June 2, 1931. F. T. COPE 1,808,160

QUENCHING TANK

Filed Feb. 6, 1930 4 Sheets-Sheet 1

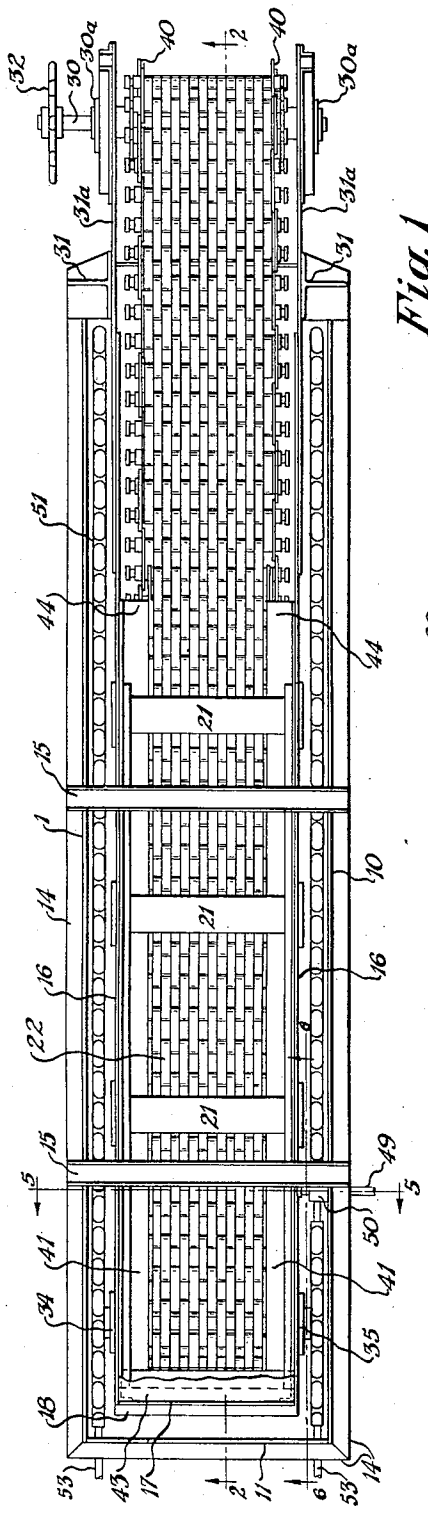


Fig. 1

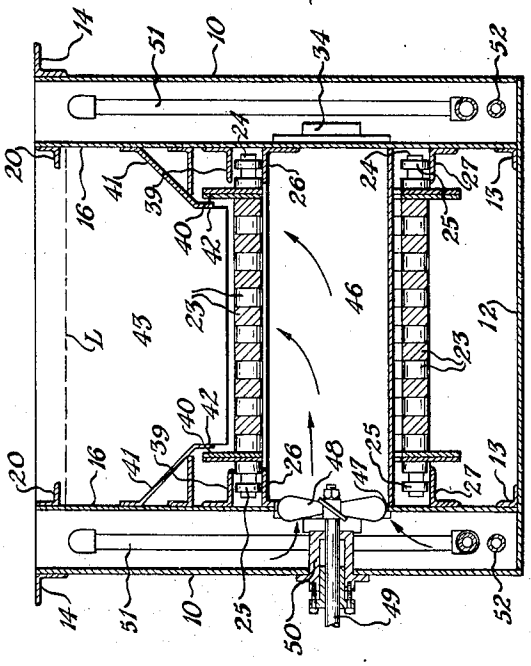


Fig. 5.

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QUENCHING TANK

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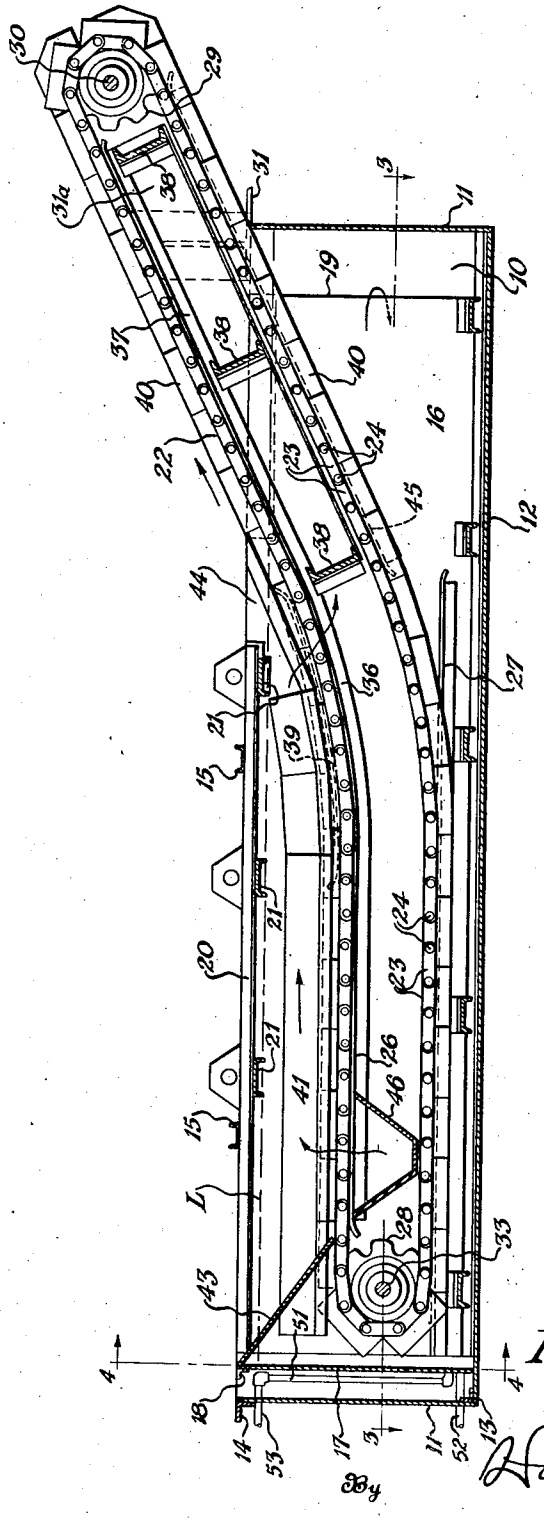


Fig. 2

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QUENCHING TANK

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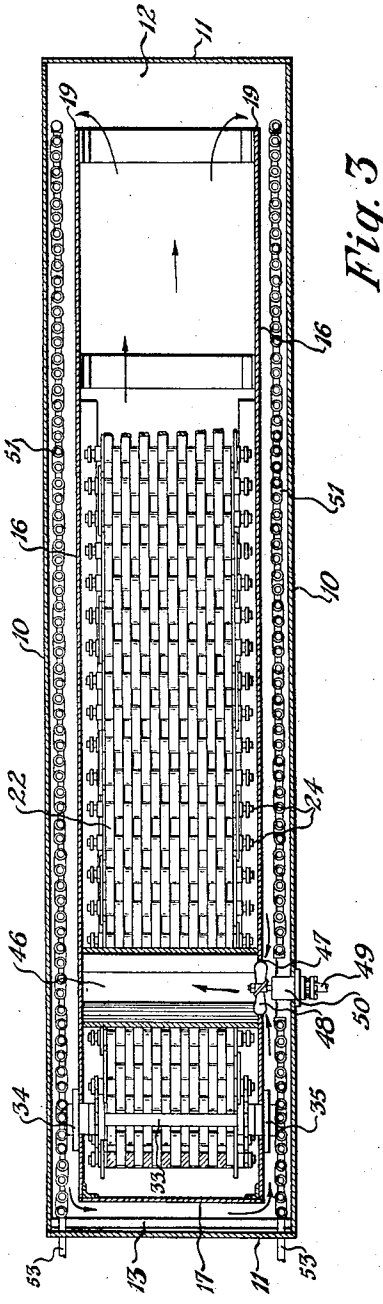


Fig. 3

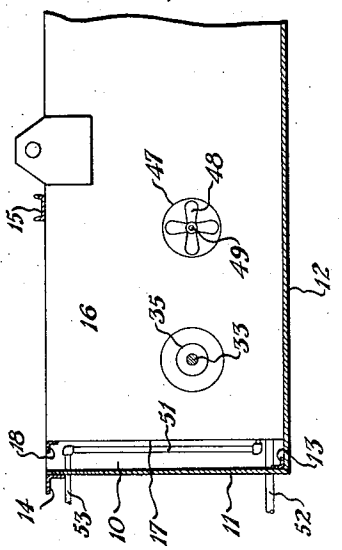


Fig. 6

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QUENCHING TANK

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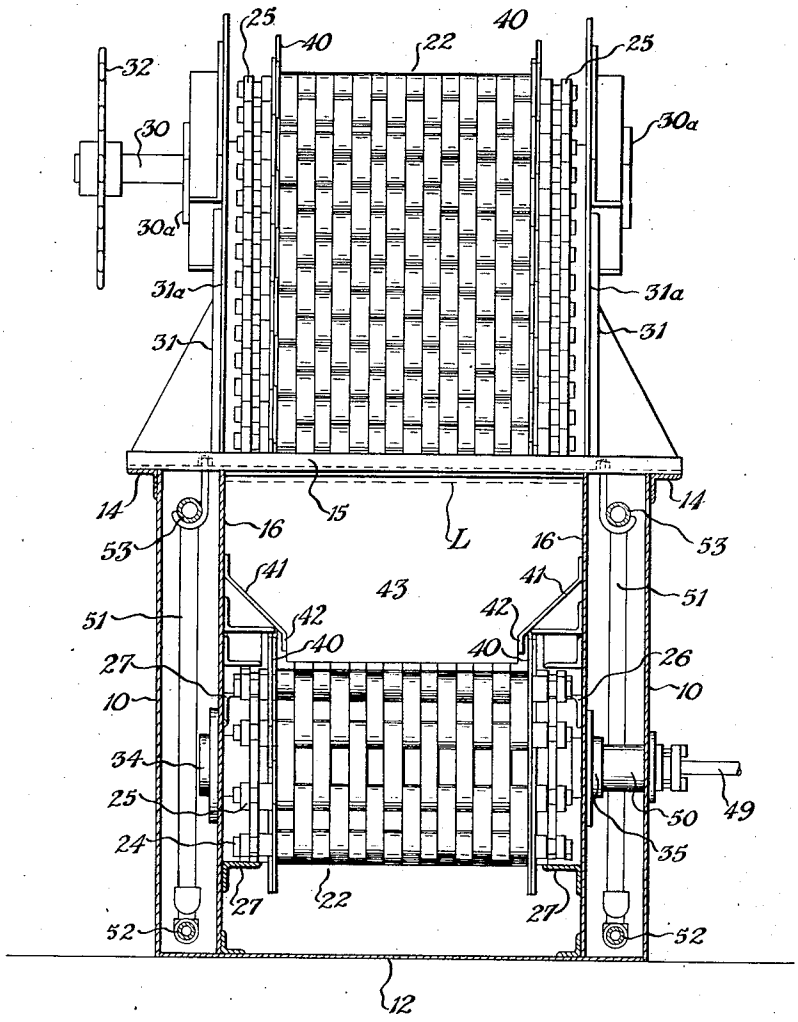


Fig. 4.

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UNITED STATES PATENT OFFICE

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QUENCHING TANK

Application filed February 6, 1930. Serial No. 426,310.

The invention relates to apparatus for quenching material or articles emerging from a heat treating furnace, and more particularly to means for cooling and circulating the quenching fluid.

The object of the improvement is to provide an apparatus including a tank adapted to contain oil or other quenching fluid and provided with baffle walls and a propeller for continuously circulating the fluid through the tank in a predetermined path; an endless chain belt or the like being located through the tank and extending upward out of the discharge end thereof for conveying articles or material to be quenched through the quenching fluid and discharging the same therefrom; means being provided for cooling or heating the fluid before the incoming hot articles or material contact therewith.

An embodiment of the invention is illustrated in the accompanying drawings, in which

Figure 1 is a plan view of the improved quenching apparatus;

Fig. 2, a vertical longitudinal section taken substantially on the line 2—2, Fig. 1;

Fig. 3, a plan sectional view taken substantially on the line 3—3, Fig. 2;

Fig. 4, a transverse section on the line 4—4, Fig. 2;

Fig. 5, a transverse section on the line 5—5, Fig. 1; and

Fig. 6, a longitudinal section on the line 6—6, Fig. 1.

Similar numerals refer to similar parts throughout the drawings.

The quenching apparatus includes a tank of elongated rectangular form comprising generally the side walls 10, end walls 11 and bottom 12 which may be reinforced and strengthened as by the angles 13 and 14 and channels 15.

A substantially U-shaped baffle wall is built within the enclosure of the tank walls above described and comprises the side walls 16, spaced from the outer side walls 10 and extending from the bottom 12 to the top of the tank, being joined at the charging end of the tank by the end wall 17 which is spaced from the adjacent outer end wall 11 and extends from the bottom to the top of the tank, being braced and strengthened as by the angle iron 18.

The baffle walls 16 terminate at a point spaced from the rear end wall 11, as indicated at 19, and may be reinforced at their upper edges as by the longitudinal angle irons 20 and the transverse channels 21.

Thus the baffle walls 16, 17 form an inner tank open at its discharge end, and its side and end walls form with the walls of the outer tank a passage through which quenching liquid may be circulated.

For the purpose of conveying articles through the quenching fluid, a chain belt or other form of perforate belt, indicated generally at 22, is arranged to pass through the liquid in the tank and to carry the articles through the quenching bath and then out at the discharge end of the tank.

This chain belt may be formed of links in the manner illustrated in the drawings or may be of any other suitable structure which is perforate throughout in order to permit the quenching fluid to readily pass through the same.

The structure is preferably such as illustrated in the drawings in which links 23 are connected together in staggered relation by means of the pins 24 provided at their ends with rollers 25 adapted to ride upon the upper and lower rails 26 and 27 respectively, which may be supported upon the baffle side walls 16.

The chain belt is continuous and passes over the sprocket 28, located within the tank near the charging end thereof and over the sprocket 29 mounted upon a shaft 30 journaled in bearings 30*a* supported by the brackets 31 and plates 31*a* mounted upon the discharge end of the tank.

A sprocket or pulley 32 may be fixed upon the shaft 30 and connected by a chain or belt to any suitable source of power. The sprocket 28 is mounted upon a shaft 33 journaled in suitable bearings 34 and 35 supported by the walls 16.

The upper track 26 is curved as at 36 and inclined upward as at 37 to a point adjacent to the sprocket 29, being supported as by

the transverse channels 38 connected to the baffle walls 16 and side plates 31*a*.

For the purpose of holding the chain down upon the curved portion 36 of the upper track, a pair of curved guide rails 39 are fixed to the inner sides of the baffle walls 16 and located above the rollers 25 on the upper strand of the chain, as best shown in Figs. 2 and 5.

The chain is provided at each side with the upright flanges 40 to retain the articles or material upon the chain and prevent its falling over the edges thereof. In order to prevent the material from being accidentally charged upon the outer edges of the chain, over the rollers 25, a depending, inclined guard plate 41 is fixed to each baffle wall 16 and terminates in the depending flange 42 located just inside of the adjacent flanges 40 upon the chain.

Thus, as the material to be quenched is charged onto the inclined chute or plate 43, at the charging end of the apparatus, the same will be guided onto the chain between the flanges 40 and thus cannot be accidentally charged onto the outer edge portions of the chain.

The guard plates 41 may extend a considerable distance along the chain, preferably extending for some distance around the upward curve thereof and terminating at the top edge of the tank, as indicated at 44, in Fig. 2, thus giving the material or articles sufficient time to be properly leveled off on the chain without danger of their being accidentally pushed over the upright flanges 40 and onto the outer edges of the chain.

The inclined portion of the lower strand of the chain may be supported by the rails 45 connected to the inner sides of the baffle walls 16 and plates 31*a* and supporting the chain from the sprockets 29 to a point adjacent to the lower tracks 27.

A downwardly tapered trough 46 is located transversely through the quenching tank and extends from one baffle wall 16 to the other, between the upper and lower strands of the chain, being open on its upper side and communicating at one end with an opening 47 in the adjacent baffle wall 16.

A propeller 48 is located in the opening 47, being mounted upon a shaft 49 journaled in a bearing, shown generally at 50, supported in the adjacent side wall 10, the shaft extending outward through the bearing and being connected to any suitable driving means for rotating the propeller in a direction to pump the oil or other quenching fluid through the opening 47 and trough 46, in the direction of the arrows in Figs. 2 and 5.

The only exit for the oil after it passes into the trough 46 is up through the perforate belt, then rearward and again through the belt to the rear or discharge end of the apparatus and around the ends of the baffle walls 16, the oil then passing forward between the baffle walls and outer walls 10 and then back through the propeller and into the trough 46, as shown by the arrows in Fig. 3.

The chain conveyer being perforated permits the oil to pass upward through the same so that the articles may be submerged in oil as the chain travels through the tank, the oil level being preferably substantially at the point indicated at L in the drawings.

As the belt travels up the inclined track toward the discharge end of the apparatus, it will be seen that the oil may freely pass through the same and return to the tank, as it drains from the articles which have been quenched.

For the purpose of changing the temperature of the oil before it is returned, through the trough 46, to the interior of the baffle walls, coils 51 may be located between the baffle walls 16 and the outer side walls 10, the oil which has been heated by contact with the articles passing around said coils as it returns to the trough 46 to be again brought into contact with incoming heated articles.

Each coil may be provided with inlet and outlet pipes as indicated at 52 and 53 for the purpose of continuously circulating any suitable cooling or heating fluid through the coils.

It should be understood that instead of providing the cooling or heating coils in each tank, the fluid from a battery of tanks may be all circulated through a central cooling or heating apparatus and then back to the tanks which would be constructed the same as illustrated in the accompanying drawings, except for the omission of the coils therein.

I claim:

1. Quenching apparatus including a tank, baffle walls within the tank spaced from the side walls thereof and terminating at a point spaced from the discharge end of the tank, means for passing articles to be quenched through the tank between the baffle walls, means for changing the temperature of the quenching liquid, and means for bodily circulating the liquid between the baffle walls, around the terminations of the baffle walls and between the baffle walls and side walls and between the baffle walls.

2. Quenching apparatus including a tank, a baffle wall within the tank spaced from the adjacent side wall thereof and terminating at a point spaced from the discharge end of the tank, means for passing articles to be quenched through the tank, means for changing the temperature of the quenching liquid, and means for bodily circulating the liquid in the direction of movement of the articles, around the termination of the baffle wall, between the baffle wall and adjacent side wall and into contact with the incoming articles.

3. Quenching apparatus including a tank,

a substantially U-shaped baffle wall within the tank spaced from the walls thereof, the open end of the U terminating at a point spaced from the discharge end of the tank, means for passing articles to be quenched through the tank between the baffle walls, a transverse trough extending between the baffle walls at the entrance end of the tank below the path of the articles, there being an opening in one baffle wall communicating with the adjacent end of the trough, means for changing the temperature of the quenching liquid and means for then circulating the liquid through said opening and into the trough.

4. Quenching apparatus including walls forming an outer tank having an inlet end and a discharge end, walls forming an inner tank open at the discharge end and within the outer tank, the walls of the inner tank being spaced from the walls of the outer tank to form a circulating passage for a quenching liquid between the tanks, the side walls of the inner tank terminating at a point spaced from the discharge end of the outer tank, means for bodily circulating quenching liquid through the inner tank around the termination of its side walls into the circulating passage and back into the inner tank at its entrance end, and means in the circulating passage for controlling the temperature of the quenching liquid.

5. Quenching apparatus including walls forming an outer tank having an inlet end and a discharge end, walls forming an inner tank open at the discharge end and within the outer tank, the walls of the inner tank being spaced from the walls of the outer tank to form a circulating passage for a quenching liquid between the tanks, the side walls of the inner tank terminating at a point spaced from the discharge end of the outer tank, means for passing articles to be quenched through the inner tank, separate means for bodily circulating quenching liquid through the inner tank around the termination of its side walls into the circulating passage and back into the inner tank at its entrance end, and means in the circulating passage for controlling the temperature of the quenching liquid.

6. Quenching apparatus including walls forming an outer tank having an inlet end and a discharge end, walls forming an inner tank open at the discharge end and within the outer tank, the walls of the inner tank being spaced from the walls of the outer tank to form a circulating passage for a quenching liquid between the tanks, the side walls of the inner tank terminating at a point spaced from the discharge end of the outer tank, means for passing articles to be quenched through the inner tank, walls forming a transverse trough within the inner tank at its entrance end below the path of the articles and communicating with the circulating passage, separate means for circulating quenching liquid from the circulating passage through the trough into the inner tank, and means in the circulating passage for controlling the temperature of the quenching liquid.

7. Quenching apparatus including walls forming an outer tank having an inlet end and a discharge end, walls forming an inner tank open at the discharge end and within the outer tank, the walls of the inner tank being spaced from the walls of the outer tank to form a circulating passage for a quenching liquid between the tanks, the side walls of the inner tank terminating at a point spaced from the discharge end of the outer tank, and means for passing articles to be quenched through the inner tank, walls forming a transverse trough within the inner tank at its entrance end below the path of the articles, there being an opening formed in one inner tank side wall communicating with the adjacent end of the trough, means adjacent the opening for circulating quenching liquid from the circulating passage through the trough into the inner tank, and means in the circulating passage for controlling the temperature of the quenching liquid.

In testimony that I claim the above, I have hereunto subscribed my name.

FRANK T. COPE.