J. R. C. AUGUST.

DIPPING AND QUENCHING ARRANGEMENT FOR METAL BARS OR OTHER METAL ARTICLES.

APPLICATION FILED MAY 8, 1920.

1,366,152. **Patented Jan. 18, 1921.**

4 SHEETS—SHEET 1.

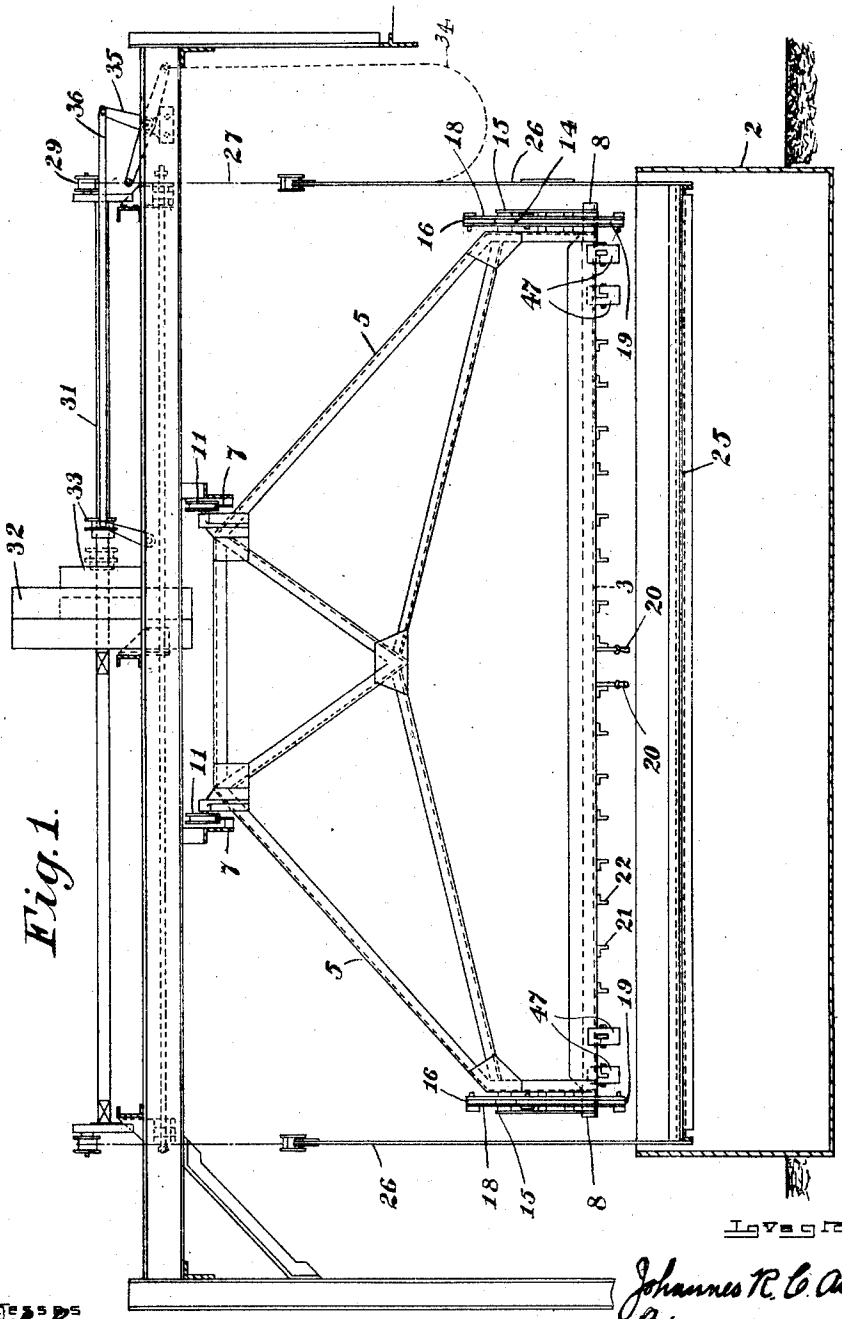


Fig. 1.

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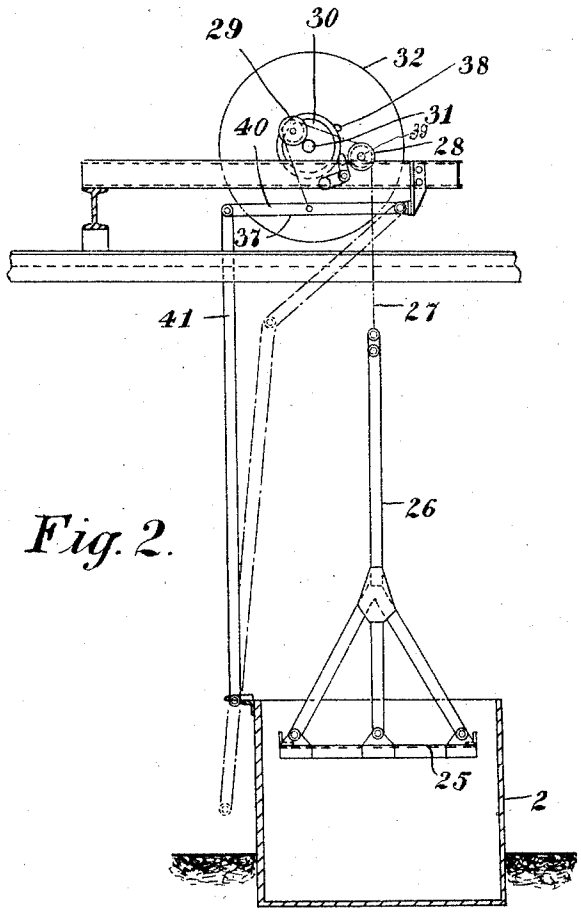


Fig. 2.

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4 SHEETS—SHEET 3

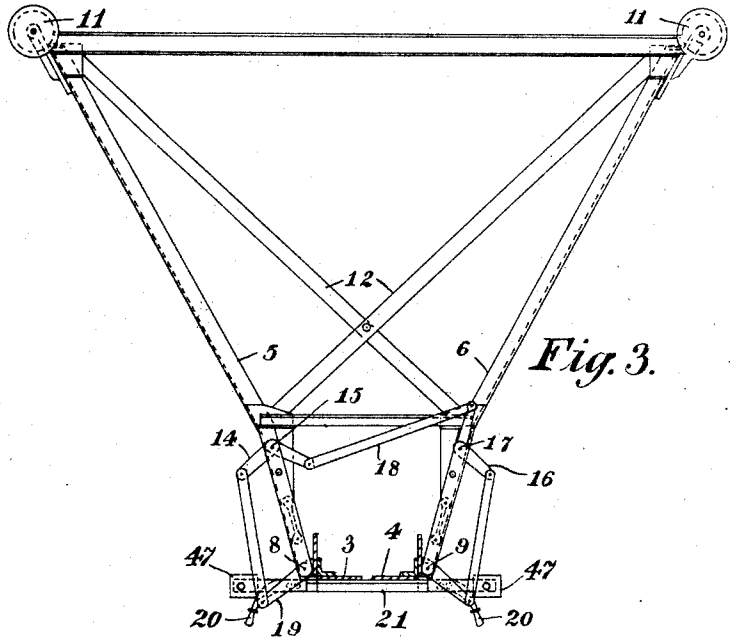


Fig. 3.

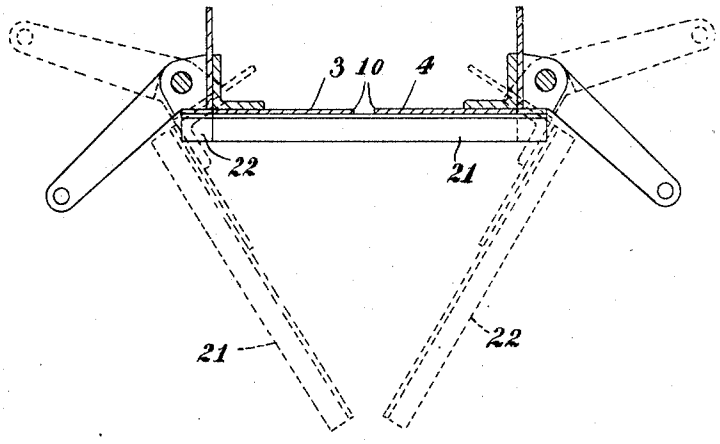


Fig. 4.

Witnesses

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4 SHEETS—SHEET 4.

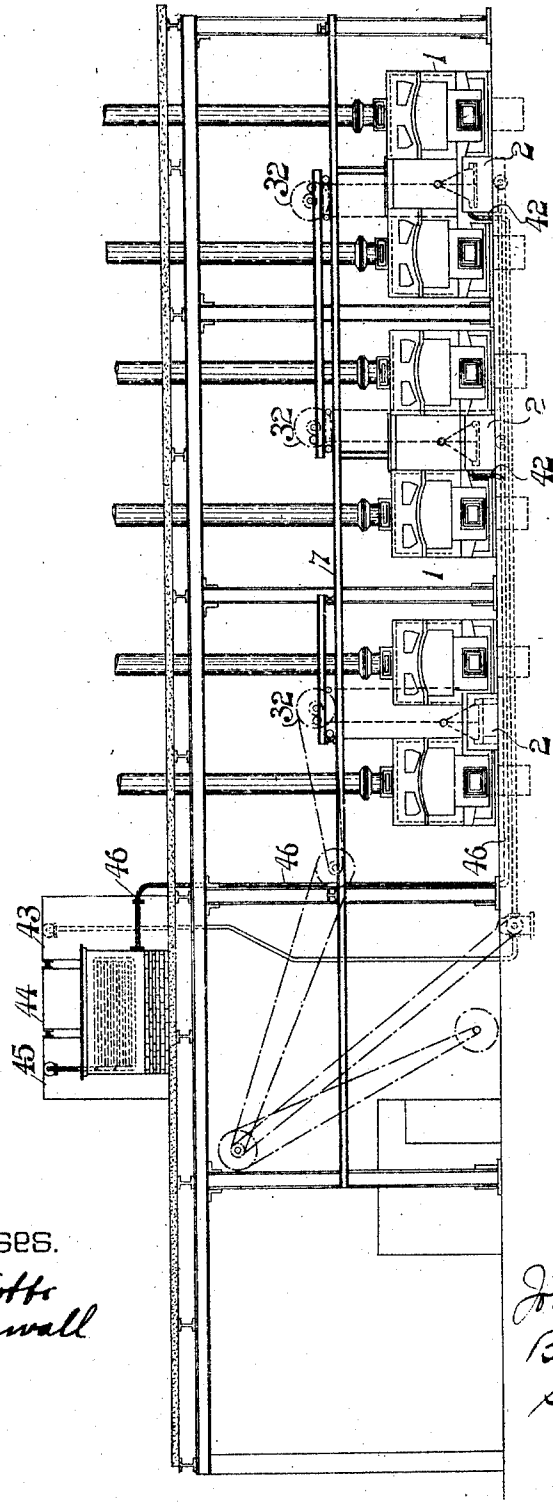


Fig. 5.

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UNITED STATES PATENT OFFICE.

JOHANNES ROBERT CARL AUGUST, OF HALIFAX, ENGLAND.

DIPPING AND QUENCHING ARRANGEMENT FOR METAL BARS OR OTHER METAL ARTICLES.

1,366,152. Specification of Letters Patent. Patented Jan. 18, 1921.

Application filed May 8, 1920. Serial No. 379,996.

To all whom it may concern:

Be it known that I, JOHANNES ROBERT CARL AUGUST, a subject of the King of Great Britain, residing in Halifax, Yorkshire, in the Kingdom of England, have invented certain new and useful Dipping and Quenching Arrangements for Metal Bars or other Metal Articles, of which the following is a specification.

This invention relates to improvements in apparatus for annealing, tempering or otherwise modifying the physical characters of metal bars or other metal articles.

The invention is more especially concerned with dipping and quenching arrangements, and is especially useful for dealing with long metal bars in connection with which it will be hereinafter more particularly described by way of example.

One of the objects of the contrivance is to enable long thin bars to be handled separately instead of in bundles, thereby giving uniform results in the heat treatment and keeping the bars as straight as possible.

My improved dipping arrangement is extremely convenient in handling heavy section bars, and the bars are not released by the dipping arrangement until just clear of the oil, thus avoiding excessive splash. By the bars becoming submerged perfectly level in the oil, warping is reduced to a minimum, also excessive waste and combustion of the oil is prevented by the bars being quickly covered, thus showing a large saving in oil. The dipping arrangement is combined with a shaking gear in the oil tank, whereby the articles are kept in motion in the oil and insuring a uniform cooling off.

The invention is characterized by the combination with a furnace or furnaces in which the heating of the metal bars or other articles can be carried out and an oil tank or tanks in convenient proximity to the said furnaces in which the dipping or quenching of such heated bars takes place, of a platform or trough supported by a suitable carriage adapted to travel along a track, and arranged to bring the empty platform or trough into alinement with the furnace so that the heated bars can be directly charged thereonto, and be then conducted into a position directly above the dipping tank to drop the bars into it. The platform or trough is longitudinally divided into two portions, pivoted to the carriage, the two halves being arranged so as to be maintained horizontal or approximately so, with their meeting edges in contact or nearly so, when in position to receive the hot bars, etc., but adapted to tilt or dip down on their pivots so as to open and assume an inclined position when releasing hot bars into the quenching tank. In combination with the interior of the quenching tank, a dipping tray is provided onto which the bars are discharged from the platform or trough, such dipping device being given by suitable gear, an up and down motion in the tank, or raised up clear of the liquid in the tank so as to drain and allow the bars to be removed.

The invention will be understood from the following description, reference being had to the accompanying drawings in which—

Figure 1 is a side elevation of the apparatus;

Fig. 2 is an end elevation of the dipping tray in the tank together with the apparatus for giving it an up and down motion in the tank or holding it clear of the liquid.

Fig. 3 is an end elevation of the traveling carriage with its platform or trough;

Fig. 4 is an end view of the platform or trough on a larger scale showing the two parts in their closed and open position;

Fig. 5 is a general view of a number of heating furnaces and quenching tanks with my apparatus applied thereto.

Referring to these drawings 1 is the furnace or furnaces in which the heating of the metal bars or other articles can be carried out, 2 is the oil tank or tanks in convenient proximity to the said furnaces in which the dipping or quenching of such heated bars takes place, 3, 4, is the platform or trough supported by a suitable carriage 5, 6, adapted to travel along a track such as 7, and arranged to bring an empty platform or trough into alinement with the furnace so that the heated bars can be directly charged thereunto and be then conducted into a position directly above the dipping tank.

The platform or trough is longitudinally divided into two portions 3, 4 pivoted to the carriage 5, 6, at 8, 9, the two halves being arranged so as to be maintained horizontal or approximately so, with their meeting edges 10 in contact or nearly so, when in position to receive the hot bars etc., but

adapted to tilt or dip down on their pivots so as to open and assume an inclined position when releasing the hot bars into the quenching tank. In its preferred form the carriage which runs on wheels 11 along an overhead track 7 past the front of a series of furnaces, is carried on ball bearings and is made in braced arch form so as to have a narrow wheel base as shown in Fig. 1, because with a wide wheel base, there is a tendency for one side to travel before the other, when pushing power is applied at one end and consequently wedge the wheels on the track. This carriage is composed of two opposite depending hangers 5, 6 more or less converging toward each other below. These hangers 5 and 6 are suitably stayed together with cross stays 12. The two halves 3, 4, of the platform are pivoted at each side to the respective hangers by the pivotal rods 8, 9, and counter weights are provided to maintain the platform in the closed position. The platform members are arranged to work in any suitable way, as for instance mounting bell crank levers 14 on pivot pins 15 also secured to the hangers at the ends thereof, and by mounting other bell crank levers 16 on pivot pins 17 also secured to the hangers at the end thereof, and connecting one arm of the bell crank levers 14, 16 together by connecting rods 18 and connecting the other arm of the said bell crank levers to crank arms 19 projecting from the respective longitudinal pivotal shafts 8, 9. The pivotal shaft 8 is provided with a crank handle 20 and the shaft 9 is provided with a similar handle, and by operating either handle, the platform members 3, 4 are arranged to work in unison through being connected by the connecting links and cranks aforesaid. Counter weights 47 are provided to maintain the platform members in the closed position, and fastening devices may also be provided to keep them closed. Each half of the pivoted divided platform consists of a flat plate or plates 3 and 4 and a series of fingers 21, 22 extending beyond the meeting or adjacent edges of the plates, the fingers 21 of one platform portion alternating with and being oppositely directed to the fingers 22 of the other platform portion, so that when the two portions are horizontal or approximately so, they form a trough the plates of which form the floor for the bars to rest on, while when the two halves are turned into an inclined position, the fingers as well as the plates form inclined planes down which the hot bars slide into the oil in the quenching tank, the wedge formation assumed by the intermeshing fingers in their inclined position, having a tendency to straighten the bars as they are released and insure their entering the oil perfectly level, so that warping is reduced to a minimum.

Means are provided to keep the articles in motion in the oil to insure uniform cooling off. For this purpose a dipping tray 25 is given an oscillatory or shaking movement in the tank. The tray 25 is suspended at each end from a vertical rod 26 which may be actuated by a crank, cam, or in any other suitable manner. For example, the vertical rods 26 are connected above, to vertical belts or cords 27 running over guide rollers or pulleys 28 and passed over pulleys 29 mounted on crank pins on disks 30 keyed to a shaft 31 and driven by an overhead belt pulley 32, the other end of these belts or cords being secured at the points 37. Suitable clutch gear 33 is provided for throwing the said shaft 31 into and out of operation. This clutch gear can be operated from the floor level through the medium of a chain 34 the three armed rocking lever 35 and rod 36. By these means the dipping tray may be rapidly raised and lowered, say about thirty times per minute, thus insuring the hot bars being uniformly cooled. Any suitable means may be provided to allow the dipping tray to be suspended in its top position without falling back owing to its weight and the weight of the material on it. For this purpose each crank disk may be provided with a ratchet tooth or teeth 38 which can be engaged by a pawl 39. The crank disks could be made with ratchet teeth all around their periphery, or at one portion thereof, or the periphery of the crank disks would be fitted at a suitable position with a stop, such as a set screw chamfered on one side, or made with a notch in which the pawl is adapted to engage in order to hold the tray in its raised position. One end of the belts 27 or the like is connected at 37 to an anchor lever 40 jointed to a long depending arm 41 which can be locked by suitable means in any desired position. When the cooling is finished, the tray is stopped in its raised position and held there by the pawl and ratchet or other locking device. By loosening the anchor lever and pulling it down to the required extent into say the position shown by the dotted lines the dipping tray can be raised above the quenching tank clear of the oil, and the tray is then left there to drain. The anchor levers are preferably weighted so as to balance the tray when empty.

The depth of immersion of the tray in the dipping tank can be regulated by the same device namely by taking up more or less of the belt 27.

I provide suitable means for circulating and cooling the oil used in the dipping or quenching tanks, whereby the oil is pumped from the dipping tanks 2 and circulated through cooling apparatus, and then returned in a cold condition to the dipping

tanks. In such an arrangement, for example the dipping tanks are connected by piping to one or more cooling tanks, separate pipes being of course provided for the flow of the hot and cool oil from and to the cooling apparatus. Any suitable cooling medium is contained or circulated in the cooling tanks, and any desired number of such tanks may be used, which may be connected together in series. The hot oil which is taken from the upper part of the dipping tanks 2 by a pipe such as 42, is pumped by a suitable pump to the top of the first cooling tank 43 and passes through a coil or worm in the said cooling tank to the bottom thereof, and then by a straight pipe up the center of the tank to a second tank 44 and is then forced down the coil in that tank and up the center of the tank through a pipe to the next tank 45 in the series and so on and then back to the lower part of the dipping tank by pipe 46. The cooling tanks are preferably arranged at a higher elevation than the quenching tanks 2, and where the plant comprises a series of dipping or quenching tanks 2 as in Fig. 5 the respective dipping tanks 2 are connected by branch pipes to main pipes carrying the hot and cold oil. The pump may be inserted at any suitable point in the pipe system, preferably in the hot oil pipe between the quenching tanks and the cooling tanks.

In action a carriage is caused to bring an empty platform or trough into alinement with a furnace so that heated bars can be directly charged thereunto. The carriage with its loaded platform is now moved by rollers on the over-head track so as to bring the loaded trough into a position directly above the dipping tank. The platform is then opened, and the bars slide down the inclined support into the quenching tank so as to enter the oil therein. The bars are not released until just clear of the oil, and thus excessive splash is avoided. The tendency of the inclined fingers is to straighten the bars as they are released, and the bars being preferred perfectly level in the oil, warping is reduced to a minimum.

The features of construction, advantages, and operation of the apparatus will now be apparent. It is to be understood that I do not consider my self limited to the details of construction herein described, as various changes could be readily suggested which, while they might materially change the appearance of the apparatus, would not involve a departure from the scope of the invention herein set forth. Accordingly the relative positions of the various parts may be varied, and instead of arranging the carriage to run on an overhead track, it can be arranged to run on a track on the ground level or on a level with the top of the tanks. Furthermore the apparatus for giving an up and down motion to the dipping carriage can be modified. It is to be understood that my invention has to undergo a certain amount of constructional modification to suit the particular local conditions of each place at which it is to be erected.

I declare that what I claim is:—

1. The combination with a furnace or furnaces in which the heating of metal bars or other articles can be carried out, and an oil tank or tanks in immediate proximity to the said furnaces in which the dipping or quenching of such heated bars takes place, of a platform or trough supported by a suitable carriage adapted to travel upon a track and arranged to bring the empty platform or trough into alinement with the furnace so that the heated bars can be directly charged thereonto, and be then conducted into a position directly above the quenching tank to drop the bars into it.

2. A dipping or quenching arrangement for metal bars and other articles, comprising a traveling carriage adapted to run on wheels along a track, a quenching tank or tanks for holding oil or other liquids, a platform or trough longitudinally divided into two portions pivoted to the carriage, the two halves being arranged so as to be maintained horizontal or approximately so with their meeting edges in contact or nearly so when in position to receive the hot bars etc. but adapted to tilt up or dip down on their pivots so as to open and assume an inclined position when releasing hot bars into the quenching tank.

3. A dipping or quenching arrangement for metal bars, comprising a pivoted divided platform made of a flat plate or plates, and a series of supporting fingers extending beyond the meeting edges of the plate the bars of one platform alternating with and being oppositely directed to those of the other platform, so that when the two halves are horizontal or approximately so, they form a trough the plates of which form the floor for the bars to rest on, while when the two halves are turned into an inclined position, the fingers as well as the plates form inclined planes down which the hot bars slide into the oil in the quenching tank, the wedge formation assumed by the intermeshing fingers in their inclined position having a tendency to straighten the bars as they are released and insure their entering the oil perfectly level so that warping is reduced to a minimum.

4. In a dipping or punching arrangement for metal bars, the combination with the pivoted divided platform of a link and crank arrangement so arranged that when the two part platform is turned on its pivots it will work in unison, and a handle in connection with each part of the platform.

5. In a dipping or quenching arrangement

for metal bars, the combination with an oil tank or tanks and a platform supported by a suitable carriage adapted to travel along a track, of a dipping tray on to which the bars are discharged from the platform or trough such dipping device being given by suitable gear an up and down motion in the tank, or raised up clear of the liquid in the tank so as to drain and allow the bars to be removed.

6. In a dipping or quenching arrangement for metal bars, the combination with an oil tank or tanks of a platform longitudinally divided into two portions and a traveling carriage made in braced arch form so as to have a narrow wheel base by which carriage the two part platform is suspended.

7. In a dipping or quenching arrangement for metal bars, the combination with an oil quenching tank or tanks, of a platform longitudinally divided into two portions for bringing the bars to the tanks, and a carriage for supporting the two part platform, such carriage consisting of two opposite depending hangers more or less converging toward each other below and suitably stayed together.

In witness whereof, I have hereunto signed my name this 19th day of April 1920, in the presence of two subscribing witnesses.

JOHANNES ROBERT CARL AUGUST.

Witnesses:

AUGUSTUS E. INGRAM,

R. DE B. NICHOLLS.