G. H. KENDALL.

PLATE PRINTING MACHINE.

APPLICATION FILED MAR. 27, 1912.

1,040,691.

Patented Oct. 8, 1912.

2 SHEETS—SHEET 1.

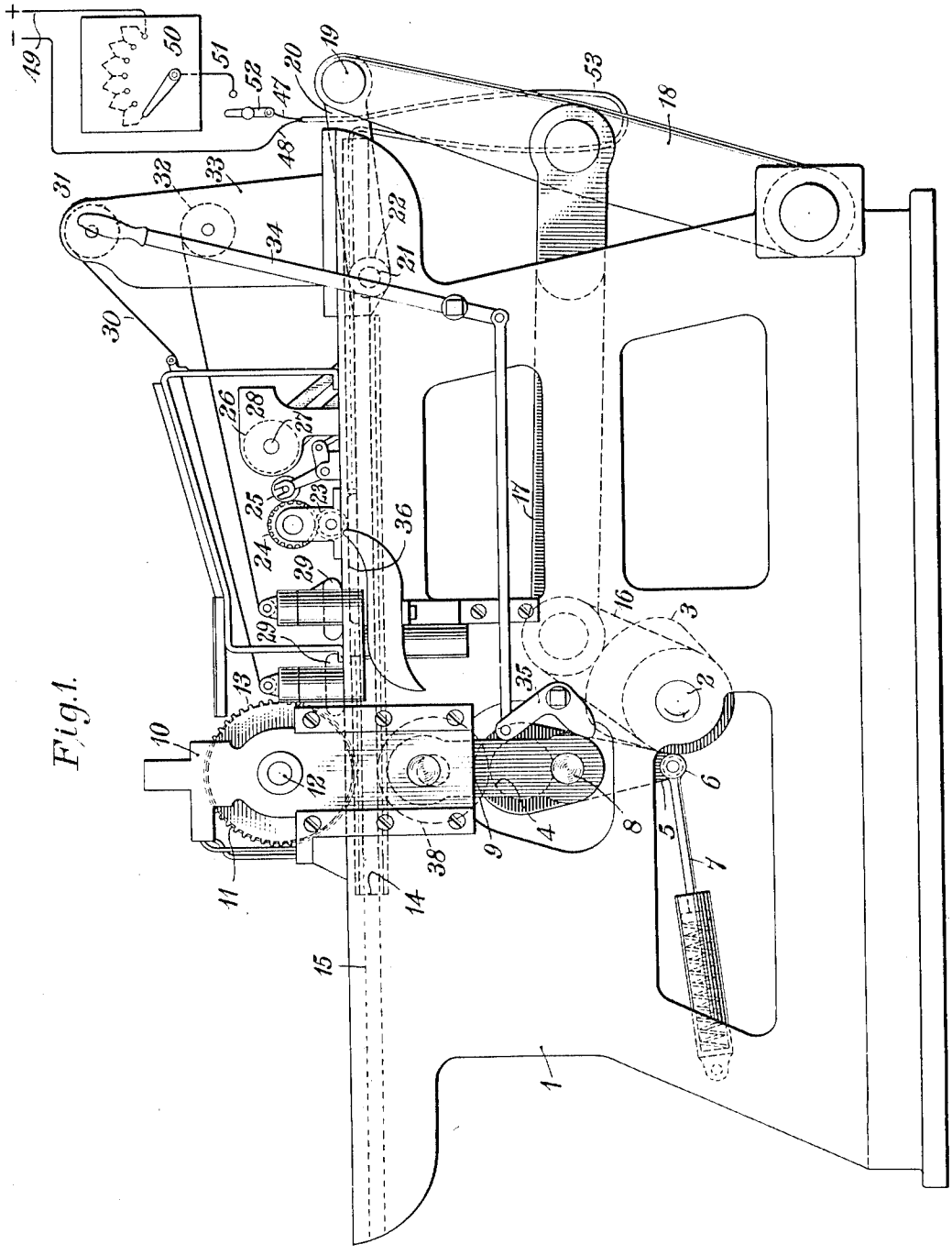

Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 2.

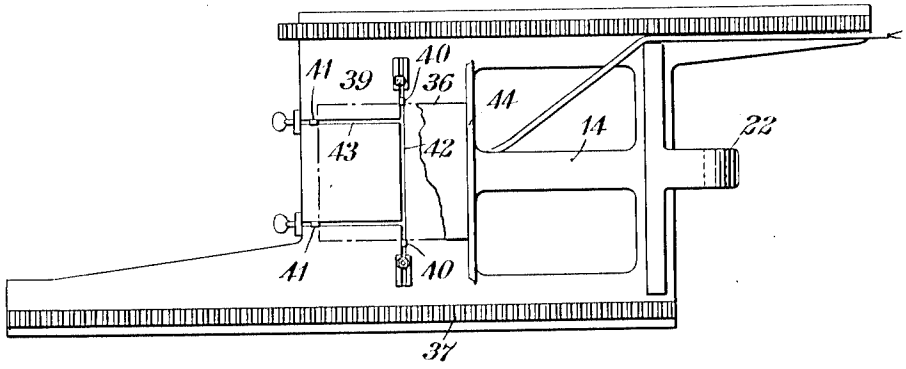


Fig. 3.

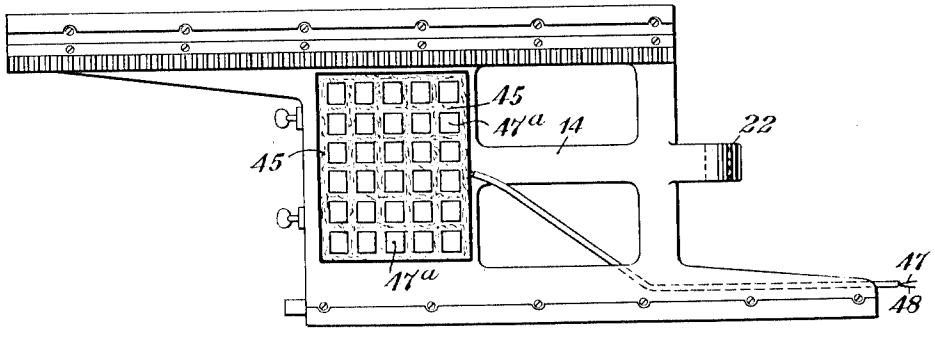
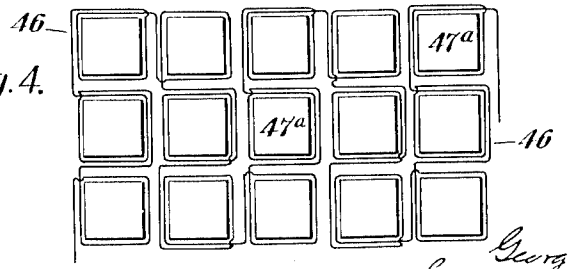


Fig. 4.



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UNITED STATES PATENT OFFICE.

GEORGE H. KENDALL, OF NEW YORK, N. Y.

PLATE-PRINTING MACHINE.

1,040,691. Specification of Letters Patent. Patented Oct. 8, 1912.

Application filed March 27, 1912. Serial No. 686,553.

To all whom it may concern:

Be it known that I, GEORGE HOVEY KENDALL, a citizen of the United States, residing at the city of New York, in the borough of Manhattan and State of New York, have invented certain new and useful Improvements in Plate-Printing Machines, of which the following is a full, clear, and exact description.

This invention relates to plate-printing machines.

In plate printing, aside from the provision of power driven machines, such as that described in my Patent No. 823,878, granted June 19, 1906, adapted to perform automatically and mechanically certain operations in the process previously done by hand, but relatively little progress seems to have been made in this as compared to other printing arts, the procedure, *per se*, of heating an engraved plate prior to the application of ink thereto, applying the ink to said plate, wiping off the surplus ink, polishing the plate and then applying the material, *e. g.*, paper or parchment to the plate, under pressure, being substantially the same as that practised one hundred years ago and more. In the old hand-operated process which is still in use today by the United States Government and by many private concerns, the engraved, etched or otherwise prepared plate is placed by hand upon a heating apparatus and left there a sufficient length of time to properly heat the plate, so as to render the somewhat heavy ink sufficiently fluid to penetrate and completely fill the fine grooves or crevices upon the plate surface, when the ink is applied thereto. The ink is wiped into these crevices, the surplus ink is wiped off, the plate carefully polished and then removed from the heating apparatus and placed in the press with the parchment or paper in place thereon; pressure being applied to effect the reproduction in ink upon the paper of the engraved or etched lines on the plate. Necessarily, the plate begins to cool by radiation, convection and conduction when removed from the heating appliance, and it further cools yet more rapidly when in place in the press; so that by the time that proper pressure has been attained, the minute quantities of ink in the finest lines, is frequently more or less congealed or of improper consistency, (unless the plate has been greatly overheated initially) for producing the higher grade of plate-printing work, such as bank-notes, treasury certificates, bonds, securities and the like, where the fineness of the work is largely depended upon to foil counterfeiting. In the power plate-printing machines of the type above referred to, to the best of my knowledge, the plate is usually heated at one end of the stroke of the bed which supports the engraved plate, as by means of stationary gas flames. The heat is not as uniformly distributed as might be desired, and while the plate is being carried to the rolls or platen, and especially when directly between these rolls, it chills, heat passing off into the surrounding machine parts and the air.

It is the object of the present invention, therefore, to so conduct the operation that heat shall be practically continuously and preferably uniformly supplied to the plate before the ink is applied thereto, while it is being applied, while the surplus is being removed, and the plate polished while the plate is being carried to the pressure rolls or platen and preferably even while the plate is under pressure.

The source of heat may be steam, gas, electricity, or other heating medium; the desideratum being, in any case, that heat be preferably continuously imparted in proper amount to the plate regardless of its position with respect to the pressure means. Of the above recited heating mediums, electricity is, I find, best adapted to the purpose in question, in that it is most readily controlled and enables the heat to be distributed to the best advantage with the least inconvenience to the operator. Where a stationary flame or flames have been used, as heretofore, for heating the plate, one of the principal objections thereto resides in the waste of heat, and particularly to the elevation of the temperature of the air in the room where the process is conducted, which especially in summer, greatly discomforts the workmen. I find that even where a flame is used which travels with the plate, this objectionable effect is still present, although owing to the fact that a smaller flame may be used, the said effect is not so pronounced. On the other hand, heating electrically permits the heat to be applied practically directly to the plate and no air need be supplied thereto to maintain combustion, as in the case of gas,

while the heating appliance may be heat insulated upon the sides thereof away from the plate.

In the accompanying drawings I have exemplified a plate-printing machine of similar construction to that described in my said Patent No. 823,878; the plate-supporting bed of the machine being provided with means for electrically heating the plate.

I am aware that various modifications and changes may be made in my process and in the apparatus for effectuating the same, and hence do not desire to be limited other than by the scope of the appended claim.

Referring to the drawings in which like reference characters designate like parts throughout the respective views: Figure 1 is a side elevation of the machine; Fig. 2 is a plan of the bed; Fig. 3 is a bottom view of the same, and Fig. 4 is a diagrammatic detail of the electrical wiring in the bed, below the plate to be heated.

No attempt will be made herein to go at length into the details of construction of the machine in question, since my patent above referred to sets these forth very clearly and since in so far as the present application is concerned these details of construction are immaterial. The principal working parts only of the known construction will therefore be referred to, but their relationship to the features of moment in the present case will be hereinafter more fully discussed.

The frame of the machine, designated 1, has journaled therein the main operating shaft 2, which may be driven in any suitable manner, such, for example, as that shown in said Patent No. 823,878. Shaft 2 carries a cam 3 which, as it is rotated, is adapted to rock a shaft 4 through the instrumentality of a crank 5 which depends from the latter shaft and which carries at its lower extremity a roller 6. This roller is normally maintained in engagement with the surface of the cam through the action of a spring pressed push-rod 7 or similar device, so that a pin 8 upon the crank 5 is normally held directly below the axis of rotation of the shaft 4. Pin 8 is journaled in a link 9 which connects with a sliding bearing 10; it being understood, of course, that two of these bearings and their links are provided, one upon either side of the mechanism, precisely as in my said patent. The sliding bearings 10 carry an impression roll 11 shown in dotted lines in Fig. 1, said roll being mounted upon a shaft 12 which is journaled in said sliding bearings. This shaft also carries a gear 13 which is in mesh with one of the racks carried by the bed 14 hereinafter described. The cam 3 as it rotates laterally displaces the roller 6 and thereby swings the pin 8 to the left, as viewed in Fig. 1, and upwardly, elevating the sliding bearings and the impression roll. The amount which the shaft 12 may in this manner be elevated, is, however, normally insufficient to effect a disengagement of the gear 13 from its rack. The bed 14 is reciprocally mounted in guides 15, indicated in dotted lines in Fig. 1. A crank 16 mounted upon the shaft 2 and a pitman 17 connected to said crank serve to impart a rocking movement to a lever 18 at the right-hand end of the machine, as viewed in said figure; and the upper extremity of this rocking lever has pivotally connected thereto at 19 a link 20, which in turn pivotally connects at 21 to a boss or lug 22 upon one side of the bed 14.

The inking devices may be the same as those described at length in my said patent, and comprise an inking roller 23 which receives ink from an ink-carrying roller 24, which in turn receives ink from a ductor roller 25 adapted for oscillatory movement back and forth between the roller 24 and an ink reservoir roller 26 journaled, as at 27, in an ink reservoir 28. The ductor roller 25 is oscillated in the manner above described by any suitable mechanism such as that shown in the said patent. Wiping pads 29 perform the same functions and have the same mode of operation in the present mechanism as the corresponding parts described in the said patent and hence need not be particularly described. The fabric 30, which provides the effective surfaces of these pads is delivered from a supply roll 31 in the form of a strip which extends therefrom around the wipers 29 and back to a take-up roll 32; rolls 31 and 32 being mounted in brackets 33 upon the right-hand end of the mechanism. I have also indicated other portions of this patented mechanism such as the lever 34 and connections therefrom to the bell-crank 35 by means of which the impression roll may be manually elevated from its engagement with the printing plate 36, indicated in dotted lines in Fig. 1 and in full lines, but partly broken away, in Fig. 2.

The rack carried by the bed 14 with which the gear 13 is normally in mesh, as above described, has been designated 37 (Fig. 2); and it is obvious that as the bed is reciprocated, the impression roll will be correspondingly rotated first in one direction and then in the other, while the bearing roller 38 mounted in the frame 1, as described in my said Patent 823,878, is adapted to support the bed 14, as the latter moves back and forth under the impression roll; roll 38 also preferably being rotated positively by the reciprocating bed as in the case of the patented mechanism.

Referring now to Figs. 2 and 3, the bed 14 is made of substantially the same contour as in the patent in question and for similar reasons. The plate 36 which of course may be of various sizes, is held in position upon

the finished surface 39 of this bed in any suitable manner, as, for example, by means of clamps 40 and 41 disposed in slots 42 and 43, respectively; the plate being properly alined with the bed by means of a rib 44 which projects up from the said surface 39. The clamps 40 and 41 may be of any suitable description and so need not be here further described, it being obvious of course that no portions thereof should project above the surface of the impression plate 36, to avoid recessing or cutting away the upper or impression roll. The under side of the bed may have a series of grooves 45 therein, said grooves being preferably so disposed as to form a checkerwork upon the under side of this bed directly below the finished surface 39 which carries the impression plate. In the present instance these grooves are adapted for the reception of wires 46 which by their resistance to the passage of current therethrough provide the heating means for the plate 36 substantially immediately thereabove; current being delivered to these wires from the leads 47, 48. The wires 46 have been somewhat diagrammatically indicated in Fig. 4 wherein the blocks or tables 47^a of the checkerwork are shown with the wires 46 coiled or looped therearound. These wires of course should be insulated from the bed plate and the spaces or grooves between the blocks 47^a are shown in Fig. 3 as filled with asbestos or the like. The table-like portions 47^a should be disposed with respect to each other, as for example, by having relatively narrow grooves 45 therebetween, so as to insure smooth operation when the bed is drawn between the rolls 11 and 38; and of course the wires or other heating means should preferably be contained entirely within the bed between the plane of the table-like surface of the blocks 47^a, and the finished surface 39, so that they will not encounter the roll 38 when drawn thereover. Current is supplied to the heating device from any suitable source, passing, for example, over a lead 49 to a suitable resistance device or rheostat 50 and from thence through a connection 51 to a switch 52, current passing down through lead 47 around a loop 53, in the present instance, to the wires 46; returning via the lead 48. For convenience the wires or leads 47 and 48 are incased in a flexible tube or conduit of any known and suitable construction, as indicated, so as to protect them from injury when the bed is being reciprocated.

It is obvious of course that various other electrical connections may be provided instead of those shown, so that I do not wish to be limited to the loop 53 or to any particular arrangement of the heating coils.

In its broadest aspect, as I have indicated, the invention is not to be limited even to heating by means of electricity, since other heating mediums may be employed to excellent advantage; but I prefer electrically heating the plate for reasons indicated in the opening paragraphs of this specification.

The operation of the mechanism, except for the heating means, is substantially the same as described in my said patent, and it will suffice herein, therefore, to but briefly review this operation, considering in connection therewith, the action of the plate heating means.

The feeding assistant stands ordinarily at one side of the machine with a pile of sheets to be printed upon conveniently at hand. These are successively secured to the impression cylinder preferably by the means described in my said patent, although in so far as the present invention is concerned they may be positioned upon the impression cylinder, or even upon the printing plate, by hand. In like manner no attempt has been made herein to repeat the description of the mechanism for stripping off the sheets from the impression cylinder when finished, since again in so far as the present invention is concerned the stripping may be done manually, and either from the impression roll or platen, or from the plate. Considering therefore that the bed is in its extreme right hand position as viewed in Fig. 1, the principal operator may be stationed at the left hand end of the machine, and the initial portion of the movement of the bed toward him passes the plate beneath and in contact with the inking roller 23. Thereafter the wipers 29 successively engage the plate and wipe off the surplus ink and polish said plate. The plate then passes between the impression and bearing rolls, but at this time the upper or impression roll, with the sheet to be printed in place thereon, is held up out of engagement with the polished plate by the action of the cam 3.

As the plate emerges from under the raised roll 11, it is inspected by the operator who also customarily passes his hand over the wiped plate to polish the same more perfectly. It will be understood that this last operation is not absolutely essential; but since the operator is not otherwise occupied at such time, and since the additional polishing insures practically invariably perfect results, it is usually resorted to. The rearward or, as viewed in Fig. 1, right hand movement of the reciprocating bed carries the plate into contact with the sheet to be printed upon; said sheet, in the meantime having been placed upon and secured to the impression roll in any suitable manner, and the impression cylinder thereafter having been lowered substantially to the plane of the working surface of the plate; and the ink is transferred from the fine lines or crevices in the printing plate to said sheet. It is at this stage of the operation that the

effect of heating the plate, in the manner previously described, becomes apparent; since it is by reason of this that the printing ink, even when present upon the plate surface in exceedingly minute quantities, is maintained at just the proper temperature to enable it to be transferred to the paper or parchment to be printed upon, most perfectly. The further rearward movement of the bed removes the plate from contact with the now printed sheet; the roll 11, with the sheet thereon is again elevated by the cam 3; and the sheet stripped therefrom in any approved manner.

Having thus described my invention, what I claim is:

A plate printing machine, comprising a reciprocating bed, a printing plate adapted to be carried upon the surface of said bed, a pair of pressure rolls between which the bed and plate pass to accomplish the printing operation, the under surface of the bed over which the plate rests being provided with table-like projections the surfaces of which are all in the same horizontal plane and extend over the entire area covered by the plate, and electro-heating devices located in the spaces between said projections, whereby the passage of the bed and plate between the rolls is not obstructed and the plate is evenly heated throughout its area.

In witness whereof, I subscribe my signature, in the presence of two witnesses.

GEORGE H. KENDALL.

Witnesses:
WALDO M. CHAPIN,
ELIZABETH BAILEY.