E. C. Jayne. Sheet 1. 2 Sheets

Printing on Glass, etc.

No. 52,418. Patented Feb. 6. 1866.

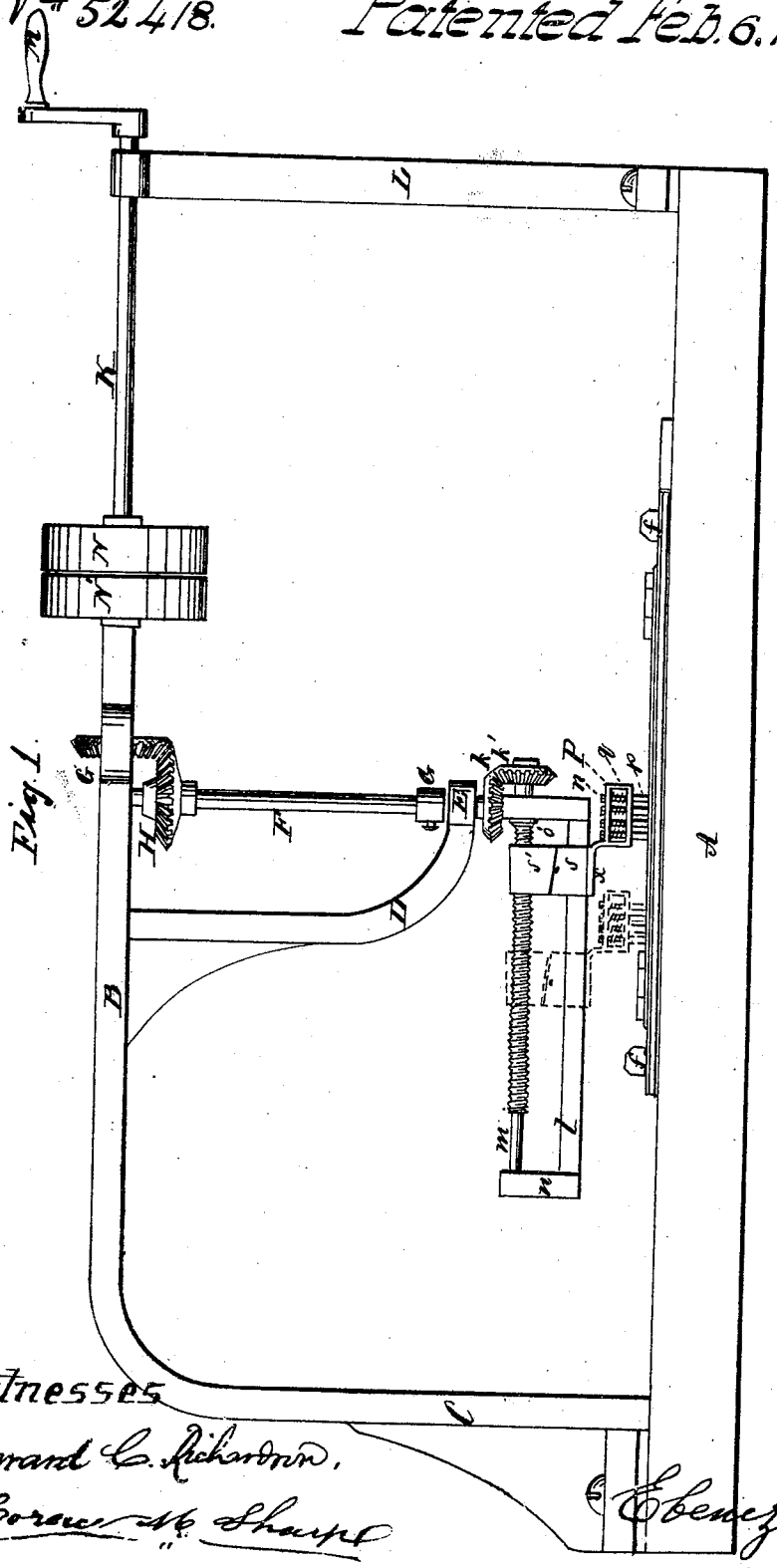

Fig. 1.

Witnesses

Gerard C. Richardson,

Horace M. Sharpe

Inventor

Ebenezer C. Jayne

E. C. Jayne. Sheet 2. 2 Sheets.

Printing on Glass, etc.

No. 52418. Patented Feb. 6. 1866

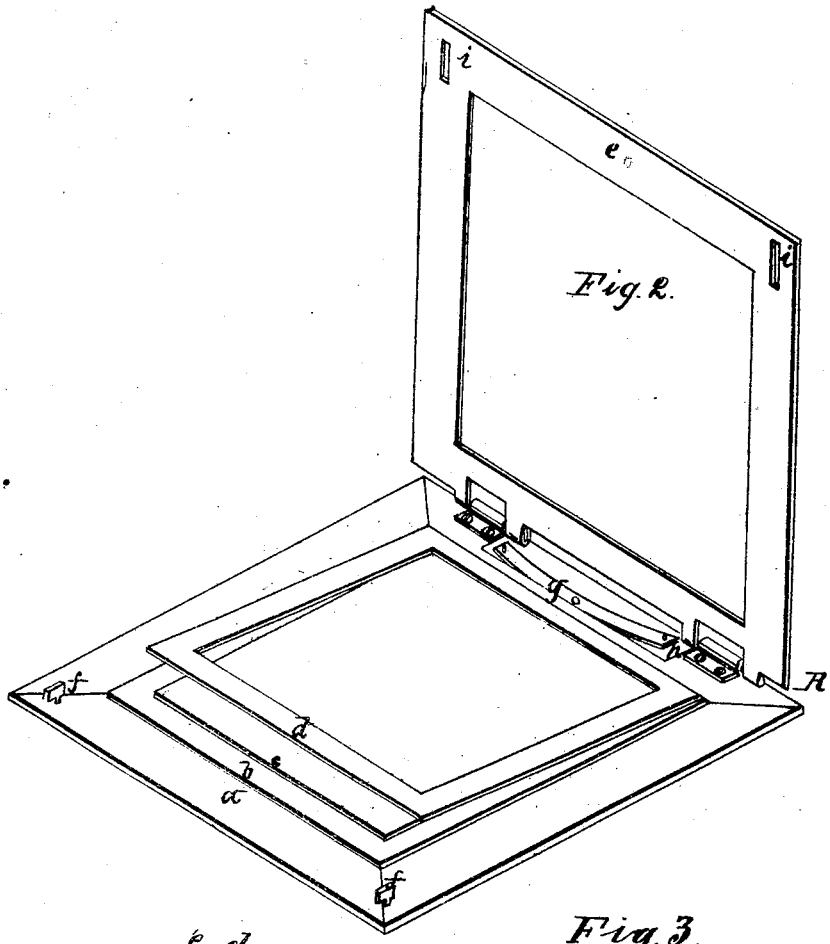

Fig. 2.

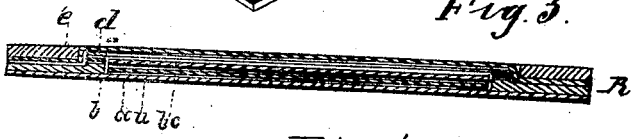

Fig. 3.

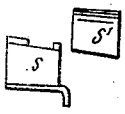

Fig. 4.

Fig. 5.

Witnesses

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UNITED STATES PATENT OFFICE.

EBENEZER C. JAYNE, OF PHILADELPHIA, PENNSYLVANIA.

METHOD OF PRINTING ON GLASS, PORCELAIN, &c.

Specification forming part of Letters Patent No. **52,418**, dated February 6, 1866.

To all whom it may concern:

Be it known that I, EBENEZER C. JAYNE, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and Improved Method of Printing upon Glass, Porcelain, and other Similar Materials; and I do hereby declare that the following is a full and exact description thereof.

The nature of my invention pertains to the art of printing, and its only object is to facilitate and cheapen the cost of the production of letters and other characters upon the surface of glass, porcelain, or other material; and it consists, first, in a method of printing letters and other characters upon the surface of glass, porcelain, and other material; secondly, in means adopted for supporting the glass or other material and adapting it to sustain with the least possible liability to fracture, the heavy pressure required to effect the printing; and, thirdly, in certain mechanism by the aid of which the requisite pressure is produced and applied in a manner to answer most perfectly the end in view.

My new method will, perhaps, be more fully comprehended and appreciated by considering at once the mechanism and the mode of operation of the same hereinafter set forth and explained; but, in general terms, it may be said to consist in transferring letters or other characters from a sheet of printed or painted paper or other material superimposed upon the glass, porcelain, or other material directly to the surface of said glass or other material by a rubbing or rolling pressure applied progressively in lines, singly or in a series, circular, straight, or otherwise, or in one or more continuous lines, spiral or otherwise, in such manner and so close one line to another as to force consecutively every portion of the printed or painted character in close and intimate contact with the glass, porcelain, or other material.

Of the drawings hereto annexed, and making part of this specification, Figure 1 represents a vertical side elevation of the mechanism constituting the third part of my invention. Figs. 2 and 3 represent that which I have denominated the second part of my invention; and Figs. 4 and 5 represent portions of Fig. 1 detached.

For supporting the glass and for confining the printed or painted paper or other material upon it, I employ a holding device, R, shown in detail in Figs. 2 and 3 and constructed as follows: Upon a wooden plank or plate of metal or other material, *a*, is secured a frame, *b*, which incloses an area in shape and dimensions corresponding to the shape and dimensions of the glass or other material to be used, but of a thickness considerably greater than that of the latter. Within this frame, and upon the surface of the plank *a*, is placed a cushion or bed, *u*, made of india-rubber, leather, cloth, or other elastic or slightly elastic material, of such depth or thickness that the upper surface of the glass *c*, when the latter is resting upon it, will be level, or nearly so, with the surface of the frame *b*.

Another frame or skeleton, *d*, made of metal, parchment, or other similar material, and of somewhat less dimensions interiorly than the frame *b*, is connected, by means of a thin flexible material attached to one of its four outer edges, to the corresponding outer edge of frame *b* in such manner that it may be conveniently raised up out the way, and thus offer no impediment to the placing of the glass upon the bed or removing it therefrom, and yet be so controlled and guided by its flexible hinge as that when folded down upon the frame *b* it will maintain thereon its proper position.

Another frame, *e*, made of thin metallic plate, is connected by means of hinges to the plank *a*, outside of the frames *b* and *d*, which, when folded down, will fit accurately around, but not quite in contact with, the outer edge of frame *b*, and be level upon its upper surface with the upper surface of said frame *b*. The frame *e* is provided with two mortises, *i*, one near each of the two angles most remote from the hinged edge, which, when it is folded down, embrace the necks of two turn-buttons, *f*, which, on being turned, clamp the frame close down upon plank *a*.

A flat spring, *g*, is placed in a groove or recess, *h*, and upon the ends of this spring two registering-points are affixed, by the aid of which the transfer-sheet is adjusted in proper position on the glass or other materal, these points operating in same manner and for the same purpose as the registering-points on ordinary printing-presses.

In the employment of this device I am careful, first, to see that the bed is perfectly smooth and of a uniform and proper thickness. I

then lay the glass upon it, the latter fitting snugly within the frame, but not so tightly as to prevent it from moving vertically, and then fold down the parchment frame, which will form, as it were, a thin flexible but tenacious bridge, its inner edge lying upon the surface of the glass and its outer edge resting upon the surface of the frame *b*. I then place the freshly printed or painted sheet of paper with its printed surface downward upon the glass, allowing the sheet to extend over the parchment frame and to some distance all around beyond the frame *b*, and bring down the frame *e* and fasten the same by means of the buttons, as before described. By these means the paper is drawn tightly over the surface of the glass and so firmly held at its edges that any lateral displacement during the subsequent operations upon it is quite impossible.

My printing or transferring mechanism is supported by a table or platform, A, and may be described as follows: A horizontal beam, B, is supported at a certain elevation above the table by one or more standards, C. From this beam depends a curved bracket, D, having in or attached to its lower end a journal-bearing, E, through which passes a vertical shaft, F, the latter being secured at its upper end in a bearing attached to the beam, and prevented from being displaced vertically by said journal-bearing and a collar, G, secured to the shaft by a set-screw or otherwise, which rests upon the bearing E.

To the shaft, near its upper end, there is secured a beveled cog-wheel, H, which gears into another and similar wheel, I, upon the end of a horizontal driving-shaft, K, the latter being supported at one end in a journal-bearing secured to the beam or to a bracket projecting therefrom, and at the other end in a bearing secured to a standard, or otherwise.

Below the bearing E the vertical shaft passes loosely through a fixed beveled-gear wheel, *k*, and at its extreme lower end there is rigidly secured to it one end of a horizontally-projecting guide-bar, *l*, and parallel with the latter, but placed some distance above it, is a screw-threaded rod, *m*, the outer end of which is connected with that of the guide-bar by a stirrup, *n*. An unthreaded portion of the rod *m* passes transversely through the vertical shaft and is fitted snugly therein, but so nevertheless as to be free to turn, and the rod is secured against any longitudinal play or displacement by collars *o*, fastened to it by set-screws or otherwise, upon the two opposite sides of the shaft.

Upon the end of the rod which projects beyond the vertical shaft there is secured a beveled cog-wheel, *k'*, which gears into the fixed cog-wheel *k*.

Thus it will be seen that by the application of power through the medium of a crank, M, or pulley N upon the driving-shaft a movement of rotation upon its axis will be imparted to not only the vertical shaft, but likewise to the rod *m*, and that the latter, as well as the guide-bar, will at the same time have imparted to them a revolving movement in horizontal planes around the axial line of the vertical shaft.

The rubbing device P is represented in the drawings as consisting of four rubbers, all arranged in one frame, but each one entirely independent in its action of the others. One rubber instead of four would answer my purpose; but I prefer to use several, as the certainty of an absolutely perfect transfer is enhanced thereby, while no disadvantage can arise from the use of this or even a greater number, except that rather more power will be required. So, too, rollers instead of rubbers might be used, and they would be found perhaps of equal efficiency; but I find the rubbers to be admirably adapted to the end in view, and also that the cost of their construction is considerably less than that of rollers. The device P consists of a series of four pins, *p*, arranged vertically in an open frame, *q*, and so as to pass through the two sides of the same. Each pin projects some distance below the frame and sufficiently far above it to receive at its upper end a nut, *r*, the lower portion of the pin being about one-eighth of an inch in diameter and slightly rounded at the extremity, but of reduced size from the lower side piece of the frame upward, to accommodate a spiral spring which surrounds that portion of the pin within the frame and rests with its lower end upon a shoulder formed on the pin, and with its upper end in contact with the upper side piece of the frame. Each spring is of sufficient stiffness to offer great resistance to the elevation of the pin upon which it acts, and its tension may be increased to a still greater degree by means of the nut, as is evident from what has been already said, or by replacing the spring with a stronger. The frame of this rubbing device is connected by a curved bar, *x*, with one section, *s*, of a sliding chuck fitted to the guide-bar, and so that the four pins arranged in a row are directly underneath and on a line radial to the axis of revolution of said bar. The other section, *s'*, of the chuck hangs suspended from the screw-rod *m*, the hole through which the rod passes being elongated, or of considerably greater diameter vertically than horizontally, and with its lower surface screw-threaded to correspond with the thread upon the screw-rod, so that if this section be forced upward until the threads of the one engage with those of the other this section will of course, if the screw be rotated, be forced out gradually toward the end of the rod.

The contact-surfaces of the two sections of the chuck are not parallel with the guide-bar and screw-rod, but are somewhat inclined thereto, so that in order to establish a connection between the series of rubbers and the screw-rod the section *s'* must be forced up until its screw-threads engage with those of the screw by sliding the section *s* tightly under it. To prevent any lateral movement of the sec-

tions one upon the other, the surface of one section may be provided with a projecting tongue or pin and that of the other with a groove corresponding thereto, as represented in Figs. 4 and 5. Suppose, now, the glass to have been placed upon its bed, the printed sheet to have been drawn over it and clamped in the manner described. The holding device R is then placed upon the table A in such position that the center of the glass will be directly under the shaft F. The two sections of the clutch are then connected, care being had that their position when so connected will be such as to bring the foremost one of the pins as nearly as may be vertically under the shaft F. Power being then applied, the frame P will commence to rotate, the axis of rotation being occupied first by the foremost pin of the series, and afterward successively by each of the others, the screw forcing the clutch, and with it the series of rubbers, gradually outward, thus causing the latter to describe, with a strong pressure upon the printed sheet, a series of four continuous curved and parallel lines, or spiral curves of gradually-increasing diameter, until said lines of pressure shall have extended themselves over the entire exposed surface of the sheet. The revolution of the shaft is then stopped by shifting the belt upon a loose pulley, N′, or otherwise, and the holding device is drawn forward far enough to permit the glass to be removed and another glass with another printed sheet to be placed in its stead.

To adjust the rubbers in position for repeating the operation, it is only necessary to disconnect the two sections of the clutch, to slide the section *s* with the thumb and finger and carry it back to the starting-point, and reconnect the two by slipping section *s* under section *s′*, as before.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. Transferring letters or other characters from a sheet of printed or painted paper or other material superimposed upon glass, porcelain, or other material directly to the surface of said glass or other material by a rubbing or rolling pressure applied progressively in lines, singly or in a series, circular, straight, or otherwise, or in one or more continuous line or lines, spiral or otherwise, in such manner and so close one line to another as to force consecutively every portion of the painted or printed character in close contact with said glass, porcelain, or other material.

2. In the process or operation of transferring by pressure printed or painted characters from sheets of paper or other material to the surface of glass, porcelain, or other material, the employment of a yielding presser or a series of yielding pressers, in combination with a yielding bed, substantially as set forth.

3. A holding device, substantially as and for the purpose set forth.

4. The combination of a revolving shaft or spindle, F, screw-rod *m*, guide-bar *l*, and clutch, operating substantially as described.

5. A pressing device in which one or more yielding pins or rollers are used, substantially as described.

6. The combination of a revolving shaft, F, screw-rod *m*, guide-bar *l*, and a clutch with a pressing device and a holding device, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of the subscribing witnesses.

EBENEZER C. JAYNE.

Witnesses:
EDW. C. RICHARDSON,
H. M. SHARP.