J.C. Petyt. Sheet 1. 3 Sheets

Making Type.

No. 5049 Patented Apr. 3. 1847.

Fig. 1.

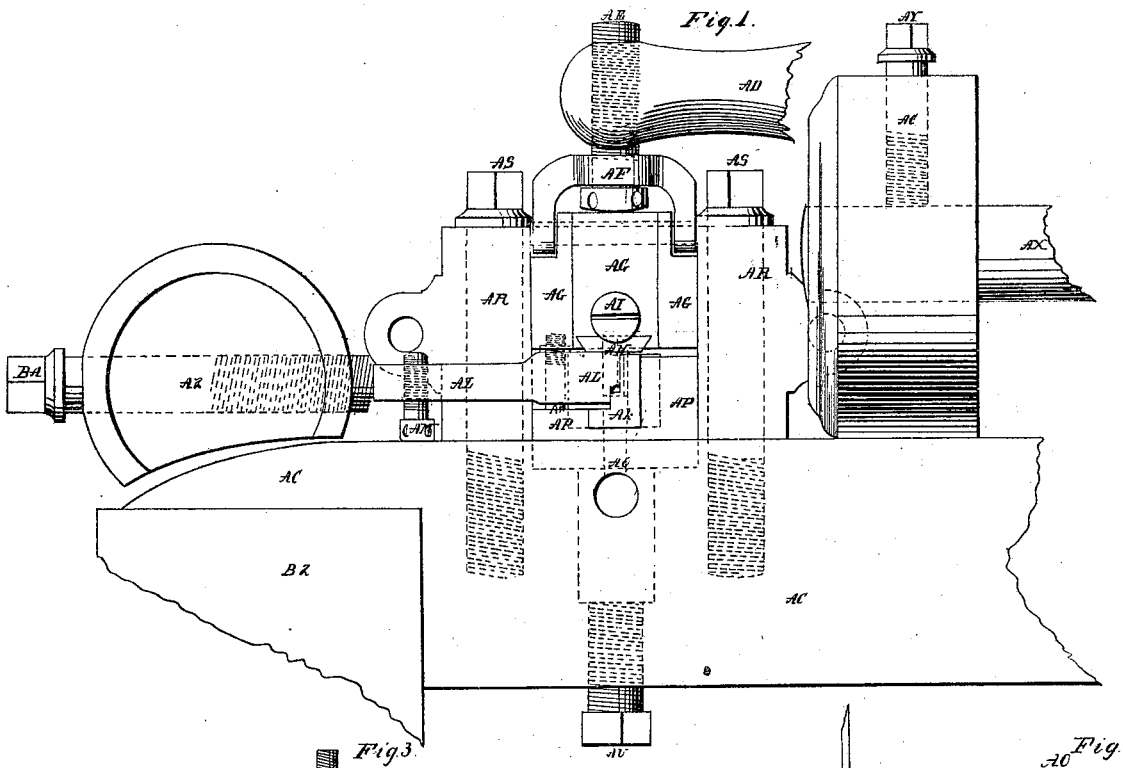


Fig. 2.

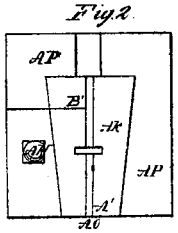


Fig. 3.

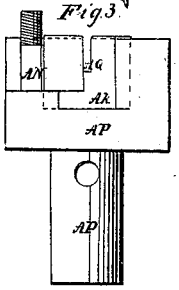


Fig. 4.

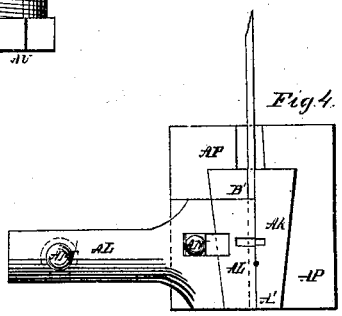


Fig. 5.

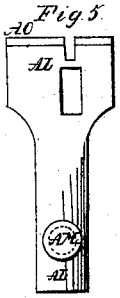


Fig. 6.

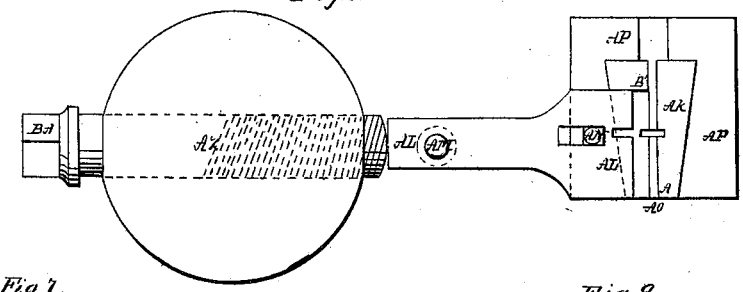


Fig. 7.

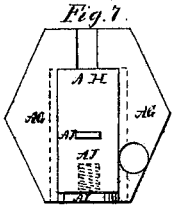


Fig. 8.

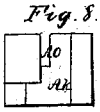
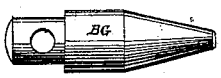


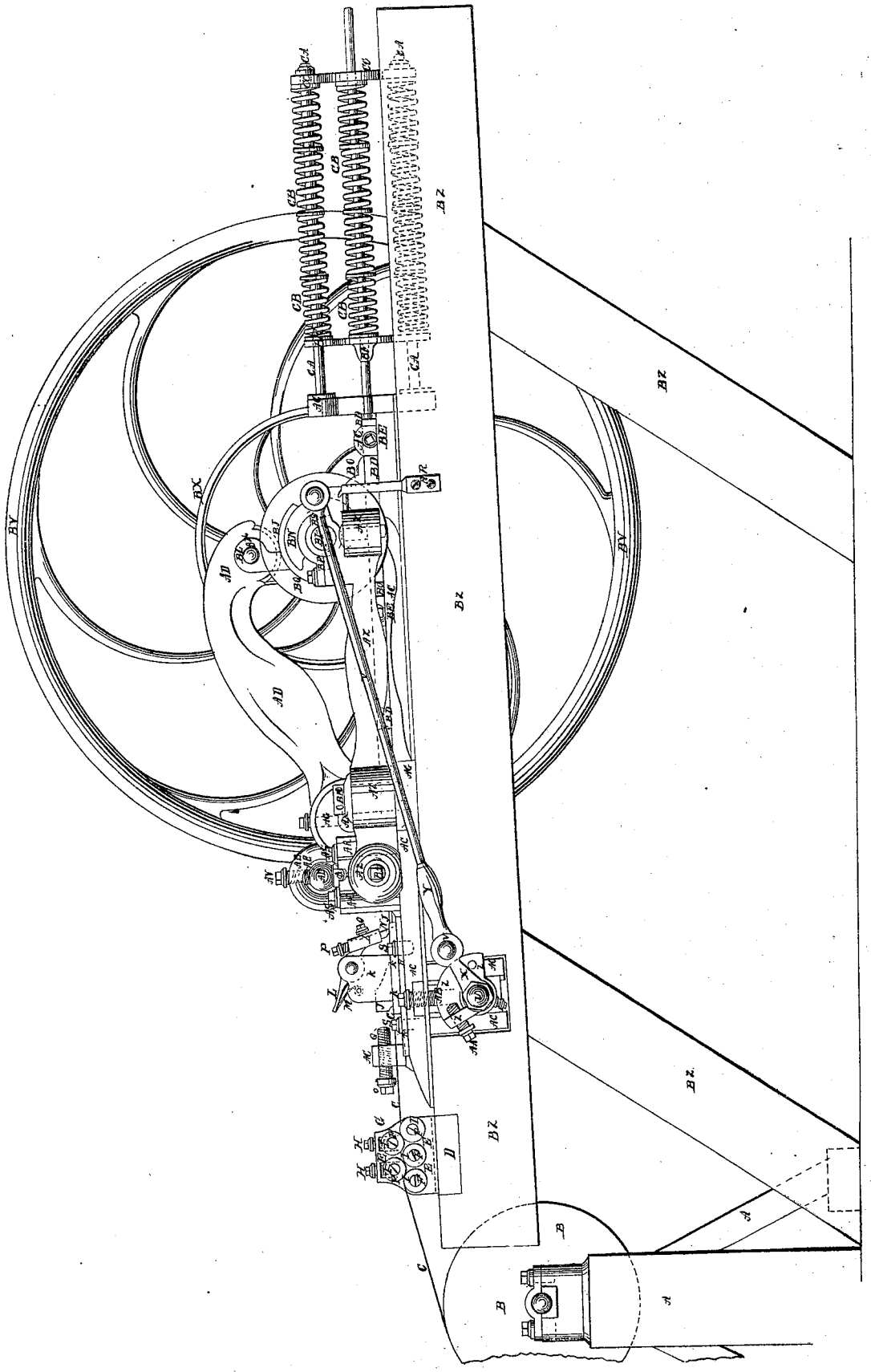
Fig. 9.



J.C. Petyt. Sheet 2. 3 Sheets.

Making Type.

No. 5049 Patented Apr. 3. 1847.



J.C. Petyt. Sheet 3. 3 Sheets.

Making Type.

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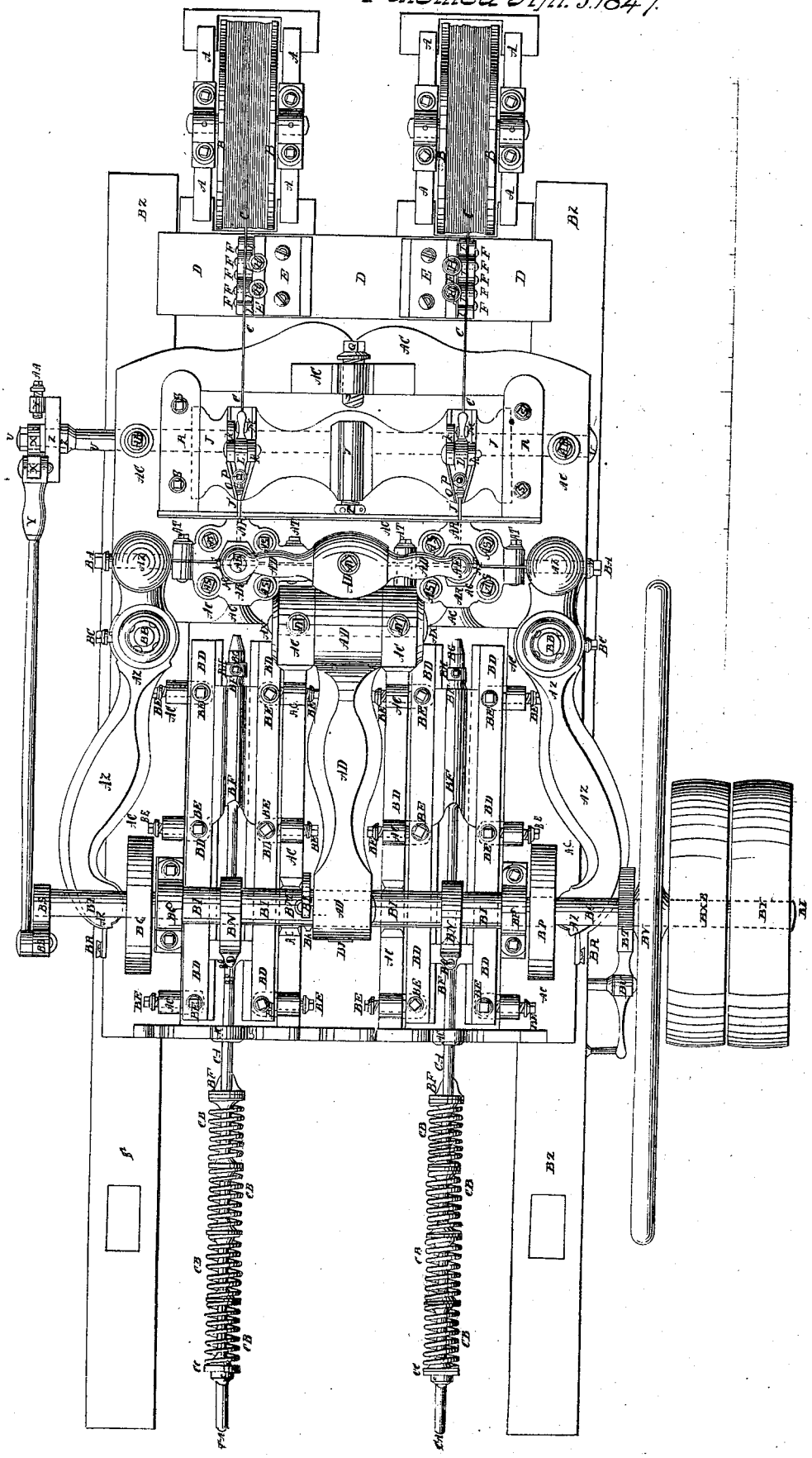

UNITED STATES PATENT OFFICE.

JEAN C. PETYT, OF PARIS, FRANCE.

IMPROVEMENT IN MACHINERY FOR MAKING TYPE.

Specification forming part of Letters Patent No. **5,049**, dated April 3, 1847.

An explanation of the annexed plates for the purpose of obtaining the Patent Right of a Machine for Making Type in relief and in creux, cold-wrought, and of any metal.

Since the highly-valuable and memorable invention of Guttenberg, which gave birth to the art of printing, the many processes which time and experience have suggested for the improvement of the art have hitherto but very imperfectly removed the difficulty which the operation of casting presents in obtaining distinctness and durability in the use of type—a difficulty resulting from the necessity of selecting highly-fusible metals. Mechanism, the fruitful power which in this century has imparted so active an impulse to every branch of industry, has never until in the present instance been successfully applied to the manufacturing of cold-wrought printing-type. In the United States, in some countries of Europe, recently in France, vain attempts have been made to solve this problem, the effects of stamping and the distinctness of the impression of the relief on thin plates were well known, and it was hoped that the same result might by the same means be obtained on metallic rods. Hammers and levers have been resorted to alternately; but the result was always either a want of distinctness in the relief or a defect of parallelism in the body. The isolated pressure caused an injurious disturbance in the molecules of the metal, irregularity was the consequence, and the type became useless. Attempts have likewise been made with a system of machinery called the "Parisian nail-machine," but this being calculated to act upon round wire which requires no minute precision, the first alteration requisite was to suppress its curvilinear pressure; but it may readily be understood that this particular pressure being applied to a square rod requiring a mathematical pressure at right angles in all directions, there could be no parallelism obtained, nor other results necessary for the perfection of the type, the nature of type being such as to render the task of the printer impossible should there exist the least imperfection in any part. In fact, of what use to the art of printing could a new mode of manufacturing type prove if the most essential conditions—distinctness and parallelism of body—were not fulfilled. In this the difficulty consisted: to remove it is the object of the present new and simple machine, of which I solicit the Patent Right—a machine which fulfills all the necessary requisites of celerity, distinctness, and economy, and turns out a type in every respect superior to those cast.

A represents wooden supports of the drums B, Plates 1 and 2.

B represents wooden drums, on which are wrapped the metallic rods C, to prevent them from mixing and twisting, that in passing into the rod-dresser D they may be perfectly straight.

C represents metallic rods, of any metal, placed according to the thickness and width necessary for the body of letter desired, Plates 1 and 2.

D is a rod straightener or dresser composed of five pulleys of iron, I, three of which are placed at the base of their block or bed E and held by screws F. The two others are placed above the first three and held by screws F to two sliding boxes, G, which ascend and descend by means of a screw, H, in order that the distance may be varied between the first two pulleys and three lower ones, according to the required thickness of the metallic ends. The pulleys are changed as often as the size of the metallic rods varies, because the grooves on the pulleys are relative to the size of the rods, Plates 1 and 2. This rod-dresser is used to straighten the rod as it comes from the drum B, in order to remove all the curvatures which it may have contracted.

E is a small casting intended to support the five iron pulleys I, Plates 1 and 2.

F is a steel screw to secure the iron pulleys I of the rod-dresser D to the casting or bed E to the box G.

G is a steel box or bearing sliding in the casting E, for the purpose of raising or lowering the pulleys I according to the size of the rod, Plate 2.

H is a steel regulating-screw to raise or lower the bearings upon which rest the pulleys I, Plates 1 and 2.

I represents five iron pulleys, three of which are below and two above. They are intended to straighten or dress the rod as it comes from the pulley or drum B, Plates 1 and 2.

J is the rod-drawer, of casting, intended to draw the rod C as it comes from the pulleys

I toward the guides A K and A L. This piece is placed as follows: All that part marked K is a casting, on the top of which is a piece, L, moving on a pivot the fulcrum of which is a pin fixed to its axis. The back part of this piece is raised by a spring, M, which causes the front part armed with a chisel to press against the rod C, so that as the rod-drawer advances the rod is carried with it to its destination in the guides A K and A L, which latter closing upon it prevent it from going back. Consequently as the rod-drawer recedes the chisel N slides on the metallic rod C until again coming forward it brings the rod once more to its destination, &c., Plates 1 and 2.

J′ is an iron tube having interiorly the shape and dimension of the rod. This tube is screwed to the casting of the rod-drawer, and is intended to hold the rod in the space between the casting K and the guides A K and A L. This tube is changed in the same case as the guide should be, Plates 1 and 2.

K is a block or bed of casting supporting the pieces of the rod-drawer, Plates 1 and 2.

L is an iron lever moving on a pivot intended to press the chisel N upon the rod, Plates 1 and 2.

M is a spring which raises the back part of the lever L, Plates 1 and 2.

N is a small chisel intended to press upon the rod C, Plates 1 and 2.

O is a pressing-screw intended to secure the chisel N to the lever L, Plates 1 and 2.

P is a pressing-screw to press at will upon the chisel in order to decrease or increase its bearing upon the rod, Plates 1 and 2.

Q is a screw to prevent the rod drawer from receding beyond a certain distance regulated according to the length required for the body of the type, Plates 1 and 2.

R represents iron sliders for the rod drawer. Plates 1 and 2.

S represents four screws to secure to the sliders R to the casting A C, Plates 1 and 2.

T is a screw to regulate the advance, as screw Q does the receding of the rod-drawer. Plate 1.

U is an iron shaft of the rod-drawer, to which is attached a gearing-pinion, which in describing part of a quarter of a circle by means of the connecting-rod V advances or withdraws the rod-drawer J by means of an upright gearing below the rod-drawer, Plates 1 and 2.

V is a connecting-rod attached at one end to the crank B S, and at the other to the arm X by means of an iron piece, Y, to which it is screwed in such a manner as to be capable of being lengthened and shortened, Plates 1 and 2.

X is an iron piece or arm forming a crank, attached at one end to the iron piece Y and at the other to the shaft U, on which it moves without communicating to the shaft any motion, Plates 1 and 2.

Y is an iron piece screwed to the end of the connecting-rod V, as described in article V, and communicating a to-and-fro motion to the arm X, Plates 1 and 2.

Z is an iron segment attached to the end of the shaft U, Plates 1 and 2. When the connecting-rod V is set in motion by the crank B S, it communicates a to-and-fro motion to the arm X. As this arm advances it rests upon a bearing of the segment, Plate 2, and thus causes the shaft U to make a partial turn forward, and as the arm recedes by bearing in like manner upon the screw A A it gives the shaft U a like backward turn, Plates 1 and 2.

A A represent a screw serving to regulate the course of the arm X and to determine the portion of the revolution that the shaft U must perform, and thus determining the course of the rod-drawer, the effect of which is this: The more the rod-drawer recedes the greater the length of rod with which it will return; and vice versa, Plates 1 and 2.

A B represent a regulating-screw, intended to raise and lower the boxes of the shaft U, which are placed below the casting A C, Plates 1 and 2.

A C represent a casting serving as the seat or bed of the machine, Plates 1, 2, and 3, Fig. 1.

A D represent a pressing-lever, a double cutter, Plates 1 and 2. This large lever, one extremity of which starts directly from the shaft B I, from which it receives its movement, and the other end of which, of an oval form, is traversed by an arm, is intended to give an ascending and descending motion to two bands, A F, to which it is attached by the screws A E.

A E represent a screw fastened into the extremity of the arm of the lever A D, Plates 1, 2, and 3, Fig. 1. This screw is intended, on the one hand, to fasten the bands A F to the lever A D, and on the other to give more or less pressure upon the sliding box A G. The passage of this screw into the bands A F presents an oval aperture sufficient for the motion, although somewhat curvilinear, that the lever imparts to the screw to permit the sliding box A G to ascend perpendicularly.

A F represent a steel band intended to raise the sliding box A G, to which it is attached by a pin passing through the eyes of the band and of the sliding box, Plates 1 and 3, Figs. 1 and 7.

A G represent an iron sliding box, Plates 1 and 3, Figs. 1 and 7. This box is inclosed between two parallel bronze pieces, A R, which act as guides and oblige it to descend perpendicularly when pressed by the screw A E. At the same time that it presses strongly upon the upper guide, A L, this box serves to bring the punch or die adapted to the slide A H to bear upon the metallic rod. The groove which exists in the middle of the piece serves to introduce a peg or punch to drive the slide A H, placed at the end of the sliding box A G. This slide can be changed at will each time that it is desired to change the punches A J. The round hole at the side is to receive the end of the peg A N and of the screw that holds the upper guide.

A H represent a slide upon which are riveted two punches, A J, Plate 3, Figs. 1 and 7.

A I represent a steel flat-headed screw even with the sliding box, intended to prevent the slide A H from escaping from its groove, Plate 3, Figs. 1 and 7.

A J represent two steel punches riveted to the slide A H, the first having an oblong form with a scoop in the center, Plate 3, Fig. 7. From its position it has the following effect: The straight side of the punch cuts the rod perfectly even and square, the length required for the body of the type, while the side with a scoop directs the metal by the other end, upon which the letter is to be stamped, to enter into the matrix B G, and thus facilitates the stamping. This form of scooped punch is only used for those letters which occupy the center of the rod—such as *m n o*, &c.—for those which cover the whole space, as *b i j*, &c., the square punch without scoop or stops is employed, (see Plate 3, Figs. 2 and 4,) which represent the lower guide, A K, with its aperture, through which passes the punch without slope. The second punch, having the shape of a large round point, acts with half of its circumference upon the edge of the rod and makes a little groove in the body of the type, which printers designate by the name of "nick," Plate 3, Fig. 7. These two punches, after having passed through the metallic rod and been driven into the lower guide, A K, forming, as it were, a cutting-plate, remain there only so long as is necessary for the stroke to be effected, and thus contributing to prevent the recoil of the rod at the time of the stroke.

A K represent a lower guide or protector of steel, Plate 3, Figs. 1, 2, 3, 4, 6, and 8. The lower guide or protector has the form of a truncated cone, Fig. 2. It is adjusted to the guide carrier. In the middle of this piece there is a groove, of mathematical precision, cut exactly the size of the type, according to the body of the letter it is intended to make. Thus we say, for example, that the body of the point 8 requires a groove mathematically conformable to it, and that for the determined length from the point A′ to the bearing or shoulder B′, Figs. 2, 4, and 6, against which the upper guide or protector rests. That portion of the groove extended beyond the point B′ is of greater width to facilitate the passage of the metallic rod. The shoulder B′ is intended as a bearing for the upper guide against the force of the stroke. The two holes—one round and the other square—traversing this guide are intended for the purposes explained in article A J.

A L represent an upper guide or support, also of steel, having two notches intended to receive the two punches A J, not tightly however, in order that the one used as a cutter may in no way cramp this guide in its operations. The special use of this guide or protector is to press together with the lower guide upon the rod. This pressure is for a double purpose. First, to preserve the parallelism of the body of the type perfect to the spot where the cutting-punch cuts it; second, to secure the rod from the line of incision to the bearing or shoulder B′, and thus prevent it from recoiling at the moment that the rod-drawer recedes to bring back a new length of rod for the body of a new type. The action of this guide or protector is regulated by a strong pressure communicated to it by the lever A Z, Figs. 1 and 6. This upper guide bearing strongly upon the lower presses laterally the metallic rod by its widest sides and holds it so firmly as to prevent it from spreading out when the teeth A O come to imprint themselves into this rod. This guide or protector, by its square form, corresponds exactly with the groove in the lower one, and both united form an oblong perfectly conformable to the body of the type. It is at this moment that the sliding box A G, armed with its two punches, Plate 3, Fig. 1, descends. At the same time that the two punches cut the metallic rod the sliding box compresses the upper protector or guide, which in its turn compresses the rod by its narrowest edge without any alteration being made in the lateral pressure of the guides. At the moment that the pieces are thus arranged the stroke is given, immediately the sliding box ascends with its punches, the piece A L, following this motion of retreat, ceases its lateral pressure, liberates the body of the letter from its protectors, and that piece of the rod kept between the line of incision and the epaulment B′, receiving in its turn an impulse from the rod-drawer, pushes before it the letter produced and takes its place, to begin again a new operation. Thus, as has been said above, each body of the type requires analogous protectors or guides.

A M represent a supporting-screw intended to sustain the back part of the upper protector, A L, and to preserve it always horizontal with the metallic rod, and as this rod is changed according to the thickness of the type it is intended to produce the intention of this screw is likewise to raise or lower the piece A L in a corresponding manner, Plate 3, Figs. 1, 4, 5, 6.

A N represent a square steel rod, Plate 3, Figs. 1, 2, 3, 4, and 6. This is fixed into the guide-carrier. Its use is to prevent the upper guide or protector from being deranged by the course of the metallic rod, or from any other cause, leaving it at the same time sufficient liberty when the pressure ceases. The end of this steel rod emerging from the upper guide, A L, is rounded and threaded, Fig. 3, to receive a screw, which serves in its turn to prevent the guide from rising too high. As the raising is intended to allow the passage of the rod that advances above the body of the type that has been struck, there should consequently be no more space than is sufficient to allow a free passage to the body of the type.

A O represent prongs of the lower guide, Plate 3, Figs. 2, 3, 6, and 8, of the upper, Fig. 5, are two little, as it were, teeth of steel fixed at the extremity of each guide at the point of encounter. They are so fixed as by the press-

ure of the guides to enter entirely into the body of the metallic rods at the extremity, where the stroke will be given that is to produce the eye of the letter. These teeth are indispensably necessary, because by clutching the metallic rod the metal acquires a greater density at the extremity where the stroke is to be applied. The metal, being no longer able to spread, (by reason of the pressure of the guides or protectors,) is prevented from being battered up by the stroke; and this produces a distinctness and neatness in the relief and fidelity in the graving of the matrix. It is well, also, to observe that the projection of these teeth should correspond to the thickness of the body upon which they are to act. Thus for an *i* or an *l*, for example, they should be less projecting than for those letters which are of greater thickness. This has caused us to adopt three sets of guides or protectors, divided thus: One set with very projecting teeth for the thick letters—such as *m w*, &c.—another set with middle sized teeth for such as *a o u*, &c., and another with very small ones for such letters as *i j*, &c. These teeth should also be perfectly smooth, so as not to retain the body of the type after the stroke.

A P represent a steel guide-holder or carrier, Plate 3, Figs. 1, 2, 3, 4, and 6. This piece has the form of a square die, with a cylindrical end or stalk below and at the center. This cylinder is adjusted into a cylindrical hole of the casting-bed, Fig. 3, and serves to raise and lower without vacillation the guides, by means of the screw A U, in order to place the metallic rod well in connection with the matrix. As to the square part of the guide-holder, Figs. 1 and 3, it is likewise adjusted into the casting, and its use is to prevent the piece from moving right or left under the strokes of the matrix. It is on the face opposite to the cylindrical end that the lower guide and the square rod A N are placed. This guide-holder has a hole corresponding with the conduit A Q of the casting and the holes of the guide, so as to permit the escape of the wasting or scraps produced by the cutting of the metallic rods by the punches, Plate 3, Fig. 3.

A Q represent holes in the casting-block of the machine, intended, as above mentioned, as a vent for the escape of the scraps, Plate 3, Fig. 1.

A R represent two parallel bronze pieces intended to confine the sliding box and oblige it to descend perpendicularly. They are attached to the casting by the screw A S, and joined together by the screw A T, Plates 1, 2, and 3, Fig. 1.

A S represent a screw attaching the bronze pieces to the casting after the regulation of the sliding box, Plates 1, 2, and 3, Fig. 1.

A T represent a screw intended to draw the bronze pieces together and remedy their wearing, Plates 1 and 2.

A U represent a screw to press, screwed into the casting-block and intended to regulate the guides, Plate 3, Fig. 1.

A V represent a screw intended to secure the arms of the lever A D, Plates 1 and 2.

A X represent a large iron pin acting as a hinge or axis for the large lever A D, Plates 1, 2, and 3, Fig. 1.

A Y represent two screws securing the pin A X, Plates 1, 2, and 3, Fig. 1.

A Z represent two large side-pressing levers, Plates 1, 2, and 3, Figs. 1 and 6. These levers give a side pressure to the guides A L. Their pressing movement is regulated, on the one hand, by the notched B Q, on the other by the springs B R.

B A represent a screw fixed into the ball of each lever A Z, to increase or diminish their pressure upon the upper guides, Plates 1, 2, and 3, Figs. 1 and 6.

B B represent pins with screw-thread fixed into the casting A C, and acting as hinges or axes to the lever A Z, Plates 1 and 2.

B C represent screws to secure the pins B B, Plates 1 and 2.

B D represent guides of the hammers, acting as their sliders, having screws attaching them to the casting A C, Plates 1 and 2.

B E represent a screw to regulate the guides of the hammers, Plates 1 and 2.

B F represents steel hammers or rammers with bronze sliders, Plate 1. To these are attached matrices or punches of steel intended to stamp the letters. The direction of these hammers or rammers can be changed at pleasure, either to the right or left, by means of the movable sliders B D, between which they move and which are themselves regulated by the pressing-screws B E.

B G represent steel matrices with graving in creux to make letters in relief, or steel puncheons graved in relief to make letters or type in creux, Plates 1 and 3, Fig. 9. They may be changed at pleasure. The body of each one is round, whether matrix or punch, in order that they may be fitted hermetically into the cavity of the hammers. They are secured into the hammers by means of little screws, B H, with conic extremities, which, passing through the body of the hammers, enter into little cavities, likewise conic, drilled into the body of each matrix or puncheon, in order to keep them in the same position, Plate 3, Fig. 9. As the guide-holders are susceptible of a movement up or down, and the hammers, by means of their sliders, may be moved to the right or the left, it is easy to adjust the matrices or puncheons in a fixed direction, so as to strike the letter in the manner required.

B H represent a pressing-screw with conic-shaped end, traversing the body of the hammer, Plate 1.

B I represent a large motor-shaft provided with cams, flat wheels, and cam levers or spurs.

B J represent a steel cam of the lever A D, fixed to the shaft B I, and intended to raise and lower this lever, Plates 1 and 2.

B K represent a steel spur attached to the shaft B I, which in turning rests against a

bearing of the piece B L, attached to the lever A D by the pin B M, and thus lowers the lever while its prong is in the notch of the cam B J, Plate 1.

B L represent a steel piece serving to lower the lever A D, Plates 1 and 2.

B M represent a pin of the piece B L, serving at the same time as a pin for the interior spur of the lever A D, Plates 1 and 2.

B N represent a cam of the hammers attached to the shaft B I, intended to raise the hammers by means of the cam levers or spurs B O, Plates 1, 2, and 4, Fig. 4.

B O represent spurs attached to the hammers, serving to raise them, Plates 1, 2, and 4, Fig. 4.

B P represent caps of the boxes in which the shaft turns, Plates 1 and 2.

B Q represent a flat wheel with notches intended to move the levers A Z, Plates 1, 2, and 4, Figs. 1 and 2. The flat wheel in Plate 2 is represented as open, though in fact it is solid, in order that the arrangement of the parts behind it may be seen.

B R represent steel springs bearing upon the levers A Z, and causing them to open at the moment that the rollers thereon are about to fall into the notches of the flat wheel.

B S represent a crank of the connecting-rod V, Plates 1 and 2.

B T represent an indented wheel, Plate 1.

B U represent pawl-levers of the wheel B I, Plate 1.

B V represent a fly-wheel of the shaft, Plates 1 and 2.

B X represent loose pulleys, Plates 1 and 2.

B Y represent fixed pulleys, Plate 1.

B Z represent a seat or frame of the machine, Plates 1 and 2.

C A represent six iron rods, three for each hammer or rammer. Of these three one is attached to the rammer and the two others to the casting C A, that slides in the arms of the rammer. These rods are furnished with springs that impel the rammer as soon as the cams B M allow the spurs of the rammers or hammers to escape, Plates 1 and 2.

C B represent springs of the rammers, Plates 1 and 2.

C C represent plates with three holes, through which pass the iron rods. They serve to hold the springs, and by means of screws at the end of four of these rods they serve also to give the springs more or less tension. The scale of Plates 1 and 2 represents a meter. The figures of Plates 3 and 4 are of the natural or real size.

It is evident from the above description that this machine is provided with a duplicate arrangement—that is, with two rammers or hammers, two levers for lateral pressure, two sliding boxes, two sets of guides or protectors, &c.—and that it acts in the following manner: By the operation of its pieces the shaft B I raises the arms of the lever A D. The lever A Z ceases to press and the guides open at the same time that the rammer in raising presses the springs. The connecting-rod then advances the rod-drawer, which conducts the metallic rods between the guides or protectors. Immediately the lever A Z effects its lateral pressure, the large lever A D lowering causes a perpendicular pressure upon the guides. At the same time the punches cut the rods, the rod-drawer recedes to seize again the metal, and the rammer escaping gives the stroke. Thus are simultaneously effected the operations of advancing, pressing, cutting, and striking the type, again immediately to recommence. By a slight rubbing between the fingers it will be easy (considering the feeble adhesion which, owing to its want of thickness, it could offer) to remove the little roughness that will be caused by the stroke around the eye of the letter. Dressing upon stone will destroy all traces of this roughness, and as to the completion of the type the operations are throughout the same as for those that are cast.

It is well to observe that the projection beyond the guides should be in proportion to the size of the letter intended to be produced, in order that there should be sufficient metal, and neither more nor less, for the formation of the eye of the letter. The rod-drawer should also be regulated accordingly. This practice will teach.

I now describe the manner of producing by my apparatus a relief upon a metallic rod with the aid of a steel matrix adapted to a rammer. If in place of a matrix I adapt to the rammer a steel puncheon with its letter graved in relief, the same operation of striking being applied to a metallic rod of a size conformable to that required for the letter will produce a matrix rod or body similar to type, but with the impression in creux. To obtain this type in creux suitably executed it will be sufficient to make the following modifications: First, substitute for the matrix in creux a puncheon graved in relief; second, employ guides with smaller teeth or prongs. It is necessary, also, carefully to regulate the rod-drawer, in order that the extremity of the rod should come even with the guides, and to use punches without slope. By means of these few modifications in place of type in relief type in creux of equal precision are obtained. I naturally ask, as it is a new idea and for the first time rendered practicable, the right to apply these creux type, as being an advantageous substitute for the mode at present employed in the process of making stereotype. Only in this latter case it would be necessary that the type in creux should be of a denser metal—of copper, for example. Thus this machine enables me to produce either type in relief by means of hammers with matrices, or type in creux by means of the same hammer with puncheon in relief, observing at the same time the modification pointed out in the body of this description.

Although for the clearness of the description I have always spoken of a single letter or

type, of course the matrices or puncheons may include several letters, figures, and even flowers, vignettes, and, in a word, every ornament used in typography.

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

The combination of the lateral dies with the punches and letter-dies arranged and operating substantially as described.

J. C. PETYT.

Witnesses:
JOHN BARTLY,
A. LEFEVRE.