Oct. 28, 1924.

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H. BOHLANDER

HEAT INSULATING LAGGING

Filed Feb. 2, 1924

Fig.1

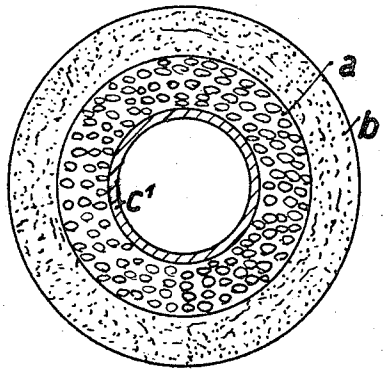


Fig.2

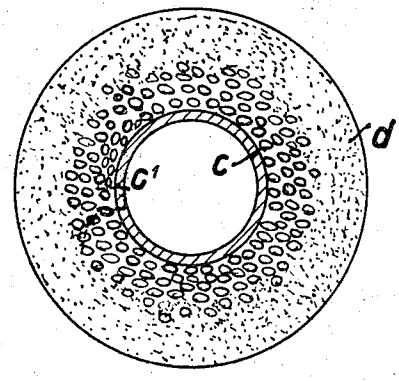
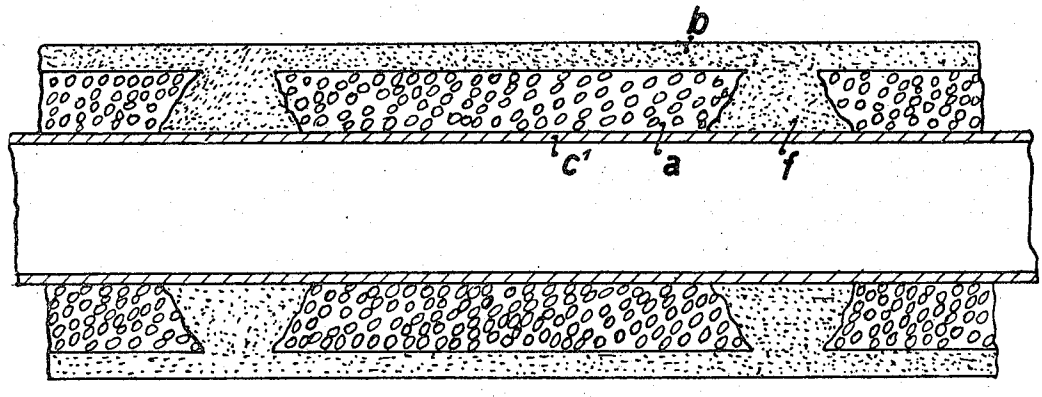


Fig.3



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UNITED STATES PATENT OFFICE.

HEINRICH BOHLANDER, OF COLOGNE-ON-THE-RHINE, GERMANY.

HEAT-INSULATING LAGGING.

Application filed February 2, 1924. Serial No. 690,319.

To all whom it may concern:

Be it known that I, HEINRICH BOHLANDER, a citizen of the German Republic, residing at Cologne-on-the-Rhine, Germany, have invented certain new and useful Improvements in Heat-Insulating Lagging, of which the following is a specification.

My present invention embodies a heat insulating covering for pipes the same being composed of an inner and an outer layer of heat insulating material, the inner layer being formed of a loose dry mixture of slag wool and kieselguhr, the outer layer being formed of a hardened plastic having circumferentially arranged and longitudinally spaced feet extending through the inner layer and into engagement with the surface of the pipe, the sides of adjacent feet being flared inwardly of the covering and toward each other, so as to form dovetailed recesses by means of which the two layers are united together and held in contact with the pipe.

These two properties can only at the best be unsatisfactorily united in one material. If, on one hand, a certain definite mechanical strength must exist in the material in order to provide for a sufficiently long life, this presupposes a material coherence between the particles of that material, and if, on the other hand, the insulating value shall be as high as possible, this can be attained only by a loose texture and a large volume, as the insulating effect is based, first of all, on the air enclosed in the pores of the respective material.

Now, according to this invention, the two heat-insulating masses are arranged in superposition, the inner thereof having the highest possible insulating value, although a comparatively slight strength, and the other or outer having the highest possible strength, although a diminished heat-insulating value. It is, in this way, possible to obtain at a time a good insulation and a sufficient strength. The fact that the heat-insulating capactiy of the outer layer is lesser than that existing in a homogeneous mass does not prevent obtaining a greater insulating capacity of the two layers combined according to this invention because the outer layer can be comparatively thin. Especially if cylindrical bodies, such, for instance, as tubes or pipes or the like, are insulated by means of the new heat-insulating lagging, the insulation is, extraordinarily good even if the outer layer is only thin.

To carry the invention into practice the raw substance suited for the purpose in view are, first of all, such suited already per se to bestow on the insulating mass produced with them the particular properties mentioned, i. e. the mechanical strength or the conductivity for heat. Thus, plastic masses of kieselguhr, the particles of which include already air spaces, tend to form a loose texture, whereas plastic masses of various kinds of dust (for instance from the throat of blast furnaces) yield more a dense texture. Besides, these properties may be reinforced by special appropriate admixtures, for instance by admixing so-called pore-forming substances, viz finely reduced materials, such as pulverulent cork, sawdust, and the like, to that mass which is to have the low coefficient of heat conduction. The just-mentioned materials and similar ones, when having been charred or carbonized at the high temperatures concerned, or having been decomposed chemically, produce small air cells in the mass. That plastic mass which is to have a particularly great strength may get an admixture of binding means, such, for instance, as clay.

Instead of using just two masses, more than two may, of course, be employed, one or the other or both being then divided so as to possess different degrees of the above-mentioned properties. Or provision may be made that there is, in a mass of such a kind, more air enclosed in the inner part than in the outer part thereof, this being effected, for instance, in this way, that the mass is subdivided into layers and a larger amount of the pore-forming additional substances is admixed to the inner layer or layers than to the outer one or ones.

In order to better support the outer main layer under which term is understood that layer having the greater strength parts of this layer may be caused to extend through the inner main layer so as to contact directly with the surface of the tube or other object to be insulated. The outer main layer consists preferably always of a plastic mass which has become stiff, whereas the inner main layer may consist either of a plastic mass having great insulating value or of a loose material, for instance dust or the like.

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My invention is illustrated by way of example in the accompanying drawing in which Figure 1 is a cross section through a tube provided with a heat-insulating compound layer composed according to this invention; Figure 2 is a similar illustration showing a modification, and Figure 3 is a longitudinal section through a piece of tube provided with another modification of the heat-insulating lagging. I wish it, however, to be understood that instead of tubes or pipes also many other articles of quite different shapes and for a lot of other purposes may be provided with a compound layer or layers composed in conformity with this invention.

Referring to Figure 1, the compound layer is composed of an inner insulating layer *a* and an outer insulating layer *b*. Either both layers consist of plastic masses or the outer layer consists of a plastic stiffened mass, whereas the inner one is formed of a loose material. In either case the material forming the inner layer must possess a greater insulating value than the mass forming the outer layer, which, in its turn, is of greater mechanical strength in comparison to that of the other layer.

In the modification illustrated in Figure 2, there is but one kind of mass used for the inner layer *c* and the outer layer *d*, but the inner one contains a larger admixture of a pore-forming substance, as is indicated in the figure by the sectional representations at *c* and *d*.

In Figure 3, however, there are again two distinct masses, an inner mass *a* and an outer one *b*, and parts *f* of this latter extend through the inner mass or layer *a* to the surface of the tube c^1 so as to form a kind of feet supporting the outer layer *b* on the inner one. This modification is intended especially for such cases where the inner layer consists of a loose or dust-like heat-insulating material.

A particularly efficacious compound is formed by a mixture of kieselguhr and slag wool. Both these substances are known as heat-insulating means. Kieselguhr which is highly insulating when preserved in dry state sags, however, easily when being subjected to shocks, and its heat-insulating value is thereafter considerably lesser. But when it is mixed with slag wool, the kieselguhr is, firstly, prevented from sagging, and secondly, the slag wool is apt to resist higher temperatures than otherwise. This may be explained, perhaps, in this way that the slag wool serves, as it were, as a carrier for the loose kieselguhr and retains it when it is subjected to shocks, whereas, on the other hand, the kieselguhr prevents the slag wool from sintering. A good ratio is that in which equal parts in weight are made use of. Mention must be made also of the feature that by surrounding the slag wool (which is employed in the form of small pads or the like) with kieselguhr the hygroscopicity thereof is considerably diminished and decomposition is prevented.

Instead of kieselguhr also other pulverulent materials apt for use as insulating may be mixed in dry state with slag wool, the considerations being the same as those already mentioned. Such materials are, for instance, chalk, calcined magnesia, and the like.

I claim:

A heat insulating covering for pipes consisting of two layers of heat insulating materials, an inner layer composed of a loose dry mixture of slag wool and kieselguhr, and an outer layer composed of a hardened plastic having circumferentially arranged and longitudinally spaced feet extending through the inner layer and into engagement with the surface of the pipe, the sides of adjacent feet being flared inwardly of the covering and toward each other, forming dovetailed recesses by means of which the two layers are united together and held in contact with the pipe.

In testimony whereof I affix my signature in presence of a witness.

HEINRICH BOHLANDER.

Witness:
ERIC RONDU.

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