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BASIC PATCHING MATERIAL FOR ROTATABLE
DRUM TYPE FURNACES

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The present invention relates to basic patching material for rotatable drum type furnaces.

As refractory lining for industrial furnaces, melting furnaces or the like, especially for converter bottoms, basic mixtures are employed which comprise primarily granulated sintered dolomite, and tar for steel making purposes as binding agent. These mixtures are pressed to bricks or are tamped into molds and are subsequently burned, or they are tamped into the cold furnace which is subsequently heated. When the mixture is being burned, the tar leaves a carbon skeleton which binds the dolomite grains to each other and fills in the interstices between the grains.

The crude tar obtained from pit coal consists of a mixture of colloidal solutions of resins in oils of different boiling points and on an average contains 60% of pitch which is obtained as residue during the customary fractional distillation of the crude tar. By partially driving out low boiling oils from the crude tar, a tar with a higher pitch content can be produced which tar also will have a higher viscosity. For the production of resistant converter bottoms, such steel mill tar has proved particularly suitable which contains approximately from 60 to 65% pitch. Experience has proved that the employment of tars with very high pitch content or of pitch for the manufacture of converter bottoms causes difficulties and leads to poor results.

Already tars with a pitch content exceeding 68% are too viscous for being processed and yield no improvement in the resistance of the lining.

The heretofore known and employed lining material for converter bottoms have a tar content amounting to approximately from 7 to 9% by weight of the tar-dolomite mixture. Lining material with an essentially lower tar content, e.g. a tar content lower than 5%, results in a considerable impairment of the workability of the lining material and the resistance of the refractory lining. Lining materials with a tar content exceeding the amount of approximately 10% are not usable inasmuch as they are too pasty and, when being burned, easily cause the separation of oil and thereby bring about an increased formation of pores.

It is known for purposes of patching brickwork of industrial furnaces to employ lining material having a tar content of approximately from 7 to 9% and a pitch content in the tar of approximately from 60 to 65%. In this connection, the patching material is tamped onto the damaged portion and is burned at a temperature up to 500° C. If this temperature is exceeded, it cannot be assured any longer that the patching material will satisfactorily bind with the base material or that a higher proportion of the tar of the patching material will not burn already when the patching material is introduced into the furnace. Damaged portions in the lining of hearth type furnaces have been repaired by throwing the patching material by hand or by centrifuges into the hot furnace having a temperature exceeding 500° C. Due to the penetration of slag into the patching material, eventually in the course of time a sufficient consolidation of the patching material and a binding with the base material occurs.

Such methods are, however, not usable when repairing

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damaged portions in the lining of cylindrical drum type furnaces which rotate about their horizontal axis during their operation. For economic reasons, it is not permissible with each required repair to wait till the drum type furnace has cooled down to a temperature below 500° C. because such waiting period would result in a long standstill of the furnace and in intolerable losses in production. The repair of the lining of a drum type furnace must, therefore, be carried out at a temperature in excess of 600° C. At such high temperatures, the heretofore known tar-dolomite lining material is not adapted sufficiently to sinter because a great portion of the tar will burn prematurely. The repair work is particularly impaired by the fact that the drum type furnace rotates about its horizontal axis during the repair of the cylindrical furnace lining, and by the fact that the patching material deposited on the damaged portion may drop off due to the force of gravity, i.e. its weight, before a consolidation and binding with the base material has occurred.

When employing a basic lining material for repairing the refractory lining of drum type furnaces, which lining contains dolomite and tar in a quantity from 5% to 11% by weight of the dolomite, the above mentioned drawbacks will in conformity with the present invention be avoided by employing a lining material with such an addition of hard pitch that the total pitch content of the lining material will amount to from 7 to approximately 25% by weight, preferably from 10 to 18% by weight of the lining material. The invention is more fully explained in connection with the following numerical examples. Example I indicates the composition of the heretofore known tar-dolomite lining material, whereas Examples II and III show the compositions of a lining material according to the invention. All examples are based on a medium pitch content in the tar of 60% by weight.

Example I

A material composed of 9% by weight of tar (with 60% pitch) and 91% by weight of dolomite.
100 kilograms of material contain

	Kilograms
Dolomite	91
Pitch from tar	5.4
Pitch-free tar substance	3.6

The patching material contains 5.4% by weight of pitch.

Example II

The material consists of 9% by weight of tar (with 60% pitch), 8% by weight of hard pitch, 83% by weight of dolomite.
100 kilograms of material contain

	Kilograms
Dolomite	83
Hard pitch	8
Pitch from tar	5.4
Pitch-free tar substance	3.6

The patching material contains 8+5.4=13.4% by weight pitch.

Example III

The material consists of 8% by weight of tar (with 60% pitch), 19% by weight of hard pitch, and 73% by weight of dolomite.
100 kilograms of material contain

	Kilograms
Dolomite	73
Hard pitch	19
Pitch from tar	4.8
Pitch-free tar substance	3.2

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The patching material contains $19 + 4.8 = 23.8\%$ by weight of pitch.

Experience has shown that the repair of the lining of rotatable drum furnaces by means of patching material having its pitch content increased in conformity with the present invention to from 7 to 25% by admixing hard pitch to a tar-dolomite mixture, will have considerable advantages. Although a portion of the tar will burn while the patching material is being introduced into the furnace, the carbon content of the patching material is sufficiently high so that during the burning of the patching material a still resistant carbon skeleton will form between the dolomite grains. The repair work may be carried out in the rotatable drum furnace at temperatures exceeding 600°C . Inasmuch as the patching material will, even with a high addition of hard pitch, have a granular friable character, it can without difficulty manually or automatically be deposited on the damaged portions. The binding of the patching material to the drum lining is effected at such a speed that the patching material will not drop off when the drum type furnace rotates during the repair work.

It is, of course, to be understood that the present invention is, by no means, limited to the specific examples referred to above but also comprises any modifications within the scope of the appended claims.

What we claim is:

1. A basic lining material for repairing the refractory lining of rotary drum furnaces in hot condition, which consists essentially of dolomite and a bonding substance the latter consisting essentially of tar containing 60 to 65% pitch, said tar being in amount ranging from 5 to

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11% by weight of said dolomite, and hard pitch to the extent that the total pitch content of the lining material is from 7 to 25% by weight of said lining material, said lining material being in a granular friable condition.

2. A basic lining material for repairing the refractory lining of rotary drum furnaces in hot condition, which consists essentially of dolomite and a bonding substance the latter consisting essentially of tar containing 60 to 65% pitch, said tar being in amount ranging from 5 to 11% by weight of said dolomite, and hard pitch to the extent of from 10 to 18% by weight of said lining material, said lining material being in a granular friable condition.

3. A basic lining material for repairing the refractory lining of rotary drum furnaces in hot condition, which consists essentially of approximately 83% by weight of dolomite, approximately 9% by weight of tar with a pitch content of approximately 60% by weight, and approximately 8% by weight of hard pitch.

4. A basic lining material for repairing the refractory lining of rotary drum furnaces in hot condition, which consists essentially of approximately 73% by weight of dolomite, approximately 8% by weight of tar with a pitch content of approximately 60% by weight, and approximately 19% by weight of hard pitch.

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