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INSULATING PIPE COVERING COMPOSITION

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4 Claims. (Cl. 106—84)

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This invention pertains to insulating pipe covering composition, and is a continuation in part of my application, Serial Number 762,542, filed July 21, 1947, now abandoned.

One of the objects of the invention is to provide an insulating composition in which granular sintered and expanded perlite is the principal ingredient, and in which an inorganic binder is used to supplement the natural tendency of certain perlite granules to cake when compressed;

Another object is to provide an insulating pipe covering composition of perlite granules, an inorganic binder, and a binder setting agent which can be handled as a dry mix and pressed to the shape desired and immediately applied to the pipe;

Another object is to provide an insulating pipe covering which has a firm texture, is water resistant, and will afford a maximum degree of insulation at a minimum cost.

I attain the foregoing objects by means of the mixture, the composition of matter and the practice hereinafter described.

Vermiculite, pumice, and perlite having horny projections and cavernous vugs are each entirely unsuited to the purposes here concerned. Particles of the proper type, when pressed together, knit or cling together and form a solid cake, even with slight compressive pressure. This is thought to be due to partial crushing of adjacent cell walls. The edges of cells remaining after crushing become included within the edges of opposite cells and the whole mass shrinks in volume, becomes more dense and clings together. The volume shrinks in proportion to the pressure applied. Knitting commences when a sufficient number of cells have been mutually compressed. A compacted mass of this type of perlite may be compressed to about one-third its original volume and the particles, partially crushed, dry, and without any binder, will knit, and form a cake which may be handled and moved without breaking.

To secure usable objects of compressed perlite, of firmer texture and with less pressure, than would be the case if dry granules were compressed, I mix perlite granules with sodium silicate as a binder, then add sodium chloride, preferably in the form of finely ground rock salt as a setting agent and subject the mass in moulds to a compression pressure of about 5 to 7 tons per square foot. Insulating shapes thus formed may be applied at once to pipes or boilers without drying. When dried these coverings have a greater compressive strength than commercial pipe coverings now in common use.

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To form insulating semi-cylindrical pipe covering sections I select perlite granules of the above mentioned type, composed of thin walled bulbous cells, in a plaster grade aggregate. The granules and particles composing this aggregate are substantially of the following sizes:

8 mesh screen passes all
16 mesh screen retains 23.6%
20 mesh screen retains 53.3%
30 mesh screen retains 75%
50 mesh screen retains 91.5%
100 mesh screen retains 97.4%

Preferably, the aggregate weighs from 4 to 10 pounds per cubic foot.

The mixture is then prepared in following proportions:

To one cubic foot of the above specified aggregate I add with continuous mixing, approximately one half gallon, liquid measure, of sodium silicate, 40° Baumé as a binder.

After the particles of this mix have become coated with the binder, I add as a setting agent approximately ten ounces, avoirdupois, of sodium chloride in the form of finely ground rock salt, and continue mixing until this is thoroughly worked into the mixture. This produces a mass which is light, fluffy, and only slightly damp.

This mass or mixture is then placed in compression moulds and subjected to a pressure of from 5 to 7 tons per square foot. Upon removal from the mould, objects formed from the mass have sufficient firmness and rigidity so that they may be lifted from the moulds and handled without breaking. Quick hardening is due to the action of the sodium chloride on the binder, the adhesion of the particles, and, also, by reason of the natural tendency of perlite of the grade above specified, to knit by pressure into a solid cake.

Under the pressures stated, dry perlite of the above described grade may be made to form a light cake or immobile mass as above mentioned. For the uses here concerned, however, the dry compressed cake is too fragile, and therefore the binder is used. When the binder, above mentioned, together with the setting agent, is added to this grade of perlite aggregate, the pressure necessary to obtain a handleable object is much less, and the insulating shapes and pipe covering sections may be formed in a light hydraulic, or even a hand press. After forming, the compression moulded objects may be air dried for several days at normal temperatures, or, in the case of insulating pipe or boiler covering, may be applied at once and air dried in place.

The compression moulds, above mentioned, for making pipe covering sections, consist of a semi-cylindrical bottom half and a semi-cylindrical upper half of smaller diameter proportioned so that when pressed or forced toward and into the lower half by hydraulic or mechanical means, a semi-cylindrical shape or covering section is formed which has an inner face adapted to fit over one half of the pipe to be covered and mate with a similar section on the opposite side of the pipe. The thickness of these sections will vary according to the degree of insulation desired. They made be made of any length which may be conveniently handled. After positioning, the two mating covering halves may be wrapped with fabric, or held by metal bands, so as to secure them to the pipe to be insulated.

As above described, I have provided a means for forming insulating pipe sections by immediate compressive molding. This has been found to be cheaper and to provide better insulation than compositions heretofore used. The covering can be used to support the weight of the pipes, if desired.

Perlite, which is the chief ingredient of this composition, resists compression to such an extent that once compressed it cannot be further compressed except by a pressure greater than that first applied. It does not crush to an impalpable powder as other insulating materials would do under similar conditions. Vermiculite, for example, can not be compressed either with or without a binder to obtain any fixed form or shape. If it is compressed sufficiently to reduce its volume, only a crushed mass results. Mixtures of magnesium carbonate and asbestos fibers can not be compressed as here indicated. These materials must be mixed with water and moulded and then kiln dried, all of which includes a process which is more expensive than that above described.

Sodium silicate is used here because of the small quantity required. Its presence does not mitigate against the insulating qualities of the perlite and it makes possible the formation of rigid shapes by pressure moulding.

It is also resistant to heat and does not break down or lose its binding qualities when heated even somewhat beyond 1200° F. On the other hand, all other binders heretofore applied to other substances, give off water vapor and break down at a much lower temperature. Another advantage of using perlite of the class and quality above stated is that it will knit together as above explained. On the other hand, such materials as pumice or horny brittle perlite will not knit and when compressed crumble to an unusable mass and can not be compressed in the manner above described.

Whereas I have explained one example of my invention, many variations will suggest themselves to those familiar with the art and therefore I wish to be limited only by the following claims.

I claim:

1. A compressible composition, for dry pressing semi-cylindrical insulating pipe covering sections, consisting of expanded perlite granules composed of thin walled bulbous cells adapted to knit and form a solid cake under compression, of plaster grade aggregate and having a density of eight pounds per cubic foot, one cubic foot; a binder consisting of sodium silicate 40° Baumé, one half gallon; and a setting agent consisting of powdered rock salt ten ounces.

2. A compressible composition for dry pressing semi-cylindrical insulating pipe covering sections, consisting of one cubic foot of expanded perlite granules having a structure composed of small evenly spaced bulbous cells, adapted to knit under compression and sized to form an aggregate 100% of which will pass an 8 mesh screen and not more than 3% of which will pass a 100 mesh screen, having a density of from 4 to 10 pounds per cubic foot; sodium silicate 40° Baumé, one half gallon, liquid measure; and powdered sodium chloride approximately ten ounces avoirdupois.

3. A compressible composition for dry pressing semi-cylindrical insulating pipe covering sections, consisting of expanded perlite granules composed of thin walled bulbous cells adapted to knit and form a solid cake under compression, of plaster grade aggregate, having a density of four to ten pounds per cubic foot, one cubic foot; a binder consisting of sodium silicate forty degrees Baumé approximately one-half gallon; and a setting agent consisting of powdered rock salt approximately ten ounces.

4. A compressible composition for dry pressing semi-cylindrical insulating pipe covering sections, consisting of perlite granules composed of thin walled bulbous sections adapted to knit and form a solid cake under compression, and having a density of approximately eight pounds per cubic foot, one cubic foot; together with a binder consisting of sodium silicate forty degrees Baumé sufficient to make a light fluffy mixture when said particles are evenly coated therewith; and a setting agent consisting of powdered rock salt approximately ten ounces.

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