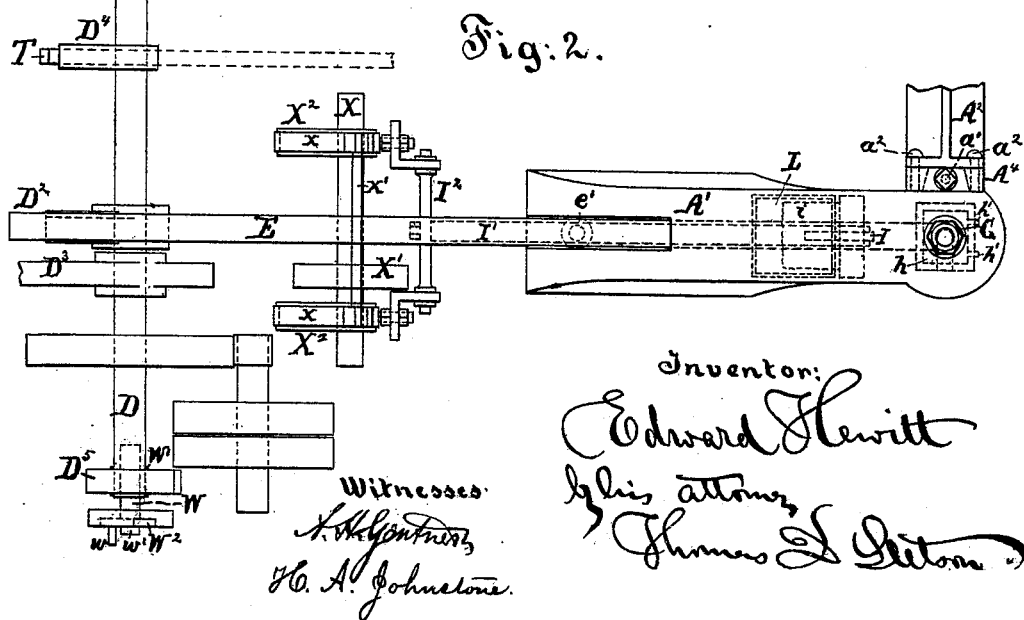
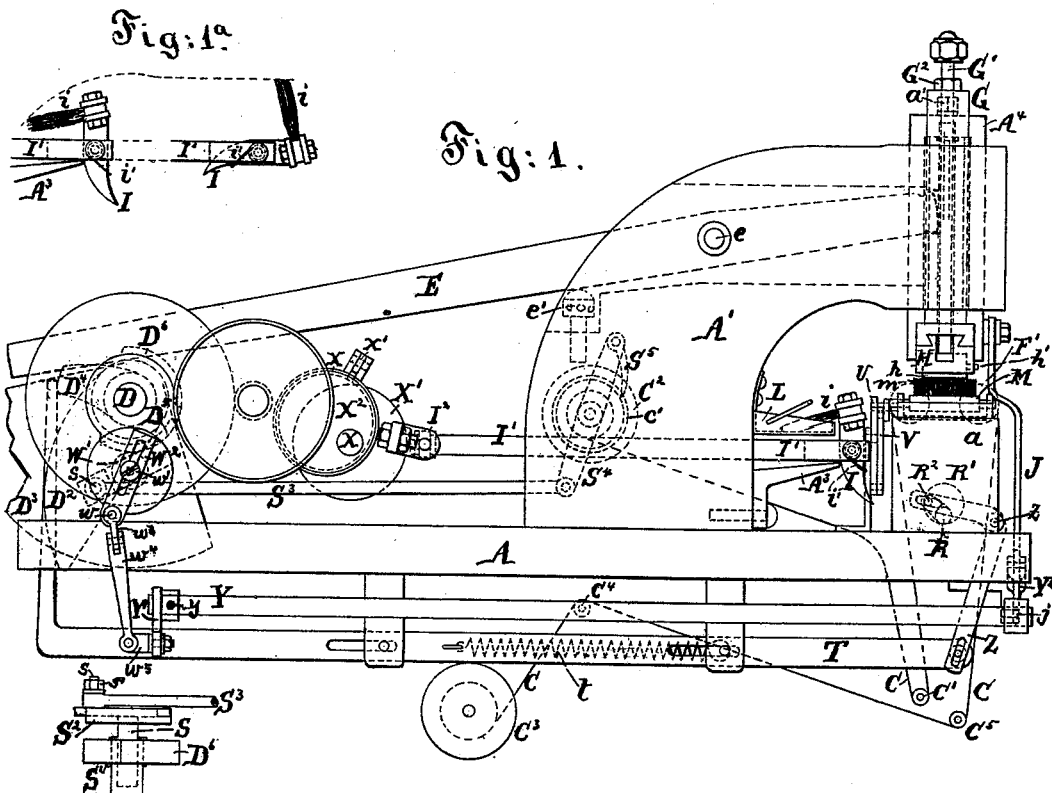


E. HEWITT.
Die and Plate Printing-Machine.

No. 221,461.

Patented Nov. 11, 1879.

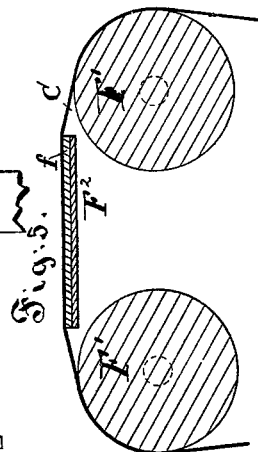
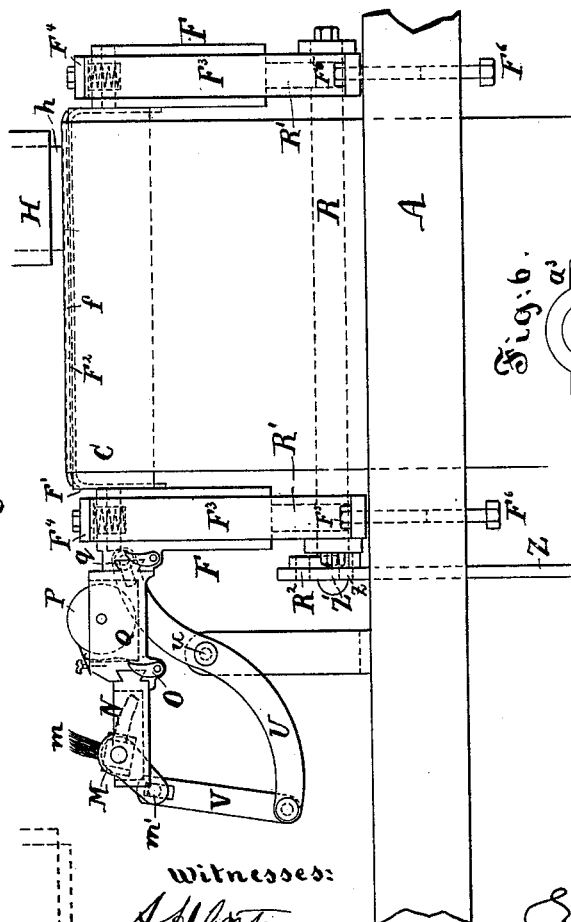


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witnesses:

A. M. Gortner,
J. C. A. Johnstone.

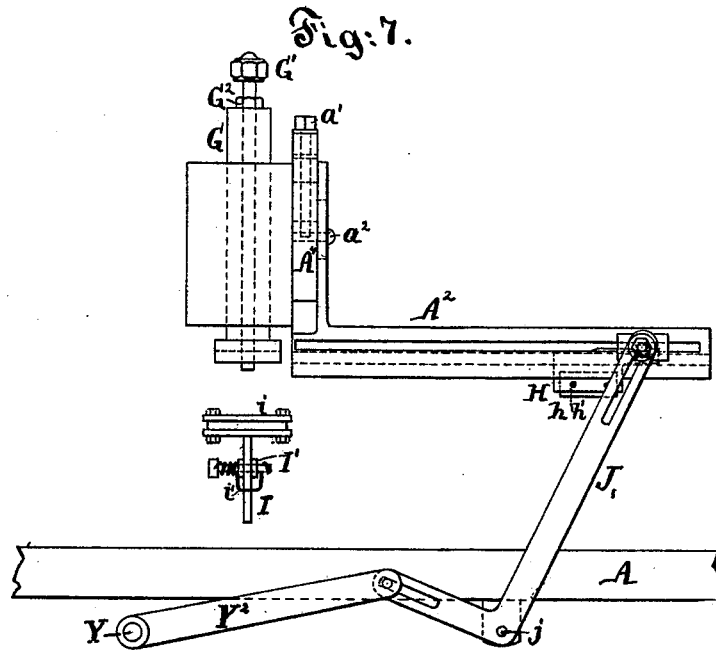
Inventor:

Edward Hewitt
by his attorney
Thomas L. Selton

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Witnesses:
A. H. Gentry
Hattie A. Johnston

Inventor.
Edward Hewitt
by his attorney
J. D. Stetson

UNITED STATES PATENT OFFICE.

EDWARD HEWITT, OF NEW YORK, N. Y.

IMPROVEMENT IN DIE AND PLATE PRINTING MACHINES.

Specification forming part of Letters Patent No. **221,461**, dated November 11, 1879; application filed February 12, 1878.

To all whom it may concern:

Be it known that I, EDWARD HEWITT, of New York city, in the State of New York, have invented certain new and useful Improvements relating to Machines for Die and Plate Printing, of which the following is a specification.

My invention is more particularly applicable to printing with dies, sometimes called "stamping;" but I believe that important parts of the invention may be applied to printing from plates of considerable size.

There has been in all previous efforts a considerable difficulty in properly filling the heavy lines in the die or plate. The inking-material I will call "ink," whether it be black or other color, in oils or in varnish. In my machine the ink is applied by two successive operations. In one or both operations it is applied by a brush. I can by such means carry more ink than can be applied by rollers.

I effect the wiping by a lateral movement of the die or plate, carrying it, loaded with ink, across a wiping-surface of paper or other material, which is held up elastically and adjustably. Means are provided for moving the wiping material after each impression, so as to present fresh surfaces, as required.

I have provided eccentrics peculiarly arranged and operated to move the inking-slide; also, skip-gear peculiarly combined and arranged for operating the subsequent inking and the wiping; also, a third set of skip-gear and connections, which gives the proper step-by-step motion to the paper on which the wiping is effected. I have also provided means for adjusting the height of the die.

The following is a description of what I consider the best means of carrying out the invention.

The accompanying drawings form a part of this specification.

Figure 1 is a side elevation. In this figure the drawings show the novel parts, with only so much of the ordinary mechanism as is necessary to indicate their relations thereto. The view is of what may be called the "left side" of the machine—that is to say, it is a view from that side which is to the left hand of the operator, who sits in front of the machine. Fig. 1^a represents the first inking means in two positions. The lines on the left show it in the same position in which it stands in Fig.

1. The lines on the right show it in the position in which it is thrown as it is moved forward to effect the inking. Fig. 2 is a plan view, showing many of the novel parts in their proper places, omitting their supporting-bearings.

The remaining figures indicate details on a larger scale.

Fig. 3 is a front elevation, showing the second inking and wiping means. The strong lines show the die in the act of being wiped on the paper. The dotted lines at the left (near the witnesses' signatures) show the die in the position in which it stands when engaged with the stamping-slide. Fig. 4 is an end elevation of the same parts. This is a view from the side which is at the right hand of the operator. Fig. 5 is a cross-section through a part of Fig. 4, on a larger scale. Fig. 6 represents one of the bearings detached; and Fig. 7 is a front view of certain parts concerned in the first inking and in the wiping.

Similar letters of reference indicate like parts in all the figures.

A is the fixed frame-work; A', the strong head guiding the main slide G, which is operated by the lever E through the action of a cam, D², on the stout shaft D, and produces the impression by means of a die, *h*, acting on a fixed or relatively fixed surface, *a*, below, as will be understood.

A² is a tolerably strong lateral extension or arm from the head A', equipped to serve as a guideway or railway for the die in the lateral traverse which it is required to make previous to each impression. The motion of the die is effected through the action of a bell-crank lever, J, which turns on a center, *j*, and is operated by connections from the main shaft at the proper time.

It will be understood that the main slide G, which is recessed at its lower end to receive the die-holder H, stands, when at rest at the top of its motion, exactly in line with a corresponding dovetailed railway or slideway in the arm A².

The die-holder H, with its contents, is traversed out and back in the railway A² by means of the arm J to effect the wiping, and on its delivering to the main slide G the latter receives it and afterward descends, carrying

it powerfully down to produce the impression, after which the slide G again rises to its highest position, carrying with it the die, and after again coming into line with the railway A², and waiting a little to allow time for the first inking, it is again moved away by the arm J and the round of operations is repeated.

The wiping is effected by a surface of paper which is moved with a step-by-step motion over a suitable support under the arm A². Before the die is presented to that paper it is twice inked.

The first inking is effected by a brush, *i*, carried on a swinging arm, I, which is pivoted on the reciprocating slide, I', operated by eccentrics X² X² on a counter-shaft, X, driven at the proper rate by skip-gearing X' D² from the shaft D. A connection, x', between the eccentric-straps x x insures a uniformity of position of the two eccentrics, and causes them to work as one in giving the proper reciprocating motion to the slide I'.

L is the first ink-reservoir. On each withdrawal of the slide I' the lower arm of the brush-lever I strikes a stop, A³, and causes the brush-lever I, with its attached brush *i*, to turn actively and dip the brush in the ink. By this means the ink is received in the brush *i*.

A spring, *i'*, attached to the brush-lever I, and finding its abutment on the slide I', exerts a constant force tending to lift the brush out of the ink-reservoir, and to present it with its bristles upward. So soon as the slide I' is, by the action of the eccentrics X², moved forward a little to commence its motion to ink the die, the brush-lever I swings over by the action of the spring *i'* as far as it is allowed by the contact of the lever I with the lower face of the slide I'. The working-face of the brush-lever I, which is in contact with the slide I', is so shaped that the brush is held with its bristles upward in just the right position as it passes under the face of the die *h* to brush strongly and reliably across the under face of the die, both on its outward and returning motion, the die at that period standing still, held in the lower end of the slide G. This makes the first inking. Immediately that this is completed and the brush *i* is moved out of contact, or before it has completely left the face of the die, the latter commences to move laterally by the action of the lever J.

During the first part of the lateral movement of the die outward it receives its second supply of ink. I have shown this as effected in two installments—first by a brush, and second by a roller; but either of these may be used alone with good effect.

A brush, *m*, is carried in a holder, M, which is capable of a partial revolution in its fixed bearings mounted on the side of the ink-tank N. When out of use this brush remains depressed, as indicated in dotted lines in Fig. 3. When the die-holder H is about to move out the brush *m* is thrown up by a partial revolution of its holder M, and the bristles are

brought in the path of the lower face of the die *h*, so that the ink is strongly applied a second time to the face of the die, this time in a direction at right angles to the motion of the first brush, *i*. After the die *h* has passed outward and commenced to return the brush-holder M and brush *m* are again partially rotated, so that the brush *m* assumes again its depressed condition in the ink-reservoir N. In addition to this turning of the brush *m* this entire portion of the mechanism is raised and lowered, as will appear farther on.

P is a roller of the elastic composition commonly used for applying the ink for surface-printing, or, preferably, of some slightly-elastic material considerably harder than ordinary inking-roll composition. It must be of a material adapted to endure all the inks and varnishes liable to be used in die and plate printing, and sufficiently elastic on its surface to act kindly against the polished face of the die or plate. It works in a reservoir, Q, which is supplied with the proper ink or varnish, and is, like the brush *m*, held up into contact with the die only during the outward motion of the latter. It is depressed during the return of the die, and is consequently never turned except in one direction, and that intermittently. A scraper or doctor stands in proper relation to this roller P to remove the superfluous ink and leave the roller in just the right condition to ink the die.

The points in the engraved lines which fail to be properly filled by the first inking operation effected by the brush *i* are filled by the second inking operation or set of inking operations effected by the brush *m* and roller P. The die is certain to move out after the second inking is completed with the deepest and broadest of its engraved lines well filled. It remains to wipe the plane and polished face of the die *h* quickly and strongly upon a suitable surface, so as to leave the ink only in the engraved lines.

My wiping paper is marked C. It is by the action of the mechanism wound off from one drum or spool and wound up on another, being in the interim carried across a suitable holding-surface and presented to the die to wipe it. After the die has been wiped the paper is caused to traverse a considerable distance, and is carried past a roller, C', which has the effect to spread the thickest masses of ink thereon, so that it will become dry before being wound upon the receiving-drum.

F' F' are rollers, of iron or other suitable material, carried in movable boxes F, mounted in a suitable housing, F², which allows the boxes and rollers to rise and sink. F² is an elastic table, faced with felt *f*, and holding the upper surface of the felt a little above the upper surface of the rollers, not so high but that the paper resting on and being moved across it will be held up by the action of the rollers F' and relieved from any serious friction on the felt.

During the brief period while the die is, by

the action of the arm J, moved outward across the paper and wiped the paper C rests firmly and motionless upon the felt *f*. Immediately that the die has completed its outward movement and commences to return, the entire system of devices which supports the paper at that place, and also supports the second inking devices, is lowered. The die returns by the return motion of the arm J without contact either with the wiping-paper C or with the inking devices P *m*. It returns idly and rapidly to assume its proper place in the slide G and be strongly carried down and impressed on the paper or other material to be printed.

I prefer that the die shall wipe across the paper only in one direction. Time is an important element in the working with some kinds of varnishes. Wiping only one way across the paper cleans the face of the die without wiping the ink too much out of any of the lines; and the lowering of the paper and of the inking apparatus enables me to return the die by as rapid a motion as may be desired to be carried down and produce the impression. Another important end thereby attained is to promote the durability of the die or plate. All the wiping beyond what is necessary is a damage by destroying or wearing out the engraved lines. Wiping in one direction can be made efficient, and I thereby obtain a considerably increased durability of the finer parts of the die or plate.

The rising-and-sinking motion of the paper and of the second inking devices is effected by a single set of mechanism.

R is a cam-shaft supported in bearings in the housing F³, and carrying two cams, R' R', which act on the under surface of the boxes F. A crank-pin, R², on the end of the shaft R is engaged with an arm, Z', of a bell-crank, Z, which turns on a fixed center, *z*. At the proper time this bell-crank Z is moved by a slide, T, standing in the position represented, and actuated by a cam, D⁴, on the shaft D. The action of these parts raises the boxes F, and consequently the paper C, by a positive motion. So soon as they are liberated all the parts make a return motion by the force of a spring, *t*, which promptly turns the cam-shaft R and lowers the boxes F, and consequently the paper C. This motion is assisted by springs under the binders F⁴. (Shown in Figs. 3 and 4.)

The elevation and depression of the boxes F impart the required motions to the second inking-brush, *m*, as follows: The second ink-tank, N, and its attachments are mounted indirectly through an intermediate tank, Q, on the side of a box, F, and move with it. A projection, *q*, from the side of the tank Q engages in a slot in a lever, U, turning on a fixed center, *u*. A link, V, jointed to the other end of this lever, engages, by means of a hole or slot, with a crank-pin, *m'*, on the end of the second brush-holder, M.

The first part of the rising motion of the box F produces no effect on the brush *m*; but so

soon as the slack is taken up the continued elevation of the box F causes the slotted link V to act on the crank *m'* and turn the brush *m* to present its bristles upward. I prefer that it shall not stand vertically, but at an angle of about forty-five degrees, more or less. The moment the operation is completed and the box F sinks the brush *m* is turned downward again. This effect will result so soon as it is liberated by the slotted link V. The slot allows the parts to move independently of each other through a considerable space, and thus allows for differences in the quantity of the ink and various conditions which may require the brush to stand at different angles when down. I know of no conditions that will require the brush to stand at any other than a uniform angle when up.

The ink-reservoir N and its attachments may be removed when required for filling, cleaning, or the like, by simply turning the button O and drawing the ink-tank and its connections out from their engagement with the side of the roller-tank Q, which is now to be described. This roller-tank Q is mounted on the side of the box F by a similar mode of connection to that by which the ink-tank N is connected to it. This tank also contains ink; but to avoid confusion I will simply call it a "roller-tank." It will be understood that the ink or varnish in all the several tanks or fountains may be of the same or of a different character.

I have not fully determined by experiment, but believe that it may be expedient, at least in some kinds of work, to use a superior and more costly ink for the first inking by the brush *i*, and thereby to fill all the fine lines of the die, and afterward to complete the filling of the coarse lines by a cheaper ink. The rolling and brushing, or either, tends to mix the inks in the last part of the operation; but in all cases the first inking being effected on a clean die, the fine ink would remain unmixed.

The roller P has been before described. It turns intermittently in one direction, and applies a liberal coating of such ink as is in its tank. I propose to connect gearing, (not represented,) and to give this roller a constant motion in the proper direction, equal or about equal to the motion of the die when it is in contact with it. This would be especially important in working with some kinds of volatile varnishes, as it would tend to keep the material on the roller-surface fresh.

I can employ any ordinary means of adjustment for any and all the parts; but my adjustment for the elevation and depression of the boxes F, and, consequently, of the rollers F', table F², and felt *f*, will be briefly described. All these parts are carried in the housings F³. These housings are held down by adjustable screw-bolts F⁵. On relaxing a bolt the corresponding end of the housing may be set free, and on changing the support under it, and again screwing down the housing, and consequently the entire work which it sup-

ports, including the corresponding corner of the felt f , will be raised or lowered. The supports under the housings F^3 being made by adjustable screws F^6 , I can turn the latter up and down at will, and correspondingly lower or raise either end or either corner of the elastic support f , which holds up the wiping-paper.

It is desirable to be able to adjust the position of the die h up and down in the die-holder H . The cavity in the die-holder is of sufficient depth to allow the die to be pressed upward as high as ever required. Pinching-screws h' are provided in the side of the die-holder H , which can hold the die firmly by side pressure in any desired position in the die-holder H , provided there is some adjustable device above which shall be able to resist the strong forces pressing the die upward in the die-holder in the act of stamping. I obtain this by a long screw, G' , reaching centrally down through the entire length of the slide G , and extending loosely through a slot in the back or top of the die-holder H . The lower end of this screw is smooth and bears fairly on the back of the die. By adjusting it up and down the die h is correspondingly adjusted. G^2 is a jam-nut, which holds it firmly in place when adjusted.

The slot in the die-holder H allows the latter to be moved out and back without interference from the screw G' .

In Figs. 1, 2, and 7 I have shown adjusting means for raising and lowering the arm or railway A^2 relatively to the other parts, and thereby to modify the force with which the die h will be pressed upon the paper C in the act of wiping. Other things being equal, the die will press upon the paper C with a force depending on the level at which it is moved outward.

The whole railway A^2 , instead of being bolted immovably upon the side of the head A' , is fixed by bolts a^2 passing through slots, which allow a slight adjustment up and down. A screw, a' , engages by collars, as shown, with a gallows-frame, A^4 , fixed on and forming a part of the head A' , and this screw a' , being tapped into the part A^2 , adjusts the latter up and down with great delicacy. So soon as the proper position is attained the holding bolts a^2 are set tight, and the guideway or railway A^2 is thenceforward as firm as any other part of the machine, but adjusted at a higher or lower level than before, according as the screw a' was turned in one direction or the other.

In case such adjustment should be carried to a great extent, so as to require the slide G to stand at a higher or lower level in order to be in line therewith, I can change the position of rest of the slide G by turning the screw e' , against which the lever E comes to rest when the slide G is elevated.

I make a hinge-binder to hold down the bearings of the drums C^2 and C^3 . This is shown in Fig. 6, where A^5 is the post or pedestal sup-

porting the bearing A^6 . The binder a^3 turns on a hinge, which connects the binder at one side to the bearing. A pin, a^4 , secures the binder on the other side. On drawing out the pin a^4 the binder a^3 may be turned up and the drum may be taken out and exchanged. The parts are then again secured by a reverse of the several steps.

Many modifications may be made, some of which have been already intimated. The roll P , to assist in the second inking, may be dispensed with. To effect this the roll P may be simply taken out of its tank Q and all the rest left, as shown, or the entire tank Q may be taken away, and a simple block or casting may be introduced in its place to afford the proper support for the ink-reservoir N and its connections, which should be maintained in the position shown, and will in such case perform alone the function of the second inking; or I believe that I can operate the second inking with some success by the use of the roller P alone without the brush m . To effect this I can simply remove or disconnect the brush m , so as to throw it out of use; or I can disconnect and remove the entire ink-reservoir N and its connections. In either case the brush m will be out of use, and the roller P will serve alone to effect the second inking.

The means for obtaining the peculiar motions required may be briefly described as follows: The counter-shaft X receives motion through gear-wheel X' and skip-gear D^3 from the shaft D . It communicates motion, as already described, through the eccentrics X^2 X^2 , including eccentric straps x x , and hinged connections to the cross-piece I^2 on the ink-slide I' .

On the counter-shaft D is a skip-gear or geared segment, D^5 . It communicates motion to a pinion, W' , on the short shaft W , and, by means of a crank-pin, w , mounted on an adjustable slide, W^2 , secured by a pinching-screw, w' , communicates the proper reciprocating motion through hinged connections w^3 and w^4 to a swiveling pin, w^5 , in an arm, Y' , on the horizontal shaft Y , mounted in fixed bearings. (Not represented.) Another arm, Y^2 , on this shaft Y connects through a pin in its forked extremity with a slotted horizontal arm, which forms the base of the bell-crank lever J , which gives motion to the die to effect the wiping, as before partially described. By slacking the screw w' , and moving the slide W^2 so as to shift the crank-pin w in or out, the motion of the lever J , and consequently the wiping motion of the die h , may be increased or diminished. The lever Y' is held on the shaft Y by a pinching-screw, y , so that the lever Y' may be shifted around on the shaft. This, in connection with the before-named adjustment, gives a perfect control of the inking motion of the die. If it is found that the die h in its wiping movement is not carried sufficiently far across the paper C , the screw y must be slacked, and the arm Y' lifted and again tightened. If it be found the motion is not sufficient to carry the die out across the wip-

ing-paper C and then completely back to leave the die *h* in the slide G, the crank-pin *w* must be adjusted farther out by slacking the screw *w'* and moving the slide *W*².

D⁶ is another skip-gear wheel or geared segment mounted on the counter-shaft D. It gears into a pinion, S', fixed on a short shaft, S. A disk, S², on this shaft is formed with a dovetailed groove across its face. A crank-pin, *s*, is adjustable in this slot by means of a tightening-nut, *s'*. This crank-pin, through a connecting-rod, S³, operates a lever, S⁴, which, by means of a pawl, S⁵, communicates an intermittent motion to a ratchet-wheel, *c'*, on the shaft of a drum, C², which winds on the paper. This gives the desired intermittent motion to the paper.

The paper C is given off from a drum or roller, C³, mounted in bearings, (not shown,) traversing first up over a roller, C⁴, then down under a roller, C⁵; thence up over the rollers F', and across the felt *f*; thence it descends, after passing the roller F', and passes a roller, C', which should be held without motion, or without sufficient motion to relieve the surface from friction. The effect of the rubbing on this roller is to spread out the ink where it lies in a thick mass. It enables it to dry rapidly, so that by the time the paper has, by its intermittent motion, reached the roller C² it will have ceased to be sticky. After a long roll of paper has been thus used, and has become wound upon the roller C², the position of the rollers C² and C³ may be reversed, and the same paper may be again used; but care should be taken to change the position of the paper, so that the die will wipe the principal mass of the ink on different parts of the paper. I propose, ordinarily, to use the same paper four times, wiping across twice in opposite directions on one face, and then afterward wiping across twice in opposite directions on the other face.

What I have termed a "brush" may be long or short bristles, hair, or any suitable material to absorb and apply the ink or varnish brushwise instead of rollerwise.

I propose in some cases to use a soft and porous material like sponge, mounted in the same manner, and worked in the same manner, as the brushes which I have shown. I consider that sponge would be an equivalent, and would be included by my term "brush" if mounted and worked in the same manner as the brushes shown.

I claim as my invention—

1. The wiping-apron fed along by a uniform feed, in combination with mechanism for operating it, and with means for varying the force of the wiping, and with a reciprocating die-head and die and an inking and stamping mechanism, substantially as specified.

2. In a machine for die and plate printing, the skip-gear D⁵ on the constantly-revolving shaft D, in combination with the pinion W', crank *w*, and connections *w*³ *w*⁴ *w*⁵, and arm Y', shaft Y, arm Y², and bell-crank lever J, adapted to give a quick reciprocation of the die *h* to effect the wiping and to allow the die to remain a long period in the slide G at each operation, as herein specified.

3. The reciprocating and rocking brush *i*, slide I', and its operating mechanism, substantially as described, in combination with the ink-tank L, wiping means, substantially as described, and an automatically-moved die or plate, as set forth.

4. In combination with the slide I', the swinging arm I, carrying the brush *i*, the stop A³, and spring *i'*, as herein specified.

5. In combination with the automatically-moved die *h*, two inking devices and mechanism, substantially as described, for operating them, one inking device acting while the die is in its stamping-slide G, and the other after the die has commenced to move away toward the wiping device, as specified.

In testimony whereof I have hereunto set my name in presence of two subscribing witnesses.

EDW. HEWITT.

Witnesses:

J. K. OULAHAN,
H. A. JOHNSTONE.