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G. KELLY.

INSULATING BOARD, TILE, OR SLAB.

(Application filed Sept. 28, 1901.)

(No Model.)

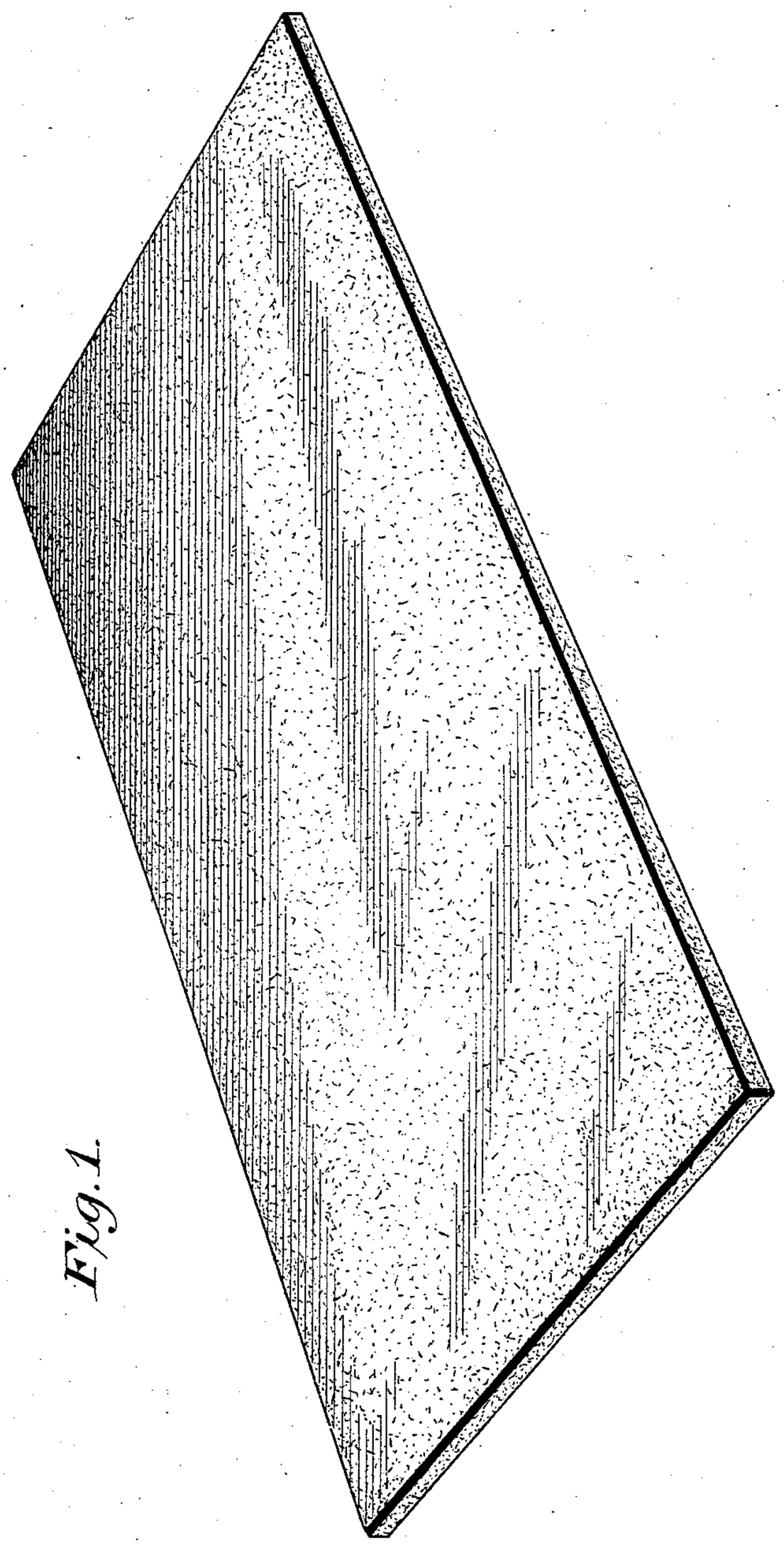

Fig. 1.

Fig. 2.

Witnesses
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UNITED STATES PATENT OFFICE.

GEORGE KELLY, OF MINERALPOINT, WISCONSIN.

INSULATING BOARD, TILE, OR SLAB.

SPECIFICATION forming part of Letters Patent No. 688,420, dated December 10, 1901.

Application filed September 28, 1901. Serial No. 76,924. (No specimens.)

To all whom it may concern:

Be it known that I, GEORGE KELLY, a citizen of the United States, residing at Mineralpoint, in the county of Iowa and State of Wisconsin, have invented a new and useful Insulating Board, Tile, or Slab, of which the following is a specification.

This invention relates to a novel insulating board, tile, or slab and to its method of production. The insulation of cold-storage plants, for which my novel, board, tile, or slab is especially intended, has been attempted in a large number of ways with varying success.

The prime requisites of an insulating-slab susceptible of use in this connection are, first, a self-sustaining structure which will prevent the sagging or disintegration of the insulating material; second, absolute non-conductivity; third, cheapness or inexpensive production, and, fourth, exceeding lightness, so that superposed slabs will not subject the subjacent material to a considerable pressure.

Principal among the materials employed in the formation of insulating walls or sheets is asbestos combined with various fillers, either fibrous or plastic, or both; but such insulation is very expensive. The employment of the fibrous fillers does not result in a completely self-sustaining structure, and the employment of either plastic or glutinous fillers renders the body more or less conductive and makes it heavy, hard-surfaced, and impractical for use. Attempts have also been made to employ mineral wool for cold-storage insulation, and this material, by reason of its practically absolute non-conductivity, lightness of weight, and exceeding cheapness, is, as a matter of fact, the most desirable of all materials for insulating purposes. It is well understood, however, that mineral wool, by reason of its peculiar flocky character, is not self-sustaining when formed in slabs, even when combined with ordinary fillers, which would be reasonably efficient in connection with material made up of somewhat longer fibers. The utilization of mineral wool has therefore been impossible without combining it with fillers or binding material, greatly increasing the expense of the insulation, destroying the non-conductive qualities of the wool, and increasing its weight to a very objectionable extent.

The value of mineral wool as an insulator is largely due to its porosity, the material being permeated by multitudinous dead-air cells or chambers so infinitely small that air, which is a good insulator, is occluded throughout the material within air-spaces too small to permit of its circulation. It is obvious, then, that any binder or filler which will destroy this air-retaining property of the wool will destroy its value as an insulating material, and hence it is that a mixture of wool and a plastic—as, for instance plaster-of-paris or magnesia—while self-sustaining is more or less conductive besides being hard, heavy, and expensive to manufacture. Thus, also, a mixture of mineral wool with glutinous bodies—such, for instance, as flour, starch, or silicates of soda—produces a material having the necessary strength, but lacking that lightness and non-conductivity which are absolutely essential. It has also been suggested to mix hair and other fibers with mineral wool to obtain a self-sustaining structure; but this is absolutely inefficient, because the wool has little or no adhesive property so far as the individual fibers are concerned, and the wool will invariably sift or sag in spite of the fibrous material with which it is intermixed. At the present time, therefore, mineral wool is unavailable for the manufacture of cold-storage insulating boards or slabs, first, because the pure mineral wool is not self-sustaining, and, secondly, because all efforts heretofore made to produce a self-sustaining mineral-wool structure have resulted in the destruction of one or more of the essential properties of an insulating-board and have involved disproportionate expense in the production.

After an extended period of experimentation I have discovered that mineral wool may be made into a self-sustaining board, slab, or tile suitable for cold-storage insulation by combining therewith in accordance with my novel process a comparatively small percentage of paper-pulp, preferably obtained from waste paper.

In the accompanying drawings, Figure 1 is a perspective view of the cold-storage insulating board, tile, or slab; and Fig. 2 is a sectional view thereof.

In practicing the method I take, say, ninety-

five per cent. of mineral wool, preferably such as is blown from a rock disclosing both lime and cement by analysis, and five per cent. of waste-paper stock and reduce these ingredients to a pulp, either singly or together, in an ordinary beating-engine—that is to say, the paper and wool are reduced to a pulp together or in some cases the paper may be pulped first and the wool added. The resulting paper and wool pulp is then run from the beater into a receiver, and after being thoroughly agitated to secure the proper intermixing of the wool and paper the pulp is run into screens of proper dimensions and is drained. After the removal of the free moisture by drainage the board—the preferable dimensions of which are four feet by two feet by two inches thick—is subjected to light pressure, after which it is transferred from the screen to a drying-tray and is dried in any well-known manner.

The product of the process described is an inexpensive, extremely light, non-conductive, and perfectly self-sustaining slab, board, or tile of a cellular spongy structure in every way adapted for successful use in the insulation of cold-storage plants and, in fact, for general insulating purposes.

The short fibers of the paper and wool are thoroughly intermingled and the paper fiber adheres to the wool fiber in a manner to absolutely prevent the sagging or settling of the wool or the disintegration of the slab during either its use or the handling thereof, which is necessary in its transportation and erection. Furthermore, the paper fiber while effectually binding the wool fiber increases neither the weight nor the expense of the slab and does not close any of the myriad of dead-air cells throughout the entire bulk of the slab. These dead-air cells are therefore left open and contain the vast quantity of dead air which is so essential to the proper insulating properties of the slab. It should be noted, however, that the stated proportions of waste-paper stock and mineral wool may be varied according to the grade and quality of either; but it will be noted from the proportions given that a very small quantity of paper-stock is efficient to render a comparatively large body of mineral wool self-sustaining.

It is thought that from the foregoing the composition of my novel insulating slab, tile, or board will be understood, and that the method of producing the same will be clearly comprehended by those skilled in the art. In carrying the invention into effect, however, I desire to reserve the right to vary the proportions of the materials used, the order of procedure, and the dimensions of the product in accordance with the exigencies of manufacture, provided only that such variations are properly comprehended within the scope of the protection prayed.

What I claim is—

1. That method of producing a self-sustaining board, tile or slab for cold-storage or other insulating purposes, which consists in commingling paper-pulp and mineral wool in the proper proportions, in subsequently forming the board, tile or slab, and finally in drying the same.

2. That method of producing a self-sustaining board, tile or slab for cold-storage and other insulation, which consists in commingling paper-pulp and mineral wool in the proper proportions by mechanical agitation, next drawing the free moisture from the resultant mixture, and finally in drying the board, tile or slab.

3. That method of producing a self-sustaining board, tile or slab for cold-storage or other insulating purposes, which consists in commingling paper-pulp and mineral wool, next draining the free moisture from the resulting mass, next subjecting the mass to light pressure to form the board, tile or slab, and finally drying the same.

4. A self-sustaining board, tile or slab for cold-storage or other insulation, composed of mineral wool and a binder of paper intermixed with the wool.

5. A self-sustaining board, tile or slab for cold-storage or other insulation, composed of mineral wool and desiccated paper-pulp.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

GEORGE KELLY.

Witnesses:
JOHN H. SIGGERS,
FLORENCE E. WALTER.