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COOLING DEVICE FOR CONTINUOUS CASTING MOLDS

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Fig. 1

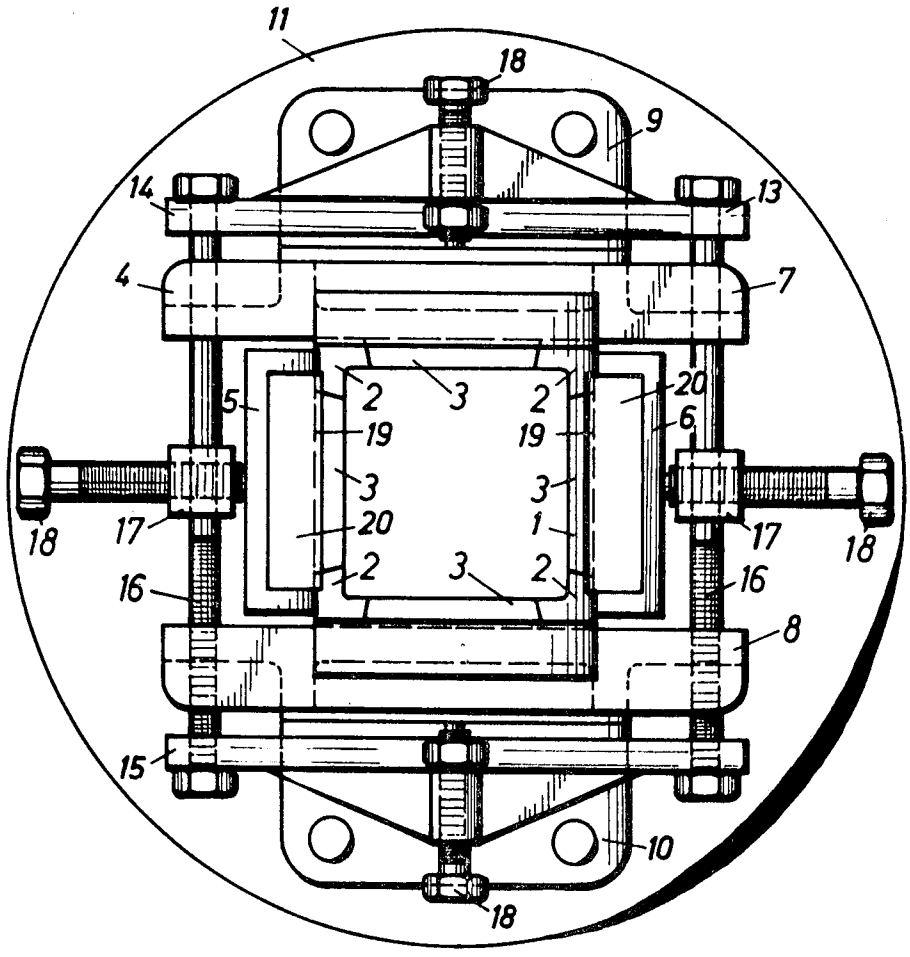

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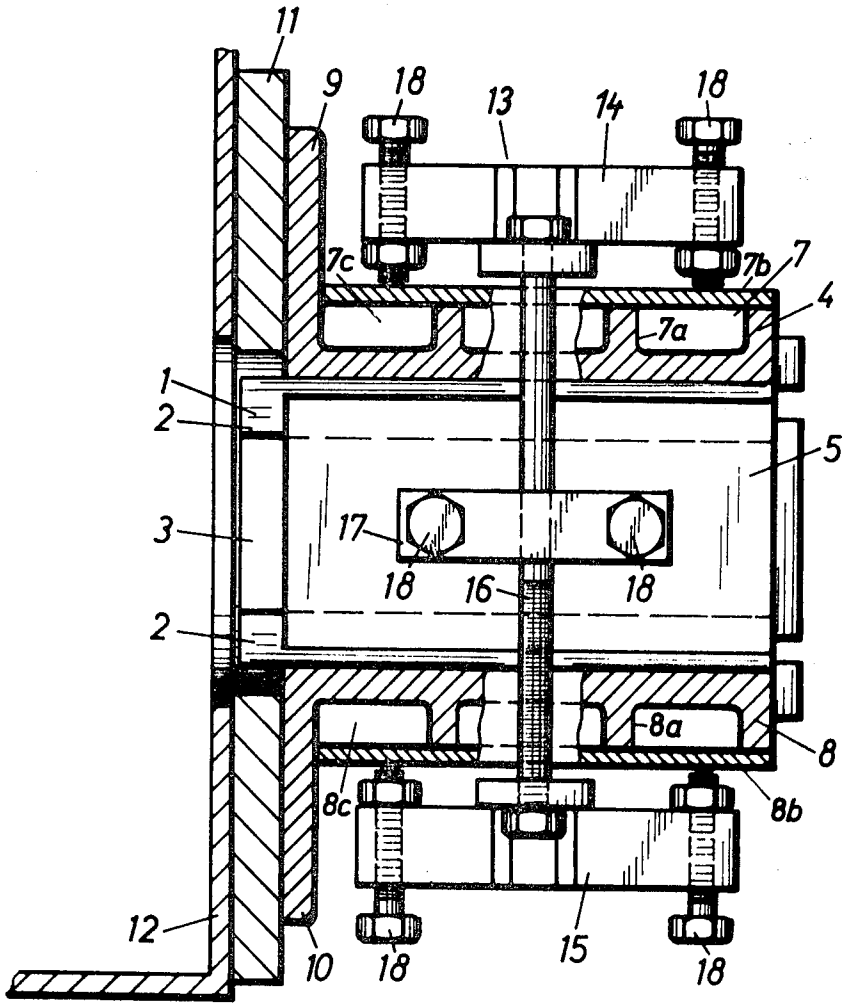
Fig. 2



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COOLING DEVICE FOR CONTINUOUS CASTING MOLDS

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Int. Cl. B22d 11/12
U.S. Cl. 164—283 2 Claims

ABSTRACT OF THE DISCLOSURE

The disclosure relates to a device for cooling molds for the continuous casting of bars, strips and sections with edges. The mold is elongated and made up of elongated mold parts abutting each other, such as for a rectangular mold corner members and mid-sections therebetween. Two opposite sides of the mold have cooling plates abutting the outside of the mold parts. These plates have spaced ribs extending outward therefrom and a closure plate rests upon the ribs so that coolant channelways are formed. Strap members having adjusting screws right against the outside of these closure plates and tension rods secure the opposite strap members against the outside of the closure plates and force the opposite cooling plates into close abutting contact with the outside of the adjacent mold members. The other opposite two outsides of the mold members each have an elongated U-shaped plate member with its legs resting against the outside of the adjacent opposite mold members. A sleeve is received on each tension rod adjacent the outside of the U-shaped cooling plates and a screw is threadedly received in a threaded aperture in each sleeve and presses against the outside of the bight portion of the U-shaped coolant plate to urge the legs thereof into engagement with the adjacent mold members. The elongated space formed between the U-shaped member and the outside of the adjacent mold member serves as a passageway for coolant. The first two mentioned cooling plates have in line transverse flanges that serve as mounting means for mounting the assembly onto an intermediate plate attached to the furnace at its discharge opening. The intermediate plate has an aperture therein in alignment with the adjacent open end of the mold assembly.

BACKGROUND OF THE INVENTION

As is well-known in the continuous casting process, the molten metal in the mold is cooled by a cooling device, surrounding it. While passing through the mold the molten metal solidifies by the effect of the cooling device. Furthermore, it is well-known to use for the cooling device a single cooler which is provided with a flange to mount it to the furnace.

Such coolers, however, have to be machined very exactly on the internal faces so that a good heat transfer is guaranteed. The usually used material steel when used tends to distortion owing to the thermal effect so that these coolers have to be refinished after a short time of operation or scrapped respectively. Coolers made of other material which is not so susceptible to distortions bring about considerable rises in price for the cooling device owing to the material costs. Another disadvantage is the rigid inner cooler opening. This and the surface of the mold have to be machined very precisely so that they fit tightly. A refinishing of the joint faces of already used molds and the use of these molds is no longer possible without many difficulties. Therefore, the suggestion has already been

made to design the cooling device of several parts and to screw the individual parts to each other. Such coolers are held by the mold itself. When using thin-walled molds the danger exists, however, that the sensible mold material breaks owing to the weight of the cooling device.

SUMMARY OF THE INVENTION

It is an object of the invention to create a cooling device which avoids these disadvantages.

The problem is solved by providing a cooling device that consists in an actually known way of at least two individual cooling plates of which at least one is provided with a flange. The cooling plates provided with a flange are mounted as by screws to a second flange (intermediate flange) and then this is mounted directly to the holding furnace. The cooling plates of the cooling device which are not provided with a flange are pressed in an actually known way against the mold together with the other cooling plates. According to the invention this is done by means of a tightening cross the essential character of which is that the individual cooling plates are not pressed laterally but in the middle of the longitudinal shaft against the mold. Owing to this a one sided distortion of the cooling plates is avoided when they are pressed on.

The face of the cooling plate resting against the mold is plane and easily accessible for refinishing so that it can be easily subjected to surface grinding after being disassembled.

The over-all dimensions of the mold can be changed within certain limits without having to acquire new coolers because the cooling plates can be moved on the intermediate flange and this is also permitted by the tightening cross. Owing to its simple design the cooling plate can be manufactured of a cheap material with little danger of distortion.

The cooling device is mounted to the furnace and carries the graphite mold which has only a low stability. Owing to this a higher mechanical load of the continuous casting form is guaranteed as against the solutions known so far.

BRIEF DESCRIPTION OF THE DRAWINGS

An embodiment of the invention is hereinafter described by way of example with reference to the accompanying drawings but it is clearly to be understood that the invention is by no means restricted to the details of this embodiment.

FIG. 1 shows the mold and its cooler as seen looking into the discharge end of the mold end,

FIG. 2 is a lateral view of the cooler partly in section.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The mold **1** consists of four corner members **2** and four mid-sections or intermediate members **3** abutting the corner members. These are held together by the forces transferred by the cooler **4** consisting mainly of four parts, the two lateral coolers **5** and **6** and the upper cooler **7** and the lower **8**. The upper cooler **7** has a flange **9**, the lower cooler **8** has a flange **10**. The flanges **9** and **10** are secured as by screws (not shown) to the intermediate flange **11** which consists of a flat plate. They can be adjustably positioned on it within certain limits. The intermediate flange is secured to the holding furnace by known means. The upper and lower coolers **7** have outwardly extending spaced apart ribs **7***a* and **8***a* and over these ribs are received cover plates **7***b* and **8***b*. The void spaces **7***c* and **8***c* formed therein are coolant passages. Each individual part **5** to **8** of the cooler **4** has connections for the cooling water inlet and outlet connections. Cooler **4** is held together by tightening cross **13**. This consists of the straps **14** and **15** which are pulled toward each other by the tension rods **16**. The

straps **14** and **15** have screws mounted therein that tighten against the cover plates **7***b* and **8***b*. On the tension rods **16** there received sleeves **17** having threaded apertures extending transverse to the tension rods. By means of the screw **18** received in these threaded apertures the four parts of cooler **4** are pressed against mold **1** so that its individual parts **2** and **3** are closing tightly at the joints. The joints **19** between mold **1** and cooler **4** are also watertight and cannot lose the water flowing through the inner chambers **20** of cooler **4**.

What is claimed is:

1. A cooling device for attachment to a holding furnace having an elongated mold for the continuous casting of bars, strips and sections with edges, an intermediate flange attached to said furnace and having an aperture therethrough, through which extends said mold, said cooling device having at least two individual cooling plates arranged around the circumference of the mold, at least one of said cooling plates having a flange thereon extending transversely to the rest of the plate and being shiftably connected to said intermediate flange.

2. A cooling device according to claim **1** having a tightening cross means for each of said two individual cooling

plates, means holding the tightening cross means about said mold, each of said tightening cross means having pressure means applying pressure to the respective plates at a middle point of the plate.

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