UNITED STATES PATENT OFFICE.

LOUIS GRIMM AND JOHANNES CORVIN, OF MAGDEBURG, PRUSSIA.

IMPROVEMENT IN LIQUIDS FOR HEATING BY MEANS OF PIPES, &c.

Specification forming part of Letters Patent No. **138,082**, dated April 22, 1873; application filed March 14, 1873.

To all whom it may concern:

Be it known that we, LOUIS GRIMM and JOHANNES CORVIN, both of the city of Magdeburg, in the Kingdom of Prussia, Germany, have invented a new and Improved Fluid for Filling Heaters and Heating-Pipes, &c., of which the following is a specification:

Among the different fluids hitherto used as conductors of heat in heaters and pipes there are none which do not present essential objections. Water has been most generally used for that purpose, and the manner of employing the same consists of three different methods. The older method, the hot-water or low-pressure heating, presents the following objections: First, great expense in the first arrangement, together with the considerable room required; second, the great consumption of fuel; third, the considerable loss of time from the time of starting the fire, because a great quantity of water must be heated nearly to the boiling-point before it begins to circulate and transmit heat into the rooms; fourth, great expense for heating and cleaning the heater and pipes; fifth, the danger of freezing of the pipes when in very cold weather the heating is not constantly continued; sixth, the temperature of water cannot be raised above 63° centigrade, in consequence of which the apparatus will prove insufficient in very cold weather. In consequence of the evaporation and the rather frequent restoration of water being required, there will be a rapidly-increasing sediment of mud and incrustation in the pipes, particularly when the water is limy or impure, which will in a short time render the apparatus useless and dangerous. When the heating apparatus and pipes, &c., are filled with the fluid below described, there will be no evaporation, and, consequently, no restoring of fluid required; less fuel will be used; a sediment of mud or incrustation will be impossible; the heat can be increased to more than 300° centigrade; and this fluid will not freeze even at 40° centigrade; consequently an apparatus filled with this improved fluid is applicable to rooms which are not continually heated, such as churches, railway-carriages, &c.

The newer method or high-pressure apparatus, which by recent improvements has been divided in two classes, the medium and high pressure, differ only from each other by the introduction of certain valves, which open as soon as the expansion in the pipes exceeds a certain limit. In comparing the low-pressure hot-water heating with the high-pressure system, the latter has the advantages of being cheaper in its first construction, requiring less space, and allowing a quicker warming of the localities, and capable of extending the temperature even to a heat required in a baker's oven. The disadvantages of this high-pressure-heating system consist in the danger from explosion, liability to freezing in cold weather, and the short duration of the different parts of the apparatus; besides, the great vehement circulation of the overheated water in the apparatus and pipes subjects them to a perpetual shaking, whereby the joints are loosened, and costly repairs continually required.

Several other fluids have been tried, such as mineral oils, &c., which, in practice, have shown the difficulty of a gradual decomposition; besides, the combustibility of heated mineral oils renders their use most dangerous. Glycerine, too, has been used, pure or combined with water; but the same is subject to a slow decomposition, and has, besides, the peculiarity to boil by shocks.

The new and improved fluid invented by us consists in the employment of glycerine in which is dissolved chloride of calcium, or similar hygroscopic salts dissoluble in glycerine, so that the specific gravity of glycerine, which is 1.26, increases in the mixture to 1.40 to 1.45. The point of ebullition of this fluid is in ratio to the greater or smaller addition of salt, 330° to 300° centigrade. No change of heat will influence this improved fluid, even though it were used in open vessels; the humidity taken from the air would instantly be again evaporated.

This fluid may therefore be employed in every system of heating, as well as for cooking apparatus and different baths, and recommends itself particularly for baking-ovens, varnish-stoves, and railway-carriages, &c. It is entirely free from all those objections to water, mineral oils, or glycerine, pure or mixed with water. It is not subject to freezing, even

in the greatest cold. It is incombustible, does not corrode any metal, and no pressure of more than one atmosphere will act in the pipes when they transmit a temperature of 340° centigrade. This glycerine composition is of particular advantage in heating bakers' ovens, there being no risk of explosion, and the apparatus will have a longer duration. In cooking-stoves the use of this composition is equally commendable, because the meats can never be burned; no pressure takes place in the apparatus, which is therefore less costly. The heating apparatus not being necessarily located on the stove, several may be put in action by one and the same fire.

What we claim as our invention, and desire to secure by Letters Patent, is—

The herein-described fluid, consisting of glycerine and chloride of calcium, or its equivalent, in the manner and for the purposes substantially as hereinbefore set forth.

LOUIS GRIMM.

Witnesses: JOHANNES CORVIN.

HERMANN KREISMANN,

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