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EXTRUSION OF METALS

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FIG. 1.

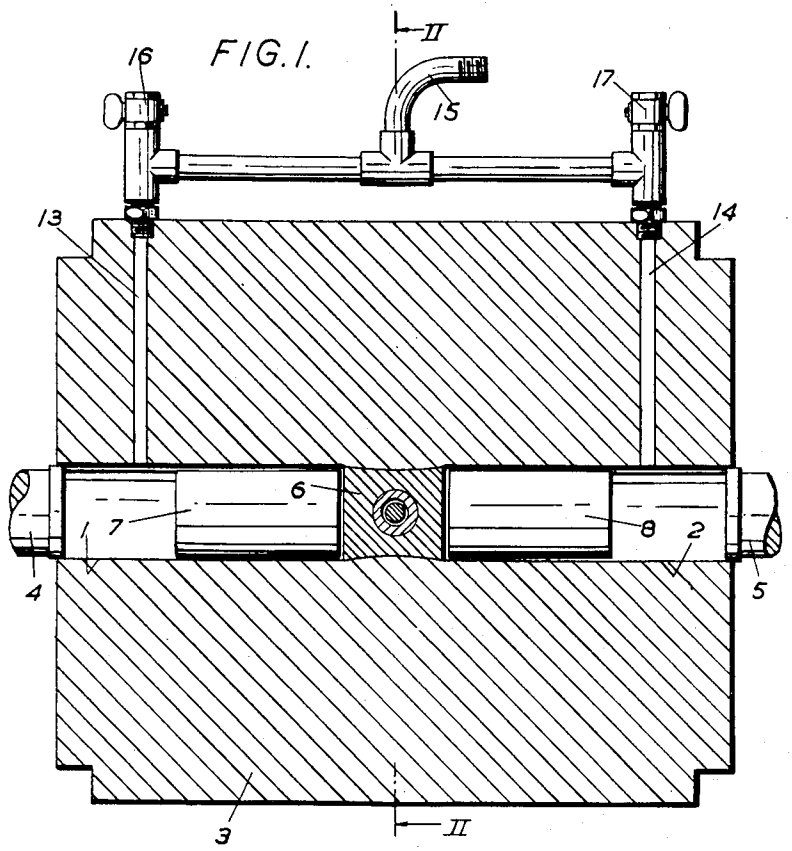
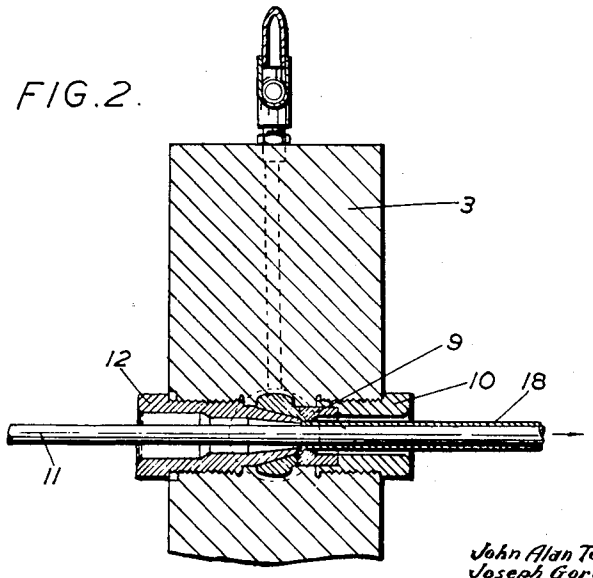


FIG. 2.



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EXTRUSION OF METALS

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4 Claims. (Cl. 207—4)

This invention relates to presses for the extrusion of metal of the kind in which a hot billet of metal is inserted in a cylinder and is forced by a ram advancing in the cylinder from one end thereof to pass, by plastic flow in front of the ram, through a shaping passage (a die or dies) to form the extruded article (hereinafter referred to as "billet presses"). The invention deals both with the extrusion of single billets and with the extrusion of a series of billets inserted and extruded in succession to form a long extruded body or series of bodies. The term "extruded in succession" means that the extrusion of the residue of a billet which remains in the press when extrusion is temporarily interrupted for reloading with a fresh billet is succeeded, as a continuous process, by the extrusion of part or all of the fresh billet.

The invention is not concerned with the shape of the bodies extruded (they may for instance be tubes or the sheaths of electric cables) and is applicable to presses for the extrusion of metals in general. It is particularly useful in presses dealing with aluminium and its alloys.

In the extrusion of single billets, there is a danger that air will be trapped between the billet and the cylinder wall. This danger arises because the billet, in order to be freely inserted, must be of a diameter less than that of the cylinder and, on being pressed forward by the ram is upset to spread to the full bore of the cylinder. In the extrusion in succession of billets the additional problem arises of ensuring complete union between the residue of the old charge left in the cylinder at the end of the stroke of the ram and the new billet which is inserted in the cylinder after the withdrawal of the ram. In both cases it is found that there is considerable risk of the production of occlusions of compressed air in the extruded metal. If this metal forms the comparatively thin wall of a tube, the body of occluded air may be in such a position and at such a pressure that it can burst the metal lying between it and the surface of the tube. In any case the presence of the occluded air is a source of weakness to the extruded body.

The improved press is provided with a passage opening into the cylinder connected to means for producing a vacuum. This passage may open into the cylinder in the region occupied by the billet or, when the press is only to be used for the extrusion of billets in succession, in the region between the end of the cylinder and the outer end of the billet. When the extrusion die is blocked by the residue of the previous billet, immediately the ram enters the cylinder evacuation of air commences. When the die is open, however, it may not be possible to evacuate the space between the new billet and the cylinder until extrusion has commenced, since the front end of the billet may not make an air tight joint with the cylinder. Under these circumstances it is essential that the passage should enter the cylinder in the region occupied by the billet.

Wherever the passage is located it is liable to receive

small quantities of metal into its end. The passage is preferably so designed that a rod can be pushed through it in order to clear it and prevent accumulation. A prodding rod can be permanently located in the outer part of the passage and automatic means operated by external mechanism provided for operating it.

The vacuum passage is formed in the wall of the cylinder, preferably in a straight line about at right angles to the inner surface of the wall of the cylinder. It is found that a comparatively small hole will suffice to effect good evacuation.

A horizontally opposed double-acting billet press for extruding cable sheaths in accordance with the invention will hereinafter be described with reference to the accompanying drawings in which Figure 1 is an elevation in cross-section, in the direction in which the cable sheath is extruded, and Figure 2 is an elevation in cross-section on the line II—II in Figure 1.

The press cylinders are two co-axial cylindrical bores **1** and **2** in a metal block **3**. Extrusion of the cable sheath is in a direction at right-angles to the axes of the cylinders **1** and **2** and is effected by the simultaneous movement of the two rams **4** and **5** towards each other by hydraulic or other means. In the drawings, the extrusion chamber is occupied by the residue **6** of a charge and new billets **7** and **8** have been inserted in the cylinders **1** and **2** in contact with the residue **6**.

Referring to Figure 2, the extrusion die **9** is held in position in the block **3** by a die block **10**. A cable core **11** which is being sheathed passes, during extrusion, in a direction from left to right through a hollow mandel **12**, also mounted in the block **3**, and is formed with a sheath **18**.

From Figure 1 it will be seen that immediately the rams **4** and **5** enter the cylinders **1** and **2** they effect substantial enclosure of the spaces between their leading surfaces and the surfaces of the residue **6**. These spaces are partly filled by the billets **7** and **8** but since the billets cannot fit tightly into the cylinders there are gaps in which air might be occluded between the cylindrical surfaces of the billets and the cylinder walls. Gaps may also exist between the inner faces of the billets and the faces of the residue **6**.

Two bores **13** and **14** opening into cylinders **1** and **2** are drilled through the block **3**. These bores are connected through a pipe **15** to a vacuum pump (not shown).

During the extrusion process a film of metal may be formed on the inner surfaces of the cylinders by metal escaping backwards past the rams. Since this film may obstruct the passages **13** and **14**, provision is made to enable them to be cleared, comprising stop cocks **16** and **17** through which a rod may be inserted.

The vacuum pump connected to the pipe **15** is started as the rams **4** and **5** approach the cylinders **1** and **2** and thus, immediately the rams enter the cylinders, evacuation of the air spaces in the cylinders will be commenced. The vacuum is maintained by the pump until the rams **4** and **5** have advanced past the passages **13** and **14**, that is until the rams are about to make contact with the billets **7** and **8** and commence the extrusion operation. The residue **6** is first extruded and the extrusion of the billets **7** and **8** then proceeds.

What we claim as our invention is:

1. A billet press for extruding metal from a succession of billets comprising at least one cylinder open at one end to receive a ram and leading at its other end to an extrusion orifice, a ram, means for forcing said ram into said cylinder, a straight passage extending through the wall of said cylinder opening into said cylinder through an orifice of small diameter near the region occupied by the end of a new billet adjacent the ram head when the new

billet is in position in contact with the residue of the old charge, and adapted to receive means for clearing the passage, and means connected to said passage for producing a vacuum.

2. A billet press for extruding metal from a succession of billets comprising at least one cylinder open at one end to receive a ram and leading at its other end to an extrusion orifice, a ram, means for forcing said ram into said cylinder, a straight passage extending through the wall of said cylinder opening into said cylinder through an orifice of small diameter between said open end and the region occupied by the end of a new billet adjacent the ram head when the new billet is in position in contact with the residue of the old charge, and adapted to receive means for clearing the passage, and means connected to said passage for producing a vacuum.

3. A billet press for extruding metal comprising at least one cylinder open at one end to receive a ram and leading at its other end to an extrusion orifice, a ram, means for forcing said ram into said cylinder and for separating said ram and said cylinder by a distance sufficient to enable a solid metal billet to be inserted into the open end of said cylinder, a straight passage opening into said cylinder through an orifice of small diameter and extending through the wall thereof spaced from the extrusion orifice a distance substantially equal to the length

of said billet, means communicating with the passage normally sealing said passage from the atmosphere adapted to receive means for clearing the passage and means connected to said passage for producing a vacuum.

4. A billet press for extruding metal from a succession of billets comprising at least one cylinder open at one end to receive a ram and leading at its other end to an extrusion orifice, a ram for forcing said ram into said cylinder, and for separating said ram and said cylinder by a distance sufficient to enable a solid metal billet to be inserted into the open end of said cylinder, a straight passage extending through the wall of said cylinder opening into said cylinder through an orifice of small diameter near the open end thereof, means communicating with the passage, means sealing the communicating means from the atmosphere movable therein to clear the passage, and means connected to said passage for producing a vacuum.

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