ABSTRACT: A mold joggler for use while continuously casting metal, the joggler comprising a mold support pivotally supported at one end and retaining the continuous casting mold intermediate its ends. A device for oscillating the mold support, which device comprises at least one link mechanism pivotally connected to the other end of the mold support. A shaft having a first eccentric mounted on it for actuating the link mechanism and drive means for rotating this eccentric to thereby oscillate the mold support. An additional eccentric mounted within the first mentioned eccentric and capable of being moved relative thereto to vary the total eccentricity imparted to the mold support.
MOLD JOGGLER FOR CONTINUOUS CASTING

The present invention relates to plants for continuous casting of metal, and more particularly to devices for oscillating or jogging a mold employed in these plants.

Devices are known for oscillating a mold comprising a crank mechanism which sets the mold support into motion, and an eccentric cooperating with said crank mechanism, said eccentric being kinematically connected to an electric motor (see the book written by Boitchenko, M.S., entitled "Continuous Casting of Steel," pp. 132–135, Moscow, 1961).

A main disadvantage of the known devices consist in the fact that they do not alter the amplitude of oscillation of the mold during the operation of the plant with the speed of casting varying, which affects the quality of ingots being cast.

An object of the present invention is to provide a device allowing the value of the amplitude of oscillation of the mold to be varied during the plant operation with the speed of casting varying, too.

An important object of the present invention is to provide a device permitting the selection of optimum conditions of oscillation of the mold with the speed of casting varying.

A further object of the present invention is to provide a device improving the quality of ingots being cast.

These and other objects are accomplished by the present invention due to the fact that in the device for oscillating the mold, made as a crank mechanism connected via an eccentric to a drive there is provided at least one additional eccentric mounted in the first eccentric in such a manner as to be capable of rotating relative thereto with a view to varying the eccentricity.

For rotating said additional eccentric relative to the first one it is expedient to provide a separate drive, which may comprise a differential gear.

For a better understanding of the invention, and to show how the same may be carried into effect, made by way of example, to a preferred embodiment thereof, taken in conjunction with the accompanying drawings, in which:

FIGURE 1 is a general view of the device according to the present invention; and
FIGURE 2 is a top diagrammatic view of the device.

The device for oscillating the mold comprises a movable link 1 (FIGURE 1), setting in motion a support 2. The mold 3 is mounted on the support 2 which, as shown, comprises two arms 19 of the frame. An eccentric 4 engages said link 1 and is driven by an electric motor 5 (FIGURE 2); an additional eccentric 6 is mounted within the first eccentric 4, and an additional electric motor 7 (FIGURE 1), is connected to the eccentric 6 via a differential gear housing 8 (FIGURE 2).

The eccentric 6 is mounted in the eccentric 4 in such a manner as to be capable of rotating relative to eccentric 4 with the aid of the electric motor 7, which results in varying the total eccentricity and so varies the amplitude of oscillation of the support 2 of the mold 3.

The electric motor 7 is started to operate whenever it is necessary to vary the value of the amplitude of oscillation of the mold 3; thus, the electric motor 7 may be started during the process of casting metal.

The kinematic connection of the eccentric 4 with the electric motor 5 may be carried into effect by gears 10 rigidly secured on a shaft 9, and gears 11 engaged with gears 10, said gears 11 carrying guiding members 12 connected to the eccentric 4.

With the electric motor 7 being stopped the guiding members 12 also act to prevent the eccentrics 4 and 6 from rotating relative to each other during the oscillation of the mold, as will appear below.

The connection of the eccentric 6 with the electric motor 5 is effected by means of gears 13, 14, 15, 16 and 17 that are engaged with each other, of which gear 17 is rigidly secured on shaft 18 carrying the eccentric 6.

The gear ratios of the pair of gears 10 and 11, and of the gear transmission 13 - 17 are selected in such a manner that the angular speeds of rotation or angles of rotation of the eccentrics 4 and 6 are equal, which results in the value of the amplitude of oscillation of the support 2 of the mold 3 remaining constant, the amplitude of the oscillation being dependent on the relative angular adjustment between gears 11 and shaft 18.

The electric motor 7 is geared to the differential gear housing 8 and the gears 14 and 15 are moved bodily about gears 13 and 16 to adjust the angular position of shaft 18 with respect to gears 11 and guiding members 12.

The support 2 is made as a frame having arms 19, 19, one end being secured in stationary uprights 20, while the other end thereof is articulated on the link mechanism 1, which imparts an oscillating motion to frame 2 relative to the uprights 20.

The device operates as follows.

With the electric motor 5 running, driving through the gears 10-11 and 13-17, the eccentrics 4 and 6 rotate at the same angular speed. The eccentric 4 causes the arms 19 of the frame together with the mold 3 to oscillate under the influence of the link mechanism 1 relative to the stationary uprights 20.

Since the eccentrics 4 and 6 rotate at the same angular speed, the amplitude of oscillation of arms 19 of the frame remains constant.

Whenever it is necessary to vary the amplitude of oscillation of said arms 19 together with the mold 3, for example, in case of a variation in the casting speed, the electric motor 7 is started, which by rotating the differential gear housing 8 carrying gears 14, 15 and driving gears 16 and 17 varies the angular position of the eccentric 6 with respect to gear 11, members 12 and therefore of eccentric 4, which results in a variation of the eccentricity of eccentric 4 with respect to shaft 18 and, hence, in that of the value of the amplitude of oscillation of the frame 19.

Thus, the device described above permits the obtaining of any selected value of amplitude of oscillation of the mold during the process of casting metal in conformity with the casting speed.

We claim:

1. A mold jogger for use in continuous casting of metal comprising a mold support pivotably supported at one end and adapted to retain a mold intermediate the ends; a device for oscillating said mold support comprising at least one link mechanism pivotably connected to the other end of said mold support; a shaft having at least one eccentric mounted thereon for actuating said link mechanism; drive means for rotating said eccentric and thereby oscillating said mold support; at least one additional eccentric mounted within said first mentioned eccentric and capable of being moved relative thereto to vary the total eccentricity imparted to said mold support.

2. A mold jogger as claimed in Claim 1 wherein a separate drive means rotates said additional eccentric relative to said first mentioned eccentric.

3. A mold jogger as claimed in claim 2 wherein said separate drive means includes an electric motor and differential gear operably connected to rotate said additional eccentric.