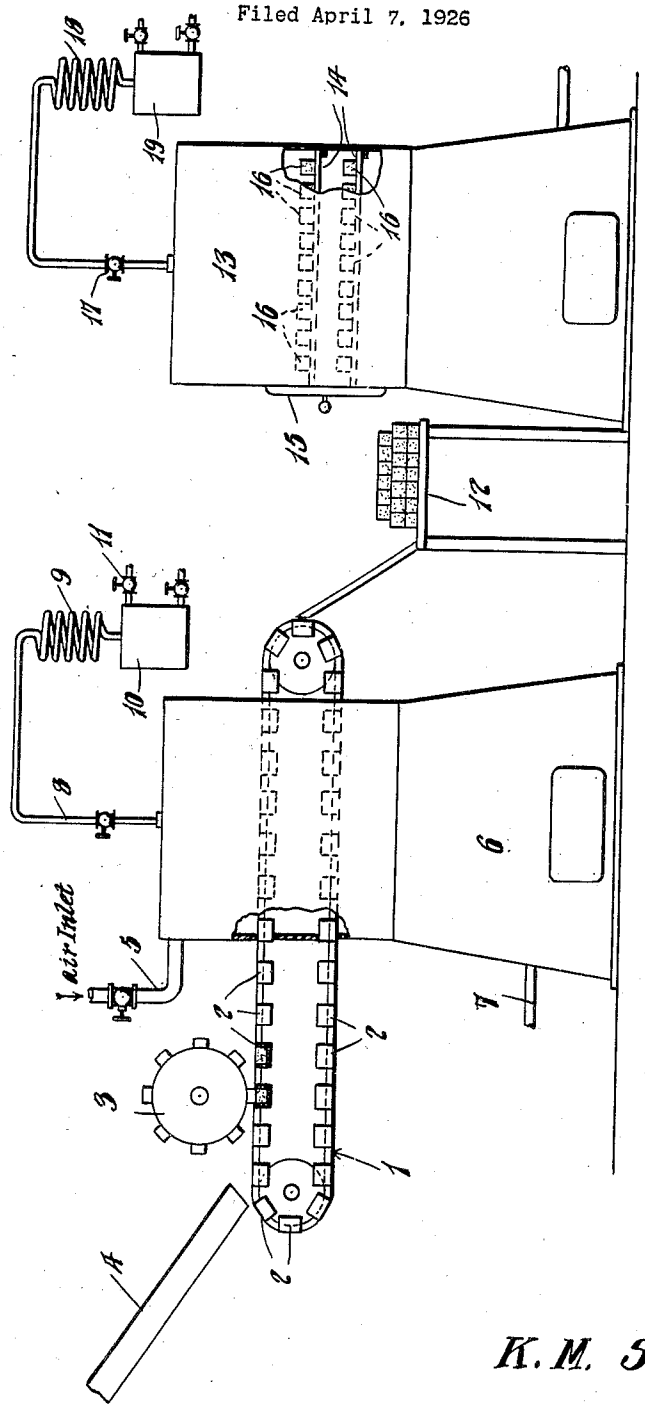
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K. M. SIMPSON

PROCESS FOR TREATING FLUE DUST

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Inventor
K. M. Simpson,

By Bacon & Thomas
Attorneys.

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KENNETH M. SIMPSON, OF NEW YORK, N. Y.

PROCESS FOR TREATING FLUE DUST.

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The invention relates to improvements in a process for producing tough and hard charges for blast and other smelting furnaces.

Among its many objects the invention aims to provide a process wherein the flue dust from blast furnaces and the like may be so treated as to provide a most useful change for such furnaces or others of a similar character. It has been long recognized that this dust contains valuable ores, carbonaceous matter and the like, but up to the present time this dust has largely been a waste product because of the failure of prior art processes to adequately handle the same. While the invention is highly applicable to the treatment of this material, it is also applicable in connection with the treatment of flotation concentrates and other materials in an exceedingly fine state of subdivision.

Primarily the invention embodies a process in which the fine flue dust or other material containing ores, etc., is mixed with finely pulverized coal or coke and a hydrocarbon oil, the mixture being baked in the presence of air to harden the oil by oxidation and provide the tough firm masses which may be used with most satisfactory results, as charges for blast and other smelting furnaces.

In carrying out the process I collect the flue dust discharging from a blast furnace, containing a substantial quantity of ore which, of course, largely depends upon the material being treated by the furnace, as well as fine coke, etc. This material I collect and then thoroughly mix with an added charge of finely pulverized coal or coke. The substances are then thoroughly intermingled with coke oven tar or the like in the proportion of about 16 per cent of the amount of mixture in the form of the tar. These materials are then thoroughly mixed.

The mixed substances may then be briquetted at a pressure of say 2500 pounds per square inch in any conventional form of roll press. This step is preferable, although not necessary. The resulting briquettes are quite hard or firm and are then placed in any kiln or oven of any well known type and heated to a temperature of say 350° F. This heat treatment occurs in the presence of air, thereby causing the oil and the briquettes to be thoroughly oxidized. The time required for this baking treatment naturally varies, but I have found that in most cases a period of four hours is sufficient. It will be understood that the oil distilled from the briquettes during this treatment may be recovered from the condensers in any well known manner. The briquettes after this described treatment are then placed in a second continuously operated kiln or retort and from this retort air is excluded. The temperature of this retort is raised to say 1000° F., the briquettes being maintained at this temperature for approximately one hour. Practically all of the oil is thus removed from the briquettes. The resulting briquettes are very tough and hard and constitute excellent charges for blast and other smelting furnaces.

The ore content of the briquettes may, of course, vary and consist of such materials as zinc, lead, and copper ores, as well as various iron ores. It will likewise be appreciated that the preparation of pulverized coal or coke in each briquette may also vary between wide limits, although the proportion of oil will not materially vary because it is the residual carbon of the oil resulting from the oxidation and distillation thereof that acts as a cementing material to bind the oil and fuel particles together.

For ordinary commercial work the briquettes should carry from 5 to 50 per cent coke, the amount being determined by the nature of the ore particles contained in the briquettes and the demands of the smelting operation. For instance, in the case of iron flue dust, I use generally from 30 to 40 per cent coke, while in the case of copper concentrates 5 per cent coke may be sufficient as the sulphur in the copper mineral furnishes the bulk of the fuel.

At times when dealing with certain ores no pulverized coke may be used. In fact, I may mix the finely pulverized ore concentrates with oil tar and form the mixture into briquettes in the manner I have herein before set forth.

In the figure of the drawing I have shown diagrammatically an apparatus for supporting this process.

In the drawing the numeral 1 designates a briquetting belt having a series of pockets 2 therein, the walls of which are preferably perforated. A briquetting roller 3 cooperates with this belt to place the material fed to the pockets into the shoe 4 under a high

state of compression. The belt then travels through the initial heating furnace where the briquettes in the pockets 2 thereof are heated in the presence of air admitted through the air controlled line 5. A furnace 6 is employed for heating this oven gas or light fuel being admitted thereto through the line 7. The gaseous products escape from the oven through the line 8, pass through a condenser 9 where the condensable products are condensed, and collected in the container 10. From this container uncondensed substances may be discharged through the valve controlled line 11. The partially treated briquettes are then discharged upon a platform 12.

From the platform 12 the briquettes are introduced to the oven 13. They are placed on movable platforms 14 which may be inserted in the oven 13 and removed therefrom by opening or closing the door 15. Air is excluded from this oven so that the briquettes 16 are baked therein under a high temperature with no air being present. From the oven 13 gaseous products escape through the valve controlled line 17 to a suitable condenser 18 and thence to a container 19 which is of the same construction as the container 10.

Having thus described my invention, what I claim is:

1. The herein described process which comprises mixing with flue dust pulverized carbonaceous fuel matter, in adding to such mass a hydrocarbon, in briquetting the resulting mixture, in subjecting the mixed materials to a carbonizing treatment in which the volatiles of the hydrocarbon are largely removed and the solid materials bonded by the carbon residue thereof by preliminarily heating the material in a zone where oxygen is present, and in thereafter raising the temperature of the material in a zone where oxygen is excluded.

2. A process for agglomerating materials containing minerals in substantial quantities in pulverized form consisting in mixing with said minerals a liquid hydrocarbon, in first baking the mixture in the presence of air and in recovering the products of distillation and thereafter subjecting the material to higher temperature treatment in the absence of air to form a tough, hard briquette and in condensing and collecting the products distilled during this second treatment.

In testimony whereof I affix my signature.

KENNETH M. SIMPSON.