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[54] **METHOD FOR PREPARING CARBONACEOUS PASTES**

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[58] **Field of Search** 106/281, 284; 208/23, 126, 208/127; 264/29; 252/502, 510

[56] **References Cited**

UNITED STATES PATENTS

1,639,188	8/1927	Kleinschmidt	106/284 X
1,837,770	12/1931	Gilbert	264/29
2,459,520	1/1949	Greenshields	106/281 R X
2,563,285	7/1951	Shea et al.	106/284 X
2,645,583	7/1953	Stanko et al.	252/510

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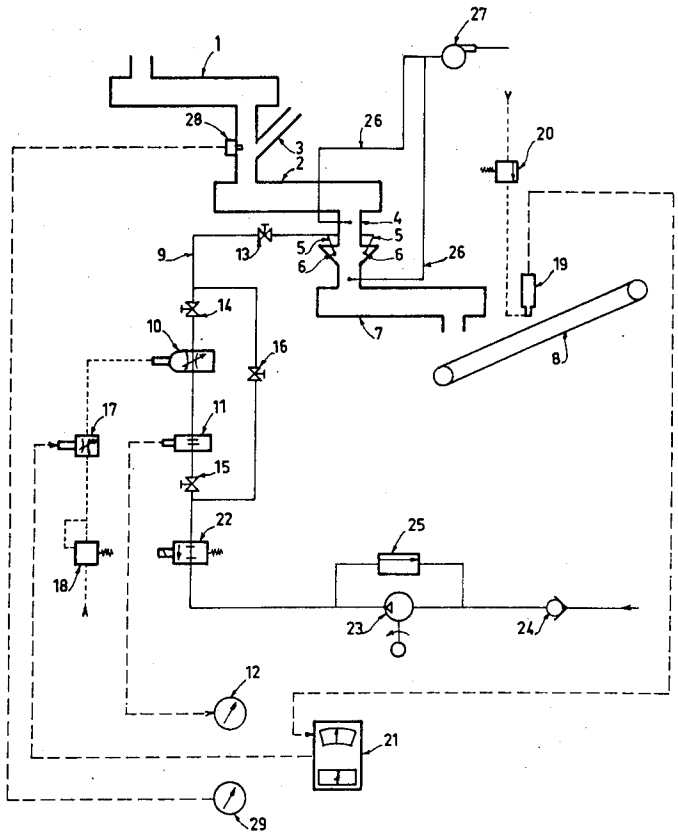
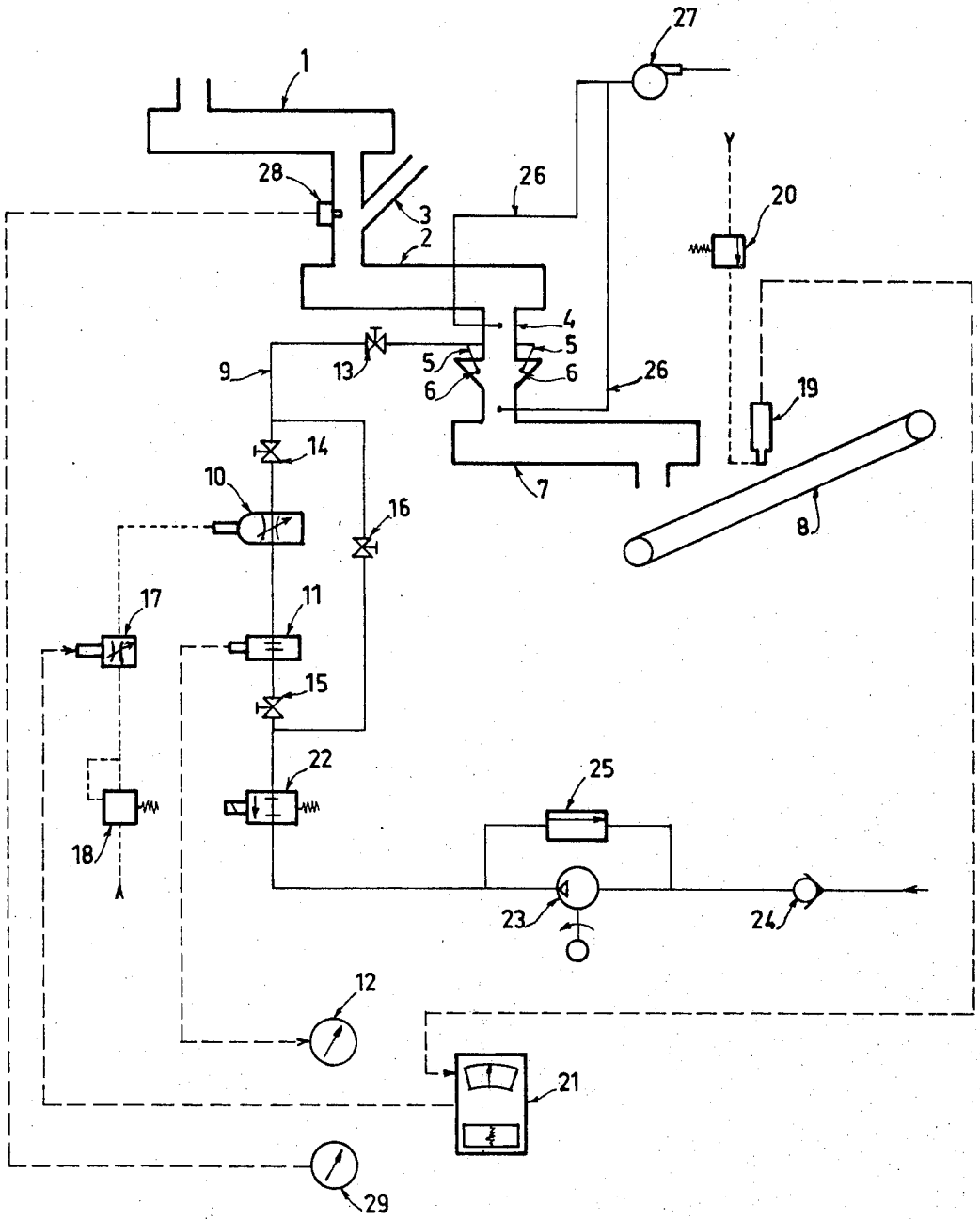
[57] **ABSTRACT**

Method and apparatus for the preparation of carbonaceous pastes intended primarily for use in the manufacture of electrodes wherein the prime materials, which may be formed of coke and tar, are mixed and heated and heated and then followed by water cooling to a temperature above 100°C by introducing the water in atomized form into an enclosure through which the pasty composition is allowed to pass as small fragments.

5 Claims, 1 Drawing Figure

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METHOD FOR PREPARING CARBONACEOUS PASTES

The present invention concerns a method and apparatus for preparing carbonaceous pastes intended, in particular, for use in the manufacture of electrodes.

It is known that numerous industries, in particular the aluminum industry, use carbon or graphite electrodes, the manufacture of which generally involves heating and mixing of very pure coke and oil or petroleum tar. The usual practice is to cool the resultant homogeneous paste to a temperature of between 100° and 115°C, after which the paste is pressed into shape.

The current practice is to cool the paste by the circulation of air while the paste is being advanced either by helical elevating systems or by covered conveyor belts. In the first case, costs are prohibitive and cooling takes place in an irregular manner. The second method requires conveyor belts of great length and a large system of pipes for aspiration of the tar vapors. Continual cleaning of the pipes and the presence of suction units are clearly indispensable.

It has also been proposed to cool the paste indirectly by means of water circulated during its conveyance by means of an endless screw. The main drawback of this method is that accidental stoppage of the screw necessitates very rapid evacuation of the paste to prevent clogging. This operation is lengthy and cumbersome.

All these methods suffer from the drawback of not enabling correct regulation of the cooling of the paste, and this results in lack of homogeneity in the structure of the carbonaceous composition.

Finally, it has been proposed to introduce the paste into the mixer water at a pressure sufficiently high to keep the composition in a liquid state, followed by cooling and evacuation at a temperature of 100° to 115°C. It has been found that approximately one-third of the heat is drawn off by the water in the downstream portion of the mixer, the rest of the heat being dissipated when the water evaporates. Apart from the need for increasing the length of the mixer, as a result of this introduction of water during stirring, the necessity of maintaining an elevated pressure in the mixer results in considerable complication of the equipment. On the other hand, the risk of premature vaporization of the water is present and the increase in viscosity of the composition in the downstream direction calls for the expenditure of additional power.

It is an object of this invention to overcome the various difficulties present in these known methods and to ensure efficient cooling of the pasty composition in a simple and inexpensive manner.

According to the invention, the method of preparing carbonaceous pastes intended particularly for use in the manufacture of electrodes, by heating and mixing prime materials, such as coke and tar, and by water-cooling the pasty composition to a temperature above 100°C, is characterized in that, for the purpose of cooling the pasty composition, water is sprayed in atomized form within an enclosure or column through which fragments of the pasty composition are allowed to fall.

The free fall of the paste causes it to break up into fragments of small dimensions, so that droplets of water move into intimate contact with the paste fragments and rapidly vaporize. In this way, a remarkably efficient cooling is achieved at minimum cost as soon as the paste leaves the mixer, it being possible easily to regulate the cooling action by adjusting the quantity of water used.

According to the invention, the apparatus for performing this method embodies a mixer in which the prime materials are heated and mixed, characterized in that the mixer comprises an enclosure or column at the top of which the mixer terminates and which is fitted with tubular ducts for admitting water and discharging the vapors that are generated.

In the annexed drawing, the single FIGURE illustrates diagrammatically an apparatus embodying features of this invention for preparing carbonaceous pastes intended for use in the manufacture of anodes.

The apparatus illustrated comprises a screw-type preheating unit **1** of known type, into which very pure coke is introduced. After having been raised to a temperature of between approximately 150° to 170°C, the coke is tipped into a first screw-type mixer **2**, and at the same time oil tar or petroleum tar is passed into this mixer through a duct **3**. The coke and tar are mixed and heated in such a manner that the resultant pasty composition is always at a temperature of 150° to 170°C.

The outlet for mixer **2** is at the top of a column **4** into which penetrate tubular ducts **5** having atomizers **6** at their ends for introduction of atomized water. At its lower end, the column **4** communicates with a second screw-type mixer **7**, the discharge end of which is located above a conveyor belt **8** which transports the paste to a pressing machine (not illustrated).

The tubular ducts **5**, for admitting water, form part of a water-feed circuit **9**, the flow from which can be regulated by means of a pneumatically operated valve **10**, with a flowmeter **11** upstream which is connected to an indicating instrument **12**. Manually operated valves **13 – 16**, one of which, **16**, is fitted in parallel with the pneumatically operated valve **10**, enable the latter to be disconnected and the flow of water to be adjusted manually.

Pneumatic operation of the valve **10** is achieved by means of an electrically operated valve **17** associated with a pressure regulator **18** which in turn is controlled by an instrument for measuring the temperature of the paste at the outlet from the second mixer **7**. This instrument comprises an infrared visor **19** associated with a pressure regulator **20** and connected to a temperature recorder **21** which actuates the valve **17**. The pressure regulator **20** supplies air at very low pressure to prevent tar vapors, dust or air from becoming deposited upon the visor **19**.

The water circulating line **9** also comprises, upstream of the valves **15** and **16**, an electrically operated valve **22** which enables the flow of water to be stopped when the mixers cease to function, a motor-driven water pump **23**, a non-return valve **24** and a pressure regulator **25** fitted in parallel with the pump.

Conduits **26**, for jointly evacuating the tar vapors and water vapor, terminate at different levels in the column **4**, these conduits being connected at their other ends to a suction unit **27**.

The temperature of the coke, at the outlet from the preheating unit **1**, is measured by means of a thermocouple **28** which is connected to a temperature recorder **29**.

The apparatus functions in the following manner:

Coke is introduced into the preheating unit **1** and its temperature is measured at the outlet of this unit. On the other hand, the flow of water into the circuit **9** is

regulated by means of the manually operated valves **13** - **16**, the valve **10** being cut off from the circuit.

As soon as the coke has reached the working temperature, the water circulating system is brought into automatic operation by means of the valve **10**, the manually operated valve **16** being closed.

The flow of water is then controlled by the temperature of the paste, as measured by the infra-red visor **19**, which temperature should in general be between 100° and 110°C. The pasty composition discharged from the first mixer **2**, and raised to a temperature of 150° to 170°C, breaks up into small fragments at the top of the column **4** since it unrestrictedly drops into this column. The droplets of water, sprayed by the atomizers **6**, vaporize rapidly when they move into intimate contact with the fragments of paste, so that excellent conditions for cooling take place.

The tar vapors and the water vapor are discharged through the pipe system **26** with the aid of the suction unit **27**.

The pasty composition, collected at the upstream end of the second mixer **7**, is virtually free from water vapor. The temperature of the paste, after cooling, should be above 100°C in order to cause all the water to vaporize and to prevent any of it from remaining in the paste.

In the event of accidental stoppage of one of the mixers, the electrically operated valve **22** enables the supply of water to be cut off.

The main advantages of the invention are: the high degree of uniformity in the cooling of the paste; ease of regulating its temperature in a precise and rapid manner; the almost complete elimination of water vapor and tar vapors; only slight clogging of the vapor discharge ducts because of the fact that tar particles are entrained by the water vapor, only readily removable suspensions being formed; and reduced operating and maintenance costs.

It will be understood that changes may be made in the details of arrangement and operation without departing from the spirit of the invention, especially as defined in the following claims.

I claim:

1. A method of preparing, in particulate form, a carbonaceous paste consisting essentially of carbon in admixture with a carbonaceous binder capable of being fluidized by heat, for use of the carbonaceous paste particularly in the manufacture of electrodes, comprising the steps of heating the carbonaceous paste to a pasty state at a temperature considerably above 100°C, introducing said heated carbonaceous paste into a closed space and spraying water in atomized form into contact with the carbonaceous material as it passes through the enclosed space whereby the droplets of water vaporize upon contact with the heated carbonaceous material to break up the carbonaceous material into small and relatively dry fragments while simultaneously cooling the fragments of carbonaceous material, and collecting the cooled fragments of carbonaceous material for removal from the enclosed space.

2. The method as claimed in claim **1** in which the carbonaceous binder is selected from the group consisting of oil tar and petroleum tar.

3. The method as claimed in claim **1** in which the carbonaceous material is heated to a temperature within the range of 150° to 170°C.

4. The method as claimed in claim **1** in which the fragments of carbonaceous material are cooled to a temperature which is still above 100°C to effect removal by vaporization of residual water.

5. The method as claimed in claim **1** in which the carbon is coke.

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