UNITED STATES PATENT OFFICE.

ARTHUR Z. PEDERSEN, OF WEST ORANGE, NEW JERSEY.

NONCORRODING ANTIFREEZE MIXTURE.

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To all whom it may concern:

Be it known that I, ARTHUR Z. PEDERSEN, a citizen of the United States, and a resident of West Orange, in the county of Essex and State of New Jersey, have invented an Improvement in Noncorroding Antifreeze Mixtures, of which the following is a specification.

My invention relates to anti-freeze mixtures, particularly such as may be employed in the radiators of internal combustion engines for cooling such engines in place of water, which has the decided disadvantage that it freezes at a temperature of 32° F., or lower, with consequent danger to the radiator and engine in cold weather. The object of the present invention is to provide an anti-freeze mixture which shall not only have a low freezing point and which may therefore be used in place of water in the radiators of internal combustion engines without danger of freezing at the ordinary temperatures encountered in winter, but which shall also be free from the corroding action of the ordinary anti-freeze mixtures till now employed in place of water in the radiators of internal combustion engines.

By way of example, I shall in the accompanying specification, describe several illustrative embodiments of my invention, it being understood that said embodiments are herein described for illustrative purposes only. I have discovered that if to an anti-freeze mixture, such as an aqueous solution of sodium or calcium chloride or an equivalent freezing-temperature depressant, I add a chromate, particularly a readily soluble one, such as potassium, sodium or ammonium chromate, preferably potassium chromate, certain very desirable and unexpected results follow.

The term "alkali metal chromates" as used in the claims is intended also to include ammonium chromate. By "readily soluble" is meant a solubility in water of the order of that of the alkali metal chromates.

For example, if to an aqueous solution containing about 25% of calcium chloride I add about 1% of potassium chromate, I get an anti-freeze mixture which not only has a low freezing point, but which is also non-corroding. That is, by actual trial I have found that the corrosion of aluminum, iron, brass, solder or rubber, with such a mixture is either entirely absent or at least less than with an equivalent mixture from which the chromate is absent. So also if I make up an anti-freeze mixture comprising an aqueous solution of about 25% of sodium chloride and about 5% of potassium chromate, I obtain another anti-freeze mixture having similar desirable qualities. Not only does the added chromate prevent corrosion, but it helps to lower the freezing point, thereby serving a double purpose.

The non-corroding, anti-freeze mixture of my invention may be used in the manner in which the ordinary anti-freeze mixture is employed, and will be found to possess superior utility and a very desirable lack of corroding power when in use, while at the same time being economical and very easy to prepare.

It is of course to be understood that my invention is not limited to the specific embodiments herein set forth for purposes of illustration only. It is also to be understood that the proportions in which the chromate and the freezing-temperature depressant are used may be varied to suit the particular conditions under which the compound is to be employed, although I prefer to use the proportions mentioned in the specification above. It is also to be understood that a mixture of several freezing-temperature depressants may be employed instead of a single such depressant. It is further to be understood that where available and otherwise suitable, a bichromate may be used in place of a chromate, and that the term "chromate," as used in the claims, is, wherever such a meaning is consistent with the present invention, intended to cover the use of a bichromate as well as of a chromate, with or without the addition of free chromic acid. It is also to be understood that the present mixture may be used for any purpose for which it is suitable, as, for example, for the so-called brine solution in a refrigerating plant.

I claim:

1. The method of rendering an anti-freeze mixture non-corrosive which consists in including therein a readily soluble chromate.

2. The method of rendering non-corrosive an anti-freeze mixture containing a soluble chloride which consists in including therein an alkali metal chromate.

3. The method of rendering non-corrosive, an anti-freeze mixture containing calcium

chloride which consists in including therein a water-soluble chromate of an alkali metal.

4. A non-corroding, anti-freeze mixture comprising an aqueous medium having a freezing-temperature depressant, and a readily soluble chromate dissolved therein.

5. A non-corroding, anti-freeze mixture comprising an aqueous medium having a freezing temperature depressant chloride and an alkali metal chromate, dissolved therein.

6. A non-corroding, anti-freeze mixture comprising an aqueous solution of calcium chloride and potassium chromate.

7. A non-corroding, anti-freeze mixture containing water soluble calcium chloride and a water soluble chromate of an alkali metal in the proportions of approximately one to five parts of the chromate for twenty-five parts of the chloride.

In testimony whereof, I have signed my name to this specification this 12th day of October, 1920.

ARTHUR Z. PEDERSEN.