

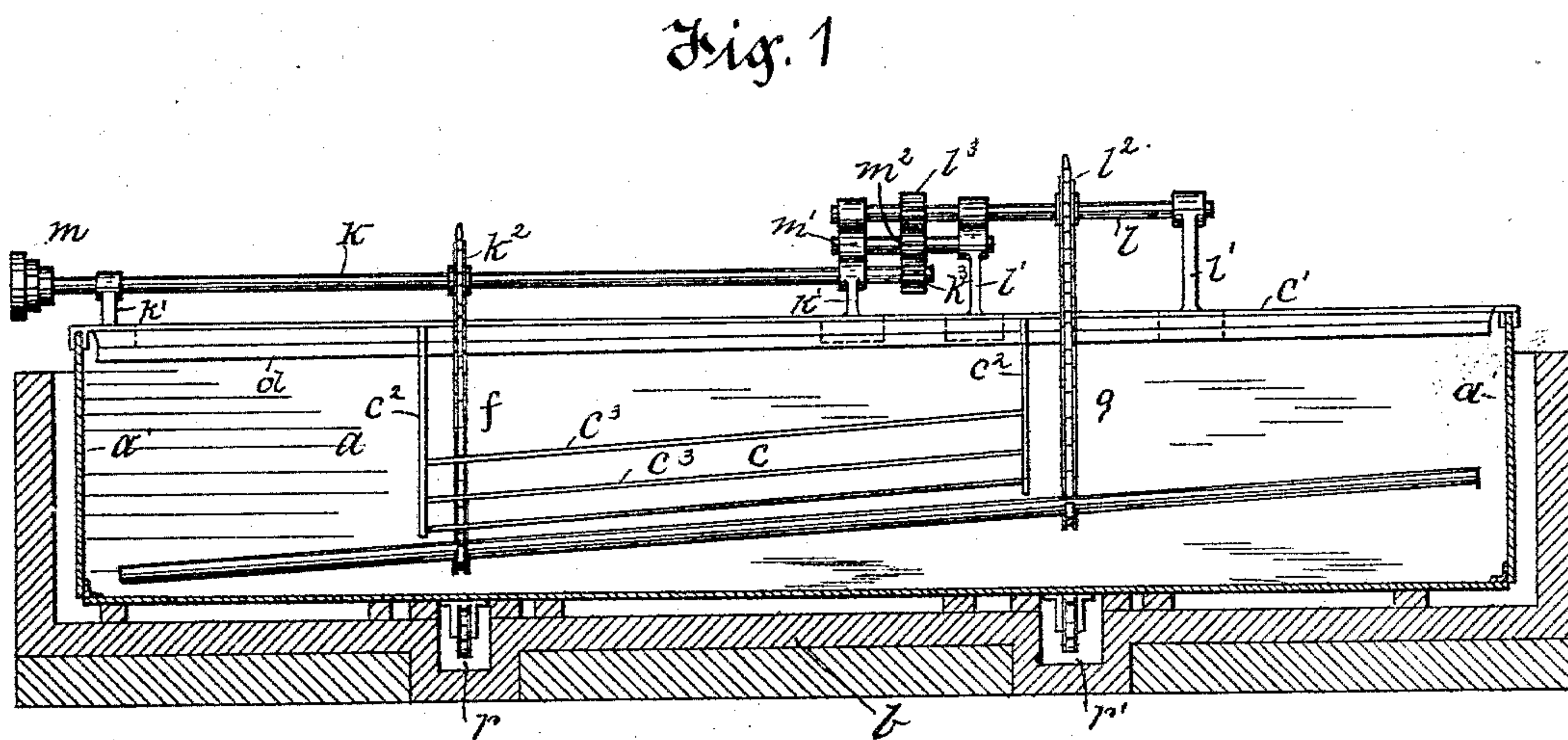
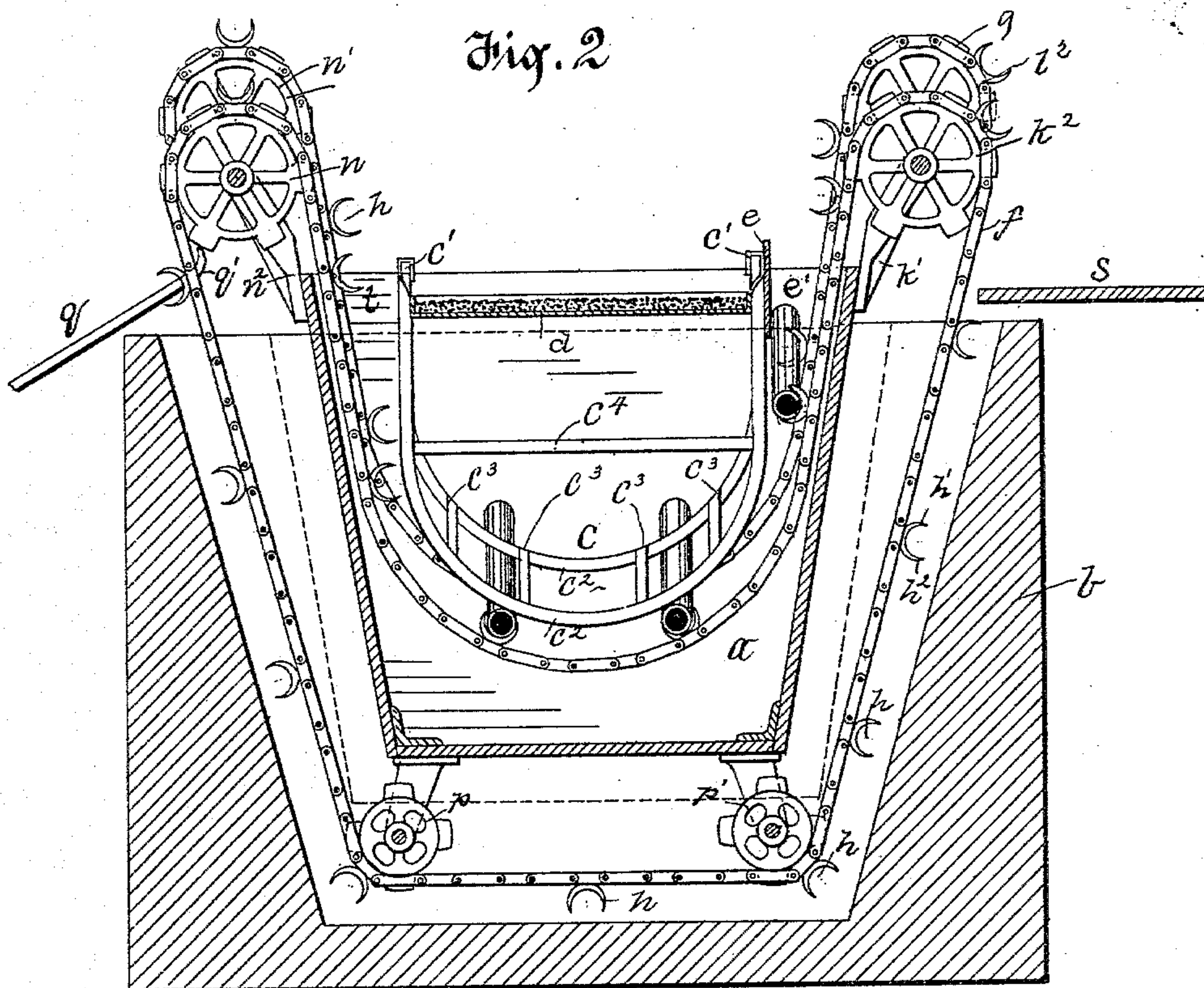
(No Model.)

D. T. LEWIS.

METHOD OF AND APPARATUS FOR COATING PIPE.

No. 545,429.

Patented Aug. 27, 1895.



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DAVID TREVOR LEWIS, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR OF FIVE EIGHTHS TO WILBUR F. MCKELVY AND JAMES D. GLOVER, OF SAME PLACE.

METHOD OF AND APPARATUS FOR COATING PIPE.

SPECIFICATION forming part of Letters Patent No. 545,429, dated August 27, 1895.

Application filed July 25, 1894. Serial No. 518,574. (No model.)

To all whom it may concern:

Be it known that I, DAVID TREVOR LEWIS, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Methods of and Apparatus for Coating Pipe; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to the coating of pipe, such as galvanizing pipe, coating it with other metals or alloys, or coating it with asphalt, tar, or other like material, being also applicable to the coating of rods or bars. The ordinary way of coating such pipe has been to pass the same at an incline longitudinally into the bath of spelter, alloy, liquid asphalt, or tar until more than one-half of the pipe is coated, manipulating the pipe by the other end thereof, and then to withdraw the pipe at an incline so that the coating material can drain out of it, and to turn it around and insert the other end into the coating material until it laps over the part which has been previously coated. This is an expensive and slow process, as it requires the pipe to be moved by hand or overhead-pulley devices, which have to grasp the pipe, and in addition to that it causes a waste of the coating material, because part of the pipe is double-coated; and, further, in coating with hot metals it is wasteful as to the coating of the whole pipe, because a thinner coating can be applied when the pipe is heated, and at least its central part is only in the metal a short time, while the pipe cannot be left in the bath a sufficient length of time to be heated to the extent desirable.

The object of my invention is to overcome these difficulties and to provide for the handling of the pipe by machinery, so that the manual labor is reduced to a minimum.

It consists, generally stated, in coating the pipe by carrying it laterally and in an inclined position into and out of the bath, and the whole pipe being carried down into the coating material in such a position that coating material may flow through it and the air or gases in the pipe be driven off and the pipe held in the coating material a sufficient length

of time to properly heat it when coating with molten metals, and as the pipe is withdrawn in an inclined position it can be properly drained of all metal within the pipe.

It also consists in mechanism for coating the pipe consisting of chain-carriers passing through the coating material and entering on one side of bath and passing out on the other side, and so carrying the pipe through the coating material, the speed of these chain-carriers being regulated according to the necessary heating of the pipe when coating with molten metals, and provision being made so that several pipes may be coated at the same time.

The construction of the apparatus and the invention desired to be covered will be hereinafter fully set forth and claimed.

To enable others skilled in the art to practice my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a longitudinal section of the apparatus employed for coating with molten metals, and Fig. 2 is an enlarged cross-section of the same.

Like letters of reference indicate like parts in each.

I will first describe the apparatus employed as shown on the drawings, and subsequently describe the method as practiced with such apparatus, so that the same may be fully understood. I employ a suitable pot or tank *a*, made of plate metal, which is of sufficient length to receive the pipe or bar and of sufficient depth and width to provide for the carrying of the pipe or bar through the coating material in the tank by means of chain-carriers. This tank, when employed in coating with molten metals, is supported within a suitable furnace *b*, which can be heated in any suitable way, either by gas or solid fuel, and which does not require description. Within the said pot is supported a suitable guiding-frame *c*, which is supported by bars *c'*, extending longitudinally of the tank and resting on the ends *a'* thereof, so as to give free space at the sides of the guiding-frame for the passage of the pipe into and out of the bath. The

frame *c* hangs from the bars *c'* and is skeleton in construction, being formed of curved bars *c²*, the ends of which are connected to the supporting-bars *c'*, and the bars extending thence downwardly into the bath, while the curved bars *c²* are connected by one or more longitudinal brace-bars *c³*, and each curved bar *c²* is preferably braced below the metal by a cross-bar *c⁴*. These guiding-frames may be made of different sizes, according to the sizes of the pipes to be coated, being reduced in width and depth when used with larger pipe, so as to give a free course for the chain-carriers within the tank and room for the pipe to pass into and out of the same. They can also be easily removed, when necessary, by overhead pulleys for the removal of dross from the tank when employed with metals liable to form dross. When galvanizing or coating with metals liable to oxidize, I also prefer to protect the tank by a pan which is supported by the longitudinal bars *c'* and extends down close to the metal in the pot, and may be covered by any suitable non-conducting material, such pan *d* supported in this way from the ends of the pot covering the larger part of the metal of the bath and preventing such exposure of the metal to the atmosphere as would lead to the rapid drossing or oxidizing thereof. While the material contained in the cover *d* may be any suitable non-conductor which will aid in holding the heat within the pot, a mixture of sulphur and salt is well adapted for the purpose. In galvanizing or coating with metals, where it is desired to employ any suitable flux through which the pipe is entered into the coating material, I also support at the entrance side of the frame the plate *e*, extending for the full length of the pot, and which forms that side of the same into a box for holding such flux.

Passing through the pot or tank, and operated by any suitable mechanism, are the chain-carriers *f g*, provided at intervals with suitable holders *h*, which are adapted to receive the pipe and carry it down into the bath under the guide-frame *c*, which acts to hold the pipe down in the coating material and to carry the pipe in the desired course through the bath. The chain-carriers may be operated by any suitable mechanism, it being understood that my invention includes the same, no matter how operated, though the means for operating the same, as illustrated in the drawings, are considered the preferable ones. Mounted on the sides of the pot or tank are the brackets *k'*, in which the sprocket-shaft *k* is mounted, said sprocket-shaft carrying the sprocket-wheel *k²*, and secured to the pot are the brackets *l'* in which the sprocket-shaft *l* is mounted, said sprocket-shaft carrying the sprocket-wheel *l²*. These are the driven sprocket-shafts which are placed in the entrance side of the pot, power being applied to the pulley *m* on the shaft *k* and by pinions *k³ l³*, operate through the intermediate

shaft *m'*, carrying the pinion *m²*, power as applied to the sprocket-shaft *l*. It will be seen that these driven sprocket-shafts *k l* are arranged one above the other, this arrangement being made in order to provide for the proper handling of the pipe, so as to carry it at an incline into the bath, for the purpose hereinafter described. At the opposite side of the pot are the idle sprocket-wheels *n n'*, mounted in suitable bearings *n²* secured to the side of the pot, these sprocket-wheels being arranged in the same relative positions as the driving-sprockets *k² l²* and supporting the chains on the opposite side of the pot. Below the pot, and mounted in bearings secured thereto, are the sprocket-wheels *p p'*, such sprockets being arranged in proper position so as to direct the chain-carriers around the base of the tank, such chain-carriers passing from the driving-sprockets *k² l²* down into the coating material in the pot, thence over the idle sprockets *n n'*, and thence downwardly below the tank and around the idle sprockets *p p'*, and thence upwardly over the driving-sprockets *k² l²*. As the chains are driven at the entrance end it will of course be seen that the slack portions of the chains extend down into the bath, the weight of the chains carrying them into the coating material, even if the guide-frame *c* were not employed to direct the pipe or bar to be coated in its proper course. The pipe holders or rests *h* are of crescent shape, extending out from the chain, and of such shape that they will hold the pipe in place and carry them over the driving-sprockets and thence downwardly into the bath and over the idle sprockets *n n'* at the opposite side, and will then drop them onto the inclined guideway *q*, which guideway is made to extend into the course of the pipe and by means of a hooked upper end *q'* draw the pipe out of its rest if it does not naturally drop therefrom. The pipe can then slide down the guideway *q* to any desired point. These pipe rests or holders *h* are preferably made a little larger than the pipe to be coated, so that it can enter easily between the horns *h' h²* thereof, but such horns by extending partially around the pipe hold it therein, except where it comes to the discharge-point where it naturally drops out of the holder onto the discharge-guide.

It will be noticed that when the apparatus is used for coating with hot metal the chains pass downwardly into the furnace, or, rather, into pockets or recesses *r r'*, formed in the furnace, the purpose being that the chains shall be exposed either to the heat of the metal or to the heat of the furnace for the larger part of said course, so that they will not become clogged with the coating material and will all run freely, it being shown by the drawings that they are only exposed to the temperature of the factory while passing around the sprockets at the upper end of the pot. They may be protected in any desired

way from direct contact with the flame or heat of the furnace, the furnace being constructed so as to keep them at a proper temperature to prevent clogging thereof. The chains can
 5 be made in the ordinary well-known sprocket-chain form, so that the links can be easily drawn therefrom, such as when it is desired to change the pipe-holders *h* in the chain-carriers, according to the size of the pipe to be
 10 coated. It will be noticed that the pipe-holders are so located on the chains as to carry the pipe down into and out of the bath in an inclined position. The advantage of that is that as the pipe is carried in such inclined
 15 course into the coating material the coating material may flow upwardly through the pipe and drive out the air contained therein or gas or steam arising either from the flux or from any liquid on the pipe, such as where it is
 20 dipped wet. The inclined position of the pipe in passing through the coating metal also produces a current of the same through the pipe, so that fresh metal is caused to flow through the same, and when the pipe reaches the de-
 25 livery end the inclined position of the pipe as it is drawn from the coating material provides for the draining of the same and the flow of the surplus metal or coating material from the interior of the pipe.

30 In the operation of coating the pipe by the apparatus above described and according to my invention the previously-cleaned pipe is brought, on any suitable platform *s*, to the entrance of the apparatus, and is rolled or other-
 35 wise placed in the pipe-rests *h*, and it is then lifted by the chain-carriers and carried over the driving-sprockets *k*² *l*², and thence downwardly into the bath laterally of the length of the pipe and in the inclined position above
 40 described, and is carried down under the guide-frame *c* and then gradually raised at the other end of the pot and carried out of the bath, being drained as it is raised therefrom on account of its inclined position, and
 45 then carried over the sprockets *n n'* and delivered onto the discharge-guide *q*, the pipe-holders being brought to such position that the pipe can be easily withdrawn therefrom by such discharge-guide. The chain then
 50 passes around the base of the pot and back to the driving-sprockets. During this operation any desired number of pipe may be carried through the bath at the same time, the only requirement being that the pipes will be
 55 so held that they will not contact with each other, and as the only labor connected with the operations is the placing of the pipes in the pipe-holders of the chain-carriers the labor is reduced to a minimum.

60 The above description applies to the coating of the pipes or bars with any suitable coating material, whether it be for coating with hot metals or with asphalt, tar, or even with paint, such as in some cases may be
 65 found desirable—for example, in the painting of sheet-metal water-conductors.

I will now describe the operation in the coating of pipe or bars with hot metals. The actual operation is the same as that above described; but the pipe is carried first through
 70 the flux-box *e'* where it is desired to employ the same, so that it is properly coated with any suitable flux which will aid in the coating operation, and at the same time, as such flux prevents the gathering of dross in that
 75 part of the pot, the pipe is necessarily carried into clear coating metal. The apparatus can be operated at a proper speed, so as to heat the pipe by means of the bath itself to the best temperature for the coating—that
 80 is to say, that the movement of chain-carriers can be operated at such speed as to hold the pipe within the bath for a sufficient length of time to bring it to the desired heat at which it receives the most perfect coating
 85 commensurate with economy in the use of the coating metal, it being found that when the pipe is at a certain heat it receives a more perfect coating and yet the coating is not thick enough to waste the metal, a more per-
 90 fectly coated pipe and yet a thinly-coated pipe being thus obtained. As a matter of fact, for the coating of the ordinary sizes of pipe several of them may be in the bath at one time, and thus a large number be coated by
 95 the apparatus in any given time, though the course of the pipe through the bath may be slow. As the pipe enters the bath laterally and in an inclined position, as above referred to, the coating metal flows upwardly through
 100 the same and continues to flow through the same as the pipe is carried down into the bath, and as the pipe is delivered from the bath the coating metal flows out from the same and the pipe is perfectly drained there-
 105 from, so preventing waste of the coating metal. If desired, the sprockets and sprocket-chains may be so mounted that different inclines may be given to the pipe, according to the best position for draining. The larger
 110 part of the bath is protected from the atmosphere by the cover *d*, which also aids in the holding of the heat thereof, and practically the only part of the spelter or other metal exposed to the atmospheric action is that at
 115 the delivery end as the pipe is drawn from the bath, as at *t*. In the coating of pipe, it will thus be seen, as the pipe is evenly coated throughout instead of being double-coated in the middle portion thereof, which
 120 leads to great waste of coating material, that the coating of the pipe can be regulated so that an even and a perfect coating is obtained without a waste of material, and that as the pipe leaves the bath at a regular delivery-
 125 point, which can easily be kept free from dross, a much cleaner and handsomer coating of the pipe may be obtained.

When it is necessary to dross the pot, the guide-frames and the parts connecting there-
 130 with can be easily lifted from the pot by means of suitable overhead pulleys, and the

slack parts of the chains can also be withdrawn from the pot, leaving it free for that operation.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The herein described method of coating pipe or bars consisting of carrying the same laterally and in an inclined position into and out of the bath, substantially as and for the purposes set forth.

2. The combination with a pot or tank for containing coating materials; of chain carriers having pipe rests or holders thereon, mounted on the pot so as to enter the bath on one side and pass out on the other side and so carry the pipe into and out of the bath at the other side of the pot, substantially as set forth.

3. The combination of a pot or tank for containing coating materials, chain carriers having pipe holders thereon mounted on the pot so as to enter the bath on one side and pass out on the other side and so carry the pipe into and through and raise it out at the other side of the pot, and a depending guide-frame entering within the pot to hold the pipe therein, substantially as set forth.

4. The combination of a pot or tank for containing coating materials; chain carriers having pipe holders thereon adapted to enter the bath on one side and to carry it through and raise it out at the other side of the pot, and a depending guide-frame entering within the pot to hold the pipe therein, said guide-frame being supported at the ends of the pot, substantially as set forth.

5. The combination of a pot or tank for containing coating materials; chain carriers having pipe holders thereon adapted to enter the bath on one side and to carry it through and raise it out at the other side of the pot, and a depending guide-frame entering within the pot to hold the pipe therein, said guide frame having a curved lower portion corresponding to the course of the chain carriers through the bath, substantially as set forth.

6. The combination with a pot for containing coating materials, of chain carriers having pipe holders thereon adapted to enter the bath at one side, carry the pipe through and raise it out at the side of the pot, and a protecting cover extending between the ends of the pot and covering the central part thereof, substantially as set forth.

7. The combination with a pot or tank for containing coating materials, of sprocket chains having pipe holders thereon adapted to enter the bath on one side and carry the pipe through and raise it out at the other side of the pot, and a vertical plate extending for the length of the pot at the entrance side, so as to form a flux box, substantially as set forth.

8. The combination with a tank or pot for containing coating materials, of a continuous chain having pipe holders thereon adapted to enter the bath on one side and carry the pipe through and raise it out on the other side and passing thence downwardly under the pot, and sprocket wheels on which such chain carriers are mounted, substantially as set forth.

9. The combination with a tank or pot for containing coating materials, of a continuous chain having pipe holders thereon, adapted to enter the bath on one side and carry the pipe through and raise it out on the other side of the pot, and passing thence downwardly under the pot and sprocket wheels on which such chain carriers are mounted, and a discharge guide in the course of the pipe, substantially as set forth.

10. The combination with a pot or tank for containing coating materials, of driving sprocket wheels at one side of the same, but on different horizontal planes and chain carriers passing around said sprocket wheels and into the bath in the pot and thence over sprocket wheels mounted on different horizontal planes, substantially as set forth.

11. The combination with a pot or tank for containing coating materials and a furnace surrounding the same, of chain carriers mounted on sprocket wheels on said pot and within said furnace, so as to pass in the course into and out of the bath in the pot, and thence under the pot into and out of the furnace chamber, substantially as set forth.

12. The combination with a tank for containing coating materials, and a furnace surrounding the same and having recesses therein, of chain carriers mounted on sprocket wheels and passing into and out of the bath in the pot, and thence through such recesses within the furnace chamber, substantially as set forth.

13. The combination with a tank for containing coating materials, of a skeleton frame depending in said tank, a chain carrier for carrying pipe through the coating material entering the tank on one side, passing below the skeleton frame and passing out of the tank at the other side, and having holders thereon of crescent shape and having hooks of the crescent extending out in both directions from the main body, substantially as set forth.

In testimony whereof I, the said DAVID TREVOR LEWIS, have hereunto set my hand.

DAVID TREVOR LEWIS.

Witnesses:

L. DE. B. LITTLE,
ROBERT C. TOTTEN.