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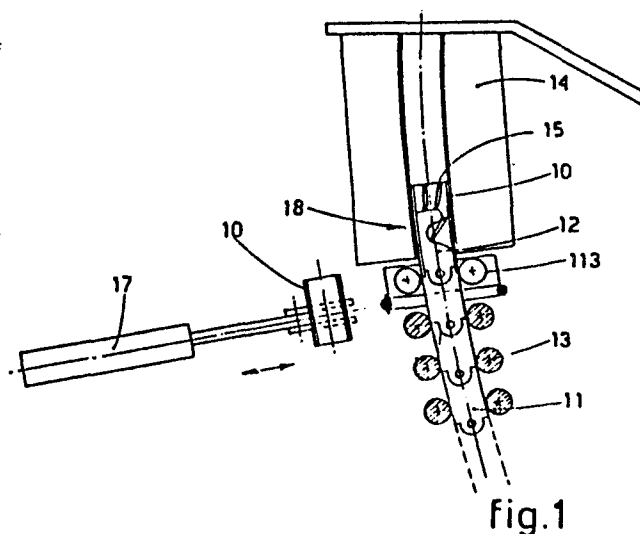
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54 Protective cover for a starter bar in continuous casting, and starter bar which employs such protective cover in continuous casting.

57 Protective cover (10) for a head (12) of a starter bar (11) in continuous casting, which cover is able to protect the inside of the passage for a billet being cooled in an ingot mould (14) during continuous casting and has a jacket-wise shape and encloses the head (12) of the starter bar (11) at least partially, being positioned between such head (12) and the inside of the passage for the billet.

Starter bar (11) for continuous casting, which cooperates with a protective cover (10) that encloses at least a head (12) of a starter bar at least partially at least when such head is inside the passage for a billet being cooled in an ingot mould (14).



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1 "PROTECTIVE COVER FOR A STARTER BAR IN CONTINUOUS CASTING, AND
2 STARTER BAR WHICH EMPLOYS SUCH PROTECTIVE COVER
3 IN CONTINUOUS CASTING"

4 *****

5 This invention concerns a protective cover for the head of
6 a starter bar in continuous casting and also concerns a
7 starter bar which employs such protective cover in continuous
8 casting.

9 To be more exact, the invention concerns an element which
10 safeguards the inside of a continuous casting ingot mould
11 during the initial step of introducing and positioning the
12 starter bar.

13 It is known that an ingot mould to cool metal in continuous
14 casting consists of an alloy very expensive as regards the
15 components of the alloy and the processes required.

16 It is also known that the inside of the ingot mould suffers
17 damage, sometimes serious damage, owing to the mechanical wear
18 caused by introduction of the heads of starter bars and also
19 by the abrasion of any chills or crystallizers which cooperate
20 with the starter bar.

21 When the head of the starter bar and the chills or
22 crystallizers penetrate within the passage of the ingot mould,
23 they cause scratches, dents, impacts and various damages,
24 which not only shorten the life of the ingot mould but also
25 deform its cross section, thus creating at least malformation



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1 of a bar issuing continuously therefrom.

2 So as to prevent these shortcomings, the present applicant
3 has designed, tested and embodied a device having the function
4 of protecting the inside of the ingot mould temporarily. Such
5 protective cover cooperates with the head of the starter bar
6 and prevents any contact, even of an accidental nature,
7 between the head of the starter bar and the inner cooling
8 channel of the ingot mould through which a billet being cooled
9 passes.

10 According to the invention, a jacket having a shape and
11 outer dimensions substantially suitable to cooperate with the
12 inner channel of the ingot mould is introduced into the lower
13 terminal portion of the ingot mould.

14 The introduction of such protective jacket may be performed
15 before insertion of the head of the starter bar or in
16 cooperation with insertion of the head of the starter bar.
17 Such protective cover or jacket then acts as a protective
18 cushion between the head of the starter bar and the inside of
19 the ingot mould, thus safeguarding the inside of the latter.

20 The protective cover or jacket may have various lengths to
21 suit the form of the crystallizer and the form and conformat-
22 ion of the removable head of the starter bar.

23 The protective cover may be made of various materials; thus
24 it may be embodied with plywood, compressed and moulded wood
25 dust, plastic foam, cellular resin or moulded resin, these
26 being some possible but non-restrictive examples, the word
27 "resin" being understood to cover any desired plastic or
28 synthetic material.

29 Moreover, the protective cover may consist of a metallic
30 material having a low or very low melting point and in this
31 case will be a non-reusable element.

32 The material forming the protective cover will
33 advantageously be suitable not to cause problems during the

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1 step of release of the head of the starter bar or else will be
2 positioned and conformed so as to cooperate with the head of
3 the starter bar and possibly to be released together with that
4 head.

5 In a preferred embodiment the protective cover will be made
6 of a material suitable to be burned or to be practically
7 destroyed during the casting step or to be rendered so fragile
8 that it can be readily eliminated during the step of
9 extraction of the head of the starter bar.

10 According to the invention the protective cover can be
11 fitted to the head of the starter bar before the latter is
12 introduced into the ingot mould, or else it can be applied to
13 the end portion of the ingot mould before introduction of the
14 starter bar thereinto. Application can be performed by hand or
15 by a robot, for instance by means of a manipulator head which
16 withdraws the protective cover from an appropriate storage
17 point.

18 The invention is therefore embodied with a protective cover
19 for a head of a starter bar in continuous casting, which cover
20 is able to protect the inside of the passage for a billet
21 being cooled in an ingot mould during continuous casting,
22 being characterized in that it has a jacket-wise shape and
23 encloses the head of the starter bar at least partially, being
24 positioned between such head and the inside of the passage for
25 the billet.

26 The invention is also embodied with a starter bar for
27 continuous casting, characterized in that it cooperates with
28 a protective cover that encloses at least a head of the
29 starter bar at least partially at least when such head is
30 inside the passage for a billet being cooled in an ingot
31 mould.

32 Let us now see an embodiment of the invention with the help
33 of the attached figures, which give a non-restrictive example

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1 and in which:-

2 Fig. 1 shows the invention applied to a starter bar having a
3 head which is released sideways;

4 Fig. 2 shows the invention applied to a starter bar having a
5 head which remains embedded at the end of the billet.

6 A starter bar 11 comprising a head 12 with release means 18
7 is able to cooperate in an ingot mould 14 having an inflow
8 channel of a required section and characteristics.

9 The release means 18 may be of various types and are shown
10 in Fig.1 as being of a type for extraction by sideways
11 displacement and recovery of the head, whereas Fig.2 shows a
12 type with lateral movement and an expendable head 12.

13 Chills 15 or 115 are included in cooperation with the head
14 12 of the starter bar 11 and have the function of crystalli-
15 zers to speed up and accentuate the cooling and engagement of
16 the end of a billet being cast in the ingot mould 14.

17 The head 12 of the starter bar 11, the starter bar 11
18 itself and the crystallizer chills 15 of Fig.1 are of a known
19 type and may be of any desired type, this being unimportant
20 for the purpose of the invention.

21 In Fig.1 the chills 15 consist of simple crop ends of round
22 metallic bars, as commonly employed in the art.

23 Instead, Fig.2 shows a spiral type of chill or crystallizer
24 115. According to the invention this type of embodiment
25 prevents contact between the chill 115 and the wall 14 of the
26 ingot mould; it therefore enables a shorter protective cover
27 10 to be used since such cover does not need to reach the zone
28 of the chill 115. Pollution of the cast billet by residues of
29 the carbonised protective cover 10 or of gases caused by
30 combustion of the cover is thus avoided.

31 A protective cover or jacket 10 is provided to cooperate
32 with the head 12 of the starter bar 11 and is suitable to
33 cooperate with the inside of the ingot mould 14, thus

1 preventing the head 12 of the starter bar 11 and the starter
2 bar 11 itself from knocking or damaging the inside of the
3 discharge channel of the ingot mould 14.

4 The protective cover 10 can be applied to the lower part of
5 the ingot mould 14 before the head 12 of the starter bar 11 is
6 introduced thereinto or else can be fitted to the head 12 of
7 the starter bar 11 before the head 12 is introduced into the
8 ingot mould 14.

9 The protective cover 10 can be applied by hand or by a
10 manipulator 17 which takes the cover 10 from an appropriate
11 storage point and positions it.

12 If a manipulator 17 is provided, rolls 113 at the end of
13 the starter bar will be capable of being opened apart so as to
14 enable the protective cover 10 to be positioned.

15 Guide rolls 13 may possibly be spaced apart in such a way
16 as to enable the manipulator 17 to operate without contacting
17 the rolls.

18 The length of the protective cover 10 will vary to suit the
19 conformation of the head 12 of the starter bar 11 and the
20 inner conformation of the ingot mould 14.

21 Moreover, the protective cover 10 may consist of plywood,
22 compressed and/or moulded wood chips, wood chips plus a
23 filler, glass-reinforced polyester resin, plastic foam or
24 moulded resin, the name "resin" comprising any known type of
25 plastic or synthetic material.

26 The protective cover 10 may also be made of any material,
27 even a metallic material, having a low melting point provided
28 that it is soft, so that it will be destroyed at the time of
29 the casting or will be embedded on the end portion of the
30 billet.

31 The protective cover 10 will be positioned and conformed
32 advantageously in such a way that it will not hinder the
33 releasing of the head 12 of the starter bar 11 at the time

- 1 when the starter bar is detached from the billet.

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CLAIMS

1 - Protective cover (10) for a head (12) of a starter bar (11) in continuous casting, which cover is able to protect the inside of the passage for a billet being cooled in an ingot mould (14) during continuous casting, being characterized in that it has a jacket-wise shape and encloses the head (12) of the starter bar (11) at least partially, being positioned between such head (12) and the inside of the passage for the billet.

2 - Protective cover (10) as claimed in Claim 1, which is introduced into the inside of the passage in the ingot mould (14) before the head (12) of the starter bar is inserted.

3 - Protective cover (10) as claimed in Claim 1, which is fitted to the head (12) of the starter bar before such head is inserted into the passage for the billet in the ingot mould.

4 - Protective cover (10) as claimed in any claim hereinbefore, which is applied by hand.

5 - Protective cover (10) as claimed in any of Claims 1 to 3, of which the application is mechanized (17).

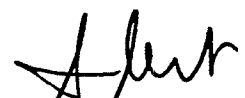
6 - Protective cover (10) as claimed in any claim hereinbefore, the rolls (113) at the end of which can be opened apart.

7 - Protective cover (10) as claimed in any claim hereinbefore, which is made of a material softer than the material of the inside of the ingot mould (14).

8 - Protective cover (10) as claimed in any claim hereinbefore, which is expendable.

9 - Protective cover (10) as claimed in any claim hereinbefore, which cooperates with a spiral-type chill (115) surrounding the head (12) of the starter bar (11) (Fig.2).

10 - Starter bar (11) for continuous casting, characterized in that it cooperates with a protective cover (10) that encloses



1 at least a head (12) of the starter bar at least partially at
2 least when such head is inside the passage for a billet being
3 cooled in an ingot mould (14).

