

Dec. 1, 1931.

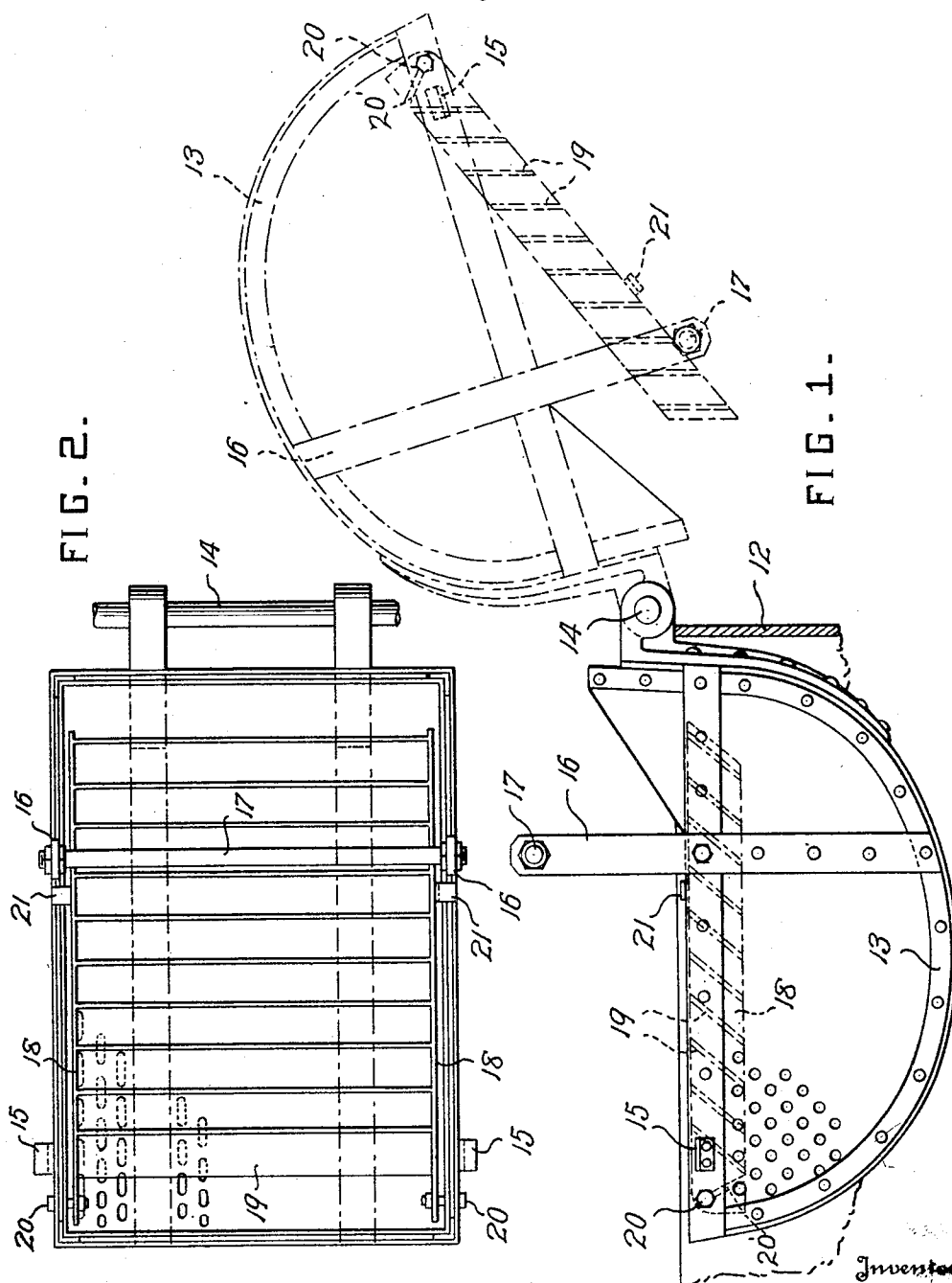
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1,834,872

QUENCHING APPARATUS FOR HARDENING METAL WORK

Filed Sept. 24, 1929

3 Sheets-Sheet 1



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FIG. 3.

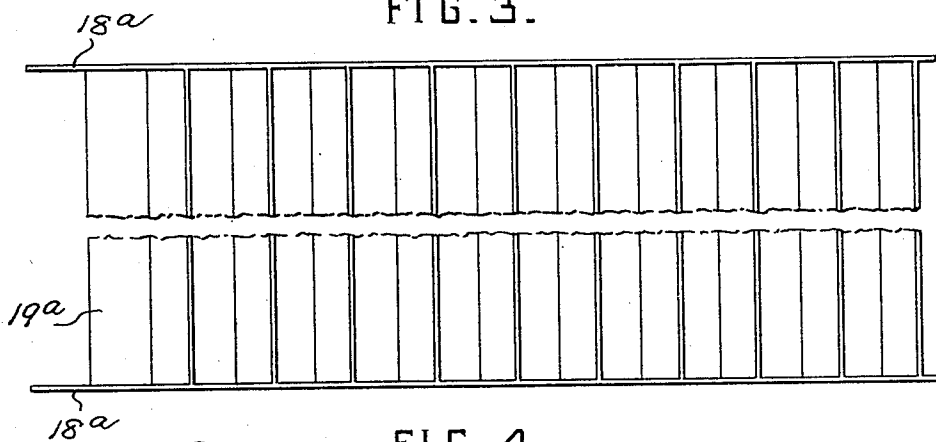


FIG. 4.

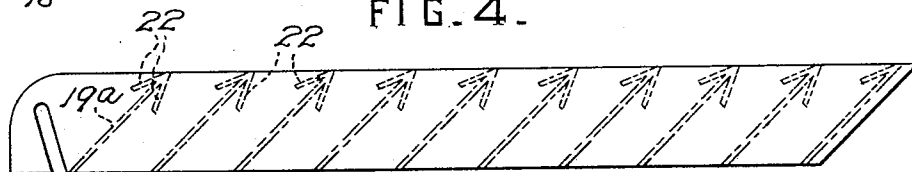


FIG. 5.

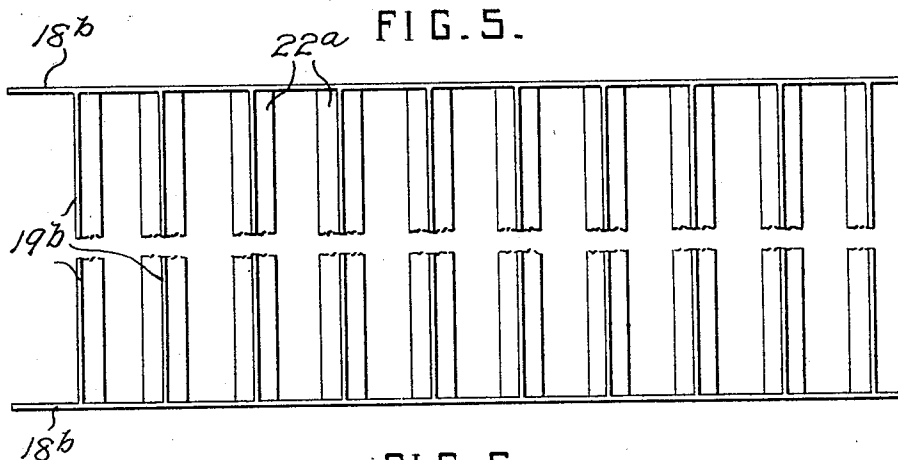
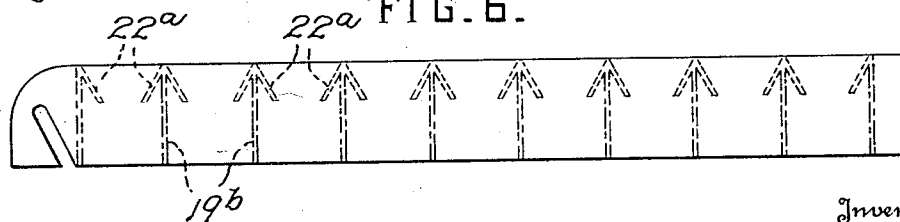


FIG. 6.



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3 Sheets-Sheet 3

FIG. 7.

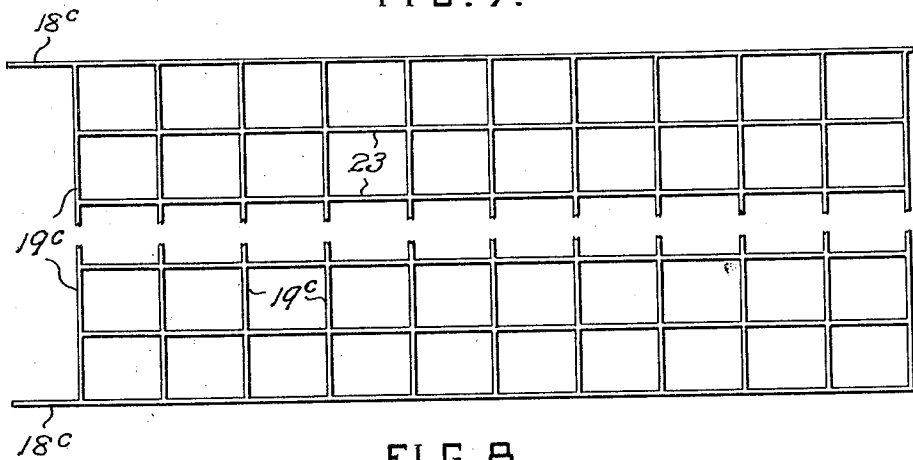


FIG. 8.

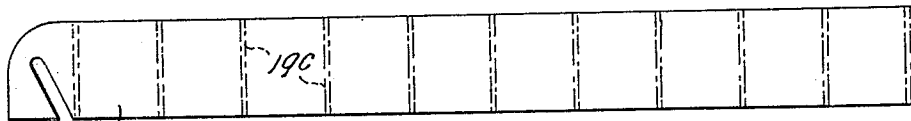


FIG. 9.

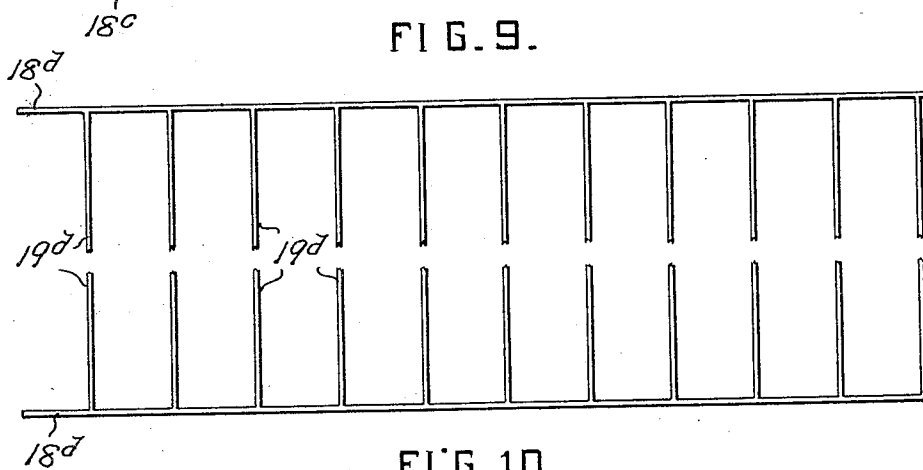
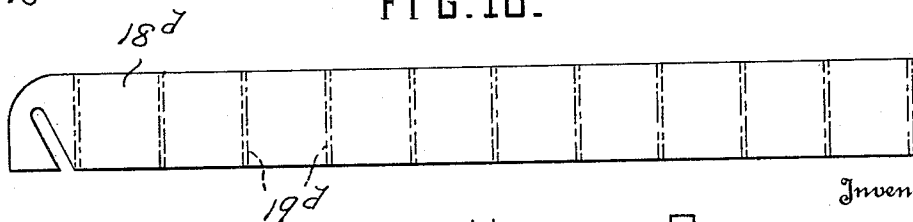


FIG. 10.



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QUENCHING APPARATUS FOR HARDENING METAL WORK

Application filed September 24, 1929. Serial No. 394,831.

This invention relates to improvements in apparatus for heat treating metal work for hardening the same, and more particularly to the devices employed in the quenching of the heated work.

Two distinctive and characterizing objects in view are the uniform quenching of individual articles of work delivered en masse, and the prevention of back splashing of quenching fluid toward the source of heat.

With these and further objects in view as will in part hereinafter be stated and in part become apparent, the invention comprises apparatus for effectively dividing a mass or group of separate articles of work, when discharged en masse, to cause them to enter the quenching fluid as individual articles and to be so acted upon without the delay of penetration as occurs when the mass is unbroken as it enters the quenching fluid.

The invention also comprises similar apparatus constructed and located to receive splashes of fluid entered by the work being quenched in a manner to preclude return movement of such fluid in the direction of original approach of the articles of work.

In greater detail, the invention also comprises apparatus for thus segregating work and precluding back splashing, and also means for facilitating application and removal of such apparatus.

The invention further comprises certain other novel constructions, combinations, and arrangements of parts as will be subsequently specified and hereinafter particularly pointed out in the appended claims.

In the accompanying drawings,—

Figure 1 is a side elevation of an apparatus embodying the features of the present invention, parts being broken away, and the discharging position from the quenching vat being indicated in dotted lines.

Figure 2 is a plan view thereof, parts being broken away.

Figure 3 is a plan view of a slightly modified embodiment of baffle apparatus, parts being broken out for the saving of space.

Figure 4 is a view in side elevation thereof.

Figures 5 and 6 are views respectively

similar to Figures 3 and 4 of a further modified embodiment of the same.

Figures 7 and 8 are, respectively, similar views to Figures 3 and 4 of another embodiment of the baffle apparatus, and

Figures 9 and 10 are, respectively, views similar to Figures 3 and 4 of a still further embodiment of the baffle apparatus.

Referring to the drawings by numerals, 12 indicates a quenching vat such as illustrated in greater detail in my co-pending application Serial No. 372,457, filed June 20, 1929, reference to which may be had for details of construction not herein specifically illustrated. The vat 12 is preferably located adjacent the furnace or other source for heating work to be heat treated for hardening, such as case-hardening. Cyanide or other molten salts treatment may be considered an illustrative instance of the character of treatment of the work after the manner set forth in detail in my said co-pending application, and the work will be delivered from the molten salts vat after the manner set forth in said co-pending application, or after the manner set forth in the application for patent executed even date herewith Serial No. 394,832 and filed even date herewith, in each of which applications there is shown and described a crank arm carried by a rock shaft and carrying a basket or baskets for containing work to be heat treated, and thereafter to be moved to a position discharging into vat 12 for quenching. As set forth in my said co-pending application Serial No. 372,457, a reticulated basket is arranged within the quenching vat and is adapted to receive the heated work within the quenching fluid. The fluid, of course, may be water, or oil, or other acceptable quenching liquid. As soon as the required quenching has occurred, according to my said co-pending application Serial No. 372,457, the reticulated basket in the quenching vat is swung out of the vat to a position discharging the work beyond the vat. This action is accomplished by fixing the said work-receiving basket to a rock shaft and by rocking the shaft to the discharging position. Then, by a reverse rock-

ing of the shaft, the basket is returned to the vat to receive the next charge of work.

Referring to the drawings of this application, the vat 12 is provided with the work-receiving basket 13 corresponding in form and detail of construction to the work-receiving basket of my said co-pending application Serial No. 372,457. The basket 13 is fixed to a rock shaft 14 which is adapted to be oscillated for swinging the basket from a position within vat 12, as seen in full lines in Figure 1, to a discharging position outside of the vat, as seen in dotted lines in said figure. The free portions of the basket 13 are provided with supporting brackets 15, 15, outstanding laterally in position to engage and rest upon appropriate portions of vat 12 when the basket is within the vat. Standards 16, 16 are fixed to and upstand from the frame of basket 13 and carry a cross bar 17 which is primarily designed to receive and limit the discharging movement of the work-carrying basket or baskets from the cyanide or other salts vat, or other heat treatment. Such work-carrying basket or baskets approaches or approach the bar 17 from the direction of the point of heat, that is, the direction at the opposite side of vat 12 from rock shaft 14.

While the basket 13 and its connected parts may differ slightly in some details, it is substantially identical with that disclosed in my said co-pending application Serial No. 372,457, except for parts now to be described.

As fully set forth in my said co-pending application Serial No. 372,457, it is very desirable to prevent any back splash from the quenching vat toward or into the cyanide vat or other source of heat, and in the said co-pending application there is illustrated in detail means in the form of hooding to restrict opportunity for such back splashing. The present invention contemplates limiting against splashing beyond the confines of the vat 12 itself, particularly in the direction toward the cyanide vat or other source of heat. To this end, a baffle is detachably and movably arranged within the upper portion of the vat 12, and particularly within and carried by the upper portion of the basket or tray 13. The baffle may be made up in any of a large variety of ways, as will be hereinafter pointed out in detail, the preferred form consisting of a grating of longitudinally arranged plates or bars 18, 18 connected by cross bars or baffle plates 19, 19. The plates 18 and 19 may be formed integral or appropriately connected to each other as preferred, and it is desirable to have each baffle plate 19 disposed at such inclination, as clearly seen in Figure 1, as to cause the upper edge of each plate to overhang the lower edge of the next succeeding baffle plate, whereby, when the baffle is located upon any plant, as seen in Figure 2, one is unable to see through

the structure but sees the successive plates 19 lapping each other. Nevertheless, abundance of space is left between the several plates 19 for the passage of articles of work. The baffle structure made up of the plates 18 and 19 is proportioned to the size of the upper part of basket 12 to substantially fill the same, and while the baffle structure is adapted to be detachably applied in any of numerous ways, it is desirable to pivotally connect one end of said baffle structure to the basket 13, as by extending bolts 20, 20 through the upper side frames of baskets 13 and through the forward ends of side plates 18. The word "forward" is intended to indicate that direction toward the source of heat treatment, or the source of supply of heated work to be quenched. Bolts 20 are detachably applied and serve to pivotally sustain the baffle structure in place. While the pivotal mounting of the baffle structure may be effected in any of numerous ways, it is preferable to provide slots 20' in the side plates 18 to allow the plates to be inserted into and removed from bolts 20 laterally. Each slot 20', however, is preferably inclined at about fifty-five degrees angle from the under face of the baffle structure, so that, when the basket 13 is elevated to the discharging position seen in dotted lines in Figure 3, the baffle structure will merely swing on the bolts 20 as a pivot and will restore itself to normal, operative position when the basket 13 is returned to a position within the vat 12. When the baffle structure is to be removed bodily from its engagement with the basket 13, it is only necessary to lift the baffle structure out of the basket from the full line position of the basket as seen in Figure 1, such lifting movement being first slightly diagonal to correspond with the inclination of the slots 20' until the slots escape from the bolts 20. Whenever the baffle structure requires cleansing, it may be bodily removed and treated as required, and then bodily replaced with greatest facility and at the same time is always effective for operation. In cyanide case-hardening, it is found that chemicals accumulate on the baffle structure and some times this happens quite frequently. Cleansing without removal would either not be effective or be done at an expense of delaying other operations and be accomplished under awkward conditions. Obviously, a substitute baffle structure may be inserted upon the withdrawal of one, and the whole machine may continue its operation without further interruption.

Laterally outstanding bracket plates 21, 21 are carried by plates 18 in position to overhang the upper side plates or framing bars of basket 13 to support the otherwise free end of the baffle structure in position.

Thus, in operation, when work is to be discharged from basket 13, the baffle structure is free to swing on its pivot 20 to the position

indicated in dotted lines in Figure 1, being limited against swinging to a further open position by contacting with cross bar 17.

In operation, a batch or batches of work is discharged into basket 13 as from a basket or baskets brought from the source of heat over to an inverted position above bar 17. The batch or batches of work thus discharged would in the absence of the baffle structure 18—19 descend en masse into the quenching fluid, and while fairly acceptable and satisfactory chilling would occur, it is nevertheless true that in some instances where small articles of work are being treated, such as screws, nails, rivets, and the like, a sufficient interlocking of the hot articles of work occurs to allow the entire batch to enter the quenching fluid substantially as a mass and quenching, therefore, advanced progressively only as the mass is penetrated, and a proportional difference in action occurs which sometimes causes a slight or measurable distinction between those articles of work at the exterior of the mass and the shielded articles within the mass. When the present invention is utilized, the mass of articles of work strikes against the cross baffles 19 and is broken or segregated so that the articles enter the quenching fluid distinctively as separate and individual articles, each receiving exactly the same character of reaction as received by all the others. Obviously, it is desirable to maintain the quenching fluid at the predetermined low temperature either by replacement or circulation to dispose of the heat supplied incident to the quenching action. The circulatory method of heat disposal is fully set forth in my said co-pending application Serial No. 372,457. Not only is the work segregated and each article afforded an independent and direct action, but the tendency toward creating a splash of the quenching fluid is largely reduced. A series of small articles separately entering the fluid will not produce that unitary splashing action which follows the entering of a large mass, and, furthermore, any splashing which does occur will be confined to being expressed in a direction away from the source of heat or source of approach of the work. The several baffle plates 19 effectively preclude back splashing.

As soon as the discharged work has been quenched and settles to the bottom of the basket 13, it may be discharged therefrom by rotating shaft 14 to swing the basket 13 to the position seen in dotted lines in Figure 1. The upward swinging movement of the free end portion of basket 13 causes the work to collect by gravity toward the pivoted end of the basket, so that, when the basket reaches the place where it begins to be inverted, the work will be in position for discharging at the place nearest the pivot 14. Meanwhile, as the basket swings beyond the center of gravity, the baffle apparatus 18—19 swings

down on its pivot 20 to the dotted line position of Figure 2, and leaves the space below basket 13 near the pivot thereof free and clear for the ready discharge of the work. After discharge, the basket 13 is swung back by reverse oscillation of shaft 14 until the basket 13 is in its normal at rest position in vat 12.

As indicated above, the baffle apparatus is susceptible of a wide range of modified embodiments, some of which are illustrated in Figures 3 to 10 inclusive.

In Figures 3 and 4 is seen a slightly modified embodiment of baffle apparatus in which the side plates 18a, 18a are connected by the cross baffle plates 19a, 19a. Supplemental fin-like baffle plates 22, 22 extend along the upper edge of each baffle plate 19a and are located to tend to spread an incoming load or batch of work while affording additional resistance to out-splashing of the quenching fluid. The operation of the structure seen in Figures 3 and 4 will be substantially the same as that described except that an additional spreading or segregation of the articles of work will occur and a further suppression of splashing even in a reverse direction from the direction of the source of heat will be secured.

In Figures 5 and 6 is shown a further modified embodiment of the baffle in which the side plates 18b, 18b are connected by baffle plates 19b, 19b, but in this instance, the cross baffle plates are arranged in a position to be substantially vertical when in operative relation to the work-receiving basket. Supplemental fin-like baffle plates 22a, 22a are arranged along the upper edge of each baffle plate 19b to assist in spreading or segregating the articles of the load of work and to resist tendency toward splashing. Obviously, the structure will function similarly to the structure seen in Figure 4, except that the results will not be as effective in preventing back splashing, since a passageway is left between baffle plates notwithstanding the supplemental fins 22a. Nevertheless, because of the separation of the articles of the batch of work, the resulting reduced splashing will be effectively taken care of by the baffle as seen in Figures 5 and 6.

In Figures 7 and 8 a still further embodiment of the baffle apparatus is shown in which the side plates 18c, 18c are employed, connected by the cross baffle plates 19c, 19c, and the said cross baffle plates are again connected by longitudinally supplementing baffle plates 23, 23 parallel to the plates 18c. Plates 19c and 23 are located to be disposed vertically when in the operative position and are proportionally less effective in preventing back splashing than the structures above described, but, in some instances, will suffice owing to the reduced amount of splashing

occurring after the batches of work have been broken up into individual articles.

In Figures 9 and 10 is illustrated the least effective baffle apparatus in which the side plates 18*d*, 18*d* are illustrated as connected by the cross baffle plates 19*d*, 19*d*, each arranged to lie in a substantially vertical position in operation. While the said baffle plates 19*d* will restrict some back splashing, the efficiency is considerably less than that of the structure seen in Figure 3 and 4, or the structure seen in Figures 1 and 2, and is successful only under certain conditions where the reduced splashing incident to breaking up of the load can be taken care of by plain, vertical baffle plates.

It should be understood that while the present improved apparatus is well adapted for treating articles of work of various sizes, it is especially designed and intended for case-hardening relatively small articles by which is meant any articles of a size lending themselves to group treatment. Also, while the apparatus set forth is adapted for a wide range of modification in proportions and contour, the preferred manner of use is that set forth in greater detail as an art or method in my co-pending application executed even date herewith and also filed even date herewith to which reference is had for a disclosure of a complete, organized structure in which the present improved apparatus is incorporated as a factor.

What is claimed is:—

1. The combination, with a quenching vat adapted to receive heated work to be quenched, of a baffle grating disposed in the path of entrance of such work to said vat, mounted to be stationary during passage of work therethrough into the vat, and having its baffling portions overlapping and spaced apart for the passage of articles of work therebetween.

2. The combination, with a quenching vat adapted to receive heated work to be quenched, of a baffle grating disposed in the path of entrance of such work to said vat, the baffle being mounted to be stationary during passage of work therethrough into the vat, and said baffle having means located to interrupt movement of liquid splashed in the vat incident to the entrance of work.

3. The combination, with a quenching vat adapted to receive heated work to be quenched, of a baffle grating disposed in the path of entrance of such work to said vat, the baffle being mounted to be stationary during passage of work therethrough into the vat, and said baffle having means located to interrupt movement of liquid splashed in the vat incident to the entrance of work, said means being also located to segregate articles of work delivered in a batch toward the vat.

4. The combination, with a quenching vat of a grating extending across the vat and

having spaced plates located in the path of back splashing from the vat.

5. The combination, with a quenching vat adapted to have work dropped into liquid contained in said vat, of a baffle grating located to allow passage of work therethrough into the vat and to interrupt movement of liquid splashed by such work, and the baffle being mounted to be stationary during passage of work therethrough into the vat.

6. The combination, with a quenching vat adapted to have work dropped into liquid contained in said vat, of a baffle grating located to interrupt movement of liquid splashed by such work, the several members of said grating being disposed at an inclination diagonal to the approach of the work, and the said members being sufficiently juxtaposed to successively lap each other.

7. The combination, with a quenching vat adapted to have work dropped into liquid contained in said vat, of a baffle plate located to interrupt movement of liquid splashed by such work, said plate being disposed at an inclination diagonal to the approach of the work, and other similarly located baffle plates spaced from the first at such distances as to interrupt substantially all back splashing.

8. The combination, with a quenching vat, of a series of baffle plates located in the path of approach of work to said vat and disposed to segregate the articles of work and retard splash from the vat.

9. The combination, with a quenching vat, of a series of baffle plates located in the path of approach of work to said vat and disposed to segregate the articles of work and retard splash from the vat, said baffle plates being arranged to lap each other without closing access to the vat.

10. The combination, with a quenching vat, of a series of baffle plates located in the path of approach of work to said vat and disposed to segregate the articles of work and retard splash from the vat, said baffle plates being arranged to lap each other without closing access to the vat, each baffle plate being inclined to the direction of approach of work approaching to enter the vat.

11. The combination, with a vat, of a baffle therefor, said baffle comprising spaced plates located across the entrance to the vat, to interrupt back splashing from the vat.

12. A baffle adapted to be applied to a vat comprising plates located to interrupt back splashing from the vat, each of said plates having a fin-like, supplemental baffle extending along the side of the respective plate.

13. A baffle adapted to be applied to a vat comprising plates located to interrupt back splashing from the vat, each of said plates having a fin-like, supplemental baffle extending along the side of the respective plate at the edge thereof remote from the liquid level of the vat.

14. In apparatus of the class described, the combination of a work-receiving, reticulated tray adapted to move to and from a position in quenching liquid, of a baffle carried by said tray in the path of approach of work to the tray when in the quenching liquid.

a quenching vat, and a baffle detachably mounted across the path of intake of work to the tray.

In testimony whereof I affix my signature.

HEYMAN ROSENBERG.

15. In apparatus of the class described, the combination of a work-receiving, reticulated tray adapted to swing to and from a position in quenching liquid, of a baffle carried by said tray in the path of approach of work to the tray when in the quenching liquid, said baffle being movably connected to said tray and adapted to move out of the path of discharge of work from the tray when the tray is swung to a discharging position.

16. In apparatus of the class described, the combination of a work-receiving, reticulated basket adapted to swing to and from a position in quenching liquid, of a baffle carried by said basket in the path of approach of work to the basket when in the quenching liquid, said baffle being movably connected to said basket and adapted to move out of the path of discharge of work from the basket when the basket is swung to a discharging position, and means for preventing complete dislocation of the baffle from operative relation to the basket for automatically restoring the baffle to said operative relation upon return swing of the basket to work-receiving position.

17. In apparatus of the class described, the combination, with a work-receiving, reticulated tray adapted to swing to and from a position in quenching liquid, of a baffle pivotally connected to the tray and adapted to lie across the intake face thereof.

18. In apparatus of the class described, the combination, with a work-receiving, reticulated basket adapted to swing to and from a position in quenching liquid, of a baffle pivotally connected to the basket and adapted to lie across the intake face thereof, and means for limiting the pivotal movement of the baffle away from the intake face of the basket.

19. In apparatus of the class described, the combination, with a work-receiving, reticulated basket adapted to swing to and from a position in quenching liquid, of a baffle pivotally connected to the basket and adapted to lie across the intake face thereof, means for limiting the pivotal movement of the baffle away from the intake face of the basket, and means for limiting said baffle against pivotal movement into the basket.

20. The combination, with a vat, of a baffle therefor, said baffle comprising spaced plates located across the entrance to the vat to interrupt back-splashing from the vat, each plate being disposed inclined to a direct path of entrance into the vat.

21. The combination of a tray for receiving work in and discharging the same from

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