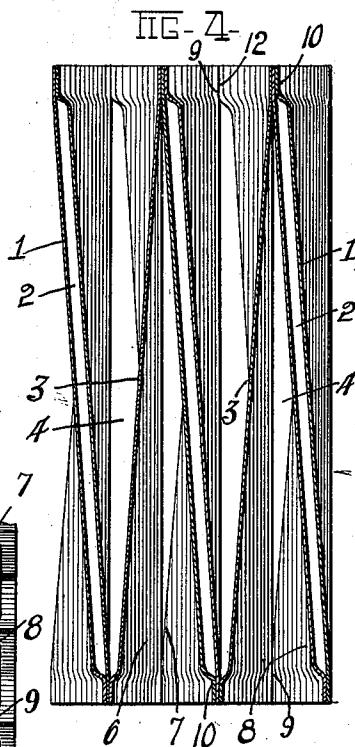
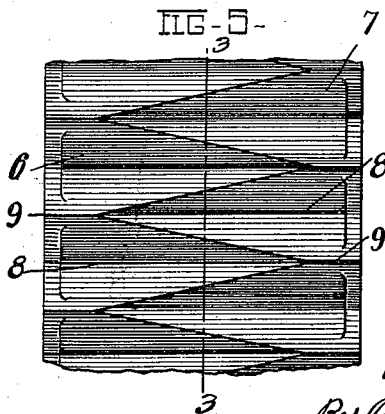
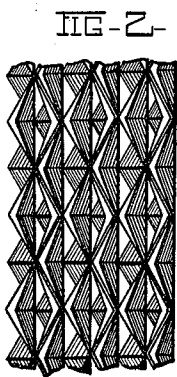
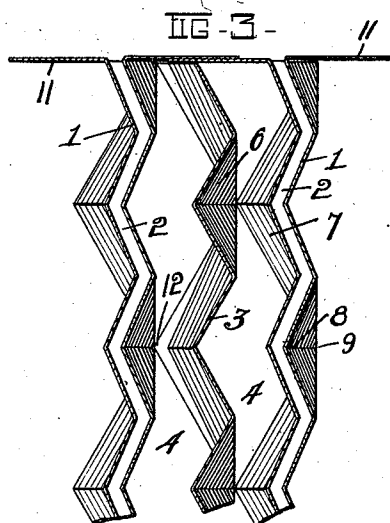
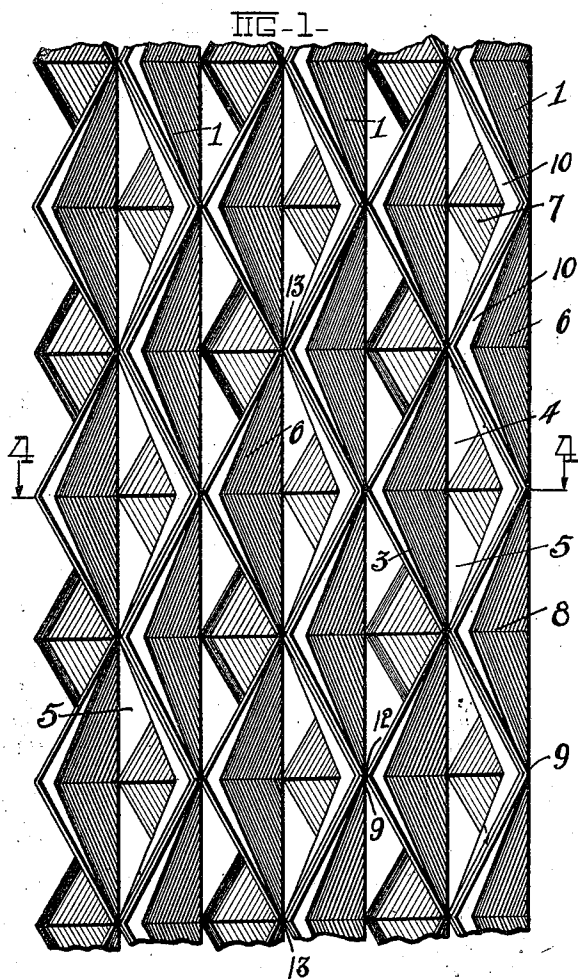


1,429,644.

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Atty.

UNITED STATES PATENT OFFICE.

VINCENT SCHREINER, OF TOLEDO, OHIO.

RADIATOR CORE.

Application filed March 28, 1921. Serial No. 456,301.

To all whom it may concern:

Be it known that I, VINCENT SCHREINER, a citizen of the United States, and a resident of Toledo, in the county of Lucas and State of Ohio, have made an invention appertaining to Radiator Core; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates to radiators for use in connection with the water cooling systems of internal combustion engines.

The primary object of my invention is the provision of a radiator of the class described which is light, simple and inexpensive in its construction and has its air cells so formed and arranged as to intercept and deflect a maximum amount of the air passing through so that practically the full cooling efficiency of the air on the walls of the water passages is obtained.

A further important feature of the invention is the provision of a novel radiator of the class described, the walls of the water passages of which are free to expand within considerable limits so that freezing of water within the radiator may occur without danger of straining the radiator or springing leaks by opening joints therein.

A further object of the invention is the simplicity, ease and rapidity with which the parts of the radiator may be assembled and the small amount of solder required to secure the parts together.

The invention is fully described in the following specification, and while, in its broader aspect, it is capable of embodiment in numerous forms, a preferred embodiment thereof is illustrated in the accompanying drawings, in which,—

Figure 1 is an enlarged fragmentary front or rear elevation of a radiator core. Fig. 2 is a similar view thereof with the parts approximately the size used in practice. Fig. 3 is an enlarged central vertical section of a portion of a radiator core taken transverse to the passage of the air therethrough on substantially the line 3—3 in Fig. 5. Fig. 4 is an enlarged horizontal cross-section taken substantially on the line 4—4 in Fig. 1, with

the outer spacing strip removed, and Fig. 5 is a fragmentary side view of a crimped sheet metal strip used in the radiator construction.

A radiator core embodying the invention comprises a plurality of vertically disposed laterally spaced flat water tubes 1 forming water passages 2, and spacing strips 3 interposed between the tubes and cooperating therewith to form air passages 4.

The tube walls and spacing strips are formed of crimped strips of sheet metal of substantially the same shape, size and form, the strips forming the tube walls being nested together in slightly spaced relation intermediate their vertical or side edges to form the water passages 2 therebetween, and the spacing strips being placed with the laterally protuberant portions which are adjacent to their side edges, bearing against the corresponding protuberant portions of the adjacent tube walls to cooperate therewith to form inlet and exit openings 5 to and from the registering air passages 4, respectively, at the front and rear of the radiator core.

Each sheet metal strip forming the tubes 1 and spacers 3 is provided lengthwise thereof with two sets of crimps 6 and 7, in the present instance of V-form in cross-section, arranged along the opposite side edges of the strip with the crimps of the two sets alternating and tapering inward with respect to the strip edge along which disposed, and losing themselves adjacent to the opposite strip edge in the aligned ridges or apex portions of the other set of crimps. In other words, the central longitudinal line of each valley 8 of a crimp of one set aligns with the ridge or laterally protuberant or apex portion 9 of a crimp of the other set, with each crimp valley tapering or gradually diminishing in depth inwardly from its outer end until it loses itself in the aligned ridge of a crimp of the other set.

Each water tube is formed by nesting a pair of crimped strips together with the crimp of one strip entering those of a corresponding set of the other strip. In order to form a water space 2 between the strips, which space is open at top and bottom and closed along the side edges thereof, each outside valley 8 of a tube strip is formed at its outer end with an inward transverse depression or offset 10 forming a spacing means which is of greatest depth at its center

and gradually loses itself towards the outer edges of the valley sides, as shown. The upper and lower ends of each tube strip are outwardly turned to form end flanges 11, each being intended to lap a flange of an adjoining water tube and to cooperate therewith to bridge and close the respective end of an air space 4. The lapping flanges are soldered together, as are also the side edges 10 of the strips forming the water tubes 1 to form a close water tight edge joint for the tubes.

The spacing strips 3 which are of the same crimped form as the tube wall strips, are disposed in spacing relation between adjacent tubes 1 with the ridges or lateral protuberant portions 12 of their crimps bearing at their outer ends against registering ridges or lateral protuberant portions 9 of the tube walls spaced thereby. The tubes and spacing strips are secured together in assembled relation by soldering the same at the points of contact of the ridges 9 and 12 of the different members, as shown, at 13. The entrance and exit openings 5 to the air passages 4, which openings are formed by assembling the tubes and spacing strips, as shown and described, are necessarily, in the present instance, of diamond form, due to the V-form of crimping employed, but it will be understood that the invention is not restricted to this particular form of openings, as the form may be changed by varying the form of the crimps.

It is evident that this construction of radiator core provides water passages which are of zig-zag form lengthwise of the passage of water therethrough so that the water is continually baffled in its flow through the passages; that the air passages 4 are also of zig-zag form in a vertical direction and that each inlet opening 5 at one side of the core is offset from all outlet openings at the opposite side thereof so that the air instead of being permitted to pass directly through a straight air cell, as is customarily the case, is deflected by the tapering walls of the valleys and ridges of the crimped sheet metal strips, thereby bringing more air into contact with the walls of the water passages than would otherwise be the case and obtaining the full cooling efficiency on the water tube walls of the air in its passage through the core. It is also evident that by reason of the peculiar manner of crimping the spacing and water tube strips all surfaces with which the air coacts in its passage through the radiator core are angled or inclined with respect to the normal direction of travel of air through the core so as to continually baffle and agitate the air and tend to restrict its free passage through the core. With respect to the off-setting of the air openings 5 at one side of the core relative to the other side, it will be noted that the center of each

opening at one side aligns with the point of contact 13 of two protuberant portions 9 and 12 of abutting strips so that the air which enters each opening is deflected upward or downward in order to find its exit from the opposite side of the core.

It will be noted that the sheet metal strips forming the water tubes and spacing members are all spaced apart except at their front and rear edge portions so that the walls of the water tubes are permitted to freely expand without danger of opening up joints or springing leaks should freezing occur therein, thereby providing a radiator of the anti-freeze type.

I wish it understood that my invention is not limited to any specific construction, arrangement, or form of the parts, as it is capable of numerous modifications and changes, without departing from the spirit of the claims.

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

1. A radiator core having sheet metal strips forming water passages, the strips being nested and each having a separate set of transversely extending crimps along and extending inward from each side edge thereof and gradually losing themselves toward the opposite edge of the strips with the crimps of one set alternating with those of the other, the strips having their side edges connected to form a water tight joint and the portions between the edges being separated to form a water passageway between the strips lengthwise thereof.

2. A radiator core having spaced sheet metal strips connected at the side edges to form vertical water passages and horizontal air passages between the water passages, the strips being formed with successive transversely extending V-shaped crimps along their side edges, with the crimps along one edge of each strip alternating with those of the other edge and tapering inward to gradually lose themselves in the aligned valleys of the other set of crimps, the air passages having diamond shaped inlet and outlet openings at their front and rear sides with all openings in one side out of true register with all openings in the other side.

3. A radiator core having sheet metal strips forming water passages, each strip having two sets of crimps arranged along opposite side edges thereof with the crimps of the two sets alternating and tapering inward and losing themselves adjacent to the opposite strip edge, the strips being nested together and having edge portions offset to maintain the major portions of the strips in spaced relation to form a water passage therebetween.

4. A radiator core having crimped strips of metal forming zig-zag water passages

with the crimps in two sets arranged along opposite edges of each strip and gradually shallowing toward their inner ends and with the valleys of the crimps of one set losing themselves in the protuberant portions of the crimps of the other set.

5 5. A radiator core having vertically disposed water tubes of flat form, a spacing strip disposed between adjacent tubes and
10 V-crimped along opposite side edges thereof with the crimps of each set alternating and gradually diminishing in depth toward the opposite edge of the strip to present tapering deflecting surfaces to air passing through
15 the radiator between the strip and tubes.

6. A radiator core having a plurality of sheet metal strips forming water tubes and spacing members for the tubes, the strips

being crimped in substantially duplicate fashion along opposite edges thereof with the crimps gradually diminishing in depth inwardly from the respective edges of the strip and alternating with the crimps at the other edge so that the ridge of each crimp of one set aligns with the valley of a crimp of the other set, the ridge portions of the crimps of the tubes and spacing member strips successively abutting at their outer ends to retain the major portions of the tubes and spacing strips in spaced relation and to form air inlet and exit openings to and from the air spaces.

In testimony whereof I have hereunto signed my name to this specification.

VINCENT SCHREINER.