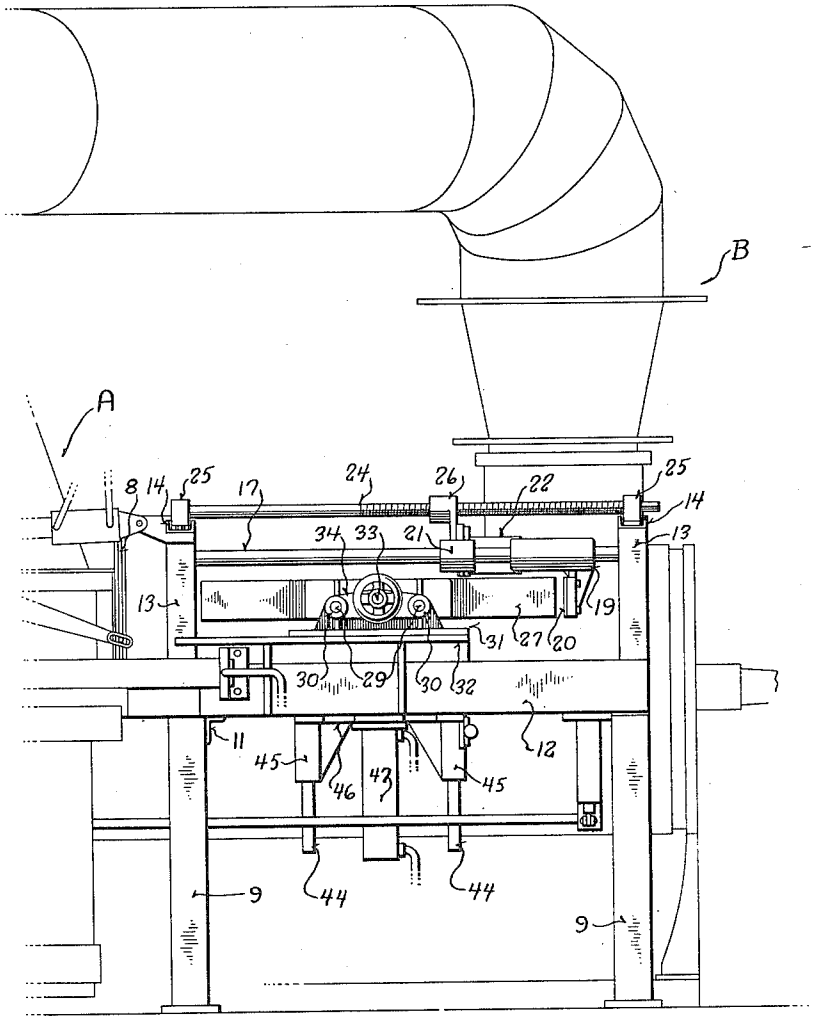
Jan. 2, 1940. H. S. MUNCH ET AL 2,185,381

APPARATUS FOR STRAIGHTENING AND SQUARING RADIATOR CORES

Original Filed Sept. 16, 1936 4 Sheets-Sheet 1

Fig. 1.



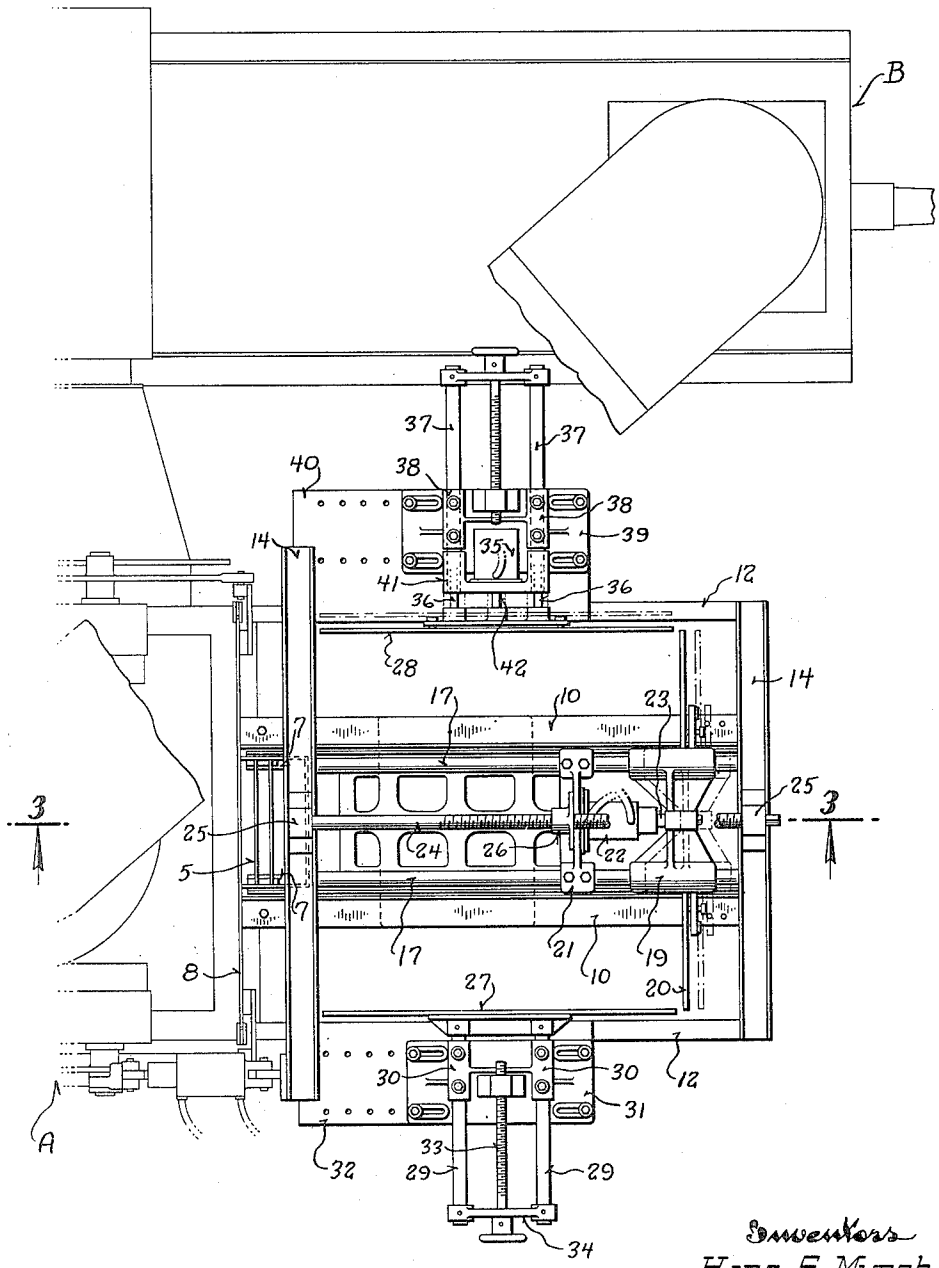
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APPARATUS FOR STRAIGHTENING AND SQUARING RADIATOR CORES

Original Filed Sept. 16, 1936 4 Sheets-Sheet 2

Fig. 2.



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APPARATUS FOR STRAIGHTENING AND SQUARING RADIATOR CORES

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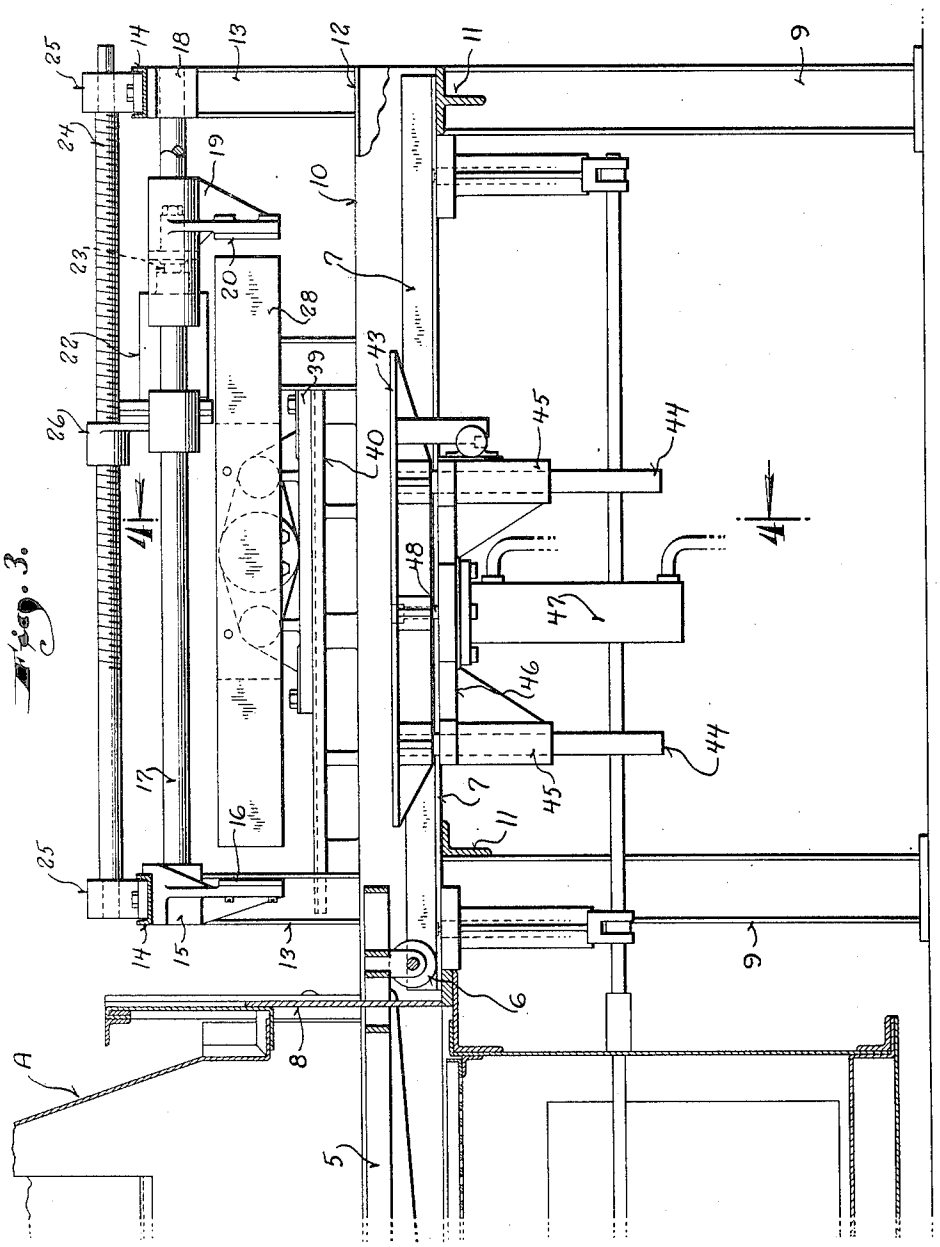


Fig. 3.

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APPARATUS FOR STRAIGHTENING AND SQUARING RADIATOR CORES

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Fig. 4.

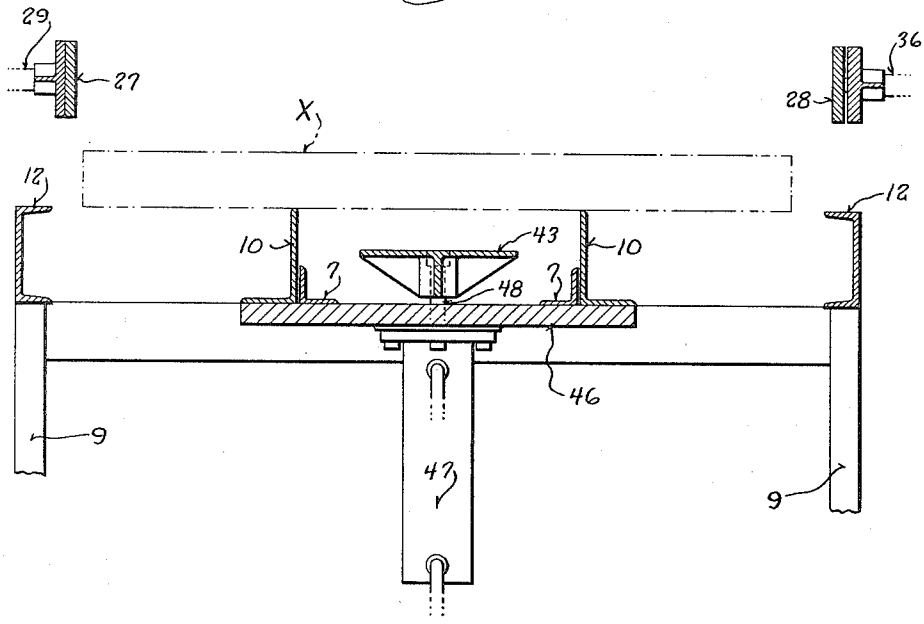
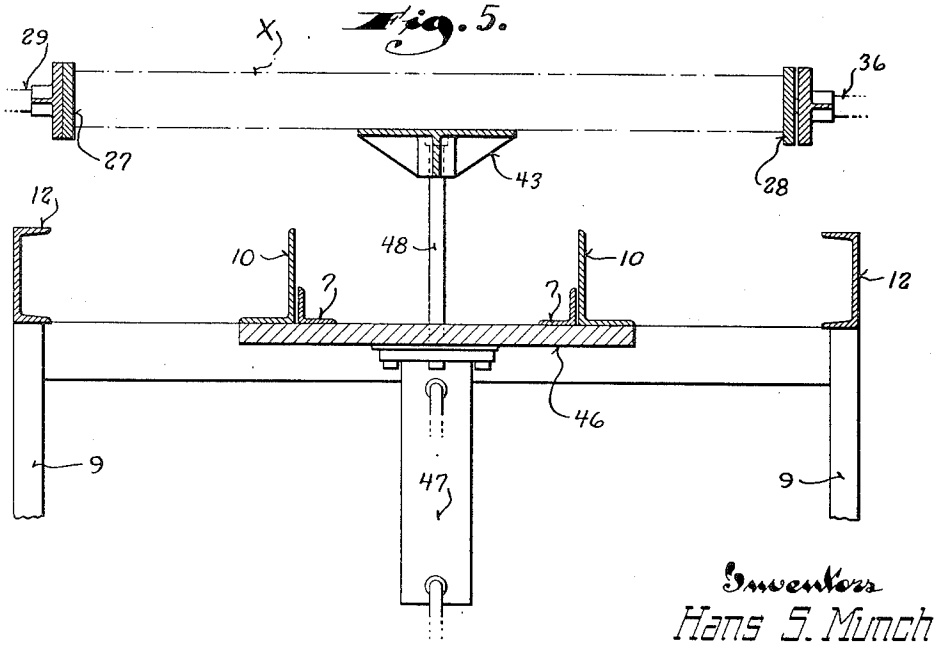


Fig. 5.



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UNITED STATES PATENT OFFICE

2,185,381

APPARATUS FOR STRAIGHTENING AND SQUARING RADIATOR CORES

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Original application September 16, 1936, Serial No. 101,102, now Patent No. 2,154,104, dated April 11, 1939. Divided and this application July 20, 1938, Serial No. 220,291

9 Claims. (Cl. 153—48)

This invention relates to the manufacture of radiator cores and other similar articles which consist of a multiplicity of thin-walled tubes having a multiplicity of spaced thin metal fins attached thereto, and refers particularly to an apparatus for squaring and straightening the radiator cores or other similar articles directly after a heat treatment by which securement is effected between the tubes and fins.

In the manufacture of radiator cores, prior to assembly of the tubes and fins, the tubes are thoroughly tinned with solder. The fins have apertures to snugly receive the tubes so that the peripheral edges of the apertures lie in close contact with the outer walls of the tubes. The securement between the fins and tubes is effected by first dipping the core into an acid bath to provide the flux which enables solder to adhere to the untinned fins, and then the entire core is subjected to a heat treatment high enough to melt the solder on the tubes and cause it to run onto the adjacent portions of the fins.

The present invention is a division of a parent copending application, Serial No. 101,102, filed September 16, 1936, now Patent No. 2,154,104, dated April 11, 1939, and in which a complete disclosure of all of the component parts of the apparatus is made. The mechanism for dipping the cores into an acid bath, while completely disclosed in the parent application above referred to, forms the subject matter of a copending divisional application, Serial No. 220,292, filed July 20, 1938.

As noted hereinbefore, the present invention is concerned primarily with the squaring and straightening of the cores after the heat treatment, and has as one of its objects to provide a simple apparatus capable of receiving the cores directly from the baking oven and automatically positioning them for action thereon by the pressure applying members so that no manual handling of the cores is necessary between the baking operation and the squaring operation.

Another object of this invention is to provide a squaring apparatus of the character described which is readily adjustable to accommodate radiator cores of different sizes.

With the above and other objects in view which will appear as the description proceeds, this invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described, and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the herein disclosed invention may be made as come within the scope of the claims.

The accompanying drawings illustrate one complete example of the physical embodiment of the invention constructed in accordance with the best mode so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a side view of the squaring apparatus, illustrating its relationship to the baking oven;

Figure 2 is a top view thereof, also showing its relationship to the baking oven and to the heat source;

Figure 3 is a vertical sectional view through the squaring apparatus and the adjacent portion of the oven on the plane of the line 3—3 in Figure 2;

Figure 4 is a cross sectional view through the squaring apparatus taken on the plane of the line 4—4 in Figure 3; and

Figure 5 is a view similar to Figure 4, but showing the parts in the positions necessary to lift a core into position to be engaged by the pressure applying members.

Before specifically defining the invention with relation to the drawings, it is desired to point out that the complete apparatus, which is fully disclosed in the aforesaid parent application, Serial No. 101,102, forms one unitary structure with all portions thereof associated and coacting toward a common end, but which may be divided into an oven unit, a heat source and heat recirculating system for supplying heat to the oven unit, an acid bath, a loading station at which the dipped cores are presented to the oven, and the squaring unit or apparatus which forms the subject matter of the present application.

Inasmuch as the drawings illustrate only that part of the apparatus directly adjacent to the squaring unit, the acid bath and the loading station have not been illustrated at all, and the oven unit and heat source have been shown but diagrammatically. These units are designated A and B, respectively.

As defined at length in the aforesaid parent application, the oven is of the convector type and has heated air circulated therethrough to rise upwardly through radiator cores or other articles positioned therein.

The radiator cores, designated X in the drawings, are carried into the oven on a carriage 5, one end of which is supported on rollers 6 which run on tracks 7. The tracks 7 extend longitudinally through the squaring unit or appara-

tus so that the carriage 5 in addition to positioning a core in the oven also carries the baked core out of the oven when its door 8 is opened, to present the same to the squaring unit. It is desired to point out that this close relationship between the oven and the squaring unit precludes the solder setting permanently before the actual squaring and straightening takes place.

The supporting structure for the squaring unit comprises four legs 9 which support the adjacent ends of spaced longitudinal rails 10. The tracks 7, which lie directly inside the longitudinal rails 10, are also supported by the legs 9, being carried by suitable transverse members 11 which are secured to the legs 9.

The longitudinal rails 10, which are preferably of angle iron, provide supports upon which the core is deposited by the carriage 5 in position for the mechanism of the squaring unit to act thereon. Outside the longitudinal rails 10 are channel rails 12 which rest directly on the legs 9, and rising upwardly from the channel rails 12 near the rear wall of the oven and the opposite rear end of the squaring unit are upright pedestals 13 joined at their upper ends by transverse channel crossbeams 14.

Depending from the forward crossbeam 14 is a bracket 15, the lower end of which mounts a fixed transverse pressure plate 16 against which one edge of the core is pressed during the straightening and squaring operation. The bracket 15 also supports the adjacent ends of two spaced longitudinal rods or shafts 17, the opposite rear ends of which are fixed in brackets 18 carried by the rear crossbeam 14.

Slidably mounted on these rods or shafts 17 is a crosshead 19, which carries a movable transverse pressure plate 20 in parallelism with the fixed plate 16. Also slidably mounted on the rods or shafts 17 forwardly of the crosshead 19 is a carrier member 21 upon which a hydraulic cylinder 22 is mounted. The ram or piston of the cylinder is connected through its rod 23 with the crosshead 19 so that as the piston is reciprocated, the crosshead and consequently the pressure plate 20 carried thereby, is moved toward and from the opposite plate 16.

To accommodate radiator cores of different sizes, the crosshead 19 and its actuating cylinder 22 may be slid on their supporting shafts or rods 17 as required, and to facilitate adjustment thereof, an adjustment screw 24 is provided. This screw 24 is journalled at its opposite ends in bearings 25 mounted on the central portions of the crossbeams 14 and has its rearmost end squared for the reception of a crank. Threaded on the screw 24 is a nut 26, which is fixed to the carrier member 21 upon which the hydraulic cylinder 22 is mounted. Consequently, by turning the screw 24, the entire pressure applying assembly is adjustable longitudinally toward and from the fixed pressure plate 16.

The pressure plates 16 and 20 are in exact parallelism and engage the front and rear edges of the radiator core. The side edges of the core are similarly engaged by a fixed pressure plate 27 and a movable pressure plate 28.

The fixed pressure plate 27 is mounted on two parallel connected rods 29 slidable in bearings 30 which form part of a bracket 31. The bracket 31 is secured to a supporting table 32 rigidly carried by the adjacent channel rail 12. The bracket 31 may be secured to the supporting table in a number of different positions to accommodate different core sizes. The pressure plate 27 is adjustable transversely by sliding its supporting rods 29 through their bearings 30. This adjustment is facilitated by a screw 33 threaded in a fixed nut carried by the supporting table and bearing against a crosshead 34 which joins the outer ends of the rods 29.

The opposite movable pressure plate 28 is actuated by a hydraulic cylinder 35 to effect a clamping action. This movable pressure plate 28 is carried by two spaced rods 36 slidable in tubes 37, which in turn are slidable in bearings 38 forming part of a bracket 39 similar to the bracket 31 and similarly adjustably mounted on a supporting table 40. Fixed to the inner ends of the tubes 37 is a transverse member 41 upon which the hydraulic cylinder 35 is mounted. The piston or ram of the cylinder is connected through a rod 42 with the casting by which the pressure plate 28 is mounted on the rods 36 so that as the piston or ram is reciprocated, the pressure plate 28 is moved toward and from the pressure plate 27.

Through the adjustment of the tubes 37 in the bearings 38, the location of the pressure plate 28 is adjustable to coact with the adjustment to coact with the adjustment of the plate 27 and enable both plates to be centered with respect to the tracks 7 along which the carriage 5 moves. The pressure plates themselves are removable from the castings on which they are fastened to permit replacement thereof with either larger or smaller plates to conform to the size of the radiator cores being handled.

After the adjustments and the location of the pressure plates have been effected in the manner described, accidental displacement is prevented by the provision of suitable set screws by which the various adjustable members are locked in place, as will be clear from the drawings.

From Figures 4 and 5 particularly, it will be apparent that the pressure plates or clamping members are disposed at an elevation above the core supports provided by the vertical flanges of the angle iron rails 10 so that when the cores are deposited at the squaring unit, they must be lifted into alignment with the pressure plates.

For this purpose, a lifting table or elevator 43 is located between the supports 10. The elevator is normally below the level of the supporting edges a distance sufficient to permit the passage of the carriage 5 thereover, as shown in Figure 4.

The table or elevator 43 is guided for vertical motion by a plurality of vertical rods 44 slidable in bearings 45 forming part of a casting 46 secured to the undersides of the rails 10. The casting 46 also has a hydraulic cylinder 47 depending centrally therefrom, the ram or piston of which is connected through its rod 48 with the table or elevator 43 so that upon response of the piston, the table is elevated to its position shown in Figure 5 to lift a radiator core deposited thereabove into position to be clamped by the pressure plates.

The functioning of the hydraulic cylinder which actuates the table or elevator, and the hydraulic cylinders which actuate the movable clamping members, are so cooordinated that proper sequence of operations is maintained. The control system whereby this proper sequential operation is effected, however, forms no part of the present invention, and consequently, it is not shown. For a complete description thereof, reference may be had to the aforesaid parent application, Serial No. 101,102, now Patent No. 2,154,104, dated April 11, 1939.

As noted hereinbefore, the carriage 5 traveling on the tracks 7 carries the cores into the oven A, and from the oven conveys them into position to be lifted by the elevator 43 into horizontal alignment with the clamping members of the squaring frame. To this end the tracks upon which the carriage 5 runs are movable vertically to lift the carriage from a position beneath the top edges of the rails 7 to an elevation higher than the top edges thereof.

The manner in which raising and lowering of the track 7 is effected, however, forms no part of the present invention, and for a detailed disclosure thereof, reference may be had to the aforesaid copending parent application.

It is, of course, to be appreciated that the oven A has inlet and outlet openings closed by doors, one of which, designated 8, is illustrated in Figure 3, and that these doors are opened and closed in coordination with the movement of the carriage to carry the cores into and out of the oven.

From the foregoing description taken in connection with the accompanying drawings, it will be readily apparent that this invention provides a compact practical squaring unit for use in conjunction with radiator baking ovens to square and straighten the cores after they have been soldered, and that the adjustability of the various clamping elements which constitute the squaring frame enables the same to be used on a wide range of core sizes.

What we claim as our invention is:

1. An apparatus for straightening and squaring radiator cores comprising: a plurality of flat pressure applying members; means mounting said pressure applying members so that they form a rectangle and act inwardly with relation to the center of the rectangle; means for adjusting the pressure applying members without affecting the relative angularity between the members so as to accommodate cores of different sizes; and means for actuating certain of the pressure applying members to clamp a core located in the space defined by said members.

2. An apparatus for straightening and squaring radiator cores comprising: a support upon which cores to be straightened and squared are deposited; a plurality of pressure applying members disposed at an elevation above the support high enough to permit the edgewise passage of a core thereunder for disposition on said support, said pressure applying members being adapted to clamp against the edges of a core in alignment therewith to square and straighten the core; an elevator for lifting a core flatwise from the support into alignment with the pressure applying members; means for actuating the elevator; and fluid pressure means for actuating the pressure applying members to effect the clamping action.

3. An apparatus for straightening and squaring radiator cores comprising: a support for cores to be straightened and squared; a carriage movable to deposit a radiator core on said support; a plurality of pressure applying members arranged in a frame disposed on a horizontal plane high enough above the said support to enable the passage of the carriage with a core thereon under the pressure applying members, said pressure applying members being adapted to clamp against the edges of a radiator core to square and straighten the same; means for actuating certain of the pressure applying members in a clamping stroke toward opposite pressure applying members; and means for elevating a radiator core from the support into alignment with the pressure applying members.

4. An apparatus for straightening and squaring radiator cores comprising: a fixed horizontal support; a movable carriage; track means supporting the carriage for movement to and from said fixed support; means for raising and lowering the track means whereby a radiator core on the carriage may be deposited on said support by lowering of the track means; a rigid supporting structure above the track means; a plurality of complementary pressure applying members carried by said supporting structure and arranged in a frame on a horizontal plane above the support at an elevation sufficiently high to permit edgewise passage of radiator cores onto the support and into vertical alignment with the space between said pressure applying members; an elevator for lifting a radiator core from said support into horizontal alignment with said pressure applying members; and means for actuating certain of said pressure applying members in a clamping stroke toward opposite pressure applying members.

5. In an apparatus of the character described: a rigid supporting structure; pressure applying means carried by the supporting structure to clamp against the edges of a radiator core to straighten and square the same, said pressure applying means including, a plate engageable with one edge of a radiator core; a complementary flat clamping member parallel to said plate; a rod carried by the rigid supporting structure and extending perpendicularly to said clamping member; a crosshead movable along said rod and carrying the clamping member for translating motion toward and from the plate; pressure applying means adjustable along the line of motion of said clamping member; and means connecting said pressure applying means with the clamping member.

6. In an apparatus of the character described: a stationary supporting structure; a pressure applying plate adapted to engage one edge of a radiator core; means mounting said pressure plate from the supporting structure for translating motion along a line perpendicular thereto; means for adjusting the position of said plate and securing the same in fixed adjustment; a second pressure applying plate parallel to said first named pressure applying plate to clamp against an opposite edge of the radiator core; a pressure cylinder having a piston reciprocable therein; means connecting the piston of said cylinder with said second pressure applying plate, whereby motion may be imparted thereto toward and from the first named pressure applying plate; and means adjustably mounting said pressure applying cylinder on the stationary supporting structure, whereby the position of said second pressure applying plate with relation to the first pressure applying plate may be adjusted to accommodate radiator cores of different sizes.

7. In an apparatus of the character described: a rigid supporting structure including, transverse rails joined by longitudinal supporting rods; a pressure applying element fixedly mounted on one of said transverse rails and having a flat surface perpendicular to said longitudinal supporting rods; a complementary pressure applying element having a flat surface parallel to the flat surface of the first pressure applying element; means slidably mounting said second named pressure applying element from said longitudinal rods; a pres-

sure cylinder supported for movement along said rods; means for adjusting the position of the pressure cylinder and for holding the same in adjusted position; and means connecting the second named pressure applying member with the piston of said cylinder.

8. An apparatus for squaring and straightening radiator cores and other similar articles comprising: a plurality of pressure applying members mounted to act on a fixed horizontal plane and arranged in predetermined definite angular relationship with respect to each other and substantially on said horizontal plane so as to enable said pressure applying members to give a core positioned on said horizontal plane in the space between the pressure applying members a predetermined fixed shape, certain of said pressure applying members being horizontally movable toward and from the opposite pressure applying members to effect the clamping and release of a core; means for imparting such motion to said movable pressure applying members; a support for cores to be straightened and squared positioned beneath the plane of action of said pressure applying members a distance at least equal to the thickness of the cores so as to enable disposition of cores on the support by lateral movement thereof under the pressure applying members; and an elevator to lift the cores from said support to said horizontal plane and into alignment with the pressure applying members.

9. An apparatus for straightening and squaring radiator cores comprising: a substantially horizontal support for cores to be straightened and squared; a plurality of pressure applying members arranged in a rectangle on a plane above said support a distance at least equal to the thickness of the cores so as to enable disposition of cores on the support by lateral movement thereof under the pressure applying members; an elevator to lift a core from said support into horizontal alignment with the pressure applying members; and means for forcing certain of the pressure applying members horizontally toward opposite pressure applying members to clamp a core therebetween.

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