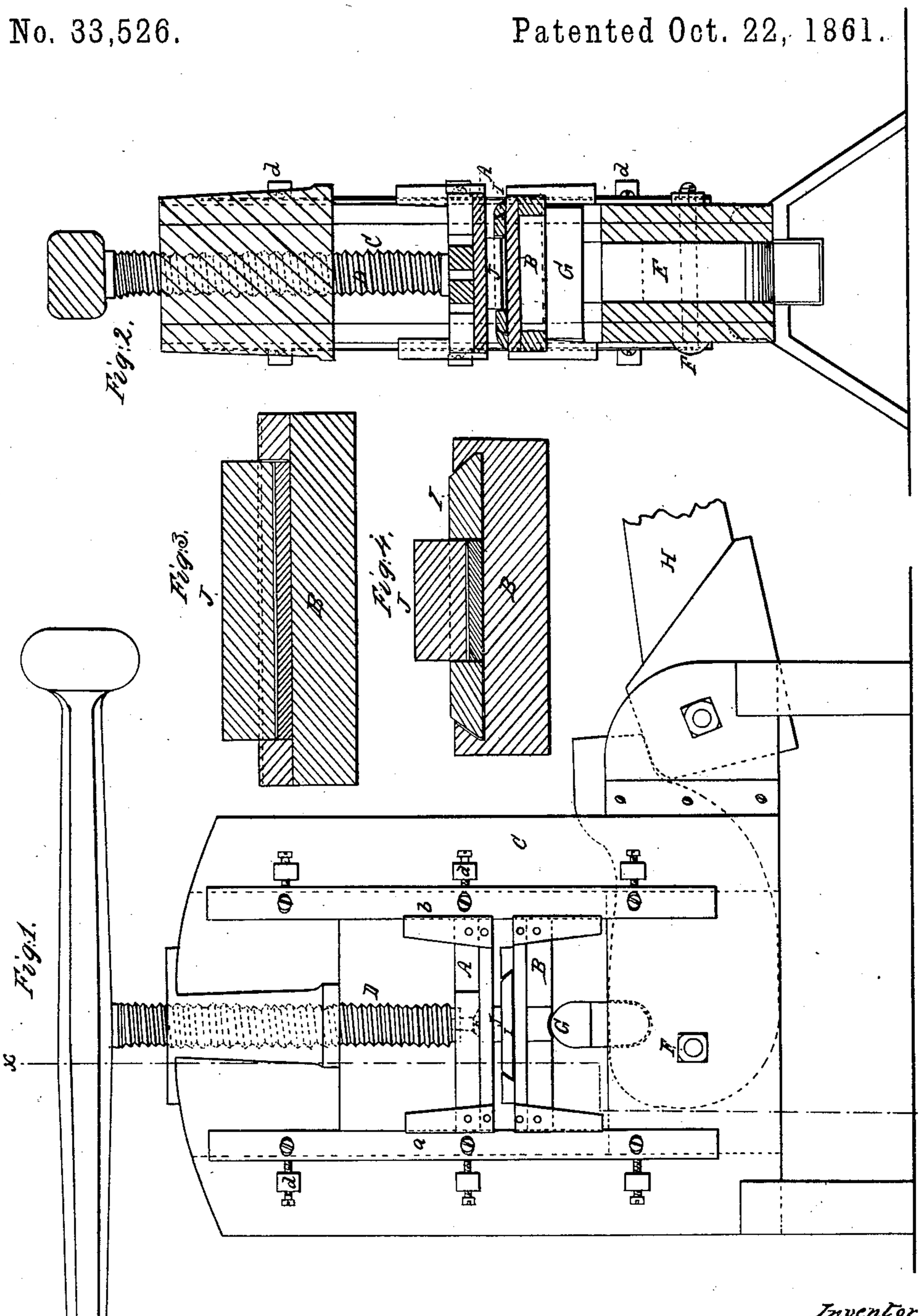
J. W. HAYES.

APPARATUS FOR PRINTING BANK NOTES.

No. 33,526. Patented Oct. 22, 1861.



Witnesses.

Jno Coombs

Geo Reed

Inventor.

J. W. Hayes

per Munn & Co

Attorneys

UNITED STATES PATENT OFFICE.

JABEZ W. HAYES, OF NEWARK, NEW JERSEY.

IMPROVEMENT IN APPARATUS FOR PRINTING BANK-NOTES.

Specification forming part of Letters Patent No. **33,526**, dated October 22, 1861.

To all whom it may concern:

Be it known that I, JABEZ W. HAYES, of the city of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Printing Bank-Notes, Drafts, and other Fine Under-Surface Printing; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a side elevation of a press embodying a portion of my invention. Fig. 2 is a transverse section of the same, taken at the line *x x*, Fig. 1. Fig. 3 shows by an enlarged view a longitudinal section of the under platen, chase, upper platen, and plunger. Fig. 4 is a transverse section of the same.

Similar letters of reference indicate corresponding parts in the several figures.

It is evident that bank-notes, drafts, and similar articles should be so printed, if possible, as to have each note a fac-simile of all the others, and it is well known that in order to prevent counterfeiting by photography and other methods bank-notes are now commonly printed in colors, two or more colors on each note; but it is only known to those skilled in printing that it is exceedingly difficult, if not impossible, in the ordinary way to obtain fac-simile notes, and when colors are used it is still more difficult, because the colors being printed one upon or within the other the position and various relations of the separate colors each to the other will be different in each note. Again, the paper must in every instance be wet when printed, and being afterward dried inequalities are necessarily produced, which are further increased from the fact that the printing is done by passing the plate and paper between rollers under pressure, the inevitable effect of which is to stretch or roll out the paper and all the more so that the paper is wet and only a small portion of it is acted upon by the rolls at any given time. Should the paper be passed through the rolls dry, no sufficient impression could be produced. Indeed, so true is this that skillful printers have long believed under-surface printing on dry paper to be impossible. Should the pressure on the rolls be very considerably increased over what it is now, the result would be to stretch or roll out the plate itself, and thus destroy it—a result which even now obtains to an appreciable extent. Again, as one color is to be printed upon or within the other, it is highly important that the position and various relations of these separate colors each to the other should be accurately and positively the same in all the notes; but in order to print in different colors it is necessary to have as many separate plates as there are colors required, each plate having engraved upon it that portion of the design intended to be produced in a single color, the plates otherwise corresponding exactly each to the other. Hence by the present method very great care is required in the use of these plates, in order that the paper may be so placed from plate to plate as that the registration of the colors will be accurate and well defined one against the other upon the same note, and that each note shall be the exact fac-simile of all the others. This by the present method of under-surface printing cannot be accomplished.

To overcome all of these objections, and at the same time to print under-surface fac-similes clear and bold in impression and when in colors entirely accurate and well defined in registration, is the object of my invention. This I accomplish by adopting a method similar to the one employed and found necessary in striking up coins and medals—viz., the strict confinement of all the parts when in the act of being printed. To this I add the application first of a set or stated pressure to the plate and paper preparatory to the full impression, and upon this the application of a secondary pressure progressive or accumulative in character with very great momentum, resolving itself at last by reason of its momentum into a blow.

To enable others skilled in the art to fully understand and use my improvements in the method of printing, I will proceed to describe them.

A and B represent the upper and under platens of the press fitted to move up and down in a massive iron frame on vertical ways *a b*, attached on opposite sides thereof. These ways are provided with horizontal slots where they are attached to the frame, so that by means of set-screws passing through

the projections *d*, cast on the frame C, they can be adjusted relatively to the frame and movable platens. The upper platen A is connected to the end of the screw D, which is fitted to work vertically through a nut formed in the upper cross-piece or cap of the framing. The lower portion of the frame is cast with a longitudinal opening through it, in which a lever of the second order E (shown in dotted lines in Fig. 1) is fulcrumed at F and supports the under platen and communicates motion thereto through the medium of a step-block G. The front end of the lever E rests upon the short end of a lever H of the first order, which is also fulcrumed in the longitudinal opening in a horizontal line with the lever E. The engraved plate from which the impression is to be taken is nicely fitted in the chase I, which is dovetailed in the upper surface of the platen B and is introduced in the press from the front side. Attached to the bottom of the upper platen is a plunger J, the perfect counterpart of and exactly fitting the inside of the chase I, and is furnished on its under surface with a covering of india-rubber or analogous substance, for the purpose hereinafter to be explained.

The operation is as follows: The engraved plate after being inked in the usual manner is inserted in the chase and both placed upon the under platen. The paper then being cut the exact size of the plate and inside of the chase is placed in the latter, which secures both plate and paper against lateral and endwise movement. The upper platen is now run down by its screw until the rubber face of the plunger coming in contact with the paper presses both it and the plate hard down upon the platen and holds them in an unalterable position while the impression is being taken and providing against the loss of motion in the secondary application of the power. The power is now applied to the long lever with great momentum, and an immense and progresssive or accumulative leverage is thus obtained, which acts against the rubber face of the plunger to produce the impression of the engraved plate upon the paper by impact, the rubber face of the plunger against the back of the paper causing the pressure to be distributed equally over its entire surface. After the impression is thus obtained the upper platen is run up out of the way by the screw and the engraved plate and printed note removed and the same operation repeated with another.

Among the many advantages of my improved method of under-surface printing are the following: The production of fac-simile notes. The wetting of the paper with its consequent expansion and contraction is avoided. Bank-notes can be printed either on one or both sides in as many different colors as is desired and produce a perfect register. The notes being printed in colors prevent their being copied by photography or the alterations of denominations by insertions or otherwise, and the impossibility of producing a perfect register by the common mode of under-surface printing is an additional security against counterfeiting. One figure of a certain color can be introduced into another figure of a different color so nicely and accurately as to leave a fine line between the two of the original color of the paper. The paper is far more durable and the original surface better. The paper not having been wet, the fiber remains undisturbed.

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

1. The plunger J, with a rubber or analogous face or covering, in combination with the chase I and platen B, operating in the manner and for the purpose substantially as described.

2. The levers E H, step-block G, and platen B, with the plate A and screw D, the whole combined and operating in the manner and for the purpose substantially as described.

J. W. HAYES.

Witnesses:

JAMES H. GRIDLEY,

J. W. COOMBS.