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MATERIAL AND METHOD FOR SEALING LEAKS IN LIQUID-CIRCULATING SYSTEMS

No Drawing.

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The purpose of this invention is to provide a material and a mode of use of such material for closing the small leaks which occur in liquid circulating systems such as the cooling systems of automobiles. It consists in the combination of ingredients herein described and in the manner of utilizing the same herein set forth as indicated by the claims.

10 In many liquid circulating systems including water heating systems, and particularly the cooling apparatus associated with internal combustion engines in automobiles and other vehicles, there are frequently small
15 leaks which do not interfere with the operation of the system sufficiently to justify any large repair expense but which are a constant annoyance and may later develop more serious trouble if not remedied. This is especially true in the automobile radiator which
20 is composed of many pieces of thin metal seamed or soldered together in such a way that slight crevices are likely to open in the seams as the result of road vibration, corrosion or freezing of the circulating liquid in
25 certain areas of the radiator.

Numerous compounds or mixtures have been devised and marketed which were intended to be placed in and carried by the circulating liquid for sealing these small breaks
30 from within. Most of these compounds include some fibrous material in the nature of straw or lint which is expected to mat and pack in the opening when carried to the point
35 of the break by the outflow of the leaking liquid, but these fibrous ingredients have a serious disadvantage in tending to clog the entire system by catching on any projecting
40 shoulder or obstruction to the direct flow of the liquid, or even on the slightly roughened surfaces which may be caused by mineral deposits from the water on the interior walls of the radiator. Thus the fibers build up accumulations at various points in the system
45 so as to seriously hamper the proper flow of the liquid. Furthermore the fibers tend to accumulate in bunches and travel in this form through the liquid and when these bunches of material are arrested at any point the clogging
50 proceeds rapidly. When the system is

drained the plugs of packed or matted fibers at the leaks are likely to come loose upon release of the water pressure, whereupon they will flow out with the liquid, leaving the breaks or crevices unsealed. Furthermore,
55 at the opening which it is intended to seal, the fibrous material if used in combination with a glue binder or the like, may mat and pack and may even tend to form into a fairly hard plug while the circulation is maintained
60 and the liquid is kept hot and while the air is being drawn through the radiator by the operation of the usual cooling fan; but when the engine is stopped and the fan ceases to draw the air past the exposed plug at the leak,
65 the water from the inside of the system will gradually soak through the fibrous plug and will re-dissolve the glue binder so that the leak is only temporarily mended; of course the same thing will happen even more rapidly
70 with those sealing compounds which use glue with fibrous matter.

My invention contemplates the use of a sealing compound which is composed of non-fibrous solid particles, preferably metallic in
75 nature and therefore insoluble in the circulating liquid, but so finely divided as to be carried readily in suspension therein throughout the system; and with these solid particles
80 I suspend in the liquid a gum, preferably resinous in nature so that it may serve as a binder for the solid particles when they accumulate at the leak. A resinous gum while
85 it may be suspended in the circulating liquid if introduced therein in finely divided form, and while it may even dissolve to some extent when the liquid is warm, will harden and
90 solidify when it is exposed to the air at the opening constituting the leak, and as the moisture is evaporated from the outer surface of the seal thus formed at the leak the resinous
95 gum will become practically insoluble and will not re-dissolve in the water of the circulating system. The seal thus built up of the solid particles and the resinous gum becomes permanent and if the solid particles
100 are metallic their exposure to the outer air will induce oxidation which operates to more firmly cement them to each other and to the radiator surfaces.

For the solid particles I prefer to use a finely divided form of aluminum which is obtainable in minute flakes rated at 120 mesh and smaller. As a result of the pulverizing process these flakes or particles have an oily coating which would tend to interfere with their cementation into a firm seal; therefore I prefer to treat the aluminum with a thick soap solution which cuts the oil from the particles rendering them more readily subject to oxidation and cementation as above noted, and facilitating distribution of the metallic particles in the liquid of the system. The soap solution is made with a resin soap which contains a sufficient quantity of resinous gum to neutralize the lye of the soap and an excess of resinous matter which will serve as a binder as already explained. After thoroughly intermingling the aluminum particles in the resin soap solution I remove a portion of the moisture and press the mixture into a fairly solid block which places it in convenient form for marketing and for subsequent use. To repair the leaks in an automobile cooling system the user then cuts up this block or cake into small chunks and simply drops them into the cooling liquid at the usual radiator filler opening. The small chunks will not disintegrate at once and some of them may even be carried directly to the leak and become caught at the point which is to be repaired; but if the entire block of material is thoroughly broken up, its ingredients will be carried in suspension in the circulating liquid and will tend to accumulate and build up a seal at any small opening through which the liquid is leaking. As already explained, the rapid evaporation from the outer surface of the leak tends to dry and harden the resinous gum which in turn tends to bind firmly the solid metallic particles into a very serviceable seal for closing the leak.

Frequently in cold weather the water in an automobile cooling system is partially replaced with glycerine which is more penetrating than water and tends to leak through much smaller crevices; it becomes necessary to tighten up all packed joints in the system and even then the glycerine may find openings in the radiator at which there was no discoverable leakage of water. A fibrous sealing plug which might be relatively impervious to water would be inadequate to seal the system against the leakage of glycerine, whereas my compound of minute particles suspended in the circulating liquid may even be carried into these minute crevices in addition to accumulating over them at the inner surface of the radiator; thus these particles will form an effective seal and plug of hardened resin and insoluble matter which will retain the glycerine perfectly in the system. Some of the crevices are in or adjacent the asbestos packing which is used in the joints of the system and which of itself frequently

proves inadequate to hold the glycerine even when compressed by clamping screws at the joints; but the minute solid particles of my compound will find their way into these crevices along with sufficient resinous gum to seal them. In other words, this material carried in suspension in the mixture of glycerine and water will be transported to any points through which the glycerine tends to leak and will promptly form sealing plugs at such points which will retain the glycerine in the system indefinitely. In fact, where glycerine or like material is used as the circulating liquid, it is found that the minute solid particles such as aluminum may be used practically without any binder because they are carried in a colloidal state and will serve by themselves to plug the minute crevices through which the glycerine would otherwise tend to escape.

Oxidation of these minute particles upon exposure to the outer air and to the heat of the radiator serves to cement them together without any additional binder. And the same is true in a water circulating system; that is, the minute metallic particles are carried in suspension by the flow of the liquid toward the small leaks, and if the aluminum or other metal has been first cleaned of oil, or can be obtained free from oil initially, their own oxidation will cement them into an effective plug without other binding material.

It may be noted that almost any salt or fibrous material adhering to the walls of a radiator by reason of the roughness caused by mineral deposits as above noted, will tend to act as a heat insulator, thus retarding the conduction and radiation of heat through the radiator walls, whereas when my sealing compound is added to the circulating liquid, the accumulation of minute metallic particles of the compound on the radiator walls if they should be caught and held by the roughness thereof, would tend to assist radiation rather than hamper it, since the metallic particles will readily conduct heat from the liquid to any substance with which they are in contact.

I claim:—

1. A composition for admixture with the liquids of circulating systems comprising a leak sealing element consisting essentially of suspendable finely divided oxidizable metal, and a resinous binder.

2. A composition for admixture with the liquids of circulating systems comprising a leak sealing element consisting essentially of finely divided oil free oxidizable metal carrying a protective coating of soap.

3. A composition for admixture with the liquids of circulating systems comprising a leak sealing element consisting essentially of finely divided oxidizable metal adapted to be carried in colloidal suspension in said system.

4. A composition for admixture with the

liquids of circulating systems comprising a leak sealing element consisting essentially of finely divided oxidizable metal, and a soap including a resinous material.

5 5. A method of stopping leaks in liquid circulating systems comprising the step of suspending in the circulating liquid of said system, finely divided metal particles adapted to flow into leaking orifices in said system and to become there oxidized by exposure to the atmosphere.

10 6. A method of stopping leaks in liquid circulating systems comprising the step of mixing with the circulating liquid of said system, finely divided metal particles and a resinous binder, said materials adapted to flow in suspension into leaking orifices in said system, the resinous binder there entrapping the metal particles which are adapted to oxidize upon exposure to the atmosphere.

15 7. A composition for admixture with the liquids of circulating systems comprising a leak sealing element consisting essentially of finely divided oxidizable metal, and a detergent including resinous material in excess of the amount required to neutralize alkalis present in the detergent.

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