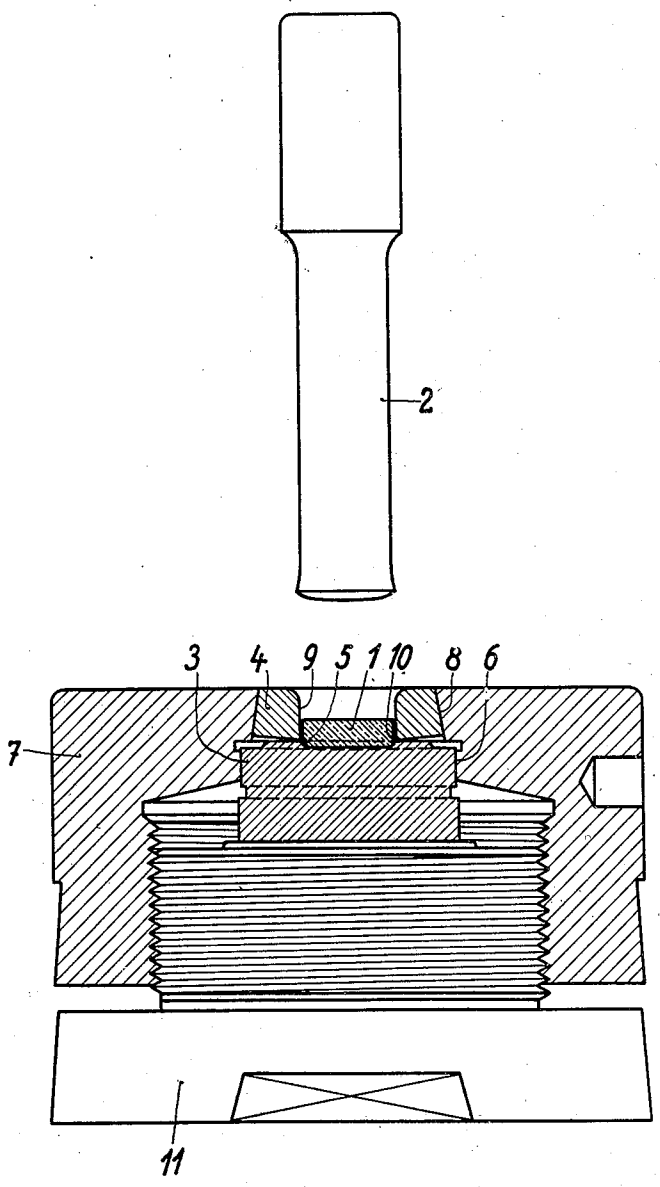
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MATRIX FOR EXTRUDING METALS

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MATRIX FOR EXTRUDING METALS

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For the warm or cold extrusion of tubular articles, such as shells or cups, one-part matrices are employed, into which a blank is inserted, which is shaped into the tubular article by means of a plunger. Since exceedingly high shaping forces are necessary for this purpose, the implements, particularly the matrix, are of course also exposed to very heavy stresses. The radial shearing forces occurring in extrusion are so great that matrices made in one piece, after being used only a comparatively small number of times, break in the neighbourhood of the transition from the horizontal bottom surface upon which the blank lies to the vertical peripheral surface along which the metal squirts up, and therefore soon become useless.

This serious disadvantage is obviated according to the present invention by dividing the matrix in the plane in which the greatest radial forces occur. The matrix therefore consists according to the invention of an under matrix member, which may be provided with a shallow recess to receive the blank, and a ring, separate therefrom, to receive the radial forces, which occur as tensile stresses. Both the under part of the matrix and the ring are held firmly in their positions by a clamping block.

One example of construction of the invention is illustrated in the accompanying drawing in elevation, partly in section.

The implement consists essentially of a matrix for the reception of the blank 1 and of the associated mandrel 2. The matrix consists of an under part 3 and a ring 4 separate therefrom. The under part 3 has a shallow recess 5 for the reception of the blank 1, and is guided in a cylindrical bore 6 in a clamping block 7. In a slightly conical bore 8 in this block 7 is inserted the ring 4, the internal peripheral surface 9 of which fits accurately to the annular edge 10 of the recess 5. The ring 4 is preferably only in close contact with the under part 3 around the lower edge of its inner peripheral surface 9, this edge resting upon the margin of the recess 5. By screwing the clamping block 7 on to a base 11, the under part 3 of the matrix is pressed upwards, and in its turn transmits the pressure to the ring 4, which is thereby pressed firmly into the conical bore 8. By screwing in the base 11, therefore, the two parts 3 and 4 of the matrix are held fast in the clamping block 7 in an axial direction. Since, however, the ring 4 is not rigidly connected with the under part 3, it has freedom of movement in radial directions within the limits of elasticity. Now if during the shaping of the blank 1 radial forces of greater or less magnitude, according to the nature of the material to be upwardly extruded, are produced by the plunger 2, these forces act upon the ring 4, which alone receives them. There is therefore in a radial direction some possibility of movement of the ring 4 in relation to the under member 3, though this movement can only be very small. In other words, the radial forces converted into tensile stresses will bring about a change in the shape of the ring, but cannot adversely affect the under part 3, since the shearing forces that occur in the case of matrices made in one piece can no longer arise at all owing to the separation of the ring from the under part of the matrix. It will be understood that when the conical insertion 4 is very strongly forced into its bore 8 by the great pressure of the large screw 11, with the interposition of the under part 3 of the matrix, compressive stresses are produced in the ring and by the external radial forces, so a certain initial stress is given to the ring. In extrusion or squirting, however, the radial forces acting from the inside are converted into tensile stresses. Part of the tensile stresses arising is therefore taken up and compensated by the compressive stresses already existing in the ring, while the other part of the tensile stresses is taken up by the ring without compensating internal forces. By the partial compensation of the internal stresses the power of the insertion ring to resist tensile stresses is considerably increased, so that the formation of cracks in the internal surface is obviated. The tests so far made confirm the correctness of the opinion concerning these stress relationships. The two-part matrix constructed according to this invention is particularly suitable for the cold extruding

of metals such as zinc and aluminium, which require particularly large shaping forces. As experiments have shown, the life of the matrix according to this invention is considerably longer than that of known matrices.

The division of the matrix into two parts has the advantage that only the ring, which has to stand the highest stresses, need be made of high-grade steel.

What I claim is:—

1. A matrix for the backward extrusion of metals, consisting of an under part for the reception of a metal blank, a ring, separate from the underpart, and adapted to be superposed thereon and to surround the blank, a clamping block formed with a cylindrical bore adapted to receive the under part of the matrix and with a conical bore adapted to receive the ring, and a base adapted to be screwed into the clamping block, and, when so screwed in, to force the under part of the matrix against the bottom of the ring and thereby to force the ring into its conical bore.

2. A matrix for the backward extrusion of metals, consisting of an under part formed with a shallow recess in its top surface for the reception of a metal blank, a ring, separate from the underpart, and adapted to be superposed thereon with the lower edge of its internal periphery registering with the outer edge of the recess in the under part of the matrix, a clamping block formed with a cylindrical bore adapted to receive the under part of the matrix and with a conical bore adapted to receive the ring, and a base adapted to be screwed into the clamping block, and, when so screwed in, to force the under part of the matrix against the bottom of the ring and thereby to force the ring into its conical bore.

3. A matrix for the backward extrusion of metals over a co-operating plunger, consisting of an under part for the reception of a metal blank, a ring, separate from the under part, and adapted to be superposed thereon and to surround the blank, this ring only being in close contact with the under part around the lower edge of its inner peripheral surface, a clamping block formed with a cylindrical bore adapted to receive the under part of the matrix and with a conical bore adapted to receive the ring, and a base adapted to be screwed into the clamping block, and, when so screwed in, to force the under part of the matrix against the bottom of the ring and thereby to force the ring into its conical bore.

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