(No Model.) 3 Sheets—Sheet 1.

M. J. SUNDERLIN.

AUTOMATIC COPYING MACHINE.

No. 307,073. Patented Oct. 21, 1884.

FIG-I-

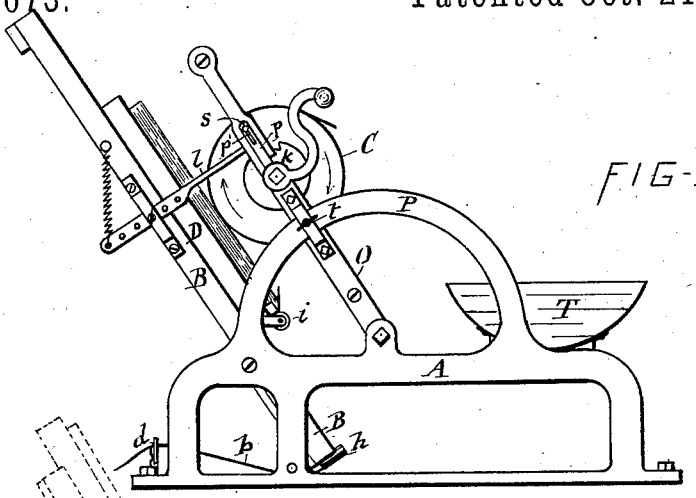


FIG-II-

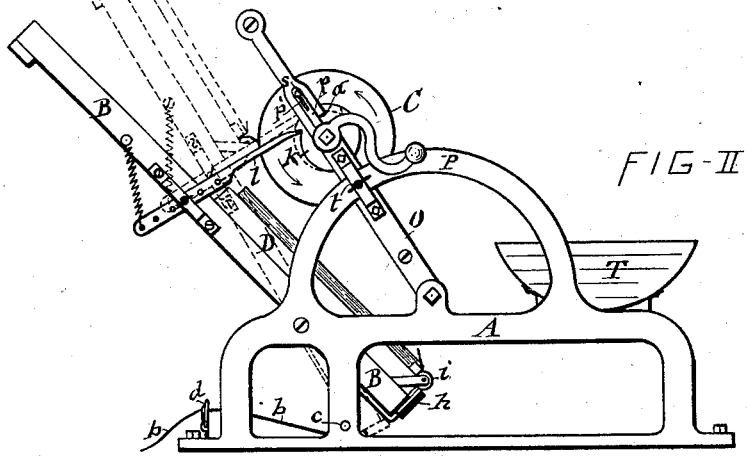
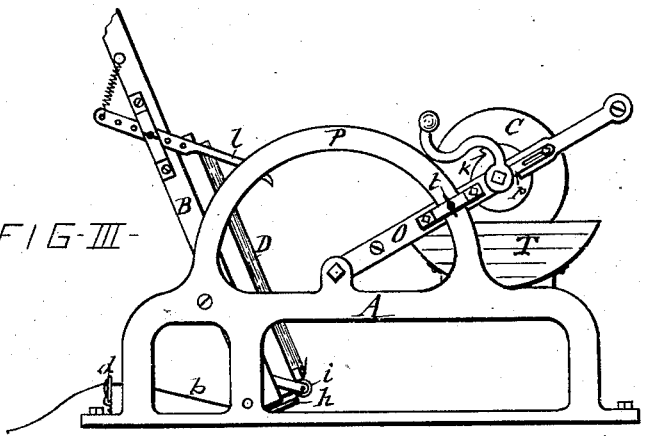


FIG-III-



WITNESSES

C. Bendixon

Chas. E. Raymond.

INVENTOR

Martin J. Sunderlin

per Duell, Laass & Hoyt, Attys

(No Model.) 3 Sheets—Sheet 2.

M. J. SUNDERLIN.

AUTOMATIC COPYING MACHINE.

No. 307,073. Patented Oct. 21, 1884.

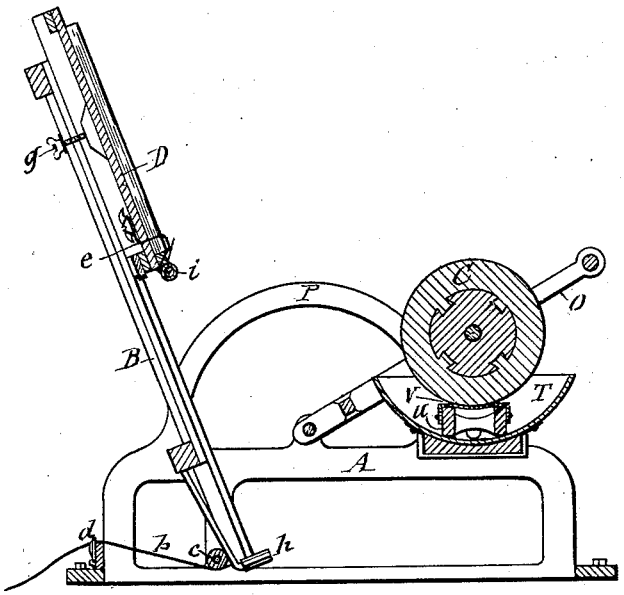


FIG-IV-

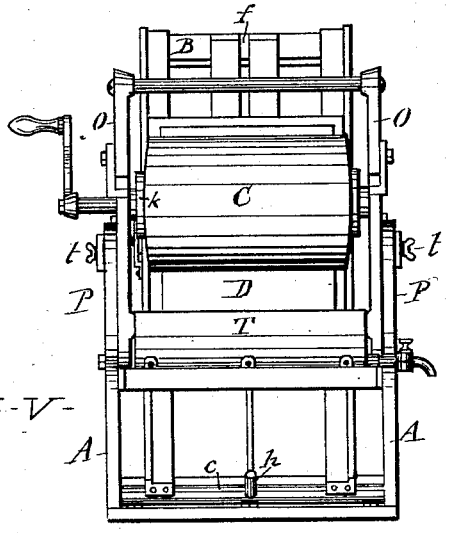


FIG-V-

WITNESSES

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Attys

(No Model.) 3 Sheets—Sheet 3.

M. J. SUNDERLIN.

AUTOMATIC COPYING MACHINE.

No. 307,073. Patented Oct. 21, 1884.

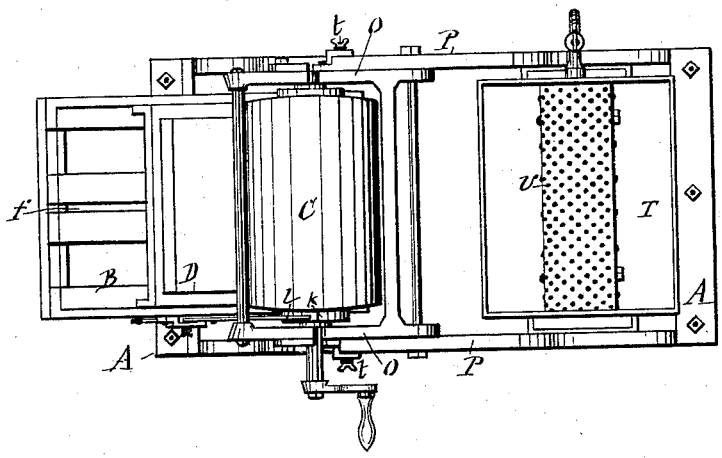

FIG-VI-

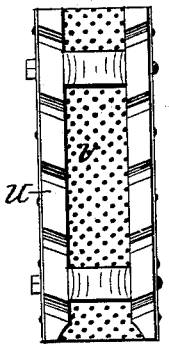

FIG-VII-

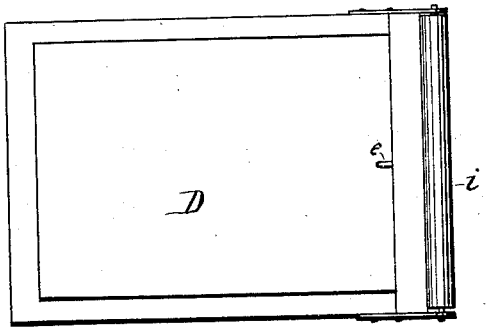

FIG-IX-

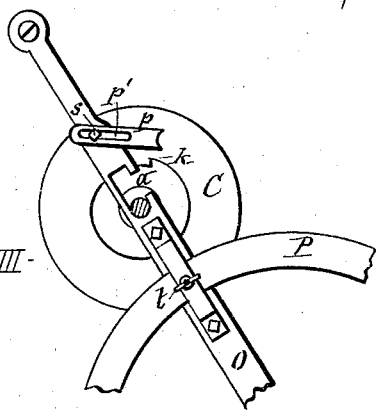

FIG-VIII-

WITNESSES

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Wm. C. Raymond

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UNITED STATES PATENT OFFICE.

MARTIN J. SUNDERLIN, OF WATKINS, NEW YORK.

AUTOMATIC COPYING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 307,073, dated October 21, 1884.

Application filed October 23, 1883. (No model.)

To all whom it may concern:

Be it known that I, MARTIN J. SUNDERLIN, of Watkins, in the county of Schuyler, in the State of New York, have invented new and useful Improvements in Automatic Copying-Machines, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to the production of copies of writings and other ink delineations by means of an absorbent surface carrying an impression from the original writing or delineation and reproducing said impression on paper brought in contact therewith.

The object of this invention is to provide simple, convenient, and efficient means for producing copies, as aforesaid, in a convenient, expeditious, and accurate manner; and to that end it consists in the construction and combination of mechanisms, as hereinafter fully described, and specifically set forth in the claims.

The invention is fully illustrated in the annexed drawings, wherein Figures I, II, and III are side elevations showing the copying-machine in its different operative positions. Fig. IV is a vertical longitudinal section of the machine with the copying-cylinder in position for being cleaned and deprived of the impression. Fig. V is an end view of the same, with the cylinder in position for producing copies. Fig. VI is a plan view of the same. Fig. VII is an enlarged inverted plan view of the device for scraping and cleaning the copying-cylinder. Fig. VIII is a detail view of the detachable connection of the cylinder with the standards of the machine, and Fig. IX is an enlarged detached plan view of the paper-holder.

Similar letters of reference indicate corresponding parts.

A represents the main supporting-frame of the copying-machine, from opposite sides of which frame rise two semicircular plates, P P, in the center of each of which is pivoted one of the standards O O. These standards are provided with a set-screw, *t*, by which they are clamped on the plates P in any desired position.

C denotes the rotary copying or impression cylinder, consisting of a wooden or other rigid core enveloped in a cylindrical cover of gelatinous substance, which latter I prefer to form of a compound of about one part of fish-glue and common gelatine in equal proportions, one part of water, and three and one-half parts of glycerine, the proportions to be varied according to the temperature of the air. This cylinder is provided at opposite ends with trunnions, by which it is mounted on the standards O O. In order to admit of a ready removal of said cylinder when required to be renewed, I provide the standards with a lateral opening, *a*, at the journal-bearing and place over the trunnions a plate, *p*, having a longitudinal slot, *p'*, through which passes a set-screw, *s*, by which said plate is adjustably secured to the standard. By slackening the set-screw *s* the plate *p* can be raised off from the trunnions of the cylinder sufficiently to allow it to be raised out of its bearing and out of the opening *a*. A crank is connected to one of the trunnions of the cylinder for rotating the latter.

B represents an oscillatory bed pivoted on the frame A parallel with the axis of the cylinder C, and sustained yieldingly in an inclined position by means of elastic bands *b b*, which are attached to the foot of the bed B, and extended rearward under a roller, *c*, arranged across the base of the frame A, and thence pass through buckles *d*, attached to the rear end of the frame. The connection of the bands *b b* with the buckles affords simple, convenient, and effective means for adjusting the tension of the said bands. The upper portion of the bed is thus held yieldingly toward the cylinder C, its approach to the cylinder being limited by the encounter of the foot of the bed with the roller *c*, aforesaid, which is thus made to serve as a stop or barrier for limiting the movement of the bed.

D represents the paper-holder, consisting of a frame which is mounted movably on the bed B, and is guided in its movement by parallel ways or flanges on the bed at right angles to the axis of the cylinder, in which direction the paper-holder is designed to move. The foot of the paper-holder is provided with suitable means for fastening thereto the usual glued end of a block or pad of writing-paper, or a number of single sheets of writing-paper,

the free ends of which lie toward the upper end of the paper-holder, for the purpose hereinafter explained.

The means for fastening the paper to the holder is in this case represented in the form of a string, *e*, which passes through the lower end of the paper and is fastened to the back of the holder, as illustrated in Fig. IV of the drawings. I do not, however, limit myself to such means of attaching the paper, as it is obvious that the same admits of many modifications. The bed B is provided with a longitudinal slot, *f*, through which passes the shank of a set-screw, *g*, which enters a socket on the back of the paper-holder, and is provided with a manipulating-head at the back of the bed, as shown in Fig. IV of the drawings. Said set-screw serves to retain the paper-holder on the bed during its movement thereon, and by tightening it the paper-holder can be confined in its position while replenishing it with paper. To the foot of the bed is secured a cushioned stop, *h*, to arrest the descent of the paper-holder. A roller, *i*, is extended across the lower end of the paper-holder, and is pivoted to the sides thereof, which roller is carried under the cylinder C after the paper-holder has traversed its entire length upward on the bed B, as hereinafter more fully described. Said roller being capable of rotating with the cylinder relieves the latter of undue abrasion.

K is a cam-disk attached to the end of the cylinder C, and *l* is a lever or push-bar connected to the side of the bed B and adapted to engage by its free end the shoulder of the cam K, as illustrated by full lines in Fig. II of the drawings. When the standards O are set to bring the cylinder C to operate on the paper attached to the paper-holder D, the push-bar *l* lies upon the cam-disk K and slides freely thereon, while the cylinder is rotated in the direction indicated by arrows in Fig. I of the drawings. A reverse movement of the cylinder causes the cam-shoulder to push on the push-bar, and thereby throws the bed B, together with the paper-holder, away from the cylinder C, as represented by full lines in Fig. II of the drawings. This thrust of the bed B is made adjustable by providing the push-bar *l* at different points of its length with a series of holes for the reception of the pin or bolt by which it is connected to the bed B. This allows the push-bar to be made to project a greater or less distance from the bed B.

The operation of the described machine in copying writings is as follows: The paper-holder D, with a block or number of sheets of writing-paper secured thereto, being fastened to the upper portion of the bed B by the clamp-screw *g*, the original writing to be copied, made with any of the aniline or transfer inks on a sheet of paper, is laid smoothly upon the block or sheets of paper upon the paper-holder D, with the writing to be copied toward the copying-cylinder C, and is fastened at its lower end to the top sheet of the block or sheets of paper by mucilage, or in any other convenient manner. The standards O are then loosened from the plates P and swung toward the paper-holder, and before bringing the copying-cylinder in contact with the original writing aforesaid the cylinder is turned to bring the cam K into engagement with the push-bar *l*, and the standards O are clamped on the plate P. The set-screw *g* of the paper-holder is then loosened by a slight reverse movement of the cylinder C. The lever or push-bar *l* being engaged with the cam K throws the vibratory bed B away from the cylinder C, and this allows the paper-holder D to descend to the foot of the inclined vibratory bed B. Then by rotating the cylinder in the direction of the arrows in Fig. I of the drawings the cam K releases the push-bar *l* and allows the paper-holder D, resting upon the vibratory bed B, automatically to approach the cylinder, and the original writing resting on the paper upon the paper-holder D is brought in contact at its top end with the copying-cylinder and pressed against it. The adhesion of the gelatinous face of the cylinder C on the paper thus fastened to the paper-holder D causes the latter to be drawn its entire length upon the bed B, the sheet containing the original writing adhering to the cylinder. After the lapse of about a minute the paper containing the original writing is removed from the cylinder, when the greater portion of the ink will be found to be retained on the surface of the cylinder in clear and distinct lines, an exact counterpart of the original writing. The rotation of the cylinder is then continued in the direction of the arrows until the lever or push-bar *l* again drops into and engages the cam K, when the movement is slightly reversed again, the paper-holder D again descends to the foot of the vibratory bed B, and by moving the cylinder forward in the direction of the arrows the push-bar is again released from the cam K and the top sheet of paper on the paper-holder D is automatically brought in contact with and pressed against the cylinder at the same point at which the original writing came in contact with it, and by rotating the cylinder in the same way as before in the direction of the arrows the adhesion of the cylinder to the paper causes the paper-holder D to again traverse the entire length of the vibratory bed B, the top sheet of paper adhering to the cylinder and receiving an impression of the ink-marks of the same in fac-simile to the original writing. By taking hold of the end of the sheet of paper it can be readily drawn off the cylinder, and in the same manner each succeeding sheet upon the paper-holder is made to receive a copy until the desired number is obtained. It is at the end of each upward movement of the paper-holder that the roller *i* performs its function. The paper-holder having moved from under the cylinder, it becomes support-

ed above the cylinder by the roller *i* bearing thereon; and since said roller is capable of rotating with the cylinder the danger of abrading or injuring the gelatinous surface of the cylinder is obviated.

When it is desired to place a new supply of paper on the paper-holder, the latter is raised to the upper end of the bed B, and the set-screw *g* is tightened to retain the paper-holder in said position, then a new block or quantity of writing-paper can be secured thereon.

Inasmuch as it is essential to remove the ink from the gelatinous cylinder as soon as possible after the copying process, I connect to the supporting-frame A a cleaning apparatus in such relative position as to allow the aforesaid cylinder to be readily carried thereto. This cleaning apparatus consists of a water-trough or receptacle, T, secured to the frame A, between the plates P P, at the end opposite that to which the bed B is connected. In this trough is placed longitudinally a skeleton frame, U, to the top of which is fastened a perforated metallic sheet, V. By loosening the standards O on the plates P the cylinder C can be carried over into the trough T and laid onto the perforated sheet V; then by revolving the cylinder C the sheet V is caused to erase the ink-marks from the surface of the cylinder in a very expeditious, convenient, and effective manner.

Persons conversant with the use of gelatinous beds for copying writings will appreciate the advantages of the before-described copying apparatus. The copies being produced in the most expeditious manner prevents the ink from penetrating the gelatinous surface as deep as it generally does the ordinary flat gelatinous bed; hence it is more readily erased and the cylinder correspondingly preserved.

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

1. In combination with a rotary copying-cylinder, a vibratory bed provided with ways at right angles to the axis of the cylinder, and a paper-holder mounted movably on said bed, substantially as and for the purpose set forth.

2. In combination with a rotary copying-cylinder, a vibratory bed provided with ways at right angles to the axis of the cylinder, a spring for pressing the bed toward the roller, and a paper-holder mounted movably on the bed, substantially as set forth and shown.

3. In combination with a rotary copying-cylinder, a vibratory bed provided with ways at right angles to the axis of the cylinder, a spring for pressing the bed toward the cylinder, a stop or barrier for limiting the movement of the bed, a paper-holder mounted movably on the bed, and throw-off mechanism, substantially as described, for pushing the bed from the cylinder after the paper-holder has passed the cylinder, substantially as specified and shown.

4. In combination with the copying-cylinder, paper-holder, supporting-frame, and the vibratory bed pivoted thereon, a buckle attached to the frame and an elastic band attached to the vibratory bed and held adjustably by the buckle, substantially as described and shown.

5. In combination with the copying-cylinder, paper-holder, supporting-frame, and the vibratory bed pivoted thereon, a roller extended across the frame back of the foot of the vibratory bed, and elastic bands connected to the latter and passing under the roller and attached to the end of the frame, substantially in the manner set forth and shown.

6. In combination with the rotary copying-cylinder, a vibratory bed in an inclined position, a paper-holder mounted movably on the bed at right angles to the axis of the cylinder, and a stop at the foot of the bed for arresting the movement of the paper-holder, substantially as shown and described.

7. In combination with the rotary gelatinous cylinder, the paper-holder arranged movably across the periphery of the cylinder at right angles to the axis thereof, and a roller pivoted across the lower end of the paper-holder, substantially as and for the purpose set forth and shown.

8. In combination with the rotary gelatinous cylinder and a vibratory bed held yieldingly in proximity to the cylinder, a cam attached to the end of the cylinder, and a lever or push-bar connected with the bed and adapted to engage with the cam, substantially as and for the purpose shown and set forth.

9. In combination with the rotary gelatinous cylinder and vibratory bed held yieldingly in proximity to the cylinder, a cam attached to the end of the cylinder, and a push-bar adapted to be secured at different points of its length on the bed, and having its free end adapted to engage with the cam, substantially as described and shown.

10. In combination with the rotary gelatinous cylinder, the bed disposed in an inclined position and held yieldingly in proximity to said cylinder, and provided with a longitudinal slot, the paper-holder mounted movably on the bed, and a clamping-screw projecting through the slot of the bed and into the paper-holder, and provided at the back of the bed with the manipulating-head, substantially as described and shown.

11. In combination with the rotary cylinder, a water-receptacle under the cylinder, and a scraper or eraser adapted to be brought in contact with the periphery of the cylinder.

12. In combination with the rotary cylinder, a water-trough and a perforated plate supported in the trough to scrape the cylinder rotated thereon, substantially as set forth.

13. In combination with the gelatinous cylinder, the trough T, skeleton frame U, and perforated sheet V, secured across said frame, substantially as specified and shown.

14. The combination, with the main supporting-frame, of the semicircular plates P,

the standards O, pivoted in the center of said plates and provided with the set-screw *t*, and the trough T, secured to the supporting-frame between the ends of the plates P P, all constructed and combined to operate substantially as described and shown.

In testimony whereof I have hereunto signed my name and affixed my seal, in the presence of two attesting witnesses, at Syracuse, in the county of Onondaga, in the State of New York, this 13th day of October, 1883.

MARTIN J. SUNDERLIN. [L. S.]

Witnesses:
FREDERICK H. GIBBS,
WM. C. RAYMOND.