

June 22, 1937.

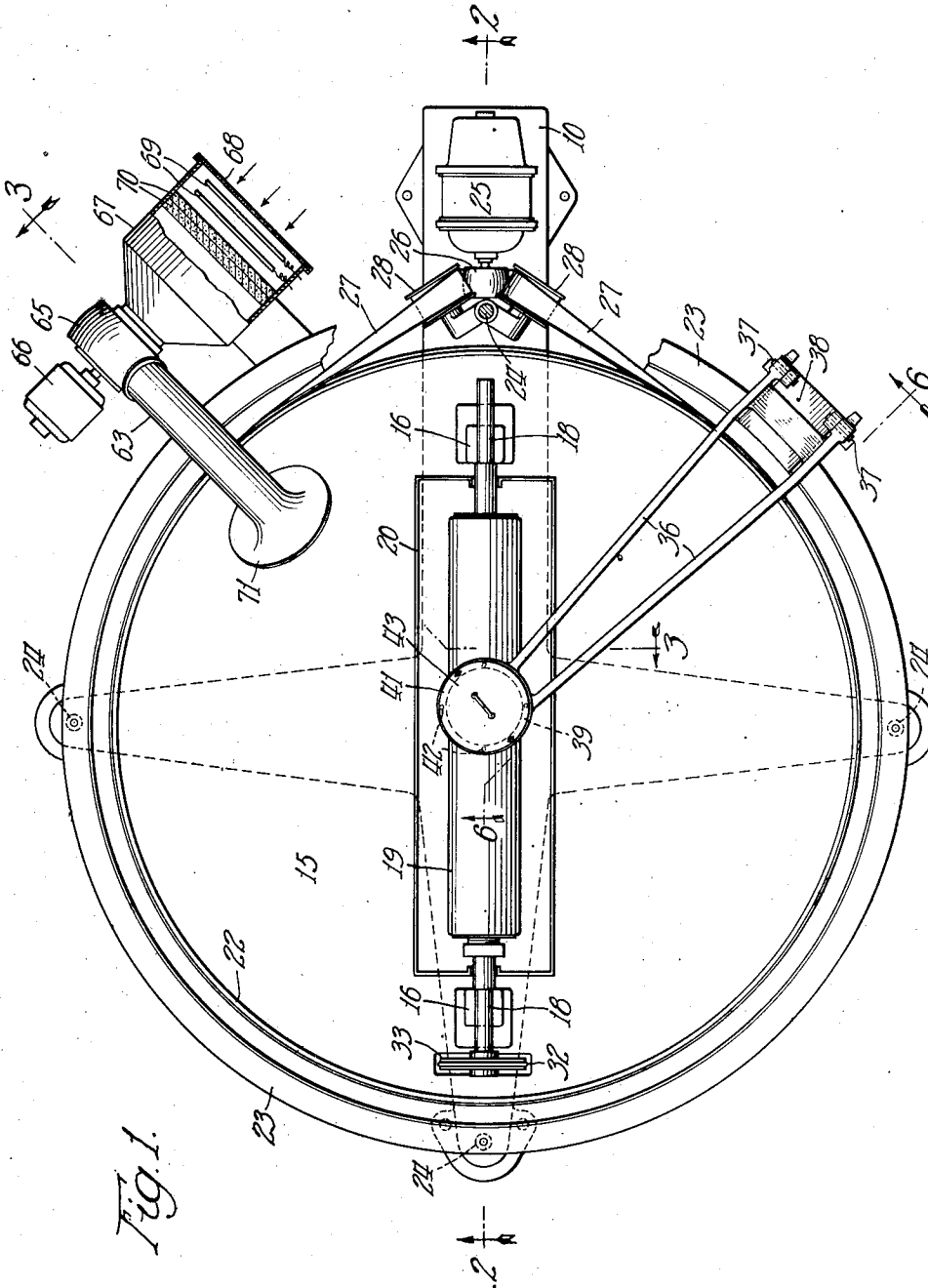
C. L. HENDERSON

2,084,642

APPARATUS FOR COATING PRINTING CYLINDERS

Filed Oct. 24, 1935

4 Sheets-Sheet 1



Inventor
Charles L. Henderson
By Fisher, Clapp, Soans & Pond, Attys.

June 22, 1937.

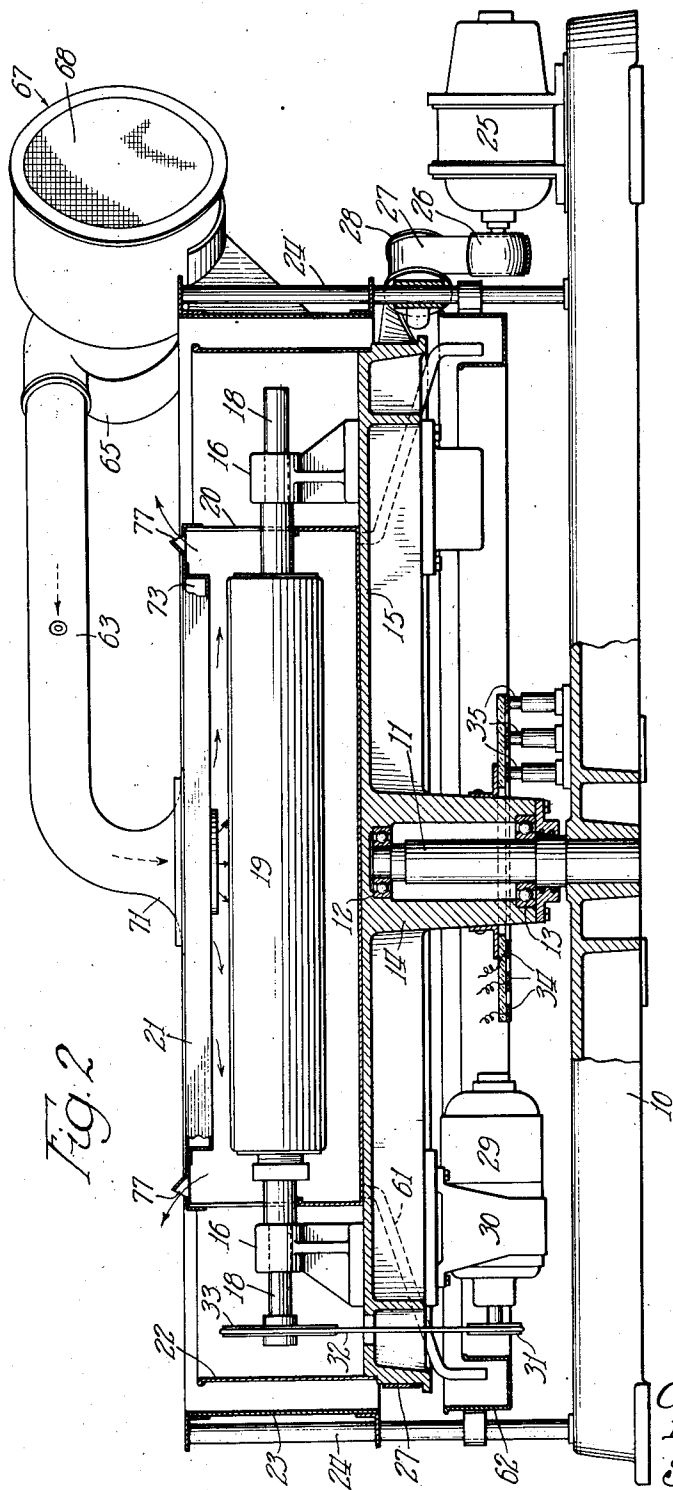
C. L. HENDERSON

2,084,642

APPARATUS FOR COATING PRINTING CYLINDERS

Filed Oct. 24, 1935

4 Sheets-Sheet 2



Inventor
Charles L. Henderson
By Fisher, Clapp,
Soums & Pond, Attys.

June 22, 1937.

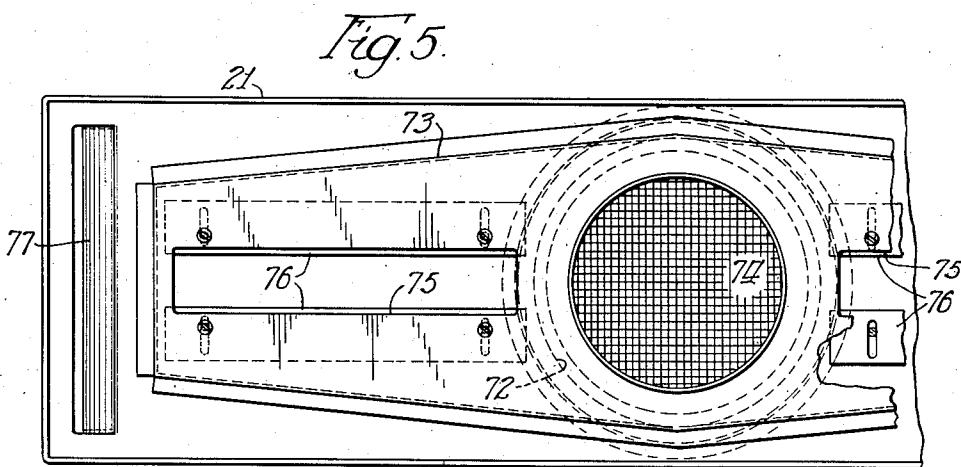
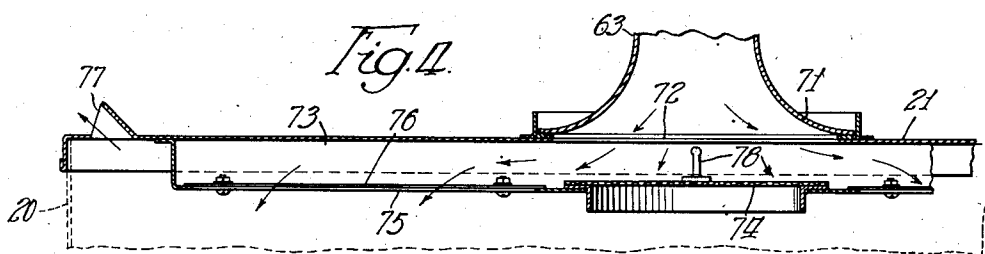
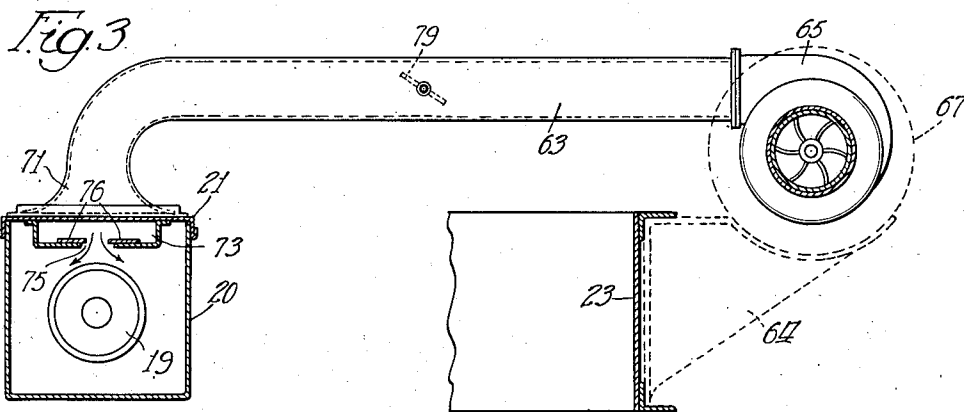
C. L. HENDERSON

2,084,642

APPARATUS FOR COATING PRINTING CYLINDERS

Filed Oct. 24, 1935

4 Sheets-Sheet 3



Inventor
Charles L. Henderson
By Fisher, Clapp, Soans & Pond Attys.

June 22, 1937.

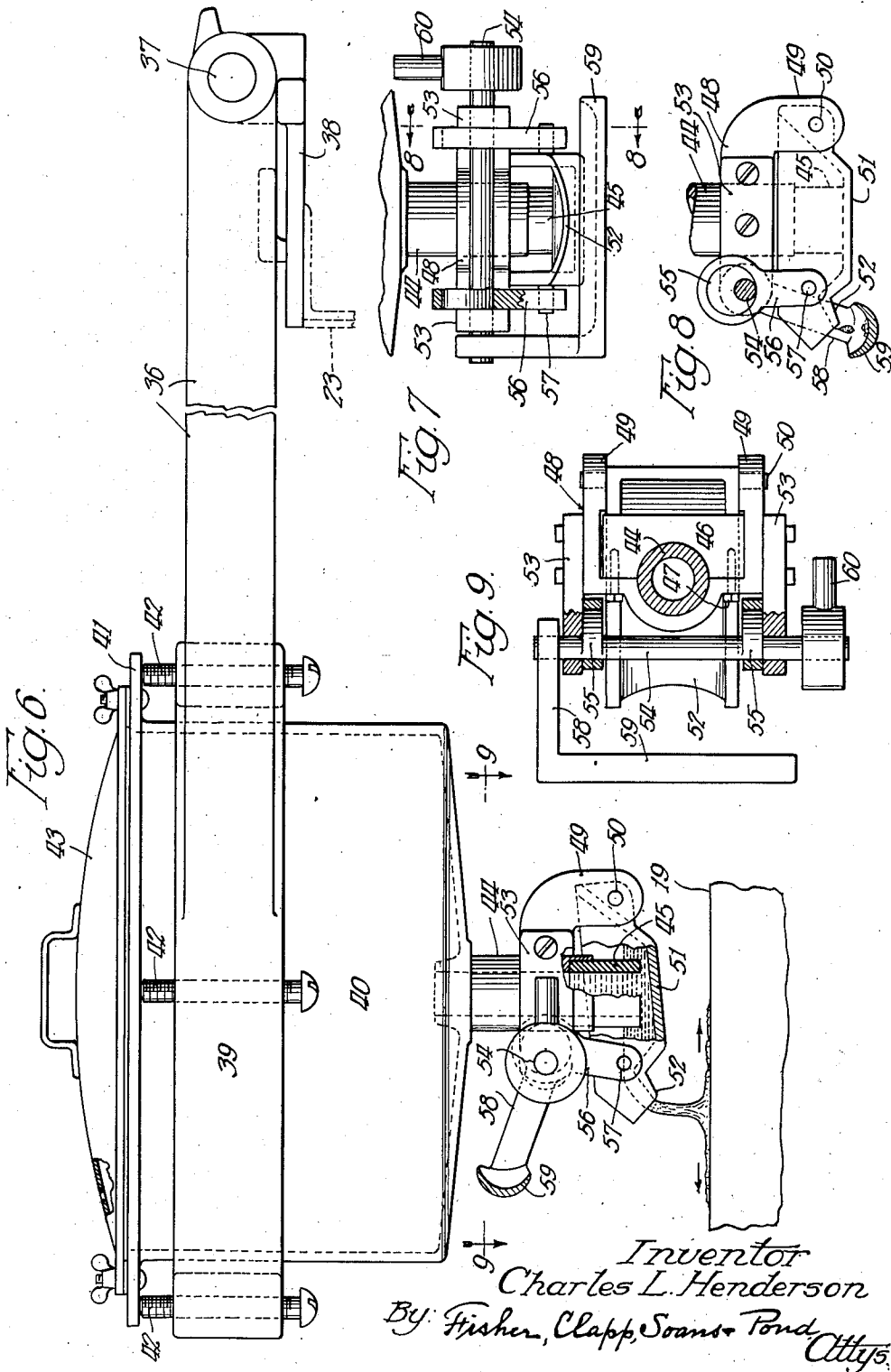
C. L. HENDERSON

2,084,642

APPARATUS FOR COATING PRINTING CYLINDERS

Filed Oct. 24, 1935

4 Sheets-Sheet 4



UNITED STATES PATENT OFFICE

2,084,642

APPARATUS FOR COATING PRINTING CYLINDERS

Charles L. Henderson, Appleton, Wis., assignor
to Paper Patents Company, Neenah, Wis., a
corporation of Wisconsin

Application October 24, 1935, Serial No. 46,506

14 Claims. (Cl. 91—42)

This invention relates to the general art of roto-
gravure printing, and has reference more par-
ticularly to the preparation of the printing cy-
linders used in that type of printing. In the prac-
tice of preparing such a printing cylinder with
the design or pattern in intaglio on the surface
thereof, a photographic or other positive of the
pattern or design is photographed on to a metal
cylinder to the surface of which has been applied
a sensitized coating solution that becomes insol-
uble in water after exposure to light and forms the
so-called "resist" that protects those parts of the
cylinder surface that are not to be etched when
the etching acid is later applied.

A uniform and even coating of these cylinders
with the sensitized resist solution has heretofore
been attempted, but, so far as I am aware, has
never been successfully accomplished, and the
general object of the present invention has been
to provide a new and improved apparatus for
coating printing cylinders of the type referred to
that will be practically successful and will con-
tribute materially to the production of intaglio
printing cylinders of superior quality and dura-
bility.

My invention is based upon the discovery that
an even and uniform coating of the printing cy-
linder may be accomplished simply by applying
the coating material to the printing cylinder and
then rotating the cylinder about its longitudinal
axis and also about a vertical axis generally per-
pendicular to the longitudinal axis during the pe-
riod when the coating is drying and becoming set.
The coating may be initially applied to the cy-
linder when the cylinder is rotating about its
longitudinal axis, as will hereinafter appear, and,
if desired, the cylinder may be subjected to flow
currents of heated air during the drying opera-
tion.

In the accompanying drawings I have illus-
trated a form of apparatus embodying the prin-
ciple above outlined, which in practice has dem-
onstrated the soundness of the principle and
given satisfactory results; and referring there-
to,

Fig. 1 is a top plan view of the apparatus, show-
ing the solution-pouring device in working posi-
tion, and the warm air applying device in idle po-
sition, and the cover of the cylinder housing re-
moved.

Fig. 2 is a vertical transverse section of the
same on line 2—2 of Fig. 1, but showing the warm
air applying device in working position.

Fig. 3 is an enlarged fragmentary section on
the line 3—3 of Fig. 1.

Fig. 4 is an enlarged fragmentary vertical sec-
tion lengthwise of an air distributing duct on the
under side of the cover of the cylinder housing.

Fig. 5 is a bottom plan view of Fig. 4.

Fig. 6 is an enlarged side elevation of the solu-
tion container in pouring position and its sup-
porting arm (broken out) on line 6—6 of Figure
1.

Fig. 7 is a front elevation of the spout, valve
and drip catcher of the solution container, show-
ing the valve closed and the drip catcher in op-
erative position.

Fig. 8 is a vertical section on the line 8—8
of Fig. 7.

Fig. 9 is a plan section on the line 9—9 of
Fig. 6.

In the drawings, 10 designates a hollow cast
iron base in which is mounted a fixed vertical
post 11. Rotatably mounted on post 11 by up-
per and lower anti-friction bearings 12 and 13 is
the hub 14 of a revoluble circular table 15. On
the table 15 are open bearings 16 which receive
and journal the ends of the cylinder shaft 18.
19 designates the body of the cylinder, which is
disposed within a stainless steel rectangular
housing 20, the end walls of which are vertically
slotted to admit the shaft ends. The housing 20
has an open top, but after the cylinder is in-
stalled the housing is closed by a removable
cover 21 for the subsequent coating and drying
operations, as more fully explained later. The
periphery of the table 15 is also preferably
equipped with an anti-splash guard rim 22, and
this, in turn, is encircled by a stationary ring 23
supported by posts 24 from the base 10.

The table 15 is revolved by a variable speed
electric motor 25 mounted on one end of the base
10, the motor shaft carrying a pulley 26 that
drives a belt 27 encircling the periphery of table
15 and trained over idler guide pulleys 28. The
cylinder 19 is revolved on its longitudinal axis
by a geared electric motor 29 suspended from
the under side of table 15, the gear part of the
motor being represented by 30. The shaft of
motor 29 carries a pulley 31 which, through a
belt 32, drives a pulley 33 removably keyed to the
cylinder shaft 18. Collector rings 34 for bring-
ing the current to the motor are fastened to and
revolve with the table hub 14, and contact brushes
35 are mounted on the base 10.

One arrangement for applying the coating so-
lution to the cylinder 19 is shown in Figs. 1, 6,
7, 8 and 9, wherein 36 designates an arm that
is hinged at 37 to a bracket 38 mounted on the
ring 23 and is disposed radially of the table 15.

The inner end portion of arm 36 is formed as a ring 39 that forms a holder for the solution container vessel 40, which latter has a flange 41 at its upper end that rests on vertical adjusting screws 42 mounted in the ring 39. The vessel 40 is equipped with a cover 43, and centrally of its bottom wall is a tubular neck 44 in the lower end of which is secured a short rubber hose section 45. Clamped on the neck 44 by a block 46 and screws 47 (Fig. 9) is a yoke-shaped bracket 48, the rear ends of the arms of which are turned downwardly as shown at 49, and in and between the down-turned ends 49 is a pin 50 on which is pivoted the rear end of a pan 51 that underlies the hose section 45 and forms in effect a valve to open and close the said hose section. The front end of pan 51 is formed as a spout 52. To the outer sides of the yoke arms are secured forwardly projecting arms 53 in the front ends of which is journaled a rock shaft 54, fast on which are a pair of eccentrics 55. Links 56 mounted on and depending from said eccentrics are pivotally connected at 57 to the sides of the pan 51. Also keyed on one end of the rock shaft 54 is an arm 58 carrying on its free end a drip catcher 59 which, in the raised cut off position of the valve 51 underlies the spout 52 as shown in Figs. 7 and 8, and, in the lowered open position of the valve 51 is raised out of the way of the spout, as shown in Fig. 6. Fast on the other end of the shaft 54 is an operating handle 60.

When the coating solution is to be applied to the cylinder 19, the long arm 36 carrying the solution container 40 is lowered to horizontal position, as shown in Fig. 6, and, the table and cylinder motors having been started, by the handle 60 the valve 51 is opened as shown in Fig. 6, the drip catcher being simultaneously elevated out of the way, and the solution flows in a steady uniform stream onto the top surface of the cylinder 19. Since the cylinder is undergoing rapid revolution both on its own longitudinal axis and sidewise in a horizontal plane, the coating is uniformly distributed over the entire surface of the cylinder. Excess solution that falls from the cylinder is caught on the bottom of the housing 20 and flows through drain pipes 61 to an underlying gutter 62 mounted on the posts 24, whence it runs to the sewer. At the end of the coating operation, the operating handle 60 is swung in the reverse direction, and this closes the valve 51 and at the same time swings the drip catcher 59 down beneath the spout 52 as shown in Fig. 8, so as to prevent the deposit of surplus drops on the surface of the cylinder.

The solution-applying device is then swung upwardly out of the way, or it may be bodily removed, and the drying device is next brought into operation. This device is shown in Figs. 1, 2, 3, 4 and 5, wherein 63 designates a tubular arm connected to the discharge side of an air blower filter and heater unit that is mounted on a bracket 64 that may also be secured to the stationary ring 23. In Fig. 1 the blower is indicated at 65, the motor at 66, and the filter casing at 67, the blower 65 being pivotally mounted on the neck of the casing 67. This latter carries a fine mesh screen 68 at its air intake end, one or more electric heaters 69 behind the screen 68, and a body of filter cloth 70 behind the heater 69. It is very important to protect the coating solution from contamination by dust in the operating room, and it is

for this reason that the blower is equipped with means for screening out any dust in the air. The tubular arm 63, like the arm 36, is disposed radially of the table 15, and its inner end is given a funnel formation 71 which, in the lowered position of the arm 63 shown in Figs. 2, 3 and 4, registers with a central opening 72 (Fig. 4) in the cover 21. To the under side of the cover 21 is attached an air distributing duct 73 that lies above and lengthwise of the cylinder 19. In the central portion of the bottom wall of this duct is a removable fine screen 74 directly beneath the discharge mouth of the tube 63, which screen is put in place after the solution applying device has been raised; and on either side thereof is a slot 75 that extends substantially to the end of the duct. The width of each slot may be adjusted to vary the amount of heated air flowing onto the surface of the coated cylinder by means of adjustable strips 76 movable toward and from each other by the means clearly indicated in Fig. 5. In the top wall of the cover 21 beyond the ends of the duct 73 are air escape ports 77. To the frame of the screen 74 may be attached a vertical handle 78 (Fig. 4) by which, screen 74 may be placed into position or removed.

During the application of the warm air to dry the cylinder, the cylinder motor 29 and the table motor 25 are kept in operation so that all parts of the surface of the cylinder are uniformly subjected to the action of the heated air. When the cylinder coating has been sufficiently dried, the arm 63 is swung upwardly out of the way, the cover 21 is removed, the cylinder taken out, and an uncoated cylinder inserted in its place.

Briefly summarizing the operation, a cylinder is first prepared for coating by smoothing its surface and removing all traces of oxidization or other imperfections and is then placed immediately, while still wet, in the coating machine. Cover 21 is put in place and both motors started. The roll is then kept wet with a hose up to a few seconds before the coating is applied to insure a uniform condition of the roll surface. The coating is then applied and the coating solution container removed. Screen 74 is then dropped in place and the drying air applied until the coating is dry. It is imperative that the roll continue to operate uninterruptedly about both axes from the time the motors are first started until the resist is dry.

From the foregoing it will be seen that the described apparatus enables the cylinder to be first coated and then dried in situ, which is the only way a coating can be successfully applied. To secure the most perfect results it is, of course, necessary to secure a correct coordination of the speed of rotation of the table, the speed of rotation of the cylinder, and the volume of the warm air supplied during the drying operation, for which latter purpose the tubular arm 63 may be equipped with a shutter or damper 79. The temperature of the warm air also requires to be nicely regulated; and this may easily be done by regulating the current which supplies the heaters 69.

I have herein shown and described a form of apparatus which I have found by test satisfactorily effectuates the stated purposes and objects of the invention, but manifestly the structural details of this apparatus may be widely varied within the scope of the invention as defined in the claims.

I claim:

1. In an apparatus for coating printing cylinders with a sensitized resist solution, the combination of a revoluble table mounted on a vertical axis, means for rotating said table, means for supporting a horizontal cylinder rotatably on said table, means for pouring the coating solution on said cylinder as said table rotates, and means for rotating said cylinder on its longitudinal axis during the pouring operation.
2. In an apparatus for coating printing cylinders with a sensitized resist solution, the combination of a revoluble table mounted on a vertical axis, means for rotating said table, bearings on said table to receive the shaft of a horizontal cylinder, means for pouring the coating solution on the center of said cylinder as said table rotates, and means for rotating said cylinder on its longitudinal axis during the pouring operation.
3. In an apparatus for coating printing cylinders with a sensitized resist solution, the combination of a revoluble table mounted on a vertical axis, means for rotating said table, bearings on said table to receive the shaft of a horizontal cylinder, means for applying the coating solution to said cylinder, means for rotating said cylinder on its longitudinal axis during the applying operation, and means for subjecting the coated surface of the cylinder, while still revolving about both its vertical and horizontal axes, to a current of heated air.
4. In an apparatus for coating printing cylinders with a sensitized resist solution, the combination of a revoluble table mounted on a vertical axis, means for rotating said table, bearings on said table to receive the shaft of a horizontal cylinder, means for pouring the coating solution on the center of said cylinder as said table rotates, means for rotating said cylinder on its longitudinal axis during the pouring operation, and means for flowing a current of heated air onto the coated cylinder while the latter is rotating on its longitudinal and vertical axes.
5. In an apparatus for coating printing cylinders with a sensitized resist solution, the combination of a revoluble table mounted on a vertical axis, means for rotating said table, means for supporting a horizontal cylinder rotatably on said table, a motor on said table mechanically connected to the shaft of said cylinder for rotating the latter as said table revolves, and means for applying the coating solution to said cylinder during the rotating movements of said table and cylinder.
6. In a cylinder coating apparatus of the character described, the combination of a revoluble table mounted on a vertical axis, means for rotating said table, means for supporting a horizontal cylinder rotatably on said table, a motor on said table geared to the shaft of said cylinder for rotating the latter as said table revolves, means for pouring a coating solution on the center of said cylinder during the rotating movements of said table and cylinder, and means for flowing a current of heated filtered air onto the coated cylinder while the latter is rotating on its longitudinal and vertical axes.
7. In a cylinder coating apparatus of the character described, the combination of a revoluble table mounted on a vertical axis, means for rotating said table, means for supporting a horizontal cylinder rotatably on said table, means for rotating said cylinder on its longitudinal

axis, an arm disposed above and radially of said table and horizontally hinged at its outer end, and a solution container mounted on the inner end of said arm, said container having a spout located directly above the center of said cylinder in the lowered position of said arm.

8. In a cylinder coating apparatus of the character described, the combination of a revoluble table mounted on a vertical axis, means for rotating said table, means for supporting a horizontal cylinder rotatably on said table, means for rotating said cylinder on its longitudinal axis, an arm disposed above and radially of said table and horizontally hinged at its outer end, a solution container mounted on the inner end of said arm, said container having a hinged valve formed with a spout located directly above the center of the cylinder when said arm is lowered and said valve is opened, and means for opening and closing said valve.

9. In a cylinder coating apparatus of the character described, the combination of a revoluble table mounted on a vertical axis, means for rotating said table, means for supporting a horizontal cylinder rotatably on said table, means for rotating said cylinder on its longitudinal axis, an arm disposed above and radially of said table and horizontally hinged at its outer end, a solution container mounted on the inner end of said arm, said container having a hinged valve formed with a spout located directly above the center of the cylinder when said arm is lowered and said valve is opened, means for opening and closing said valve, and a drip catcher associated with said valve and spout in a manner to move beneath said spout when said valve is closed and out from beneath said spout when said valve is opened.

10. In a cylinder coating apparatus of the character described, the combination of a table, means for supporting a cylinder on said table, means for applying a coating solution uniformly to the surfaces of said cylinder, and means for drying said coating solution on the surface of the cylinder comprising an open-top housing surrounding the body portion of the cylinder, a removable cover on said housing formed on its under side with an air distributing duct extending lengthwise of the cylinder above the latter and having a longitudinal slot in its bottom wall, and means for supplying heated air to said duct.

11. In a cylinder coating apparatus of the character described, the combination of a table, means for supporting a cylinder on said table, means for applying a coating solution uniformly to the surface of said cylinder, and means for drying said coating solution on the surface of the cylinder comprising an open-top housing surrounding the body portion of the cylinder, a removable cover on said housing formed on its under side with an air distributing duct extending lengthwise of the cylinder above the latter and having a longitudinal slot in its bottom wall, said cover having air escape ports beyond the ends of said ducts, means for adjusting the width of said slot, and means for supplying heated air to said duct.

12. In a cylinder coating apparatus of the character described, the combination of a table, means for supporting a cylinder on said table, means for applying a coating solution uniformly to the surface of said cylinder, and means for drying said coating solution on the surface of the cylinder comprising an open-top housing surrounding the body portion of the cylinder, a cover

on said housing formed on its under side with an air distributing duct extending lengthwise of the cylinder above the latter and having longitudinal slots in its bottom wall, a tubular arm disposed above and radially of said table and horizontally hinged at its outer end, the inner end of said arm in its lowered position registering with a hole in said cover and communicating with said duct, and means for supplying a current of heated air to the outer end of said arm.

10 13. In a cylinder coating apparatus of the character described, the combination of a table, means for supporting a cylinder on said table, means for applying a coating solution uniformly to the surface of said cylinder, and means for drying said coating solution on the surface of the cylinder comprising an open-top housing surrounding the body portion of the cylinder, a cover on said housing formed on its under side with an

15 20 air distributing duct extending lengthwise of the

cylinder above the latter and having longitudinal slots in its bottom wall, said cover having air escape ports beyond the ends of said ducts, means for adjusting the width of said slots, a tubular arm disposed above and radially of said table and horizontally hinged at its outer end, the inner end of said arm in its lowered position registering with a hole in said cover and communicating with said duct, and a blower and air filter communicating with the outer end of said arm.

14. In an apparatus for coating printing cylinders with a sensitized resist solution, the combination of a revoluble table mounted on a vertical axis, means for rotating said table, means for supporting a horizontal cylinder rotatably on said table, means for applying the coating solution to said cylinder, and means for rotating said cylinder on its longitudinal axis during the applying operation.

CHARLES L. HENDERSON.