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W. L. FENN & J. W. CONWAY.

ART OF UNITING METALS.

APPLICATION FILED SEPT. 6, 1904.

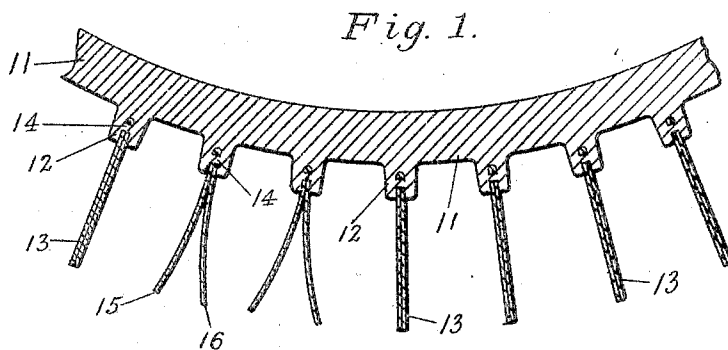
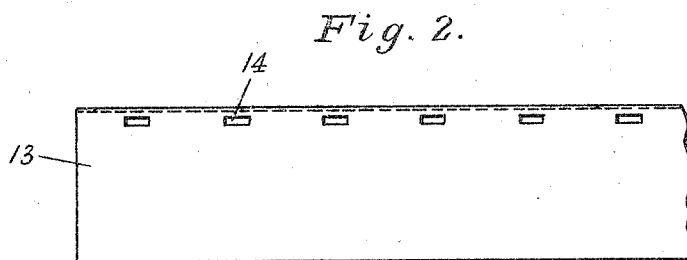


Fig. 3.

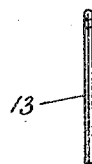
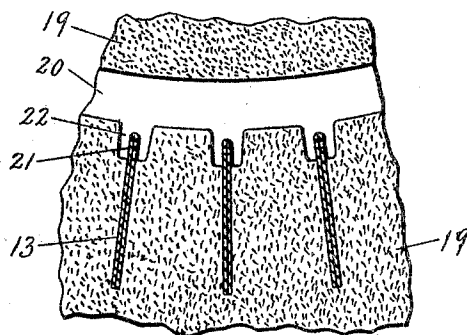


Fig. 4.



Witnesses:

Gas. M. Green
H. M. Mallner

Inventors:

Wilson L. Fenn,
John W. Conway,
By *W. A. Lewis*, Att'y.

UNITED STATES PATENT OFFICE.

WILSON L. FENN AND JOHN W. CONWAY, OF HARTFORD, CONNECTICUT;
SAID CONWAY ASSIGNOR TO SAID FENN.

ART OF UNITING METALS.

SPECIFICATION forming part of Letters Patent No. 789,530, dated May 9, 1905.

Application filed September 6, 1904. Serial No. 223,344.

To all whom it may concern:

Be it known that we, WILSON L. FENN and JOHN W. CONWAY, citizens of the United States, and residents of Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in the Art of Uniting Metals, of which the following is a full, clear, and exact specification.

This invention comprises improvements in the art of fusing together two or more metals, one of which is relatively thin, and particularly when the thinner metal fuses at a lower point than the metal with which it is united.

This invention is herein shown as applied to the production of cast-iron cylinders for air-cooled gasoline and other engines, the principal object in this case being to provide these cylinders with relatively thin projecting fins, preferably of sheet-copper, for increasing the heat-radiating surface of the cylinder.

Figure 1 is an end view showing in transverse section a fragment of an engine-cylinder having projecting fins of sheet metal fused therein. Fig. 2 is a side view, and Fig. 3 an end view, of a portion of one of the fins. Fig. 4 is a sectional end view of a fragment of the mold into which the cast-iron is poured and shows some of the sheet-metal fins in position in the mold.

In making air-cooled cylinders, particularly for automobiles, it is necessary to secure these fins very firmly into the cylinder on account of the jarring to which they are subjected, which would otherwise shake them loose. Hence it is desirable to fuse them into the cylinder rather than to hold them in by pinching or other mechanical means. The difficulty ordinarily experienced in fusing them in place in the operation of casting the cylinder arises from the fact that the heat of the molten body of the cylinder is high enough and by reason of its usual bulk holds long enough to melt off the inclosed base of the strip, thus disintegrating and destroying the structure of the base, so that the strip if it

continues to hold at all does so only by an area equal to its thickness, as though it had been brazed edgewise against the outer surface of the cylinder.

In the present invention the fins or strips are seated in ribs or bosses which project from the main body of the casting and are so proportioned as to retain the heat long enough to insure fusion between the casting and the strip without melting off the base of the strip. In the embodiment shown herein the outer surface of the cylinder 11 is provided with the longitudinal ribs 12 for receiving the bases of the fins 13. The projecting ribs 12 chill much more quickly than the greater mass of the cylinder-wall 11, and they are so proportioned that they begin to chill as soon as the fins are properly fused to the rib. Thus the fin retains its original firm structure, thereby insuring a firm seating in the iron casting. The fins 13 are here shown as being doubled upon themselves and extending lengthwise of the cylinder. When doubled over in this manner, the strips may be afterward separated a little on their ends, as shown in the fins 15 and 16, thereby largely increasing the radiating-surface.

As a further means of insuring the retention of the fins in place they are preferably provided with a row of holes 14 near their folded base portion, so that the molten iron flows into these holes, as shown in Fig. 1, the section in this figure being taken through a line of these holes. This construction practically rivets the strips in place. It is obvious that the strips may also be secured in place by means of indentations or corrugations on their surface, into and around which the molten metal could flow.

Fig. 4 shows a portion of the mold ready for the casting of the cylinder. (Shown in Fig. 1.) The space 20 is formed to receive the body of the cylinder-wall, and the projecting ends 21 of the fins 13 extend into the recesses 22 formed for the projecting ribs. In practice it has been found convenient to place the fins in the pattern before the latter has been placed in the flask. After that the sand

may be rammed into place and the pattern withdrawn, leaving the fins in proper position, as shown.

It is not necessary that the projections 12 should extend lengthwise of the cylinder. They may be annular and extend around the cylinder, the fins in this case being made in the form of washers, with their inner edges seated in the ribs. In many other ways this invention may be modified to suit various purposes or conditions.

It is considered preferable to seat the fin approximately in the middle of the rib; but this is not essential, since the fin may obviously be at or toward either side of the rib. The proportions of the ribs must be suited to the size and character of the two parts to be fused together and to the fusing-points and other relevant characteristics of the metal or metals of which they are respectively made.

We claim as our invention—

1. The method of fusing to a casting a piece of metal of a lower fusing-point, which consists in molding the casting with a projecting seat for the fused-in piece extending beyond the main body of the casting, and proportioned to hold sufficient metal of the casting to partially but not wholly melt the fused-in portion of the piece.

2. The method of fusing thin pieces of metal to a relatively large casting of a higher fusing-point, which consists in molding the casting with projecting seats extending from the main body and contour of the casting against and around the pieces to be fused thereto, each projecting seat being proportioned to receive a volume of the metal of the casting sufficient to partially but not wholly fuse the contacting portions of the thin pieces.

3. The process of fusing into a casting a piece of metal of a lower fusing-point, which consists in molding the casting with a projecting seat for the fused-in piece extending from the main body and contour of the casting, and proportioned to insure the cooling of the seat before melting away the fused-in portion of the piece, and placing the piece of metal in the mold with a portion thereof extending into the seat-space.

4. The process of casting an engine-cylinder having heat-radiating fins of a different metal fused therein, which consists in molding the cylinder with cavities to form seat projections extending from the wall of the cylinder, supporting the fins to extend into the said cavities, and then pouring the casting, the seat-cavities being proportioned to receive a

volume of the casting metal sufficient to partially but not wholly fuse the contacting portions of the fins.

5. As a new article of manufacture, a structure comprising a body of cast metal having fused to it a piece of metal fusing at a lower temperature than the body metal, that part of the body metal immediately in contact with the piece being proportioned to fuse the adjacent portion of the piece without wholly melting it.

6. As a new article of manufacture, a structure comprising a body of metal having fused to it in the casting process a piece of metal fusing at a lower temperature than the body metal, the latter being provided with a seating projection for the piece, proportioned to fuse the surface of the seated portion of the piece without wholly melting it.

7. A heat-radiating surface formed of a piece of metal fusing at a relatively high temperature, and a plurality of pieces of metal fusing at a relatively low temperature, the two metals being united by casting the higher-fusion piece about portions of the lower-fusion pieces, the inclosing portions of the higher-fusion piece being proportioned to partially, but not wholly fuse the seated portions of the lower-fusion pieces.

8. A heat-radiating surface formed of two pieces of metal fusing at different temperatures and united by casting the higher-fusion piece about a portion of the lower-fusion piece, the lower-fusion metal being seated in a plurality of ribs which extend from the surface of the higher-fusion metal and are proportioned to fuse the seated portions of the lower-fusion metal without wholly melting them.

9. As a new article of manufacture, a structure comprising a body of metal having fused to it a piece of metal fusing at a lower temperature than the body metal, that part of the body metal immediately in contact with the piece being proportioned to fuse the surface of the seated portion without wholly melting that portion, the seated portion being provided with depressions for the molten metal to enter.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

WILSON L. FENN.
JOHN W. CONWAY.

Witnesses:

JOSEPH MERRITT,
JOSEPH F. SADLER.