No. 620,082. Patented Feb. 21, 1899.

C. E. ANTHONY.

WURTZILITE PRODUCT AND APPARATUS.

(Application filed Oct. 15, 1896.)

(No Model.)

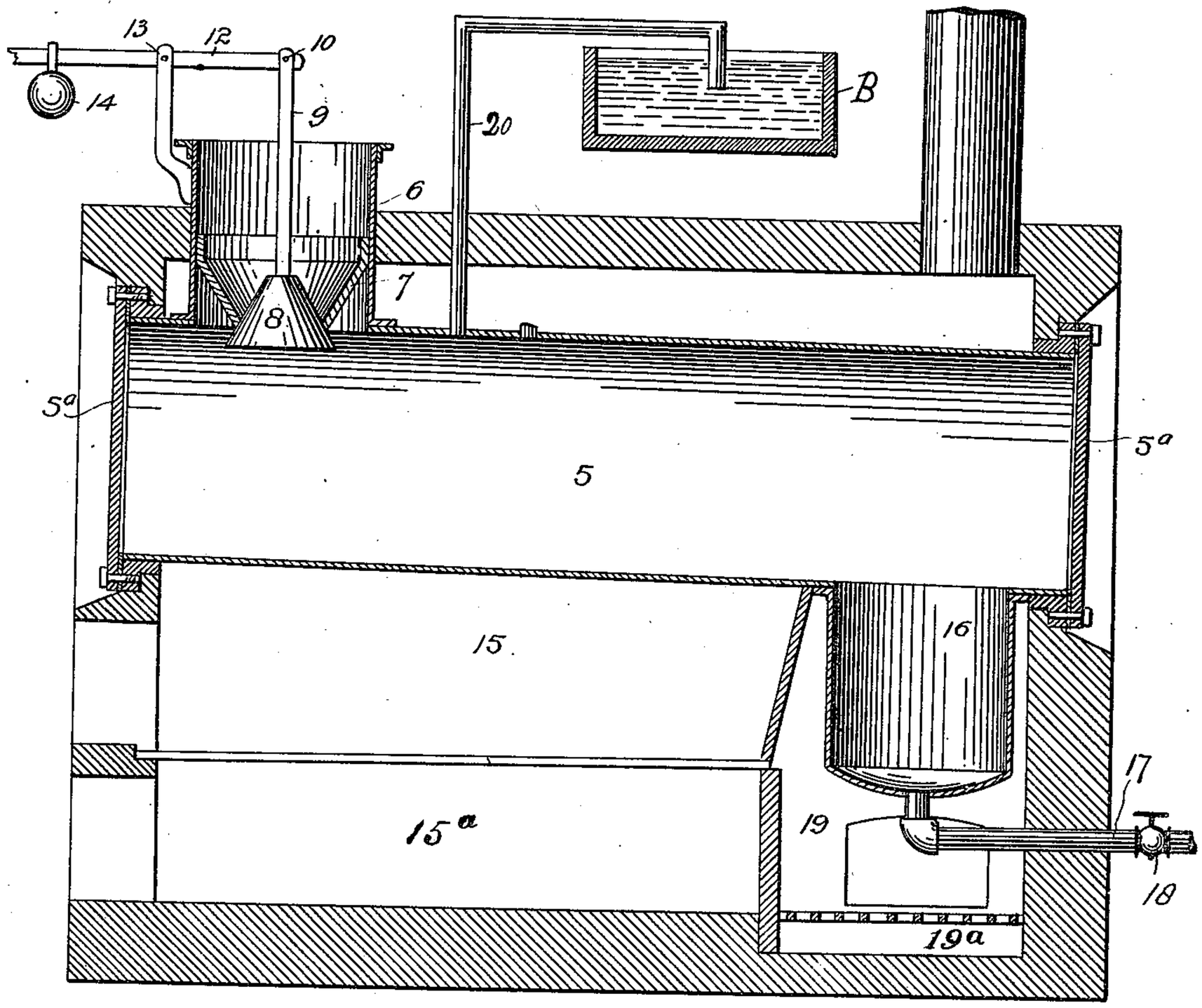

FIG. 1

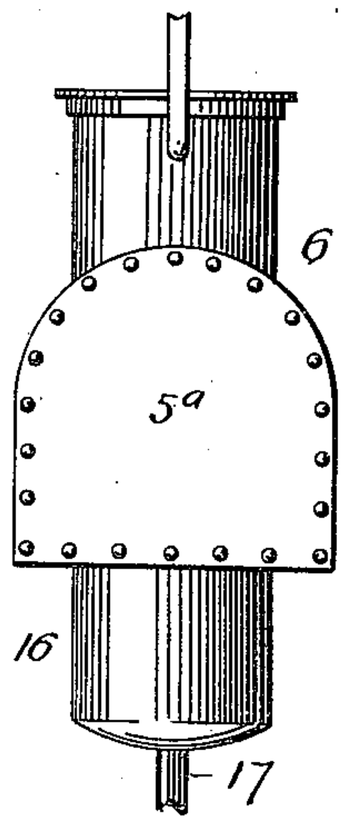

FIG. 2.

Witnesses
G. J. Fleming
Edith Ainsworth.

Inventor
C. E. Anthony
By his Attorney
A. J. O'Brien

UNITED STATES PATENT OFFICE.

CHARLES E. ANTHONY, OF DENVER, COLORADO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO FRED RENNER, JR., OF HASTINGS, NEBRASKA.

WURTZILITE PRODUCT AND APPARATUS.

SPECIFICATION forming part of Letters Patent No. 620,082, dated February 21, 1899.

Application filed October 15, 1896. Serial No. 608,990. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. ANTHONY, a citizen of the United States of America, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in a Wurtzilite Product and Apparatus; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

Wurtzilite is described by Prof. W. P. Blake in an article in *The Engineering and Mining Journal* of December 21, 1889, as "a newly-discovered and peculiar bitumen," and he comments upon its lack of fusibility and solubility, stating that it "takes fire and burns with a bright luminous flame with a slight crepitation" and that it "resists the usual solvents of bitumen." Dr. Henry Wurtz, in articles which appear in the said *Journal's* issues of January 11 and 25, 1890, also comments upon the insolubility of wurtzilite and its failure to fuse under atmospheric pressure. Many of the characteristics of wurtzilite explained in these articles are such as to indicate a commercial value of the material; but its lack of fusibility and solubility has thus far baffled attempts to utilize it in the arts.

My invention provides for the conversion of this heretofore practically useless material into a commercial product capable of utilization in the arts as readily as caoutchouc; and the invention consists in a new manufacture having most of the physical characteristics of wurtzilite, but readily soluble in the ordinary solvents for reducing caoutchouc and like substances—such, for example, as spirits of turpentine, bisulfid of carbon, naphtha, or chloroform—and also fusible in an ordinary vessel, and therefore a product having the desired commercial attributes. I attain this result by pursuing the following-described method: a quantity of crude wurtzilite is placed in an air-tight vessel or retort and heated to about 600° Fahrenheit, with the effect, in perhaps an hour's time, of evolving a light gas, which in turn attacks the wurtzilite, first reducing it to a spongy mass and after several hours to a liquid state, in which it may be drawn off for use.

In practice a small percentage of the gas evolved from the wurtzilite in the retort is allowed to escape from the latter to relieve the pressure therein, and I sometimes distil this gas over and secure an oil of a dark-brown or reddish-brown hue. The product which is drawn off from the retort may be immediately utilized in its hot liquid condition, or it may be partially cooled and solidified and then worked in some suitable apparatus, such as employed with caoutchouc. Again, it may be completely cooled and hardened for storage or transportation, for it is no longer the intractable crude wurtzilite, but a product readily soluble in the common caoutchouc solvents, and is, moreover, fusible in an ordinary vessel. Thus from crude wurtzilite, heretofore valueless commercially, I produce a product of great utility in the arts.

Among the practical uses to which this product can be put may be mentioned the following: in a liquid condition as a paint or varnish ingredient or as an insulating covering, and in a plastic state as a covering for textile fabrics to be used as belting, clothing, roofing, or in other appropriate ways. It is especially useful for such purposes as roofing, where the characteristics of the crude wurtzilite retained by the new product are of great advantage.

In form, elasticity, hardness, color, and electric character the product corresponds quite closely with the crude wurtzilite; but while the latter decomposes before reaching the fusion-point the product is readily fusible, and, as before set forth, the chief distinction is in the solubility of the product. It may be added that when a flame is applied to the product it does not take fire and burn with crepitation, as the crude wurtzilite does, but simply melts.

There are different grades of wurtzilite in which the characteristics discovered by Professor Blake are more or less pronounced, and so the product will vary correspondingly; but subjected to the process herein described wurtzilite of any known variety is converted into a soluble and fusible product. Of course

the process may be varied in the matter of the degree of heat or the duration of time the crude material is subjected to treatment.

Form — Amorphous in homogeneous masses.—At ordinary temperatures and when cold it becomes somewhat brittle and breaks with a large conchoidal fracture, giving very brilliant glossy surfaces, with a vitreous luster like uintahite, or itself in its original condition resembling in appearance the splendent conchoidal surfaces of newly-broken obsidian. It has, however, a decided tough quality, which increases with an elevation of temperature. It has wonderful cleavage properties at all temperatures. At high temperatures it requires a sharper blow to break it than at the lower temperatures. At temperatures above the ordinary it becomes so tough and rubber-like that it cannot be powdered, while at the lower temperatures it can be powdered, yet when chipped into fragments each fragment shows intense cleavage properties. Even the smallest of these show a decided resistance to separate into a powder by displaying a cleavage quality.

Elasticity.—Its elastic qualities depend largely upon the temperature. When cold, it is brittle and shows no elasticity, while at temperatures above the ordinary it is elastic, and when bent will again assume its original shape. When drawn out into thin masses while reasonably warm it recedes quite a bit. Its elasticity at temperatures above the ordinary is much greater than asphaltum products, having more tensile strength, and may be compared with a thick well-kneaded flour-dough, having, however, greater tensility and being harder and tougher, or very much like a mass of rubber. It can be called "flexible" and "subelastic" and is sectile and cuts like horn.

Hardness.—At ordinary temperatures it can be impressed with the nail. It leaves a soft brown mark on paper. Its condition changes somewhat with the temperature, being reasonably hard at low, getting tougher and more pliable as the temperature rises, never becoming so soft (from sun heat) as to adhere to the fingers or run. In general it is identical with the wurtzilite in its original state.

Color.—Fine black with a slight shade to a brown. The extreme thin edges of the flakes obtained by fracture are garnet red by transmitted light, often brilliantly so. It would thus appear to be transparent in very thin plates and to be deep red in color. The color of the mass by reflected light is a glossy jet black, like uintahite or wurtzilite in its original state.

Fusibility.—It does not fuse or melt in boiling water, but becomes softer, tougher, and plastic, and more elastic, but not viscid or sticky to the fingers, although fragments slightly cohere. Brought near the flame of a candle it softens and melts, does not take fire, but emits a little smoke, giving off a gas and a strong bituminous odor. Heated in any kind of kettle or vessel it gives off a dense cloud of white and yellow smoke of strong odor, and while it requires a high heat to dissolve it it does not require the addition of any other oils or materials.

Solubility.—It dissolves very easily in a kettle or any kind of ordinary vessel at high temperatures without the addition of any oils. When finely ground or powdered, it readily dissolves in spirits of turpentine, gasolene, bisulfid of carbon, sulfuric ether, and chloroform. Alcohol has no effect on it.

Electric characters.—It is a good electric. Negative electricity is easily developed in it by friction. It will be found valuable as an insulating material and for other purposes in the arts. It does not absorb moisture. It is a non-conductor of heat, cold, and electricity to a remarkable degree. Heat softens it without melting, but upon raising the temperature a little above 500° Fahrenheit it begins to dissolve, emitting a gas of strong odor. In powdering it it does not leave a stain or fine dust like uintahite.

In the accompanying drawings, which form part of this specification, I have illustrated a form of apparatus specially designed for carrying on the process above explained and producing the new product.

In said drawings, Figure 1 represents the apparatus in longitudinal section. Fig. 2 represents the retort detached in end elevation.

In a suitably-constructed brick furnace a retort 5 is arranged, said retort being of cylindrical form and slightly inclined from front to rear and supported in openings made for it in the end walls of the furnace. The ends of this retort are closed by heads 5^a, which are securely bolted on, but removable for cleaning purposes.

The interior of the furnace below the retort is divided into two fire-boxes 15 and 19, with ash-pits 15^a and 19^a below the same, one of said fire-boxes running approximately three-fourths of the length of the retort, while the other is of correspondingly limited extent and considerably deeper.

Suitable bridgework separates the fire-boxes and within the smaller one 19 there depends a reservoir 16, which is secured to the bottom of the retort around an opening therein at the rear end. It will be remembered that the bottom of the retort inclines from front to rear, and, therefore, liquefied matter in the retort will flow over the bottom thereof and into the said reservoir, whence it can be drawn off through a pipe 17, leading out of the center of the dished bottom of said reservoir and being equipped with a valve 18.

The retort is fed at its front portion, where a cylinder 6 is secured to its upper side around an opening therein and projects through the top of the furnace and contains within it a funnel 7, whose lower end is closed by a conical valve 8. This valve closes upwardly and its stem 9 is jointed at 10 to one end of a le-

ver 12, which is pivoted at 13 intermediate its ends to a bracket on the side of the hopper, and which carries on its outer arm an adjustable weight 14.

A short distance back of the hopper a vent-pipe 20 rises out of the top of the retort and through the top of the furnace, and said pipe is formed with bends taking its outer open end down into a tank B, containing water, as indicated in Fig. 1 of the drawings.

Fires are maintained in both of the fire-boxes 15 and 19, and a charge of wurtzilite introduced into the retort through the hopper 6 7 and past the valve 8 is first subjected to intense heat generated in the fire-box 15, and upon becoming liquefied in the manner hereinbefore described will run into the reservoir 16, which is directly exposed to a comparatively moderate heat generated in the fire-box 19, sufficient to keep the substance at the proper consistency for readily drawing it off. The retort is kept closed with the exception of the vent through the pipe 20, which provides for escape of a small percentage of gas sufficient to relieve pressure in the retort. Thus the effects hereinbefore explained take place with respect to the wurtzilite and the product drawn off through the pipe 17 is the product of my invention.

The gas passing over through the pipe 20 is preferably condensed in the water-tank B, but may be allowed to escape to the atmosphere without being so condensed.

Of course the above-described apparatus is only one of many which might be employed to carry out the invention; but it is better adapted for the purpose than the ordinary forms of stills.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A soluble and fusible wurtzilite product possessing the characteristics of the crude material in form, elasticity, hardness, color and electric properties, substantially as described.

2. An apparatus of the character described comprising a retort having a bottom inclined from end to end and a reservoir depending from said bottom at the low end, together with a furnace having a fire-box around the reservoir and a separate fire-box under the inclined bottom of the retort, substantially as and for the purpose described.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES E. ANTHONY.

Witnesses:

ISHAM R. HOWZE,

ALFRED J. O'BRIEN.