

D. H. MURPHY.
 APPARATUS FOR ELECTROPLATING PIPES, &c.
 APPLICATION FILED JUNE 1, 1908.

962,655.

Patented June 28, 1910.

2 SHEETS—SHEET 2.

Fig. 3.

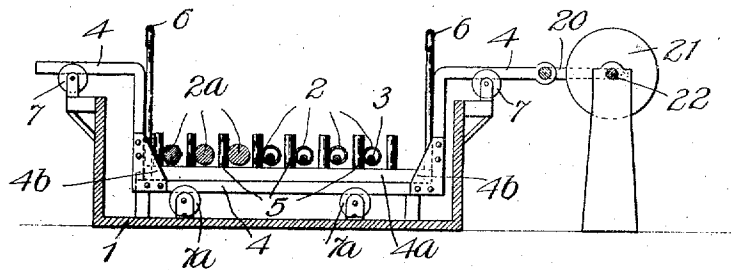


Fig. 4.

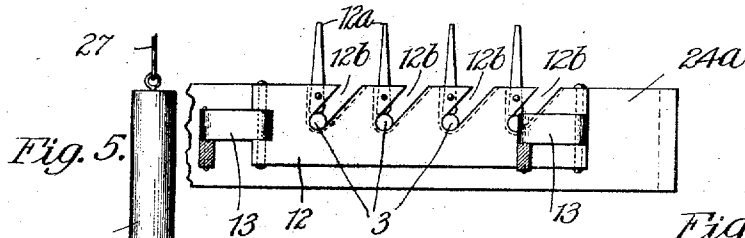


Fig. 5.

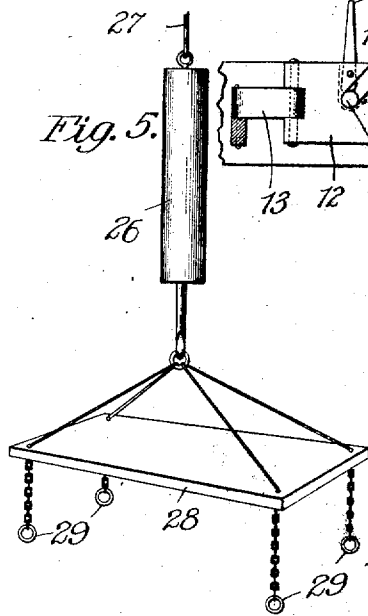
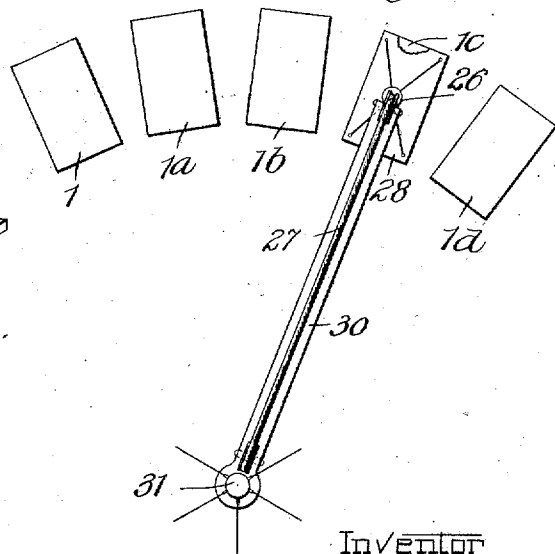


Fig. 6.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR ELECTROPLATING PIPES, &c.

962,655.

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To all whom it may concern:

Be it known that I, DANIEL HAYES MURPHY, a citizen of the United States, residing at New Castle, in the county of Lawrence and State of Pennsylvania, have invented a new and useful Apparatus for Electroplating Pipes, &c., of which the following is a specification.

The object of my invention is to provide an improved means for electroplating pipes, &c., and consists in apparatus adapted to effect the plating operation effectively and uniformly over the exterior and interior surfaces of the pipe.

In Patent No. 891,361, dated June 23, 1908, I have shown a means for plating pipe, rods, &c., in which serious difficulties existing in processes before my invention, are eliminated.

My present invention has for its object the accomplishment of results similar to those accomplished by my patent referred to, but in the present application different means are used for accomplishing these results.

In my present invention I use a tank to contain the plating solution, and in this tank, by suitable means, the pipe or rods to be plated are supported and have a reciprocating rotary motion imparted thereto, as a result of which the entire external surface of the rods or pipe is exposed to the plating operation, with the result that a uniform deposit is secured. By this means I obviate the necessity for having a large tank, which would be required were the rotary motion of the rods or pipe a continuous one, and in this way the disadvantages incident to an extensive equipment are avoided.

In the plating of pipe I make use of anodes consisting of metal rods located inside of the pipe, and provide means by which the reciprocating rotary motion referred to displaces the pipe relatively to the internal anodes in such a way that the inside surface of the pipe receives a uniform deposit of the material used in the plating operation.

My present invention also contemplates an improved means for handling the rods or pipe in placing them in the plating tanks and removing them therefrom, by which a single handling mechanism is able to serve a number of plating tanks at the same time.

Other features of my invention will appear in connection with the description of the apparatus used which is given below.

The several drawings illustrating my invention are as follows:

Figure 1 is a top view of one of the plating tanks, and shows the rods and pipe located therein, in position to be plated; Fig. 2 is a longitudinal sectional view of the parts shown in Fig. 1, taken along the dotted line $x-x$; Fig. 3 is a transverse sectional view of the parts shown in Fig. 1, taken along the dotted line $y-y$; Fig. 4 is a detail view of the mechanism used to displace the internal anodes longitudinally of the pipe as such pipe are rotated reciprocally in the tank, such view being taken along the dotted line $x'-x'$, as shown in Fig. 1; Fig. 5 is a detail view of a hoisting mechanism that may be used in connection with my apparatus for supplying the pipe to tanks and delivering them therefrom; and Fig. 6 is a diagrammatic view of a crane that may be used to advantage to support the hoisting mechanism shown in Fig. 5 over the several tanks used.

Similar numerals refer to similar parts throughout the several views.

Referring to Figs. 1 to 4, inclusive, the tank 1 is so proportioned as to contain the rods 2^a and pipe 2 to be plated and the anodes and plating solution to be used in the apparatus. Located transversely of this tank, and on the bottom thereof, are the bars 25—25, preferably of non-conducting material, as wood, supporting in their upper surfaces the conductors 8—8 upon which the rods and pipe are adapted to be supported. The rods and pipe when in position in the tank are kept separate one from the other by means of spacing members comprising pins 5 carried by cross bars 4^a, which cross bars are supported in turn by the carriers 4 supported upon rollers 7 and 7^a, as indicated. The bars 4^a and carriers 4 extend beneath the rods and pipe, but out of contact therewith, from which when the carriers 4 are reciprocated the pins 5 engage the rods or pipe and roll them reciprocally upon the conductors 8. The carriers 4 are shown as supported, both inside and outside of the tank 1 by means of rollers 7^a and 7, respectively, but in some cases where it is objectionable to support these carriers from the inside of the tank, by suitably proportioning the carriers 4, the outside rollers 7 may be used alone. In order to reciprocate the carriers 4 upon the rollers mentioned, these carriers are connected at one end by means of a rod 19 connect-

ed at its ends by connecting rods 20—20 with crank disks 21—21 carried by a shaft 22 supported in suitable bearings, as indicated, and adapted to be driven by a wheel or pulley 23.

5 A series of anodes 9 are located below the rods or pipe and in close proximity thereto, to facilitate the plating operation. Similar anodes 10 are located immediately above the rods and pipe over the conductors 8, for the purpose of plating those portions of the rods and pipe which rest upon such conductors. As the rods and pipe are reciprocated in the tank 1, longitudinal motion of such rods and pipe is prevented by the frames 24 and 24^a carried by the end carrier frames 4—4, and in the frame 24^a notches are formed to receive the internal anodes 3 used inside of the pipe 2. The internal anodes 3 have wrapped spirally around them strips of insulating material 3^a for the purpose of preventing electrical contact between such anodes and the inside surface of the pipe. The left-hand ends of the anodes 3, as shown in Figs. 1 and 2, are adapted to be secured to a bar 12 by means of cam levers 12^a, as shown in Fig. 4, the anodes 3 having been first inserted in suitable slots 12^b in such bar 12. The bar 12 is supported at its ends by links 13 from the left-hand end of the tank 1 in such a way that as the pipe 2 are moved reciprocally in the tank 1, the bar 12 is alternately moved nearer to and farther from the left-hand end of the tank, as a result of which the internal anodes 3 are moved longitudinally of the pipe. By this construction, the rods 2^a, the pipe 2, the internal anodes 3 and the connecting bar 12 may be together removed from or placed in the tank by means of the carrier bars 4^a. The bar 12 constitutes a convenient means for inserting the anodes 3 in the pipe 2 or for removing the anodes therefrom. In this connection it is to be observed that the frame 24^a, while it permits this motion of the anodes 3, prevents displacement of these anodes in the pipe laterally as the pipe are moved by the pins 5. In the drawings, the space between the pins 5 and the rods or pipe is purposely exaggerated to more clearly show the operation of the mechanism, and it is to be understood that in practice the clearance between the pins 5 and the rods or pipe would be comparatively small, and that separate bars 4^a—4^a would be used for different sized rods or pipe.

The bar 12 is composed preferably of conducting material, and is connected by wire 15 through resistance 17 and regulating switch 16 with one terminal of the electric generator 18. The wire 15 also connects this same terminal of the generator with the anodes 9 and 10. The other terminal of the generator 18 is connected by wire 14 with the conductors 8, by which it will be understood an electric circuit is completed from

the several anodes through the solution in the tank 1 to the rods or pipe, and thus to the conductors 8, and back to the generator 18.

The bars 4^a—4^a are adapted to be removed from the carrier frames 4—4 by means of hook bolts 6—6 secured in the ends of the bars 4^a—4^a, and these bars therefore constitute a means by which the rods and pipe may be removed from the tank after removing the upper anodes 10—10. The bars 4^a—4^a are normally retained in proper position in the carrier frames 4 by means of the corner plates 4^b—4^b, shown in Fig. 3, which also constitute a stiffening means for the carrier frames.

As a means for handling the rods or pipe and placing them in the tank 1 or removing them therefrom, a hoisting mechanism, shown in Fig. 5, may be employed, which consists in a cylinder 26 supported by a rope 27 from a swinging crane 30, shown in Fig. 6, such cylinder 26 being preferably operated by means of compressed air. The cylinder 26 is adapted to support and raise or lower, by means of a hook secured at the lower end of its piston rod, a spreader 28 from which a number of rings 29 are supported by chains or other suitable means, as indicated, in such a position as to engage the several hooks on the upper ends of the hook bolts 6. The rope 27 provides a convenient means for adjusting the cylinder 26 to the proper position vertically, and by disposing a number of tanks as indicated, at 1^a, 1^b—1^c—1^d, in Fig. 6, the same crane 30 and cylinder 26 may be used to place the pipe in the tanks or remove them therefrom, whether all of these tanks be used for plating or some of them for preparing the rods or pipe for the plating operation, as may be the case. By this means it will be observed that the pipe as delivered to the crane 30 may be prepared for the plating operation and then delivered to any one of a number of plating tanks, after which they may be washed, if desired, and delivered to the stock pile without interfering with the plating of other lots of rods or pipe in others of the same series of tanks.

In the operation of my mechanism, I prefer to employ internal anodes of another material than that to be plated, and have found that iron or steel answers very well for this material, and is preferable to other materials, since it is stronger and stiffer, and does not produce as rapid a plating operation as though it were made of the material to be deposited. This slower electrolytic action is desirable inside the pipe, since the distances between the anodes and the pipe are less than between the anodes outside of the pipe and the outside surface of the pipe, and I have found that the material contained in the plating solution fur-

nishes a sufficient deposit inside of the pipe on account of this difference in distance, while, on the other hand, if the same material were used in the internal anodes that is used in the external anodes the deposit inside the pipe would be excessive.

While I have shown the particular system herein described for handling the rods or pipe and placing them in and removing them from the several tanks, I may use any equivalent hoisting and conveying means for accomplishing the same result without departing from the spirit of my invention.

While I have shown my invention in the particular embodiment herein described, I do not, however, limit myself to this construction, but desire to claim broadly any equivalent modification that will suggest itself to those skilled in the art.

What I claim is:

1. As a means for electroplating rods or pipe, a tank containing a plating solution, conductors for supporting the rods or pipe in the solution, anodes in the solution, a source of electric energy, a circuit leading from such source of energy through the anodes, the solution and such rods or pipe, and means for moving the rods or pipe laterally in the tank and thereby imparting a reciprocal rotation thereto.

2. As a means for electroplating pipe, a tank containing a plating solution, means for supporting the pipe in the solution, internal anodes in the pipe in the solution, a source of electric energy, a circuit from the source through the anodes, the solution and the pipe, means for preventing longitudinal motion of the pipe in the tank, means for reciprocating the pipe laterally in the tank and thereby rotating the same, and means for moving the internal anodes longitudinally of the pipe.

3. As a means for electroplating pipe, a tank containing a plating solution, means for supporting the pipe in the solution, internal anodes in the pipe in the solution, a source of electric energy, a circuit closed from the source through the anodes, the solution and the pipe, means for preventing longitudinal motion of the pipe in the tank, means for reciprocating the pipe laterally in the tank and thereby rotating the same, and means for moving the internal anodes longitudinally of the pipe by the lateral displacement of the pipe in the tank.

4. As a means for electroplating pipe, a tank containing a plating solution, means for supporting the pipe in the solution, anodes in the solution outside of the pipe, internal anodes in the pipe in the solution, a source of current, a circuit leading from the source through the anodes, the solution and the pipe, means for moving the pipe laterally in the tank and thereby imparting a reciprocal rotation thereto, and means for

moving the internal anodes longitudinally of the pipe.

5. As a means for electroplating pipe, a tank containing a plating solution, means for supporting the pipe in the solution, anodes in the solution outside of the pipe, internal anodes in the pipe in the solution, a source of electric energy, a circuit through the source, the anodes, the solution and the pipe, means for reciprocating the pipe laterally in the tank and thereby rotating the same, and means for moving the internal anodes longitudinally of the pipe by the lateral displacement of the pipe in the tank.

6. As a means for electroplating rod or pipe, a tank containing a plating solution, conductors for supporting the rods or pipe in the solution, anodes in the solution, an electric circuit including the anodes, the solution and the rods or pipe, means for reciprocating the rods or pipe laterally in the tank and thereby rotating the same, and means for preventing the rods or pipe coming in contact with each other.

7. As a means for electroplating rod or pipe, a tank containing a plating solution, conductors for supporting the rods or pipe in the solution, anodes in the solution, an electric circuit including the anodes, the solution and the rods or pipe, means for reciprocating the rods or pipe laterally in the tank and thereby rotating the same, and means for preventing the rods or pipe coming in contact with each other, the means for moving the rods or pipe being removable from the tank.

8. As a means for electroplating rods or pipe, a tank containing a plating solution, conductors for supporting the rods or pipe in the plating solution, anodes in the solution, an electric circuit through the anodes, the solution, the rods or pipe and the conductors, and means for reciprocating the rods or pipe laterally in the tank and thereby rotating the same.

9. As a means for electroplating pipe, a tank containing a plating solution, fixed conductors for supporting the pipe in the solution, anodes in the solution outside of the pipe, internal anodes in the pipe in the solution, a source of electric current, a circuit from said source through the anodes, the solution, the pipe and the conductors, means for moving the pipe laterally in the tank and thereby imparting a reciprocal rotation thereto, and means for moving the internal anodes longitudinally of the pipe by the lateral displacement of the pipe in the tank.

10. As a means for electroplating rods or pipe, a tank containing a plating solution, fixed conductors located laterally across the bottom of such tank for supporting the rods or pipe in the plating solution, anodes of the material to be deposited located in the solution beneath the rods or pipe, an elec-

tric circuit through the anodes, the solution and the rods or pipe, reciprocating frames supported in the tank and adapted to engage the rods or pipe, and means for moving such reciprocating frames consisting in connecting rods, cranks and a driving shaft associated therewith.

11. As a means for electroplating pipe, a tank containing a plating solution, fixed conductors supported laterally with respect to the tank and adapted in turn to support the pipe in the solution, internal anodes of a material other than that to be deposited located in the pipe in the solution, means for preventing electrical contact between the anodes and the pipe, removable means for preventing rotation of the internal anodes, an electric circuit leading through the anodes, the solution and the pipe, conveyer frames for reciprocating the pipe laterally in the tank and thereby rotating the same, frames secured to the conveyer frames for preventing longitudinal motion of the pipe in the tank, and link connections between the internal anodes and the tank by which the lateral displacement of the pipe in the tank effects a longitudinal motion of the internal anodes in the pipe.

12. As a means for electroplating pipe, a tank containing a plating solution, fixed lateral conductors supported from the bottom of the tank and in turn supporting in the solution the pipe to be plated, anodes of the material to be deposited located in the solution below the pipe, internal anodes of another material than that to be deposited located in the pipe in the solution, insulating means surrounding the internal anodes to prevent electrical contact between such anodes and the pipe, external anodes of the material to be deposited located in the solution over the lateral conductors and the pipe, an electric circuit including the anodes, the solution, the pipe and the conductors, conveyer frames for moving the pipe laterally in the tank and thereby imparting a reciprocal rotation thereto, frames supported from the conveyer frames for preventing longitudinal motion of the pipe in the tank, mechanism serving to move the internal anodes longitudinally in the pipe as such pipes are displaced laterally in the tank, and pins supported by members carried by the conveyer frame, such pins constituting means for separating the pipes from one another, such members constituting a means for placing the pipe in and removing the pipe from the tank.

13. As a means for electroplating rods or pipe, a tank containing a plating solution, means for supporting the rods or pipe in the solution, anodes in the solution, a circuit adapted to be closed from a source of electric energy through such anodes, solution and

such rods or pipe, means for reciprocating the rods or pipe laterally in the tank, and pins for engaging the rods or pipe to rotate the same when the reciprocating means is operated.

14. As a means for electroplating pipe, a tank containing a plating solution, means for supporting the pipe in the solution, internal anodes in the pipe in the solution, a circuit adapted to be closed from a source of electric energy through such anodes, solution and such pipe, means for preventing longitudinal motion of the pipe in the tank, means for reciprocating the pipe laterally in the tank, pins for engaging the pipe to rotate the same when the reciprocating means is operated, and means for moving the internal anodes longitudinally of the pipe.

15. As a means for electroplating rods or pipe, a tank containing a plating solution, conductors for supporting the rods or pipe in the plating solution, anodes in the solution, a circuit adapted to be closed from a source of electric energy through such anodes, solution, rods or pipe and such conductors, means for reciprocating the rods or pipe laterally in the tank, and pins for engaging the rods or pipe to rotate the same when the reciprocating means is operated.

16. As a means for electroplating rods or pipe, a tank containing a plating solution, means for supporting the rods or pipe in the solution, anodes in the solution, a circuit adapted to be closed from a source of electric energy through such anodes, solution and such rods or pipe, reciprocable members in the tank, and pins carried by such members for engaging the rods or pipe to cause rotation thereof when such members are reciprocated.

17. In combination, an electrolytic tank containing a plating solution, conductors located in the tank for supporting rods or pipe in the plating solution, anodes located in the solution, an electric circuit through the anodes, the solution and the rods or pipe to be plated, reciprocating frames supported in the tank and adapted to engage the rods or pipe, and means for moving such reciprocating frames.

18. In an apparatus for electroplating rods or pipe, a tank containing a plating solution, means for supporting the rods or pipe in the solution, means for reciprocating the rods or pipe laterally in the tank and thereby rotating the same, and means out of contact with the rods or pipe while in the solution for removing the rods or pipe from the tank.

19. In an apparatus for electroplating rods or pipe, a tank containing a plating solution, conductors for supporting the rods or pipe in the solution, means for reciprocating the rods or pipe laterally in the tank and thereby rotating the same, means for

preventing the rods or pipe coming in contact with each other, and means for removing the rods or pipe from the tank.

20. In combination, a tank containing a plating solution, means located in the tank for supporting the rods or pipe in the solution, and removable members supported in the tank out of contact with the rods or pipe but adapted to engage the rods or pipe, when removed from the tank to remove the rods or pipe from the tank.

21. In combination, a tank containing a plating solution, conductors located in the tank for supporting rods or pipe in the solution, and removable members supported in the tank and adapted to engage the rods or pipe, such members adapted by their removal to remove the rods or pipe from the tank.

22. In combination, a tank containing a plating solution, means located in the tank for supporting the rods or pipe in the solution, removable members supported in the tank out of engagement with the rods or pipe but adapted to engage the rods or pipe when removed from the tank, and means for reciprocating such members, such members adapted by their removal to remove the rods or pipe from the tank.

23. In combination, a tank containing a plating solution, conductors located in the tank for supporting rods or pipe in the solution, removable members supported in the tank and adapted to engage the rods or pipe, and means for reciprocating such members, such members adapted by their removal to remove the rods or pipe from the tank.

24. In combination, an electrolytic bath, a framework carrying means for determining the location of the articles to be plated relatively to one another, means for supporting said articles out of contact with said framework proper, and means for causing the reciprocation of said framework, the

removal of the framework from the bath serving to remove from the bath the articles to be plated.

25. In combination, an electrolytic bath, a framework carrying means for determining the location of the articles to be plated relatively to one another, means for supporting said articles out of contact with the framework proper, means for causing the reciprocation of said framework, and means for causing rotation of the articles to be plated when reciprocated by said framework, the removal of the framework from the bath serving to remove from the bath the articles to be plated.

26. As a means for supporting rods or pipe in a solution for plating or other treatment, frames adapted to carry a plurality of such rods or pipe, each of such frames consisting in a horizontal cross member and means secured thereto for engaging suitable hoisting mechanism for placing the frame in or removing it from the solution, said cross members being substantially parallel and in the same horizontal plane, the rods or pipe being laid thereon.

27. As a means for supporting rods or pipe in a solution for plating or other treatment, frames adapted to carry a plurality of such rods or pipe, each of such frames consisting in a horizontal cross member and means secured thereto for engaging suitable hoisting mechanism for placing the frame in or removing it from the solution, and means carried by each of such frames for preventing the rods or pipe coming in contact with the adjacent rods or pipe, said cross members being substantially parallel and in the same horizontal plane, the rods or pipe being laid thereon.

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Witnesses:

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