

EXTRUSION OF ALUMINIUM WITH HOLLOW RIBSBACKGROUND OF THE INVENTION

The present invention relates to the extrusion of a mesh with hollow ribs. In the extrusion of an aluminium workpiece which is then stretched into an aluminium mesh with hollow ribs, various methods and machines have been disclosed for the stretching of the mesh. Examples include British Patents Nos. 1,601,015; 1,600,947; 1,588,197, and Japanese Patents Nos. 22,462; 7,264; 36,108; 24,021 and 13,186. In a known method of forming mesh, a workpiece is firstly formed by the process of extrusion in an extrusion machine. The workpiece thus obtained is then stretched by means of mesh stretching machine to form the mesh. This method enables a high production rate at low production cost to be achieved. Further, the mesh can be conveniently formed in any of a variety of patterns. However, mesh which is made from aluminium material by any of the known methods cannot be used, for example, to replace mesh that is made of stainless steel tubes or other metal tubes. Because the ribs in known aluminium mesh are made in solid structure which has low resistance against shearing or bending forces, an aluminium mesh can not bear high pressure, and is not therefore suitable for making door panels or reinforced window screens or for making door panels or reinforced window screens or for making the face for a seat or fence.

Where the ribs in a mesh are hollow the structural strength of a mesh is improved. Further, when same amount of material is

used for forming the mesh, a greater peripheral surface area is provided in the mesh having hollow ribs than in the mesh having solid ribs. Because of the greater peripheral surface area, the structural strength of the hollow ribbed mesh is greater. As a result, mesh which is made of stainless steel or other metal is still widely accepted for various purposes although its outer appearance is marred by welds made during manufacture, more or less damage its outer appearance.

Accordingly, the present invention provides an extrusion die comprising a mother die unit having a plurality of through holes inter connected with one another to form an extrusion outlet; and a daughter die unit having a plurality of raised blocks each of which engages in a respective one of said through-holes to form a peripheral gap between each said block and through-hole for the extrusion therethrough of material into a hollow, panel-like workpiece having a plurality of elongate hollow ribs inter connected by connecting strips.

The present invention also provides a workpiece when formed by extrusion through an extrusion die as described in the immediate proceeding paragraph.

The present invention further provides a mesh when formed by a process of stretching a hollow, panel-like workpiece as described in the immediately preceding paragraph, the mesh having a plurality of interconnected hollow ribs with a plurality of open spaces formed therein.

BRIEF DESCRIPTION OF THE DRAWINGS:

The present invention will now be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is an exploded perspective view of an extrusion die according to the present invention;

Figure 2 is a flow chart, showing the production of aluminium mesh;

Figure 3 illustrates an aluminium mesh formed from an extrusion mode using the die of Figure 1; and

Figures 4, 5 and 6 illustrate various forms of extruded aluminium workpiece.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT:

Figure 1 shows an aluminium workpiece extruding die 1 which is generally comprised of a mother die unit 11 and a daughter die unit 12 for use in an aluminium extruding machine for making a hollow aluminium workpiece which is to be further stretched by a mesh stretching machine into an aluminium mesh. The mother die unit 11 has a plurality of tooth-shaped holes 111 arranged along the centre or a diameter and connected with one another, forming an extrusion outlet. The daughter die unit 12 has a plurality of raised blocks 121 aligned along the centre or diameter. The size and number of the raised blocks 121 on the daughter die unit 12 are made to match with the tooth-shaped holes 111 on the mother die unit 11. When the mother die unit 11 is mounted on the daughter die unit 11, the raised blocks 121 engage in respective tooth-shaped holes 111 with a peripheral gap between each block 14 and its cooperating hole 111 to allow

extrusion of a hollow, panel-like or generally planar workpiece which has a plurality of hollow ribs interconnected by connecting strips.

Each hollow rib is formed by a respective block 121 and its cooperating hole 111 whilst the connecting strips are formed by the connecting spaces in the mother die unit 11 between adjacent tooth-shaped holes 111. The raised blocks 121 are respectively designed on the daughter die unit 12 at a polar angle position relative to the tooth-shaped holes 111 so that they are forced into correct position in the tooth-shaped holes 111 by the squeezing force from feeding material during the extrusion process.

Figure 2 is a flow chart which illustrates the production of an aluminium extrusion through the die of Figure 1. An aluminium ingot, after having been properly cut and pre-heated, is fed into a feed pipe of an extrusion machine where it is heated and then squeezed through the extrusion die 1, forming into an extruded workpiece. On extrusion through the tooth-shaped holes 111, the workpiece 2 (Figure 3) is formed as a hollow panel having a plurality of hollow ribs 21 respectively interconnected connecting strips 22. The extruded workpiece 2 is then subjected to patterning and slotting processes to form elongated slots 23 on the connecting strips 22 according to pre-determined patterns. After slotting, the extruded workpiece 2 is then delivered to a mesh stretching machine to be stretched into an aluminium mesh with hollow ribs.

Because of the limitation of the aluminium workpiece extrusion die 1, the size of an extruded workpiece is limited. In order to obtain a large aluminium mesh, several aluminium workpieces extruded through the extrusion die 1 may be coupled with one another into a single, large workpiece for stretching into a large aluminium mesh. Figure 4 shows a hollow, panel-like workpiece which has been extruded through an aluminium workpiece extrusion die according to the present invention. The workpiece is shaped like a hollow panel having a plurality of hollow ribs 21 and a plurality of connecting strips 22 therebetween. The hollow rib at one side of the workpiece has a unitary male fastening member 24 along its outer side edge and the hollow rib on the opposite side has a unitary female member 25 along its outer side edge. By fastening a male fastening member 24 on one such workpiece with a female fastening member 25 on another such workpiece, a plurality of hollow, panel-like workpieces can be coupled into a unitary, hollow, panel-like workpiece assembly. The male and female fastening members 24 and 25 may be variously shaped.

Figure 5 illustrates an alternate design of the male and female fastening members. In another alternate form of the present invention, the two hollow ribs at the two opposite sides of an extruded aluminium workpiece are respectively formed with elongated retaining notches 26 extending along an outer side edge of each workpiece. An elongate connecting bar 27 (which is separately made is then used to couple two extruded aluminium workpieces into larger size of aluminium workpiece assembly).



CLAIMS

1. An extrusion die comprising a mother die unit having a plurality of through holes interconnected with one another to form an extrusion outlet; and a daughter die unit having a plurality of raised blocks each of which engages in a respective one of said through-holes to form a peripheral gap between each said block and through-hole for the extrusion therethrough of material into a hollow, panel-like workpiece having a plurality of elongate hollow ribs interconnected by connecting strips.
2. An extrusion die as claimed in Claim 1 for extrusion of aluminium.
3. A workpiece when formed by extrusion through an extrusion die as claimed in claim 1.
4. A workpiece as claimed in claim 3, formed of aluminium.
5. A mesh formed by a process of stretching a hollow, panel-like workpiece as claimed in claim 3 or 4, the mesh having a plurality of interconnected hollow ribs with a plurality of open spaces formed therein.
6. An extrusion die substantially as herein before described with reference to Figure 1 of the accompanying drawings.
7. A workpiece substantially as hereinbefore described with reference to any of Figures 2 - 6 of the accompanying



drawings.

8. A mesh formed substantially as hereinbefore described with reference to Figures 4, 5 or 6 of the accompanying drawings.
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