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PROCESS FOR THE PRODUCTION OF CARBON BLACK

Harry Kloepfer, Cologne, Germany; vested in the Alien Property Custodian

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It is well known that carbon black, especially the so-called active rubber black, can be produced by burning carbonaceous materials such as naphthalene or anthracene residues in burners with restricted quantities of air, the carbon black produced being made to deposit on cooled surfaces. By carrying out this process on a large scale, however, contrary to excellent working in a testing plant, undesired variations in the yield, in the color, in the activity, in the content of empyreuma and other qualities were observed. Experiments made to eliminate these disadvantages by keeping constant or regulating the given working conditions were without any result, rather causing economically impossible interruptions of the work.

Now it was found that excellent results may be obtained also on a large scale by carrying out the incomplete combustion of carbonaceous substances in mixture with combustible or incombustible gases in burners in such a way that the burner gases are as far as possible laminarily adjusted. According to my invention it is essential that the area of flow of the burner gases in the whole burner piece will be kept substantially free of any whirling motion. This may be obtained at first by laminarily adjusting the hot gases outside the flames, i. e. the mixtures of burnt gases and secondary air, by means of uniform introduction, guiding sheets and the like. Furthermore, dividing walls and subdivisions between the burners tend to restrict eventually occurring whirl like disturbances both in time and in space. It is most important to avoid the noxious whirling formations in the course of the gas flow in the burner place, on the deposition areas and on the way to the gas delivery tube, in such a way that on the whole cross section of the apparatus a substantially uniform suction is maintained. I have now found that already rather small differences in space in the suction effect suffice to create whirl formations and therewith the aforementioned disadvantages. This may be avoided, for instance, in such a way that the whole furnace unit on the upper part is covered rooflike, whereby this covering may be provided out with a plurality of division walls. The passing on of the burner gases on the upper part of this rooflike covering is then carried out by a plurality of hoods which finally are united to a common gas delivery tube.

Variations of pressure and flow beyond these hoods may lead sometimes to a disturbance of the laminar area of flow in the interior of the burner space. In order, to avoid these disturbances draft interruptions may be inserted into each hood so that with a small increase of suction "false air" will be sucked in with and thereby disturbances of the burner space avoided. On the other hand, eventually occurring obstruction by the aforementioned draft interruptions may

be rendered innocuous by equalization of pressure in the open air.

Besides the above mentioned steps which refer to the operations outside the flame front it is essential to keep the flame gases as far as possible also laminarily adjusted inside the flame front. According to hydrodynamic fundamental laws this may be carried into effect by an adequate adjustment of the composition of the gas, the gradient of pressure, the space velocity, the space between the burner orifice and the cooled area and so on. Thereby it is important to construct the burners with final parallel conducts in such a way that these parallel conducts exceed the width of the holes. Especially with slit burners it has been proved necessary that the final parallel conduct exceeds the width of the slit like burner orifice. By these steps an excessive divergence at the end of the burner orifice will be avoided and consequently the formation of whirls inside the flame front and to a certain extent also outside thereof will be reduced.

According to my invention these measures tend to a substantially laminar conduct of the burner gases inside of the whole burner space. This may be recognized, for instance, already in a stability of the flame front both in time and in space. Contrary to the common sooting flames the flames according to my invention stand practically absolutely still. Moreover, the laminar conduct effects that the lines of contact of the flames with the cooled areas, i. e. the sledge or the advantageously used water cooled cylinders remain practically unchanged.

The scope of my invention lies in the production of carbon blacks of desired activity, color, content of empyreuma or the like in a substantially uniform condition with maximal yields. With working conditions prescribed it suffices only, according to my invention, to consider the above mentioned measures with the result of an excellent, simple and safe conduct of operation.

By carrying out my invention all sorts of carbonaceous initial substances may be utilized, such as for instance, propane, butane, benzene, naphthalene or other aliphatic or aromatic hydrocarbons or mixtures, as for instance, anthracene residues. Instead of or besides these substances also gaseous substances which are lower in carbon, i. e. richer in hydrogen, such as carbonmonoxide, methane, ethane or the like may be used. In practice town gas generator gas, water gas, eventually in combination with liquid gas may be loaded with heated naphthalene or anthracene residues, the quantity of these higher boiling constituents adjusted preferably in a range of about 250 grs. to about 1000 grs./Ncbm of the total mixture.

HARRY KLOEPFER