

May 5, 1931.

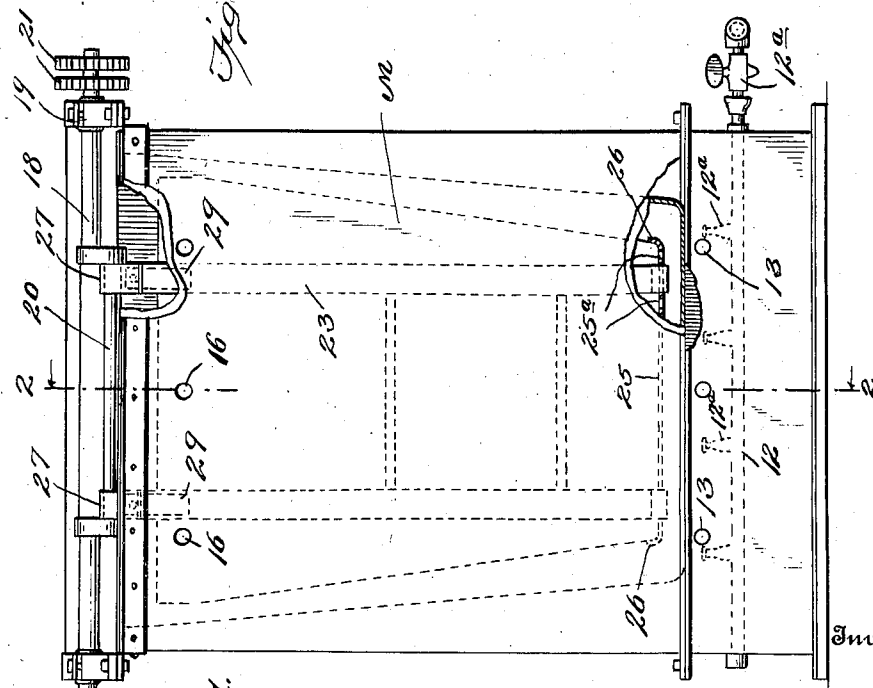
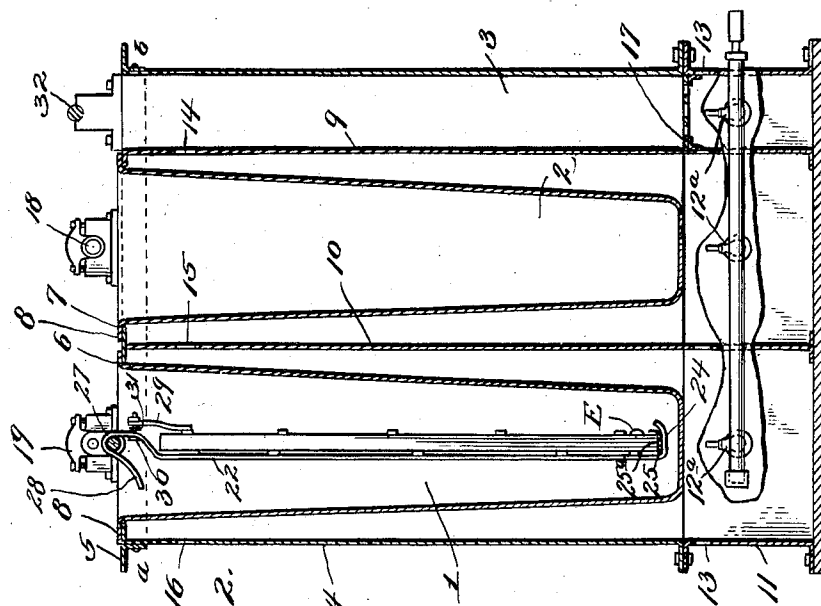
H. R. FREUND

1,804,331

METHOD OF CLEANING MAGAZINES AND MATRICES

Filed Nov. 22, 1928

2 Sheets-Sheet 1



Inventor

Herman R. Freund

By

James L. Patton

Attorney

May 5, 1931.

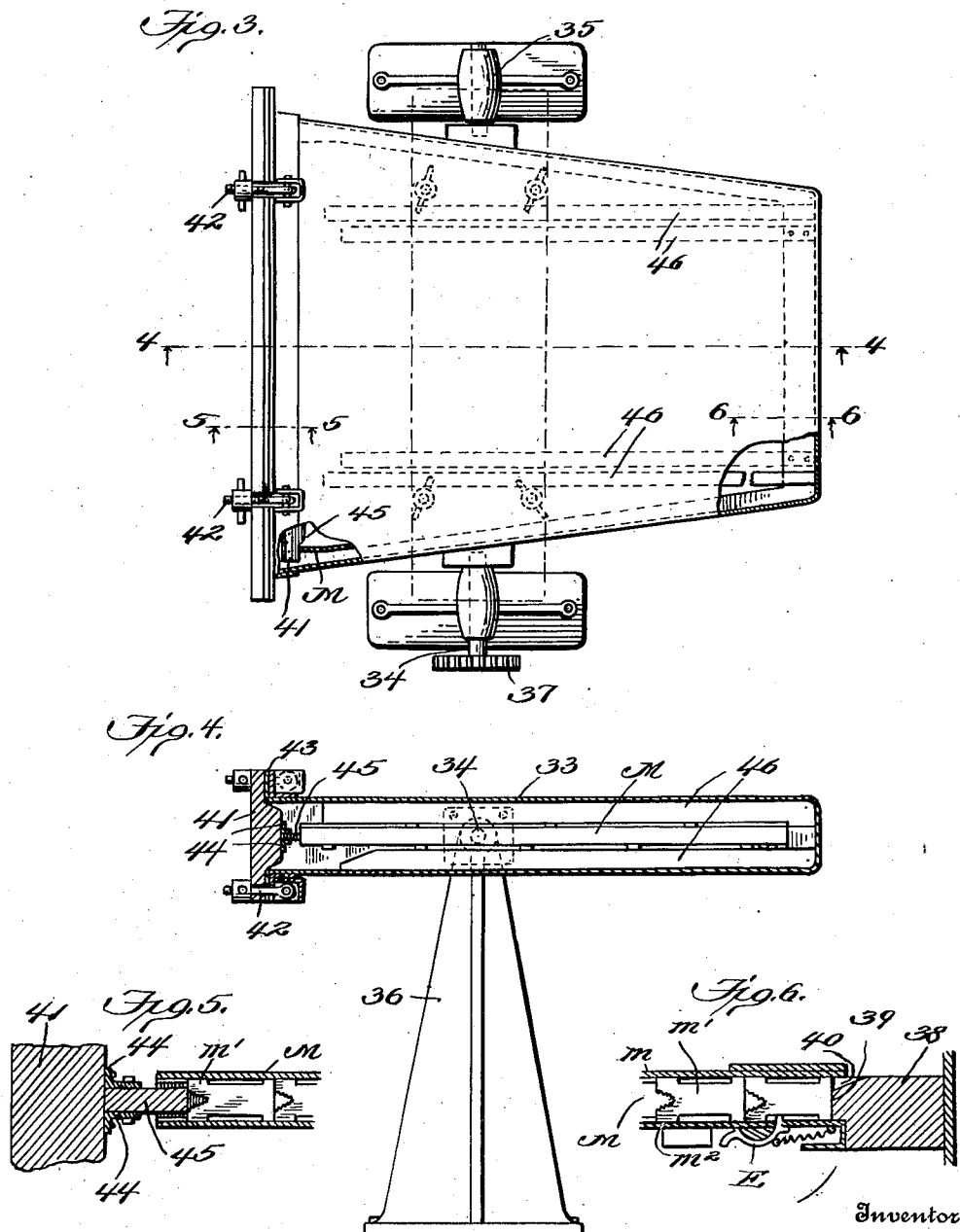
H. R. FREUND

1,804,331

METHOD OF CLEANING MAGAZINES AND MATRICES

Filed Nov. 22, 1928

2 Sheets-Sheet 2



By

James L. Norris
Attorney

UNITED STATES PATENT OFFICE

HERMAN R. FREUND, OF BROOKLYN, NEW YORK, ASSIGNOR TO INTERTYPE CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

METHOD OF CLEANING MAGAZINES AND MATRICES

Application filed November 22, 1928. Serial No. 321,146.

The present invention relates to improvements in the method of removing dirt or other foreign substances and tarnish and for otherwise cleaning matrices and the matrix-guiding channels in matrix magazines of the kind commonly used in line casting machines of the general class shown and described in Letters Patent No. 436,532 granted September 16, 1890 to O. Mergenthaler.

Experience has shown that the matrices and also the guiding channels therefor within the magazines of machines of this class accumulate dirt, grease and other foreign matter and also become tarnished or corroded incident to the use of such machines, and such accumulations of foreign matter and tarnish tend to clog or to offer undue frictional resistance to the descent of the matrices by gravity through the magazines which are usually inclined downwardly and forwardly to their matrix delivery end, and hence the matrices and also the guiding channels therefor within the magazine require cleaning periodically to remove such accumulations and tarnish in order to insure smooth or uninterrupted passage of the matrices through the magazine and to effect prompt and certain delivery of the matrices therefrom under control of the usual keyboard-actuated escapements.

It has been a common practice, prior to the present invention, to clean the matrices by removing them from their magazines and placing them in a machine which subjected them to the action of a liquid cleaner or to the abrasive action of brushes, felt or rubber, and to clean the magazines by passing a specially designed brush up and down through the matrix guiding channels therein while the matrices are removed therefrom, but such cleaning methods have not been entirely satisfactory, because of the great amount of work required in removing the matrices from the magazine and replacing them therein, which was rendered necessary by such methods, the inability of such methods to thoroughly clean the matrices and magazines, especially the matrix channels in the magazines which tend to accumulate dirt, grease, tarnish and other obstructing matter at the

intervals in their length corresponding with the positions of the matrices when they are at rest therein, and because of other reasons.

The present invention provides a novel and improved method whereby the matrices and the magazines may be cleaned thoroughly and simultaneously and while the matrices are contained in their magazines, thus avoiding the necessity of removing the matrices from their magazines and replacing them therein and thereby saving much time and labor.

In the accompanying drawings:—

Fig. 1 is a side elevation of an apparatus embodying the present invention and suitable for use in carrying out the improved cleaning method, portions of the apparatus in this figure being shown broken away to illustrate certain details of its interior construction;

Fig. 2 represents a vertical section taken through the apparatus shown in Fig. 1 on the line 2—2 therein and looking in the direction of the arrows, certain parts being shown in elevation;

Fig. 3 is a top plan view, partly broken away, of another form of apparatus adapted to be used in carrying out the present invention;

Fig. 4 represents a vertical section taken on the line 4—4 in Fig. 3 and looking in the direction of the arrows therein;

Fig. 5 represents a section on an enlarged scale, taken on the line 5—5 of Fig. 3 and looking in the direction of the arrows; and

Fig. 6 represents a section on an enlarged scale, taken on the line 6—6 of Fig. 3 and looking in the direction of the arrows.

Similar parts are designated by the same reference characters in the different figures of the drawings.

In these drawings, M represents a matrix magazine of the kind commonly used in machines of the class hereinbefore referred to, these magazines being usually composed of opposed plates m of metal, usually brass, which are spaced apart a distance equal to the width of the bodies of the brass or metal matrices m^1 and are formed on their inner sides with grooves in which the lugs m^2 on

the four corners of the matrices slide or travel, the magazines being usually located in the machine so that they are inclined in a forward and downward direction so that the matrices will travel by gravity from the upper to the lower delivery end of the magazine, and the delivery of the matrices at the lower end of the magazine and from the respective matrix-guiding channels therein is controlled by an escapement E one of which is provided for each matrix-guiding channel, as is well understood by those skilled in this art.

It will also be understood that in magazines of this class containing a full supply of matrices, the opposite or upper and lower ends of the magazine are open so that passageways are formed throughout the length of the magazine in the spaces between or not occupied by the rows of matrices therein.

The apparatus shown in Figs. 1 and 2 comprises a cleaning solution tank 1, a washing tank 2 and a drying tank or compartment 3, each of these tanks being of a size and shape to receive a matrix magazine of the usual or standard construction when suspended or supported vertically therein. These tanks may be mounted or arranged separately, but they are preferably combined in a unit which comprises a casing 4 which encloses them, the casing being composed of sheet metal or other suitable material and having a top member 5 having openings 6 and 7 therein through which the tanks 1 and 2 may be introduced, these tanks being supported on the top member 5 by flanges 8 which project outwardly from their upper ends and rest on the top member 5. The drying tank or compartment 3 may be formed as a part of the space enclosed by the casing 4, it being divided off from the remainder of the space within said casing by a vertical partition 9, and the tanks 1 and 2 are also preferably contained in separate compartments within the casing 4, these compartments being separated by a vertical partition 10 which extends across the interior of the casing 4.

The casing 4 preferably rests on and is attached to a base 11 which provides combustion chambers for gas or other suitable burners 12, one of these burners being arranged beneath each of the tanks 1, 2 and 3 so as to supply heat thereto, and each of the burners may be provided with an individual gas or fuel control cock 12^a to regulate the temperature in each tank. The base is provided with openings 13 therein to admit air to the burners to support combustion and to set up a circulation of heat within the compartments in the casing 4, the partitions 9 and 10 having openings 14 and 15 therein which establish communication between the compartments for the circulation of heated air or gases between the compartments, and the upper portion of the outer

wall of the casing 4 is provided with suitably arranged openings 16 for the escape of products of combustion.

One of the tanks, for example the tank 1, is adapted to contain any suitable well known cleaning solution such as chromic acid and water, soda and water or a benzol or other hydrocarbon liquid, and another of the tanks, for example the tank 2 is adapted to contain a washing liquid which may consist of clear water, the liquids in these tanks being heated preferably to boiling temperature to effect thorough and efficient cleaning and washing of the magazines and the matrices therein by heat produced by their burners, and the remaining burner serves to heat the drying tank or compartment 3 to effect drying of a magazine and matrices therein when placed in such tank or compartment, the bottom of the latter being preferably separated from the burner chamber by a perforated plate or a similar grid 17.

The tanks 1 and 2, containing the cleaning and washing liquids respectively, are provided with means to suspend therein a magazine containing matrices and to cause the cleaning or washing solution to flow relatively to the magazine and the matrices therein, in a direction longitudinally of the magazine. As shown in this embodiment of the invention, such means comprises shafts 18 one of which extends across the top of each of the tanks 1 and 2 and is journaled at its ends in bearings 19 which are mounted on the top member 5, the intermediate portion of the shaft in each instance being provided with a crank or eccentric part 20, and an end of each shaft 18 being provided with a sprocket wheel 21 which may be connected by a sprocket chain to an electric motor or other means for revolving these shafts continuously and at a relatively slow speed. A rack or frame 22 is provided to hold each magazine while it is suspended in one or another of the tanks 1, 2 or 3, this rack comprising vertical strips 23 of metal or other suitable material which are adapted to lie vertically against one flat side of the magazine, the lower ends of these strips being bent laterally as at 24 to support a bar or strip 25 which overlies them and is adapted to extend beneath the lower end of a magazine to support the latter and also prevent the escape of any matrices which might be accidentally released by their escapements, the ends of this strip 25 being preferably upturned as at 26 to engage the opposite edges of the magazine and thus center the magazine edgewise on the rack 22 and prevent its displacement therefrom, and the intermediate portion of the strip 25 being provided with a suitable number of perforations 25^a through which the cleaning or washing liquid may flow freely into and out of the lower end of the magazine. The upper ends of the strips 23 of the rack are bent over to form

hooks 27 which are adapted to be fitted over and to hang upon the crank or eccentric part 20 of one or the other of the shafts 18, and the free end of this hook is extended to form a handle 28 by means of which the rack and a magazine thereon may be lowered into a tank or lifted therefrom. A catch 29 is preferably provided on each of the strips 23 to prevent tipping of the upper end of the magazine out of the rack, each catch comprising an arm which is pivoted to the respective strip 23 as at 30 so that it may be swung to and from a position which overlies the upper end of the magazine, and a coil spring 31 may be applied around the pivot 30 to act frictionally on the arm of the catch and thereby hold it either in magazine retaining position or in released position. The magazine may be readily placed in or removed from the rack while the catches 29 are swung upwardly, and while the magazine is contained in the rack it is retained therein by swinging the catches 29 downwardly or into the position shown in Fig. 2.

When a magazine is mounted in a rack 22, the upper end of the magazine is open or unobstructed and the lower end of the magazine is substantially open or unobstructed by the perforated strip 25 on which it rests. In practice, the tank 1 is filled with the cleaning liquid and the tank 2 is filled with clear water or washing liquid up to substantially the level indicated by the line *a, b* and relatively slow rotation imparted to the shafts 18 while magazines are suspended on the crank portions 20 thereof. The racks 22 will cause the magazines to be raised and lowered and to be swung laterally in the respective tanks while the magazines are submerged completely, for a part of the time at least, in the liquids contained in the respective tanks, the upper end of each magazine swinging in substantially a circle the radius of which is substantially equal to the eccentricity of the crank portion 20 with respect to its shaft 18 while the lower end of the magazine will have mainly a vertically reciprocatory movement, lateral swinging of the lower end of the magazine being damped or retarded by the liquid to which the opposite sides of the magazines are exposed, so that the movement of the magazine will be substantially oblique to its length. The drying compartment 3 is provided with a straight shaft or bar 32 which extends across its top, this shaft or bar being adapted to receive the hooks 27 on the upper end of each of the magazine racks and to thus support a magazine and its rack vertically in the compartment 3.

In carrying out the invention with an apparatus such as that just described, a matrix containing magazine which is to be cleaned is inserted in a rack 22 and the rack is suspended by the hooks 27 thereon upon the crank portion 20 of the shaft 18 which overlies the tank

1, it being assumed that this tank has been supplied with a sufficient quantity of cleaning liquid and that the burner is in operation to heat this liquid to the boiling point and that the shaft 18 is revolving at a speed which will not be sufficient to cause endwise shifting of the matrices in the magazine so that they will strike against their escapements but will produce some lateral edgewise movement of the matrices between the opposed plates of the magazine. The magazine submerged in the cleaning liquid in the tank 1 will be filled interiorly with the cleaning liquid the boiling of which causes it to flow vertically therein, and the vertical and lateral or oblique movements imparted to the magazine by the rotating shaft will cause a relative back and forth movement to take place between the magazine and the cleaning liquid in a direction longitudinally of the interior space within the magazine and will thereby produce a back and forth scrubbing action of the cleaning liquid upon the matrix guiding channels within the magazine and the lugs or ears on the matrices which engage in these channels, thereby removing dirt, grease, tarnish or corrosion or other foreign matter that may have accumulated on the walls of the grooves or upon the lugs or ears of the matrices, and the lateral motion imparted to the magazine will cause edgewise shifting of the matrices within the magazine whereby the lugs or ears of the matrices will rub against the walls of the grooves in the magazine, this relative motion between the matrices and the magazine assisting in dislodging any dirt, grease or other foreign matter that may have accumulated so that it may be removed by the cleaning liquid.

After the magazine has been thus treated in the cleaning liquid in the tank 1 for a period of about five or ten minutes, the magazine and its rack is lifted out of the tank 1 and inserted into the washing liquid boiling in the tank 2, the hooks 27 on the rack 22 being engaged with the crank portion of the shaft 18 which overlies the top of this tank, and the rotation of the shaft above this tank will cause the magazine suspended therefrom to move vertically and laterally or to oscillate obliquely so that a relative movement will be produced between the magazine and the washing liquid in a direction longitudinally and obliquely to the length of the magazine whereby the washing liquid will exert a scrubbing action upon the walls of the matrix-guiding channels in the magazine and upon the matrices to remove any dirt, grease or other foreign matter that may still adhere thereto as well as to remove any cleaning liquid that may remain on the surfaces of the magazine or the matrices, and the washing action will be assisted by the slight lateral agitation or displacement of the matrices within the magazine, due to the lateral movement of the magazines while reciprocating vertically.

After the magazine has been treated in the washing tank 2 for about 5 minutes it and its rack are removed from the tank 2 and placed in the drying compartment 3, it being suspended vertically therein by engaging the hooks 27 of the rack 22 on the straight shaft or rod 32. The magazine will hang substantially centrally within the drying chamber 3 so that spaces will be left at its opposite sides, and the perforated plate or grid 17 will be heated practically red hot by the burner 12. The heated air or gas passing through or rising from the plate 17 will not only pass up along the outer sides of the magazine to effect drying of its exterior surfaces but will also flow upwardly through the interior of the magazines thereby drying any washing liquid that may remain therein, either upon the interior surfaces of the magazine or upon the matrices. The drying action is greatly facilitated by the circulation of hot air from the burner compartment through the perforations in the plate or grid 17 and up through the drying compartment 3, and the drying of the magazine and the matrices is further facilitated by the hot condition of the magazine and the matrices immediately after the magazine has been removed from the hot washing liquid. It will be understood that in carrying out the invention in an apparatus such as that just described, each of the tanks 1 and 2 and also the compartment 3 may contain a magazine under treatment at the same time, each magazine removed from one tank or from the drying chamber 3 being replaced by another magazine to be treated therein, so that a cleaning operation may be taking place in the tank 1, a washing operation in the tank 2 and a drying operation in the drying chamber 3 concurrently.

Figures 3 to 6 inclusive show another form of cleaning apparatus which may be used instead of the tank 1 for cleaning the magazine and the matrices therein, this form of cleaning apparatus enabling the entire magazine and the matrices contained therein to be rotated while immersed or submerged in a cleaning liquid, and after the magazine and its matrices have been thus submitted to a cleaning operation, they may be placed in a tank like the tank 2 and washed in the manner hereinbefore described, and then placed in a drying chamber like the chamber 3 and dried in the manner hereinbefore described. The cleaning apparatus as shown in Figs. 3 to 6 inclusive comprises a tank 33 which is of a size to receive the usual standard magazine together with the matrices contained therein, this tank being supported at its opposite narrow sides by horizontal trunnions 34 which rotate in bearings 35 in the upper ends of standards 36 the latter being mounted in stationary position upon a floor or other support. One of the trunnions has a sprocket wheel 37 fixed to it whereby it may be rotated by a

sprocket chain connected to an electric motor or other driving means, rotation of the sprocket wheel causing the tank 33 connected to it to rotate at a relatively slow speed in a vertical plane. One end of the tank is preferably closed permanently and has a strip of wood or other relatively yieldable material 38 secured to it, the inner edge of this strip being formed with a rib 39 which is adapted to enter the lower end of the magazine in the space thereof between the top and bottom plates *m*, as is shown in Fig. 6, the innermost edge of this rib preferably projecting into the magazine sufficiently far to dislodge the lowermost matrices from their escapements *E*, substantially as is shown in Fig. 6, so that the rib 39 will withstand the impact due to the dropping of the matrices toward that end of the magazine, when the latter is brought into lowered position, thereby relieving the escapements *E* from the impact of the matrices. The strip 38 also abuts against this end of the magazine and thereby prevents endwise shift of the magazine toward the closed end of the tank 33, but it is slotted to provide passages 40 through which cleaning liquid contained in the tank may flow into and out of the interior of the magazine. The opposite end of the tank is provided with a removable cover or head 41 which may be detachably connected to that end of the tank 33 which is open and provides for the insertion and removal of the magazine, clamping bolts 42 being shown in the present instance for securing the cover or head 41 in place and to form a fluid-tight fit against the flange 43 which surrounds the open end of the tank. The cover or head 41 is provided with a pair of angle irons 44 which are fixed to its inner side, and these angle irons are spaced apart a distance sufficient to receive and hold between them a strip of leather or other suitable yielding material 45 so that it abuts against the narrow edges at the top of the magazine and projects into the upper open end of the magazine throughout the width thereof, so that this strip 45 will prevent endwise displacement of the magazine and will be in a position to be engaged by the matrices in the magazine and to arrest the dropping of the matrices toward the upper or wider end of the magazine when this end of the magazine is lowered by the rotation of the tank 33 about the center of the trunnions 34 as an axis, damage to the matrices being thereby avoided. The strip 45 is sufficiently thin to provide spaces at its sides for the flow of the cleaning liquid into and out of this end of the magazine. Spacing strips or ribs 46 are preferably provided at the inner sides of the tank to engage the top and bottom plates of the magazine and thereby center it in a direction transversely of the tank, and these strips will guide the lower end of the magazine into

engagement with the lower rib 39 during insertion of the magazine into the tank.

In carrying out the cleaning operation with an apparatus such as that just described, the magazine to be cleaned containing the matrices which are also to be cleaned, is lowered into the tank 33 while the latter is at rest, and its open end is uppermost and the cover or head 41 is removed, the magazine being lowered edgewise between the strips 46 until the lower end of the magazine is engaged on the ribbed edge 39 of the strip 38 which will extend across the full width of the lower end of the magazine and will project into it a distance sufficient to engage the lowermost matrices and to push them back slightly from their escapements, and assuming the tank 33 has been filled to a suitable extent with a suitable cleaning liquid which preferably has been pre-heated, the cover or head 41 is applied to the tank 33 to close it, the inturned flanges of the angle irons 44 being adjacent to the upper wider end of the magazine and the leather or similar strip 45 being thereby brought into a position within this end of the magazine where it will catch the matrices as they drop toward this end of the magazine during rotation of the latter, Fig. 5 showing the manner in which the angle irons 44 and the matrix arresting strip 45 are positioned at this end of the magazine. After the magazine containing the matrices has been thus introduced into the tank and the latter tightly closed, the tank containing the magazine is slowly revolved or rotated about the horizontal axis of the trunnions 34. Such rotation of the magazine and the matrices contained therein will cause the cleaning fluid to flow longitudinally through the inside of the magazine, first in one direction and then in the opposite direction, as each end of the magazine is alternately brought into lowered position, and at the same time, the matrices will be caused to slide within the magazine, first toward one end thereof and then toward the opposite end thereof, incident to the slow rotation of the tank and the magazine therein. This shifting of the matrices alternately from the upper to the lower end of the magazine will cause a frictional rubbing of the matrices alternately against the matrix-guiding channels in the top and bottom plates of the magazine, due to the successive inversions of the magazine and its contained matrices, and this rubbing action will effectively dislodge or remove any dirt, grease, tarnish or corrosion or other foreign matter that may have accumulated either on the surfaces of the magazine which are engaged by the matrices or upon the matrices, and the flow of the cleaning liquid or solution substantially longitudinally within the magazine will produce a scouring action which will further clean and wash away any foreign matter present. The sliding movement of the matrices is particu-

larly effective in removing dirt or grease from the matrix guiding channels in the magazine as the dirt or grease tends to accumulate in areas which are spaced apart in the length of the matrix-guiding channels at intervals corresponding to the length of the matrices, and the sliding motion of the matrices serves to effectively remove such accumulation of foreign matter. The cleaning solution used in the rotatable tank 33 may be one of those hereinbefore mentioned or any other suitable cleaning liquid and the cleaning liquid may be used either hot or cold. Endwise movement of the matrices within the magazine during its rotation is insured, as the magazines are never completely filled with matrices from top to bottom, there being sufficient space in all of the matrix channels to permit the matrices therein to move lengthwise.

In both embodiments of the invention hereinbefore described, the magazine and the matrices belonging therein are cleaned as a unit, thereby avoiding the labor and delay occasioned by removing the matrices from the magazine, cleaning the matrices or the magazine, or both, separately and then returning the matrices to their proper channels in the magazine.

Further, in both embodiments described, thorough and rapid cleaning of the matrices and magazines is accomplished by the relative flow between the cleaning liquid and the magazine and matrices in a direction substantially longitudinally within the matrix containing chamber of the magazine, aided by relative movement between the matrices and the magazine produced by the movement imparted to the latter, such relative movement of the matrices producing a rubbing or abrading action between the matrices and the walls or surfaces of the magazine which they engage which will dislodge or wear away any accumulations of dirt, grease or other foreign matter that tend to collect at the points where the matrices normally rest in the magazine, the matter thus dislodged being washed away by the longitudinally flowing cleaning liquid.

It is preferable to employ the cleaning liquid while hot, in both embodiments, as the cleaning liquid is then able to act more readily on the dirt, grease or other foreign matter, and in the embodiment represented by Figs. 1 and 2, the boiling of the cleaning liquid causes it to flow or circulate longitudinally through the interior of the magazine and past the matrices contained therein, the consequent frictional action of the liquid tending to remove and carry away the dirt or foreign matter, but the cleaning liquid may be used cold or without heating in carrying out the invention with a magazine rotating means such as that shown in Figs. 3 and 4, since the range of longitudinal sliding movement of the matrices will produce a rubbing action

which will be sufficient to insure the removal of the dirt or foreign matter, especially in the presence of the cleaning liquid.

The oscillatory movement imparted to the magazine and the matrices contained therein while in the washing tank will quickly and thoroughly remove any dirt or other foreign matter and also any cleaning liquid that might remain after the magazine and the matrices therein have been treated in the cleaning tank, such movement causing a relative movement of the washing liquid in a direction longitudinally within the interior of the magazine, and this agitation of the washing liquid will insure complete removal of the dirt or foreign matter it being aided by the rubbing action produced between the matrices and the magazine by the lateral edgewise movements of the matrices relatively to the magazine resulting from the oscillatory movements imparted to the magazine during the washing operation.

The drying of the magazine and the matrices therein will be rapid and complete, since the magazine and the matrices will occupy vertical or upright position during the drying operation so that any liquid adhering thereto will drain therefrom, and the metal composing the magazine and matrices will be hot when placed in the drying tank or chamber, due to the heating thereof incident to the hot washing treatment, so that moisture will tend to evaporate quickly from these metal surfaces. Moreover, the current of hot air which is caused to flow from the bottom to and through the top of the drying tank or chamber, part of which hot air passes upwardly through the interior of the magazine and between and past the rows of matrices therein quickly takes up and carries away any remaining moisture, so that the magazine and the matrices contained therein will be completely dried.

I claim as my invention:—

1. The method of cleaning the magazine and matrices of a line casting machine which comprises immersing the magazine while containing the matrices belonging thereto in a cleaning liquid, and causing the matrices to shift their positions relatively to the magazine while in the presence of the cleaning liquid.

2. The method of cleaning the magazine and matrices of a line casting machine which comprises immersing the magazine containing the matrices belonging therein in a cleaning liquid, and moving the magazine and its contained matrices, while immersed in said cleaning liquid, in a direction to cause relative movement of the cleaning liquid longitudinally within the matrix containing chamber of the magazine and to also cause relative movement between the matrices and the magazine.

3. The method of cleaning the magazine

and matrices of a line casting machine which comprises immersing the magazine while containing the matrices belonging thereto in a cleaning liquid, and causing the matrices to slide longitudinally in their respective matrix channels while bearing alternately on the opposed plates of the magazine.

In testimony whereof I have hereunto set my hand.

HERMAN R. FREUND.