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G. J. MASHEK.

PROCESS OF PREPARING PULVERULENT MATERIALS FOR MOLDING OR BRIQUETING.

APPLICATION FILED JULY 8, 1906.

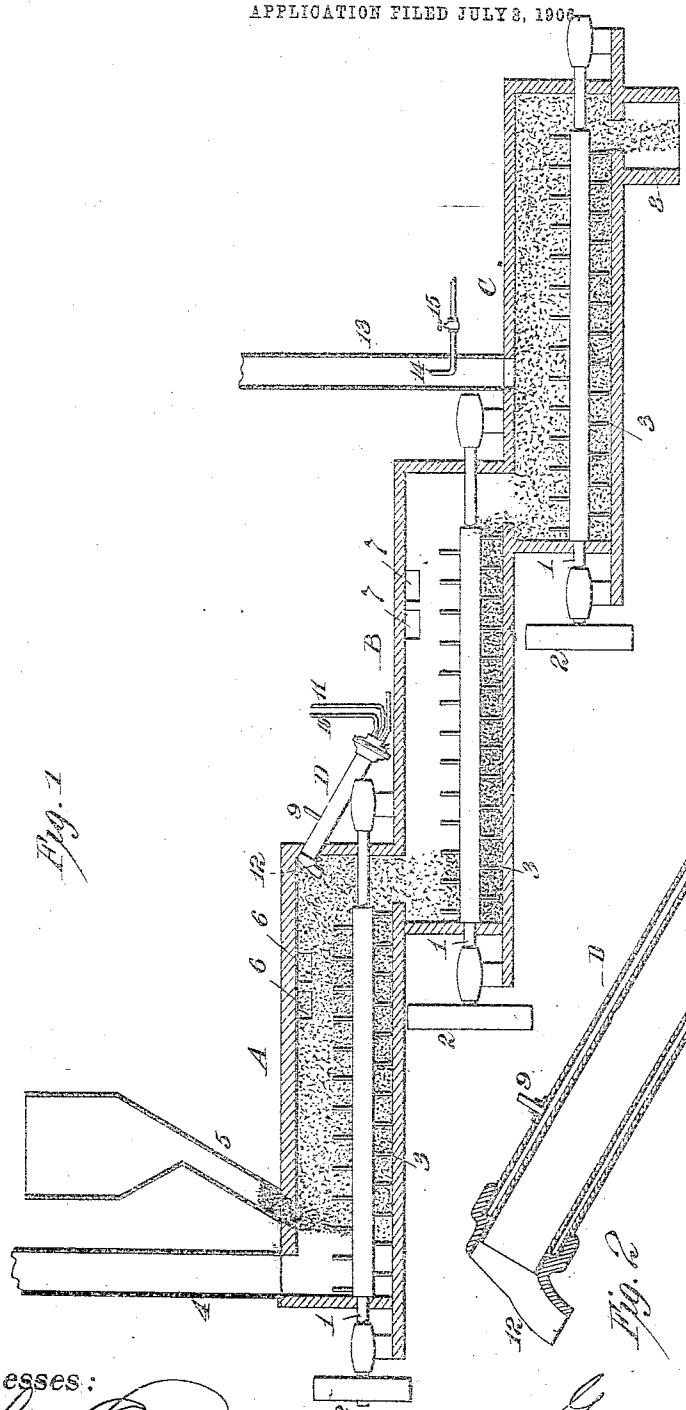

Fig. 1

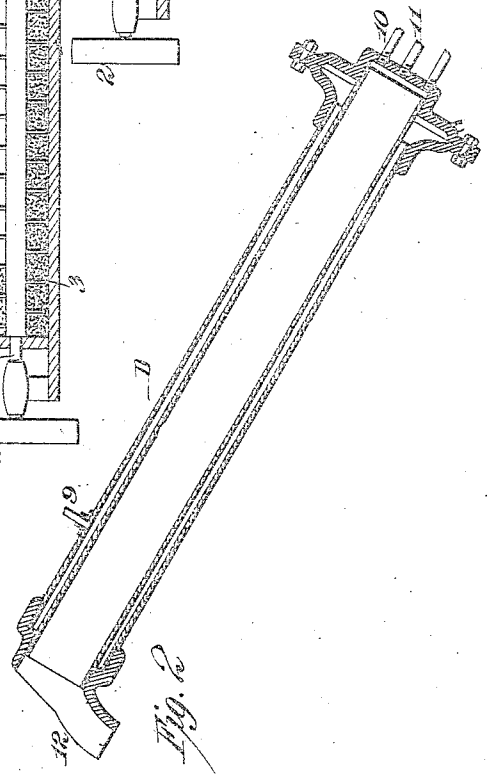

Fig. 2

Witnesses:

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PROCESS OF PREPARING PULVERULENT MATERIALS FOR MOLDING OR BRIQUETING.

No. 852,025. Specification of Letters Patent. Patented April 30, 1907.

Application filed July 3, 1906. Serial No. 324,624.

To all whom it may concern:

Be it known that I, GEORGE J. MASHEK, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Processes of Preparing Pulverulent Materials for Molding or Briqueting, of which the following is a description.

The object I have in view is to produce a simple and effective process of preparing loose, crushed or pulverized material, such as fuel or mineral dust, for molding or briqueting, and particularly for suitably drying the material, for mixing the binder with the dried and warm product, and for then cooling and finishing the material to the condition where it can be most effectively handled in molding and briqueting machines.

The process can be conveniently carried out in the apparatus which forms the subject-matter of a contemporaneous application for patent (Serial No. 324,623 filed July 3, 1906), which apparatus is shown diagrammatically and in a simplified form in the accompanying drawing, in which

Figure 1 is a vertical section through the apparatus taken on the line of the flow of the material therethrough, and Fig. 2 is a vertical section of the "foamer" or pitch-diluting apparatus on a larger scale.

The apparatus consists of three or more horizontally arranged chambers A B C located at successively lower elevations, so that the material can be discharged by gravity directly from one chamber into the next. Each section of the apparatus is a long horizontal chamber, preferably constructed of brick or brick lined, closed practically airtight and having a rounded bottom. Longitudinally through each chamber extends a shaft 1 carrying a pulley 2 on its end or having other means for applying power thereto. Upon the shafts in the chambers are secured blades 3 which rotate in the rounded troughs in the bottoms of the chambers. The chamber A is provided at its receiving end with a stack 4 for carrying off the products of combustion, and with a feed spout 5 for delivering the pulverulent material to the chamber. Near its discharging end a heating furnace is provided, delivering hot gases of combustion through flues 6 to the interior of the chamber at its top. The chamber B is also provided with a furnace delivering hot products of combustion through flues 7 to the chamber at its top and near its discharging end. The chamber C discharges into an elevator pit 8 or other means for conveying the material to the briqueting or molding machines. Near the inner end of the chamber C is a stack or air pipe 13 provided with a steam jet 14 pointing toward its outlet. This steam jet is regulated by a valve 15, so that a regulated outward draft can be produced in the stack 13 for drawing air through the chamber C from the pit 8.

Above the receiving end of the chamber B is located the discharging end of the foamer or pitch-diluting apparatus D, which discharges the pitch in a diluted form upon the material in the bottom of the chamber B at its receiving end. This foamer or diluting apparatus, as shown particularly in Fig. 2, is a cylindrical or pipe-chamber having a steam jacket to which superheated steam is delivered by a pipe 9 for maintaining the pitch at the proper temperature. Melted pitch and water are delivered to the foamer at its lower end through the pipes 10 and 11 respectively. The foamer is set at an angle, so that its discharging end is elevated above its receiving end, and the diluted pitch is delivered out of the elevated end of the foamer through a spout 12, from which it drops to the material in the bottom of the chamber B.

The shaft in the chamber A is rotated at a sufficiently high speed to throw the material up against the top of the chamber, from whence it is showered downwardly, thus maintaining the material in this chamber with its particles in a separated condition so as to be effectively acted on by the hot gases of combustion which flow through this chamber to the stack 4. With blades having a radius of twelve inches, I have found that a shaft speed of 180 revolutions per minute is sufficient to produce this effect. In the chamber B however, the shaft is run at a lower speed, so that the material is not showered or kept in a separated condition, but remains in the bottom of the chamber, the binder being mixed with the pulverulent material by the stirring action of the blades thereon. For this purpose, with blades of the radius specified, I have found that a shaft speed of about 140 revolutions per minute is sufficient. The chamber C is employed for cooling the material so as to bring the binding pitch to the condition of plasticity where the material can be most effectively molded or briqueted, and in this chamber it is desirable that the material should be

tossed and separated more or less, for which purpose a shaft speed of approximately 165 revolutions per minute has been found to be effective.

In carrying out my process the furnaces connected with the chambers A and B are first started in operation so as to heat up these portions of the apparatus. After these chambers are sufficiently heated, the apparatus is started in operation, when the furnace connected with the chamber B may be shut down completely or partially, since the heated material discharged from the drying chamber A into the chamber B will to a great extent maintain its own temperature in the latter chamber. The pulverulent material is fed to the drying chamber A in regulated quantities in a continuous stream, and in that chamber it is maintained with its particles in a separated condition and is slowly fed forward to the discharging end of the chamber, while the hot gases of combustion travel in the opposite direction through the chamber to the stack, drying and heating the separate particles of the material. The dried and heated material is delivered by gravity from the drying chamber A to the receiving end of the mixing chamber B. At this point a regulated quantity of the binding material, *i. e.* coal-tar or asphaltum pitch, is added to the material. The melted pitch is delivered continuously in regulated quantities to the lower end of the foamer, to which is also continuously supplied a regulated quantity of water. The pitch is maintained in a heated and highly fluid condition in the foamer by means of the superheated steam supplied to the steam jacket of the foamer. While in this heated condition the water unites and thoroughly mixes with the pitch, making a large volume of foam of diluted pitch, which rises and runs out at the discharge end of the foamer and falls upon the material at the receiving end of the mixing chamber B. In this chamber the pitch is thoroughly mixed with the heated and dried pulverulent material by the stirring action of the rotating blades, and is at the same time slowly fed toward the discharging end of the mixing chamber, where it is delivered into the receiving end of the cooling chamber C. In the latter chamber the material is fed forward to the discharging end of the chamber, and is cooled sufficiently to bring the pitch to the condition of plasticity where the material can be most effectively molded or briqueted. The required amount of air to produce the desired cooling effect is drawn through this chamber by regulating the steam jet in the stack 13.

While I have shown three sections of apparatus in the drawing, one for drying the material, one for mixing the binder with the material, and one for cooling the mixed product, it is evident that two or more sections of apparatus may be used for each of these purposes, and under some conditions fairly good results can be obtained without the use of any cooling chamber and by delivering the mixed material directly from the mixer to the molding or briqueting presses. It has been found essential, however, that the material should be thoroughly dried before the pitch is added to it, since even a small percentage of moisture remaining in the material will prevent the pitch from properly adhering to the particles. When the material is very wet, additional furnaces may be added to the drying chamber or chambers preceding the mixing chamber, or the number of drying chambers may be increased.

What I claim is:

1. The process of preparing pulverulent materials for molding or briqueting, consisting in first subjecting the material to heating and drying gases while its particles are maintained in a separated condition, and subsequently mixing the binder with the dried and heated material, substantially as set forth.

2. The process of preparing pulverulent materials for molding or briqueting, consisting in first subjecting the material to heating and drying gases while the material is maintained with its particles in a separated condition, and then mixing the binder with the dried and heated material by the action of stirring blades upon such material and binder, substantially as set forth.

3. The process of preparing pulverulent materials for molding or briqueting, consisting in first subjecting the pulverulent material to heating and drying gases while the material is maintained with its particles in a separated condition, then mixing the binder with such dried and heated material, and finally subjecting the material to a cooling medium to reduce the binder to the plastic condition, substantially as set forth.

4. The process of preparing pulverulent materials for molding or briqueting, consisting in first subjecting the material to heating and drying gases while the material is maintained with its particles in a separated condition, then mixing the binder with the dried and heated material, and then tossing or showering the combined material in a chamber through which air is drawn to reduce the temperature of the binder to the point of plasticity, substantially as set forth.

5. The process of preparing pulverulent materials for molding or briqueting, consisting in first subjecting the material to heating and drying gases while the material is maintained with its particles in a separated condition, then mixing the binder with the dried and heated material by stirring the binder therein, and then cooling the material to the point where the binder is plastic by tossing it in a chamber through which air is drawn, substantially as set forth.

6. The method of mixing coal-tar pitch with pulverulent material for molding or briqueting, consisting in diluting the pitch with water while in a heated condition, thereby foaming the pitch, and then mixing such pitch foam with the pulverulent material, substantially as set forth.

7. The method of preparing pulverulent materials for molding or briqueting, consisting in first heating and drying the material, and then mixing with the dried and heated material a foam of pitch, substantially as set forth.

8. The method of preparing pulverulent materials for molding or briqueting, consisting in first subjecting the pulverulent material to heating and drying gases while such material is maintained with its particles in a separated condition, and then mixing with the dried and heated material a foam of pitch, substantially as set forth.

9. The method of preparing pulverulent materials for molding or briqueting, consisting in first subjecting the material to heating and drying gases while the material is maintained with its particles in a separated condition, then mixing with the dried and heated material a foam of pitch, and then cooling the material until the pitch becomes plastic, substantially as set forth.

This specification signed and witnessed this 27th day of June, 1906.

GEORGE J. MASHEK.

Witnesses:

JNO. ROBT. TAYLOR,

AUG. LONG.