June 17, 1930. E. RODD ET AL 1,763,866

WAX MATRIX BLACK LEADING MACHINE

Filed Dec. 7, 1926 4 Sheets-Sheet 1

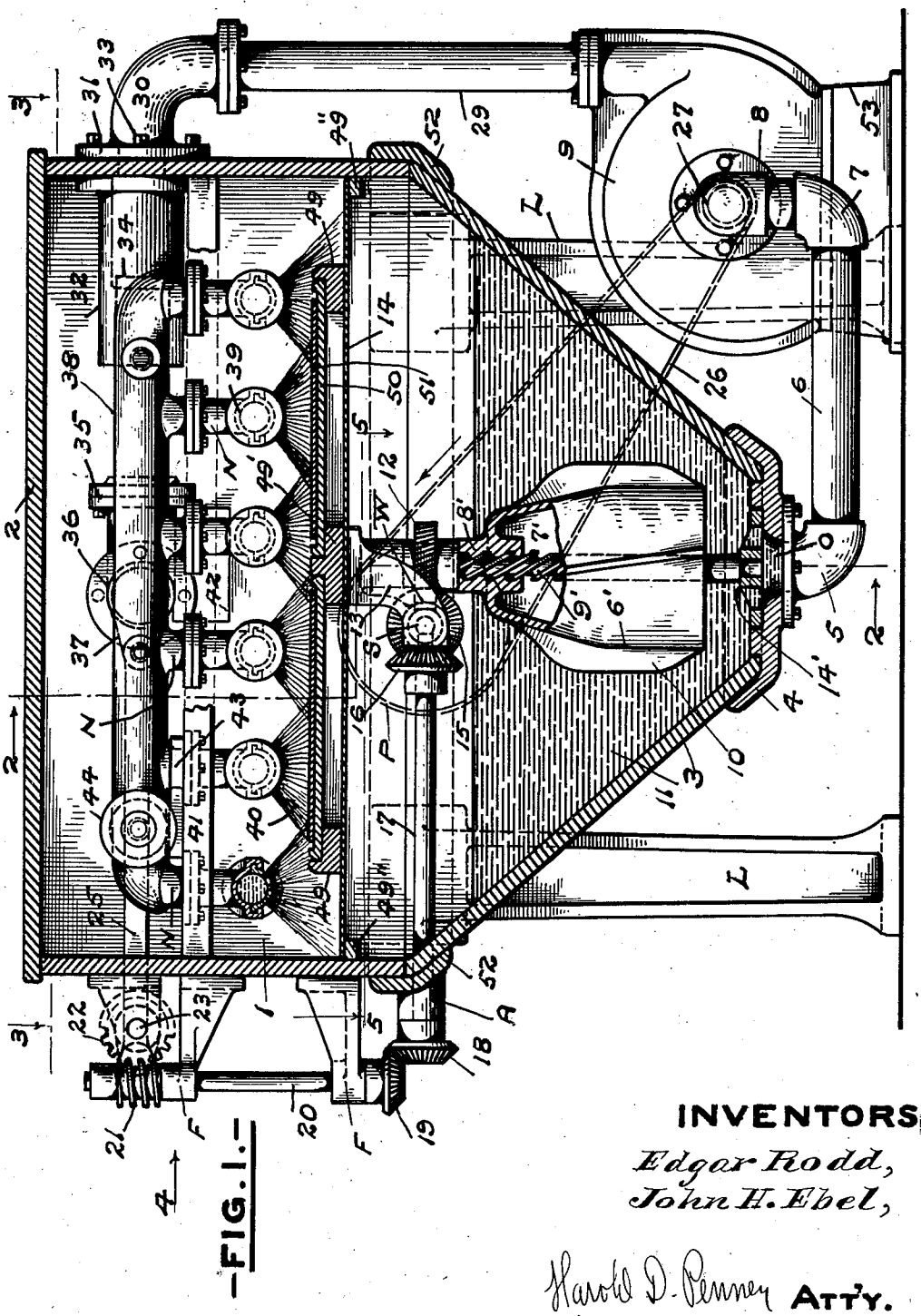


FIG. 1.

INVENTORS

Edgar Rodd,

John H. Ebel,

Harold D. Penney ATT'Y.

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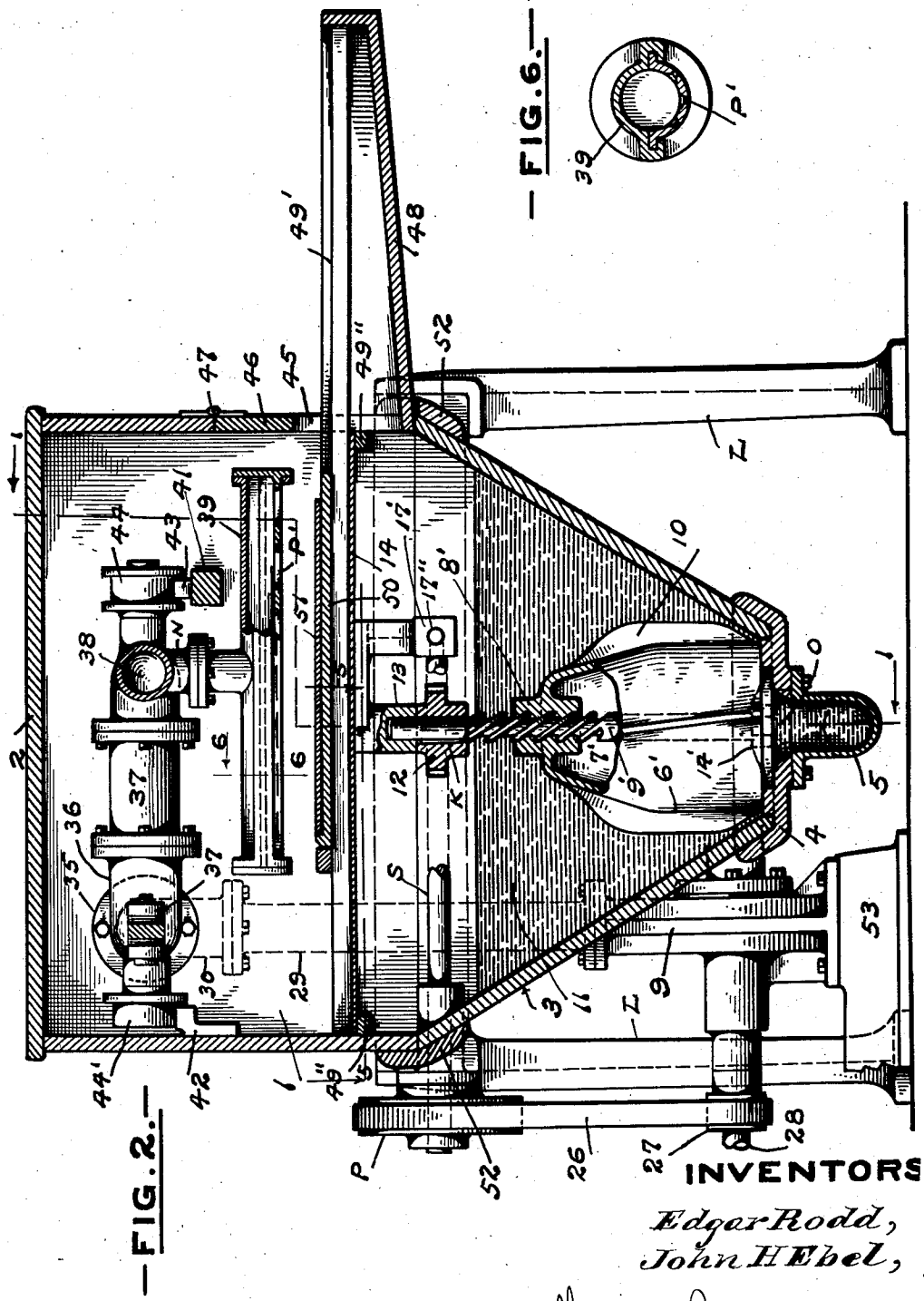


FIG. 2.

FIG. 6.

INVENTORS

Edgar Rodd,

John H Ebel,

Harold D. Penney ATT'Y.

June 17, 1930. E. RODD ET AL 1,763,866

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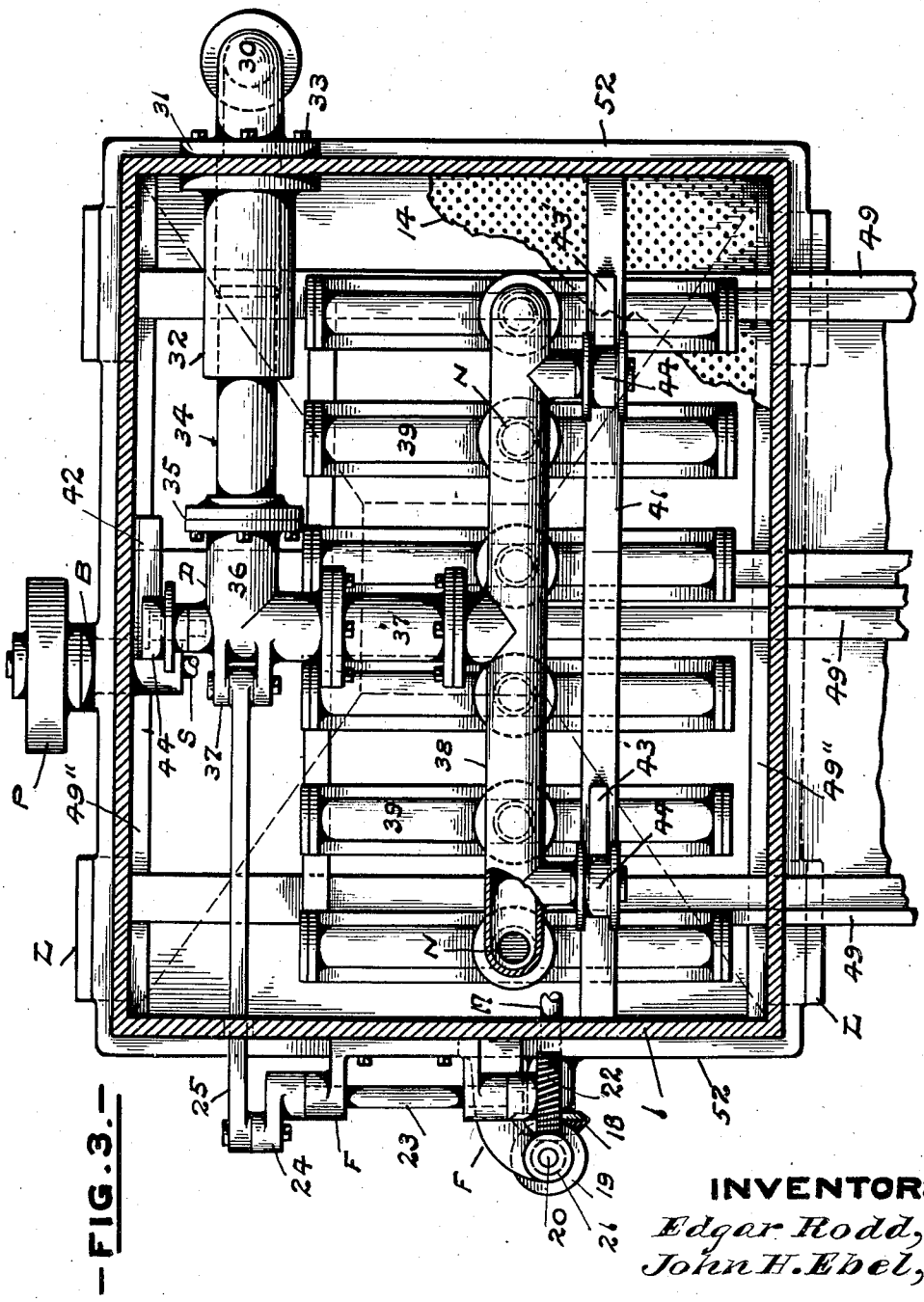


FIG. 3.

INVENTORS
Edgar Rodd,
John H. Ebel,

Harold D. Penny ATTY.

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WAX MATRIX BLACK LEADING MACHINE

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FIG. 5.

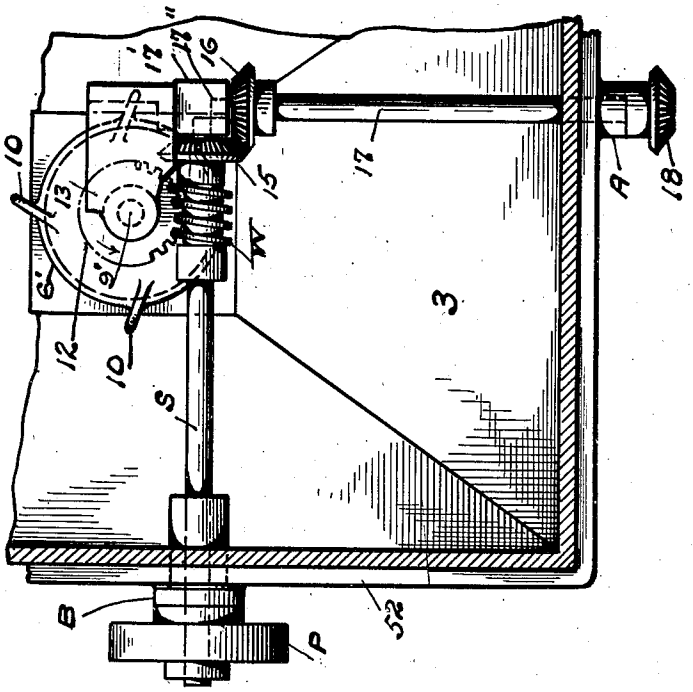
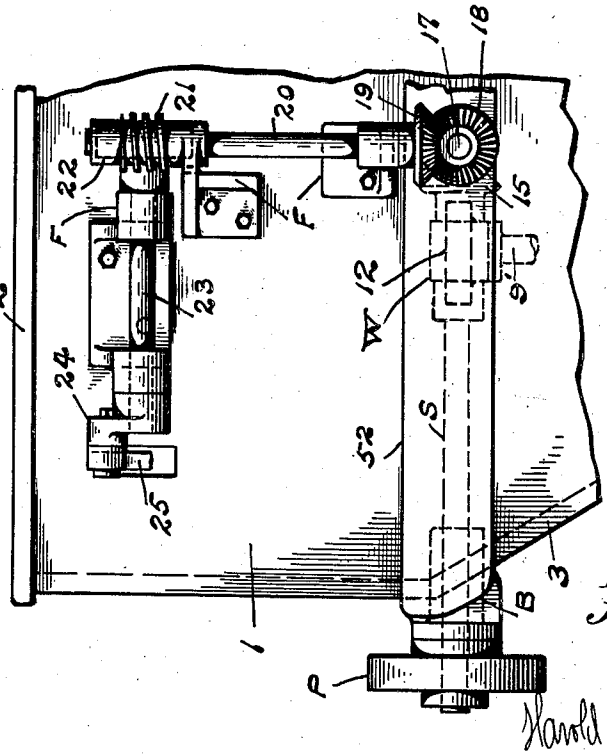


FIG. 4.



INVENTORS.
Edgar Rodd,
John H. Ebel,
Harold D. Penney ATT'Y.

Patented June 17, 1930 1,763,866

UNITED STATES PATENT OFFICE

EDGAR RODD, OF CHICAGO, ILLINOIS, AND JOHN H. EBEL, OF MAHWAH, NEW JERSEY, ASSIGNORS TO R. HOE & CO. INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

WAX-MATRIX BLACK-LEADING MACHINE

Application filed December 7, 1926. Serial No. 153,143.

Our present invention relates to an art of black-leading wax matrices, in the preparation of printing plates and plates for analogous use, and is especially directed to an improved apparatus for utilizing so-called wet solutions, for plate spraying, in which flocculate plumbage, or lead, as an aggregate and water comprise the spraying mixture.

As is well known in this art, such solutions are subject to sedimentation, due to difference in the specific gravities of the components of the solution, and also to impaction of the lead, at the bottom of the solution tank, during periods in which the apparatus is not used.

Our invention, in part, is designed to overcome the above noted difficulties, whereby an automatic, controlled agitation, or beating of the solution, keeps it in the desired state of admixture during use, and also provides means to quickly break up and readmix the impacted or settled solution, upon commencement of operation, after periods of non-use.

Another advantage of our apparatus relates to the means provided for automatically closing the outlet from the solution tank, when discontinuing use, and to automatically open the valve when the apparatus is started, thus protecting the tank outlet which is the inlet to the distributing spray means, against stoppage.

A simple construction is also provided for causing the spray head to oscillate a predetermined distance to distribute the fluid or solution evenly over the area of the surface being treated.

These and other capabilities will be ascertained as the description proceeds, and we do not desire to be held to the details thereof, as obvious modifications may be made in the structure herein outlined, without departing from the spirit or scope of the appended claims.

In the drawings:

Fig. 1 is a sectional view from the front, taken at a point approximating line 1—1, Fig. 2, looking in the direction of the arrow;

Fig. 2 is a sectional view taken on the line 2—2, Fig. 1, looking in the direction of the arrows;

Fig. 3 is a sectional view, taken from the top at the line 3—3, Fig. 1, looking downward;

Fig. 4 is a fragmentary view showing the connecting valve drive and gearing, looking in the direction of the arrow 4′, Fig. 2;

Fig. 5 is a fragmentary view in section, taken on the line 5—5, Fig. 2, looking downward; and

Fig. 6 is an enlarged transverse sectional view of one of the spray heads on line 6—6, Fig. 2.

Our apparatus comprises essentially a tank 1, having a suitable cover 2 thereon, and the lower portion of which comprises a solution tank as at 3, the same being tapered inwardly on all four sides and is closed by a bottom outlet or valve plate generally denoted by 4, to which is suitably affixed an elbow 5, a pump feed pipe 6, another elbow 7 and a pump inlet connection 8, which supplies the solution pump 9, whereby the spray solution is forced upwardly to the spray means, as will be later described.

At one end of the apparatus, as is shown in Figs. 1, 3 and 4, there is mounted a drive mechanism, whereby to operate an agitator outlet closing valve 6′ and which valve is more fully shown in Figs. 1 and 2. This agitator valve 6′ is shown as being constructed, substantially in the form of an air bell, the bottom thereof being open to the interior 7′ and closed at the upper end thereof, at which end there is provided a hub 8′ which is threaded to receive therein a rotatable threaded spindle 9′, the same being provided with a thread of suitable cooperating lead whereby, the rotation thereof will cause the valve to be lifted from the outlet closing position, shown in Fig. 2 to the upper or solution agitating position, as indicated in Fig. 1.

The closing valve 6′ is also provided on its exterior surface with a series of vanes, outstanding, 10, a suitable number of these being provided at the exterior surface and somewhat inclined, preferably in the direction of rotation, whereby when said spindle 9′ is rotated, by means hereinafter to be described, the tendency of the bell-valve 6′ is to rotate therewith in the same direction, partly due to the threaded interconnection with spindle

9′; the resistance of the flocculate lead and water solution 11 to the vanes 10, in some instances, in starting, partly due to the sedimentation within the bottom portion of the housing 1, whereby the tendency of the bell to rotate is resisted. This resistance causes the bell to slowly climb from the lowermost position, Fig. 2, to the uppermost position, Fig. 1, and upon the upper portion of the hub 8′ striking against the lower portion of the hub of the gear 12, the bell is resistively held in the uppermost position and caused to rotate at a predetermined rate of speed, thereby causing the fluid to be thoroughly agitated, and disturbed and kept in the desired state of admixture for removal therefrom, by the action of the pump 9 for use, and in a manner that will be later described.

In a means for causing the valve 9′ to lift to uncover the outlet port and to agitate the solution as described, reference may be had to Fig. 5, in which there is shown an end view of the machine, which taken in conjunction with the apparatus shown in Fig. 1, the valve 9′ is caused to operate as follows: A driving pulley P, for belt or other suitable drive means, is mounted upon a suitable support or bracket B, Figs. 4 and 5, for rotation and the interior pulley shaft S driven thereby has in turn, rigidly affixed at its inner end, a worm W, which meshes with a worm gear 12, which is affixed, in driving relation, with the bell-valve spindle 9′ by a key K, Fig. 2.

The upper end of the spindle 9′ is suitably mounted in a bearing 13, mounted within the housing 1 and is shown in Figs. 1, 2 and 5. The bearing 13 is preferably fixed to a foraminous baffle plate or screen 14, and is supported to the sides of the container 1, by the slide 49′.

The screen baffle 14 provides means for acting as a screen for straining particles of wax which may be dislodged from the plates being treated and permits the excess solution to be drained back into the solution tank, below. In conjunction with the various matrix slides 49, 49′ and the ledges 49″ which are affixed to the side walls of the housing 1, Figs. 2 and 3, the screen 14 acts also as a splash barrier for preventing upward splash from the solution tank.

Upon rotating of the pulley P, the shaft S causes the worm W and worm gear 12 to rotate, this in turn causing the bell-valve spindle 9′ to rotate, thereby rotatively lifting the valve from its lowermost position to the upper position, Fig. 2. During non-rotation of these component parts, the bell will automatically fall by gravity and under rotation, upon the spindle 9′ by its own weight to the outlet port closing position, shown in Fig. 2.

The lower end of the spindle 9′ is rotatably supported in a foot-bearing 14′ which is located on the container outlet spider-plate 4, which has an outlet port O, therein, this being fully shown in Fig. 1.

In addition to the foregoing outlined drive, there is also an additional drive mechanism mounted upon one outside wall of the housing, and this drive mechanism is for the purpose of oscillating the spray head mechanism and will now be described.

Upon the inner end of the worm shaft S, Fig. 5, and keyed, or otherwise affixed thereto, is a bevel gear 15 which in turn meshes with a mate gear 16, which is also suitably affixed to a rotatable shaft 17, on the outer end of which is located another bevel gear 18, and the end of which shaft is mounted in bearing 17′, as at 17″.

Suitable plural bearings A and B, are provided for supporting the drive mechanism above described and these bearings are mounted to adjacent parts of the housing 1 whereby to hold them in relative operative position and it is thought that these need not be further described.

The gear 18, in turn, meshes with the gear 19, Figs. 1 and 4, the said gear being affixed to the rotative shaft 20 which in turn has rigidly mounted thereon a worm 21. This worm 21 meshes with and drives the worm gear 22, Fig. 1, the said worm gear being affixed to a shaft 23 at the other end of which is rigidly mounted a crank arm 24, this being in turn operatively connected to a connecting rod 25. The opposite end of said connecting rod 25 is connected with a distributor-spray mechanism head, Fig. 3, which will be later described.

All of the foregoing described drive for operating the spray mechanism is suitably mounted in bearings F, these being affixed to the housing for supporting the drive in a suitable manner and it is thought that these need not be further described.

The pulley P, Figs. 2, 3 and 5, is connected to the pump impeller pulley 27, Figs. 1 and 2, for simultaneous rotation of the two pulleys, by means of a belt 26, Fig. 1, and by preference, although it is not necessary, an outer extension of the impeller shaft 28 of the pump may be connected directly to any source of motor power for driving the entire mechanism, whereby when the pump is started, the bell-valve 6′ is immediately lifted from its position of repose, covering the bottom outlet O, Fig. 1, and at the same time the reciprocating spray mechanism is also caused to oscillate through the connections just described.

For conveying the wet lead solution from the tank to the oscillating spray-head, there is provided at the outlet side of the pump 9, an upstanding pipe 29 which is suitably connected to the outlet of the pump and at its upper end to an elbow 30 in a fluid tight manner, the said elbow being connected, in turn, to the side of the housing 1 by means

of a suitable flange 31 or its equivalent. At the interior of said housing and adjacent said flange 31, is located a flanged telescopic coupling 32, the said coupling being held in adjacent and associated relation with the flange 31 by means of screws 33, tending to clamp the walls of the housing 1 therebetween.

In turn, the telescopic coupling receives in its open outer end, and for reciprocation therein, a telescopic, oscillatable connecting pipe 34, which in turn is connected by a flanged connection 35 to the inlet distributor pipe 36, Fig. 3.

This inlet pipe 36 is preferably in the form of an elbow D, as shown in Fig. 3, one angle of the elbow having formed thereon a yoke-connecting means 37, into which is pivotally connected one driving end of the connecting rod 25, so that when the reciprocating drive mechanism above described is put into movement, the unit 34 to 37, inclusive, is caused to oscillate to and fro, causing the telescopic pipe 34 to reciprocate to and fro within the telescopic connection 32.

The inlet elbow 36 is flangedly connected to an intermediate pipe 37′ and this in turn is flangedly connected to the distributor manifold 38, Fig. 3, and this manifold is provided with a plurality of down-hanging branch pipes N and to each of which is associated a T-shaped spray-head 39 the bottoms of which are provided with a plurality of perforations P′ therein, from which, when the pump is impelling the solution therethrough the same is caused to be discharged therefrom in a flaring manner, as indicated at 40, Fig. 1.

From the manner in which the solution is distributed from the spray heads 39, it is obvious that they distribute over a very large area, both transversely, due to the elongation of the nozzles and longitudinally due to the close spacing of the same upon the distributor manifold 38.

As a means for permitting easy reciprocation of the spray head assembly, within the required limits of the area of plate being treated, there is provided, immediately above the spray head, a cross-support 41, Fig. 3, which runs from end to end of the housing and is suitably affixed to the opposite ends thereof. Upon this is supported a seat for the track pieces 43′ for roller guiding of the manifold assembly in reciprocating movement. Another support 42 is also provided against one side of the container. Two rolls 44 are suitably affixed for rotation upon the manifold head 38 and are flanged so as to engage both sides of the track pieces 43′ and the other roll 44′ which is rotatably mounted upon the distributor elbow 36 has only one flange thereon.

In operation and during reciprocation of the entire distributor system, the weight of the reciprocating parts is carried by these three rolls and guided by the tracks, in alinement with the connecting rod motion.

By referring to Figs. 1 and 2, with reference to the intermediately located supporting screen plate 14, this member divides the housing into an upper supply chamber and a lower solution chamber and terminates at the one edge of the housing 1 as indicated at the right hand side of Fig. 2 and also adjacent an opening 45 which is formed in the side wall of the housing 1 and is covered by lid 46 the same being hinged, as at 47, to the housing 1.

At the lower part of the opening 45 there is integrally mounted an outstanding inspection and drain rack, generally denoted by 48, the top of which is open and near the upper open edges thereof are located a pair of rack slides 49, which extend into the interior of and in contact with the rear wall of the housing 1, Fig. 2. These rack slide members are sectionally shown in Fig. 1. In the interior of the apparatus the rack slides are supported upon the screen plate 14 and their exterior outstanding ends are supported on the rack member 48. Another rack slide, as 49′ is also provided, as a central support, intermediate of the two outer slides 49.

During the operation of the machine a matrix holder 50 carrying thereon a matrix 51 to be coated, may be set upon the outer ends of the rack slides 49, and pushed into the interior of the housing, through the opening 45. The lid 46 may be opened when it is desired to clean the interior. Thereafter upon completion of or during the processing thereof, the matrix holder and its plate or plates 51 may be externally withdrawn for inspection, and any excess solution thereon will be drained from the plate 51 and into the rack 48, from whence it flows backwardly into the solution reservoir downward and inward owing to the inclination of the bottom of the said rack 48.

For the support of the complete mechanism, there is shown in several of the views a leg support means L, these being joined to the surrounding partially tapered container supporting frame 52 and in which, in one preferred form of construction, the upper rectangular portion of the container may be joined to the lower, tapering solution chamber and be held by the said container frame in fluid tight relation thereto.

It will also be noted that the pump 9 is shown mounted upon a stand 53, which may be placed in any desired relation, as may be convenient, with the apparatus, but it is also obvious that these details of construction may be modified without departing from the scope of the interior arrangement of mechanism whereby the desired object is accomplished.

In the operation of the machine, the pump 9 is rotated as previously described, and this immediately starts the various gear trains,

upon the start of which the bell-valve 6', originally in the downward position shown in Fig. 1 is caused to move, rotatably and upwardly, immediately agitating the sedimented, impacted flocculate at the bottom of the solution, breaking it up immediately and causing agitation of the solution as the bell travels upwardly, against the resistance of the fluid against the vanes 10. Thereupon the solution is immediately pumped in through to the manifold 38, and from thence to the spray heads as previously described.

Simultaneously with the foregoing action the whole distributor head construction is caused to reciprocate thereby effectively and thoroughly coating the plates mounted upon the rack slides 49. All excess solution is permitted to flow away through the screen plate 14, back to the reservoir.

Continuous operation of the mechanism causes the bell valve to remain rotatively held at its upper position as previously described and shown in Fig. 1 and the rotation thereof causes the vanes 10 to thoroughly agitate and keep the solution in the desired constant state of fluidity.

Upon stopping the apparatus the bell valve may rotatably fall gravitationally, to the lowermost outlet closing position and thereby prevent the precipitated flocculate lead from caking around the outlet proper or lodging in the ducts leading therefrom. Starting of the apparatus immediately breaks up this cake due to the upward lift and the rotative motion of the bell valve 6' and its gradual upward travel.

Having thus described our invention, what we claim is:

1. In a spray machine, a fluid container, a reciprocatable gang spray mechanism including a fluid-pump in communication with said container, a stationary work holder over which the gang spray reciprocates, an outlet from said container, a valve for said outlet, and automatic means for lifting said valve from the outlet.

2. In a spray machine, a fluid container, a reciprocatable gang spray mechanism including a fluid-pump in communication with said container, a stationary work holder over which the gang spray reciprocates, an outlet from said container, a valve for said outlet, and means for lifting said valve from the outlet, said means also rotating said valve when it has reached a predetermined position.

3. In a spray machine, a fluid container, a reciprocatable gang spray mechanism including a fluid-pump in communication with said container, a stationary work holder over which the gang spray reciprocates, an outlet from said container, a valve for said outlet, means for lifting said valve from the outlet, said means also rotating said valve when it has reached a predetermined position, and fluid agitating means on said valve whereby to agitate the fluid when the valve has reached said predetermined position.

4. In a spray machine, a fluid container, a spray mechanism including a fluid-pump in communication with said container, an outlet from said container, a valve for said outlet, means for actuating said valve, comprising a rotary member, means between said valve and rotary member to rotate said valve, and means on said valve whereby the fluid in said chamber resists the rotative tendency of said valve and translates said tendency into a lifting motion.

5. In a spray machine, a fluid container, a spray mechanism including a fluid-pump in communication with said container, an outlet from said container, a valve for said outlet, means for lifting said valve comprising a rotary member, means between said valve and rotary member to rotate said valve, means on said valve whereby the fluid in said chamber resists the rotative tendency of said valve and translates said tendency into a lifting motion, and means for stopping the lifting motion of said valve and translate said lifting motion into a rotary, agitating motion.

6. In a spray machine, a fluid container, a reciprocating spray mechanism and a fluid-pump in communication with said container, an outlet from said container, a valve for said outlet, means for rotating and lifting said valve comprising a worm and thread means between said valve and rotary member and vanes on said valve whereby the fluid in said chamber resists the rotative tendency of said valve and translates said tendency into a lifting motion, and a stop for stopping the lifting motion and translate the same into a rotary, fluid-agitating motion.

7. In a fluid black leading machine comprising a housing, a fluid lead solution therein, means for agitating, spraying and pumping said solution within said housing, said pumping means having a fluid outlet to, and an inlet from, said housing, said agitating means acting as a valve to cover and uncover said outlet when the machine is stopped or started.

8. In a fluid black leading machine comprising a housing, a fluid lead solution therein, means for rotatively agitating, spraying and pumping said solution within said housing, said pumping means having a fluid outlet to, and an inlet from, said housing, said agitating means acting simultaneously as a valve to automatically cover and uncover said outlet port when the machine is stopped or started.

9. In a machine of the class described comprising a housing having a fluid holding container, a distributing fluid spray mechanism therein, means for pumping the fluid from the container to the spray mechanism, including an outlet from said container and an agi-

tator outlet valve having means associated therewith to lift the valve from the outlet and cause it to agitate said fluid, when the machine is in operation and to cause said agitator to return to said outlet, to valve the same, when the machine is stopped.

10. In a machine of the class described comprising a housing having a fluid holding container, a distributing fluid spray mechanism therein, means for pumping the fluid from the container to the spray mechanism including an outlet from and an inlet to said fluid holding portion, an agitator outlet valve, and means associated therewith to simultaneously lift the valve from the outlet and cause it to agitate said fluid, when the machine is in operation and to cause said agitator to return to said outlet to valve the same when the machine is stopped.

11. In a fluid circulating system, comprising a fluid container, fluid circulating means, a port between said container and said circulating means, and a valve operative to open said port when the circulating means starts and to close said port when the circulating means stops.

12. In a fluid circulating system, comprising a fluid container, a fluid circulating means, a port therebetween, a valve for opening and closing said port, means associated with said circulating means to operate said valve, and means carried by said valve to agitate the fluid within said container when the valve is moved.

13. An apparatus of the character described comprising a container having an opening therein; a work holder and spray means draining into the container; pump means drawing liquid from said opening; a valve over said opening; and means for operating said pump means, opening said valve and holding said valve open.

14. An apparatus of the character described comprising a container having an opening therein; a work support and spray means draining into the container; pump means drawing liquid from said opening to the spray means; a valve over said opening; and means for automatically opening and holding said valve open when the pump is operated.

15. An apparatus of the character described comprising a container having an opening therein; a work holder and spray means for the work draining into the container; an agitating valve over said opening; and means for opening and rotating said valve.

16. An apparatus of the character described comprising a container having an opening in the lower part thereof; a work support and spray means for the work draining into the container and a combined agitating means and valve adjacent to said opening.

17. An apparatus of the character described comprising a container having an opening therein; a work support and spray means for the work draining into the container; a closure for said opening; and an agitating means over said opening.

18. An apparatus of the character described comprising a container having a wide lateral extension at the upper part draining into the container; a straining baffle over the upper part of the container above the lower level of the extension; tracks over baffle and extension; and spray means above the tracks.

19. An apparatus of the character described comprising a container; work supporting tracks extending over the container; and work spraying means reciprocatory transverse to the tracks.

20. In a fluid blackleading machine, a fluid container having an opening in the lower part thereof; a spray mechanism including a spray head above the container; a fluid pump receiving fluid from said opening and supplying it to said spray head; a work holder beneath said head; a normally closed outlet valve for said opening; and means for holding the valve open when the pump operates.

21. In a fluid blackleading machine, a fluid container; a spray mechanism including a spray head and a fluid pump operatively connected with said container; a work holder for holding the work to the spray of the head; a normally closed outlet valve for the container; and means for opening the valve when the pump starts, holding the valve open while the pump is operating and closing the valve when the pump stops.

22. In a fluid blackleading machine, a fluid container having an opening in the lower part thereof; a spray mechanism including a spray head above the container; a fluid pump receiving fluid from said opening and supplying it to said spray head; a work holder beneath said head; a normally closed outlet valve for said opening and opening into the container; and means for holding the valve open and spaced above said opening whenever the pump operates and closing the valve when the pump stops.

23. In a fluid blackleading machine, a fluid container; a spray mechanism including a spray head and a fluid pump operatively connected with said container; a work holder; and a normally closed outlet valve for the container; said machine comprising means for operating the pump and the valve and holding the valve open when the pump is operating.

24. In a fluid blackleading machine, a fluid container; a spray mechanism including a spray head and a fluid pump operatively connected with said container; a work holder; a normally closed outlet valve for the container; and a means for automatically

rotating and holding the valve open when the pump is operating.

25. An apparatus of the character described comprising a container; means for supporting work over the container; an agitator in the container; and a baffle over the agitator and disposed entirely under all parts of the work to prevent up-splash on the work from the agitator.

26. An apparatus of the character described comprising a container; means for supporting work over the container; means for spraying the work; an agitator in the container; and a straining baffle over the container and the agitator and disposed under all parts of the work when the latter is over the container to prevent up-splash on the work from the agitator.

27. In a wet blackleading machine, a liquid container having an outlet opening; a spray mechanism including a spray head for liquids over the container; a pump for liquids receiving liquid from said opening and supplying it to said spray head; a wide lateral extension on the container; work supporting tracks for holding a work holder beneath said head and over said extension; a normally closed outlet valve for said opening; and means for automatically holding the valve open when the pump operates.

In testimony whereof, we have hereunto set our hands.

EDGAR RODD.
JOHN H. EBEL.