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54 **Improvements in height measuring devices for billet filling.**

57 A device for automatic regulation of billet mould filling in a chain layout, with a rod (11) that vertically approaches the billet moulds (1), without making contact with the liquid level and provides a signal of the approach of this level, which is transmitted to a control box. This signal can regulate the speed of the chain, the volume of filling flow for each billet mould or the approach volume of the liquid metal, etc., depending on the cases.

Description

The patent refers to billet filling, especially but not exclusively with liquid aluminium, and more specifically to control devices for the liquid level in automatic filling lines for the said billets. Obviously, the main aim of the patent is the obtaining of a uniform height of liquid metal in each one of the billet moulds, and this aim is achieved by carrying out measuring and control of the filling level of each billet mould.

The patent logically has available an installation for filling, equipped with a gear wheel connected to the billet mould line, which is mounted on a shaft which in its turn is used for the arrangement of a bucket elevator equipped with buckets. A flume has access towards the inside of the bucket elevator in such a way that the liquid metal which flows along the flume penetrates into the bucket elevator and through holes in the buckets themselves falls into the billet moulds.

In accordance with the patent, an essentially vertical metal rod is provided, which comes from an upper platform in relation to the plane or position of the area of the gear wheel and bucket elevator, in that this rod comes from a control box situated on top of the said platform. The rod is connected with its own tension device, which starts from the control box itself. A level tube surrounds the rod below the area of the tension device, and the lower end of this tube carries with it a guide for the rod through which it protrudes towards the lower area of the billet moulds.

The level tube surrounds and protects the sensor rod from the upper area below the tension device and down to the lower guide for the said rod, it has staggered holes along all its length, and it is fastened to the platform by means of a positioning assembly, which also incorporated a tension device for adjustment, all this with a view to achieving the immobility of the tube and consequently of the rod in each specific working position.

The lower end of the rod remains essentially at a certain distance from the billet mould, and obviously at a certain distance from the bottom of it, without at any time making contact with the level of liquid metal that comes from the filling flume through the bucket elevator.

The said end of the rod acts as a feeler, in such a way that once the liquid metal has reached a predetermined height in the billet mould, a signal is generated and then transmitted to a control unit. The signal in question can be of any kind, for example a spark produced between the rod and the surface of the liquid metal, a current induced between both, etc.

The said signal is transformed in the control box, so as to prepare an order which is transmitted in its turn to one of the variables that intervene in the filling.

Thus, these variable might be the speed of the chain, the speed of delivery of the liquid metal, the intake flow of the liquid metal, etc.

For instance, if the variable to be considered were the speed of the billet mould chain, and given that in the installation the angular speed of both the billet moulds and the bucket elevator are identical, a signal would be generated which would produce an alteration of the said speed to provide the resulting filling height.

If the variable were either the intake speed or the flow, the order would establish the resulting alteration to cause greater or lesser intake of liquid metal into each billet mould.

All these and other details of the patent can be appreciated in greater detail on the sheet of drawings which is attached, in which a diagram of the patent is represented by way of guidance.

Figure 1 represents an installation for billet filling.

Figure 2 is an elevation of the position of the control device, in accordance with the patent.

Figure 3 refers to a top view of the previous figure.

According to figure 1, we will first point out the existence of a chain of billet mould (1) to be filled by liquid metal which comes from the end of an intake flume (3). The liquid metal penetrated from the said flume (3) to the inside of the bucket elevator and from this, through the buckets (7), to produce the filling of the billet moulds (1). The bucket elevator (2) is mounted on a shaft (4), on which a gear wheel (5) is also situated, and the shaft is supported on bearings which rise from a support base, not numbered.

In figure 2, a platform (14)-(15) can be seen. From this platform, at the top, a support (13) is pointed out, which receives a tube (10), inside which is included a rod (11). The top part of this rod is connected to a tension device (17) and to a control box (9). The level tube (10) has "staggered" holes in it, and its bottom end (16) provides a guide area for the rod (11), whose bottom end is situated in proximity in relation to the billet moulds (1).

In the same figure 2, the position of the bucket elevator (2) can also be appreciated in relation to the billet moulds (1), with the liquid metal arriving from this bucket elevator towards the said billet moulds.

Figure 3 shows, also in diagram form, this solution for the positioning of the rod in relation to the gear wheel (5), the shaft (4) and the bucket elevator (2) itself. The level tube (10) is controlled by the support (13) on the platform (15) and a tension adjustment device (16) is also situated for the tube (10) and the rod (11).

It is important to point out, once having described the nature and advantages of this invention, the non-restrictive character of the same, inasmuch as changes in the shape, material or sizes of its constituent parts will not in any way alter its essentiality, as long as they do not mean a substantial variation in the assembly.

In the same way, the Applicant, adhering to the International Agreements about Patent Rights,

points out his right to the extension of this application to other countries, claiming priority over the same.

Claims

1.- "IMPROVEMENTS IN HEIGHT MEASURING DEVICES FOR BILLET FILLING", to control the filling of billet moulds, in particular for liquid aluminium, characterized because it has a vertical level tube (10), with staggered holes, which includes in its interior a rod (11) axially arranged with respect to the said tube, in that the bottom end of the tube incorporates a guide (16) for the downward projection of the end of the rod, with this rod end being directed vertically towards the billet moulds (1) but without direct contact with the liquid, in that the vertical tube is connected to a control box (9) and to a rod tension device (17) of the guide (16) both placed at the top, in that the vertical tube is connected with means of regulation attached to a side platform, in that a signal is produced between the end of the rod and the level of the liquid and that this signal is then transmitted to a transformer unit which generates an order to one of the variables that intervene in the filling.

2.- "IMPROVEMENTS IN HEIGHT MEASURING DEVICES FOR BILLET FILLING", in accordance with the previous claim, characterized

because the start order is transmitted to the motor that drives the gear wheel (5) and bucket elevator (2) of an installation, thus controlling the speed of the billet mould chain.

3.- "IMPROVEMENTS IN HEIGHT MEASURING DEVICES FOR BILLET FILLING", in accordance with Claim 1, characterized because the signal between the level of the liquid and the end of the rod is transformed into a regulation of the volume of liquid metal for filling the billet moulds.

4.- "IMPROVEMENTS IN HEIGHT MEASURING DEVICES FOR BILLET FILLING", in accordance with Claim 1, characterized because the signal between the level of the liquid and the end of the rod is transformed into a regulation of the entry flow of the liquid metal to be billet moulds.

5.- "IMPROVEMENTS IN HEIGHT MEASURING DEVICES FOR BILLET FILLING", in accordance with Claim 1, characterized because the signal produced between the level of the liquid metal in the billet mould and the end of the rod, is a spark.

6.- "IMPROVEMENTS IN HEIGHT MEASURING DEVICES FOR BILLET FILLING", in accordance with Claim 1, characterized because the signal produced between the surface of the liquid metal and the end of the rod is an induced current.

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
Y	GB-A-1 237 141 (METALLURGIE HOBOKEN) * Page 5, line 125 - page 6, line 55; claim 1 * ---	1-2,4-5	B 22 D 39/00 B 22 D 5/00
Y	LU-A- 43 574 (GEBR. BOHLER & CO.) * Claim * ---	1-2,4-5	
A	US-A-3 943 992 (F. MEZGER) * Column 3, lines 40-56 * ---	1-2,4	
A	FR-A-1 543 005 (AMSTED INDUSTRIES) * Figures 6,8; page 5, left-hand column, lines 17-30 * ---	1,4	
A	US-A-3 188 704 (A.J. SUKAVA) * Column 2, lines 42-68 * ---	1-2,4	
A	US-A-2 509 079 (C.S. TREWIN et al.) * Column 9, lines 9-40; figure 14 * -----	6	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			B 22 D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 23-06-1989	Examiner DOUGLAS K. P. R.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	