March 19, 1929. G. BUCHERT 1,706,348

MACHINE FOR AUTOMATICALLY COATING TUBES, PIPES, ETC

Filed Aug. 30, 1926 4 Sheets-Sheet 1

Fig. 1

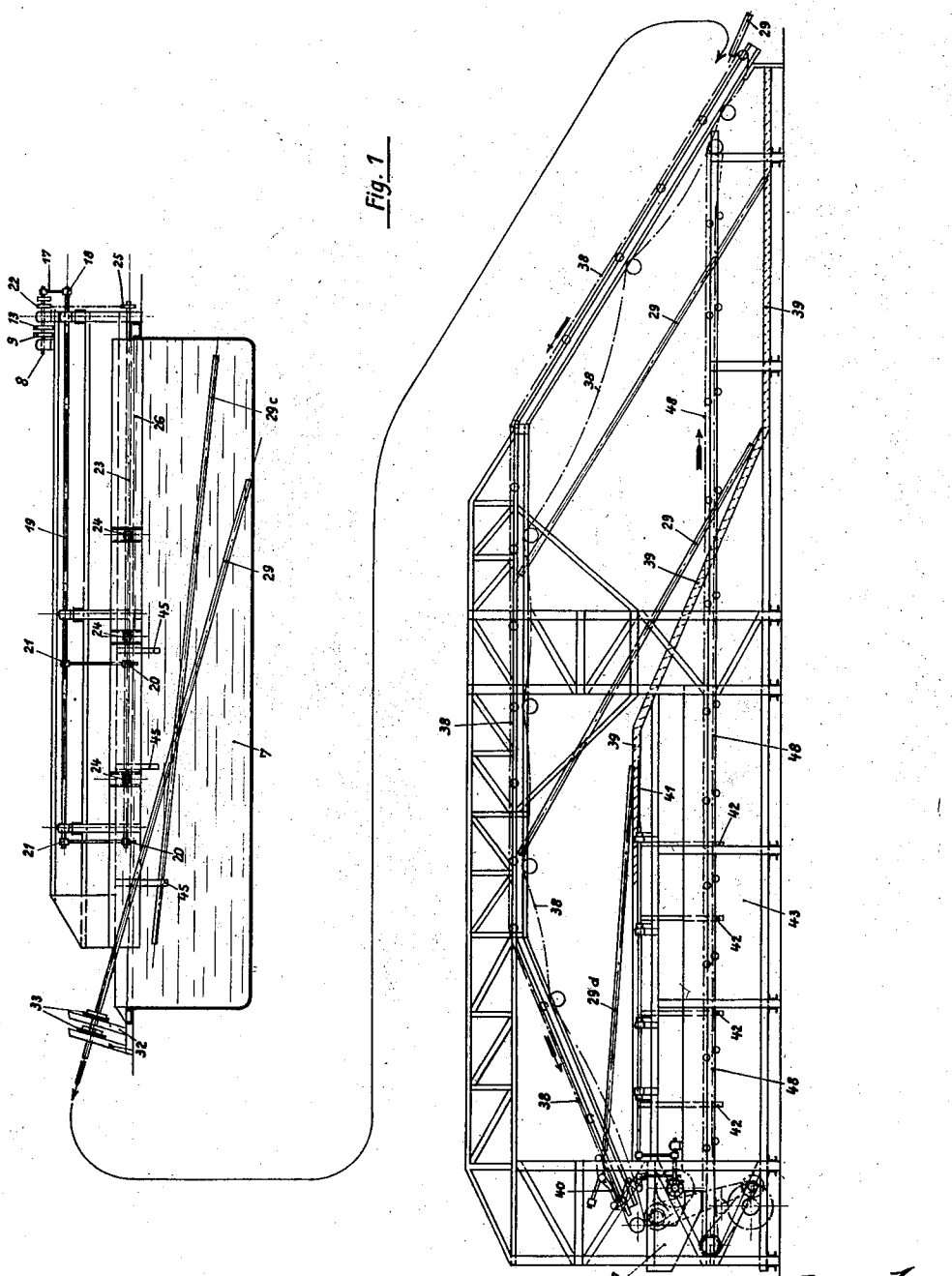

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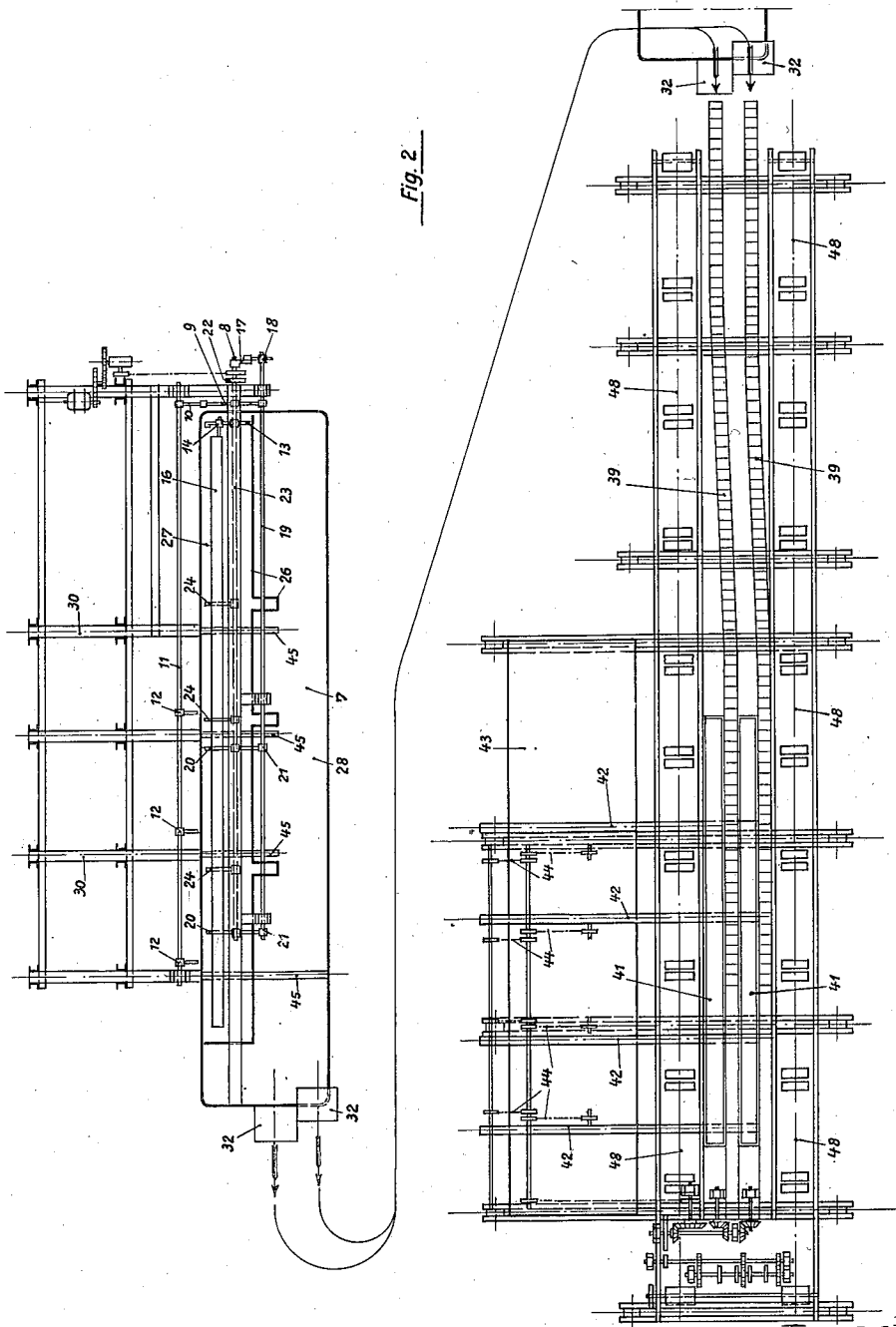
Fig. 2



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MACHINE FOR AUTOMATICALLY COATING TUBES, PIPES, ETC

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Fig. 3

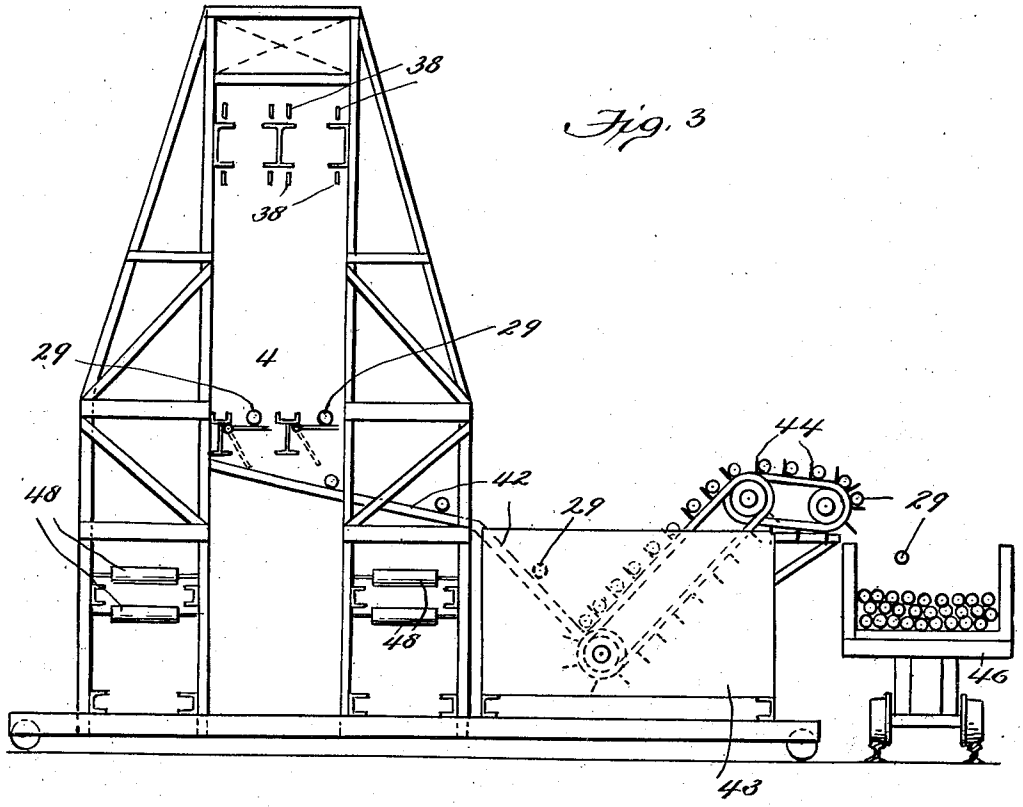
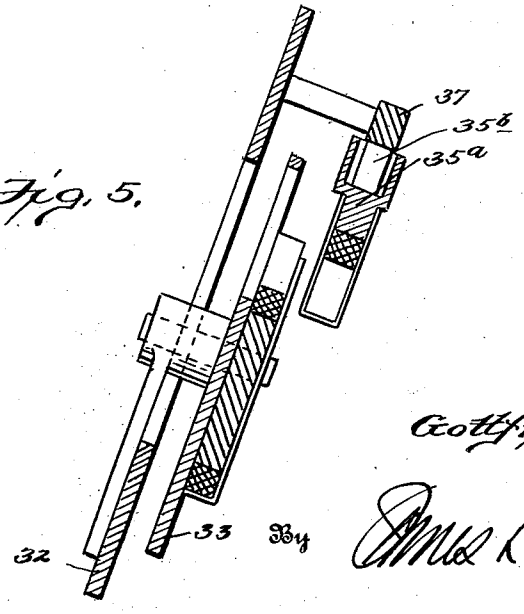


Fig. 5.



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MACHINE FOR AUTOMATICALLY COATING TUBES, PIPES, ETC

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Fig. 4

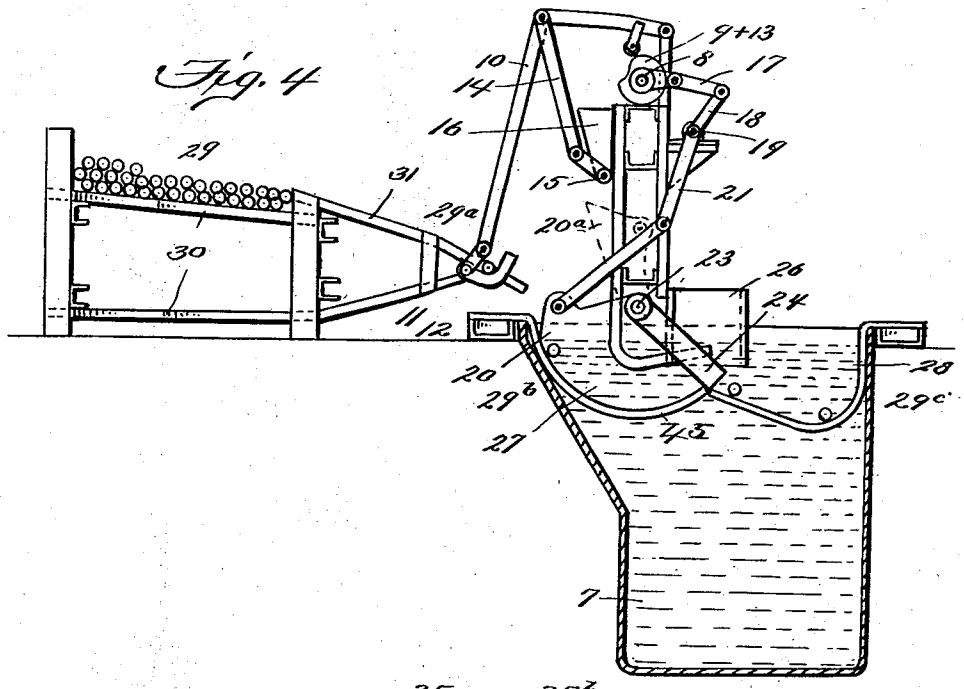
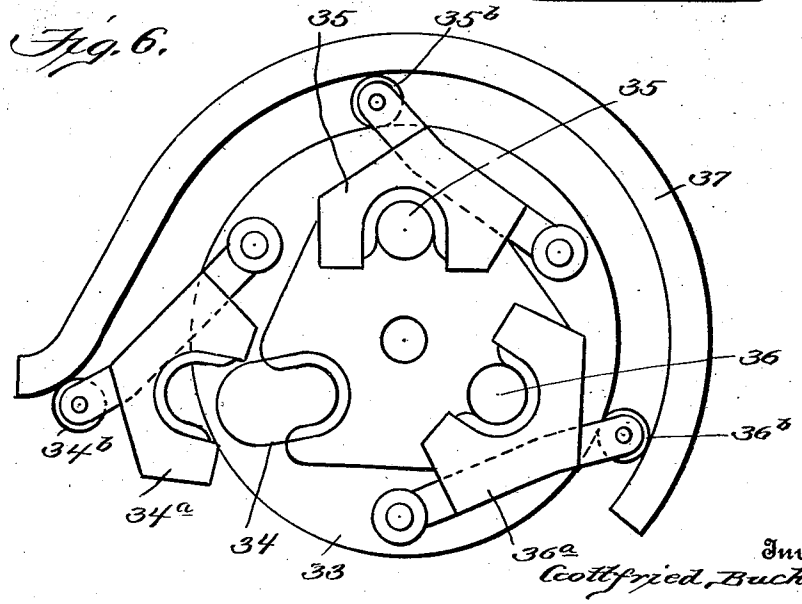


Fig. 6.



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Patented Mar. 19, 1929. 1,706,348

UNITED STATES PATENT OFFICE.

GOTTFRIED BUCHERT, OF LIEGNITZ, GERMANY.

MACHINE FOR AUTOMATICALLY COATING TUBES, PIPES, ETC.

Application filed August 30, 1926, Serial No. 132,568, and in Germany August 14, 1925.

This invention relates to a new and improved automatic apparatus, with the aid of which it has been possible to attain a perfectly continuous process of shifting tubes or other tube like bodies, when covering same with a metal-coating, such as zinc, tin, lead etc. or any other mass or material, such as asphalt, tar etc. for the purpose of insulation or rendering it rustproof etc.; and the present arrangement is designed as an improvement upon the apparatus as set forth in my U. S. Patent No. 1,034,687, dated August 6, 1912.

Devices for galvanizing tubes or other tube-like bodies are aleady known. These devices, however, embody the disadvantage, that they render a continuous working process of such extent, as will be met with as the result of the great capacity of a galvanizing pan, provided with modern means of heating in conjunction with a centralized works management, impossible. The economy of a tube-galvanizing plant is most favourably ensured, if by an even and regular charge and consequent highest possible production, the capacity of the metal-bath has been fully utilized.

Therefore, the main object of the present invention is the provision of an apparatus by means of which tubular or cylindrical bodies of metal may in a galvanizing process be submerged in a mordant or fixing bath to remove impurities from the surfaces for a predetermined length of time and in oblique position and then submerged in a galvanizing bath by a novel apparatus and from which they are drawn through a novel wiper and over a knocking out grate to be automatically delivered to a washing bath from which point they are removed to be definitely disposed of, the operation being a continuous, automatic, mechanical one from the time of entering the fixing bath to the removal from the washing bath.

This has been attained through the medium of the invention to the fullest possible extent:

1. By the provision of a charging-device, which automatically passes said goods through the metal-bath and places them in the inclined position of the so-called discharge- or outlet-side within the shortest possible time and to the extent required for this purpose.

2. By the provision of two or more draw-ways and by revolver-head-wiping-off devices, which not only enables the simultaneous depositing and drawing of a single tube, but also renders it possible to deposit and partly draw two tubes at the same time. The special construction of the draw- and knocking-out-ways and the provision of shaft-flaps ensures in a practical manner the further conveyance of the galvanized tubes even at shorter intervals than their own length.

By this arrangement a continuous, mechanical and automatic operation is obtained.

In the accompanying drawings:—

Fig. 1 is a diagrammatic side view of the complete apparatus.

Fig. 2 is a top plan diagrammatic view of the same.

Fig. 3 is a view taken from the outlet end of the conveying apparatus.

Fig. 4 is a detailed end view and partial sectional view of the galvanizing apparatus.

Fig. 5 is a sectional view through the revolving wiper head or device.

Fig. 6 is an end view thereof.

Charge and galvanizing apparatus.

The charging and galvanizing apparatus includes a framework 30 which supports the articles or tubes 29 to be treated and 7 designates the galvanizing tank which is provided at the upper central portion with the longitudinal partitions 26 submerged just the proper distance below the top of the bath and dividing the upper end of the tank into the chambers 27 and 28, the sal ammoniac which as usual is floating on top of the galvanizing material in the lower portion of the tank and the partition 26 have their lower edges disposed below the lower level of the sal ammoniac. The tube supporting apparatus 30 and guides 31 permit the tube 29 to assume the position 29^a for delivery against the pivoted angular arms 12 which are operated through the link 11 and long arm 10 and the lever 10^u which engages the cam 9 carried by the drive shaft 8. In this manner the rotation of the shaft 8 actuates this cam and in turn causes the angular arms 12 to tilt and thus deposit the tube 29 in an oblique position into the purifying or fixing bath at the upper portion of the tank 7 and upon the guides 45 and in the position 29^b as will presently appear.

The cam 13 is also fast to the drive shaft 8 and actuates the device 14 and through it the sal ammoniac stirring shaft 15 which is mounted in the sal ammoniac container 16.

The crank 17 is also fast to the shaft 8 and has imparted thereto a rocking movement so

that by means of the link 18 and shaft 19 and lever joints 21 the depressors 20 are operated to the dotted lines 20^a, the depressors 20 being provided to cause the tube 29 to be removed from the position 29^b after a predetermined length of submergence in the purifying or fixing bath into the zinc and finally to the position 29^c as will presently appear. A sprocket wheel 22 which actuates the shaft 23 is located above the edge of the galvanizing bath and carries the conveyer arms 24 movable in the same direction as the drive shaft 8. A driving sprocket 25 is placed exteriorly of the zinc bath 7 and is driven by a chain so that the conveyer arms 24 as well as the depressors 20 are operated alternately so that the tubes to be galvanized are introduced to the inner side as before stated in an inclined or oblique position, thus avoiding a formation of air bubbles and the consequent explosion. As before stated the surface of the zinc has been sub-divided into the inlet side 27 and the outlet side 28 by means of the dividing wall 26.

Tube wiping mechanism.

After the tubes have been submergerd a predetermined length of time and are delivered to the position 29^c and the arms 24 then having been introduced one at a time in succession, the first tube is lifted manually or otherwise so that the upper end may be disposed in the proper receptacle as for instance at 33 of the wiping off device 32, the same being a revolving device and provided with three independent peripherally disposed wipers 34, 35 and 36 each of which is composed of a fixed member and with a movable gripping or releasing arms 34^a, 35^a or 36^a. Each one of the latter is provided with a roller 34^b, 35^b and 36^b which as the head is rotated will engage the cam track or guide 37, and by means of which the arms are moved into closed position or released in open position.

Drawing apparatus.

The drawing apparatus includes tongs T each one of which is provided with a traverse *t* which after the upper end of the tube has been gripped by such tong, it being at the end beyond the wiper head the same is attached to one of the endless conveyers 38 and thus carried in such oblique position to be drawn through the wiper and cleared of all surplus zinc before the lower end is finally placed upon the knocking out grate 39 there being one to each conveyer 38. When the conveyer 38 has reached the point for the tong to be released, a tong releaser 40 one to each conveyer is engaged, the tong released from the tube and the tube permitted to fall outward upon the releasing arms, wings or flaps 41 which in turn assumes the position 41^a and deliver the tube upon the guides 42 where it is directed into the washing system or tank 43. The tube now enters or is engaged by the conveyer 44 and is elevated from the washing tank and delivered into the car or other receptacle 46.

The tong when released from the tube and its tong release falls into the funnel shaped member 47 which delivers said tong upon its respective endless conveyer 48, said conveyer moving toward the wipers so that the tong may be manually removed and operated to engage a succeeding tube. By the arrangement of wiper head two tubes may be drawn one by each conveyer 38 practically simultaneously or in such close succession as to produce a staggered continued operation as two tubes can be in the wiper head at one time while the third tube is being removed or placed therein.

It is also possible that three tubes may assume the position 29^b and that instead of one being removed by the arms 24 three may assume the position at 29^c, but only one at a time can be secured in the wiper head.

From the foregoing description taken in connection with the drawings it is evident that with the hereinbefore described apparatus the continued mechanical method of coating tubes and particularly galvanizing tubes is provided for, the tube being delivered to the fixing bath retained there a predetermined length of time then submerged into the galvanizing bath and removed therefrom and while being removed, having the surplus zinc wiped therefrom then carried over the knocking out grate which knocks the surplus zinc from the surfaces of the tube and finally delivers the tube into a washing bath for final disposition the rotary wiper head, parallel knocking out grates and endless tong carrying chains permitting a continuous operation upon successive and slightly overlapping tubes, so that no time is lost in the operation.

It is evident that this apparatus will operate upon tubular or cylindrical objects such as rods and the like and therefore can be used for coating the objects with paint or tar or other water resistant.

I claim—

1. In an apparatus for coating tubes, the combination of a fixing bath, a zinc bath coextensive therewith, mechanical means for continuously delivering the tubes one at a time in overlapping succession to said fixing bath, mechanical means for automatically submerging a tube in said zinc bath for a predetermined coating operation, means for drawing a tube from the zinc bath in an oblique position, means for wiping the tube as it is being drawn, a knocking out grate in the path of the lower end of the tube and over which the tube is pulled after being wiped, means for releasing the upper end of the tube, a washing bath, means for deliver-

ing a released tube to the washing bath, and means for removing the tube from said bath.

2. In an apparatus for coating tubes, the combination of a fixing bath for receiving the tubes, a zinc bath co-extensive therewith, an oblique plane for continuously delivering the tubes one at a time in overlapping succession to said fixing bath, mechanical means for automatically submerging a tube in said zinc bath for a predetermined coating operation, means for drawing a tube from the zinc bath in an oblique position, means for wiping the tube as it is being drawn, a knocking out grate in the path of the lower end of the tube and over which the tube is pulled after being wiped, means for releasing the upper end of the tube, a washing bath, means for delivering a released tube to the washing bath, and means for removing the tube from said bath.

3. In an apparatus for coating tubes, the combination of a fixing bath for receiving the tubes, a zinc bath co-extensive therewith, mechanical means for continuously delivering the tubes one at a time in overlapping succession to said fixing bath, mechanical means for automatically submerging a tube in said zinc bath for a predetermined coating operation, means for drawing a tube from the zinc bath in an oblique position, means for wiping the tube as it is being drawn, a knocking out grate in the path of the lower end of the tube and over which the tube is drawn after being wiped, a plurality of inclined tracks for releasing the upper ends of the tubes, a washing bath, means for delivering a released tube to the washing bath, and means for removing the tube from said bath.

4. In an apparatus for coating tubes, the combination of a fixing bath for receiving the tubes, a zinc bath co-extensive therewith, mechanical means for continuously delivering the tubes one at a time in overlapping succession to said fixing bath, mechanical means for automatically submerging a tube in said zinc bath for a predetermined coating operation, means for drawing a tube from the zinc bath in an oblique position, a wiping-off device with revolving head and several wipers, a knocking out grate in the path of the lower end of the tube and over which the tube is pulled after being wiped, means for releasing the upper end of the tube, a washing bath, means for delivering a released tube to the washing bath, and means for removing the tubes from said bath.

5. In an apparatus for coating tubes, the combination of a fixing bath for receiving the tubes, a zinc bath co-extensive therewith, mechanical means for continuously delivering the tubes one at a time in overlapping succession to said fixing bath, mechanical means for automatically submerging a tube in said zinc bath for a predetermined coating operation, means for drawing a tube from the zinc bath in an oblique position, a wiping-off device with revolving head and several wipers, a knocking out grate in the path of the lower end of the tube and over which the tube is pulled after being wiped, a plurality of inclined tracks for releasing the upper ends of the tubes, a washing bath, means for delivering a released tube to the washing bath, and means for removing the tubes from said bath.

6. In an apparatus for coating tubes, the combination of a fixing bath for receiving the tubes, a zinc bath coextensive therewith, mechanical means for continuously delivering the tubes one at a time in overlapping succession to said fixing bath, mechanical means for automatically submerging a tube in said zinc bath for a predetermined coating operation, means for drawing said tubes from the zinc bath in an oblique position, a plural wiping means for wiping one tube at a time as it is being drawn, a knocking out grate in the path of the lower end of the tube and over which the tube is drawn after being wiped, means for releasing the upper end of the tube, a washing bath, and automatic receiving and releasing means for receiving and releasing one tube at a time to the washing bath.

7. In an apparatus for coating tubes, the combination of a fixing bath for receiving the tubes; a zinc bath coextensive therewith; mechanical means for continuously delivering the tubes one at a time in overlapping succession to said fixing bath and comprising continuously revolving oscillatory tube conveyer arms and depressors, means for driving said conveyer arms and depressors, and means for automatically charging the conveyer arms with tubes to be coated with zinc; means for drawing a tube from the zinc bath in an oblique position; means for wiping the tube as it is being drawn; a knocking out grate in the path of the lower end of the tube and over which the tube is drawn after being wiped; means for releasing the upper end of the tube; a washing bath; means for delivering a released tube to the washing bath; and means for removing the tube from said bath.

8. In an apparatus for coating tubes, the combination of a fixing bath for receiving the tubes, means for automatically feeding a fixing material to said bath, a zinc bath coextensive with the fixing bath, mechanical means for continuously delivering the tubes one at a time in overlapping succession to said fixing bath, mechanical means for automatically submerging a tube in said zinc bath for a predetermined coating operation, means for drawing said tubes from the zinc bath in an oblique position, means for wiping the tube as it is being drawn, a knocking out grate in the path of the lower end of the tube and over which the tube is drawn after being wiped, means for releasing the upper end of

the tube, a washing bath, means for delivering a released tube to the washing bath, and means for removing the tube from said bath.

9. In an apparatus for coating tubes, the combination of a fixing bath for receiving the tubes, a zinc bath coextensive therewith, mechanical means for continuously delivering the tubes one at a time in overlapping succession to said fixing bath, mechanical means for automatically submerging said tubes in said zinc bath for a predetermined coating operation, means for drawing said tubes from the zinc bath in an oblique position, means for wiping the tube as it is being drawn, a knocking out grate in the path of the lower end of the tube and over which the tube is drawn after being wiped, a plurality of tracks, for directing and releasing the upper end of the tube, said tracks being inclined upwardly to the horizontal and then downwardly, means for releasing the upper end of the tube, a washing bath, means for delivering a released tube to the washing bath, and means for removing the tube from said bath.

10. In an apparatus for coating tubes, the combination of a fixing bath for receiving the tubes, a zinc bath coextensive therewith, mechanical means for continuously delivering the tubes one at a time in overlapping succession to said fixing bath, mechanical means for automatically submerging a tube in said zinc bath for a predetermined coating operation, means for drawing said tube from the zinc bath in an oblique position, means for wiping the tube as it is being drawn, knocking out grates in the path of the lower ends of the tubes and over which the tubes are drawn after being wiped, and a plurality of inclined tracks for releasing the upper end of the tubes, said tracks being deviated laterally from their initial direction in their further continuation.

11. In an apparatus for coating tubes, the combination of a fixing bath for receiving the tubes, a zinc bath coextensive therewith, mechanical means for continuously delivering the tubes one at a time in overlapping succession to said fixing bath, mechanical means for automatically submerging a tube in said zinc bath for a predetermined coating operation, means for drawing said tube from the zinc bath in an oblique position, means for wiping the tube as it is being drawn, knocking out grates in the path of the lower ends of the tubes and over which the tubes are drawn after being wiped, a plurality of inclined tracks for releasing the upper end of the tubes, said tracks being deviated laterally from their initial direction in their further continuation, the tracks leading upwardly, horizontally and downwardly, a washing bath, and a wing for receiving and delivering a tube at a time to the washing bath.

12. In an apparatus for coating tubes, the combination of a fixing bath for receiving the tubes, a zinc bath co-extensive therewith, mechanical means for continuously delivering the tubes one at a time in overlapping succession to said fixing bath, mechanical means for automatically submerging a tube in said zinc bath for a predetermined coating operation, means for drawing a tube from the zinc bath in an oblique position, means for wiping the tube as it is being drawn, knocking out grates in the path of the lower ends of the tubes and over which the tubes are drawn after being wiped, a plurality of tracks for releasing the upper end of the tube, said tracks leading upwardly, horizontally and downwardly, a washing bath, and an automatic wing for receiving and delivering a tube at a time to the washing bath.

13. In an apparatus for coating tubes, the combination of a fixing bath for receiving the tubes, a zinc bath co-extensive therewith, mechanical means for continuously delivering the tubes one at a time in overlapping succession to said fixing bath, mechanical means for automatically submerging a tube in said zinc bath for a predetermined coating operation, means for drawing a tube from the zinc bath in an oblique position, means for wiping the tube as it is being drawn, knocking out grates in the path of the lower ends of the tubes and over which the tubes are drawn after being wiped, each knocking out grate being horizontal at the beginning, inclining intermediately and terminating horizontally, a plurality of inclined tracks for releasing the upper end of the tube, said tracks inclining upwardly at the entrance, being level intermediately and inclining downwardly at the end, a washing bath, and a wing for receiving and delivering a tube at a time to the washing bath.

14. In an apparatus for coating tubes, the combination of a fixing bath for receiving the tubes, a zinc bath co-extensive therewith, mechanical means for continuously delivering the tubes one at a time in overlapping succession to said fixing bath, mechanical means for automatically submerging a tube in said zinc bath for a predetermined coating operation, means for drawing a tube from the zinc bath in an oblique position, means for wiping the tube as it is being drawn, knocking out grates in the path of the lower ends of the tubes and over which the tubes are drawn after being wiped, each knocking out grate being horizontal at the beginning, inclining intermediately and terminating horizontally, a plurality of inclined tracks for releasing the upper end of the tube, said tracks inclining upwardly at the entrance, being level intermediately, and inclining downwardly at the end, both the knocking out grate and the inclined tracks being deviated laterally from their initial direction in their further continuation, a washing bath, and a wing for receiving

a tube at a time and delivering it to the washing bath.

15. In an apparatus for coating tubes, the combination of a fixing and galvanizing bath, means for delivering a tube at a time in succession to said bath, means for moving the tubes through the bath, a wiping means having a plurality of wipers adjacent the outlet end of the bath, two parallel endless chains leading from the outlet end of the bath, the entrance to each of which is adjacent the wiping means, tube gripping means carried by said chains and adapted to engage the tube and draw the same while in inclined position through the wiper thereof, two parallel knocking out grates below the respective chains and over which the respective chains pull the tubes, a horizontally disposed tube-receiving wing adjacent the outlet end of each grate and upon which the tube is placed, means for releasing the tube from the gripping means, a wash bath into which each wing directs its tube, and means for operating the endless chains and wings in timed relation.

In testimony whereof I have hereunto set my hand.

GOTTFRIED BUCHERT.