

UNITED STATES PATENT OFFICE.

JOHN W. WARREN, OF OMAHA, NEBRASKA.

PROCESS OF PURIFYING HYDROCARBON OILS.

SPECIFICATION forming part of Letters Patent No. 705,168, dated July 22, 1902.

Application filed September 28, 1900. Serial No. 31,433. (No specimens.)

To all whom it may concern:

Be it known that I, JOHN W. WARREN, a citizen of the United States, residing at Omaha, in the county of Douglas and State of Nebraska, have invented new and useful Improvements in Processes of Purifying Hydrocarbon Oils, of which the following is a specification.

This invention relates to a new method of clarifying and purifying hydrocarbon oils, especially the distillate of those containing a large percentage of sulfur—as, for instance, those oils known as “Ohio skunk oil”—the distillate of which contains from one-half to two and one-half percentage of sulfur.

By the hereinafter-described method for treating hydrocarbon oils all trace of sulfur is removed and with it the color and odor, so that it can stand the test of the “doctor,” and is equal, if not superior, to the “W.” “W.” or water-white oils now found upon the market.

To remove the sulfur in the oil, I make a solution of sugar of lead in the proportion of about one ounce (1 oz.) of sugar of lead to ten ounces (10 ozs.) of water. This solution of sugar of lead in about the proportion of one to sixteen (1 to 16) I add to the distillate. The lead combines with the sulfur to form an insoluble sulfid, which falls in a black mass to the bottom of the receptacle. To the oil thus treated I add Wyoming rock-clay in a ground state in about the proportion of one pound (1 lb.) of the clay to fifty gallons (50 gals.) of the distillate. This mass passing slowly down through the distillate absorbs the water and any foreign substances resulting from the previous operation. The oil is now drawn off and treated with sulfuric acid in about the proportion of one to ten, (1 to 10,) which dissolves the impurities and destroys the color. To this is added Wyoming rock-clay in its ground state in about the proportion of one pound (1 lb.) of clay to fifty gallons (50 gals.) of distillate, which neutralizes the sulfuric acid. The distillate is then drawn off and caustic potash, preferably in a dry state, in about the proportion of six ounces (6 ozs.) of potash to fifty gallons (50 gals.) of distillate is added. The distillate and potash are allowed to stand until the distillate will satisfactorily stand the test known as the “doctor.” The doctor, as is well known,

is a solution of potash, water, and litharge, and the same is employed solely as a test by bringing to light any latent lead color as caused by excess of sulfur. Having stood thus a sufficient length of time to satisfactorily stand the test of the doctor, which can be determined by repeated trials of small quantities of the distillate in an ordinary test-tube, the final treatment is the reapplication of Wyoming rock-clay, which in its ground state is permitted to fall slowly through the oil, the proportions thus employed being about from one to five pounds (1 to 5 lbs.) of the clay to fifty gallons (50 gals.) of the oil or distillate. The clay is permitted to settle at the bottom of the receptacle, which latter is agitated one or more times, in accordance with the character of the oil, or, in other words, until the oil is colorless. The oil or distillate is then drawn off and is ready for the market and will be found rendered equal, if not superior, to the usual W. W. or water-white oil now on the market, in that it is both odorless and colorless.

The use of Wyoming rock-clay in treating hydrocarbon oils is not herein broadly claimed, as such is disclosed in United States Patent No. 666,446, granted me January 22, 1901. As stated in said patent, this “Wyoming rock-clay,” so named by reason of its presence in large quantities in the State of Wyoming and adjacent regions, contains, so chemical analysis shows, silica, 63.25; alumina, 12.62; oxides of iron, 3.70½; calcium oxid, 4.21; magnesia, 3.97½; soda, 3.95; potash, 1; sulfur, 1.58, and water 6.71. Other analyses may differ slightly from the above, but not materially. From this analysis it will be seen that this clay contains six elements that have a strong and recognized affinity for sulfur—namely, silica, alumina, magnesia, calcium oxid, soda, and potash. The name “Wyoming rock-clay” was applied to this substance for the reason that geologists have failed, so far as I have been able to ascertain, to give it any geological name and for the further reason that it has been discovered in large quantities in Wyoming and adjacent regions. It is present now in large quantities in the region of Rock creek, Albany county, State of Wyoming, and it may exist in undiscovered quantities in numerous other sections of this

and other countries. It can also be found in "Miser's Mine," in section 17, township 21 north, of range 75 west; also, in "Wilcox's Mine," in section 11, township 22 north, of range 76 west, both in the county of Albany, State of Wyoming.

In color the clay is a light drab, and when rubbed between the fingers it has a soft magnesia-like feeling. It is readily crumbled and powdered and is about the consistency of French chalk, though not so hard. By dipping one end of a piece of the clay in water it will immediately become soft, yet not dissolve. The end thus moistened may be readily scraped off with a knife, and when mixed with a few drops of water it will again harden into a kind of putty similar to its natural condition. When powdered and mixed with carbon oil, it remains disintegrated, the oil, therefore, not having the same effect as water.

I do not limit my invention to Wyoming rock-clay, as clays of substantially the same nature and qualities may exist under different names and in other localities. Therefore by the phrase "of Wyoming-rock-clay constitution," as appears in the claims, I mean any clay having substantially the same constitution.

Having described my invention, what I claim is—

1. The herein-described method of clarifying hydrocarbon oils, which consists in treating the same with a solution of sugar of lead; absorbing the water and any foreign substances resulting from such latter operation by an addition of clay of Wyoming-rock-clay constitution; drawing off the distillate; treat-

ing it with sulfuric acid; neutralizing the same by an addition of said clay; drawing off the distillate; treating it with caustic potash; allowing it to stand; re-treating the distillate with said clay; and, finally, when clear, drawing off the distillate.

2. The herein-described method of clarifying hydrocarbon oils, which consists in treating the same with a solution of sugar of lead, treating the distillate with sulfuric acid; and neutralizing the acid and clarifying the distillate by an application of clay of Wyoming-rock-clay constitution.

3. The herein-described method of clarifying hydrocarbon oils, which consists in treating the oil so as to dissolve, liberate and let fall the sulfur therein; drawing off the distillate; treating the distillate with sulfuric acid; treating the distillate to neutralize the sulfuric acid; drawing off the distillate; treating the same with caustic potash; permitting the distillate and potash to stand until the distillate is clear; and finally adding clay of Wyoming-rock-clay constitution.

4. The herein-described method of treating hydrocarbon oils, which consists in subjecting the oil to the action of a solution of sugar of lead; drawing off the distillate; treating the distillate with sulfuric acid; and, finally, letting fall through the distillate powered Wyoming rock-clay.

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

JOHN W. WARREN.

Witnesses:

H. FODERINGHAM,
HENRY M. CHILDS.