(No Model.)

P. P. NUNGESSER.

METHOD OF MANUFACTURING CARBONS.

No. 409,490. Patented Aug. 20, 1889.

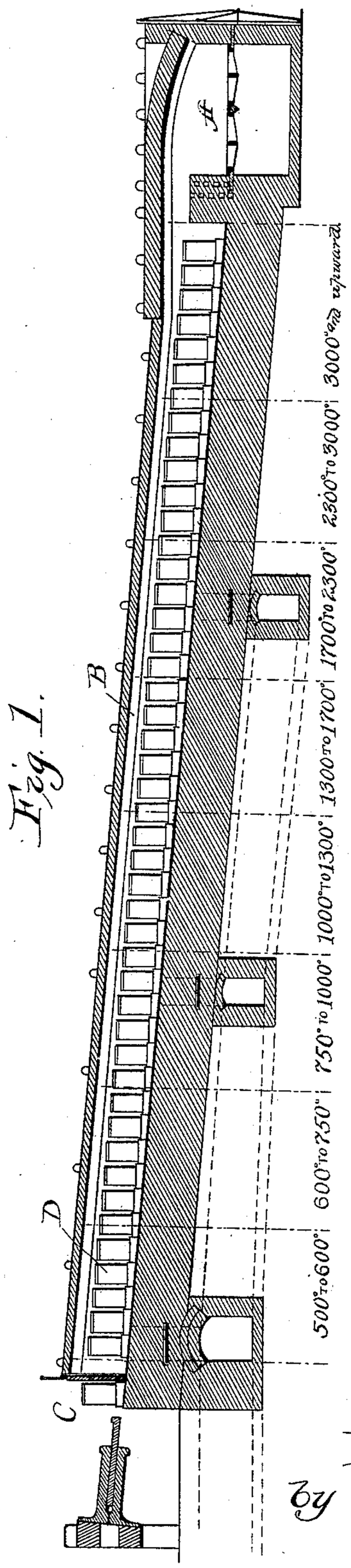

Fig. 1.

Witnesses
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UNITED STATES PATENT OFFICE.

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METHOD OF MANUFACTURING CARBONS.

SPECIFICATION forming part of Letters Patent No. 409,490, dated August 20, 1889.

Application filed January 31, 1889. Serial No. 298,255. (No model.)

To all whom it may concern:

Be it known that I, PHILIP P. NUNGESSER, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Improvement in the Method of Manufacturing Carbons; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention is an improved method of manufacturing carbon electrodes used in arc lamps.

The object of my invention is to lessen the percentage of loss which attends the method of manufacturing carbons now in use, to perform the work of carbonization more rapidly than has heretofore been done, and to improve the quality of the carbons in respect to form, and to render them uniform in quality.

My invention consists, first, in packing the carbons in saggers of greater depth than the length of the carbons, covering the ends of the carbons with sand, and passing the saggers thus packed through a heating-chamber in which the highest degree of heat is at the discharge end and the lowest degree at the charging end.

It consists, in the second place, in packing the carbons in saggers which contain small charges, in moving these saggers through a heated chamber the heat of which gradually increases from the charging to the discharge end, and finally removing each sagger while hot, when it has passed through the chamber, and emptying its carbonized contents.

Thirdly, my invention consists in packing the carbons in vertical position within the saggers on the bottom thereof, passing the saggers successively through a heated chamber from a lower to a higher temperature with the open end upward, with the flame passing over the upper ends of the saggers, whereby the carbons are dried and carbonized by gradually-increased heat from the top downward, substantially as hereinafter explained.

In the manufacture of carbons as heretofore practiced it has been customary to pack the carbons in a green state and in saggers, and to place the saggers thus packed within a furnace the temperature of which is subsequently raised to a sufficient degree to produce carbonization, after which the furnace heat is allowed to subside and the saggers removed. In this method there is difficulty in grading properly the increase of heat for the perfect formation of the carbons. The material of which they are composed includes substances which under increased temperatures give forth vapors, and where the temperature is too rapidly raised these vapors are generated more rapidly than they can pass off from the carbons without disturbance of its interior substance, and thus mar the texture or density which the carbon has received from its compression. Further, in the furnace the carbons are variably affected by reason of their different positions in respect to the heat generated in the fire-chamber—that is to say, carbons from one part of the furnace differ in quality or extent of carbonization as compared with carbons in another part, and this inequality seriously affects the utility of the carbon in electric lighting. Furthermore, in the furnace heretofore used the application of heat in respect to the position of the carbons has been such that it has been difficult to prevent warping, and the percentage of carbons damaged by warping and change of texture or density by the too-rapid escape of the vapors has materially increased the cost of producing the carbons.

I have sought by the invention hereinafter explained to avoid these special difficulties, and thus to obtain the objects sought to be accomplished.

The apparatus which I have found best for carrying out my invention is shown in the accompanying drawings, but is not herein claimed, as it is the subject of an application filed in the United States Patent Office on the 27th of December, 1888, Serial No. 294,790. In this figure the fire box or chamber is represented at *a*, the heating-chamber at B, the charging end at C, and the receptacle or sagger for the carbons at D. I prefer to use a receptacle substantially the same as that shown, so that the carbons are subjected to the heat of the furnace in small quantities, and are thus thoroughly carbonized, each charge being adapted by this means to be affected by the heat of the furnace upon the top and every side. The heat from the fire-chamber passes over the fire-bridge, where it meets a current of air, and this produces more perfect combustion and makes a white heat in the furnace

in proximity to the fire-bridge, gradually decreasing as it approaches the charging end in substantially the proportions which I have indicated on the drawings in Fig. 1, in which I have represented the varying temperatures throughout the extent of the heating-chamber when the temperature adjoins the fire-bridge as at about 3,000° Fahrenheit. It will be understood, however, that this is only an approximate scale, and it may be made to vary by regulation of dampers which may be in connection with different parts of the heating-chamber. The proportions which I have indicated show the temperature at which the furnace has been worked practically.

I have not limited myself in respect to the size of the apparatus. Its lateral and vertical dimensions are made to suit the size of the cases which hold the carbons. A good working length of the apparatus is between fifty and one hundred feet. It will thus be seen that in placing the carbons in the charging end they are subjected to the lowest temperature, and as they are moved slowly through the entire length of the furnace they are subjected to increasing temperature, which first dries them, and, by reason of the charges being separated from each other, the heat penetrates from every side, and when the receptacles have reached the end nearest the fire-bridge the carbons will be found to have been thoroughly carbonized and to be ready for removal. By packing the carbons vertically in receptacles no displacement is caused and there can be no rupture nor bending of the carbons, and when they are removed and taken from the receptacles they will be found to be perfectly straight and true.

In carrrying out my invention by the apparatus above described I first place the carbons in the saggers, preferably while they are lying in horizontal position, by introducing them through the open top, with their ends resting against the bottom. When the saggers have been filled, there is a space between the upper ends of the carbons and the mouth of the saggers, which is preferably filled with sand, and all the saggers to be used in the furnace are prepared in this manner. The furnace is then heated by fire in the fire-chamber, and the passage of the products of combustion over the bridge and through the length of the chamber is regulated by openings, so that the heat diminishes in proper degrees, which may be observed by the gages placed in different positions throughout the length of the chamber. The chamber being thus prepared, the saggers containing the charges are introduced successively and pass slowly from the charging end (which is the end of least heat) toward the discharging or hottest end of the chamber. As the charges pass, as shown in the drawings, they are three abreast and the saggers nearly fill the space in the chamber from side to side, but leave a space over the top for the passage of the products of combustion which naturally rise, and thus the pencils are heated from the top downward in a gradual degree, which causes the gradual evaporation from their upper ends, and as they rest upon the lower ends there is no tendency to warp. Further, as they are moved slowly and subjected to a gradual increase of heat regulated to a proper degree, the vapors are slowly generated within the carbon, and at such a degree that they escape without expansion of the carbons or rupture, or in any way diminishing their solidity or texture. At the discharge end the saggers are removed and emptied, and as the construction of the furnace admits their complete removal from the furnace while they are hot, another advantage arises, whereby a saving is effected in respect to the saggers.

In the old process, heretofore referred to, the saggers with their charges must cool before they can be removed, and as they shrink with the charges unremoved they are liable to crack, and in practice many of them do crack and are ruined, which involves a considerable loss. In the furnace and method above described by me saggers may be removed and emptied while they are hot, and, shrinking in the emptied condition, there is little liability of cracking, and the same saggers may be used many times.

I am aware that prior to my invention it has been suggested to bake bricks by passing them loaded on cars through an elongated heating-chamber in which the temperature was lowest at the charging end and greatest near the furnace, the cars passing from the heating-chamber into a cooling-chamber; but in this case the bricks were simply piled upon the cars and exposed to the direct action of the heat and air. In the baking of carbons, however, as is well known, they are subjected to such intense heat that were they exposed in their transmission through the heating-chamber they would be entirely consumed, being composed of a combustible material. Heretofore in the baking of carbons the carbons are placed in saggers, which they completely fill, and these are placed side by side or in layers, and the whole covered with sand and tiles. This is impracticable where the saggers are to be moved, and in order to render it possible to move the saggers and at the same time to muffle them I provide saggers of slightly greater depth than the length of the carbons, in which the carbons are packed closely and their ends covered by sand; and in the passage of the carbons through the heating-chamber they are thoroughly carbonized, while at the same time muffled by the walls of the saggers and the covering of sand, so as to prevent the access of air to the carbons and the consequent injurious effect.

I claim as my invention—

1. The hereinbefore-described method of treating carbons, consisting in packing them in saggers of greater depth than the length

of the carbons, covering the ends of the carbons with sand, and passing the saggers thus packed through a heating-chamber in which the highest degree of heat is at the discharge end and the lowest degree at the charging end, substantially as described.

2. The described method of baking carbons, consisting in placing the carbons in saggers, passing the saggers successively through a chamber from a lower to a higher heat, and finally removing the saggers while hot from the discharge end of the chamber, substantially as described.

3. The described method of treating carbons, consisting in placing them in saggers with the ends resting on the bottom of the saggers, placing the saggers with their open mouths upward in a chamber heated gradually from the charging to the discharging end, and in passing the saggers thus filled from the lower to the higher heat, with the flames passing over the upper ends of the saggers, whereby they are heated gradually and from the top downward, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

P. P. NUNGESSER.

Witnesses:
G. C. METCALF,
H. P. MCINTOSH.