W. J. McKAY.

PIPE CLEANING APPARATUS.

APPLICATION FILED MAR. 29, 1912.

1,068,599. Patented July 29, 1913.

Fig. 1.

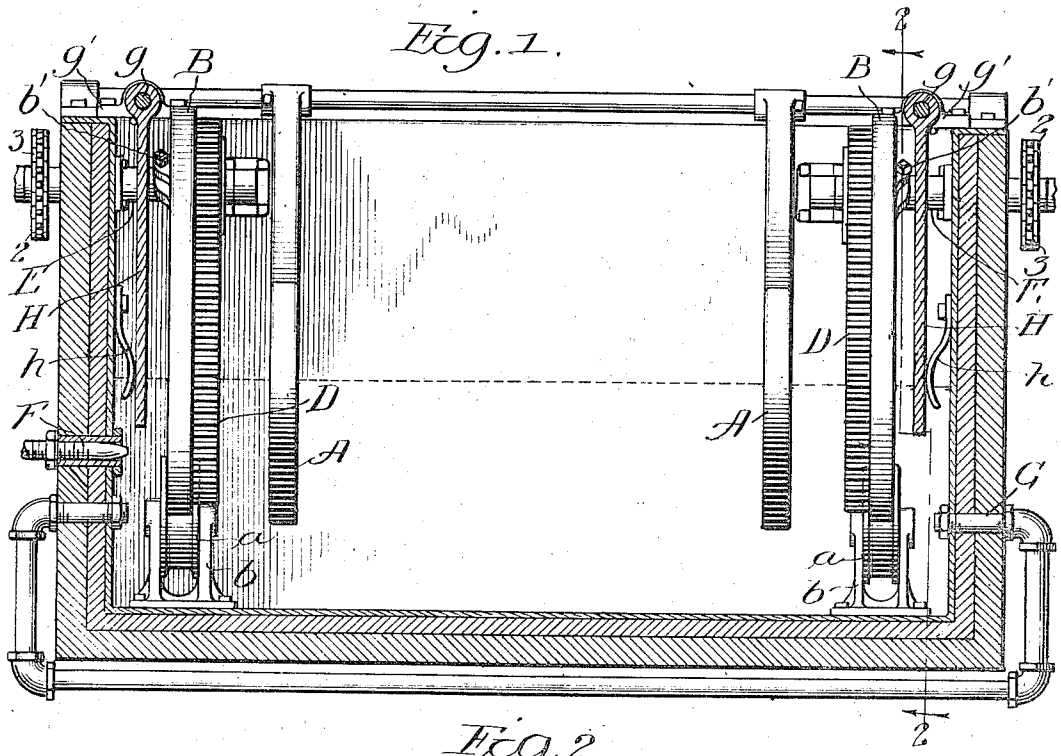
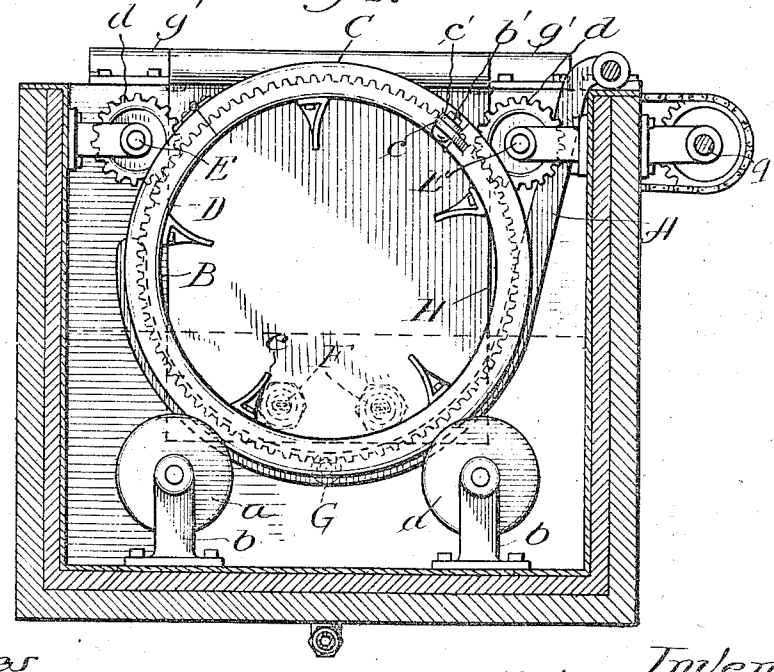


Fig. 2.



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UNITED STATES PATENT OFFICE.

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PIPE-CLEANING APPARATUS.

1,068,599. Specification of Letters Patent. Patented July 29, 1913.

Application filed March 29, 1912. Serial No. 687,074.

To all whom it may concern:

Be it known that I, WILLIAM J. McKAY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Pipe-Cleaning Apparatus, of which the following is a full, clear, and exact description.

My invention relates to apparatus for removing scale, grease, silica, surface carbon, etc., from metal pipe, and particularly pipe intended to be coated with insulating materials to make it useful for electrical conduit purposes, or to prepare it for galvanizing or other metallic coating.

The principal object of my invention is to clean such piping within a fraction of the time heretofore required, and to dispense with a large part of the manual labor heretofore considered necessary, and to do this thoroughly and satisfactorily. This I accomplish by the means hereinafter fully described and as particularly pointed out in the claims.

In the drawings: Figure 1 is a longitudinal section through the tank embodying my improvements. Fig. 2 is a transverse section thereof, taken on dotted line 2—2, Fig. 1.

My invention is hereinafter described in connection with the first of a series of tanks used in a process of cleansing pipe, which is partly filled with a weak solution of sulfuric or other acid and water, and into which the pipes are first introduced so as to remove the grease, silica and surface carbon. From this tank the pipes are placed in a second tank containing a solution of lye or other alkali and water to neutralize the acid, and from thence are placed in a tank of hot water to wash off the lye. At the outstart, therefore, it will be understood that my improvements could be used in connection with the other tanks of this process, or, in fact, with a tank employed for similar purposes in other processes.

The tank to which particular reference is had may have a wooden interior lined with sheet lead or some other material that will be unaffected by acids, and has exterior cement walls incasing the wooden interior. At suitable points between its end walls the tank has a pair of large hook-shaped arms A, pivoted in suitable bearings on the upper edge of one longitudinal wall. These hooks curve down under the pipes in the tank, and when the pipes are cleaned are moved upward by any suitable means to lift the pipes out of the tank and dump the same into the next tank (not shown). Hooks of this character have heretofore been used for similar purposes so the above brief reference thereto is deemed sufficient.

Near each end of the tank, it is provided with a pair of concaved pulleys, *a*, *a*, which I prefer to journal between lugs *b*, secured to and arising from plates fastened to the bottom of the tank in any suitable manner. Each pair of these pulleys supports a comparatively large annulus B, whose flattened outer circumference rests on the periphery of said pulleys between the flanges that form their concaved circumferences. These annuli each have a segment, C, thereof, that is removable, and I prefer to make the length of this segment correspond to about one quarter of the annulus, and to hinge one end thereof to the adjacent end of the body of the annulus, and to fasten the opposite end thereof to the opposite end of said body by any suitable means that will permit its release therefrom whenever desired. In the drawings, these means are shown to consist of companion lugs, *c*, *c'*, one of which projects laterally from the end of the body of the annulus, and the other from the end of the segment in such direction, that, when the segment is closed, they lap past each other and can be fastened together by a bolt and nut, *b'*.

Each annulus has an annular-gear D, secured to or made integral with one side thereof, which gears are concentric to the axes of the annuli and are engaged by the pinions *d*, *d*, that are securely mounted on a stud-shaft E, journaled in the end walls of the tank. The outer ends of the stud-shafts at each end of the tank extend through their bearings, and are provided with sprocket-wheels or pulleys 2, that enable the ends of the stud-shaft projecting beyond the same side of the tank to be connected together by chains or belts 3, in the conventional manner, and the stud shafts

near the same end of the tank derive motion from a common drive-shaft 4, whose axis is parallel thereto and which is journaled in bearings secured to and projecting from the adjacent end-wall of said tank.

The inner circumference of gear D, is of the same diameter as that of the annulus, and I secure to the inner circumferences of the latter, including their relative segments C, (forming part thereof) a series of corresponding hooks *e*, that are arranged at equal distance apart, and, preferably, have their inner extremities curved or inclined in the direction of rotation of the annuli.

The axes of the annuli aline and the relative position of hooks, *e*, thereof correspond so that when said annuli are rotated at a corresponding speed, lengths of piping placed within said annuli with their ends supported thereby will be maintained in a horizontal position as the annuli rotate. When it is desired to load the annuli with the desired number of lengths of pipe, segment C, is unfastened at one end and swung upward, and the pipe introduced within the inner circumferences of the annuli, in such position that their ends rest therein, and then the segment is closed down in the position shown in the drawings, and locked. The annuli are then simultaneously rotated and the pipes will be moved through and raised out of the solution in the tank to a point at or near the plane of stud-shafts E, whereupon they will roll off of said hooks and into contact with the piping in the lower part of the annuli, and into the solution and will be caught by the lowermost hooks of the annuli and passed through and raised out of the solution, and again dropped, and so on, again and again during the operation of the machine. This action thoroughly washes the exterior of the pipe and the jarring which the pipes receive when dropping upon one another assists in detaching and removing the scale, silica, etc., from the interior.

At one or both ends of the tank, I provide a series of steam or air-jets F, the discharge ends of which are in a plane a few inches above the plane of the lowest segments of the annuli. The steam-pipes that supply these jets pass through the end-walls of the tank and the steam or air discharged therefrom forces the solution through the bores of the pipe from one end to the other and softens or weakens the scale, the grease, silica and surface carbon therein, so that the concussions and vibrations to which the pipes are subjected during the rotation of the annuli will dislodge and remove the same so that it can be washed out by the steam or air impregnated current or solution. At the discharge end of the pipes adjacent the end of the tank opposite the steam-jets, the solution will enter the mouths of pipes G, which latter describe a detour down under and around to the opposite end of the tank and discharge through the end-walls below the steam-jets, and thus insure a constant circulation of the solution. Any other means for accomplishing this result can, however, be employed.

When the pipes being cleaned are dropped the rebound thereof may have a tendency to move the same longitudinally. To prevent this longitudinal movement, from displacing the ends of the pipe from within the circumferences of the annuli, I have provided aprons H, which latter consist of metal-plates suspended by suitable rock-shafts *g*, whose ends are journaled in bearings *g'*, secured to the upper edges of the side-walls of the tank near the ends thereof. These aprons depend from shaft *g*, between the stud-shafts E, to a point just below the surface of the solution and above the steam-jets, and they are maintained in their perpendicular positions, preferably, by leaf-springs *h*, one end of which latter are secured to the end-walls of the tank and the other end of which bear against the lower portion of the apron, substantially as shown. When the pipes move longitudinally and strike against these aprons, the latter will have a tendency to push the pipe back into proper position, and at the same time yield sufficiently to prevent damaging the same.

It is possible that changes may be made in the parts of my invention as hereinbefore described in order to adapt the same for changed conditions that may affect the structure without changing the functions of the same. For instance, where very long lengths of pipe are to be cleaned, an additional annulus (not shown) could be used midway between the annuli hereinbefore described, and support the middle portion of said pipe. In this event, the intermediate annulus would be constructed exactly like annuli B, but would have no gear attached thereto, and would be driven by the operation of the pipe. All such changes I desire to be considered as contemplated within the scope of my invention.

What I claim as new is:

1. An apparatus of the kind specified comprising a tank, a plurality of axially alining rotatable annular members which are arranged within said tank and have suitable projections on their inner circumferences, and means for rotating said annular members.

2. An apparatus of the kind specified comprising a tank, a plurality of axially alining rotatable annular members which are arranged within said tank, and have suitable projections on their inner circumferences, and movable segments therefor, and means for rotating said annular members.

3. An apparatus of the kind specified comprising a tank, a plurality of axially alining rotatable annular members which are arranged within said tank, a series of equidistant arms projecting inward from the inner circumferences thereof, and means for rotating said annular members.

4. An apparatus of the kind specified comprising a tank, a plurality of axially alining rotatable annular members which are arranged within said tank, movable segments therefor, a series of arms projecting inward from the inner circumferences of said members and of their segments, and means for rotating said annular members.

5. An apparatus of the kind specified comprising a tank, a plurality of axially alining rotatable annular members arranged within said tank, movable segments therefor hinged at one end to one end of the body of said members, and removably fastened to the opposite end of said body, a series of arms projecting inward from the inner circumferences of said members and their segments, and means for rotating said annular members.

6. An apparatus of the kind specified comprising a tank, a plurality of axially alining rotatable annular members which are arranged within said tank, a series of projections on the inner circumferences of said members, means for forcibly expelling a gaseous element longitudinally into said tank from one end, and means for rotating said annular members.

7. An apparatus of the kind specified comprising a tank, a plurality of axially alining rotatable annular members which are arranged within said tank, a series of projections on the inner circumferences thereof, means for rotating said annular members, and aprons interposed between said members and the ends of said tank.

8. An apparatus of the kind specified comprising a tank, a plurality of axially alining rotatable annular members which are arranged within said tank, a series of projections on the inner circumferences thereof, means for rotating said annular members, and pendent aprons interposed between said members and the ends of said tank.

9. An apparatus of the kind specified comprising a tank, a plurality of axially alining rotatable annular members which are arranged within said tank, a series of projections on the inner circumferences thereof, means for rotating said annular members, and pendent spring returnable aprons interposed between said members and the ends of said tank.

10. An apparatus of the kind specified comprising a tank, a plurality of axially alining rotatable annular members which are arranged within said tank, a series of projections on the inner circumferences thereof, means for rotating said annular members, aprons interposed between said members and the ends of said tank, and means for forcibly expelling a gaseous element longitudinally into said tank from one end below said aprons.

11. An apparatus of the kind specified comprising a tank, a plurality of axially alining rotatable annular members which are arranged within said tank, a series of projections on the inner circumferences of said members, means for rotating said annular members, means for forcibly expelling a gaseous element longitudinally into said tank from one end, and devices for conducting the solution in said tank from the end thereof opposite said means back to the end of the tank adjacent the same.

12. An apparatus of the kind specified comprising a tank, a plurality of axially alining rotatable annular members which are arranged within said tank, a series of projections on the inner circumferences of said members, means for rotating said annular members, means for forcibly expelling a gaseous element longitudinally into said tank from one end, and pipes conveying the solution in said tank from the end thereof opposite said means back to the end of the tank adjacent the same.

13. An apparatus of the kind specified comprising a tank, a plurality of axially alining rotatable annular members which are arranged within said tank, removable segments for the same, a series of projections on the inner circumferences of said members, means for rotating said annular members, and means for forcibly expelling a gaseous element longitudinally into said tank from one end.

14. An apparatus of the kind specified comprising a tank, a plurality of axially alining rotatable annular members which are arranged within said tank, and removable segments therefor, a series of projections on the inner circumferences thereof, means for rotating said annular members, and aprons interposed between said members and the ends of said tank.

15. An apparatus of the kind specified comprising a tank, a plurality of axially alining rotatable annular members which are arranged within said tank, and removable segments therefor, a series of projections on the inner circumferences thereof, means for rotating said annular members, aprons interposed between said members and the ends of said tank, and means for forcibly expelling a gaseous element longitudinally into said tank from one end thereof below said aprons.

16. An apparatus of the kind specified comprising a tank, a plurality of axially alining rotatable annular members, which are arranged within said tank, and remov-

able segments therefor, a series of projections on the inner circumferences of said members, means for rotating said annular members, means for forcibly expelling a gaseous element longitudinally into said tank from one end thereof, and devices for conducting the solution in said tank from the end thereof opposite said means back to the end of the tank adjacent the same.

17. An apparatus of the kind specified comprising a tank, a plurality of axially alining rotatable annular members which are arranged within said tank, a series of suitable projections on their inner circumferences, concentric annular gears secured alongside of and connected to said annular members, and means that engage and rotate the same.

18. An apparatus of the kind specified comprising a tank, a plurality of rotatable annular members which are arranged within said tank, concentric annular gears secured alongside of and connected to said annular members, removable segments for said members, corresponding gear segments made integral therewith and engaging said gears, and means for actuating said gears.

19. An apparatus of the kind specified comprising a tank, a plurality of revolving members having a series of projections whereby the lengths of pipe being cleansed are lifted in said tank to a suitable height and then dropped, and means for rotating said members.

20. An apparatus of the kind specified comprising a tank, a plurality of rotating members a portion of which are adapted to be immersed in the solution in said tank, and which are provided with projecting arms, which latter lift the pipe deposited in said tank out of said solution and then drop the same back again, and means for rotating said members.

In witness whereof I have hereunto set my hand this 27th day of March 1912.

WILLIAM J. McKAY.

Witnesses:
FRANK D. THOMASON,
E. K. LUNDY.