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APPARATUS FOR CLEANING CELLULAR RADIATORS

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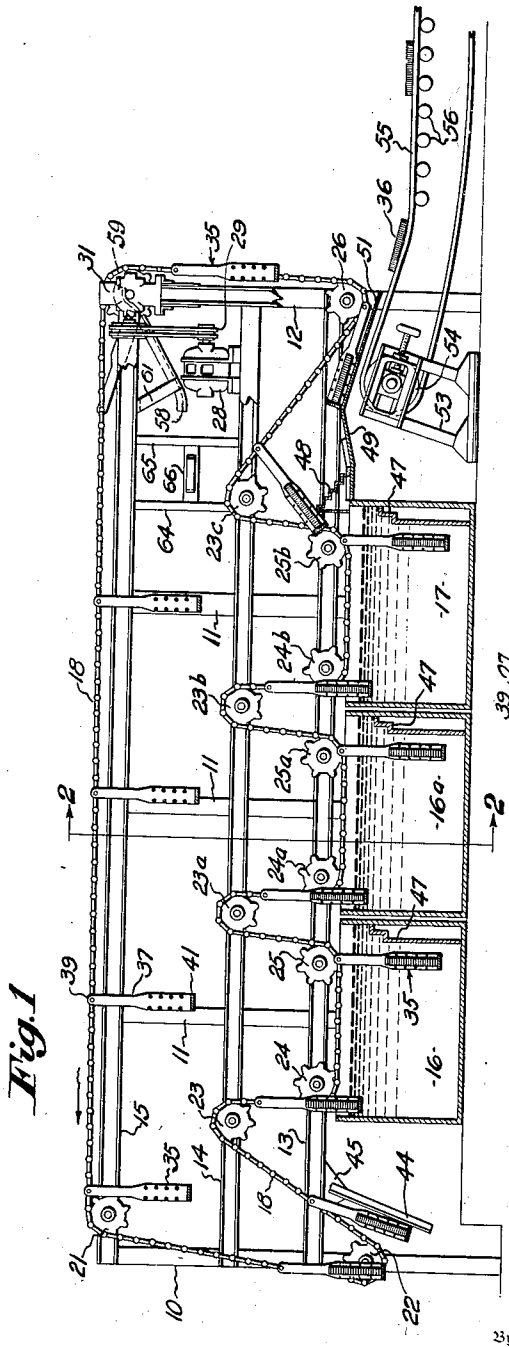

Fig. 1

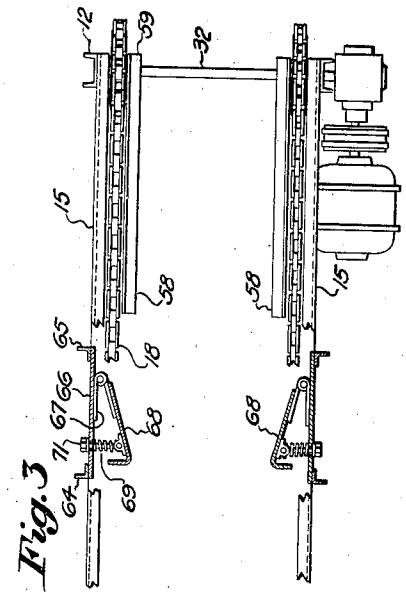

Fig. 3

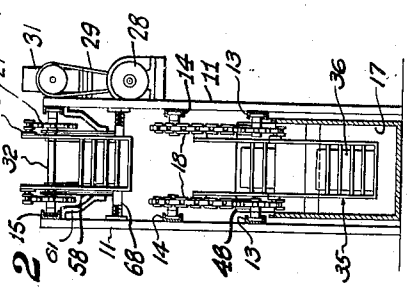

Fig. 2

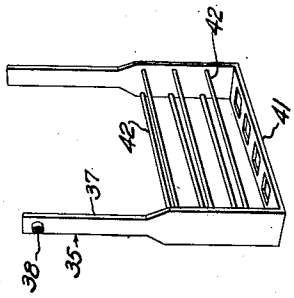

Fig. 4

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APPARATUS FOR CLEANING CELLULAR RADIATORS

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4 Claims. (Cl. 141—1)

This invention relates to apparatus for cleaning or washing cellular radiators or like articles, and it has particular reference to apparatus in which, by means of a conveying system, such articles are dipped into one or more baths of cleaning or washing liquid and are delivered in a cleansed and substantially dry condition.

An automobile radiator, irrespective of its particular structural details, invariably comprises a core section provided with a plurality of longitudinal passages for the flow of water, and a number of transverse passages for the flow of air around the water lines. Such cores are made by assembly of suitable sheets of metal, soldered together, and, during the course of manufacture, the metal, both on the interior and exterior of the water passages, becomes dirty, and must be cleaned before the article can be suitably finished. Heretofore, the cleaning of these cores has been effected by simple immersion in a cleaning bath, and by blowing steam under pressure over the face of the core, but it has been found that such expedients are not only expensive and involve more or less confusion in the production line, but that they have also failed to produce an article as clean as desired.

In order to improve on these practices, the present invention therefore proposes a machine adapted to receive such cores and to convey them, with intermittent shaking to remove dislodged dirt, through a cleaning bath, and ultimately to deliver them in a cleansed condition and fairly free of cleaning liquid.

The several and conjoint features and advantages of the invention will be readily apparent from a perusal of the following description of a typical machine, illustrated in the accompanying drawing, wherein:

Fig. 1 is a side view, essentially in longitudinal section, of the machine;

Fig. 2 is a tranverse section taken on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary view, partly in plan and partly in section, and on an enlarged scale, of the right hand portion of the machine as seen in Fig. 1; and,

Fig. 4 is a perspective of a core basket.

The frame of the machine comprises a number of upright or vertical members 10, 11, and 12, disposed in spaced pairs, as shown in Figs. 1, 2, and 3, to which are connected a series of longitudinal rails 13, 14, and 15, disposed in spaced relation and one above the other. Disposed between the upright members, and below the rails 13, are one or more tanks 16, 16a, and 17, adapted to receive the cores as they are transported from one end of the frame to the other.

The means for effecting such movement of the cores is shown in the drawing as a pair of continuous conveyor chains 18 which are mounted on the frame by suitable sprockets. It is desired to have the chains carry the cores in such fashion that they will be successively dipped into the tanks 16, 16a, and 17, moved through the tanks while more or less submerged, and then lifted from the tanks. For this purpose, a number of sprockets are used, located at various points on the side rails 13, 14, and 15, as shown best in Fig. 1.

Viewing first the left hand portion of Fig. 1, it will be noted that the chains 18 move over sprockets 21 mounted on the upper rails 15, and are directed downwardly by sprockets 22 disposed at a low point on the uprights 10, so that the carrying baskets (subsequently described) for the cores are brought into a position where they may be quickly loaded. By means of sprockets 23, mounted toward the right and on the rails 14, the chains 18 are brought to a point just above the left hand side of the tank 16, and they are then constrained to move downward by the succeeding sprockets 24, mounted just above the tank 16 and on the lower rails 13. It will be apparent, therefore, that anything suspended from the chains will be plunged into the bath in the tank 16. Thus, in the case of a vertically suspended radiator core, the initial plunge will cause the cleaning solution to rush up through the water passages to clean and flush the same.

The next pair of sprockets 25 are mounted on the rails 13 above the opposite side of the tank 16, so that, after the core is immersed, further motion of the chains 18 conveys the core longitudinally through the bath, thus cleansing the transverse openings. The chains then move upwardly by provision of the next pair of sprockets 23a, mounted on the rails 14, in a manner quite similar to the sprockets 23. By noting the relative positions of the tanks 16 and 16a, and the sprockets 23a, 24a, 25a, and 23b, it will at once be apparent without further written description that the movement of the chain over the tank 16a, and, for that matter, over the tank 17, is substantially a repetition of the motion just described. Thus, as shown in the drawing, the cores are washed successively in about the same fashion in each of the three tanks, all of which may contain wash water, or various cleaning solutions, as desired.

After passing over the sprockets 23c at the discharge side of the tank 17, the chains 18 are directed downward and to the right hand edge of the frame by sprockets 26, mounted at a low point on the uprights 12, and then up along the uprights 12 by driving sprockets 27, mounted between the top rails 15. From this point, the chains extend to the sprockets 21, thus completing the circuit. The operating power for the chains is obtained from a motor 28 mounted on a suitable support secured to a rail 14 and operating a speed reducing gear unit 31 through a drive belt 29. It will be understood that the sprockets 27 are secured to the driven shaft 32 of the unit 31, as best shown in Fig. 3, and, since this type of drive is well known in the art, it is deemed unnecessary to discuss or illustrate it further.

From what has been suggested above, it will be understood that the chains 18, as they move over the several sprockets in unison, carry between them a plurality of baskets 35, each adapted to receive a core 36. As best shown in Fig. 4, each basket comprises a pair of spaced side members 37 formed with journals 38 at their upper ends for the reception of bearing pins 39 secured to the chains 18, so that the baskets 35 hang down from the chains, and may have a swinging movement. The arms 37 are bridged at their lower extremities by a perforate base 41, and at intermediate points by a number of spaced rails or rollers 42, so that, while a core may be inserted into or removed form the open top of the basket, it is otherwise retained therein, while the washing solution flows through the basket readily.

It will also be noted that the distance between the rails 13 and 14 is such that, upon the vertical lift of the basket 35 from the tank 16 to the tank 16a, or from tank 16a to tank 17, the basket is removed entirely from and is suspended above the tank, thereby permitting the cleaning solution to drain out and run back into its own tank.

The mode of inserting a core into an empty basket will now be apparent from a consideration of the left hand portion of Fig. 1. As the empty basket 35 is delivered by the chains 18 moving toward the sprockets 22, the workman simply drops the core 36 into the basket, the top of which is accessibly located. In order to direct the basket 35 into the first tank, and to prevent the basket from striking the outer wall of the tank 16, a guide rail 44 is provided under the inclined portion of the chains 18, being affixed to the horizontal rail 13 by a plate 45. The loaded basket is thus lifted for admission into the tank 16 without the necessity of using an additional sprocket and a greater length of chain.

Adjacent the discharge end of each tank is a series of steps 47, the purpose of which is to shake the basket and its contained core to extract therefrom as much fluid as possible, before the core is immersed in the next tank. As noted previously, by lifting the core upwardly from the tank, a substantial amount of the contained liquid drains back at once into its own tank, thus preventing the undue contamination of the liquid in one tank by that in the preceding tank. However, too long a time interval would be required to complete such simple drainage, leading to a low efficiency of the system, and the steps 47 are therefore provided to extract the contained liquid more effectively.

It will be observed that the basket 35 strikes the steps 47 as it reaches the end of the horizontal travel, and while it is moving in a vertical direction. These steps slightly retard the lower end of the basket, while the upper end is moving with the chains 18, and, as the bottom 41 clears the step, the basket swings against the next step, thus jarring and shaking the core to dislodge the liquid and loose dirt entrained therein.

As a result of this action, taking place as the core leaves the tank, there is but a small transfer of the liquid in one tank to the next, and the cores are admitted into each tank in proper condition for treatment.

Referring now to the right hand side of the apparatus, there will be observed a series of steps 48, mounted above the end wall of the tank 17, and on an inclined deck 49. The relation between these steps, the sprockets 23c, and the inclined portion of the chains 18 between sprockets 23c and 26, is such that the swinging baskets 35 are materially retarded at their bottom portions, thus causing the baskets to lie at an angle and be bumped a number of times as they move over the steps 48. While the bumping caused by the steps 47 is sufficient to remove most of the cleaning liquid and prevent the contamination of one bath by the contents of the preceding bath, a more vigorous action is desired as the cores leave the apparatus. Accordingly, the foregoing arrangement is provided, to remove as much liquid as is possible by such mechanical means. Liquid collecting on the inclined deck 49 flows back into the tank 17 by gravity.

The deck 49 merges into a deck 51, disposed at a reverse angle, which causes a further drag on the bottom of the basket 35, and raises the bottom above the mounting portions. Thus, as shown in Fig. 1, as each basket approaches the extreme right hand portion of the frame, it is inverted to a sufficient degree to permit the cores to slide out freely over the smooth rails 42.

A belt conveyor may be disposed beneath the discharge end of the apparatus just described, to remove the cores from the vicinity of the machine. As shown in Fig. 1, such belt conveyor may consist of a frame member 53, mounted under the deck 51, for the reception of a pulley 54, over which passes an endless belt 55, supported at its mid portions by idlers 56. The cores 36 accordingly slide out of the baskets 35 onto the belt 55, and are removed in a substantially dry and clean condition.

It will be noted that at all points except at the driving shaft 32 there is full clearance between the chains 18, so that the baskets may hang down to the extent permitted by the steps disposed beneath at certain points. When the emptied baskets return to the input side of the machine, however, it is necessary to provide some means to carry them clear of the drive shaft 32. For this purpose, there is provided a pair of tracks 58, formed from angles to provide side guiding flanges, mounted over the drive shaft, as indicated by the numeral 59, and extending downwardly at an angle, as shown in Figs. 1 and 3. These members may be secured to the rails 15 by suitable straps 61, which, at this point, involve no interference with the remaining mechanisms. As the chains 18 and attached baskets move upward, therefore, the bottoms of the baskets are retarded by the ends 59 of the tracks, and finally are lifted and guided thereover. On a continuation of the movement, the bottoms of the baskets are gradually dropped. When clearance has been obtained, however, the

bottoms 41 are released by the lower ends of the tracks 58, thus allowing the baskets to swing to their normal vertical position.

As the release of the baskets 35 too abruptly might set up undesirable vibrations or forces on the chains 18, a mild braking means is provided to dampen the imparted swinging motion. As best shown in Fig. 3, a pair of rails 64 and 65 are fixed between the rails 14 and 15, to carry a cross plate 66, to the inner face of which is fastened a hinge 67. The inner part of the hinge is secured to an angularly disposed gate 68, which is normally extended a limited distance by a spring 69, surrounding a headed bolt 71 extending from the cross member 66 to the gate 68. By this arrangement, the innermost edges of the gates 68 are normally disposed in the line of travel of the baskets 35, and catch the edges of the baskets as they swing free from the guides 58. The gates 68 at once move toward the rails 64 and 65 under the impact of the baskets, thus permitting them to pass, but only after their swinging tendency has been reduced. Subsequent swinging movement in the opposite direction is prevented by the engagement of the baskets with the left hand edge of the gate 68.

From the foregoing description, it will be understood that the invention provides an improved and highly effective apparatus for transporting cores or like articles through a number of treating baths, and delivering such cores with a minimum of liquid adhering thereto. It will also be understood that while the invention has been described with reference to one example only, those skilled in the art may resort to various modifications and adaptations, all of which are intended to be comprehended as defined by the following claims.

I claim:

1. In a machine for washing cores, a frame, an endless conveyor mounted on said frame, drive means for the conveyor, core-receiving baskets suspended from said conveyor for free swinging movement, a tank disposed below the conveyor and positioned to permit successive immersion of the baskets therein, a plurality of steps secured adjacent one extremity of the tank, said steps being positioned in the path of the free extremities of the baskets as they emerge from the tank and adapted to be impacted successively by said ends of the baskets.

2. In a machine for washing radiator cores, a frame having spaced horizontal rail members, a plurality of tanks disposed below said rail members, sprockets disposed at varying elevations on said rail members, conveyor chains extending over said sprockets, drive means for said chains, baskets swingingly mounted between said chains, the relation of said sprockets and rail members being such with respect to each other and said tanks as to cause a basket mounted on said chains to be plunged into each tank at one end thereof, drawn longitudinally through said tank, and then elevated from said tank in a substantially vertical direction for immersion in a following tank, and step means disposed adjacent the emergent side of each tank adapted to be contacted by the lowermost portion of said basket, whereby said basket and contents will be shaken free from substantial quantities of adhering material acquired in said tank by intermittent retardation of the motion of the lower portion of the basket only.

3. In a machine for washing radiator cores, a frame comprising spaced rail members, sprockets mounted on said rail members, conveyor chains mounted on said sprockets, drive means therefor, a tank below said rails, carrier baskets mounted for swinging movement between said chains, said sprockets being so disposed with respect to said tank as to direct said baskets downwardly into and through said tank as the chains are moved, other sprockets for directing the upper ends of said baskets to a low point with respect to the top of said tank beyond the discharge end of the tank, and step means at the discharge end of the tank to retard and elevate the bottom of the basket with respect to the top thereof as the upper end of said basket is moved toward said low point, whereby said basket will be upset and its contents discharged.

4. In a machine for washing radiator cores, pairs of spaced rails defining a frame, sprockets on said frame, endless conveyor chains mounted on said sprockets, drive means therefor, a tank beneath the frame and between said rails, swinging baskets mounted between said chains, said sprockets being so located on said frame as to cause successively the vertical immersion, horizontal movement, and upward removal of a basket with respect to said tank as the chains are operated, step means at the discharge side of said tank adapted to be struck by the lower portion of the basket as the same is removed from the tank to cause a bumping thereof, whereby substantial quantities of adhering liquid from the tank will be dislodged for gravity return to said tank, and other step means above the top of the tank adjacent the discharge side thereof in the path of the basket to engage and upset the basket to discharge the contents thereof.

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