As can be seen from the tables, billets of fine powders of the sixth and seventh batches were sintered for 2-3 h to a density of 9.5 g/cm³ and above. Billets of the first two batches had insufficient density even after 6 h sintering. With the same time of sintering the density of the billets increases uniformly with increase in the sum of the last two fine fractions in the powders.

Rolling of Sintered Billets into Strip

The obtained billets were rolled in a two-high mill without preliminary drop forging. The rolls were cast iron with a chilled surface, barrel diameter 300 mm, length 220 mm. The billets were heated in a hydrogen muffle furnace to temperatures of 1100-1200°C. The reduction in one pass was 10-15%. Rolling was carried out in one and two directions. During rolling in two directions at first 1-3 passes were made along the length until the required dimension was obtained; the billet was then rotated through \( \pi/2 \) rad and rolled across the width to a sheet thickness of 1.5-3.5 mm.

After hot rolling the plates were etched in fused potassium nitrate, the surface defects were cleaned with an emery stone. Further finish rolling was conducted with a two-high mill with steel rolls having a diameter of 220 mm and barrel length 300 mm. Before rolling in this mill, the plates were heated to 300-400°C in a muffle furnace in an air medium. After rolling the strips were sent for laying out and the cutting of the edges.

The finished strip was used to prepare components of various configurations by cutting out and stamping. There was no flaking, cracks or tearing in the strip.

Conclusions

A method has been developed and introduced into production for the preparation of molybdenum powders and the sintering of plates from them suitable for rolling without the use of high-temperature welding in a welding apparatus. The method has been used to produce molybdenum sheets in squares from 100 x 100 to 180 x 180 and thickness from 1 to 3 mm in amounts of 5-6 t per year.

LITERATURE CITED

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AUTOMATIC FOUR-CAVITY DIE-CASTING MOLD

FOR PRESSING SMOOTH BUSHES

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At the present time there are no specialized presses for pressing cermet bushes. Hydraulic presses used in the production of plastics are used for this purpose. However, these presses have a number of faults: they have a slow working stroke and very small ejection force (10-12% of the pressing force).

In order to obtain the maximum productivity it is essential to use automatic press conditions. This can only be done using automatic die-casting molds. Naturally a number of cermet departments and sections need them, especially in die-casting molds for the pressing of such mass-production components as smooth bushes.
The ejection of the components cannot be achieved by the ejector of the press due to the insufficient ejection force. Usually in designs of automatic die-casting molds for this purpose the return stroke of the upper plunger is used, the force of which is sufficient to eject the pressed component. Such a die-casting mold was described in [1]. However, the required idle stroke of the upper plunger is increased by the height of the powder layer in the cavity of the die-casting mold. Since a part of the stroke of the press is used to return the lower punch to the initial position after the component has been pressed out, it is necessary to increase the open height of the press since the former design did not make it possible to press components with a considerable height along the axis of application of the pressure. Furthermore, the use of the design in [1] reduces the productivity of the press, which is also low.

![Diagram of die-casting mold](image1)

Bearing this in mind the problem was to design a die-casting mold which did not have these faults and made it possible to increase the press productivity.

A die-casting mold, the diagram of which is shown in Fig. 1, was designed from a calculation for a bush with external diameter 28, internal diameter 20 and height 25 mm of iron powder with 3% graphite and porosity of the bush 15%. For such a bush the height of the powder layer in the cavity of the dye (height of pouring) is 112 mm. For a given design of die-casting mold it is necessary to have a certain open height of the press. This is given by the PV-474 press with a force of $10^6$ N; we chose this press.

The force of the PV-474 is sufficient for pressing four bushes simultaneously; the die-casting mold was therefore designed with four cavities. The die block with pressed dies is sectional, enabling the die-casting mold to be rapidly readjusted to a bush of different dimensions. For ejection, use is made of the return stroke of the press, but in such a way that the required stroke is less than half that in the previous designs.

**Design of Die-Casting Mold**

The sectional die block 18 with four pressed dies 19 is fastened to the cage of the housing 17 (Fig. 1). The latter is suspended on springs 10 from two columns 9. The lowering of the dies, determining the stroke of the lower pressing is controlled by a thrust nut 23. The lower punches 20 were fastened in the traverse 22; in the lower position this rests on the nut 24 controlling the depth of the working cavity of the dies (height of pouring).

The rods 21, forming the internal surface of the bushes, pass through the traverse 22 and are fastened on the hinges to the main support 25. The ball supports reduce the stress in the base of the rods. The support 25 is pressed