The present invention relates to a method of manufacturing, in a mechanical way, corrugated sheets having the wave-crests extending out above the wave-troughs, the invention being essentially characterized by the fact that the sheet metal plate is first corrugated, in a manner known per se, to form wave-troughs which have the same width or are widening from the bottom and upwards, after which operation the wave-crests are pressed down, at least on both sides of the sheet metal plate, against counter-members inserted in the wave-troughs.

The invention also relates to a counter-member adapted to allow the method to be carried out. In its simplest form the said member may consist of bars intended to be inserted into the wave-troughs of the sheet-metal plate already corrugated in a well-known way, the said bars filling up the bottom part of said troughs and having the desired shape to allow the enlargement of the wave-crests.

According to a very suitable embodiment of said counter-member it may consist of two side parts mounted to slide on a wedge-shaped member. When this wedge-shaped member is pressed down, said side parts are forced apart, thus filling the bottom part of the wave-crest.

Other features characteristic of the invention will be more closely set forth in the following in connection with the description of the embodiment shown in the annexed drawings.

Figs. 1 and 2 show a pressing tool with an inserted plate and the counter-member and other parts in two different working positions, while Fig. 3 is showing said counter-member in a side view. Fig. 4 is a section on the line IV—IV in Fig. 5 and this last-mentioned figure is a section on the line V—V in Fig. 4, which shows the counter-member on a larger scale.

Referring to Figs. 1 and 2, 1 is the bottom table of the pressing-machine. Said table is provided with projections 3 upwards extending and corresponding to the shape of the preliminarily corrugated sheet 2. The tops of said projections 3 are partly cut away forming a void space 5 to allow the wave-crests 4 of the sheet 2 to be pressed down. 7 is the top table of the pressing-machine and 8 are the pressing-surfaces adapted for pressing down the wave-crests 4 of the sheet 2. Inserted in the top table are further the counter-members required for causing the wave-crests 4 of the sheet 2 to be depressed out above a part of the wave-troughs. Each counter-member consists of two symmetrical side parts 9 cooperating with a wedge-shaped member 10 slidably arranged in the top-table 7, the said wedge-member 10 being provided with flanges 11 cooperating with corresponding shoulders 12 on the side parts 9 to bring them upwards at the upward motion of the wedge-shaped member, when lifting the top table. The wedge-shaped member 10 is actuated upon by a pressure spring 13 inserted between said member 10 and the top table 7. This spring 13 tends to give the wedge-shaped member an outward motion. This motion is limited by an arrangement 14 and 15 located on the member and its guide 16 in the top table respectively. To carry the side parts 9 against each other at the lifting of the wedge-shaped member 10, the two side-parts are interconnected by a tension spring 17, which tends to bring the side-parts together in a way clearly illustrated in Fig. 4. The wedge-shaped members 10 are provided with slots 18 to allow the wedge-shaped members to be pressed down past the retaining spring 17 of the side-parts.

The arrangement works in the following manner:

After the sheet 2, corrugated in a well-known manner, has been placed in the bottom table 1 as shown in Fig. 1, the top table 7 is brought downwards forcing the wedge-shaped member 10 to move downwards. The side parts 9, after touching the sheet 2, are hereby brought apart, filling the bottom part of the wave-troughs. At continued pressing down of the top table 7 the springs 13 will be compressed causing the side-parts to rest against the sheet 2 in an efficient and reliable manner, preventing a displacement of the sheet material in the wave-troughs. When the top table is then touching the wave-crests 4 of the sheet 2, these crests will be flattened and spread out, the projections 19 at the sides of the wave-crests, aimed at by the invention being obtained by the plate resting against the side-parts 9 at the portions 20, which, for instance, are obliquely cut off.

When the pressing operation is finished, the top table 7 is again brought upwards, the wedge-shaped member 10 being brought to follow by the cooperation of the arrangement 14, 15, allowing the side parts 9 to move, at first, in a direction towards each other by the influence of the spring 17. After this operation, at continued lifting, the member 10 also lifts the two side parts 9 out of the wave-trough, which now has a narrowed section at its upper part.

Principally, the pressing operation now described may be effected using only one counter-
member, but, more preferably, the pressing of all the waves should be carried out simultaneously, provided the plate is not too long.

It is, of course possible to carry out the method without the aid of folding counter-members, but these must, in such a case, be inserted and removed in the longitudinal direction of the waves. Further, it is, of course, not necessary that the projections 3 and the corresponding pressing-surfaces 8 located in the top table, be plane. Instead of it, these surfaces may, if desired, be given any desired shape if only regard is paid to the fact that the wave-crests 4 obtain a sufficient pressing to form the projections 19. It is furthermore not necessary that the shape of the projections 19 should be that shown in the drawings, although this shape might be practically advantageous with regard to the work of deformation.

Finally, it may be pointed out that, according to the invention, it is not at all necessary to corrugate the whole surface of the sheet, nor is it necessary to provide a sheet entirely or partly corrugated in a common way, with the undulations, according to the invention, over the entire surface of the corrugated sheet. If it is, for instance, the question of manufacturing corrugated sheets for heating-radiators, it may often be sufficient, for instance, to provide the plates with one or more strips of undulations carried out according to the present invention, which, then, in an advantageous way, may be utilized to hold the two walls of the plate radiators together.

Having now particularly described the nature of my invention and the manner of its operation, what I claim is:

1. A method of manufacturing corrugated sheet metal plates having the crests extending beyond the troughs which consists in first impressing the sheet with a series of upright corrugations in a known manner; inserting the sheet thus corrugated in a die outlined in correspondence to the troughs of said sheet but leaving a free space below the top of the crests, inserting counter members into the open troughs, the outlines of said counter members wholly corresponding to the desired outlines of the troughs in the final sheet product, deforming the crests so as to form side portions thereon extending beyond the troughs by pressing down the crests to bear against said die and said counter members.

2. A machine for manufacturing corrugated sheet metal plates, having the crests extending beyond the troughs, out of sheets that first have been impressed with a series of upright corrugations in a known manner, comprising two sets of dies; the outlines of one of said dies, into which the sheet after said first corrugation is to be inserted, being formed in correspondence with the troughs of said corrugated sheet by leaving a free space below the top of the crests; counter members adapted to be inserted in the open troughs, the outlines of said counter members corresponding to the desired outlines of the troughs of the final sheet product; means for pressing down the other set of dies against the crests and deforming the latter by bringing them to bear against the first named die and the said counter members.

3. A machine for manufacturing corrugated sheet metal plates, having the crests extending beyond the troughs, out of sheets that first have been impressed with a series of upright corrugations in a known manner, comprising two sets of dies; the outlines of one of said dies, into which the sheet after first corrugation is to be inserted, being formed in correspondence with the troughs of said corrugated sheet but leaving a free space below the top of the crests; counter members adapted to be inserted into the open troughs, said counter members consisting of two side-parts provided with outlines corresponding to the outlines of the troughs of the final sheet product; means for forcing said side-parts apart in order to fill up the lower part of the troughs; means for pressing down the other set of dies against the crests and deforming the latter by bringing them to bear against the first named die and the said counter members.

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