

(No Model.)

D. T. LEWIS.  
METHOD OF AND APPARATUS FOR COATING PIPE.

No. 545,430.

Patented Aug. 27, 1895.

Fig. 1

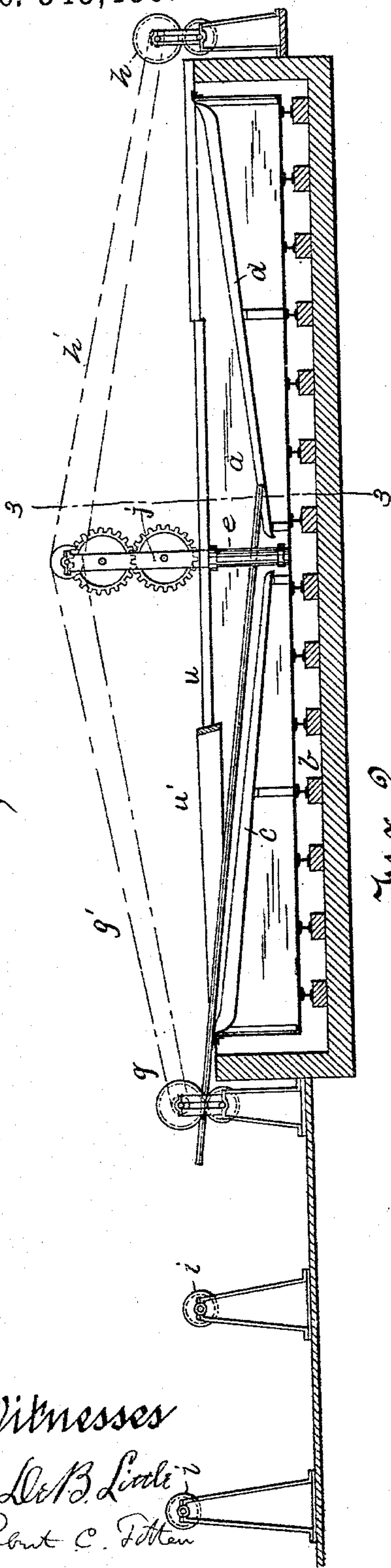


Fig. 2

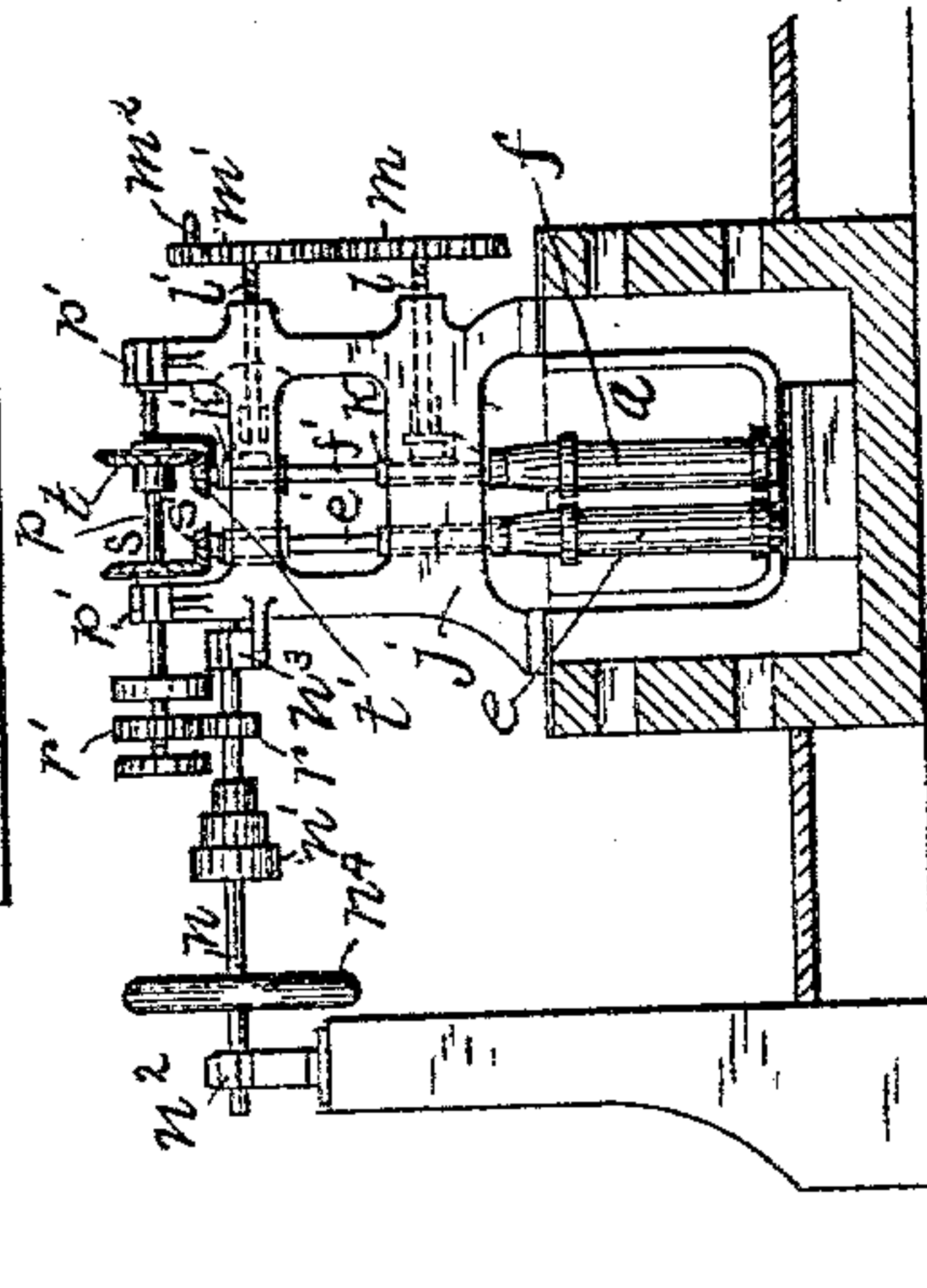
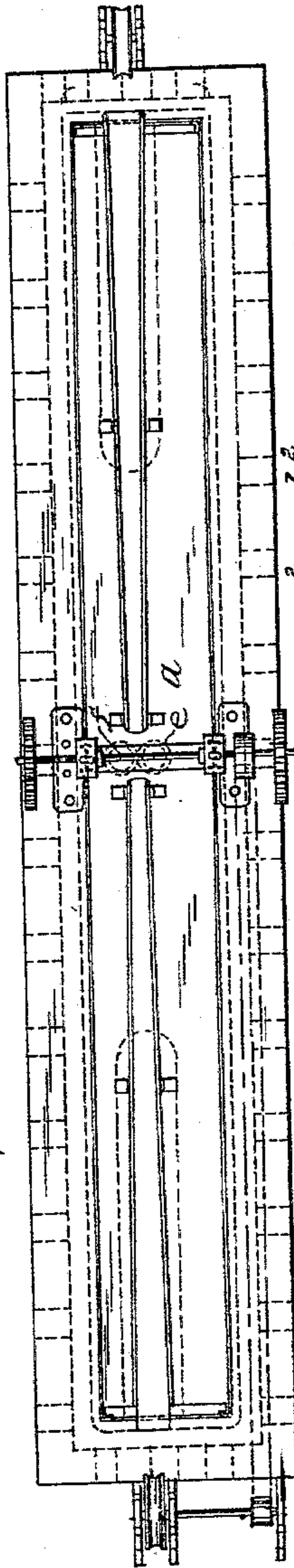


Fig. 3

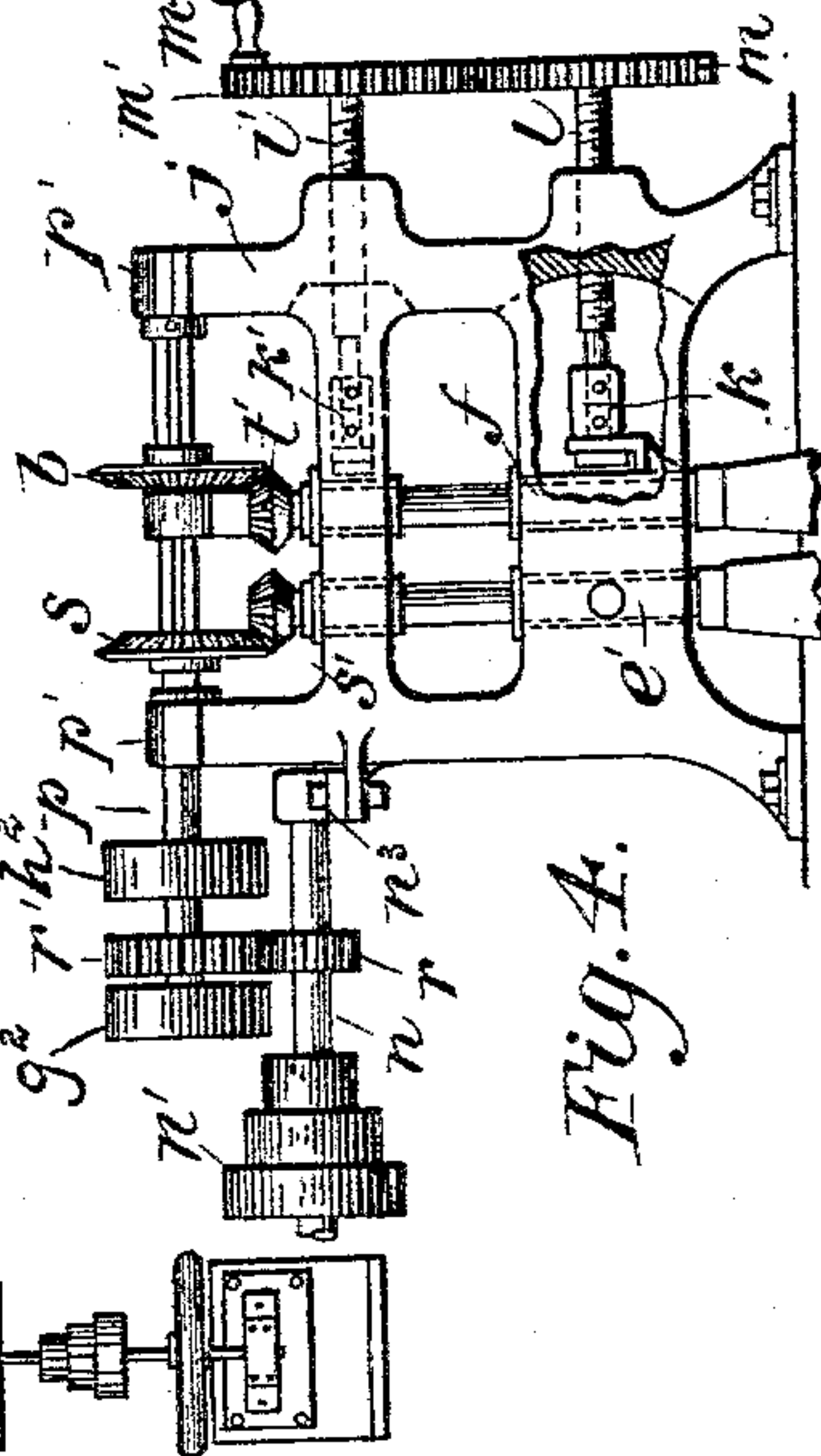


Fig. 4

Witnesses  
L. L. B. Little  
Robert C. Fetter

Inventor  
David Trevor Lewis  
by Kay & Totten  
Attorneys



# UNITED STATES PATENT OFFICE.

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. 545,430, dated August 27, 1895.

Application filed July 25, 1894. Serial No. 518,573. (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 pipes and bars with metal or with other material, such as asphaltum or tar, &c., its object being to reduce the manual labor of such work and provides for the even coating of the pipe or bars and for the more rapid coating of the same.

The usual process in coating pipe has been to insert the pipe in the coating-bath in an inclined position for something over one-half its length, manipulating it by the other end of the pipe, then to withdraw it and insert the other end, and in this way to coat the entire pipe, the coating material, however, being twice applied to the central portion of the pipe and double coating the same, which, besides leaving the coating irregular, causes unnecessary waste of coating material. The labor of coating is also heavy, especially in heavy pipe, and the work is slow, because the pipe is inserted and withdrawn from one end of the bath. By my invention the coating of pipe is made easy, as the pipe is both inserted and withdrawn by machinery, and is withdrawn at the opposite end of the bath to that at which it enters and the work is made much more rapid.

It consists, generally stated, in passing the pipe longitudinally and at an incline into the bath and carrying it in the same direction through the bath and longitudinally out of the bath at an incline, so that as the pipe enters the metal the air and gases can be driven out of the pipe and the metal enter the same, and as the pipe is withdrawn the metal can be drained from it, while at the same time the pipes can be fed in rapid succession, one after the other, through the bath, and the work performed much more rapidly, as one pipe is carried out of the way and leaves a place for the one following it.

It also consists in the combination of a pot or tank containing coating material, inclined guideways leading from each end toward the center, and vertical plain-faced feeding-rolls in the pot between the inclined guideways, so that the pipe is fed at an incline longitudinally into the bath, and is fed through the bath by the feeding-rolls and is forced by the feed-rolls upwardly over the inclined guideway at the opposite end and delivered from the bath.

It also consists in certain other improvements, which will be hereinafter more particularly described and claimed.

To enable others skilled in the art to make and use 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, and Fig. 2 is a plan view thereof. Fig. 3 is a cross-section of line 3 3, Fig. 1, and Fig. 4 is an enlarged view of the mechanism for driving the rolls.

Like letters of reference indicate like parts in each.

For the purpose of coating the pipe or bar I employ a pot or tank *a*, which is somewhat longer than the pipe or bar, so that the pipe may be entirely submerged therein. This pot or tank is made of plate metal, and when employed for galvanizing or coating with other molten metals is supported in the furnace *b*, which is built around it and may be heated in any desirable way. In said pot are inclined guideways *c d*, and between the same are the vertical plain-faced feeding-rolls *e f*, while at the ends of the tank respectively are entrance and delivery rolls which force the pipe into and withdraw it from the bath, the feeding-rolls within the bath carrying it along from the entrance-rolls to the delivery-rolls. The entrance-rolls are shown at *g*, the delivery-rolls at *h*, and in front of the feeding-rolls are the guide-rollers *i i*, like guide-rollers (not shown) being arranged at the delivery end.

I will now describe the separate parts more in detail. The guide-troughs *c d* extend from the ends of the pot at a downward incline



toward the center and are supported in any suitable way, and may be either formed of plate metal curved into trough shape or, if preferred, may be made of open-work, such as bars, so as to permit the coating material to pass through them. The entrance-rolls *g* are supported in suitable housings close to entrance end of the tank and are adapted to force the pipe into the pot and feed it along the said trough. The guide-rollers *i i* are grooved and are supported in their bearings at about the proper incline for feeding into the pipe through the entrance-rolls into the pot, it being understood that the workmen simply place the forward end of the pipe in the entrance-rolls or place the pipe in the guide-rolls in line therewith, and the pipe will pass by its own gravity along the said guide-rolls and engage with the entrance-rolls, which will carry it into the pot. It is only necessary to drive one of the entrance-rolls, which is done by a simple belt or chain, as *g'*, from the power mechanism located at the center of the tank. The delivery-rolls *h* are constructed substantially the same as the entrance-rolls and are driven in the same way by a belt or chain *h'*, and it is to be understood that like guide-rolls are placed beyond the delivery-rolls, so that the coated pipe may be received by the workmen and lifted off them. The housing *j* for the central feeding-rolls is supported on the pot about the center thereof, and one of said rolls, such as the roll *e*, has its upper part or shaft *e'* in stationary bearing in the housing, and may, if desired, also have a bearing at the base of the pot, though this is not necessary, the actual strain on the rolls not being heavy. The said roll *f* has its upper part or shaft *f'* mounted in adjustable bearings *k k'*, sliding in the housing and connected at the threaded shafts *l l'*, which engage with the threaded seats or nuts in the housing, said shafts being threaded in opposite direction and carrying at their ends the gear-wheels *m m'*, one of which is provided with a handle *m<sup>2</sup>*, by which said threaded shafts may be turned to move the roll *f* within the pot and regulate the width of pass between the rolls, according to the diameter of the pipe to be carried through the bath. The power for driving these rolls may be applied in any suitable way, the drawings, Fig. 3, illustrating that preferred by me, the power-shaft *n* being driven by a belt which engages with either of the pulleys *n'*, according to the speed desired, this shaft *n* being mounted in bearings *n<sup>2</sup> n<sup>3</sup>* and carrying the fly-wheel *n<sup>4</sup>*. Above the shaft *n*, and mounted in bearings *p'* in the housing *j*, is the shaft *p*, which is driven from the power-shaft through the gearing *r r'*. This shaft carries the bevel-gear *s*, which engages with the bevel-gear *s'* at the upper end of the shaft *e'* of the roll *e*, and sliding on the shaft *p* by a feather connection is the bevel-

gear *t*, which engages with the bevel-pinion *t'* at the upper end of the shaft *f'* of the roll *f*. The two bevel-gears *s* and *t* are set on opposite sides of the respective pinions and so drive the rolls in opposite directions. When the roll *f* is adjusted by the movement of the sliding bearings *k k'* above referred to, the bevel-gear *t*, having a sliding connection with the shaft *p*, moves with the roll *f* and holds in gear with the pinion *t'*. From this same shaft *p* power is carried to the entrance-rolls and discharge-rolls through the pulleys *g<sup>2</sup> h<sup>2</sup>* on said shaft driving the belts *g' h'*, by means of which said rolls are operated.

In the coating of pipe or bars with the apparatus above described in accordance with the method above indicated, the pot or tank *a* is filled with the coating material, and for galvanizing or coating with molten metal is filled with spelter or other metal or alloy, which is melted by heat generated in the furnace *b*, surrounding the pot. The diameter of the pipe or bar to be coated being known, the driving-rolls *e f*, the entrance-rolls *g*, and the delivery-rolls *h* are adjusted to suit that diameter, and this can easily be arranged so that the width of the feeding-pass can be indicated by a dial, if desired, it being understood that the feeding-pass can be arranged to receive any desired size of pipe from the smallest to the largest adjustment of the rolls. The entrance-rolls *g*, the feeding-rolls *e f*, and the discharge-rolls *h* are all driven in the same direction. The pipe to be treated is brought to the apparatus in such position that it can easily be lifted upon the guide-rolls *i i* and directed into the entrance-rolls *g*, and when so directed no other work is required except to withdraw the pipe after it leaves the rolls *h*, and even this can be accomplished by an inclined guideway. The pipe is then forced forward by the entrance-rolls longitudinally and in a downward incline, passing into the metal, so that the air contained in the pipe and any gases or steam which may be generated from the liquid coating of the pipe may have free escape from the pipe from its upper end when the pipe is entering the bath. The pipe continues to descend along the guideway *c*, and before it leaves the entrance-rolls its forward end passes between the feeding-rolls *e f* in the bath. These rolls then carry the pipe forward, so that its rear end passes out from the entrance-rolls and down the inclined guideway, the whole pipe being then submerged within the coating material. As it continues in its course through the bath it will be apparent that the portion thereof engaging with the feeding-rolls *e f* will be raised or lowered according to the respective positions of the ends of the pipe resting on the guideways *c d*, and that besides the forward feeding movement of said rolls there will necessarily be some vertical movement of the pipe in the rolls. As, however, these rolls are



plain-faced they permit this vertical movement and yet act to carry the pipe forward, feeding it in its course while the pipe is entirely submerged in the bath, and finally feeding its forward end up along the inclined guideway and out of the bath into the discharge-rolls *h*. As soon as the upper end of the pipe passes out of the bath the coating material contained within the pipe will of course commence to drain out, and as the pipe is held in an inclined position during all the time that it is being delivered from the bath, either by the feeding-rolls operating in the bath or the delivery-rolls operating on it as it is withdrawn from the bath, the pipe is thoroughly drained of all surplus coating material and passes from the bath evenly and properly coated. In the course of the pipe through the bath the longitudinal movement will cause a current of the coating material through the pipe itself, bringing fresh coating material in contact with the interior of the pipe, and where the apparatus is used for coating with molten metals aiding materially in the heating of the pipe, so as to bring it to the most desired heat for coating; and the speed of the pipe through the bath may be regulated so as to cause the desired heating of the bath and enable it to take on a perfect coating of the metal, and yet a thin coat thereof, which is accomplished by bringing the pipe to the desired heat at which such peculiar thin and perfect coating is obtained.

In the coating of the pipes it is evident that one pipe can follow the other in rapid succession through the coating-bath, it only being necessary that one pipe shall be delivered from the entrance-rolls, when another pipe can be inserted therein and the operation repeated. The actual output of the apparatus can therefore be very materially increased over the present hand manipulation in coating. It is also evident that the coating accomplished is even throughout, and that for this reason a considerable saving in coating material is obtained as compared with the method of coating where the coats are lapped over each other, as above described. The metal can also be held in better condition and a greater portion of its surface can be protected from contact with the atmosphere and so kept free from scum, so that an even, brighter, and handsomer coating can be produced.

It is evident that the bath can be covered by any suitable protecting covering hung from the sides of the pot or tank, leaving only a long opening at each end for the entrance and delivery of the pipe, so that in coating with metals the metal may be prevented from rapid oxidation and the heat retained in the pot, while, if desired, a suitable flux-box may be formed at the forward end of the pot.

The cover above referred to is illustrated

at *u*, Fig. 1, and in dotted lines, Fig. 2, the flux-box *u'* being formed at the forward end.

What I claim by my invention, and desire to obtain by Letters Patent, is as follows:

1. The herein-described method of coating pipe, consisting in passing the pipe longitudinally and at an incline into the bath, entirely submerging the pipe in the bath and while it is so submerged carrying it longitudinally along therein, and finally carrying it through and out of the bath at an incline and at the opposite end, substantially as set forth.

2. A combination of a pot or tank for containing coating material, inclined guide-ways leading from the ends toward the center thereof, and vertical plain-faced feeding rolls in the pot between the inclined guide-ways, substantially as set forth.

3. The combination of a pot or tank for containing coating material, and vertical plain-faced feeding rolls in the pot, adapted to grasp the pipe and move it longitudinally through the bath and permit of the vertical motion therein, substantially as set forth.

4. The combination of a pot or tank for containing coating material, vertical plain-faced feeding rolls in the pot and entrance rolls at the forward end of the pot adapted to force the pipe forward into the vertical rolls within the pot, substantially as set forth.

5. The combination of a pot or tank for containing coating material, vertical plain-faced feeding rolls in the pot, entrance rolls at the forward end of the pot adapted to force the pipe forward into the vertical rolls within the pot, and discharge rolls at the other end of the pot adapted to receive and carry the pipe therefrom, substantially as set forth.

6. The combination of a pot or tank for containing coating material, inclined guide-ways leading from the ends toward the center, vertical plain-faced feeding rolls in the pot between the inclined guide-ways and entrance rolls at the forward end of the pot adapted to force the pipe along the forward inclined guide-ways into the vertical feeding rolls, substantially as set forth.

7. The combination of a tank or pot for containing coating material, vertical plain-faced feeding rolls in the pot, and a cover extending over the pot and having receiving and discharge openings leading from the ends toward the center of the same, substantially as set forth.

8. The combination of a pot or tank for containing coating material, inclined guide-ways within the pot leading from the ends toward the center, vertical plain-faced feeding rolls in the pot between the guide-ways and a series of guide-rolls in front of the forward end of the pot, arranged to hold the pipe at the same incline as the forward guide-way and direct it into the vertical feeding rolls in the pot, substantially as set forth.



9. The combination of a pot or tank for containing coating material, vertical plain-faced feeding rolls in the pot, and means for adjusting the same laterally, substantially as and for the purposes set forth.

10. The combination of a pot or tank for containing coating material, a housing above the pot, a vertical roll depending into the pot and mounted in bearings in the housing, and a

second vertical roll depending into the pot and mounted in sliding adjustable bearings in the housing, 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.