This rod -X and its fellows pass above the slats A-, C-, and E- and below B- and D-, the lugs for this purpose, by which B- and D- are fastened to the rods -W and -W', No. 2, and -U and -U', being higher than the lugs fastening the other slats to their respective rods. To the rod -X is soldered a lug, *ui*, to which is attached by a pivot the draft-rod *ri*, with a hook, *vi*, at the end, by which -X is drawn forward in the following manner: *ai*, Nos. 1 and 3, is a brake or wooden bar, worked by the operator, supported on two arms, *ci* and *bi*, resting on the pivots *ei* and *di*. These arms are connected to the sliding bars *ji* and *hi* by the connecting-rods *gi* and *fi*, and the sliding bars *ji* and *hi* are connected to the rock-shaft *oi* by the connecting-rods *li* and *ki* and the arms *mi* and *ni*. The use of the rock-shaft *oi* and its intermediate connections with the sliding bars *ji* and *hi* is to produce a parallel movement of the slat *pi*, which is attached to the sliding bars *ji* and *hi*, and when the brake alone is moved passes over the hook *vi* and its fellows without touching them. The draft-rod *ri* rests in a groove at the end of the lever *qi*. The groove is not seen in the drawings, being immediately under the slat *pi*. To form the groove, small pieces of sheet brass are soldered to the end of the lever. The lever *qi* rests upon the rod *wi*, which is fastened to the key-board, and is used as a fulcrum for the whole series of levers, which are fellows to the lever *qi*.

It will be seen that the lever *qi* will raise the hook *vi* by pressing down the opposite end at *yi*, where a button is provided for that purpose on the top of the stem *xi*, the lower end of which works up and down in a socket in the key-board, which socket is of brass. The stem *xi* is fastened to the lever by soldering. When the button is pressed down, the hook is raised, and the brake *ai* being drawn back the slat *pi* catches against the catch *vi*, and the rod -X is thus drawn forward.

The purpose of the rod -X, No. 3, and its fellows is to give motion to the slats A- B- C- D- E-, and so to control the motions of the type-form and paper.

On the rod -X, No. 3, will be seen the projecting catches B*b*, C*b*, D*b*, E*b*, and F*b*, placed at unequal distances from the slats nearest to them. B*b* is nearer to A-, for instance, than E*b* is to D-. Of course, then, as -X is drawn forward, A- begins to move, when pressed by the hook B*b*, before D- moves. The slat A- therefore moves farther than the slat D, so that by a proper adjustment of the catches on the rod -X the distances for which the slats are moved can be accurately determined, and the type-form, whose position depends on these distances, as already explained, and the paper are brought under the control of the operator as he touches the key *yi* and draws forward the brake *ai*. To illustrate this, the greatest motion of the slat E-, which produces the longitudinal motion of the type-form, is the distance required to bring the catch A, No. 4, from a state of rest, which is against the bar C, No. 4, into the notch 13 of the reciprocating gage H. Suppose that distance to be three inches, and suppose the same extent of motion to be required of slat C-, No. 2, to bring the notch *l* of the reciprocating gage H, No. 4, so as to be in position to intercept the catch A. Now, in order to adjust the catches upon the rod -X, No. 3, so as to intercept the catch A in notch 8, the catch F*b* should be placed five-thirteenths of three inches from the slat E-, which produces the longitudinal motion of the type-form, and the catch D*b* should be seven-thirteenths of three inches in the rear of slat C-, which produces the motion of the reciprocating gage, the effect of which would be that the slat E- would move two-thirteenths of three inches before C- began to move, after which E- and C- would move together, and the catch A and the notch 8 would assume at the same instant their positions, as represented in No. 4, the gage obviating all risk of the type-form overrunning its proper extent of motion, and insuring mathematical accuracy to its position. This illustration, however, while it explains the operation of the catches on the rod -X, No. 3, to produce motion of the type-form, would be accurate only under the idea that either of the slats D-, B-, or A- were re-

quired to move through the whole space of three inches, which would depend upon which of the lines of longitude controlled by the slats D- and B- contained the required type, or whether the space required for the impression of the type was equal to the space produced by a three-inch movement of the slat A-; but should the slat A-, for instance, having the farthest to move, require to be moved but eleven-thirteenths of three inches, the difference between that and three inches—to wit, two-thirteenths—would have to be deducted, and the catch F*b* instead of being placed five-thirteenths of three inches behind the slat E- would only be placed three-thirteenths of that distance. If the motion required of the slat E- should be greater than that required of any other of the slats, the tooth F*b* would be placed in contact with the slat E-, which would then become what I term the "leading" slat, and the same would apply to each of the slats, as each in its turn is liable to become the leader. The slat having the greatest distance to move is the first to move, and the order in which each slat begins to move is in proportion to the amount of motion required of it. The rule laid down to find the location of the catch F*b* is applicable to all the others on the rod, and by the combinations thus produced by the distances of the catches from the slats, the types are subjected to positive control. The same illustration would apply in the case of the oscillating gage and lateral movement of the type-form and of the lateral and longitudinal movements in combination.

The distance of the catch B*b* from the slat A- depends upon the width of the letter, being nearer to the slat for a broad letter than for a narrow one, for in the first case the paper-platform has to be moved farther than in the last, which is done by making the arm W, Nos. 1 and 5, describe a larger arc, which in its turn depends upon the extent of the motion of the slat A-, No. 3.

As already stated, the type-form is moved from a state of rest at R, No. 4, to produce each impression. It is necessary, therefore, that the slats after each impression should be pushed back into their first position. This is done by the rod *xy*, No. 3, which always moves when the brake *ai* is moved. It is drawn forward by whichsoever may happen to be the leading slat coming in contact with either of the catches *xm*, *xn*, *xo*, *xp*, or *xq*, as the case may be, and is pushed back by the slat *pi* by means of the hook *xz* upon the rod *xl*, which is attached to the rod *xy*. Now, it will be seen that by pushing back the brake *ai* the catches upon the rod *xy* will respectively push back the slats immediately opposed to them, and the type-form be restored to its former position, which is at R, No. 4. It will also be seen that at the same time that the type-form is restored to its former position or place of rest by pushing back the brake the bob V by the same movement is raised to a position to be in readiness to make the next impression by means of the rod L-, No. 7, Fig. 7, and the connecting-rod A*o*, No. 3, which is attached to the sliding bar *ji*, which is moved by the brake *ai*.

The spaces between the words are made by means of the rod K*b*, No. 3, which rests in a groove at the end of the lever *ap*, in every respect like the lever *qi*, and is worked in the same manner. A cord, E*g*, No. 5, is attached to the arm A*g* and passes over the pulley F*g*, and is attached to the end of the rod K*b* at *p*, No. 3. When the brake is drawn forward, with a view to making a space, the finger is placed upon the space-key *st*, and the ratchet-wheel V, No. 5, is moved by the dog B*g*. When the brake is pushed back, the arm A*g*, No. 5, is restored to its position by the spiral spring D*g*, and the end of the lever of the dog B*g* at H*g*, coming in contact with the inclined plane G*g*, the dog is disengaged from the teeth of the ratchet-wheel. When A*g* is drawn down by the cord E*g*, the spiral spring I*g* causes the dog to catch in the teeth of the ratchet-wheel.

It remains to describe the manner in which the inker is made to ascend to ink the face of the types and the types to descend to make their impression at the same time that the type-form and paper are brought into their proper positions, all being effected by touching the key *yi*, No. 3, and bringing forward the brake. (See No. 1.) These operations are made to depend upon the action of the catch A, No. 4, which, as has been seen, is governed by the conjoint action of the reciprocating gage H, No. 4, and the check-bar *i*, No. 4, which is an appendage to the carriage-frame. Above the notched bar B, No. 4, is suspended a ram, M+, No. 1, of the same length with the notched bar, and supported by the arms O- P- from the rock-shaft N-, resting on the small columns Q- and Q-, No. 1, which are attached to the reciprocating frame H, Nos. 1 and 4, at *qu* and *qu*, No. 4. The ram M+, No. 1, hangs over the angles of the notches, so that it may always be struck and moved by the catch A, No. 4, as it takes its place in a notch, and it is as long as the notched bar to enable A to strike and move it into whatever notch A may fall. Supposing the ram M+ to be struck and moved by the catch A, it causes M+ to push back the dash-plate R-, No. 1, which is suspended from the rock-shaft S-, which rests on the columns T-T-, No. 1, which are attached to a member of the frame S, No. 4, and their bases (represented at *qd* and *qd*, No. 4.) To this rock-shaft is attached the upright arm U-, No. 1, which is connected by the connecting-rod W, with the horizontal arms V- and X-, No. 1, projected from the same hub, forming a right angle. X- must therefore partake of any impulse given to V-, being allowed to work freely on a pivot at the the top of the column Y-. Now, the arm X- is connected to the pendant S, Nos. 1 and 7, by the connecting-rod *z*, in order to release the arm Q', No. 7, from the notch in the pendant S at the precise moment that the pa-

per and the required type have taken their proper position to make the impression of a letter. When the ram M+, No. 1, is struck and moved forward by the catch A, No. 4, M+ is made to strike and move forward the dash-plate R-, No. 1, by which the arm U- draws back the connecting-rod W-, which draws back the arm V-, moves forward the arm X- and connecting-rod *z*, which last pushes forward the pendant S, releases the arm Q', No. 7, from the notch, and permits the bob V to fall, making the impression through the plunger C, No. 1, on the type, as already described. The inker I, as already said, is raised by lifting the arm P, Nos. 4 and 7. Now, this arm P is lifted by the collar *oo*, which is fastened to the rod A-, No. 7. When, therefore, the rod A- is raised by the fall of the bob V, the inker is raised also, and the types are all inked except the one which, having been inked previously, is descending at the instant to make its impression. Where the same letter is repeated in succession, it is inked anew by pulling a knob in front of the operator, which is connected to the inker by a wire, cord, and pulley, which raises the inker to the face of the types while they are at rest, which is its exclusive office. We thus see that the forward movement of the brake, which adjusts the position of the type-form and moves the paper, makes the catch A, No. 4, in its action upon the ram M+, No. 1, effectual to produce the inking and impression.

What I claim as new, and desire to secure by Letters Patent, is—

1. The type-form constructed, substantially as described and represented—viz., with the types arranged in rows longitudinally and laterally, in such manner as to permit each type to be brought to a given position at the will of the operator, to be pushed upon the paper by the plunger C, No. 1, or its equivalent.

2. The combination of the two motions, which I have called "lateral" and "longitudinal," for the purpose of bringing the type or character required in position to make its impression.

3. The wedge-shape movement, in combination with a type-form, substantially as described and represented, for the purpose of giving motion to the latter.

4. The manner of adjusting with precision the required position of the type-form by the use of gages, substantially as described and represented, in combination with the two motions already described as giving motion to the type-form, or in any combinations substantially the same.

5. The inking of the types by the inker interposed, during the action of the machine, between the face of the types and the paper.

6. The use of the bob V, substantially as described and represented, to furnish the power to cause the pressure on the types or the inking of the same.

7. The combination of the bob, whose fall produces the pressure on the types, with a contrivance by which, after the blow is given, a second blow or vibration is prevented.

8. The use of the slats, substantially as described and represented, or other analagous device controlling the motions of the machine, combined with the rods answering to the letters or characters wanted, by means of the catches, on which the slats may be moved separately or together in any combinations of time or extent of motion that may be required for the action necessary to produce the given character.

9. The draft rod and lever, (see *ri* and *qi*, No. 3,) in combination with the slat *pi*, or its equivalent, to produce the various movements required to control the types.

OLIVER T. EDDY.

Witnesses:
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