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CASTING OF METALS

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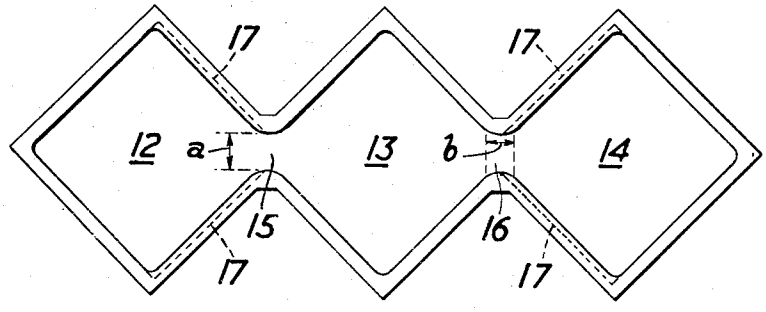

INVENTORS
James Storrs Morton
John Savage

BY E A Mosley
AGENT

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CASTING OF METALS

James Storrs Morton, Ockham, Ripby, and John Savage, Kenton, Harrow, England, assignors to The British Iron and Steel Research Association, London, England

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This invention relates to the continuous casting of metals, and in particular to ferrous metals. The metal is cast from a ladle or other container into an open-ended mould from which the metal emerges as an ingot.

In multiple strand casting, a number of moulds are used and the metal is distributed to the moulds from a ladle by tundishes. The rate at which metal is poured into each mould must be expertly controlled to balance the withdrawal rate of the cast ingot and to prevent freezing in the tundish nozzle. Accordingly, at least one operator or team of operators is required for each mould. Furthermore each of the moulds requires to have its own ancillary equipment such as starting bars, ingot guide rollers, cooling sprays, withdrawal rollers and ingot cutting torches or saws.

This duplication of personnel and equipment is avoided in accordance with the present invention by having a single mould which is designed to cast two or more ingots at a time. A continuous casting mould according to the invention may thus comprise two or more tubular mould sections each of which is in communication longitudinally with another section. Metal may then be poured into one of the sections and the metal then passes into the other sections so that a number of integral ingots are cast together. After casting the ingots are separated from one another by use of a flame cutter, saw or rolling mill.

The invention will be more readily understood by way of example from the following description of one form of mould in accordance therewith, reference being made to the accompanying drawing which shows the mould schematically in plan view.

The multiple mould shown in the drawing comprises three separate mould sections **12, 13, 14** the central section **13** being connected to the outer mould sections **12, 14** by continuous channels **15, 16** merging into the sections. Liquid metal is poured preferably into the central sections **13** so that all three mould sections may be supplied with liquid metal through the channels **15, 16** provided. These channels are sufficiently narrow to permit easy cutting between the cast ingots formed in the sections by means such as a flame cutter, saw or rolling mill, but are not so narrow as to prevent flow of the liquid metal from the central section into the outer sections. In practice a channel width *a* of from ¼ to ½ inch has been found to be satisfactory but other widths may be employed. The length *b* of the channels as illustrated is also maintained as short as possible and may be between ¼ to ¾ inch long, for example. The junctions of the three sections are rounded as illustrated since sharp angles may cause stresses to be created sufficient to cause fracture of the newly formed ingot skin.

The metal which solidifies within the channels **15, 16** preferably forms part of the ingots after separation, the cutting operation being performed to reduce to a minimum the amount of metal not usefully employed.

The outer mould sections **12, 14** are preferably provided with slight tapers **17** on the two faces of each section adjacent to the channel, these faces diverging downwardly from the outer sides of the sections **12, 14.** These tapers are for the purpose of reducing friction between the outer ingots and the mould wall caused by contraction of the castings as the outer ingots are pulled towards the central ingot. The amount of taper provided depends on the metal being cast, the size and shape of the ingot section and on the casting velocity.

It is to be understood that the mould may be designed for the multiple casting of round, rectangular, oval and rhomboidal sections. Further, while the multiple mould illustrated is for casting three ingots, similar moulds may be provided having two or more than three sections.

It is of course understood that the outer surface of the mould shown in the drawing is cooled by suitable means such as water, the methods for which are well-known in the art. It is also to be understood that the inner surface of the mould may be lubricated by means also well-known in the art. Further, the mould may be stationary during casting or movable either by a reciprocating motion or by suitable flexible mounting according to methods which have been described in the literature of continuous casting.

We claim:

1. A continuous casting mold comprising walls defining a plurality of substantially upright open ended tubular mold sections having substantially similar horizontal cross-sectional dimensions and shapes, means positioning said mold sections in adjacent side-by-side relationship, walls defining channel means for interconnecting the cavities of said adjacent casting mold sections throughout the lengths thereof, and at least one of said mold sections having the inner faces of the wall portions thereof adjacent to and facing away from an adjacent mold section diverging longitudinally downwardly throughout its length away from the longitudinal axis of said one mold section to compensate for cast metal shrinkage whereby binding of the interconnected casting formed therein and in passing through the mold sections is avoided.

2. A continuous casting mold comprising walls defining a plurality of substantially upright open ended tubular mold sections, means positioning said mold sections in adjacent side-by-side relationship, walls defining channel means for interconnecting the cavities of said adjacent casting mold sections throughout the lengths thereof, the walls of one of said mold sections being substantially parallel throughout its length, and at least one of the other of said mold sections having the inner faces of the wall portions thereof adjacent to and facing away from said one of said adjacent mold sections diverging longitudinally downwardly throughout its length away from the longitudinal axis of said other mold section to compensate for cast metal shrinkage whereby binding of the interconnected casting formed therein and in passing through the mold sections is avoided.

3. A continuous casting mold comprising walls defining three substantially upright open ended tubular mold sections, means positioning said mold sections in adjacent side-by-side and in line relationship, walls defining channel means for interconnecting the cavities of said adjacent casting mold sections throughout the lengths thereof, and the mold sections on opposite sides of centrally positioned mold sections each having the inner faces of the wall portions thereof adjacent to and facing away from said centrally positioned mold section diverging longitudinally downwardly throughout its length away from its longitudinal axis to compensate for cast metal shrinkage whereby binding of the interconnected

casting formed therein and in passing through the mold sections is avoided.

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