S. LIPSIUS.

APPARATUS FOR PRODUCING RAISED PRINTED MATTER.

APPLICATION FILED APR. 2, 1913. RENEWED FEB. 6, 1915.

1,144,303.

Patented June 22, 1915.

2 SHEETS—SHEET 1.

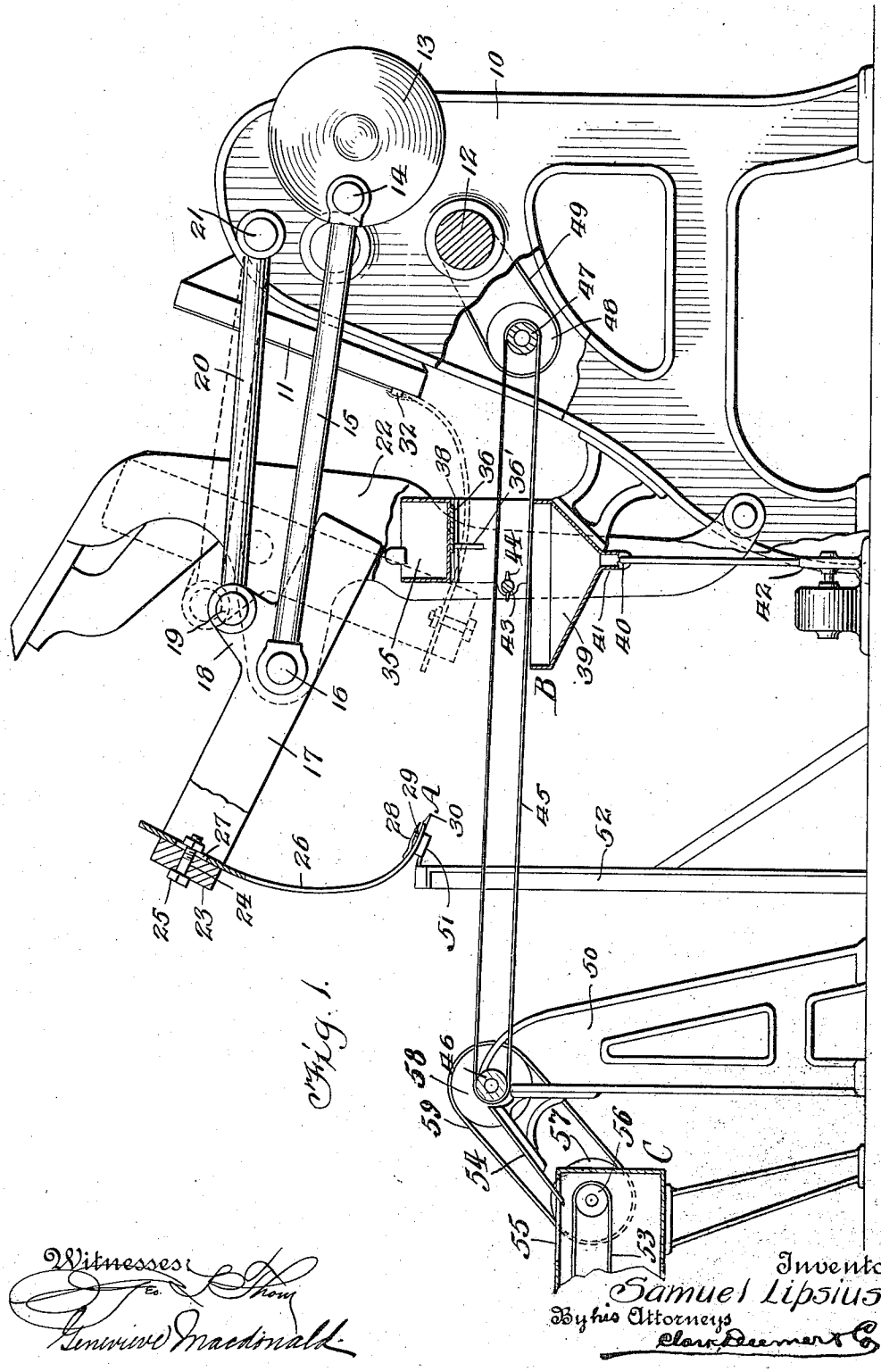


Fig. 1.

Witnesses:
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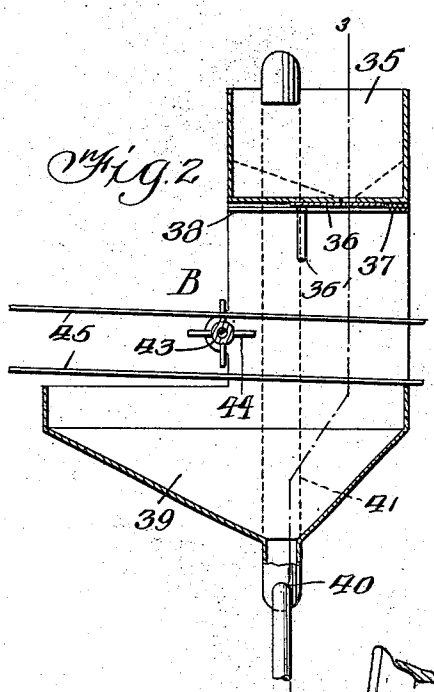


Fig. 2.

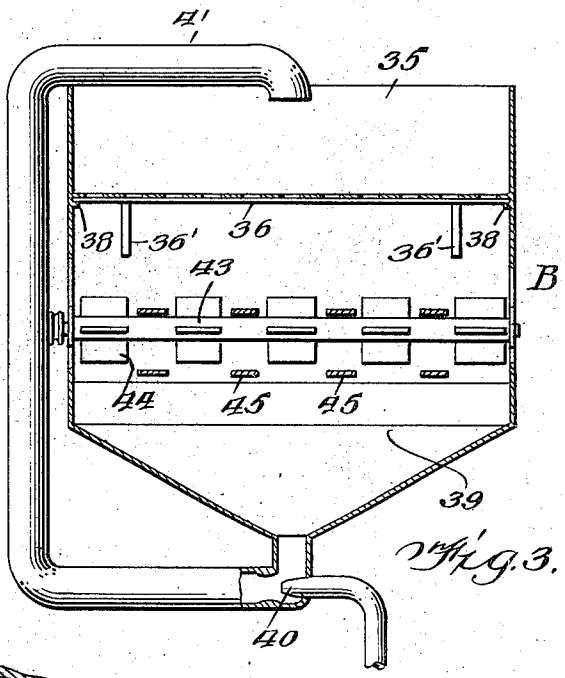


Fig. 3.

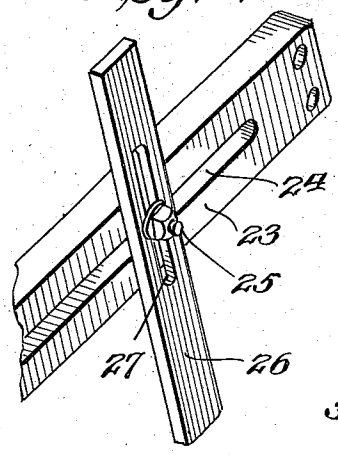


Fig. 4.

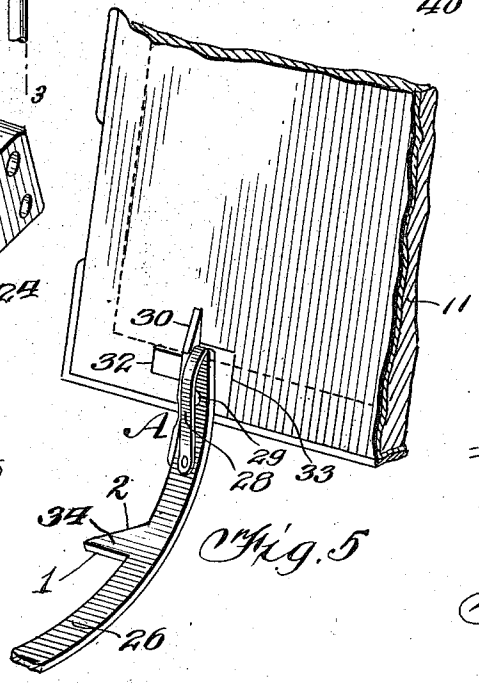


Fig. 5.

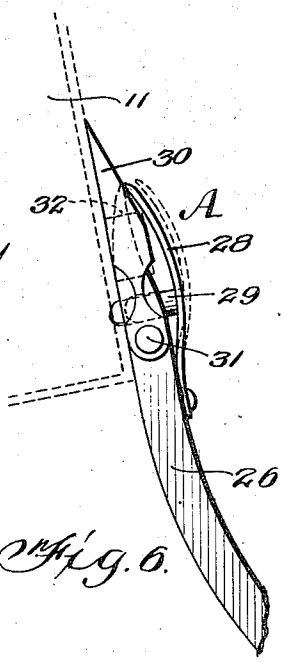


Fig. 6.

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UNITED STATES PATENT OFFICE.

SAMUEL LIPSIUS, OF NEW YORK, N. Y.

APPARATUS FOR PRODUCING RAISED PRINTED MATTER.

1,144,303. Specification of Letters Patent. Patented June 22, 1915.

Application filed April 2, 1913, Serial No. 758,396. Renewed February 6, 1915. Serial No. 6,639.

To all whom it may concern:

Be it known that I, SAMUEL LIPSIUS, a citizen of the United States, and residing at 105 John street, New York, in the county of New York and State of New York, have invented a new and Improved Apparatus for Producing Raised Printed Matter, of which the following specification is a full disclosure.

This invention deals with a unitary self-contained apparatus in the nature of an embossographer, adapted automatically to produce so-called "raised printing" in simulation of engraving.

The primary object of this invention is to create and render commercially available an apparatus which will enable printers to produce imitation embossed work so rapidly, cheaply and easily as to enable large quantities of material to be turned out at a cost only slightly exceeding that of ordinary printing.

Heretofore, raised printing in imitation of embossed or engraved work has been accomplished by tedious and laborious hand methods, and as the result of a high degree of manipulative skill, acquired by long practice, very pleasing and satisfactory work has been thus made. The chief difficulty, however, has been that these hand methods are necessarily expensive and are subject to many disturbing influences and are quite incapable of effecting substantial economies in handling large orders, because of the fact that the expense cannot be materially reduced in proportion to the volume of work to be turned out. This invention, however, by reason of its automatic character and its nicety of control, enables the output to be greatly speeded up when handling a large order of the same printed matter, and consequently this invention further improves and commercializes the production of imitation engraving by enabling it to be carried out by ordinary printers, without requiring a high degree of manipulative dexterity or skill.

Other objects will be in part obvious from the annexed drawings and in part indicated in connection therewith by the following analysis of this invention.

This invention accordingly consists in the features of construction, combinations of parts, and in the unique relations of the members and in the relative proportioning and disposition thereof; all as more completely outlined herein.

To enable others skilled in the art so fully to comprehend the underlying features thereof that they may embody the same by the numerous modifications in structure and relation contemplated by this invention, drawings depicting a preferred form have been annexed as a part of this disclosure, and in such drawings, like characters of reference denote corresponding parts throughout all the views of which:—

Figure 1 is a side view of my combined printer, powderer, excess-remover, conveyer and fuser, parts being broken away and shown in sectional elevation. Fig. 2 is a vertical sectional elevation, drawn on an enlarged scale, of the powderer for containing and distributing an excess of the powder on the printed portions of a sheet. Fig. 3 is a cross-sectional view taken on the line 3—3 of Fig. 2. Fig. 4 is a perspective view illustrating one of the minor details of construction. Fig. 5 is a perspective view of one form of sheet-feeder. Fig. 6 is a side view illustrating certain details of construction thereof.

In the accompanying drawings, I have shown how a printing press of the "Gordon" variety may be embodied as one of the elements of my combination; enough only of the press and the other elemental mechanisms being shown to illustrate a fair example of a complete practical application of the invention. In these drawings, 10 indicates the frame of the press; 12 is the main driving-shaft; 13 is the crank-wheel to which the pitman 15 is connected by means of a wrist pin 14. This pitman 15 engages the shaft 16 which is adapted to actuate the swinging-frame 17, and it extends transversely between the arms of the oscillating frame 22, which supports the type. The frame 17 is provided with an off-shoot 18 having a wrist-pin 19, to which is connected a link 20. This link is pivoted to the frame 10, by means of the wrist-pin 21, and is adapted to swing said frame into the position shown by dotted lines in Fig. 1 of the drawings during the oscillation of the type-supporting frame 22.

The two end-arms of the frame 17 are connected by means of a removable cross bar

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23, having an aperture 24 for receiving bolts 25, which are employed as a means for adjustably connecting the resilient arms 26 to the swinging frame; these arms are respectively provided with a slot 27, whereby they may be adjusted to suit requirements.

Each arm 26 is provided at its free end with a gripper A, comprising a resilient jaw 28 (see Fig. 5) having a stud 29, which passes through an opening through the end of the resilient arm 26, whereby said jaw is normally closed against the free end of said resilient arm. Pivotally attached to the arm 26, by means of a pin 31, is a tapered guide or pawl 30, adapted for lifting the lower end of the printed sheet outwardly and away from it and its supporting quads 32, and guiding it between the jaws of the gripper A. The platen 11 is provided with recesses 33 for accommodating the grippers A, the surface of said recesses contacting with the studs 29, as the grippers enter for the purpose of opening the jaws 28, whereby the printed sheet may readily enter the grippers and be carried away thereby, as will be hereinafter described.

As a means for holding and distributing the powder, I employ a receptacle B, embodying the upper compartment 35 and the lower compartment 39, the former having outlet openings in its bottom which are normally closed by the sliding door 36. This door is maintained in closed position by means of suitable springs 37. The sliding door 36 moves on guides 38, and it is provided with depending pins 36^1, for engagement with trips 34 projecting from the resilient arms 26. These trips open the sliding door during the rearward stroke of the arms 26, by means of their shoulders 1; their tapered edge parts 2 riding over said pins 36^1 on the forward stroke.

The compartment 39 is hopper-shaped and its outlet leads into a tube 41, which discharges into the upper compartment 35. Said tube, immediately below the outlet of the hopper 39, is provided with an injector nozzle 40 which leads from a suitable source of air supply, as a blower 42, whereby a jet of air is forced through said nozzle for the purpose of blowing the powder through the tube 41 and ultimately back into the upper receptacle 35. Extending transversely beneath the compartment 35 is a revoluble shaft 43, having a plurality of blades or paddles 44 for tapping the backs of the printed sheets to shake the superfluous powder therefrom.

Passing longitudinally between the upper and lower compartments 35 and 39, are endless belts 45 composed of flexible fabric, such as coarse wire-mesh, so that they need not impede the powder from dropping into the lower compartment 39. The belts 45 pass around rollers 46 and 47, and the conveying movement is imparted thereto by means of a suitable source of power, such as a pulley 48 driven by means of a belt 49 which is, in turn, driven from the main driving shaft 12. The roller 46 is journaled between suitable uprights 50 mounted in fixed relation to the main frame; and the roller 47 is journaled to the main frame 10. An offset constituting a trip 50 extends from a suitable support 52 and is adapted to engage the studs 29 of the grippers A to open the jaws 28, at the end of the stroke of the swinging frame 17, whereby the sheet is released and allowed to drop on to the belts 45.

As a means for heating the sheets to fuse the fusible powder into the ink, an elongated box C is employed. This box is heated to the required degree by any suitable heating agent, and it has wire-mesh endless-belts 53 extended longitudinally therethrough for slowly carrying the sheets through the fusion zone of the box. The sheets, as they are discharged from the belts 45, are fed on to the tilted table 54 and slide therefrom through an opening 55 into the heating receptacle C; within which they are received by the belts 53 and carried through the compartment. Movement is transmitted to the belts 53 by means of pulleys 57, 58 and a belt 59. I have only shown one end of the heating receptacle, as I believe that to suffice for illustrative purposes.

During the operation of this invention, the compartment 35 will be charged with a suitable fusible powder and, as soon as a sheet is printed in a conventional manner, it is intermittently grasped at its lower edge by the grippers and carried beneath the compartment 35 of the powderer. Meanwhile, the powderer automatically sprinkles powder on the sheet; this being done by the rearward movement of the resilient arms 26 which open the sliding door 36 by means of their trips 34. The sheet thus receives an abundant or excess coating of fusible powder on its printed surface. As soon as the sheet has been coated (and preferably just before it is released from the grippers), the rotating shaft 43 comes into effective action on the paper, whereby its paddles 44 strike and agitate the sheet, thereby causing its superfluous powder to slide off the non-tacky unprinted portions of the sheet and discharge into the lower compartment 39. The trip 51 then opens the jaws 28 of the grippers and allows the sheet to drop on to the belts 45, from whence it is automatically fed to the heating and fusion chamber. During its passage therethrough, the fusible powder which adheres to the tacky ink now melts and amalgamates with the ink, thereby producing raised printed matter.

The door 36 may be so timed in its movements as to either coat the entire sheet or only parts thereof when it is desirable to

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produce printed matter having parts composed of raised letters and parts flat embodying ordinary printing. All parts of the operation and improved method of production, however, require the employment of purely automatic mechanical means only, whereby the process is hastened, the cost of production is lowered, and operatives around the press are shielded from the deleterious effects of the powder and the fumes engendered thereby.

Without further analysis, the foregoing will so fully reveal the gist of this invention that others can by applying current knowledge readily adapt it for various applications without omitting certain features that, from the standpoint of the prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention, and therefore such adaptations should and are intended to be comprehended within the meaning and range of equivalency of the following claims.

Having thus revealed this invention, I claim as new and desire to secure the following combinations of elements, or equivalents thereof, by Letters Patent of the United States:—

1. An embossographer, combining a printing mechanism; a sheet carrier; a powderer for discharging a surplus quantity of fusible powder on the printing area of each one of a succession of sheets conveyed by said carrier; an instrumentality for automatically vibrating each of the powdered sheets to remove powder from non-inked portions thereof; and a heating device for automatically receiving each of the sheets and for subjecting them to a sufficient heat to cause the fusible powder to fuse on to and amalgamate with the inked portions of said sheets to form a raised surface thereover.

2. An embossographer, combining a carrier adapted to convey a train of separate sheets; a powderer for sprinkling fusible powder on each of said sheets; a tapper for vibrating superfluous powder free from non-inked portions of said sheets; and a heater for automatically receiving said train of sheets and fusing the powder heaped on the inked portions thereof.

3. A device for distributing fusible powder on to freshly printed sheets, combining an upper compartment having a bottom outlet; a spring-actuated means for controlling said outlet; mechanism for operating said means to govern the powder discharged through said outlet; a lower compartment for receiving superfluous powder discharged from said upper compartment, said compartments having a horizontal passageway between them; a tube leading from the lower compartment to the upper compartment; a pneumatic device for forcing powder through said tube and discharging it into the upper compartment; an agitator comprising a revoluble shaft having paddles; means for imparting movement to said paddles; means for feeding wet-printed sheets through said passageway and means for fusing the powder adhering to the inked portions.

4. A device for distributing superfluous fusible powder on to freshly printed sheets, combining swinging sheet-carrying grippers; means for actuating them; an endless sheet-carrying feed belt; means for actuating it; an agitator; means for agitating it; a container having a powder outlet; means for controlling the flow of powder through said outlet; a lower compartment for receiving unused powder, said compartments having a passageway between them; a pneumatic device for conveying powder from the lower to the upper compartment, said grippers being adapted to carry printed sheets through said passageway, whereby they may be powdered and said agitators being adapted to shake superfluous powder therefrom and means for fusing the powder adhering to the inked portions.

5. An apparatus for distributing powder on to the tacky surfaces of freshly-printed sheets, comprising an upper compartment having a discharge outlet; an endless feed belt; a reciprocating sheet-carrying gripper; an agitator for shaking a sheet carried by said gripper, whereby said sheet may be dusted and then agitated to remove the superfluous powder therefrom; and means for fusing the powder adhering to the inked portions: said apparatus being adapted to be combined with a printing press, whereby it may receive the output thereof.

6. An automatic apparatus for producing raised printing, combining a printing press; an automatic powder-applying mechanism; a sheet-carrier adapted automatically to convey a succession of separate freshly-printed sheets into effective relation with said mechanism, whereby it may automatically apply a superfluous quantity of fusible powder to the printed regions of said sheets; an instrumentality for effecting the removal of the powder from the non-inked portions of said sheets; and means for fusing the powder adhering to the inked portions.

7. An automatic apparatus for producing raised printing, combining a printing press; a mechanism for applying an excess quantity of fusible powder to the printed region of each one of a succession of sheets received from said printing press; automatic means for removing the powder from the non-inked portions of the sheets; a melter for fusing the powder remaining on the inked portions to form raised printing; and means for causing the sheets to be brought from

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said printing press successively to the action of said mechanism, said means and said melter.

8. An automatic apparatus for producing raised printing, combining means for applying an excess quantity of fusible powder throughout a printed region of each one of a succession of freshly-inked sheets of paper; means for automatically removing the powder from the non-inked portions of said sheets while leaving it heaped on the inked portions thereof; means adapted to subject said sheets to an elevated temperature to fuse the powder adhering to the inked portions, to form raised printing thereof; and means for causing said freshly-inked sheets of paper to be subjected successively to the action of said three above-mentioned means.

9. An automatic apparatus for producing raised printing, combining means for conveying separate freshly-inked and powdered sheets of paper; means for removing from said sheets the powder on the non-inked portions; a device for receiving the sheets from said first means and conveying them; and means automatically coöperating with said device to subject said sheets to a high temperature whereby the powder on the inked portions will be fused into the ink to form raised homogeneous printing.

10. A unitary apparatus for automatically producing raised printing, combining means for applying a fusible powder in excess quantity throughout the printed area of separate freshly-inked sheets of paper; vibratory mechanism for receiving said powdered sheets and for automatically removing the powder from the non-inked portions of said sheets while leaving it heaped on the inked portions; and automatic means adapted to receive said sheets and subject them temporarily to a relatively high temperature to fuse the powder adhering to the inked portions so as to form raised homogeneous printing; said means and mechanism being connected together to operate successively and automatically upon said sheets.

11. A unitary machine for making raised printing, combining a carrier for conveying a succession of sheets of paper with their freshly-printed areas exposed; a device adapted to automatically deposit a quantity of fusible powder on said areas during the transit of said sheets whereby the inked lines may retain a coating of said powder; means for receiving the superfluous powder freely separable from the non-adhesive non-inked portions of said sheets; and heating means adapted during the transit of said sheets to fuse the powder and cause it to amalgamate with the ink to form raised printing.

12. A unitary machine for making raised printing, combining a carrier for conveying a succession of sheets of paper with their freshly-printed areas exposed; a device adapted to automatically deposit a quantity of fusible powder on said areas during the transit of said sheets whereby the inked lines may retain a coating of said powder; vibratory mechanism for shaking the sheets to cause the excess powder to gravitate free from the non-inked portions thereof; means for receiving the superfluous powder freely separable from the non-adhesive non-inked portions of said sheets; and heating means adapted during the transit of said sheets to fuse the powder and cause it to amalgamate with the ink to form raised printing.

13. An automatic apparatus for producing raised printing combining a printing press, a conveyer adapted automatically to receive the sheets discharged therefrom, a device adapted immediately to receive the sheets from said conveyer and automatically to apply to said sheets microscopic particles of ink-absorbing powder, means for receiving the sheets from said device and removing therefrom the powder on the non-inked portions, and a melter automatically adapted to receive the sheets discharged from said means and to convey them through a region maintained at a sufficiently elevated temperature to fuse the powder into the ink and form raised printing.

14. An automatic apparatus for producing raised-printing combining means for applying an excess quantity of a readily fusible powder throughout the entire surface of freshly inked separate sheets of paper, means for automatically removing the powder from the non-inked portions of said sheets while leaving it heaped on the inked portions, and automatic means adapted to subject said sheets to a high-temperature treatment to fuse the powder adhering to the inked portions to form raised printing; said three means operating successively and automatically upon said sheets.

In testimony that, I claim the foregoing as my invention, I have signed my name in presence of two witnesses, this 31st day of March, 1913.

SAMUEL LIPSIUS.

Witnesses:
PAUL STACKLER,
CHRISTIAN T. OTT.