

United States Patent Office.

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Letters Patent No. 90,100, dated May 18, 1869.

IMPROVED COMPOUND FOR THE MANUFACTURE OF LUBRICATING-OILS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, E. E. HENDRICK, of the city of Carbondale, county of Luzerne, in the State of Pennsylvania, have invented a new and improved Compound, to be Used in the Manufacture of Lubricating-Oils and Greases, which I shall denominate "Plumboleum;" and I do hereby declare the following to be a full and clear description of the mode of compounding the same.

To enable others skilled in the art to understand, so as to make and use my invention, I will proceed to describe its composition, and the manner of compounding the same.

It is a well-authenticated fact, that is generally understood by men thoroughly versed in the use of mineral-oils for lubricating-purposes, that such oils are valuable for that purpose, just in proportion to their specific gravity. Mineral-oil of a specific gravity of 40° Baumé's coal-oil hydrometer, is practically worthless for lubricating-purposes. At a specific gravity of 30°, mineral-oil begins to deserve the title of lubricating-oil, but even then more because it is somewhat unfit for any other use than its own quality for general lubricating-purposes, for it is really a very indifferent lubricator, especially in warm temperatures. Mechanics say it has not body enough, and does not wear. The truth is that it is of too light specific gravity in warm temperatures, and, consequently, does not remain on the journal, or where it is put, which is proved by the fact that 30° gravity mineral-oil gives much better results in cold than in warm weather, which fact may be explained thus: the specific gravity of oils is tested at a temperature of 60° Fahrenheit, and every five degrees' variation from a temperature of 60° causes one degree variation of the specific gravity.

Now, if oil has a specific gravity of 30° at a temperature of 60°, then, at a temperature of 80, the gravity will be 34°, and correspondingly thinner; *ergo*, capillary attraction has so much more power to cause it to spread from the journal or bearing-surface to be lubricated; or, if placed in boxes, as is the custom on railroad-cars, filled with cotton-waste, or other medium used for packing, the capillary attraction of the packing is so great as to raise such light-gravity oil so rapidly, that in a short space of time, the whole side, and even the tread of the wheels will be covered with oil, and, upon examination at such time, an insufficiency of oil will be found inside the box. With good mineral or other oil, of a specific gravity of 23° to 25°, no such result will be observed, as such low specific gravity partially overcomes the capillary attraction, and the oil remains where it ought to, and does the work assigned it.

Immediately about the hub of the wheel, oil will be observed adhering quite freely when heavy oil is used, but having rather the appearance of heavy grease than

oil, whereas, where the light-gravity oil is used, the wheels have the appearance of having been recently dipped in kerosene or other thin oil, or spirits of turpentine.

It is evident to any one that oil which spreads itself away from the place to be lubricated, and over surfaces not to be lubricated, is uneconomical. It is, furthermore, a fact, which I have repeatedly demonstrated, that one gallon of mineral-oil, of a specific gravity of 23° to 25°, will perform more service than two gallons of mineral-oil of a gravity of 30°.

In numerous instances, where mechanics using mineral-oil have reported it to lack "body," I have tested it with the hydrometer, and found it of correspondingly light specific gravity; and, on taking the same oil, and depressing the gravity by a mixture of tallow or oil of heavier specific gravity, or other means, a more favorable result has been realized.

From a series of experiments, of some years' duration, by close observation, I deduce the fact, that what in common parlance is called body in lubricating-oil, is only another name for specific gravity, for to produce mineral-oil of low specific gravity is to produce oil of good body, and *vice versa*.

To obviate the difficulty arising from a want of body in mineral-oils, resort is usually had to a mixture of whale-oil, lard-oil, lard, tallow, or other heavy oils, greases, or fats, as the specific gravity of these is lower. Whale-oil having a specific gravity of 23°, and lard-oil of 25° to 26°, therefore, if equal parts of these oils and mineral-oil of a specific gravity of 30° be mixed, the resulting compound will be 27° to 28°, which is better than the mineral-oil alone, just in proportion as the specific gravity has been lowered, but not as good a lubricator as the lard or whale-oil, which has a specific gravity of 23° to 26°, or as mineral-oil alone of specific gravity 23° to 26°; but mixing these costly oils with mineral-oils makes an expensive compound, as so large an amount of the more expensive oil is required to reduce the compound to the safe point. Therefore, in order to depress the specific gravity of mineral or other oils that are of too light specific gravity for lubricating-purposes inexpensively, and yet effectively, I combine, with such oil, the oxide of lead, the specific gravity of which is twelve times heavier than oil, and hence a much less quantity is required to accomplish the object sought. Practically, this combination gives the best results I have ever witnessed, fully equal to lard or sperm-oil, and at a cost of one-fifth the former, and of one-tenth the latter. With proper attention to the manipulation, the resulting compound is of the right consistency, and of any desired specific gravity.

In practice, I use whale-oil in making the first combination, (plumboleum,) and petroleum-oil of specific gravity of 30° to 32° for the mineral-oil part of the

second compound, and, by incorporating six to eight ounces of lead with each gallon of mineral-oil, I have a compound of a specific gravity of 23° to 25° , which is a very desirable point to attain. This compound does not seem to gum more than sperm or lard-oil.

Mineral-oil of a lighter specific gravity than 30° or 32° may be used, with nearly as good results, by using a larger proportion of the plumbolum; to prepare which, I grind together, in an ordinary paint-mill, eight parts, by weight, of oil, animal or vegetable, with six parts, by weight, of the oxide of lead. I then place the ingredients in a covered kettle of four times the capacity of the quantity I wish to work, because it froths and foams considerably at some stages of the process. I connect a high flue with the cover of the kettle, for carrying away the fumes of the boiling compound, for the protection of the workmen. (I myself experienced serious symptoms of lead-poison, from inhaling the fumes from open kettles, on several occasions, while experimenting with small quantities in the laboratory.) I then apply heat until the thermometer in the kettle indicates a temperature of 400° to 410° Fahrenheit, when the contents of the kettle, which, by this time, have assumed a dark hue, begin to turn black, and to foam considerably. At this time, I slacken the fire some; and, although this be done, yet the thermometer in the boiling compound will suddenly show an increase of temperature to 450° or 500° , and I have seen it rise, within a few minutes, to 560° . This sudden rise of temperature will take place to a certain extent, although the vessel be removed from the fire when the thermometer first begins to show a sudden increase of temperature; and, on the other hand, if the fire be kept up steadily throughout, the temperature will fall, in the course of from fifteen to thirty minutes, almost as suddenly as it rose, to about where it commenced its sudden rise. The foaming nearly ceases at the same time the temperature falls, and the compound becomes black, or of a very dark brown, or, perhaps, of the color of plumbago. At this time, I remove the fire entirely.

The sudden rise of temperature, noted above, I think, indicates a chemical union of the *plumbum* and

the *oleum*, and I name the compound, at this stage, "plumbolum." I then allow the compound to cool to about 300° to 350° , at which time I add from fifteen to twenty parts, by bulk, of mineral-oil, previously heated to about 200° or 300° , or as much as will keep the compound fluid when cold, ready to dilute for use, as may be desired.

By stirring moderately for an hour or so, a permanent union of the plumbolum and the hydrocarbon-oil takes place. Heat, cold, light, dark, or rest, does not precipitate or separate the ingredients.

I have not experimented much with acids or alkalis on the compound, as I do not contemplate the use of acids or salts in the manufacture.

My reason for using oil, animal or vegetable, in making the first compound, (plumbolum,) is, that mineral-oil will not dissolve or unite directly with the oxide of lead, but will dissolve, and unite, in any proportion, with the plumbolum.

I do not confine myself to the proportions named, nor to any specific proportions, as the proportions may be varied almost indefinitely, by using a larger proportion of animal or vegetable oil, and less lead, and less mineral-oil, or no mineral-oil at all, but simply combine the oxide of lead with the oil, animal or vegetable, in the manner described, in the proper proportions. Either of the oxides of lead will answer.

I do not claim the use of oxide of plumbum when only a mechanical mixture is made by stirring the oil and oxide of lead together, or of oil so made. The difference is readily distinguished by the color and effect, as the lead will soon precipitate, if the mixture be allowed to rest.

Having described my invention,

What I claim as new, and desire to secure by Letters Patent, is—

The use of the compound formed by a union of oil with the oxide of lead, in the manner and for the purposes substantially as described.

E. E. HENDRICK.

Witnesses:

J. B. TOMBES,
ROLLIN H. SMITH.