July 11, 1933. C. E. BEDELL 1,917,918

SYSTEM OF APPARATUS FOR GALVANIZING METAL PIPES

Filed April 3, 1930 7 Sheets-Sheet 1

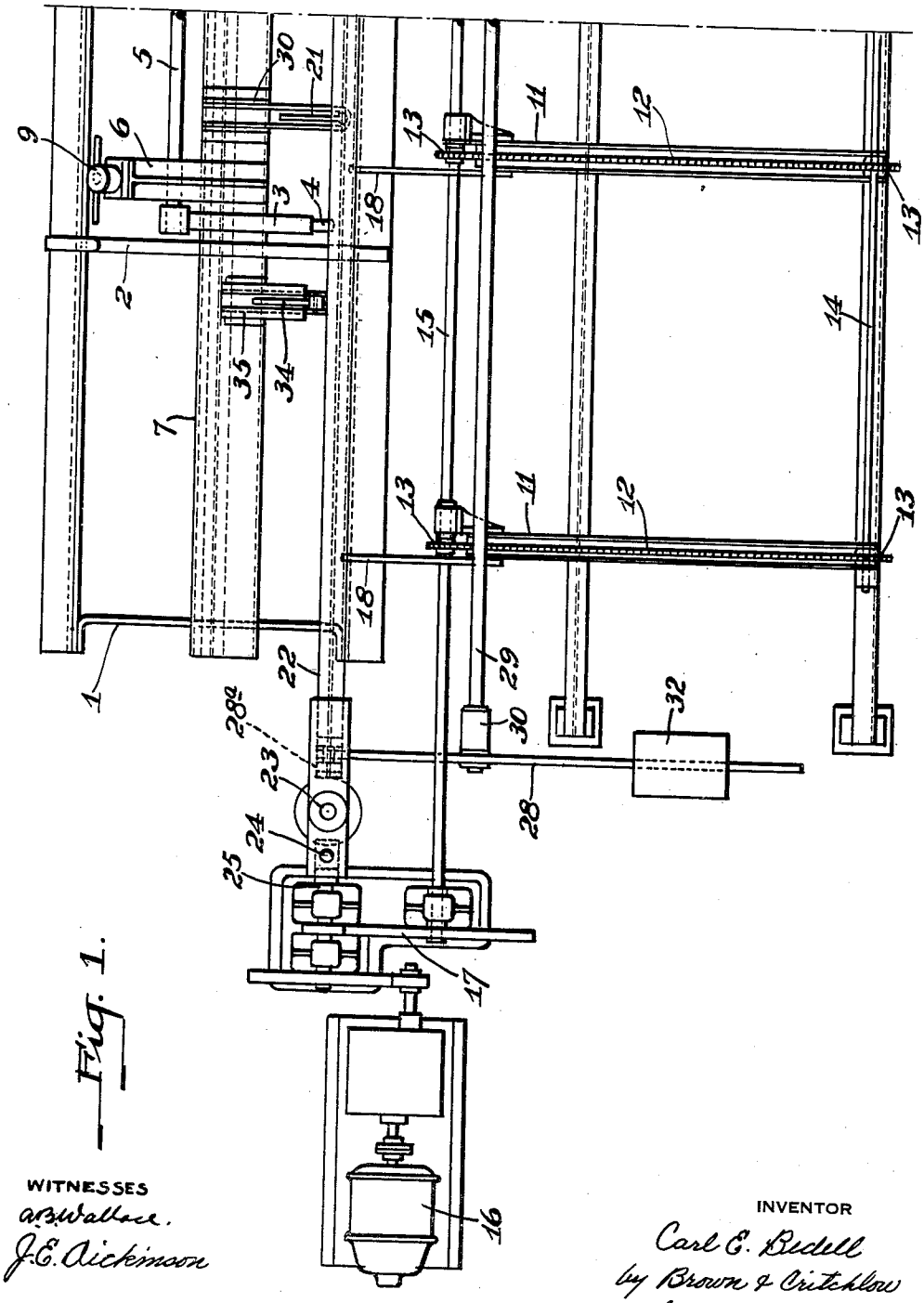


Fig. 1.

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SYSTEM OF APPARATUS FOR GALVANIZING METAL PIPES

Filed April 3, 1930 7 Sheets-Sheet 2

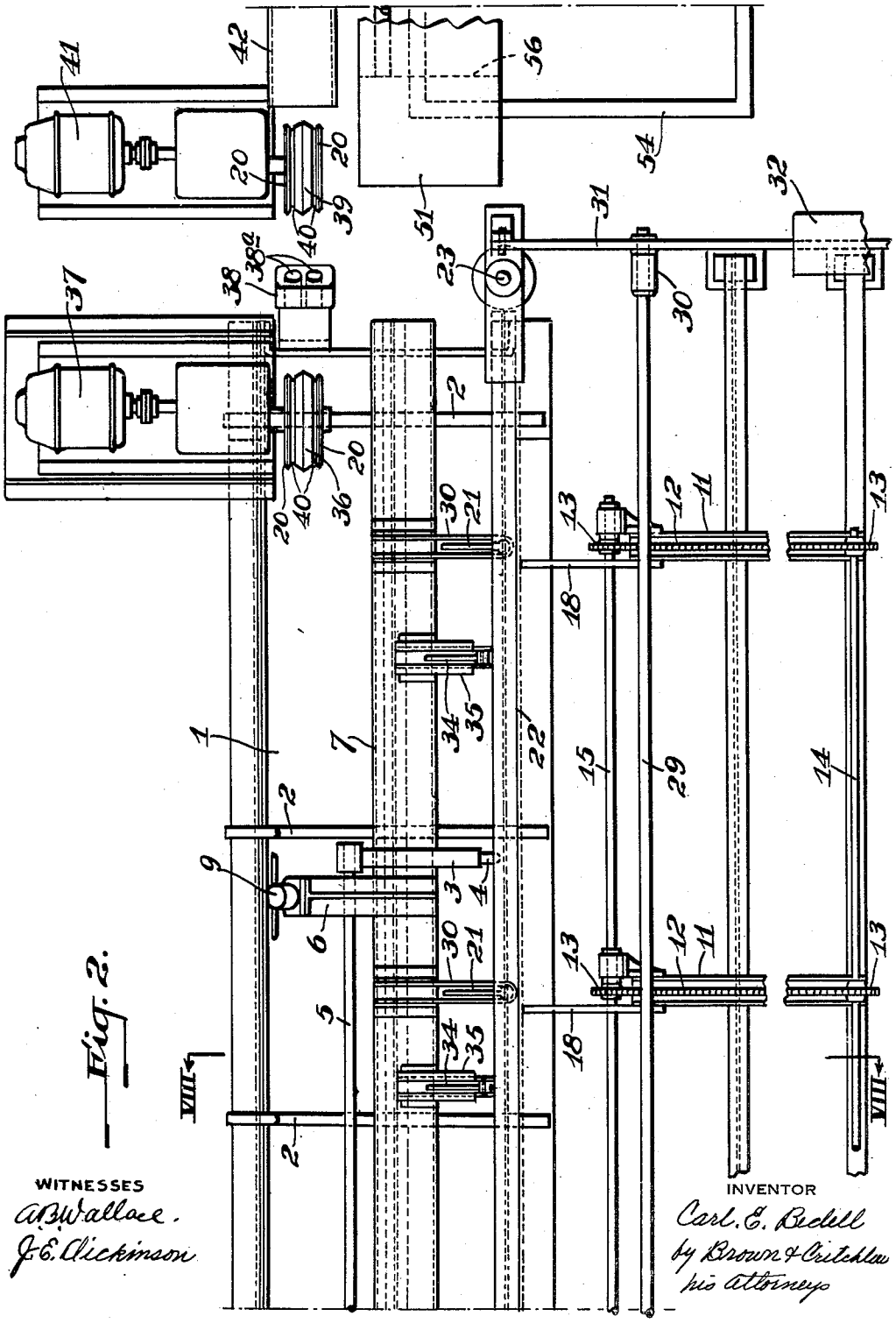


Fig. 2.

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SYSTEM OF APPARATUS FOR GALVANIZING METAL PIPES

Filed April 3, 1930 7 Sheets-Sheet 3

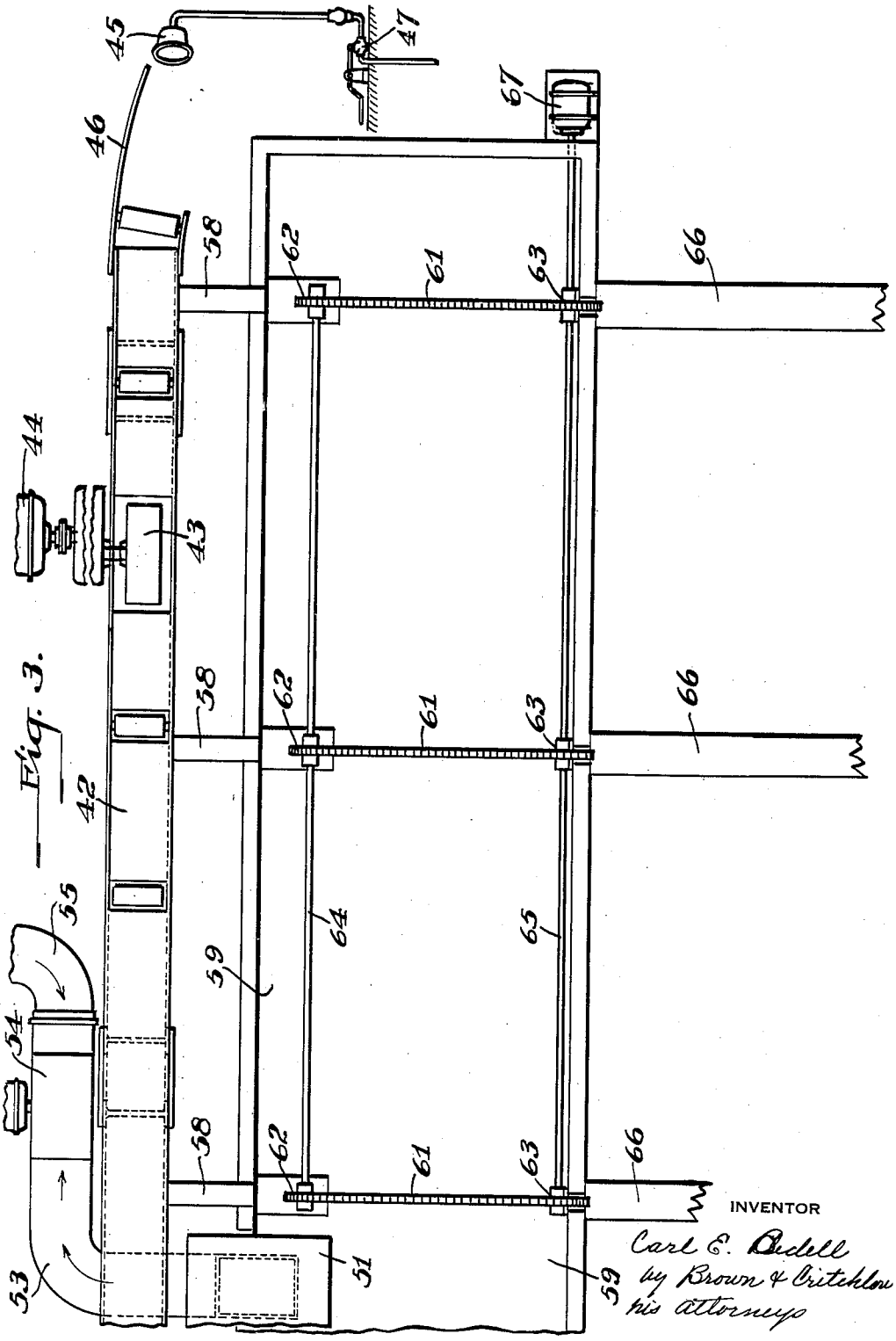


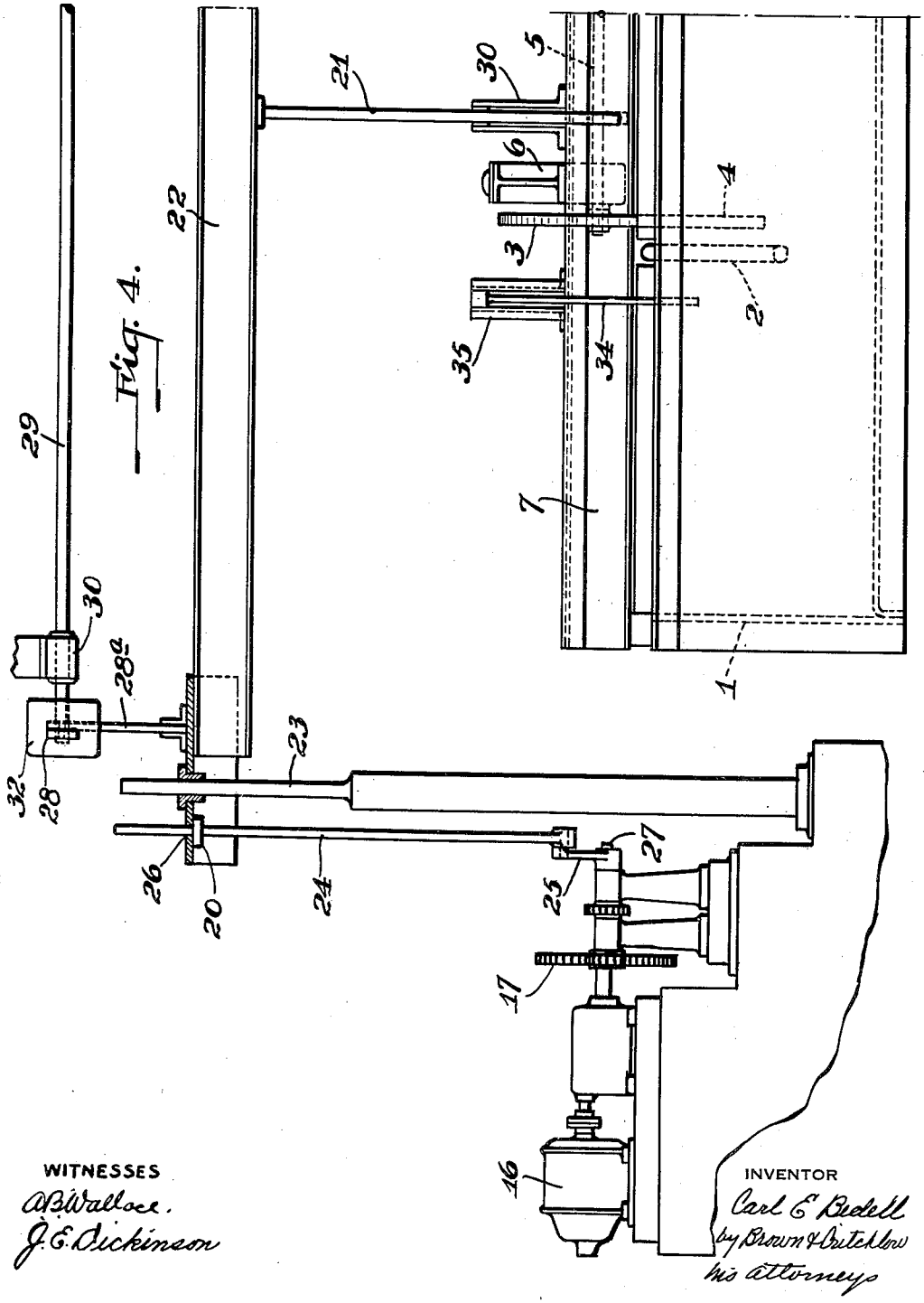
Fig. 3.

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SYSTEM OF APPARATUS FOR GALVANIZING METAL PIPES

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Fig. 4.



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SYSTEM OF APPARATUS FOR GALVANIZING METAL PIPES

Filed April 3, 1930 7 Sheets-Sheet 5

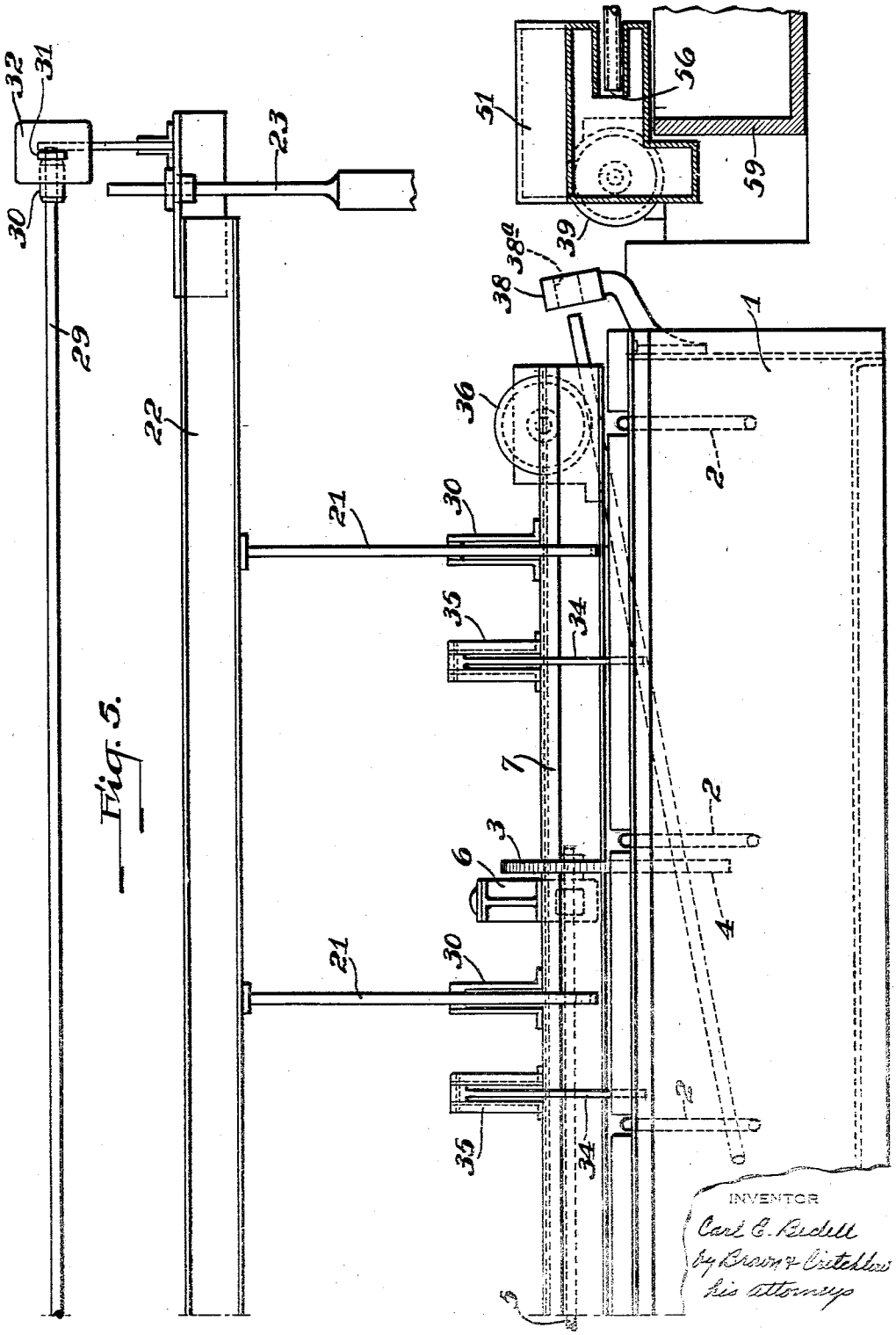


Fig. 5.

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SYSTEM OF APPARATUS FOR GALVANIZING METAL PIPES

Filed April 3, 1930 7 Sheets-Sheet 6

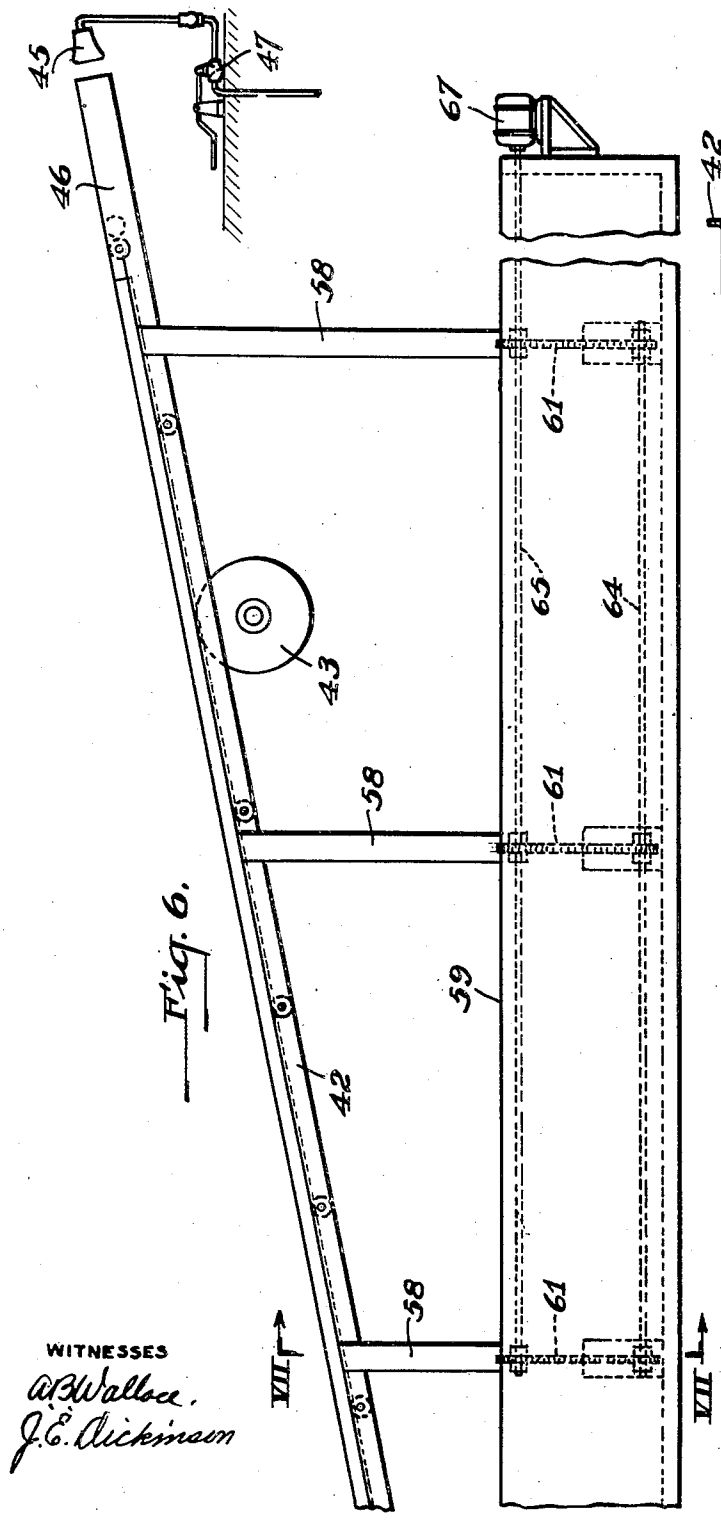


Fig. 6.

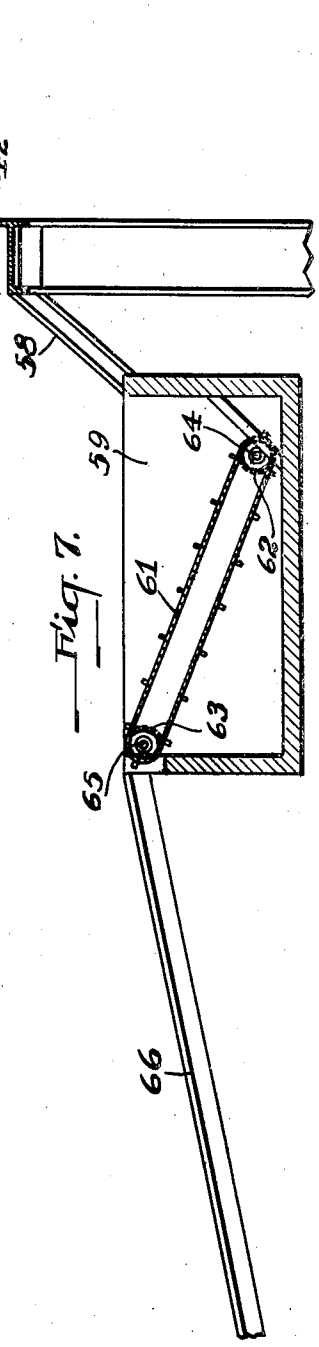


Fig. 7.

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SYSTEM OF APPARATUS FOR GALVANIZING METAL PIPES

Filed April 3, 1930 7 Sheets-Sheet 7

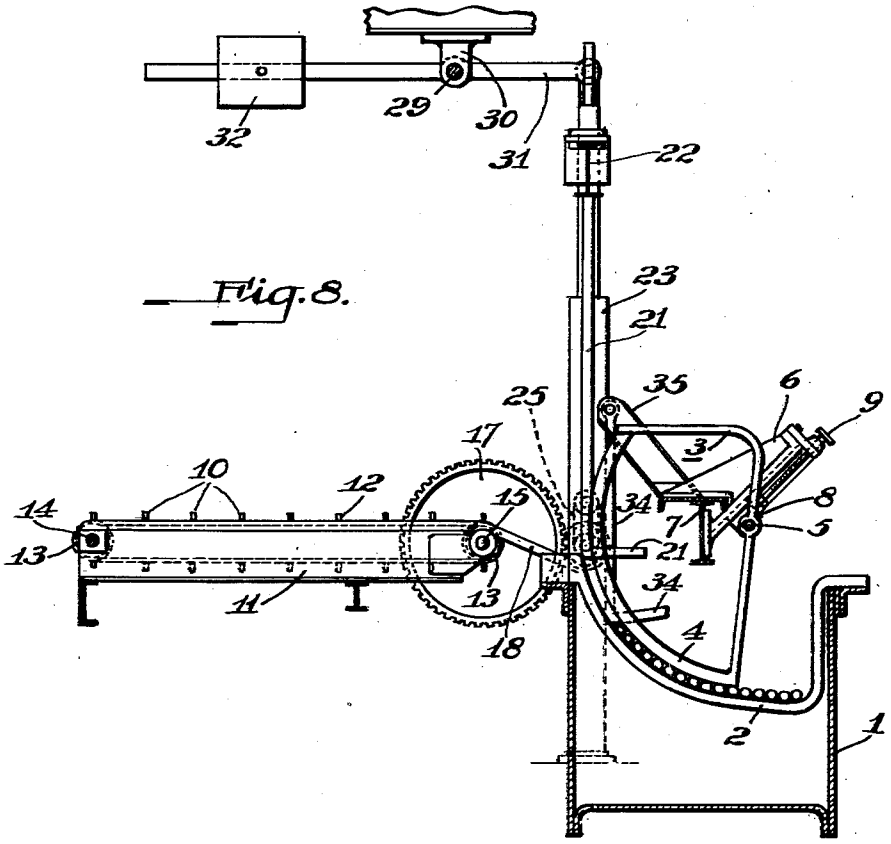


Fig. 8.

Fig. 9.

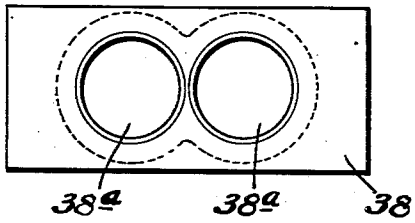
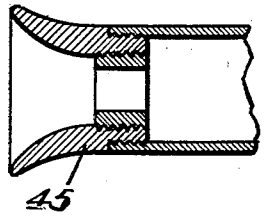


Fig. 10.



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UNITED STATES PATENT OFFICE

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SYSTEM OF APPARATUS FOR GALVANIZING METAL PIPES

Application filed April 3, 1930. Serial No. 441,265.

This invention pertains to the manufacture of galvanized metal pipes and relates more particularly to a system of apparatus for performing the galvanizing.

The primary object of the invention is to provide an improved system of apparatus for producing a superior grade of galvanized pipes at a high rate of speed and at a minimum cost.

Another object is to provide in the system for improving the surface of the galvanized coating on the pipes by wiping the excess spelter from both the inner and outer surfaces of the pipes and then passing them through a quenching bath before they have had time to cool after leaving the spelter bath.

A further object is to provide a galvanizing system of this character which is adapted to be installed in a comparatively limited amount of space and is capable of being efficiently and safely operated by a minimum number of unskilled laborers.

These and various other objects as well as the many novel features and advantages of the invention will become more apparent when the following detailed description is read in conjunction with the accompanying drawings of which Figs. 1, 2 and 3, when arranged end to end, form a plan view of what is now considered to be the preferred embodiment of the invention; Figs. 4, 5 and 6 when arranged in the same manner, comprise an elevational view of the apparatus shown in Figs. 1, 2 and 3 showing it with the feeding conveyor removed and a portion of Fig. 5 in section; Fig. 7 is a sectional view of the quenching tank taken on the line VII—VII of Fig. 6; Fig. 8 is a sectional view of the galvanizing pot, and feeding conveyor taken on the line VIII—VIII of Fig. 2; Fig. 9 is a front view of the wiper employed for removing the spelter from the exterior of the pipes; and Fig. 10 is a sectional view of the blower nozzle employed to force air or steam through the pipes at the upper end of the run-out table to remove the excess spelter from the inside of the pipes.

In accordance with the invention a tank or pot 1 of elongate form capable of holding a number of pipes at a time is employed for containing the molten spelter utilized for coating the pipes, and into it the pipes are fed in a lateral fashion. For guiding the travel of the pipes through the spelter a plurality of support rods 2 are arranged in the pot in spaced relation between its opposite ends. These rods as viewed in Fig. 8, extend in a sloping curved manner from the edge where the pipes enter the pot to the opposite wall, where they support the pipes below the surface of the pot, in a position from whence they may be withdrawn from the spelter with ease. Above these rods there is arranged a guiding device 3 which forms with them a guideway through which the pipes must move in passing through the pot, and by reason of which the pipes are maintained in alignment. This facilitates the movement of the pipes through the pot as well as insures their removal therefrom in the order that they enter it.

This guideway comprises a pair of curved bars 4 mounted on a shaft 5 that is in turn secured by brackets 6 to a beam 7 mounted on top of the pot. The brackets 6 employed for this purpose are equipped with movable parts 8 (Fig. 8) which engage shaft 5 and screws 9 by means of which the guide device may be adjusted to adapt the guideway for the reception of different size pipes. The device is also adapted to permit its being rotated about shaft 5 to provide for facilitating the disengaging of any pipes which may get lodged in the guideway.

For delivering the pipes in a lateral manner to the pot, a conveyor table 11 is employed. This table is provided with a plurality of lug chains 12 which extend around sprocket wheels 13 mounted on shafts 14 and 15 at the front and back of the table, respectively. To one end of shaft 15, through a suitable gear 17, a motor 16 is connected to operate the conveyor, while between the front end of the table and the edge of the pot there are arranged in spaced relation a plurality of skids 18 for guiding the pipes into the pot as they leave the conveyor.

Spelter used for galvanizing purposes of

this character normally develops a formation on its surface which is usually capable of causing the articles which are to be galvanized to float on its surface for a considerable length of time unless they are forced through it by some means other than their own weight. For this purpose, and to speed up the operation of the system, a plurality of sinker rods 21 are employed. These rods are suspended from a sinker beam 22 which is guided by end posts 23 stationed at the opposite ends of the pot adjacent its entrance side. At the forward end of the pot rods 21 are made longer at the forward than at the rear end of the pot so that the forward ends of the pipes will be forced first into the spelter. This permits the spelter to run freely upward through the pipes, causing their interior surfaces to be thoroughly coated.

For raising the sinker beam and sinker rods a crank 25 is mounted on and rotated by the shaft 27 (Fig. 4) on which the gear 17 is supported. Between the crank and the rear end of the sinker beam there is provided a push rod 24, the upper end of which is passed loosely through an opening 26 formed in the beam. A collar or abutment 20 is provided on this rod below the beam for engaging and positively moving the beam on the upstroke of the crank only. By this arrangement the rod is permitted to pull away from the beam on the downstroke, letting the beam settle to its lower position due to gravity only. The advantage of such a provision is that it allows the weight of the beam to assist in forcing the pipes into the spelter while at the same time protecting the sinker rods and driving mechanism against injury in case the sinker rods become fouled on the down stroke of the push rod.

To the rear end of beam 22 there is attached by means of a connecting link 28*a* a lever 28 which is keyed to a shaft 29 rotatably mounted in supports 30. On the opposite end of shaft 29 a similar lever 31 is secured, and it in turn is connected to the front end of beam 22 to cause the two ends of the beam to be raised and lowered at the same time. To suitably counteract the weigh of beam 22, levers 28 and 31 are extended beyond shaft 29 and provided with suitable counterweights 32.

To prevent the warping and bending of the heated pipes from forcing them out of the spelter after they have been placed in it, a plurality of latches 34 are provided. These are pivotally suspended from brackets 35 attached to beam 7 at spaced intervals along the length of the pot, and are so mounted that they move toward the center of the pot when the sinker rods push the pipes past them, and then by gravity drop back into place and prevent the pipes from rising out of the guideway.

To insure against any jamming of the pipes as they enter the pot, or interference between the pipes and sinker rods, the conveyor table and sinker rods are operated in synchronism with one another. That is, the rods are moved down and up each time a rows of lugs 10 on the chains 12 delivers a pipe to the pot, thus eliminating any possibility of more than one pipe being under the sinker rods at a time. For preventing the sinker rods moving laterally, they are engaged by guards 30 mounted on beam 7.

After the pipes have passed down the guide rods 2 to the front side of the pot, they are picked up by an operator who stands at the forward end of the pot and lifts them, by means of a hook or other suitable tool, into engagement with the lower face of a magnetic reel 36 mounted in the front end of the pot. This reel which is driven by a suitable electric motor 37 draws the pipes in an inclined position out of the pot and forces them through a wiper 38 into engagement with the upper face of a second magnetic reel 39 driven by a motor 41 located at the lower end of an upwardly inclined run-out table 42. In its preferred form this wiper is of the well known type employing a blast of air or steam for wiping the spelter from the outer surface of the pipes.

To increase production the wiper, as shown in Fig. 9, may be equipped with two pipe-receiving openings 38*a* so that two pipes may be wiped by it at the same time, and for guiding the pipes into and through these openings, annular grooves 40, in which the pipes are adapted to fit, are provided about the peripheries of reels 36 and 39. The outer edges of these grooves are preferably made up of bands 20 of non-magnetic material fitted on the edge of the reels to overcome any tendencies the pipes may have of creeping up the sides of the grooves and thereby getting out of alignment with the opening in the outside wiper 38.

From the pot the pipes are moved upwardly upon table 42 by the action of the magnetic reels, the table being provided with rollers arranged at spaced intervals along its length to facilitate such movement. Near the upper end of the table there is provided another magnetic reel 43 operated by a motor 44, which reel differs from the others in that its surface is flat to facilitate lateral removal of the pipes from the table.

At the top end of the table there is arranged an adjustable blower 45 (Figs. 6 and 10) which is adapted to receive the ends of the pipes for projecting a blast of air or steam through them to remove such excess spelter adhering to their inner surfaces as may not have run back into the pot due to gravity as the pipes were passing up the run-out table. To facilitate moving the ends of the pipes to blower 45, and also their removal

from table 42, a curved guide rail 46 (Fig. 3) is mounted on the upper end of the table in such a way as to engage the upper ends of the pipes as they reach the upper end of their travel and force them across and off the table.

As shown in Figs. 3 and 6, the blower or nozzle 45 is made movable so that it may be applied to the ends of the pipes with ease by an operator stationed at the upper end of the table, and, as shown in Fig. 10, is adapted by a funnel-like construction to fit pipes of different sizes, so that it will be unnecessary to change it every time a different size of pipe is run through the system. Adjacent the nozzle on the platform on which the operator stands, there is provided a treadle-operated valve 47 arranged in the air or steam line leading to the nozzle, by means of which treadle the operator can control the supply of air or steam with his foot.

A difficulty commonly encountered when hot spelter and foreign matters are blown from the inside of pipes by means of air or steam, as is done here, is that a considerable amount of very obnoxious and disagreeable fumes are usually produced. To overcome this a suction box 51 (Fig. 3) is arranged at the lower end of table 42 in such a way that the ends of the pipes lie in it when the spelter is being blown from them. For establishing a suction in this box, it is connected by means of a pipe 53 to the inlet of a motor-operated fan 54 which is in turn connected to a pipe 55 extending some distance, such as through the roof, from the system, where the fumes will not annoy the operators. The suction developed by the fan is adapted to collect the fumes produced by the blower, box 51 being equipped with a slotted opening 56 through which the lower ends of the pipes are caused to pass when the blower is applied.

From the run-out table the pipes pass down a plurality of skids 58 into a quenching bath, preferably water, contained in a tank 59 arranged beside the run-out table. The effect of this quenching bath is to improve the galvanized coating on the pipes by making it tougher and more adhesive to the pipe than it would be if it were allowed to cool gradually in air as is the usual practice.

For removing the pipes from the quenching tank and delivering them to a discharge table 66, a conveyor, formed by lugged chains 61 mounted on sprocket wheels 62 and 63 carried by a pair of shafts 64 and 65, is built in the tank, a motor 67 being connected to one end of shaft 64 for operating the conveyor. From table 66 the pipes completely galvanized are taken from the system.

In the operation of the system pipes are fed onto conveyor table 11 in such a way that each row of lugs on chains 12 deliver a single large or any suitable number of smaller pipes to the pot. As the pipes, delivered to the pot in this manner, slide down the skids 18 into the guideway formed by the support rods 2 and the bars 4 of the guide device 3, they are engaged by the sinker rods 21 which are so driven that they move down and up each time a row of lugs delivers a pipe to the pot. Accordingly, they force the pipes under the surface of the spelter where they are engaged by the latch members 34 and prevented from being forced out of the spelter. Due to the sinker rods being longer at the forward than at the back end, the pipes are forced into the spelter on an angle which permits spelter to flow upwardly through their centers with ease and causes their inner surfaces to be thoroughly coated.

After being forced under the surface of the spelter the pipes slide down the guideway to a position adjacent the other side of the pot, from which position, after they have been thoroughly coated, they are picked up at their forward ends with the aid of a suitable tool and lifted into contact with the under side of the run-out reel 36. This reel, rotated by motor 37, forces the pipes through exterior wiper 38, causing the excess spelter adhering to the outer surface of the pipe to be effectively and smoothly removed while still fluid.

On leaving the wiper, the pipes come in contact with the top of reel 39, and by it are forced up the run-out table, which, due to its inclined construction, permits the major portion of the excess spelter in the pipe to run back into the pot. As the pipes approach the top of the table they are engaged by reel 43 which forces them up the table until they are deflected across it by guide rail 46. Blower nozzle 45 is then applied to their upper ends by an operator stationed at the top of the run-out table. At the same time an operator stationed adjacent the lower end of the table pushes the bottom ends of the pipe into the slot 56 in the suction box, and the upper operator opens valve 47 to cause a blast of air or steam, depending on which is used, to pass through the pipe and blow the excess spelter remaining into the suction box, the fumes being removed by fan 54, and carried by way of pipes 53 and 55 out of the building.

From the run-out table the pipes pass down skids 58 into tank 59, which is filled with water, held at a regulated temperature by any suitable means not shown, and in which the galvanized coating is subjected to a sort of quenching process which improves it by making it tougher, smoother and more adherent to the tube walls than it would be if allowed to cool slowly in the air. From this tank the pipes are conducted by the conveyor chains 61 to the discharge table 66, from whence they are carried away from the system as a finished product.

The outstanding advantages of the invention reside in the simplicity of its construction, the efficient manner in which it may be operated to produce a superior grade of gal-

vanized pipes at a minimum cost, and the limited amount of space which it occupies. This latter feature is due to a great extent to the feeding of the pipes into the spelter pot in a lateral fashion.

According to the provisions of the patent statutes, I have explained the principle and mode of operation of my invention, and have illustrated and described what I now consider to be its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. A system of apparatus for galvanizing metal pipes comprising an elongate pot adapted to contain spelter, means for feeding pipes one at a time laterally into one side of said pot, means for guiding the pipes through the spelter in a single continuous stream from one side of the pot to the other, means operable with the entry of each pipe into the pot for forcing the pipes under the surface of the spelter, said means being adapted to force one end of the pipes into the spelter below the other, and means for drawing the pipes in a lengthwise inclined fashion from the pot after they have been galvanized.

2. A system of apparatus for galvanizing metal pipes comprising an elongate pot adapted to contain spelter, a conveyor for feeding pipes laterally into one side of said pot, support rods mounted in the pot for guiding the travel of the pipes from one side of the pot to the other a guide device pivotally mounted on top of the pot and forming with the support rods a runway through which the pipes must move in passing through the spelter, means for adjusting the position of the guide device with respect to the support rods to accommodate pipes of different sizes, and means for removing the pipes in an inclined endwise fashion from the pot after they have been galvanized.

3. A system of apparatus for galvanizing metal pipes comprising an elongate pot adapted to contain spelter, a conveyor for feeding pipes laterally into one side of said pot, curved support rods on which the pipes travel through the spelter mounted in spaced relation in the pot and extending from one side of the pot to the other, a guide device mounted on top of the pot and forming with the support rods a guide way for keeping the pipes in order in their passage through the spelter, means for forcing the pipes under the surface of the spelter as they enter the pot, and means for preventing them from being forced back out of the spelter after they have been once forced into it.

4. A system of apparatus for galvanizing metal pipes, comprising an elongate pot adapted to contain spelter, a movable conveyor for feeding pipes laterally and one at a time into one side of the pot, means for guiding the pipes in a continuous stream through the spelter, sinker rods operated in synchronism with said conveyor for forcing the pipes under the surface of the spelter as they are delivered to the pot, and power means operably coupled to both said conveyor and said sinker rods for effecting their operation.

5. A system of apparatus for galvanizing metal pipes comprising an elongate pot adapted to contain spelter, a movable conveyor for feeding pipes laterally into one side of the pot, curved support rods mounted in spaced relation in the pot and extending from one side to the other for guiding the movement of the pipes through the spelter, sinker rods driven in synchronism with said conveyor for forcing the pipes under the surface of the spelter, said sinker rods being adapted to force one end of the pipes into the spelter below the other, pivotally mounted latch members for engaging the pipes after they have been forced under the surface of the spelter to prevent them moving out of the spelter, and a guide device pivotally provided on top of the pot and forming with the support rods a runway for the pipes.

6. A system of apparatus for galvanizing metal pipes, comprising an elongate pot adapted to contain spelter, means for feeding pipes laterally into one side of said pot, sinker rods driven in synchronism with the conveyor for forcing the pipes under the surface of the spelter as they enter the pot, means for guiding the pipes in a single line across the pot, a magnetic reel mounted on one end of the pot for pulling the pipe on an incline from the spelter, a wiper mounted adjacent the end of the pot for removing the excess spelter from the outer surface of the pipes as they leave the pot, an upwardly inclined run-out table for carrying the pipes away from the pot, a second magnetic reel at the lower and a third magnetic reel adjacent the upper end of the table for moving the pipes up the table, and a blower at the top of the table for blowing the excess spelter from the inside of the pipes after their lower ends leave the pot.

7. A system of apparatus for galvanizing metal pipes comprising an elongate pot adapted to contain spelter, means for feeding pipes laterally into one side of said pot, means for guiding the pipes through the spelter in the pot, means for removing the pipes endwise from the pot after they have been galvanized, means adjacent the pot for wiping the excess spelter from the outer surface of the pipes as they leave the pot, an upwardly inclined run-out table for supporting the pipes as they move from the pot, means mounted adjacent the top of said table

for blowing the excess spelter from the inside of the pipes after they are completely out of the spelter, and means for collecting the fumes produced by said blowing operation and conducting them away from the system.

8. A system of apparatus for galvanizing metal pipes comprising an elongate pot adapted to contain spelter, a conveyor arranged along one side of the pot for feeding pipes laterally into the pot, means for guiding the pipes through the pot, a power driven magnetic reel arranged at the end of the pot for pulling the pipes from the pot after they are lifted into engagement with it, a wiper arranged adjacent the end of the pot for wiping the excess spelter from the exterior surface of the pipes, an upwardly inclined run-out table up which the pipes move as they leave the pot, a manually operated blower at the upper end of the table for blowing the excess spelter from the insides of the pipes, a power driven suction device located at the lower end of the table for collecting the fumes produced when the blower is applied to the upper ends of the pipes, a tank filled with liquid for quenching the pipes as they leave the run-out table, means for conducting the pipes into and means for discharging them from said tank.

9. A system of apparatus for galvanizing metal pipes comprising an elongate pot adapted to contain spelter, means for feeding pipes laterally into said pot, guiding means mounted in said pot for guiding the pipes through the spelter in a single continuous stream, a plurality of sinker rods arranged along the length of the pot for engaging the pipes individually as they are fed into said guiding means and forcing them under the surface of and through the spelter as they enter the pot, a sinker beam reciprocably mounted above the pot for actuating said sinker rods they being attached thereto, means for counterbalancing the weight of the rods on said beam, and means for operating it in synchronism with the pipe feeding means.

10. A system of apparatus for galvanizing metal pipe, comprising an elongate pot adapted to contain spelter, means for feeding pipes laterally into one side of said pot, means for guiding the pipes across the pot through the spelter, a power operated magnetic reel arranged at the end of the pot for drawing the pipes from the spelter, and a wiper also mounted at the end of the pot for wiping the excess spelter from the outer surface of the pipes as they leave the pot, said magnetic reel being spaced inside the pot from said wiper provided with an annular groove about its periphery for guiding the pipes into and through the wiper.

11. A system of apparatus for galvanizing metal pipes comprising an elongate pot adapted to contain spelter, means for feeding pipes into said pot, means for removing the pipes from the pot after they have been galvanized, a run-out table for supporting the pipes as they are removed from the pot, means mounted adjacent one end of said table for blowing the excess spelter from the inside of the pipes after they are removed from the pot, and a power operated suction device located at the end of the table opposite said blowing means for collecting the fumes produced by said excess spelter removing means and conducting them to a point spaced from the apparatus proper.

12. A system of apparatus for galvanizing metal pipes comprising an elongate pot adapted to contain spelter, a conveyor for feeding pipes one at a time laterally into one side of said pot, means defining a passageway for guiding the pipes in a single continuous stream through the spelter and across the pot, means arranged at the edge of the pot for wiping the excess spelter from the exterior thereof as the pipes are removed from the pot, a power-operated magnetic reel spaced inside the pot from said wiper and arranged to guide the ends of the pipes through said wiper and a second power-operated reel arranged on the opposite side of said wiper to engage the pipes and assist in removing them from the pot, and hold the pipes centrally of the wiper.

In testimony whereof, I sign my name.

CARL E. BEDELL.