

L. C. STEELE.  
 APPARATUS FOR PICKLING METAL.  
 APPLICATION FILED FEB. 9, 1910.

996,290.

Patented June 27, 1911.

3 SHEETS-SHEET 1.

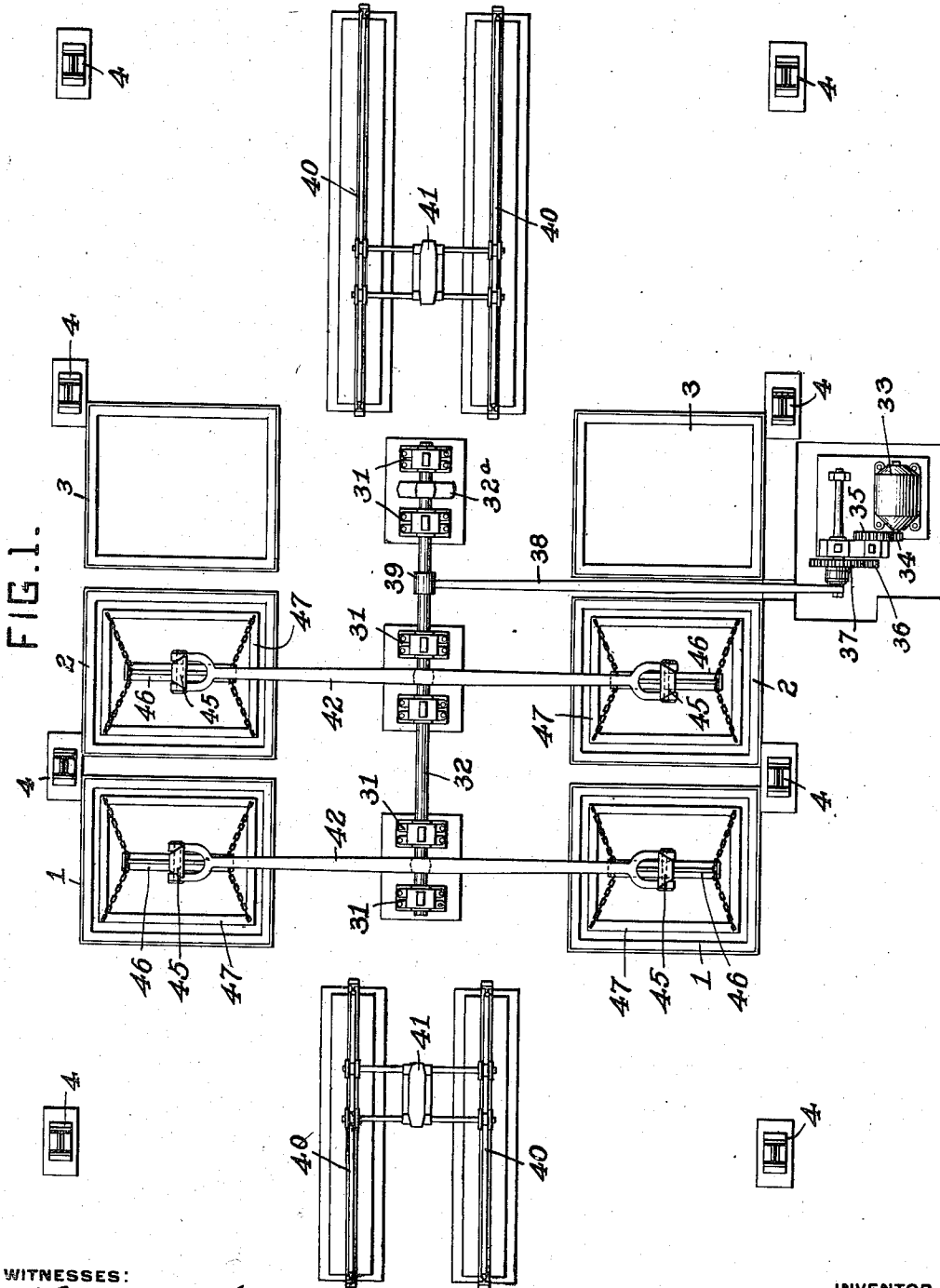
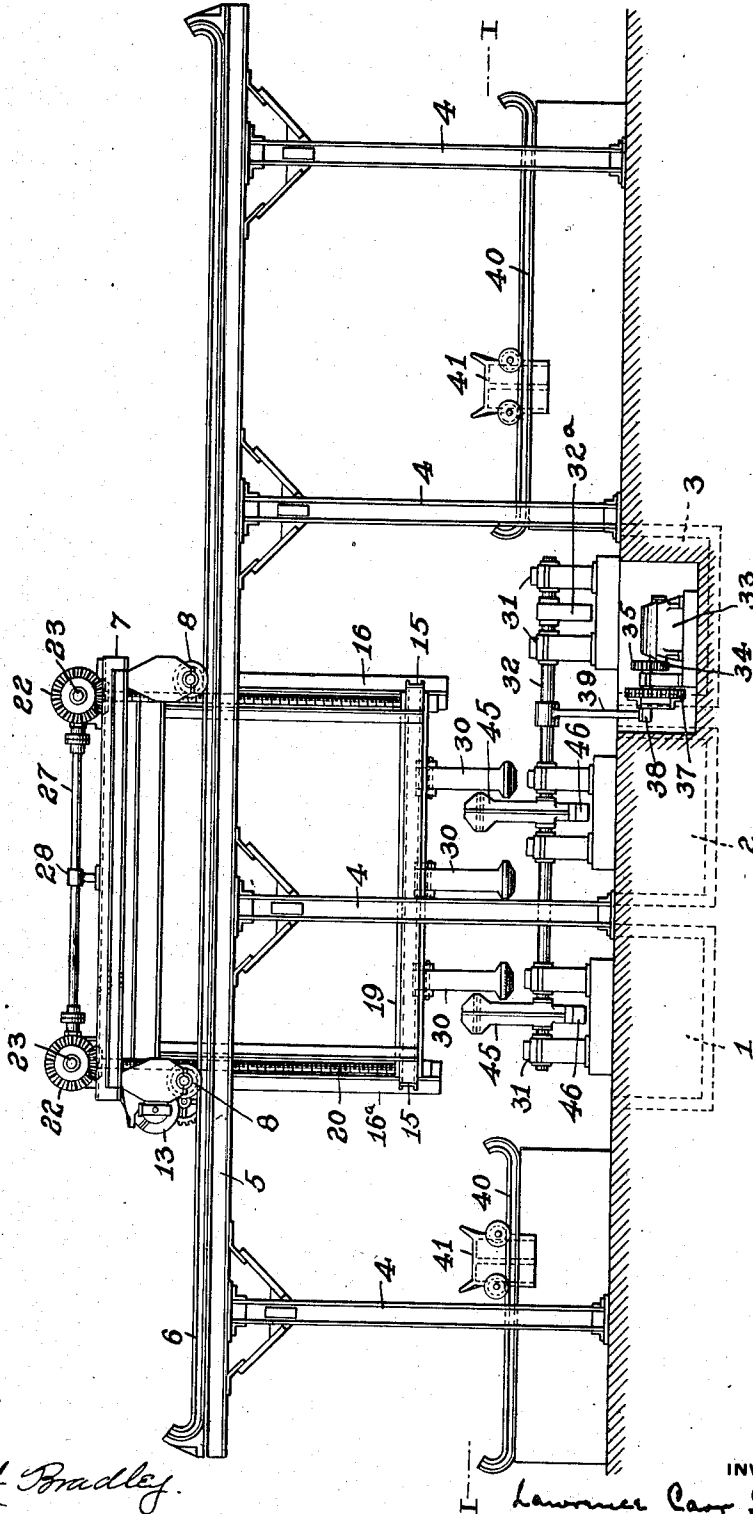


FIG. 1.

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FIG. 2.



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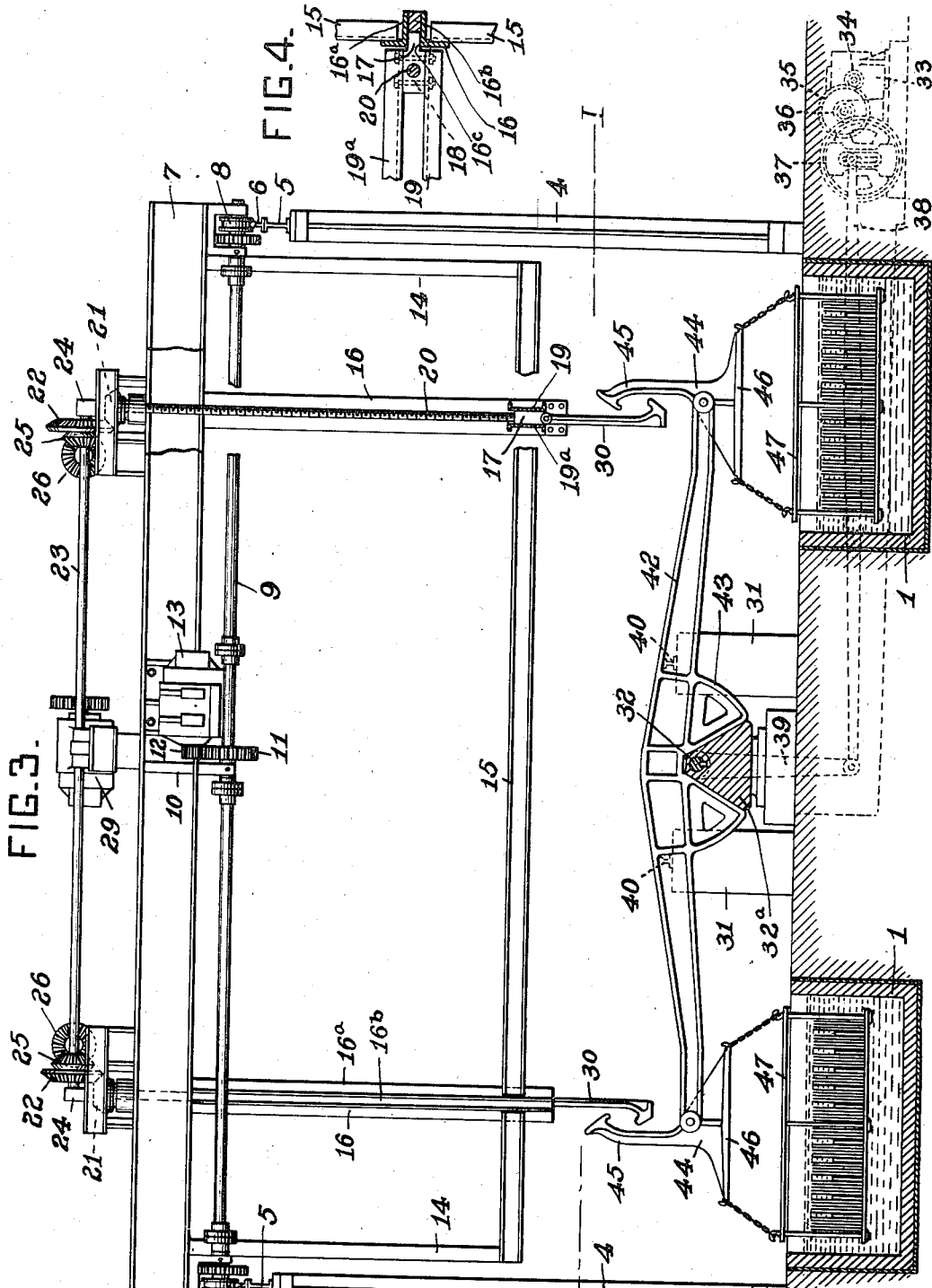


FIG. 3.

FIG. 4.

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# UNITED STATES PATENT OFFICE.

LAWRENCE CARR STEELE, OF BEAVER, PENNSYLVANIA.

## APPARATUS FOR PICKLING METAL.

996,290.

Specification of Letters Patent. Patented June 27, 1911.

Application filed February 9, 1910. Serial No. 542,863.

*To all whom it may concern:*

Be it known that I, LAWRENCE CARR STEELE, residing at Beaver, in the county of Beaver and State of Pennsylvania, a citizen of the United States, have invented or discovered certain new and useful Improvements in Apparatus for Pickling Metal, of which improvements the following is a specification.

The object of the invention is to provide improved means for pickling and washing metal sheets or other articles, whereby said articles can be handled, transferred, dipped, and agitated in the successive baths in a simple and expeditious manner, a number of crates of said articles may be simultaneously subjected to the successive steps of pickling and washing, and all operations may be carried on mechanically.

In the accompanying drawings there is illustrated a plant and machine embodying the said improvements in preferred form.

Figure 1 is a view in plan of the plant and certain parts of the machine, taken on the line I—I of Fig. 3; Fig. 2 is a side elevation of the machine; Fig. 3 is an end elevation, partly broken away in order to illustrate the operation of certain parts; and Fig. 4 is a detail.

The preferred arrangement of the plant comprises four acid vats 1, 1, 2, 2, arranged in pairs on opposite sides of the machine, and two water vats 3, 3, one on each side in line with the acid vats. The vats on each side should be arranged at equal distances apart.

Supported upon the opposite rows of columns 4 and longitudinal beams 5, are rails 6, upon which travels the crane 7 having wheels 8 running on the rails. Opposite wheels of the truck of the crane are fastened to the axle-shaft 9, medially supported by the hanger 10, and provided with pinion 11 meshing with pinion 12 on the shaft of motor 13. The motor 13 is suitably mounted on the crane, and, through the connections described, drives the crane back and forth upon the rails and above the lines of vats.

Depending from the crane is the framework 14, to the cross-bars 15 of which are secured the lower portions of opposite beams 16 depending from the crane in lines slightly within the central lines of the opposite rows of vats. These beams 16, (see Fig. 4), are each made up of the shapes 16<sup>a</sup> and filling

strip 16<sup>b</sup>, forming the slot 16<sup>c</sup>. Adjacent to the beams 16 are the screw-shafts 20, depending from the crane, and carrying the internally threaded nuts 18, which are fastened against rotation between the opposite ends of shapes 19<sup>a</sup> which form the longitudinal bars 19. The nuts 18 are provided with the tongues or lugs 17 projecting into the slots 16<sup>c</sup> in the vertical beams 16, thus guiding the nuts and longitudinal bars in their vertical movement accomplished by the rotation of screw shafts 20. The screw-shafts 20 may be rotated simultaneously in either direction by any suitable means. For example, as shown in the drawings, they are provided at their upper ends with bevel pinions 21 mounted upon the crane and meshing with corresponding pinions 22 on cross-shafts 23 supported in bearings 24. On said shafts 23 are also mounted bevel pinions 25, meshing with corresponding pinions 26 on the opposite ends of the longitudinal countershafts 27, centrally supported in bearings 28. A motor 29 mounted upon the crane serves, through suitable gearing, to drive one of the shafts 23 in either direction as desired, thus, through the described connections, raising and lowering the nuts 18 and longitudinal beams 19.

Pivotally hung from the beams 19 are rows of hooks 30. In the arrangement shown, where three vats are employed, it is preferred to have three hooks on each side, the distance between the two outer hooks being the same as that between the centers of adjacent vats, with the third hook arranged medially between the other two. The hooks are preferably provided with broadened engaging faces as shown in Fig. 2. In a line centrally between the opposite rows of vats is mounted, in bearings 31, a rock-shaft 32, which may be turned in either direction by the motor 33, through gearing 34, 35, 36 and 37, crank-arm 38, and link 39 connected to the rock-shaft. Fastened to the rock-shaft 32, at points in line with the centers of the opposite vats are blocks 32<sup>a</sup>, which are preferably wedge-shaped as shown, and which act as seats for the carriers 42 for the articles to be dipped. These carriers are preferably made like a yoke, having arms projecting oppositely from the central yokes 43 adapted to rest upon the blocks. Upon the opposite ends of these carriers are pivotally hung the crate-sup-

ports 44, having the upwardly-extending hooks 45, and suitable means such as the notched bars 46 for hanging or otherwise securing the crates 47 thereto. The hooks 5 45 on the carriers are also preferably made with broadened faces as shown in Fig. 2, and are so shaped as to be engaged somewhat loosely by the hooks 30 on the crane, so that the latter will readily disengage 10 them when lowered, and may be moved along beneath them in the longitudinal movement of the crane. Since the carriers 42 are detached from the machine proper, as many may be employed as desirable or 15 convenient. At the opposite ends of the plant are rails 40, on which may be mounted wheeled supports 41 for the carriers.

The operation of the machine will be readily apparent. Assuming both acid 20 vats on each side of the machine to be occupied by crates of metal hung on the opposite ends of two carriers 42, resting on their seats on the rock-shaft, said shaft is being oscillated by the motor 33, in order 25 to agitate the carriers and thus thoroughly bathe the metal in the pickling solution. When it is desired to transfer the crates, the crane is shifted and the depending screw-shafts 20 are turned, so as to lower 30 the bars 19 and bring the hooks 30 beneath the hooks 45 on the carriers. The hooks 30 and 45 will ride over and engage with each other, and the carriers and crates are then lifted by elevating the bars 19, and by 35 movement of the crane are transferred, each to the next succeeding pair of opposite vats, and then lowered. Then after disengaging the hooks by slightly further lowering the bars 19, the crane may be moved 40 back, and the intermediate pair of hooks 30 employed to pick up a carrier off the support 41 at the entrance-end and transport it to the first pair of vats. Said intermediate hooks may then be employed 45 to transfer the carrier in advance from the water-vats to the support 41 at the exit end of the machine. It will be apparent that since the distance between said intermediate hooks 30 and those on either side, is only 50 half the distance between the centers of adjacent vats, said intermediate hooks may be employed to handle a single carrier in any desired manner without interference by the adjacent hooks with carriers at any 55 of the vats; while on the other hand the outer hooks may be employed for handling two carriers at adjacent vats without interference by the intermediate hooks.

It is thus seen that the machine when 60 arranged as herein described is extremely flexible, and the carriers can be handled and transferred in any way desired. It is also an advantage of the described shape of the blocks or seats 32<sup>a</sup> and yokes 43 of the 65 carriers, that the carriers may be deposited

upon and lifted from their seats without stopping the oscillation of shaft 32. However said specific construction is not essential to an embodiment of the invention, 70 since any desired number of vats and any suitable arrangement of hooks may be employed, and the carriers and their seats may be of any suitable form. It is of course preferred that the motor-controlling apparatus shall be placed within reach of a single attendant, as is usual, so that the movements of the various parts of the machine may be properly coordinated and controlled. 75

I claim herein as my invention: 80

1. In combination with a pair of oppositely disposed dipping-vats and a detached carrier provided at its opposite ends with means for supporting the articles to be dipped, a support for the carrier arranged between said vats, means for depositing the carrier on the support, and means for agitating the carrier. 85

2. In combination with two oppositely disposed series of dipping-vats, and a series of supports between said series of vats, one for each opposite pair of vats, carriers for the articles to be dipped, and means for depositing the carriers on the supports. 90

3. In combination with two oppositely disposed series of dipping-vats, and a series of supports between said series of vats, one for each opposite pair of vats, carriers for the articles to be dipped, means for depositing the carriers on the supports, and means for agitating the carriers. 95 100

4. In a machine of the class described, an oscillatory block and means for oscillating it, a detached carrier, and means for depositing it upon and removing it from said block, said block and carrier having oppositely arranged surfaces of contact so disposed as to permit deposit and removal of the carrier during oscillation of the block. 105 110

5. In a machine of the class described, an oscillatory block and means for oscillating it, a detached carrier having opposite arms and a central yoke adapted to fit said block, and means for depositing the carrier upon and removing it from the block, the block and yoke having surfaces of contact so disposed as to permit deposit and removal of the carrier during oscillation of the block. 115 120

6. The combination with a series of dipping-vats having their centers arranged at equal distances apart, of an overhead crane, a pair of hooks for the articles to be dipped carried by the crane and spaced apart for the same distance as that between the centers of adjacent vats, a third hook for the articles disposed between said pair of hooks, and means for moving the hooks vertically. 125 130

7. The combination with a series of dipping-vats having their centers arranged at equal distances apart, of an overhead crane, 130

a pair of hooks for the articles to be dipped carried by the crane and spaced apart for the same distance as that between the centers of adjacent vats, a third hook for the articles disposed at a different distance from its adjacent hook or hooks, and means for moving the hooks vertically.

8. In combination with a series of dipping-vats, an overhead traveling crane, and means for moving the crane, of a bar carried by the crane and arranged above and longitudinally of the series of vats, means carried by the bar for supporting the articles to be dipped, threaded nuts secured to the bar, screw-shafts carried by the crane and engaging the nuts, and means for operating the screw-shafts in unison.

9. In combination with two oppositely disposed series of dipping-vats, an overhead traveling crane, and means for moving the crane, of a pair of bars carried by the crane, one bar arranged above and longitudinally of each series of vats, a carrier for the articles to be dipped, means carried by each bar for engaging the opposite ends of

said carrier, and means for vertically moving the bars in unison.

10. In combination with a dipping-vat, a carrier for the articles to be dipped, a support for the carrier, and means for agitating the carrier while resting upon the support, of an overhead crane, and interengaging hooks pivoted to the crane and to the carrier respectively and having broadened engaging faces.

11. The combination with a pair of oppositely disposed dipping-vats, of a support arranged between said vats, and a detached carrier for the articles to be dipped, said carrier being provided centrally with a yoke to rest upon the support, and at its opposite ends with means for sustaining the articles to be dipped.

In testimony whereof, I have hereunto set my hand.

LAWRENCE CARR STEELE.

Witnesses:

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