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SLAG COOLING AND GRANULATION DEVICE

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FIG. 1

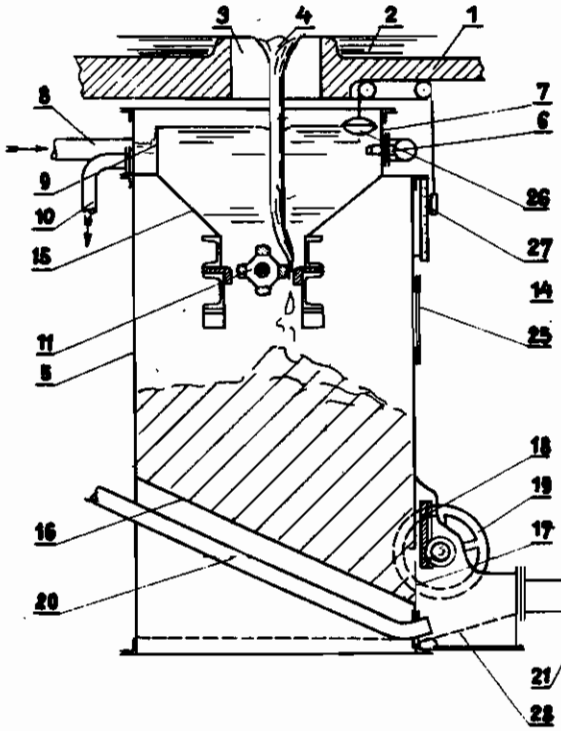


FIG. 3

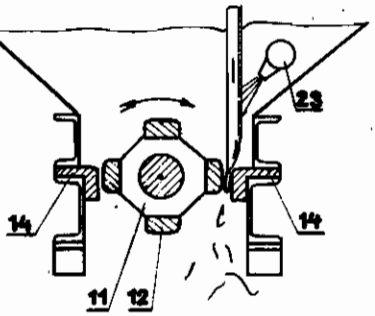


FIG. 2

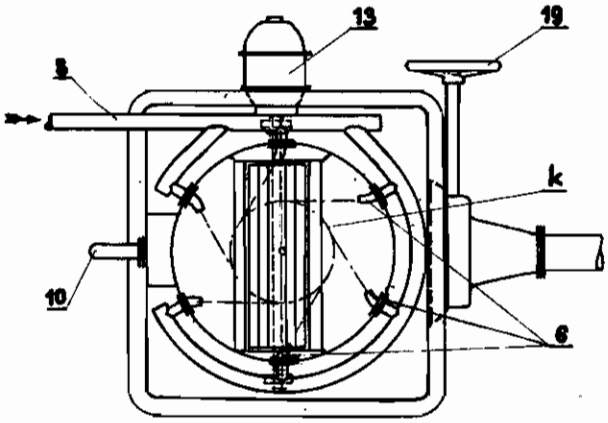
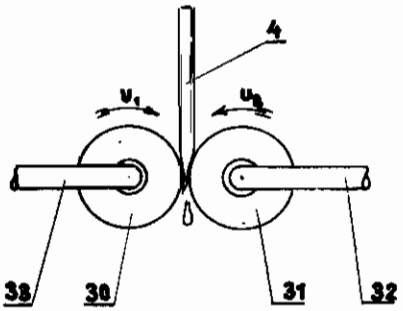


FIG. 4



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ALIEN PROPERTY CUSTODIAN

SLAG COOLING AND GRANULATION DEVICE

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My invention relates to a device for cooling and granulating liquid slag flowing out from the furnaces particularly from the slag tap furnaces or steam generators for pulverized fuel.

The main object of my invention is to provide improved and more economical method and means for handling the liquid slag flowing out steadily or temporarily from the furnaces and obtaining a granulated slag of a constant quality suitable for transportation by water in a piping. The methods used up to now to achieve this aim consisted substantially in chilling and breaking the liquid slag by streams of cold water. These methods involved the necessity of using great quantity of water, especially in cases when a high percentage of residues was deposited from the fuel. Therefore, one aim of my invention is also to reduce the quantity of cooling water which is necessary for the granulation.

In describing my invention in detail, reference will be had to the accompanying drawing in which:

Figure 1 is a sectional elevation of a complete slag handling device,

Figure 2 a top view of the same,

Figure 3, on a larger scale, a section of the rotor used for slag disintegration, and

Figure 4 a section of a modified form of the disintegrator.

Referring to Figs. 1 and 2, 1 denotes the floor of the combustion chamber of a steam generator for pulverized fuel. The liquid slag 2 is deposited on the floor of the furnace and flows out continuously through the opening 3, provided in the floor. A water tank 5 is arranged underneath this opening, the water being led into the tank continuously through the pipe 8 and through several nozzles 6 provided in the wall of a cylindrical extension 7 on the top of the tank 5. The tank 5 on its own has a rectangular shape. The level of the water in the tank is maintained on a constant height, the excess of water flowing over the wall 9 and being withdrawn through the pipe 10. The water level is controlled by a float 26 connected to an indicator 27.

A rotor 11 is situated horizontally in the tank in such a way that is is totally submerged in the water. The upper part of the tank is separated by perforated inclined walls 15. The rotor is provided with ledges 12 disposed parallelly to its axis (Fig. 3) and is driven e. g. by an electric motor 13 placed outside the tank. On the sides of the rotor and parallelly to it, two bars 14 are arranged leaving only a narrow gap through which the stream of liquid slag must pass.

The bottom 16 of the tank 5 is inclined towards an outlet opening 17, which is checked by a slide 18. This slide can be operated by the hand wheel 19. Closely underneath the outlet opening 17, the mouth of the water tube 20 is provided through which the water for transportation of the granulated slag is supplied.

A connection box 28 is fixed to the wall of the tank 5 adjacent to this outlet opening, to which a pipe 21 is connected. The pipe 21 is then connected to the centrifugal pump 22.

The slag flowing out from the furnace falls into the water, arrives, partly cooled, to the rotor 11 and is drawn into the gap between the rotor and the immobile bars 14. In this gap the stream of slag is mechanically formed, drawn or broken and crushed. In supplying the cooling water into the tank it was found advantageous to impart a definite motion to the water in relation to the stream of slag. In the example illustrated in Fig. 1, a whirl-like motion is attained by directing the inlet nozzles 6 tangentially to an imaginary circle *k* concentric with the tank.

In addition to the nozzles 6 one or more auxiliary nozzles 23 may be arranged over the rotor as shown in Fig. 3 and serving to increase the quantity of cooling water in case that exceptional quantities of slag should be worked up in the device. In cases that the slag is not of very high temperature, the nozzles 23 can be used for spreading the cooling water over the rotor 11 without the same being submerged in a water bath. The rotor is of robust construction to resist the stresses which arise when pieces of solid slag which occasionally may fall from the furnace, must be broken up.

The warm water which is withdrawn from the tank may be used with advantage for heating purposes, cooled down and then returned into the tank so that the necessary quantity of fresh water is thus considerably reduced.

From the rotor 11 the granulated slag falls to the bottom of the tank where it is deposited. The operator observes the inside of the tank through the look-in window 25 and opens the slide 16 as soon as sufficient quantity of granulated slag is accumulated. At the outlet opening 17 the slag is taken away by the stream of water projected from the pipe 20 and carried through the pump 22 to a place where it should be stored and which may be several hundred yards away.

The outlet opening 17 being open, the operator observes the level indicator 27 and closes down the slide 18 as soon as the level of the water in the tank sinks to a predetermined measure so as

to prevent any possibility of overheating or damage to the disintegrator.

In Fig. 4 two cylinders **30**, **31** are provided in place of the rotor which may be hollow and the cooling water may be led into the cylinders by the pipe **32**, **33**. The cylinders rotate in opposite directions at the speeds u_1 and u_2 and crush the stream of slag **4** between themselves. The speeds u_1, u_2 of the cylinders may be altered undependently to influence the granulation of the slag.

In another modification not shown in the drawing, the disintegrating structure may be made hollow and cooled by medium which passes through it and which may be a gas or a liquid. Cooling by streaming air may be found sufficient in case of a small quantity of slag and of low temperature thereof.

JOSEF ČERMÁK.