

951,952.

Patented Mar. 15, 1910.

2 SHEETS—SHEET 1.

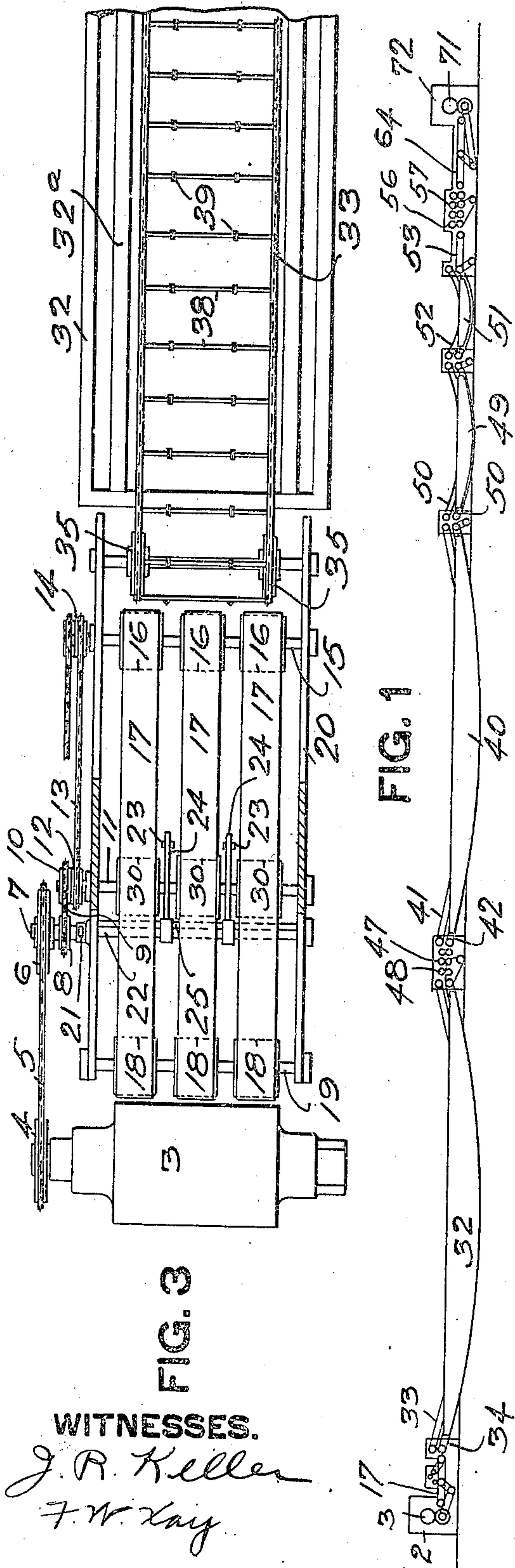


FIG. 3

WITNESSES.

J. R. Keller  
 F. W. Kay

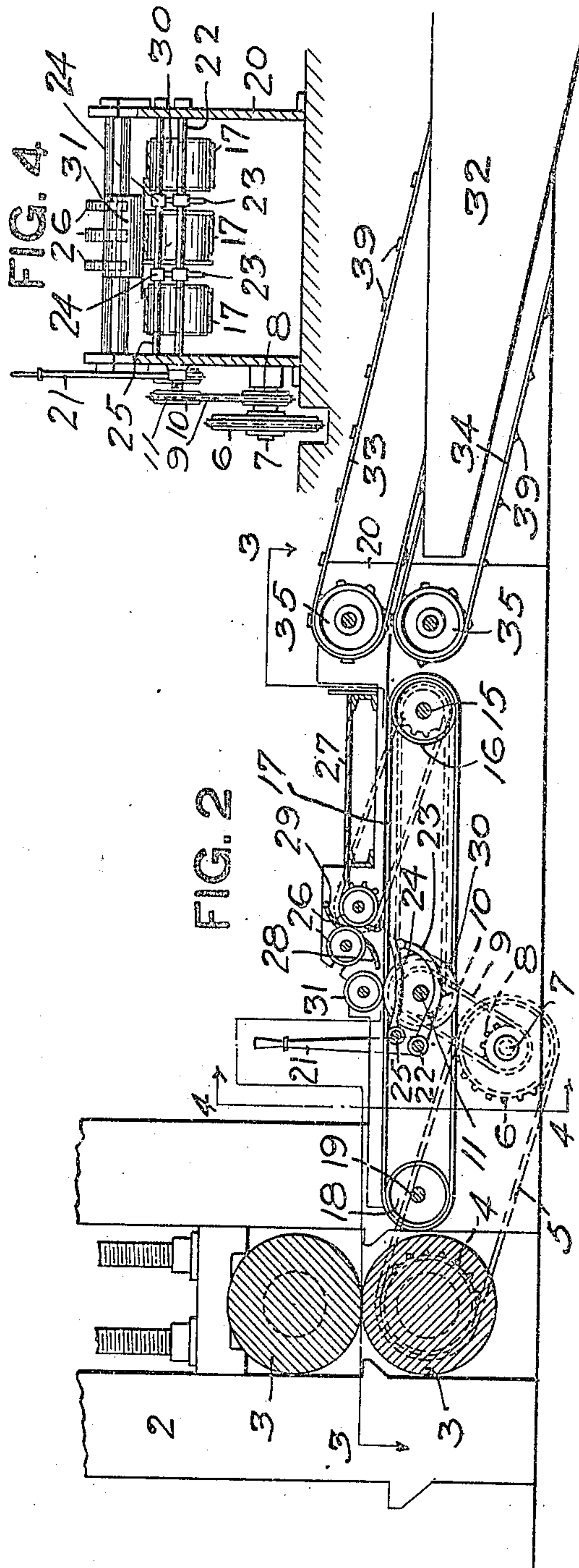


FIG. 2

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J. A. LAMP & S. C. STINER.  
METHOD OF MAKING TIN PLATE.  
APPLICATION FILED MAY 1, 1909.

Patented Mar. 15, 1910.

2 SHEETS—SHEET 2.

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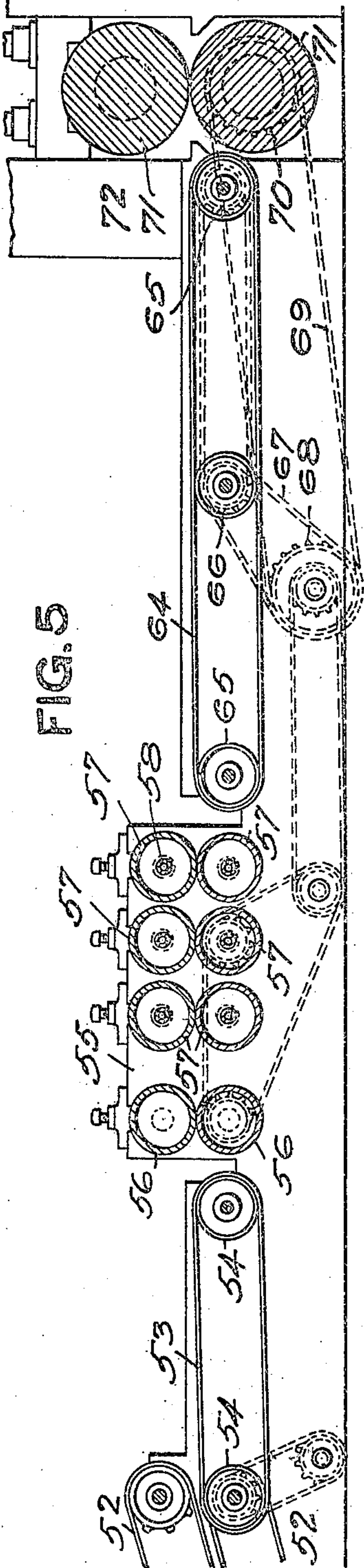


FIG. 5

WITNESSES.

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*F. W. Kay*

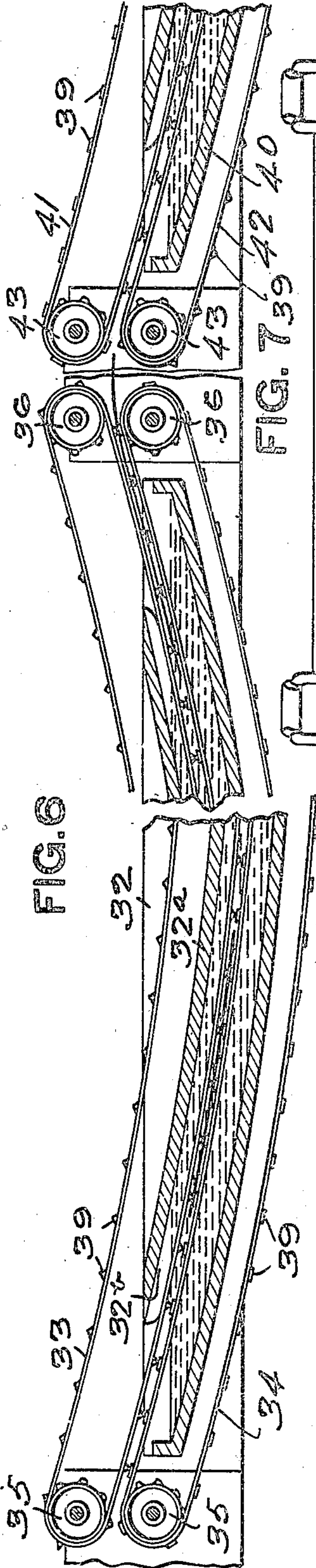


FIG. 6

FIG. 7

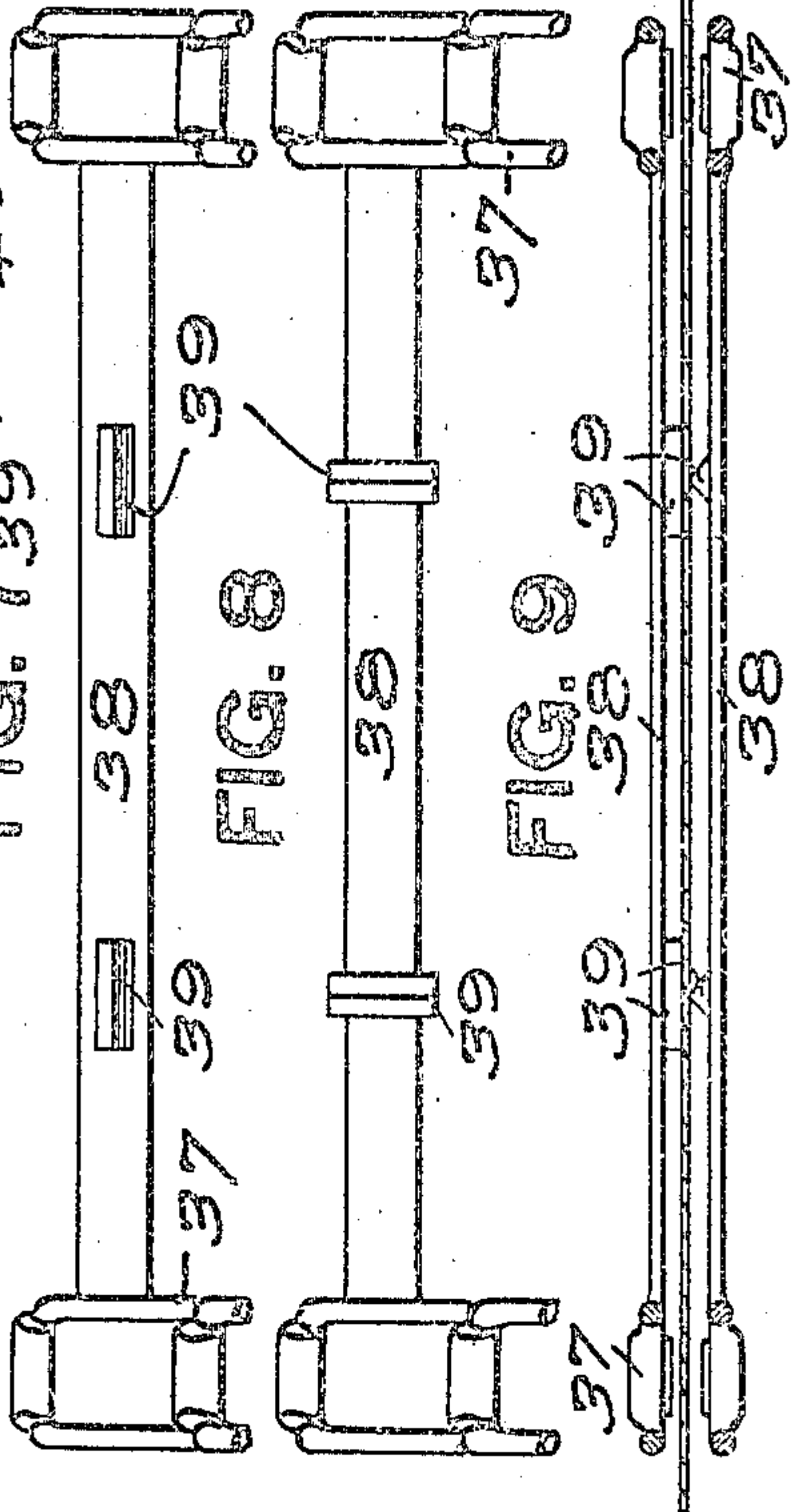
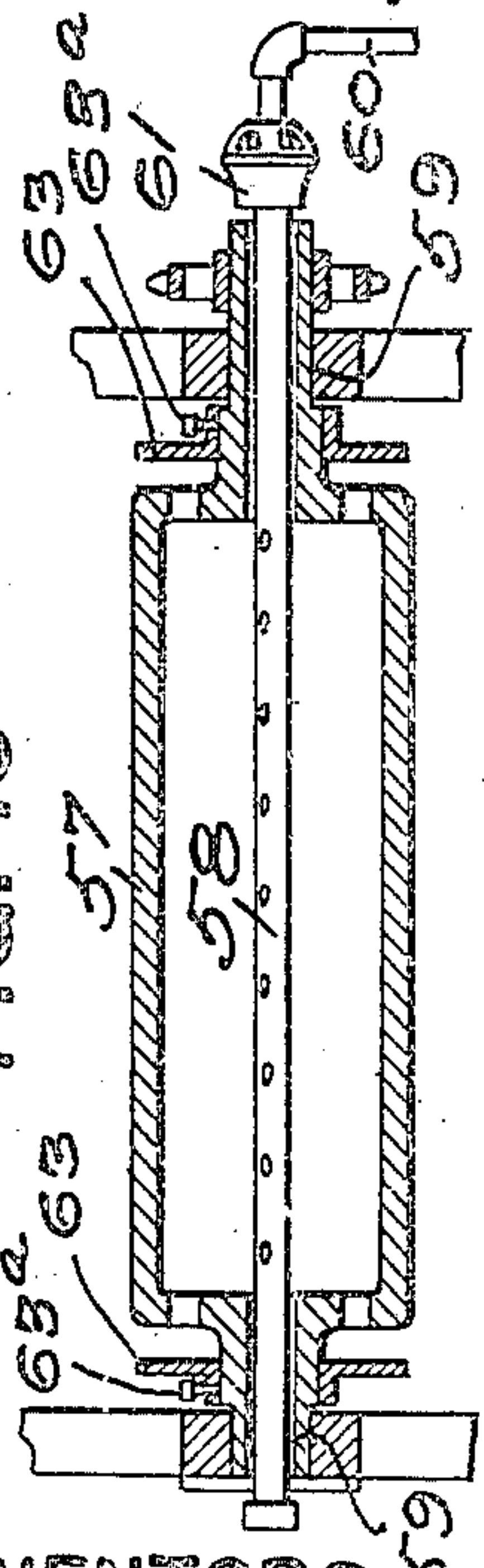


FIG. 8

FIG. 9

FIG. 10



INVENTORS.

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# UNITED STATES PATENT OFFICE.

JOSEPH A. LAMP AND SAVENIOUS C. STINER, OF McKEESPORT, PENNSYLVANIA.

## METHOD OF MAKING TIN-PLATE.

951,952.

Specification of Letters Patent. Patented Mar. 15, 1910.

Application filed May 1, 1909. Serial No. 493,417.

*To all whom it may concern:*

Be it known that we, JOSEPH A. LAMP and SAVENIOUS C. STINER, residents of McKeesport, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Methods of Making Tin-Plate; and we do hereby declare the following to be a full, clear, and exact description thereof.

Our invention relates to a method of making tin or coated plates and has reference more especially to the treatment of the plates preparatory to tinning or coating.

The object of our invention is to provide a continuous process for cleaning and drying black plates preparatory to cold rolling, in which the plates pass from one step of the operation to the other in succession, and whereby we dispense with the black annealing heretofore forming one of the steps of the present method of treating plates, and thereby greatly reducing the time and labor heretofore required in the manufacture of tin or like coated plates.

In the accompanying specification and claims we have described and claimed our invention and in connection therewith we refer to the accompanying drawings illustrating apparatus for carrying out our improved process in which—

Figure 1 is a diagrammatic view in elevation of the apparatus for carrying out our process; Fig. 2 is an enlarged detail view partly in section of the rolls for removing the scale and feeding device for feeding the plates to the first pickling bath; Fig. 3 is a plan view of the same; Fig. 4 is a section on the line 4—4, Fig. 2; Fig. 5 is an enlarged detail of the drying and heating apparatus; Fig. 6 is an enlarged sectional view of the pickling vats showing the conveyer chains for holding the plates in carrying them through the pickling baths; Figs. 7, 8 and 9 are detail views of the conveyer chain; and Fig. 10 is an enlarged detail of the heating rolls.

In the drawings the numeral 2 designates suitable housings for the cold rolls 3 employed for straightening and removing or loosening the scale from the sheets. The upper roll is adapted to be adjusted by means of the ordinary feed screws so that a heavy pressure may be brought to bear on the sheet as it passes between the rolls so as to break up the surface of the sheet and loosen the scale. These rolls are driven

from any suitable source of power, and connected up to the neck of the lower one of said rolls is the sprocket wheel 4 which is connected up by the chain 5 to the sprocket wheel 6 on the shaft 7. The shaft 7 has the small sprocket wheel 8 which is connected up by the chain 9 to the sprocket wheel 10 on the shaft 11. The shaft 11 has the sprocket wheel 12 which is connected up by the chain 13 with the sprocket wheel 14 on the shaft 15. This shaft 15 carries the belt pulleys 16 arranged at suitable intervals apart and conveyer belts 17 connect said pulleys 16 up with the pulleys 18 on the shaft 19. The shaft 15 is journaled in suitable bearings in the housing or frame 20.

A lever 21 is connected to the rock-shaft 22 mounted in the frame 20 and secured to said rock-shaft are the arms 23. These arms 23 are adapted to engage the rocker-arms 24 on the shaft 25. These rocker-arms 24 work in the spaces between the belts 17 and are employed for the purpose of directing "wasters" or imperfect sheets up into the rolls 26 to be delivered onto the platform 27. Deflectors 28 are employed for directing the sheet up into the rolls 26 and a deflector 29 above said rolls acts to direct the sheet onto the platform 27. The drums 30 on the shaft 11 act in connection with the small rolls 31 to feed the plate so that when a defective plate is to be fed up between the rolls 26 said plate will be positively fed to properly accomplish this result.

A pickling vat 32 is formed of wood, concrete or metal which will resist the action of the acid and the sheets are carried down to said vat by means of the conveyer chains 33 and 34. These chains pass around the sprocket wheels 35 at one end of said vat and at the opposite end pass around the sprocket wheels 36 which may be connected up to any suitable source of power to drive said chains at the same rate of speed. In order to take up space within the vat and reduce the amount of pickling acid, we employ the filler 32<sup>a</sup>. Secured to the bottom of said filler are the strips or guides 32<sup>b</sup> with which the upper chain engages while the bottom chain is drawn up snugly against the top chain. By this construction the acid is given full opportunity to attack the plate. These chains 34 are made of metal which will resist the action of the acid and the links 37 of said chains are connected by the cross-bars 38. Contact-lugs 39 are carried by



the bars 38, said lugs being preferably knife-edged, as indicated, so as to present as small a contact point as possible to engage the surface of the plates. The contact-lugs 39 of the one chain are arranged at right angles to the contact-lug of the other chain, and said lugs on said chain are arranged the same distance apart so as to coincide with each other when brought around in position to engage the plates, as indicated in Fig. 2. These chains 33 and 34 pass down into the pickling vat 32 and carry the plates supported thereby through the pickling acid.

Just ahead of the pickling vat 32 is a second pickling vat 40 similar in construction to the one just described and chains 41 and 42 are mounted on sprocket wheels 43 and 44. In the case of the chains 41 and 42, however, the contact-lugs 45 and 46 are arranged the reverse of the contact-lugs 39 of the chains 33 and 34 for the purpose fully hereinafter set forth. Intermediate the pickling vats 32 and 40, however, may be interposed the brushes 47 for loosening the scale adhering to the plates as they emerge from the pickling vat 32. These brushes may be driven by power obtained from the sprocket shaft 36. Rolls 48 may be employed for feeding the plates through the brushes and into the conveyer chains 41 and 42 of the pickling vat 40.

Forward of the pickling vat 40 is the cold water vat 49 for cleaning the plates and said cold water vat has the conveyers 50 for feeding the plates through said vat. The plates pass from the cold water vat 40 to the hot water vat 51, which is used for washing the plates as well as heating the same preparatory to drying. A suitable conveyer chain 52 is likewise employed for carrying the plates through said hot water vat. Just in front of the hot water vat 51 is the belt conveyer 53 which is mounted on the rolls 54.

Mounted in the frame 55 are the rolls 56 which are closely adjusted for squeezing the water from the plates and in advance of said rolls are the heating rolls 57. Three sets of these heating rolls are illustrated although any desired number may be employed. These rolls are connected up and driven from one of the rolls 56. These heating rolls, as illustrated in Fig. 10, are hollow rolls with a perforated pipe 58 passing through the hollow journals 59, said pipe being connected up with a suitable gas pipe 60 and provided with the mixer 61. This is the construction where gas is employed to heat the rolls, but we do not wish to limit ourselves to any particular manner of heating the same. Guards 63 are secured to the journals 59 by means of the set screw 63<sup>a</sup>, said guards being employed to protect the outer ends of the journals from the heat of the rolls. These guards may be formed of asbestos or any other suitable material.

Beyond the heating rolls is the belt conveyer 64 which receives the sheets from the heating rolls, said belt being mounted on the rolls 65. Intermediate rolls 66 are driven by the chain 67 from the sprocket wheel 68 connected up by the chains 69 to the sprocket wheel 70 on the lower roll 71 of the cold rolls which are mounted in the housings 72.

The above apparatus forms the subject of two separate applications for Letters Patent of the United States, Serial No. 493,418, filed May 1, 1909, and Serial No. 541,046, filed January 31st, 1910.

In carrying out our process with the above described apparatus the black plates are fed to the rolls 3 and the scale loosened by passage through said rolls, the operator standing in convenient position in front of said rolls, being able to inspect the plate as it passes from the rolls onto the belts 17, and if said plate is defective and unfit for pickling the operator, by a movement of the lever 21, throws the rocker-arms 24 up in such position as to engage the forward end of the plate and lift it up in position to engage the deflectors 28, whereby said plate is directed up through the rolls 26 and by the deflector 29 is delivered onto the table 24 whence it may be removed. If, however, the plate is not defective, it is carried forward by the belts 17 and delivered to the conveyer chains 33 and 34 of the pickling vat 32. The plate is grasped by the contact-lugs 39 at intervals and, held in this manner, it is conveyed down into and carried through the acid of the pickling bath. The contact-lugs 39 being arranged at right angles to each other and having knife-edges, hold the plate between them with only the metal covered by the knife-edges unexposed to the action of the acid in passing through the pickling vat. In this manner the plates are fed in succession through the pickling vat with practically every part exposed to the action of the acid. As the plates emerge from the pickling vat 32 they are fed to the brushes 47, where such brushes are employed, and the action of said brushes is to loosen the scale still adhering to the plates. The plates are then fed to the chains 41 and 42 of the pickling vat 40 and are grasped by said chains and the contacting lugs 45 and 46 thereof holding the plates securely in position. These contact lugs 45 and 46 being arranged in reverse position to the contact lugs 39, the plates are held at different points of contact from those by which they were held in passing through the pickling vat 32, and consequently the points of contact which were not exposed to the acid of the first vat are now acted on by the acid of the second vat so that the plates when they emerge from the second vat 40 have had all their surfaces exposed to the action of the acid and by no possibility could any points



escape such action. In this manner the plates are fed continuously through the pickling vats with the points of contact changed automatically so that no labor is required in the handling of the plates, nor does the movement of the plate cease from the time it enters the first pickling vat until it passes out at the front end of the second pickling vat. Nor does the movement of the plate cease at this point but it is carried directly into the cold water vat 49 where the cold water washes the acid from the plates, whence the plates are delivered into the hot water vat for further washing and at the same time for heating the plates preparatory to drying. As the plates emerge from the hot water vat they are fed onto the conveyer 53 and pass first through the rolls 56 which act to squeeze the bulk of the water from the plates. The plates then pass between the heating rolls which are heated up to about one thousand degrees Fahrenheit and the plates are thoroughly dried while passing through said rolls. This process of heating the plates at different points enables us to dispense with the black annealing which is ordinarily employed at this stage of the process as now generally practiced. This black annealing consists in placing the plates in an annealing furnace where they are subjected to about 1,600° to 2,000° F. until they become thoroughly soaked. They are then removed and allowed to cool under cover when the

plates are fed to the cold rolls. This is all dispensed with by our improved method and the plates are fed directly from the heating rolls to the cold rolls 71, when the plates are in proper condition to be carried to the white or finishing annealing.

What we claim is:

1. The method of treating plates preparatory to tinning or coating the same, consisting in loosening the scale by cold rolling, and passing the sheets through a pickling bath.

2. The method of treating plates preparatory to tinning or coating the same, consisting in rolling the plates under a high pressure to loosen the scale, and passing the same through a pickling bath.

3. The method of treating plates preparatory to tinning or coating the same, consisting in employing the following steps continuously and successively: cold rolling the plates to loosen the scale, passing the plates through a pickling bath, washing the plates, applying heat to dry the same, and cold rolling.

In testimony whereof, we, the said JOSEPH A. LAMP and SAVENIOUS C. STINER, have hereunto set our hands.

JOSEPH A. LAMP.  
SAVENIOUS C. STINER.

Witnesses:

JAMES G. JENKINS,  
JOHN N. HARTMAN, Jr.