No. 637,581. Patented Nov. 21, 1899.

E. HETT.

APPARATUS FOR HANDLING LITHOGRAPHIC PRINTING TUBES.

(Application filed Jan. 31, 1898.)

(No Model.)

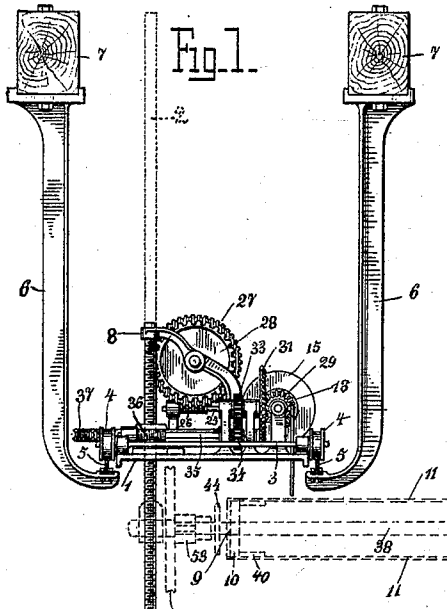


Fig. 1.

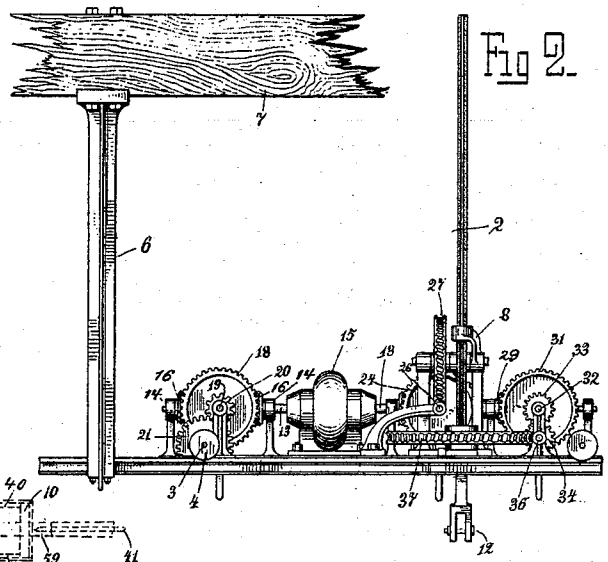


Fig. 2.

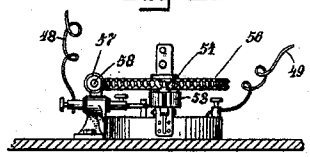


Fig. 5.

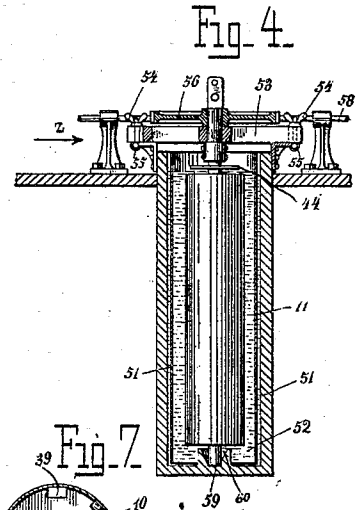
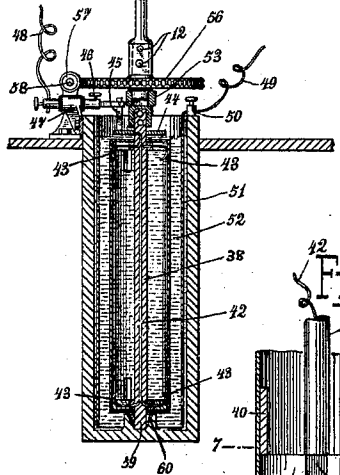


Fig. 4.



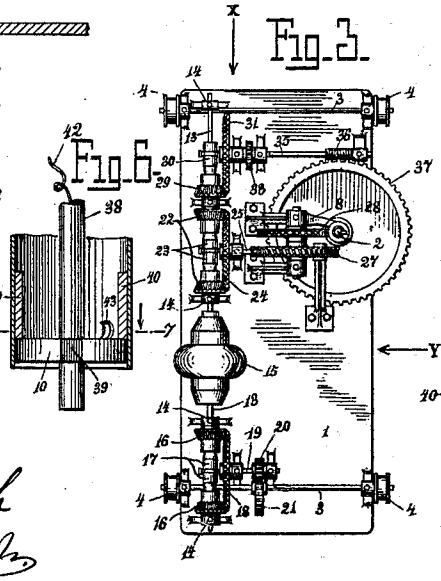


Fig. 3.

Fig. 6.

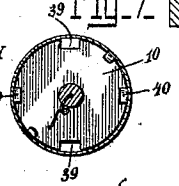


Fig. 7.

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APPARATUS FOR HANDLING LITHOGRAPHIC-PRINTING TUBES.

SPECIFICATION forming part of Letters Patent No. 637,581, dated November 21, 1899.

Application filed January 31, 1898. Serial No. 668,588. (No model.)

To all whom it may concern:

Be it known that I, EDWARD HETT, a citizen of the United States, and a resident of New York, (New Dorp,) in the county of Richmond, State of New York, have invented certain new and useful Improvements in Apparatus for Handling Lithographic-Printing Tubes, of which the following is a specification.

My invention relates to printing-tubes for lithographic surfaces, and particularly to devices for handling such tubes and for conveying them to and from electrolytic baths in which they receive electrically-deposited lithographic surfaces and for properly manipulating them in such baths, so that the electrically-deposited coating upon their surfaces shall be smooth, even, and of the same thickness throughout.

Its object is to provide mechanism for handling such printing-tubes by means of which they can easily, quickly, cheaply, securely, and with precision be carried to, be placed in, and be removed from such electrolytic baths and by means of which they can also be rotated during their insertion into and their removal from such baths and while they remain therein to prevent the electrical deposit from being irregular, uneven, or of different thicknesses upon different parts of the surface of such tubes, and to provide proper bearings for the tube-holders while in the baths, and a good electrical connection between the tubes and the rest of the circuit through the electrolytic bath.

It consists of the devices herein shown and described, and pointed out in the claims at the end of this specification.

Heretofore in forming an electrically-deposited metallic lithographic surface upon printing-tube cylinders to be used in lithographic presses it has been necessary to convey the tubes to and from the electrolytic bath and to insert them therein and withdraw them therefrom by hand. As such tubes are often large and heavy and are, moreover, delicate in construction and require careful handling, such work has heretofore necessarily been tedious and expensive and accidents to the tubes have not been infrequent. By means of my invention all this work is done by machinery. The tubes are handled easily, cheaply, quickly, and with safety and precision, and while remaining in or while being inserted into or removed from the baths the tubes are constantly rotated to prevent the deposit upon them of an irregular and uneven coating.

I will now proceed to describe the preferred form of my invention as shown in the drawings, in which similar reference characters in the different figures refer to corresponding parts.

Figure 1 is an end elevation of my improved device viewed as shown by the arrow *x* in Fig. 3, showing in full lines the printing-tube holder and printing-tube connected thereto and in position in an electrolytic bath, the tube-holder and bath being shown in vertical section. This figure also shows in dotted lines the tube-holder and the tube mounted thereon at right angles to the tube-holder rod as in the act of being connected to the latter or of being removed therefrom. Fig. 2 is a side elevation of the movable carriage viewed as shown by the arrow *y* in Fig. 3. Fig. 3 is a plan of the same. Fig. 4 is a vertical section through the electrolytic bath, showing a tube-holder and tube in position. Fig. 5 is an elevation of the upper part of the electrolytic bath viewed as shown by the arrow *z* in Fig. 4. Fig. 6 is a vertical section through the lower part of the tube-holder and printing-tube. Fig. 7 is a cross-section through the same on the line 7 7 of Fig. 6.

1 is a movable support or carriage, and 2 a tube-holder rod, by means of which the printing-tube holders and printing-tubes are handled, as will be hereinafter described. Carriage 1 is mounted upon axles 3 3, carrying wheels 4 4, which run upon rails 5 5. These rails are supported upon standards 6 6, secured to beams 7 7, which are supported in any suitable manner. The mechanism for driving the carriage along the rails will be presently described. Tube-holder rod 2 passes through an opening in standard 8 on the movable carriage and is adjustably secured to the carriage so as to be capable of upward and downward movement relative to the carriage and so as to be capable of a rotary movement in its bearings, as will be presently described.

9 is a tube-holder having shoulders 10 10,

adapted to receive and support a printing-tube 11. The printing-tube holder 9 and the tube-holder rod 2 are secured together by removable bolts 12 12. When a tube-holder is thus secured to a tube-holder rod and in the position shown by full lines in Fig. 1, the tube-holder and the tube that it carries can be moved to any suitable position over any electrolytic bath by the movement of the movable carriage along the rails 5, and they can then be lowered into the bath by the downward motion of tube-holder rod 2, and during this operation and while tube-holder and printing-tube are in the bath and while they are being removed therefrom a rotary motion is given to them by the rotation of tube-holder rod 2 by mechanism to be presently described.

The movement of carriage 1 in one direction or the other along rails 5 is accomplished by the following-described mechanism:

13 is a shaft mounted upon the carriage in bearings 14. It is preferably driven by an electric motor 15. Toward one end of this shaft are loosely mounted upon it two beveled gear-wheels 16 16, facing each other. Between them and also mounted on the shaft 13 is a compound clutch 17. This clutch may be of any ordinary construction and revolves with the shaft. By means of any well-known mechanism for the purpose it is adapted to be thrown over into connection with one of the beveled gear-wheels 16 or to be thrown in the other direction into connection with the other beveled gear-wheels 16, or to remain midway between the two gear-wheels and not in contact with either. When in the latter position, both of the beveled gear-wheels remain at rest. Whenever the clutch is thrown into engagement with one of them, that wheel rotates with the shaft.

18 is a large beveled gear-wheel meshing with both of the beveled gear-wheels 16. It is mounted upon shaft 19, which shaft also carries at its other end gear-wheel 20, the latter meshing with gear-wheel 21, mounted upon one of the axles 3 of carriage 1. Whenever clutch 17 is thrown into engagement with one of the beveled gear-wheels 16, gear-wheel 18 will rotate in a certain direction and carriage 1 will be moved in one direction along the rails; but when clutch 17 is thrown into engagement with the opposite beveled gear-wheel 16 beveled gear-wheel 18 will rotate in the reverse direction, moving the carriage the other way along rails 5. Thus by means of the mechanism operating the clutch 17 the operator is enabled to move the carriage 1 to any desired position upon rails 5.

The mechanism for raising or lowering tube-holder rod 2 is as follows: 22 22 form another set of two beveled gear-wheels loosely mounted upon shaft 13 and similarly controlled by compound clutch 23 and meshing with large beveled gear-wheel 24 upon shaft 25. The latter shaft carries at its other end worm 26, which meshes with large worm-wheel 27. Upon the same shaft upon which 27 is mounted is also secured a gear-wheel 28. Cut upon the surface of tube-holder rod 2 is a series of spur-teeth, each one completely encircling the rod. The spur-teeth of spur-wheel 28 mesh with the spur-teeth of rod 2, and as spur-wheel 28 rotates in one direction or the other rod 2 is raised or lowered. By operating clutch 23 so as to engage with one or the other of beveled gear-wheels 22 spur-wheel 28 is caused to rotate in one direction or the other, thus raising or lowering rod 2.

The mechanism for rotating tube-holder rod 2 is as follows: 29 is a beveled gear-wheel loosely mounted upon shaft 13. 30 is a clutch upon the same shaft and when thrown into engagement with beveled gear 29 causes that wheel to rotate with the shaft. Gear-wheel 29 meshes with beveled gear-wheel 31 on shaft 32. Upon this same shaft is secured gear-wheel 33, which meshes with gear-wheel 34 upon shaft 35. The latter shaft carries at its other end a worm 36, which meshes with a worm-wheel 37. Through the center of the worm-wheel 37 passes tube-holder rod 2, the rod and wheel being secured together by spline and feather, so as to cause rod 2 to rotate with worm-wheel 37, but to be free to slide up and downward through the said worm-wheel. Whenever clutch 30 is thrown into engagement with beveled gear-wheel 29 on shaft 13, worm-wheel 37 will revolve, carrying with it rod 2.

Tube-holder 9 is composed of a shaft 38, which carries at each end a cylindrical shoulder 10, upon which the printing-tube 11 is adapted to rest. Notches 39 39 are cut on opposite sides of these shoulders to receive projections 40 40 upon the inner surface of printing-tubes 11. When a printing-tube 11 is slipped upon the printing-tube holder, projections 40 40 are brought into alinement with notches 39 39, and after the tube has been slipped into position it is turned upon the printing-tube holder so as to bring the projections and notches into the relative position shown in Fig. 7, in which position the printing-tube is securely held upon the printing-tube holder even when the printing-tube holder and printing-tube are in a vertical position.

41 represents a pin in the end of a permanent shaft of a printing-tube holder in a lithographic press, such as is shown and described in my application for a patent, Serial No. 552,641, filed June 13, 1895, renewed July 12, 1898, Serial No. 685,764, for the purpose of making connection with shaft 38 of tube-holder 9 for a purpose presently to be described.

At the opposite end of shaft 38 two bolt-openings are left corresponding to similar openings in the lower end of tube-holder rod 2, through which bolts 12 12 can be passed to secure the tube-holder 9 and rod 2 firmly together. Through the center of shaft 38 I run a wire 42. At its lower end this wire runs

through shoulder 10 to the outer side and preferably bends slightly backward to form a spring-point 43. When tube 11 is placed on the tube-holder, the spring-points 43 press against the inner surface of the printing-tube and insure a good electrical connection at such points. I preferably also run branches of the wire to the other shoulder, ending in similar spring-points 43 43, as clearly shown in the section forming the lower part of Fig. 1. The upper part of the wire runs to a metallic plate 44, mounted upon shaft 38. When the tube-holder is in the bath, a spring or brush 45 presses against and makes electrical connection with plate 44. Spring 45 is secured to arm 46 and standard 47, with which one of the wires 48, forming part of the circuit through the electrolytic bath, is connected. The opposite wire 49 of this circuit is connected through post 50 with the hollow cylindrical zinc plate 51, immersed in the electrolytic bath.

52 represents the fluid of the electrolytic bath, which may be of any well-known composition.

53 is a wooden cross-bar secured to shaft 38 of the tube-holder, which is adapted when the tube-holder and printing-tube are in the bath to rest upon the upper surface of the cell of the bath to form a bearing for shaft 38.

54 54 are swinging screw-arms having ends pivoted at 55 in the framework of the electrolytic-bath cell. These swing up into notches in cross-bar 53. By tightening the screws cross-bar 53 and tube-holder 9 are firmly held in position in the cell, in which position the tube-holder is free to revolve, carrying with it in its rotation printing-tube 11.

56 is a large worm-wheel fixedly mounted upon shaft 38.

57 is a worm mounted upon shaft 58, adapted to be driven in any way for the purpose of rotating worm-wheel 56 and the tube-holder and printing-tube when disconnected from rod 2.

The axis 38 of tube-holder 9 projects at its lower end slightly below shoulder 10, as indicated by 59 in Fig. 1. When the tube-holder is in the bath, this end of the shaft fits into a corresponding bearing 60 in the lower part of the cell of the electrolytic bath. In this position the tube-holder has secure bearings at both ends.

The operation of my improved device is as follows: The printing-tube is first slipped over the shoulders 10 of tube-holder 9 while the latter is in the position shown in dotted lines in Fig. 1, with projections 40 of the printing-tube registering with notches 39 of shoulders 10. After the printing-tube is in position upon the tube-holder it is turned upon the tube-holder until projections 40 are in substantially the relative position shown in Fig. 7. Tube-holder 9 is then lowered, so as to hang vertically from the end of the tube-holder rod 2. The second bolt 12 is then put in, so as to hold it rigidly in a vertical position. Clutch 17 is thrown into engagement with the proper beveled gear-wheel 16, so as to cause carriage 1 to move along rails 5 in such a direction as to bring rod 2 and printing-tube holder 9 directly over the electrolytic bath into which it is desired to insert the printing-tube 11. Clutch 17 is then disengaged from gear-wheel 16. Clutch 23 is then thrown into engagement with that one of the beveled gear-wheels 22 which will cause gear-wheel 28 to rotate in such a direction as to force rod 2 downward. Before printing-tube 11 enters the bath clutch 30 is thrown into engagement with beveled gear 29, thus causing worm-wheel 37 to rotate rod 2. This rotation is kept up during the entire immersion in the bath and until printing-tube 11 has been entirely removed from the bath. The object of causing the rotation to begin before the immersion begins and to continue during the entire immersion is to cause the electrical coating deposited upon the surface of the printing-tube to be smooth, even, and of the same depth over the entire surface of the printing-tube and to prevent the coating from becoming irregular and thicker in some places than in others. After the printing-tube has been in the bath a sufficient length of time clutch 23 is thrown into engagement with the other beveled gear-wheel, whereupon rod 2 is raised until the printing-tube and printing-tube holder are removed entirely from the bath, when clutch 30 is thrown out of engagement from gear-wheel 39, thus stopping the rotation of rod 2 and printing-tube holder 9. When the tube-holder is at the proper height, clutch 23 is thrown into its middle position. Clutch 17 is then thrown into contact with the proper beveled gear-wheel 16 until carriage 1 is moved into the proper position for delivering the printing-tube—as, for instance, opposite the permanent shaft of a printing-tube holder in a lithographic press such as is shown and described in my said applications, Serial Nos. 522,641 and 685,764. One of the plates 12 is then removed and the printing-tube holder is swung up into a position at right angles with rod 2, as shown at dotted lines in Fig. 1. The printing-tube 11 is then removed from the printing-tube holder in any manner. As shown in my aforesaid applications, Serial Nos. 522,641 and 685,764, if it is desired to place it in position upon the press the permanent shaft of the tube-holder upon the press is made to engage with shaft 38 of tube-holder 9 by means of pin 41 in the manner shown and described in my said applications. Printing-tube 11 is then slipped off from printing-tube holder 9 onto the permanent shaft of the press and is then moved into position for printing in the press.

A number of electrolytic baths can, if desired, be employed, in that case the rails 5 being arranged to run over all of the baths. In case it should be desired to use the carriage 1 while a printing-tube remains in the

bath the tube-holder rod 2 can be disconnected from the tube-holder 9 by withdrawing bolts 12. In this case the rotation of the tube-holder in the bath is arranged for by means of a worm-wheel 53, mounted on shaft 38 of the tube-holder, which meshes with a worm 57 upon shaft 58. This shaft 58 can be driven in any manner, and where a series of electrolytic baths are used it could run to all of them, having a worm 57 at each bath for meshing with worm-wheel 56. In this way one carriage could be used with any number of electrolytic baths.

By my improved means printing-tubes are handled by machinery and are conveyed to and from electrolytic baths easily, quickly, cheaply, and with safety and precision. At the same time means are provided for rotating the printing-tubes at all times when any part of the surface of the tube is in contact with the liquid of the bath. Simple and efficient bearings are furnished for the printing-tube holder while in the bath, and good electrical connections are insured with the printing-tube.

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

1. The combination with an electrolytic bath of a tube-holder adapted to support a printing-tube while receiving an electrically-deposited coating in the electrolytic bath, having shoulders for supporting the printing-tube, a shaft upon which the shoulders are mounted, a conductor running through the shaft and adapted to bear against the printing-tube when in position, and having a connection with the electric circuit for operating the electrolytic bath, substantially as set forth.

2. The combination with an electrolytic bath of a tube-holder, adapted to support a printing-tube while receiving an electrically-deposited coating in the electrolytic bath, having shoulders for supporting the printing-tube, a shaft upon which the shoulders are mounted, a conductor running through the shaft and adapted to bear against the printing-tube when in position and having a connection with the electric circuit for operating the electrolytic bath, a worm-wheel upon the shaft of the tube-holder, a worm-shaft meshing with it and means for driving said worm-shaft, whereby the printing-tube will be revolved while in the bath, substantially as set forth.

3. The combination with a tube-holder, adapted to support a printing-tube while receiving an electrically-deposited coating in an electrolytic bath, having shoulders for supporting the printing-tube, a shaft upon which the shoulders are mounted, a conductor running through the shaft and adapted to bear against the printing-tube when in position, a plate at its upper end adapted to rest upon and be secured to the upper end of the cell to furnish a bearing for the upper end of the shaft of the tube-holder, and of a cell for an electrolytic bath having a bearing for the lower end of the shaft of the printing-tube holder, substantially as set forth.

4. The combination with a tube-holder, adapted to support a printing-tube while receiving an electrically-deposited coating in an electrolytic bath, having shoulders for supporting the printing-tube, a shaft upon which the shoulders are mounted, a conductor running through the shaft and adapted to bear against the printing-tube when in position, and a notched plate at its upper end, of a cell for an electrolytic bath having a bearing for the lower end of the shaft of the printing-tube holder and swinging screws and nuts adapted to fit into the notches of the notched plate and when tightened to form the upper bearing for the tube-holder shaft, substantially as set forth.

5. The combination with a support or carriage, a tube-holder rod adjustably secured thereto, means upon said carriage for lowering and raising the rod, and for rotating it, of a tube-holder, adapted to carry a printing-tube, removably secured to the lower end of said tube-holder rod and adapted to swing at right angles thereto, a shaft for said tube-holder having its lower end adapted to fit into a bearing therefor in the cell of an electrolytic bath and having a plate at its upper end adapted to rest upon and be secured to the upper end of the cell to furnish a bearing for the upper end of the shaft of the tube-holder rod, and a cell for an electrolytic bath whereby printing-tubes may be placed in or removed from electrolytic baths and may be rotated while in the bath and during their insertion and withdrawal, substantially as set forth.

6. The combination with a carriage, means for moving it, a tube-holder rod adjustably secured to said carriage, means upon said carriage for lowering and raising the rod, and for rotating it, of a tube-holder, adapted to carry a printing-tube, removably secured to the lower end of said tube-holder rod and adapted to swing at right angles thereto, a shaft for said tube-holder having its lower end adapted to fit into a bearing therefor in the cell of an electrolytic bath and having a plate at its upper end adapted to rest upon and be secured to the upper end of the cell to furnish a bearing for the upper end of the shaft of the tube-holder rod and a cell for an electrolytic bath whereby printing-tubes may be placed in or removed from electrolytic baths and may be rotated while in the bath and during their insertion and withdrawal, substantially as set forth.

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

EDWARD HETT.

Witnesses:
SIDNEY MANN,
EDWIN SEGER.