

UNITED STATES PATENT OFFICE.

HEINRICH WARTENBERG, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-FIFTH
TO ALICE M. MILLER, OF SAME PLACE.

ART OF MANUFACTURING CARBON.

SPECIFICATION forming part of Letters Patent No. 660,693, dated October 30, 1900.

Application filed December 16, 1899. Serial No. 740,584. (No specimens.)

To all whom it may concern:

Be it known that I, HEINRICH WARTENBERG, a citizen of the United States, residing at Chicago, county of Cook, State of Illinois, have
5 invented certain new and useful Improvements in the Art of Manufacturing Carbon, of which the following is a specification.

My invention contemplates a novel and highly-effective process of carbonization, and
10 as a result the production of a comparatively high grade of carbon capable of efficient service in various connections, but more particularly adapted for use in arc and incandescent lamps.

15 With reference to said latter purpose the principal object of my invention is the provision of carbon filaments and pencils which will render the lamps more efficient, and thereby tend to decrease the cost of electric lighting.

20 Other objects of my invention are to provide a process or method of carbonization involving comparatively few steps, and thereby reducing the cost of production, to provide a process which can be successfully worked with-
25 out employing either complicated apparatus or expensive chemicals, to provide carbon which will offer less resistance to an electric current than heretofore, and to provide an effective method or process of carbonizing
30 wood or other suitable fiber.

To the attainment of the foregoing and other useful ends I first immerse the wood in a mixture formed by combining white syrup, water, sulfuric acid, tartaric acid, and carbonate of
35 ammonia and filtering such mixture prior to immersing the wood therein. These said ingredients are preferably mixed together in the proportion of thirteen and one-half ounces of water to six ounces of white syrup, two
40 ounces of sulfuric acid, one ounce of tartaric acid, and one ounce of carbonate of ammonia, it being understood that these quantities can be varied according to the quantity of mixture desired. The wood is permitted to remain in
45 such filtered liquid until thoroughly saturated or impregnated. After becoming thoroughly saturated, the time necessary for which varies, of course, according to the character of the wood—as, for instance, in the case of hard
50 wood, about eight days—the wood is then placed in an oven and dried. When thor-

oughly dried the wood is then packed or embedded in powdered graphite, a graphite-receptacle being preferably employed for holding the mass, and a cover, preferably of metal and
55 fire-clay, being provided for sealing the top of the receptacle. This graphite-receptacle, contents and all, is then subjected to heat—as, for example, by placing the whole in a coke
60 fire. The extent of time necessary for the receptacle and its contents to remain in the fire varies, of course, according to the conditions and the character of the various materials. In practice, however, and in the case of hard
65 wood and with a comparatively high degree of temperature I find that from three and one-half to four hours is sufficient, and that at the end of such period the wood is thoroughly carbonized. After thus subjecting the wood
70 and graphite to heat for the proper length of time I then remove the same from the fire and permit the receptacle and its contents to cool together. When cooled to the proper extent, the receptacle can be emptied of its
75 contents and the carbonized wood then removed or unearthed from its bed of graphite. It will be understood, however, that the cooling of the receptacle and its contents plays no part in the actual carbonization of the
80 wood, but that such is done merely to prevent the carbonized wood from cracking, of which there would be some danger should it while hot be suddenly exposed to the air.

It is obvious that various substances or ingredients may be employed in place of the
85 white syrup—as, for instance, sugar or even ordinary syrup—and it will also be seen that the equivalents of the other ingredients may be employed, if so desired, and that the proportion can be varied to suit the conditions
90 without departing from the spirit of my invention. I find, however, that in practice the white syrup seems to give the best results and that a more satisfactory product is obtained by employing the ingredients enumerated
95 and in the proportions stated. For different purposes different kinds of wood may be employed, and, as a matter of fact, it will be seen that there are various animal and vegetable products which could be used in
100 place of wood. The subjection of the wood to heat while embedded in graphite is another

feature of my invention susceptible of modification. It may be stated, however, that the heating of the wood in this manner is highly effective and that the use of the powdered graphite and also of the graphite tub or receptacle is preferable.

Thus it will be seen that my improved process of carbonization is simple and effective, that it involves the use of no special apparatus, that the ingredients, &c., employed are comparatively inexpensive, and consequently that my invention affords a practical and economical method of producing wood-carbon.

With further reference to the matter of arc-lighting it may be stated that the carbon pencils can be made by first reducing the wood to the form of rods and then carbonizing these rods in the manner described.

The solution or mixture which I employ for saturating or impregnating the wood or other fiber is highly effective in producing a high grade of carbon, the use of tartaric acid tending to secure a more thorough and complete carbonization and the carbonate of ammonia tending to increase the conductivity of the carbon. It is obvious, however, that other chemicals or substances having a like chemical action can be employed, if so desired.

What I claim as my invention is—

1. The improvement in the art of manufacturing carbon, which consists first, in saturating or impregnating a suitable fiber with a chemical mixture formed by combining water and a saccharine ingredient with sulfuric acid, tartaric acid and carbonate of ammonia, and then subjecting the fiber to heat.

2. That step in the process of making carbon, which consists in saturating or impregnating a suitable fiber with a chemical mixture of which tartaric acid and a saccharine matter as white syrup are ingredients.

3. That step in the process of making carbon, which consists in saturating or impregnating a suitable fiber with a chemical mixture of which carbonate of ammonia and a saccharine matter as white syrup are ingredients.

4. That step in the process of making carbon, which consists in saturating or impregnating a suitable fiber with a carboniferous and acidiferous chemical mixture of which carbonate of ammonia, tartaric acid and a saccharine matter as white syrup are ingredients.

5. That step in the process of making carbon, which consists in saturating a suitable fiber with an acidiferous and carboniferous chemical mixture of which carbonate of ammonia is an ingredient.

6. That step in the process of making carbon, which consists in saturating or impregnating a suitable fiber with a carboniferous and acidiferous chemical mixture of which sulfuric acid and tartaric acid are ingredients.

7. That step in the process of making carbon, which consists in saturating or impregnating a suitable fiber with a carboniferous and acidiferous chemical mixture of which

sulfuric acid and carbonate of ammonia are ingredients.

8. The process of making carbon, which consists in first saturating a suitable fiber with a carboniferous and acidiferous chemical mixture of which tartaric acid and carbonate of ammonia are ingredients, and then subjecting the thus saturated or impregnated fiber to high temperature, substantially as and for the purpose described.

9. That step in the process of making carbon, which consists in saturating or impregnating a suitable fiber with a carboniferous mixture of which tartaric acid and carbonate of ammonia are two of the ingredients.

10. That step in the process of making carbon, which consists in saturating or impregnating wood with a carboniferous mixture of which tartaric acid and carbonate of ammonia are two of the ingredients.

11. That step in the process of making carbon, which consists in saturating or impregnating a suitable fiber with a carboniferous, acidiferous and ammoniacal liquid.

12. The process of carbonizing wood, which consists in subjecting the wood to a bath in an acidiferous and carboniferous liquid, drying the wood, and then subjecting the wood to high temperature while packed or embedded in graphite.

13. The improvement in the art of manufacturing carbon, which consists in first treating wood with a chemical mixture formed by combining water and a saccharine ingredient with sulfuric acid, tartaric acid and carbonate of ammonia, drying the wood, and then subjecting the same to high temperature for the purpose of carbonization.

14. The improvement in the art of manufacturing carbon, which consists in first saturating wood with a chemical mixture formed by combining water and white syrup with sulfuric acid, tartaric acid and carbonate of ammonia, drying the wood, and then subjecting the same to high temperature while packed or embedded in graphite.

15. The improvement in the art of manufacturing carbon, which consists, first, in saturating wood with a chemical mixture formed by combining the following ingredients in the following proportions: thirteen and one-half ounces of water, two ounces of sulfuric acid, six ounces of white syrup, one ounce of tartaric acid and one ounce of carbonate of ammonia; second, drying the wood; and, third, subjecting the wood to high temperature while packed or embedded in graphite.

16. The process of making carbon, which consists, first, in saturating wood with a chemical mixture formed by combining certain ingredients as follows: thirteen and one-half ounces of water, two ounces of sulfuric acid, six ounces of saccharine matter, one ounce of tartaric acid and one ounce of carbonate of ammonia; second, drying the wood; and, third, subjecting the wood to high temperature while packed or embedded in graphite.

17. The improvement in the art of manu-
facturing arc-light carbons, which consists in
forming rods of wood, saturating the said rods
with a chemical mixture formed by combin-
5 ing carboniferous and acidiferous ingredi-
ents, drying the rods, and then subjecting
them to high temperature while packed or

embedded in graphite, substantially as de-
scribed.

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Witnesses:

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