No. 641,495. Patented Jan. 16, 1900.

A. S. BURNELL.

DUPLICATOR.

(Application filed Jan. 28, 1898.)

(No Model.)

Fig. 1.

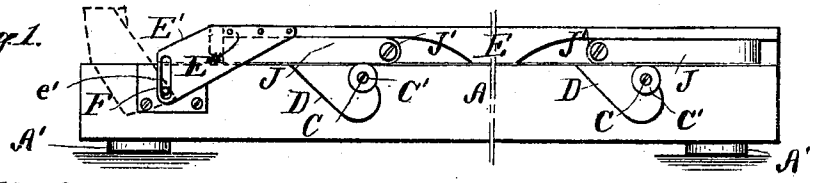


Fig. 2.

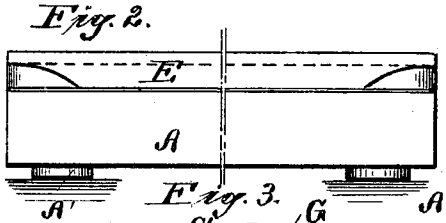


Fig. 3.

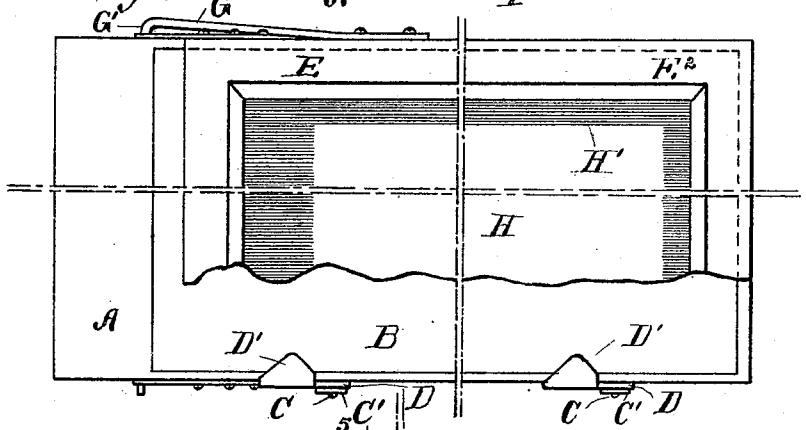


Fig. 5.

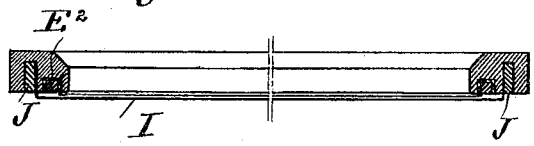
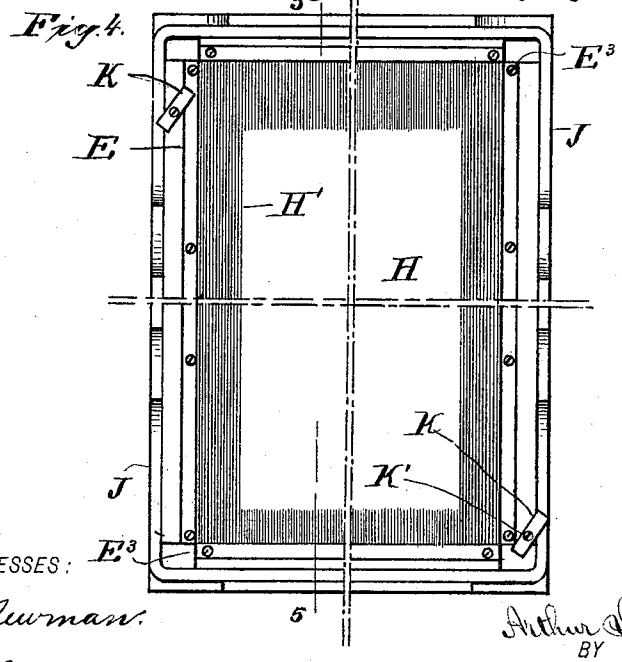


Fig. 4.



WITNESSES:

R. H. Newman.

J. B. Clautice

INVENTOR

Arthur S. Burnell

BY

Thomas Drew Stetson

ATTORNEY.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ARTHUR S. BURNELL, OF MARSHALLTOWN, IOWA, ASSIGNOR TO THE A. B. DICK COMPANY, OF CHICAGO, ILLINOIS.

DUPLICATOR.

SPECIFICATION forming part of Letters Patent No. 641,495, dated January 16, 1900.

Application filed January 28, 1898. Serial No. 668,303. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR S. BURNELL, a citizen of the United States, residing at Marshalltown, in the county of Marshall, in the State of Iowa, have invented a certain new and useful Improvement in Duplicators, which I term the "B. & M. Duplicators," of which the following is a specification.

I use the term "duplicator" to indicate a machine or apparatus, of which there are many modifications already in successful use, to produce a number of copies by a process differing from ordinary printing. I employ a long-time favorite mode of operating in which a thin sheet of material, mainly impervious to ink, but made pervious at certain predetermined points, is applied as a stencil upon the several sheets of paper successively and subjected to the action of an ink-roller applied over its upper surface. The ink strains through at the points where the stencil is pervious and produces on the paper the required figures, drawings, or other desired marks which have been previously made on the stencil. I have devised important improvements which conduce to the durability of the ordinarily fragile parts and allow a large number of clearly-defined impressions to be produced with rapidity and without requiring specially delicate manipulation.

The accompanying drawings form a part of this specification and represent what I consider the best means of carrying out the invention in working by hand.

Figure 1 is a side elevation. The full lines show the frame down ready to receive the action of the roller. The dotted lines show a portion when the frame is up. Fig. 2 is a corresponding end view. Fig. 3 is a plan view corresponding to Fig. 1, but with a small portion of the frame and the parts carried thereon broken away to show the clamps on the bed. Fig. 4 is a view of the lower face of the frame and its connections as it appears when raised. Fig. 5 is a section on the line 5 5 in Fig. 4.

Similar letters of reference indicate corresponding parts in all the figures where they appear.

A is a plane-bed of hard wood or other suitable material, and B a smooth sheet of blotting-paper or analogous material laid thereon to afford a slightly-yielding surface for the successive sheets of paper on which the duplicate characters are to be produced.

A′ are supports of soft rubber, on which the bed may rest on the table or bench when in use.

D D are clamps secured by screws C, set in the edge of the bed A, which transmit their adjustable pressure through a washer C′ to the clamp D, so that the latter will be frictionally held in position to which it may be moved. Each clamp is provided with a wing D′, which laps upon the upper face of the bed or upon the soft paper B, which it is desired to hold thereon. The soft paper may be drawn out by a sufficient force at any time; but to replace it by a new one it will usually be required to lift the clamps D D by turning them on their pivot-screws C. When the soft paper is in place, the clamps are again turned back to places so that the wings D′ press on the edge of the paper B and hold it. If these clamps turn too easily, the screws should be tightened; if too stiffly, the screws should be relaxed.

E is an open rectangular frame which is connected permanently but loosely to the bed A by wings E′, each having a slot *e′*, which is vertical when the frame is turned down upon the bed. The slot on one side receives a pin F, set rigidly in the edge of the bed. The opposite slot receives a pin G′, carried on a spring G, set in the side of the bed and engaging in a hole of the bed, so that it serves in the corresponding slot *e′* in the same manner and with the same effect as the pin on the opposite side and allows the easy disengagement of the frame E when required.

Across the under face of the frame E are extended two separate and distinct sheets or sets of sheets more or less pervious to ink. The highest when in use is a pad H, composed of one or more sheets of fine muslin, about sixty-four picks to the inch, stretched tightly and uniformly in all directions, like a drumhead. I have in my experiment used four of these sheets, constituting a pad. If

more or less be used, they are all stretched and treated together. The edges of this pad are held by the aid of strips E^2, sunk into grooves, and confined and released by screws E^3. The main portion of this pad H is pervious. Around the edge is a space which is treated with varnish H′, so as to forbid the passage of the ink when in use. A suitable ink-roller on which proper ink has been well distributed is passed by hand or otherwise over the upper face of this pad. It adds ink to the sheet to replace the ink which is gradually pressed down through the pad to the stencil below and exerts an easily-modulated and just sufficient pressure over the surface to effect such movement of the ink.

The lower and separately-mounted sheet I is a stencil composed of a single thickness of Japanese, paper known as "yoshino," or a corresponding fine and highly-pervious paper coated with wax, so as to be impervious except where the wax is removed or punctured. This sheet is previously made permeable in the required exactly-determined spaces by proper treatment. A convenient way to effect such preparation of this stencil is by holding the waxed paper upon a permeable surface, as wire-cloth or bolting-cloth, and pressing small portions of it strongly thereon by means of type operated by hand or by machinery. An ordinary type-writing machine serves well for preparing the stencils for correspondence and like purposes. The wax coating or filling of this paper should be continuous over all the surface except where the ink is desired to penetrate. If there are any faults in the paper, such may be stopped by additional wax, or preferably by a special varnish. The folds induced in the waxed paper in securing it and passing it through the type-writing machine and any other faults which may exist in the waxed paper near the edge need not be thus treated, because the varnished edge H′ of the pad H covers all the edges and prevents the ink from penetrating at those points.

It is not necessary to hold the waxed paper on all its edges. It is sufficient to hold it by the top and bottom alone. I have the waxed paper made a little longer than the frame E and hold it at the top and bottom by means of hinged frames J J, which embrace a portion of the frame E and are pivoted at J′. Each extends across in a groove in the frame E and, being applied with care and moderate skill, hold the respective ends of the waxed paper. K K are buttons turning on screw-pins K′, set in the frame E, each adapted to hold and release its corresponding hinged frame J.

In ordinary office practice the stencil requires to be changed quite often. My hinged frames or clamps J, holding this paper only by the ends, allow of effecting such changes easily and rapidly. The pad H is permanently attached, and with careful usage will serve for a long period, taking care to use an ink which will not dry on cloth. The fact that the cloth is thoroughly saturated with ink makes no difficulty in the proper stretching of a fresh stencil. It promotes the smoothness when the stencil is extended and pressed gently on the cloth by running the hands across it. The operation of the end locks dropping into the grooves and confining by the buttons K follows immediately, and the apparatus is ready for use.

I attach importance to the use of textile fabric for the porous sheet H, because it is important that it be strong. Paper thus is liable to break. The textile material is also more easily traversed by the ink in the uncoated portion than paper can be.

I attach importance to the fact that pad H is adapted to contain always a supply of ink, because it tends to make the supply forced down by the gentle pressure of the roller on the pad uniform, however the quantity of ink on the roller may vary at different times. It is essential to success that this pad be stretched uniformly both up and down and transversely. Other means than the strips E^2 and their confining means E^3 may be used to effect the stretching, but I have found these means especially applicable. The act of pushing home the several strips in their respective grooves draws uniformly in all directions on the fabric and attains a smoothness otherwise difficult of attainment.

The labor of once varnishing the edges H′ serves for an indefinite number of different stencils.

I attach importance to the winged clamps D D′ for holding the paper B, and the screws C for adjustably confining them, because they afford thin and very simple means for thus holding and for allowing it to be easily secured and released.

I attach importance to the hinged clamps J engaging in their respective grooves extending across the frame E near the ends, as shown, because they afford facilities for easy and rapid exchanges of the stencils and extend and slightly stretch the stencil in the longitudinal direction and extend it uniformly over the whole breadth.

Modifications may be made without departing from the principle or sacrificing the advantages of the invention. Parts of the invention may be used without the whole. I can use other means than the two clamps J, each turning on pivots J′, for engaging the ends of the stencil-paper. With any form of clamping device the stencil must be a little slack before the extending action due to clamping the ends.

I claim as my invention—

The within-described duplicator having a frame E with removable wings E′, a woven fabric or cloth exposed at the rear with the

marginal portion made impervious and the remainder highly pervious, stretched uniformly in all directions in the frame E with confining means E^2, E^3, and the stencil I, with clamps J and J′ pivoted at their inner ends, independently operated, adapted to hold the stencil by its upper and lower edges and allow its easy adjustment and exchange, all substantially as herein specified.

ARTHUR S. BURNELL.

Witnesses:
A. M. MITCHELL,
CHAS. COFFOCK.