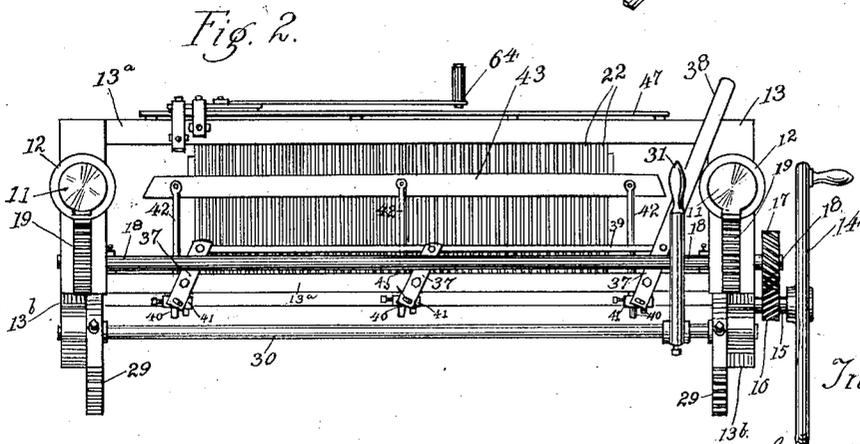
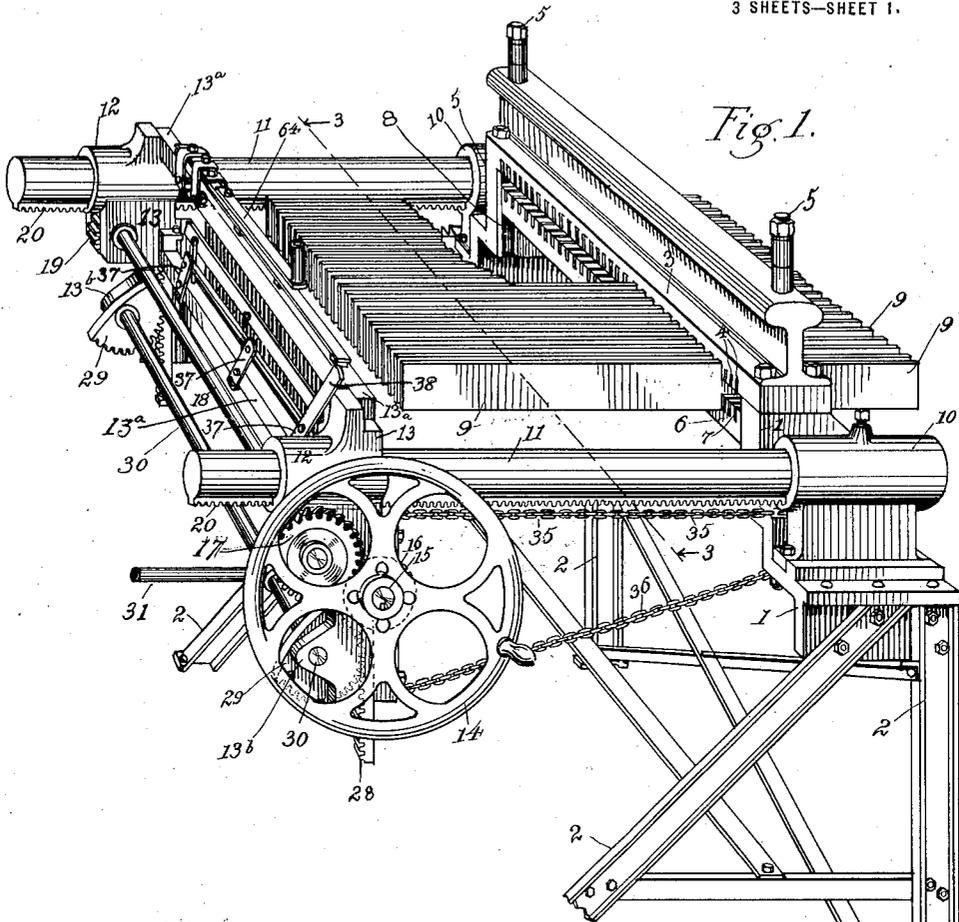


T. N. COFFELDER,
 MACHINE FOR ASSEMBLING RADIATOR CORES.
 APPLICATION FILED APR. 8, 1918.

1,339,434.

Patented May 11, 1920.

3 SHEETS—SHEET 1.



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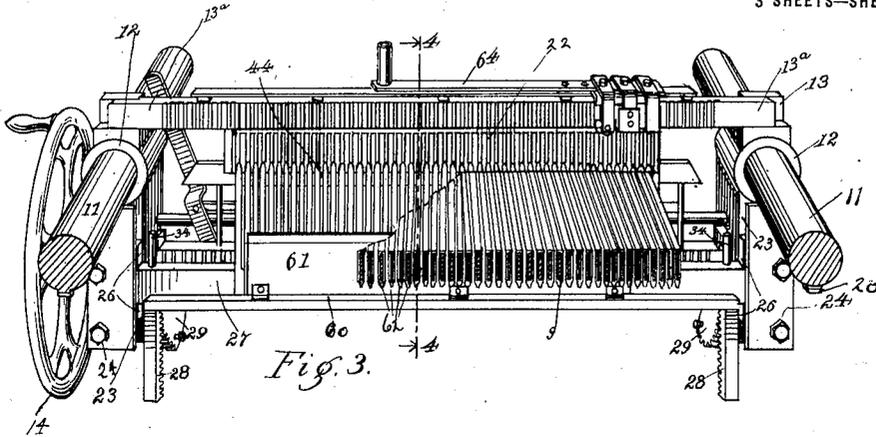


Fig. 3.

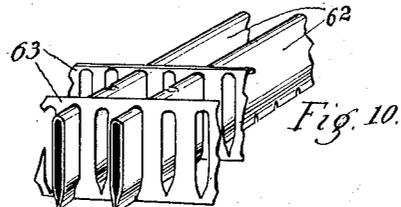


Fig. 10.

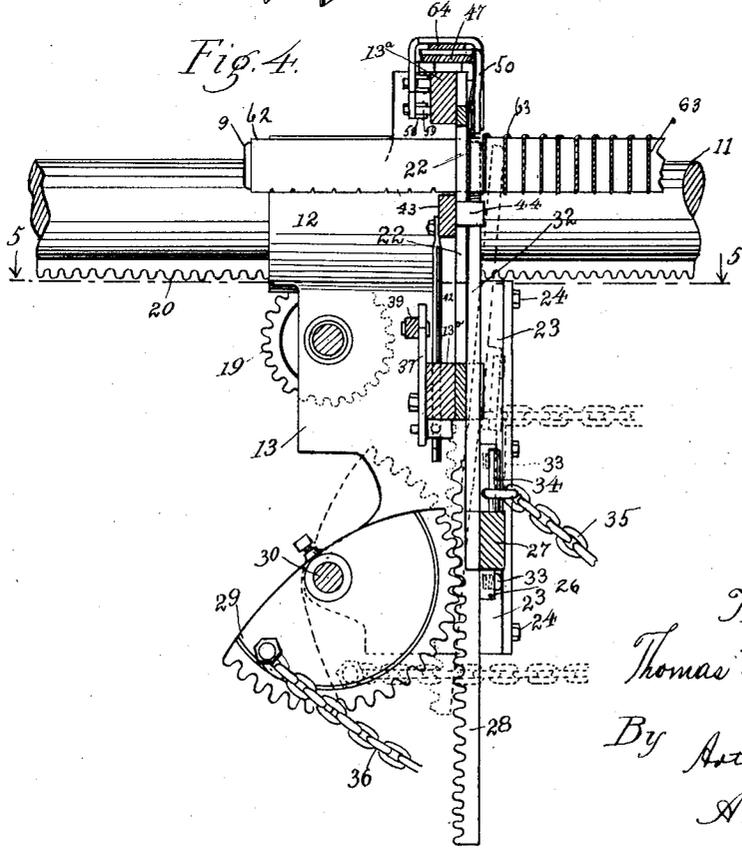


Fig. 4.

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3 SHEETS—SHEET 3.

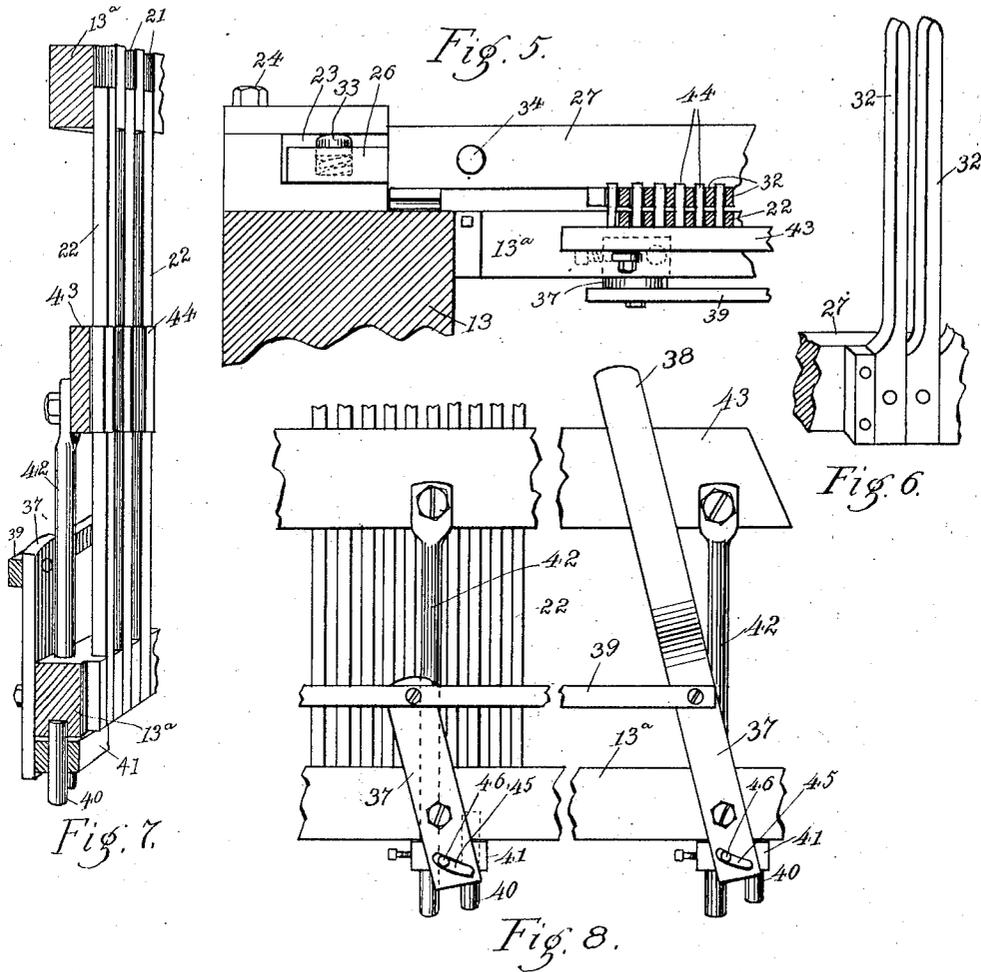


Fig. 7.

Fig. 8.

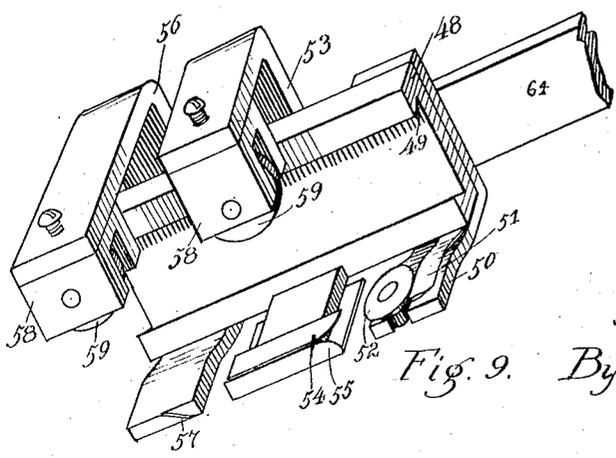


Fig. 9.

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UNITED STATES PATENT OFFICE.

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TO LIBERTY RADIATOR COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

MACHINE FOR ASSEMBLING RADIATOR-CORES.

1,339,434.

Specification of Letters Patent.

Patented May 11, 1920.

Application filed April 8, 1918. Serial No. 227,261.

To all whom it may concern:

Be it known that I, THOMAS N. COFFELDER, a citizen of the United States, and a resident of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Machines for Assembling Radiator-Cores, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to machines for assembling the cores of automobile radiators and other similar devices.

My invention is directed particularly to, and has for its chief object, the provision of a machine for the assembling of radiator cores of the general type set forth in my co-pending application, Serial Number 157,092, filed March 24, 1917, that is, of radiator cores in which circulatory tubes are in mechanical assembly with radiating fins, whereby the use of solder to secure the parts together is obviated.

Incidental objects of said invention are economy of time and material in the construction and assembly of radiator cores, and the efficient mechanical production of cores of wider availability and increased efficiency by reason of their lightness, strength and high radiating capacity.

Other objects of my invention will be apparent from the following description thereof.

In the drawings:

Figure 1 is a perspective of a machine embodying my invention, parts of the supporting frame being broken away;

Fig. 2 is a rear elevation of the carriage and actuating mechanism of said machine;

Fig. 3 is a sectional perspective on line 3-3 of Fig. 1;

Fig. 4 is a section on line 4-4 of Fig. 3, the carriage, however, being in forward position;

Fig. 5 is a section on line 5-5 of Fig. 4;

Fig. 6 is a perspective of a detail, illustrating the gripping fingers for holding the fins during their application to the tubes;

Fig. 7 is a perspective of a detail of the carriage and assembling mechanism;

Fig. 8 is a rear elevation of a detail of the carriage;

Fig. 9 is a perspective of the crimping

head for bending the back edges of the fins upon the tubes;

Fig. 10 is a perspective illustrating the tube and fin constructions and the manner of their assembly in a radiator core.

The numeral 1 indicates the supporting frame of the machine, the same being provided with braced standards 2, only partially illustrated in the drawings. The frame 1 supports a cross-member 3 having a series of transverse vertical slots 4 along its under surface, the said slots being parallel to each other and all of equal depth. Below the member 3, and supported by adjusting bolts 5, is a second cross-member 6 having slots 7 along its upper surface corresponding to, and arranged to, register vertically under the slots 4. The ends of the member 6 slide in vertical slots 8 in the frame 1; said member is thus adjustable toward and away from the cross-member 3. Arranged to be secured in the jaws formed by registering pairs of slots 4-7, are mandrels, or arms, 9, adapted to hold the tubes of a radiator in spaced relation during assembly of the core. The cross-members 3-6 are provided with sufficient slots to accommodate any required number of mandrels necessitated by the varying number of tubes entering into the construction of radiators of varying size. The mandrels 9 are of sufficient length to provide adjustability for tubes of varying length, the unrequired portions of the mandrels extending outwardly beyond the jaws, as shown at the right in Fig. 1.

Mounted on the frame 1 beyond each end of the member 3, are cylindrical heads 10-10, arranged to receive and support parallel shafts 11-11. Mounted to travel on the shafts 11-11 are cylindrical end members 12-12 of a frame, or carriage, 13. The carriage 13 is adapted to movement toward and away from the mandrels 9, and is actuated therein by the following mechanism. A hand wheel 14 is keyed on a short shaft 15 journaled in the carriage; said shaft has secured to it a pinion 16 which engages a gear 17 keyed to a shaft 18, which shaft extends across the carriage and is journaled in both ends thereof. The shaft 18 has secured to it gear wheels 19 arranged to engage rack teeth 20 on the respective shafts 11. As will be seen, rotation of the hand

wheel 14 causes the teeth of the wheels 19 to travel along the rack teeth on the shafts 11, thus actuating the carriage.

Secured between lugs 21 on the front
5 faces of upper and lower cross members 13^a
of the frame 13, as best shown in Fig. 7, are
rods 22; the rods 22 are thus spaced to form
slots through which the mandrels 9, and
thereon the radiator tubes as hereinafter set
10 forth, pass during the movements of the
carriage.

Channeled extensions are formed on the
lower front portion at each end of the car-
riage by means of plates 23 secured by
15 screws 24 to forwardly extended flanges of
the carriage. Arranged to reciprocate in
the channels of said extensions are cross-
heads 26 on the ends of a bar 27 which ex-
tends across the carriage. Near each end
20 of the bar 27, and secured thereto, is a
downwardly extending rack bar 28, the
teeth of which engage the teeth of segmental
gears 29 secured to a shaft 30 journaled in
rearwardly extended portions 13^b of the car-
riage 13. Secured to the shaft 30 is an op-
erating lever 31. Secured to the back face
of bar 27 are fingers 32, the same being
shaped to form slots between them, which
slots correspond to, and register with, the
30 slots formed by the rods 22. By operating
the lever 31, as will be apparent, the bar
27 can be raised and lowered in the chan-
nels of the carriage, thus raising and lower-
ing the fingers 32 in front of the rods 22.
35 Mounted in recesses at the two ends of each
of the cross-heads 26, are spring pressed
pins 33, which tend normally to force the
fingers 32 against the rods 22, for the pur-
pose hereinafter set forth. Secured on the
40 upper side of the bar 27, near each end, is
a pin 34 arranged to secure one end of
chains 35. The other ends of the chains
are secured to the frame 1. The chains 35
serve, as will be apparent, through the pins
45 34 to rock the bar 27 against the tension
of spring pressed pins 33, at a predeter-
mined point in the rearward movement of
the carriage, thus automatically drawing
the fingers 32 away from the rods 22 for
50 the purpose hereinafter designated. Simi-
lar chains 36, secured to the frame 1 and to
the lower ends of the segmental gears 29
serve to raise the bar 27 and fingers 32,
also at a predetermined point in the rear-
ward movement of the carriage and for a
55 purpose hereinafter set forth.

Pivotally mounted on the rear side of the
lower cross-member 13^a of the carriage, are
three levers 37, one of said levers being
60 provided with an operating handle 38.
The levers 37 extend both above and below
the cross member 13^a, and are connected,
above said cross member, by a link 39, all
three levers being thus operable by means
65 of the handle 38. Mounted to reciprocate

on pins 40 secured in the lower side of
the cross member 13^a are blocks 41. Ad-
justably secured in said blocks by set screws
are upwardly extending arms 42. On the
upper ends of the arms 42 is a bar 43, which
70 is arranged to lie adjacent to the backs of
the rods 22. The bar 43 carries on its front
face a series of narrow lugs 44, which ex-
tend forward through the slots formed by
the rods 22, as shown in Fig. 7. The lower
75 ends of the levers 37 are provided with cam
slots 45, through which pins 46 on the
blocks 41 extend. Movement of the levers
37, by means of the handle 38 and link 39
will, by reason of the engagement of the
80 sides of the cam slots with the pins 46,
serve to raise and lower the bar 43, and with
it the lugs 44.

Secured to the top of the upper cross-
member 13^a of the carriage is a trapezoidal
85 bar 47, upon which a block 48 of the crimp-
ing head of the machine maintains a slid-
ing dovetailed connection by means of an
undercut slot 49 in the block. Mounted on
the block 48 are the various crimping and
90 bending plates whereby the backs of the
fins, after being placed upon the tubes, are
crimped, or bent, upon the tubes to secure
the same permanently together. Mounted
in a depending arm 50 at the front end of
95 the block 48 is a deflecting finger 51, which
is arranged to engage the upwardly extend-
ing rear edge of the fin, after it has been
placed upon the tubes, and deflect it for-
ward. Mounted in a slot in the arm 50, im-
100 mediately in back of the finger 51, is an
indenting wheel 52, which is adapted to in-
dent slightly the back edges of the tubes to
provide a seat for the crimped edge of the
fin. Secured to the block 48, in back of the
105 arm 50, is a yoke 53, the front arm of which
carries one of the fin crimping members
composed of a vertical cam plate 54 and a
horizontal plate 55 immediately under the
plate 54. The upwardly extended rear edge
110 of the fin to be crimped is engaged by the
front cam edge of the plate 54 and bent
thereby to an angle of 90° upon the plate 55,
the fin edge passing between the narrow slot
between the two plates. On the block 48,
115 in back of the yoke 53, is a second yoke 56,
which carries, on its lower forward arm, a
cam surface 57 upon which the edge of the
fin, horizontally extended by the plates 54
and 55, impinges, and which further bends
120 or crimps the edge, folding it tightly down
against the back edge of the tubes. The op-
posite arms of the yokes 53 and 54 have
mounted thereon bearings 58 for rollers 59.
The rollers 59 bear against the rear side of
125 the upper cross-member 13^a of the carriage,
thus providing the necessary rigidity for
the crimping head during its operation. An
operating bar 64 and handle are provided.

Mounted on a forwardly extended flange 130

60 along the lower edge of the bar 27 is a guide plate 61, the upper edge of which serves as a rest for the radiator tubes when mounted on the mandrels during the operation of the machine, thus maintaining the front edges of the tubes in alinement with each other.

In Fig. 10 of the drawings I have illustrated one form of radiator tubes and fins to which my assembling machine as thus particularly described is adapted. In this form, the tubes 62 consist of a single strip of sheet metal folded together, the edges being internally soldered together to form a flat tube, as shown. The front knife edge of the tube, which is the seamed edge, is notched to receive the front edges of the fins 63; the said fins are slotted to receive the tubes, the slots being slightly longer than the width of the tubes, so that the latter may be inserted therein. After being inserted, the fins are forced into the notches, and the rear edge of each fin crimped, or bent against the rear of the tubes, thus perfecting a permanent assembly. It is to the mechanical performance of the necessary operations for the assembly of tubes and fins of the kind illustrated that my machine, in its present embodiment of the principles involved, is specifically adapted.

The operation of the machine is as follows: The desired number of tubes 62 is placed upon the mandrels 9, notched edges downward, as shown in Fig. 4. While this is being done, the carriage should, of course, be entirely removed from the mandrels, in which position it is shown in Fig. 1 of the drawings. To do this, the chains 35 should be removed from the pins 34, and the chains 36 should also be released. The tubes having been properly placed, the carriage is moved forward so that the tubes and mandrels pass through the slots formed by the rods 22. The chains 35 and 36 are re-engaged when the carriage has been moved sufficiently forward to permit the same. The carriage is then moved back until the ends of the tubes and mandrels are removed from the slots between rods 22; during this operation the chains 36 have lifted the fingers 32 to their raised position, where they extend upwardly between the mandrels, and the chains 35 have drawn said fingers away from the rods 22, in the manner above set forth, the chains, it will be understood, having been properly adjusted to this end. The carriage is then stopped at a point where the ends of the mandrels and tubes lie between the forwardly drawn fingers 32. A fin 63 is then dropped between the fingers 32 and rods 22 and in such position that the slots in said fin register with the ends of the tubes on the mandrels. In this position the fin is supported by the lugs 44, the said lugs having been adjusted to the proper

elevation by means of the adjustable arms 42. The carriage is then moved forward by means of the hand wheel 14; immediately upon the commencement of this movement the chains 35 are slackened and the fingers 32 are caused to grip the fins by means of the spring pressed pins 33. The fin is thus tightly gripped between the fingers 32 and rods 22, and is carried forward, the tubes passing through the fin slots. When the fin has been properly positioned on the tubes, and in doing this it will be understood that the thickness of the fingers 32 may be used as a gage to determine the space between adjacent fins, the bar 27, the lugs 44 are forced upward by pushing the handle 38 to the left, thus forcing the front edge of the fin into the notches in the tubes. The crimping head is then drawn along the back of the tubes and fin, slightly indenting the back edges of the tubes and crimping the fin upon the tubes; fingers 32 are lowered by lever 31 and the carriage and crimping head are then returned, a new fin is inserted upon the lugs 44 between the fingers 32 and rods 22, and the above operations are repeated; and these operations are duplicated for each fin until the required number of fins to complete the core has been placed upon the tubes.

It will be understood that in the drawings and foregoing specification I have attempted to set forth but one embodiment of my invention as applied to the assembly of tubes and fins of a particular design, and that the principles of my invention as thus typically disclosed are susceptible of numerous modifications both in the specific mechanisms directed to the performance of the required functions and in their adaptability to the assembly of tubes and fins of varying design, and I do not, therefore, limit my invention to the details shown and described, but deem the same to be co-extensive with a fair and liberal construction of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a machine for assembling radiator cores comprising tubes and slotted fins, the combination with a series of mandrels arranged to support the required number of tubes, of means for supporting a fin with the slots therein in register with the ends of the tubes on said mandrels, means for moving said fin and tubes relatively to position the tubes in the slots in said fin, and means to secure said fin and tubes together.

2. In a machine for assembling radiator cores comprising tubes and slotted fins, the combination with a series of mandrels arranged to support the required number of tubes, of means for supporting a fin with the slots therein in register with the ends

of the tubes on said mandrels, means for moving said fin and tubes relatively to position the tubes in the slots in said fin, and means for interlocking said tubes and fin together.

3. In a machine for assembling radiator cores comprising tubes and slotted fins, the combination with a series of mandrels arranged to support the required number of tubes, of means for supporting a fin with the slots therein in register with the ends of the tubes on said mandrels, means for moving said fin and tubes relatively to position the tubes in the slots in said fin, and means for crimping the edge of said fin upon said tubes to secure the same together.

4. In a machine for assembling radiator cores comprising tubes, each of which tubes has a notched edge, and slotted fins, the combination with a series of mandrels arranged to support the required number of tubes, of means for supporting a fin with the slots therein in register with the ends of the tubes on said mandrels, means for moving said fin and tubes relatively to position the tubes in the slots in said fin, and means whereby one edge of said fin is caused to enter a notch in each of said tubes to secure the same together.

5. In a machine for assembling radiator cores comprising tubes, each of which tubes has a notched edge, and slotted fins, the combination with a series of mandrels arranged to support the required number of tubes, of means for supporting a fin with the slots therein in register with the ends of the tubes on said mandrels, means for moving said fin and tubes relatively to position the tubes in the slots in said fin, means whereby one edge of said fin is caused to enter a notch in each of said tubes, and means for crimping the other edge of the fin upon the other edges of the tubes to secure the same together.

6. In a machine for assembling radiator cores comprising tubes and slotted fins, the combination with a series of mandrels arranged to support the required number of tubes, of a carriage, said carriage having slots arranged to register with the ends of the tubes on said mandrels, means carried by said carriage for holding a fin so that its slots register with the ends of said tubes and with the slots in said carriage, and means for actuating said carriage to place said fin on said tubes.

7. In a machine for assembling radiator cores comprising tubes and slotted fins, the combination with a series of mandrels arranged to support the required number of tubes, of a carriage, said carriage having slots arranged to register with the ends of the tubes on said mandrels, means carried by said carriage for holding a fin so that its slots register with the ends of said tubes and with the slots in said carriage, means for

actuating said carriage to place said fin on said tubes, and means for bringing said fin and tubes into engagement to secure the same together.

8. In a machine for assembling radiator cores comprising tubes, each of which tubes has a notched edge, and slotted fins, the combination with a series of mandrels arranged to support the required number of tubes, of a carriage, said carriage having slots arranged to register with the ends of the tubes on said mandrels, means carried by said carriage for holding a fin so that its slots register with the ends of said tubes and with the slots in said carriage, means for actuating said carriage to place said fin on said tubes, and means whereby one edge of said fin is caused to enter a notch in each of said tubes to secure the same together.

9. In a machine for assembling radiator cores comprising tubes, each of which tubes has a notched edge, and slotted fins, the combination with a series of mandrels arranged to support the required number of tubes, of a carriage, said carriage having slots arranged to register with the ends of the tubes on said mandrels, means carried by said carriage for holding a fin so that its slots register with the ends of said tubes and with the slots in said carriage, means for actuating said carriage to place said fin on said tubes, means whereby one edge of said fin is caused to enter a notch in each of said tubes, and means for crimping the other edge of the fin upon the other edges of the tubes to secure the same together.

10. In a machine for assembling radiator cores comprising tubes and slotted fins, the combination with a series of mandrels arranged to support the required number of tubes, of a carriage, said carriage having slots arranged to register with the ends of the tubes on said mandrels, means carried by said carriage for holding a fin so that its slots register with the ends of said tubes and with the slots in said carriage, means for actuating said carriage to place said fin on said tubes, and means for holding one edge of the tubes in alinement during the movement of said carriage.

11. In a machine for assembling radiator cores comprising tubes and slotted fins, the combination with a series of mandrels arranged to support the required number of tubes, of a carriage, said carriage having slots arranged to register with the ends of the tubes on said mandrels, means carried by said carriage for holding a fin so that its slots register with the ends of said tubes and with the slots in said carriage, means for actuating said carriage to place said pin on said tubes, and means for releasing said pin for the return of said carriage.

12. In a machine for assembling radiator cores comprising tubes and slotted fins, the

combination with a series of mandrels arranged to support the required number of tubes, of a carriage for successively placing fins upon said tubes, said carriage having slots arranged to register with the ends of the tubes on said mandrels, fingers carried by said carriage for gripping the front side of a fin and holding it so that its slots register with the ends of said tubes and with the slots in said carriage, said fingers being of a thickness corresponding to the space between successive fins, and means for removing said fingers to clear the fin so that said carriage may be returned.

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