PUBLISHED
MAY 11, 1943.
BY A. P. C.

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SOUND AND HEAT INSULATION

Filed April 2, 1940

Serial No.
327,474

Fig. 1

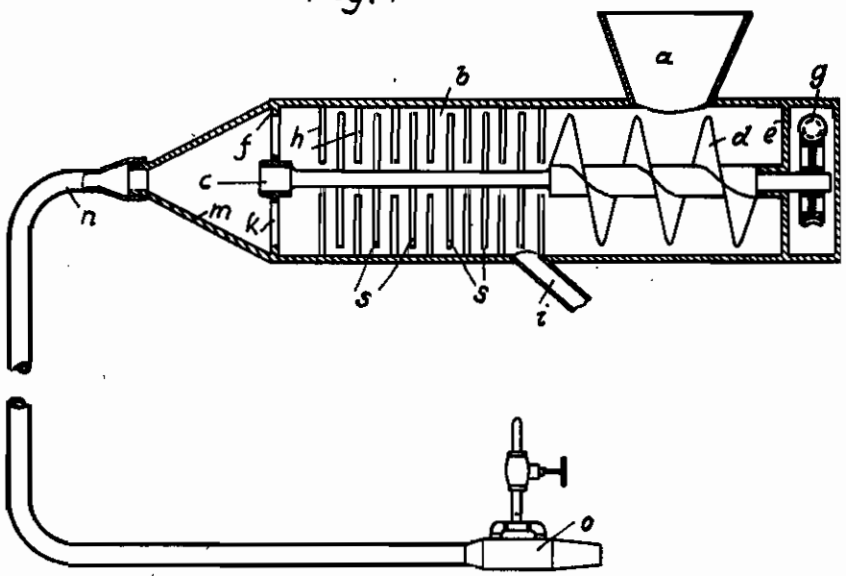
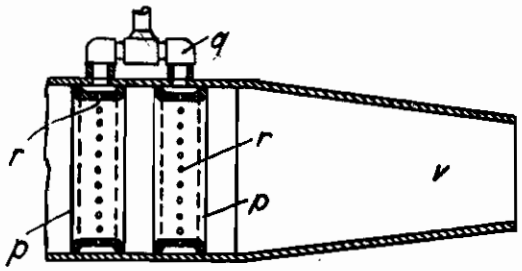


Fig. 2



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Published May 11, 1943 Serial No. 327,474

ALIEN PROPERTY CUSTODIAN

SOUND AND HEAT INSULATION

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Application filed April 2, 1940

My invention relates to improvements in a method and an apparatus for producing a sound absorbing and the heat badly conducting layer on a surface to be insulated.

In providing of structures for absorbing the sound the technics is confronted with the problem of producing materials presenting a large surface such it is realized in the clothes or woven materials from which our dresses consist. Experience made in former times has proved that such materials consisting of fine fibres and enclosing air spaces are suitable in a particularly high degree to absorb the sound. The technics is confronted with a similar problem which is engaged in the insulating against losses of heat. Herewith it depends upon finding a material which in itself badly conducts the heat and which is so composed that it encloses a great number of air spaces.

According to the present invention the said problem is solved in the following manner:

As basis mineral wool especially slag wool is used. Such material is produced in great quantities in metallurgical works especially in blast furnace plants. Mineral wool or slag wool is a material which badly conducts the heat and which is dissipated in its structure into a very great number of fine and short fibres. The said material is used in the technics in the most cases in form of pressed plates of a substantial size in order to cover therewith one side of walls or the like or to fill therewith the intermediate space between two walls, if a sound-damping or heat insulating effect is needed.

This problem is answered according to the present invention in such a manner that the material is spread or scattered upon the surface or wall to be insulated in a similar way as nowadays mixtures of lime, sand and water (mortar) are spread upon the walls in order to produce a coat of plastering.

According to the present invention the material is at first subjected to a process of loosening or opening for the reason that the said material is commercially delivered in more or less packed or agglomerated lumps which in such state cannot be used. The said loosening is effected e. g. in such a manner that the material is delivered into a receiving hopper from which it drops into a room in which it is fed by means of a conveying screw into the loosening or opening chamber.

In the said loosening chamber the loosening or opening of the mineral wool or slag wool is effected in a suitable manner by the combined action of mechanical means such as e. g. an agitator or an opener and pneumatic means, such as e. g. a current of air under pressure. The loosened or opened material is then moistened or mixed with the liquid binding substance, as e. g. water-glass; preferably only moderate proportions thereof being used. The material so treated is then applied to the surface or wall to be covered for protection against passing of sound and/or heat.

After applying the layer of material to a surface or wall the layer may be smoothed and equalised, if desired, e. g. by a mason's handfloat or similar instrument and a moderate mechanical pressure may be exerted on the layer for slightly compressing the fibres of the slag wool to form a more compact layer but still enclosing a great number of small air spaces distributed throughout the layer.

The expressions "surface" and "wall" include surfaces of any type of structure or parts thereof to be insulated against sound or heat or both. So the expression "surface" or "wall" are intended especially to comprise walls, floors, fundaments, roofings, ceilings of buildings, furnaces, fire-boxes, boilers, pipes, ice boxes, parts and housings of refrigerating apparatus etc.

My invention relates also to a device by which fibrous materials, especially mineral wool or slag wool, may be treated in the above described manner and spread upon the wall to be covered.

An example of such apparatus is shown in the enclosed drawing wherein

Fig. 1 is a front elevation of the said apparatus partly in section,

Fig. 2 is a sectional elevation of the nozzle or mouth piece of the apparatus in an enlarged scale.

Referring more particularly to the drawing *a* indicates the receiving hopper for the slag wool or the like from which such fibrous material drops by its gravity into a room or chamber in which a shaft *c* is rotatably mounted carrying a conveying screw *d*. The shaft *c* is mounted in the partitions *e* and *f* of the housing and is driven by any suitable means, e. g. a toothed gear *g* from a motor (not shown). The shaft *c* carries adjacent to the conveying screw a plurality of radial bars *s* which rotate together with the said shaft. In the intermediate spaces between the said bars *s* there are arranged on the inner peripherical face of the said cylinder a plurality of bars *h*. The material is pressed by the conveying screw *d* into the part of the chamber containing the set of the bars and is thereby broken

up and loosened. Near the delivering end of the conveying screw *d* and the beginning of the set of the bars there is arranged at *i* a lateral pipe through which the gaseous means or air under pressure can enter. The material is exposed to the combined action of the agitator or opener and of the stream of air under pressure and thereby a sufficient opening or loosening of the material is effected, so that it can pass through the openings *k* in the partition *f* skirting the chamber *b* on the side remote from the conveying screw. Under the forwardly pressing action of the said conveying screw and of the stream of air under pressure the opened or loosened fibrous material passes through the space *m* from which it enters into the flexible tube *n* which supplies it to the spreading pistol or nozzle o. This nozzle comprises a cylindrical portion and a tapered orifice *v* (Fig. 2). In the said cylindrical portion there are arranged rings *p* having holes *r* to which a liquid binder as e. g. waterglass is supplied from the exterior through the conduit *q*. This liquid binder is sprayed through fine holes *r* into the interior of the nozzle and hereby moistens the entering slag wool or the like. This moistened slag wool is then carried away by the streaming air under pressure through the nozzle *v*, is thrown out therefrom and impinges against the surface or wall upon which it is desired to apply the sound-damping or heat insulating layer or mat.

It has been already proposed to provide devices and methods by means of which it is possible to spread pulverous and granular materials after a preceding moistening. For instance, for the production of a coat of plastering upon a wall, one may spread or jet a mixture of lime, sand and water (mortar) or a mixture of cement and water and also a mixture of cement, sand and water (concrete) in the indicated manner.

In this way adapted for plastic or mortar-like materials and mixtures it was, however, not possible to apply fibrous material such as mineral wool or slag wool upon a wall or the like in such a manner that a highly efficient mat, coating or layer adapted to absorb the sound and to prevent heat conducting is obtained. Therefore, it was necessary to build up either big walls or big ceilings which are very expensive for the ordinary use. Further it has been proposed to come to the same result on a cheaper way by arranging several walls or ceilings side by side and to fill the intermediate spaces between the said structural parts with sound-damping mats. The effect of these sound-damping mats depends substantially on the absorption of the sound and this absorption is depending on the size of the presented surface of the absorbing material. The surface, however, increases with the subdivision of the material.

The sound insulating and heat insulating layers according to the present method have an extraordinarily high insulating effect as well against sound diversion as against heat diversion and the production of these highly efficient layers is obtained with a small amount of labor.

HUGO STÖSSEL.