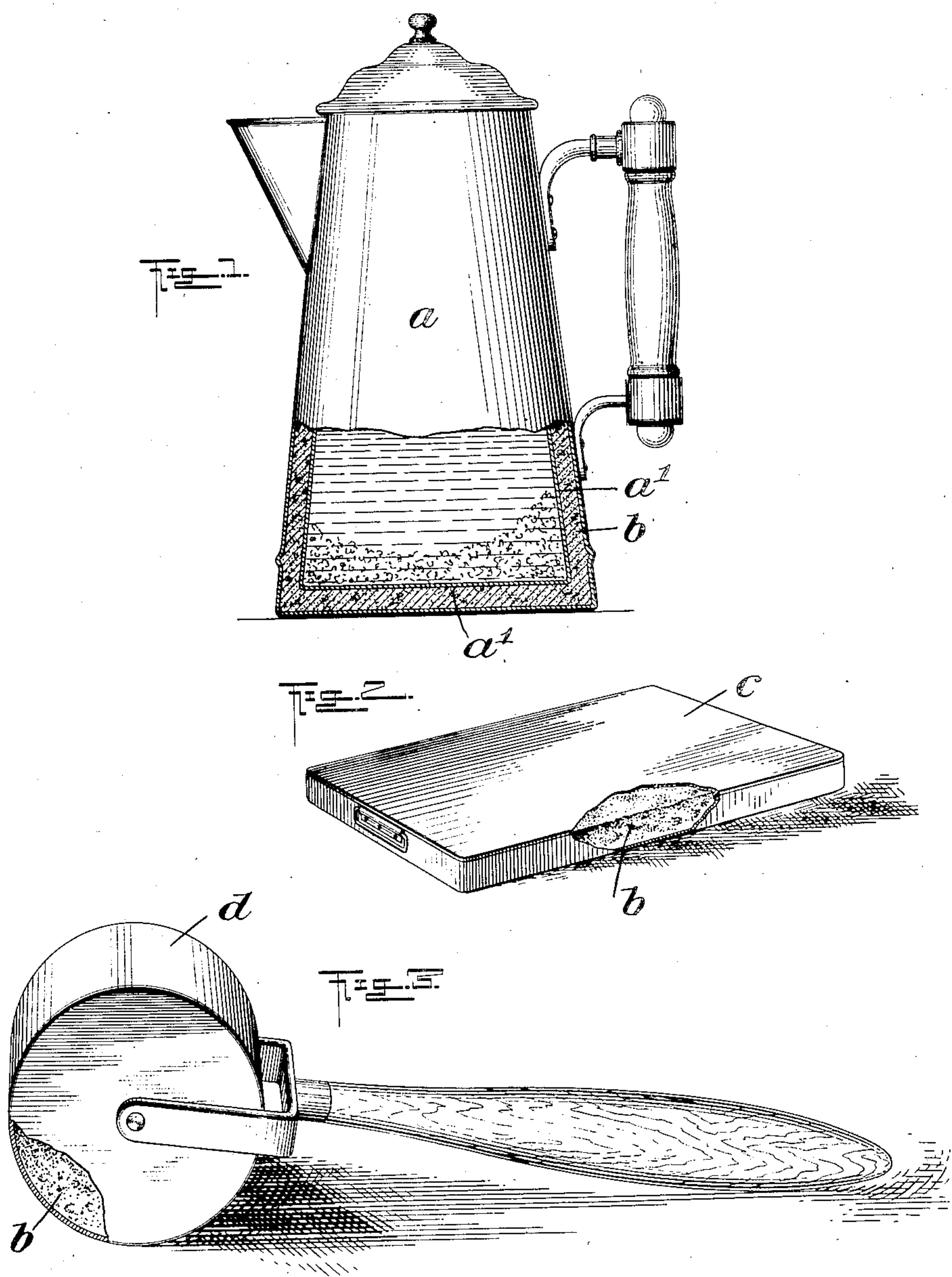


No. 780,352.

PATENTED JAN. 17, 1905.

E. KAFKA.  
HEATING COMPOSITION.  
APPLICATION FILED OCT. 3, 1904.



WITNESSES:  
*W. L. L. L.*  
*A. H. Fay*

INVENTOR  
*Emil Kafka*  
BY *M. M. M.*  
ATTORNEYS



# UNITED STATES PATENT OFFICE.

EMIL KAFKA, OF NEW YORK, N. Y., ASSIGNOR TO FIRELESS HEATING COMPANY, OF NEW YORK, N. Y., A FIRM.

## HEATING COMPOSITION.

SPECIFICATION forming part of Letters Patent No. 780,352, dated January 17, 1905.

Application filed October 3, 1904. Serial No. 226,998.

To all whom it may concern:

Be it known that I, EMIL KAFKA, a subject of the Emperor of Austria-Hungary, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and useful Improvement in Heating Compositions, of which the following is a full, clear, and exact description.

My invention relates to the retention of heat and emitting it for long periods.

It is well known that certain chemicals have the property of aqueous fusion—that is, when the crystals are heated to a certain temperature they melt in their own water of crystallization. The latent heat of fusion of such bodies is very high, and consequently after being melted they will upon cooling to their temperature of fusion remain at that temperature a long time and give off a great amount of heat before they are entirely recrystallized. Sodium acetate is such a compound. Its temperature of fusion being 58° centigrade, it will remain at that temperature for three or four hours while cooling if employed in large enough quantities. Mixing it with indifferent bodies—as, for example, glycerin, &c.—produces no better results.

Now I have discovered that by the use of a composition of two or more of certain crystalline salts a great increase in utility and effectiveness is produced, a higher temperature can be reached, the heat may be retained for much longer periods, at the same time much smaller amounts of material are required, and other advantages will result. If a receptacle be provided with such a composition and heated until all the ingredients are melted, a source of heat is obtained which will remain at gradually-lowering temperature until all of the ingredients are recrystallized.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation, partly in section, of a receptacle constructed for use with my invention. Fig. 2 is a perspective view of a carriage-warmer, showing another way

of using my invention; and Fig. 3 is a perspective view of a massage implement with my invention applied thereto.

In Fig. 1, *a* represents a receptacle in the form of a coffee-pot; but it will be obvious that the same principle could be applied to any other receptacle—such, for example, as a teapot, a dinner-pail, a soup or meat dish, a milk-bottle, a hot-water bag, a glue-pot, a chest for holding bottles, &c. The receptacle is provided with an inner lining *a'*, either at the bottom or sides, or both, so as to furnish an inner receptacle for a compound *b*. Of course it will depend upon circumstances whether the inner receptacle extends entirely around the receptacle or is located only at or near the bottom. When the receptacle is manufactured, the inner receptacle is provided with the compound and then sealed up.

In use the receptacle is preferably immersed in warm or boiling water until the crystals melt and then is set aside. It will be found to keep warm for many hours. It may be heated in any other way, as by putting it on the stove; but this would require too much attention and care for ordinary use. In cases in which the liquid to be contained in the receptacle can be heated to a considerably higher temperature than that at which it is desired to retain it the necessary heat may be imparted to the composition by merely pouring the superheated liquid into the receptacle. It will be obvious that in designing receptacles for different materials the proportions and ingredients of the composition, as well as the location of the inner receptacle, may be varied so as to retain the material at the desired temperature.

In Fig. 2, *c* represents a carriage-warmer. It may be provided with a receptacle, as before, for the composition *b*, but is preferably made hollow, so that it can be filled with the composition. It can be made in any size and shape, and obviously the same principle can be applied to foot-warmers, ear-bags, stomach-bags, and an infinite variety of articles used for keeping different parts of the body warm. A massage implement *d* may also be constructed on the same principle. It will be



understood that all of these articles may be made of metal, rubber, or any other suitable material. The composition to be employed may be considerably varied; but I prefer a mixture of lead acetate and sodium sulfate. The lead-acetate crystals form (or melt) at  $75^{\circ}$  centigrade and those of sodium sulfate at  $33^{\circ}$ . Both have the property of aqueous fusion and have high latent heat of fusion. Upon heating this mixture to a point above  $75^{\circ}$  the crystals of both substances melt, and upon cooling again to  $75^{\circ}$  the lead acetate commences to crystallize. This is accompanied by the liberation of considerable quantities of heat, and as it proceeds slowly the entire mixture will be reheated and retained at  $75^{\circ}$  for a long period. When the crystallization of this salt is completed, the resulting mass of crystals and liquid will cool to  $33^{\circ}$ , when the sodium sulfate will begin to crystallize. A saturated solution of this material will cool considerably below  $33^{\circ}$  without crystallizing unless in the presence of crystals of other substances; but in this case crystals of lead acetate are present, and consequently crystallization will commence immediately. The great amount of heat given out will keep the entire mass at about  $33^{\circ}$  until the sodium sulfate is entirely crystallized. It will thus be seen that with this composition the temperature will remain at  $75^{\circ}$  for a long time, then drop to  $33^{\circ}$ , and after remaining stationary at that point for a considerable period will gradually drop to that of the atmosphere. In order to have a connecting-link between the temperatures of  $75^{\circ}$  and  $33^{\circ}$  and to further increase the time of cooling, a little sodium acetate may be added. This will cause the mass to remain at  $58^{\circ}$  for a time and retard the cooling operation. An inert material, like gelatin, sand, or pulverized stone, can also be added to aid in holding the heat.

A composition of twenty-five per cent. lead acetate, fifty per cent. sodium sulfate, and twenty-five per cent. sodium acetate will act with such efficiency that one pound of it will evolve heat for about fifteen hours and a pound and a half for twenty hours. It is only necessary to keep the receptacle containing the mixture in hot water for a few minutes in order to prepare it for this action. Another advantage of a mixture of these two or three substances lies in the fact that if the receptacle is not heated enough to melt all of the ingredients it will still be effective if any one or more of them be melted. Furthermore, if it is not desired to heat the receptacle as high as  $75^{\circ}$  it can be retained at  $58^{\circ}$  or  $33^{\circ}$ , as desired. It will be readily understood that there are other substances which could be employed in the same way without departing from the spirit of my invention and that the latter is not limited to those mentioned above. It will also be seen that non-crystalline substances can be added.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A composition of matter for retaining and gradually emitting heat, comprising lead acetate and sodium sulfate.

2. A composition of matter, comprising lead acetate, sodium sulfate, and sodium acetate.

3. A composition of matter containing about twenty-five per cent. of lead acetate, fifty per cent. of sodium sulfate, and twenty-five per cent. of sodium acetate.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EMIL KAFKA.

Witnesses:

CARL FLEISHMAN,  
JNO. M. RITTER.