(No Model.) 2 Sheets—Sheet 1.

E. M. PRITCHARD.

COMPOSITE MATERIAL FOR ROOFING OR SIMILAR PURPOSES.

No. 513,247. Patented Jan. 23, 1894

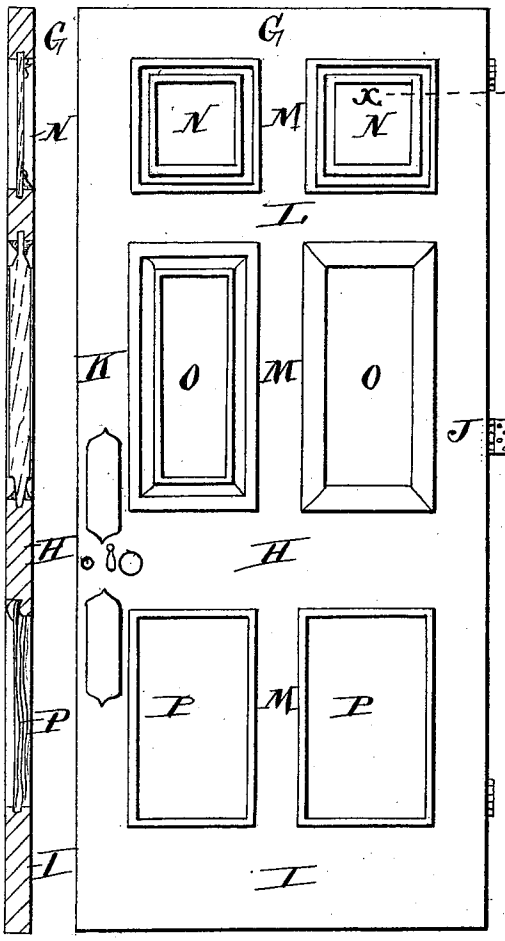


Fig. 2.

Fig. 1

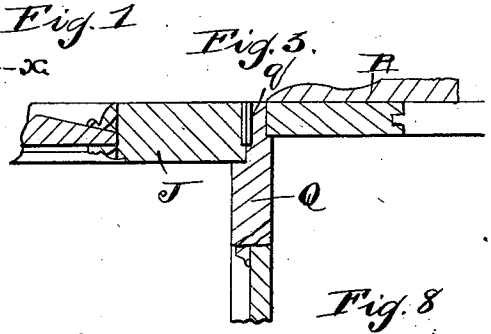
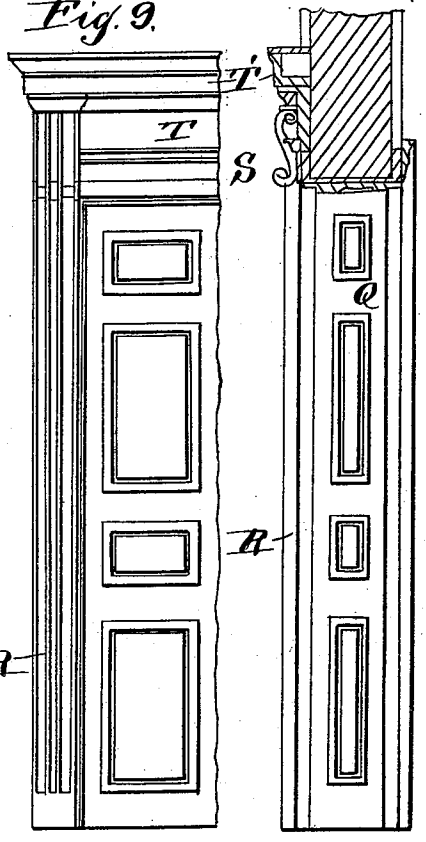


Fig. 5.

Fig. 8

Fig. 9.



WITNESSES

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

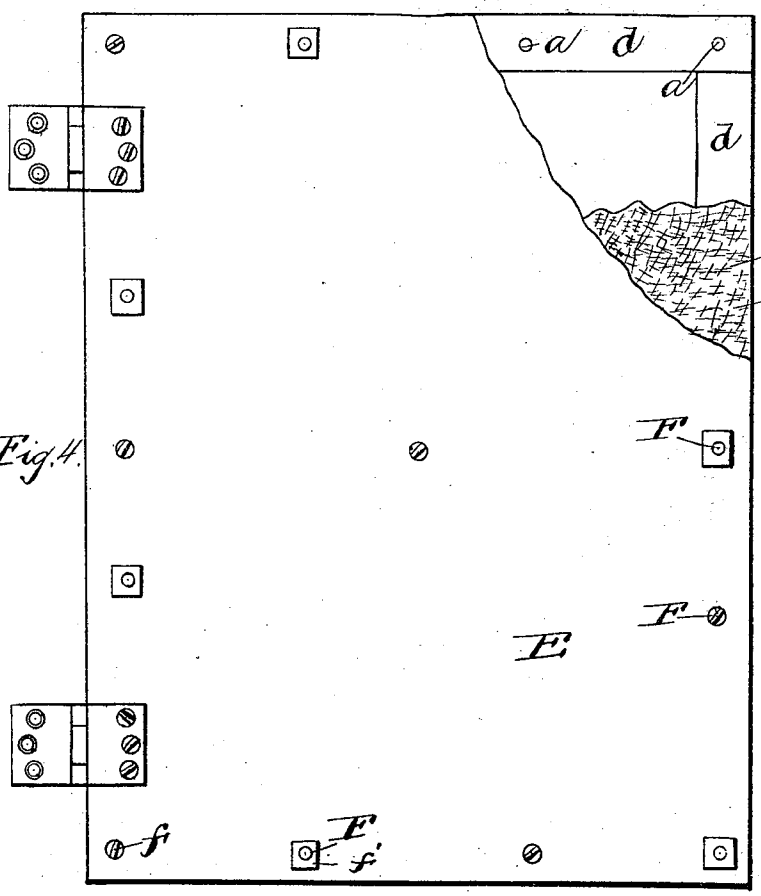


Fig. 5.

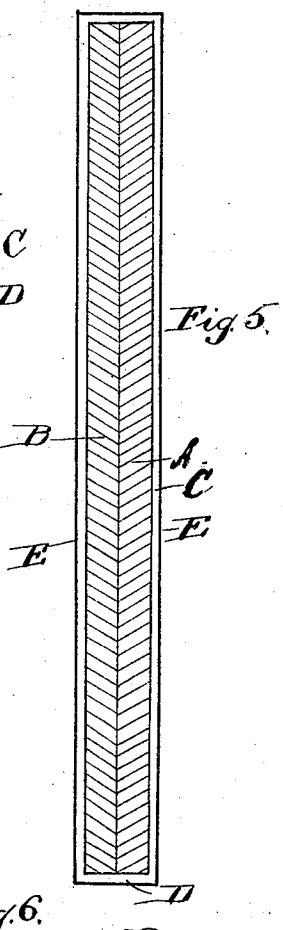


Fig. 7.

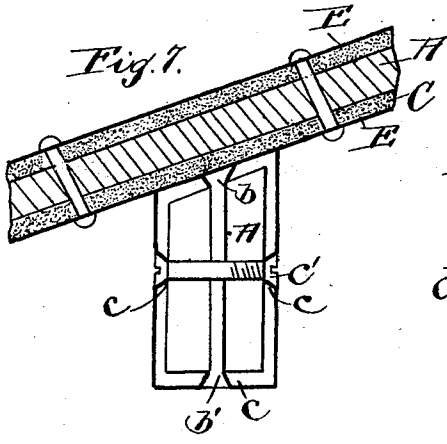
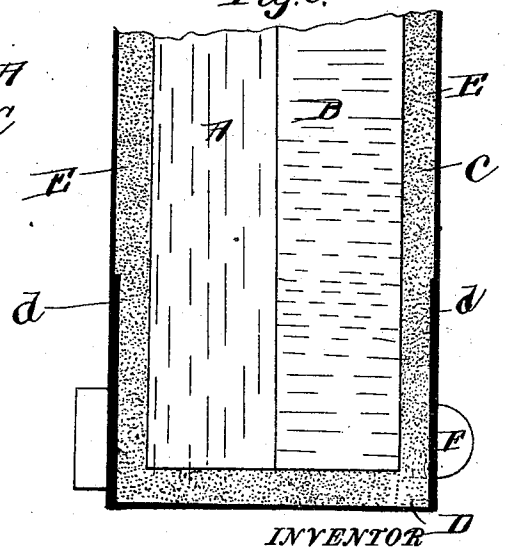


Fig. 6.



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COMPOSITE MATERIAL FOR ROOFING OR SIMILAR PURPOSES.

SPECIFICATION forming part of Letters Patent No. 513,247, dated January 23, 1894.

Application filed March 1, 1893. Serial No. 464,241. (No model.)

To all whom it may concern:

Be it known that I, EZEKIEL M. PRITCHARD, a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Composite Material for Roofing and Similar Purposes, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1 is an elevation of a paneled door containing my invention. Fig. 2 is a section on line *x x*, Fig. 1, enlarged. Fig. 3 is a section, also enlarged, on line *y y*, Fig. 1, but having added thereto door jambs including moldings. Fig. 4 is an elevation of a plain, flat door, without panels, parts being broken away. Fig. 5 is a section on line *z z* Fig. 4. Fig. 6 is an enlarged view of the lower part of Fig. 5. Figs. 7, 8, and 9 are details illustrating the construction of different parts shown in Fig. 3.

The object of this invention is to improve the construction of various parts of buildings into which wood usually enters as a material to the end that such portions of the structure shall effectually resist any temperature to which they may be ordinarily subjected, without undergoing destruction; without transmitting heat to adjacent parts of a building in such degree as to cause ignition; and without undergoing such change of form or dimensions as will permit the passage of heated air, the heated products of combustion, water or steam, or heat in any other form, in such quantity as to be objectionable. In order to meet the above requirements it is desirable that the material employed shall be comparatively inexpensive; shall not be of excessive weight; shall not be subject to great changes in dimension by expansion or contraction under varying temperatures, or under such different conditions of moisture as they will be ordinarily subjected to; and shall not be liable to be warped under the varying conditions of heat or moisture to which it will be subjected. It is also important that such material shall be capable of being made in a great many different forms or configurations, such as are usually employed in architectural designs for buildings and other structures. It is well known that neither metal alone, nor in combination with a material which is a good non-conductor of heat will answer for the uses above indicated; because, among other things, it is liable to be warped by heat, especially when its temperature is suddenly lowered by the application of water, as frequently occurs during fire in either the building where such material is used or in an adjacent building. Another objection to such use is that when wood is covered on one or both sides with sheet metal it has been found practically impossible to prevent combustion of the wood under rather high temperatures, the requisite amount of air obtaining access notwithstanding the presence of the sheet metal covering.

One part of this invention consists, essentially, of the combination with sheet metal plates, of a central supporting sheet or strip in the nature of a core having sufficient rigidity or stiffness to resist bending under ordinary circumstances, with interposed sheets of fibrous or other flexible non-conducting material arranged between the central sheet or strip and the sheet metal plate or plates on one or both sides (as the case may be) of the sheet or strip.

As one mode of carrying out this invention is illustrated in detail in Figs. 4, 5 and 6, I would refer to those figures. A, B, represent the central sheet or strip, which, in this instance, I have represented as being of thin boards preferably glued together, and of which the grain in the one marked A runs up and down (lengthwise) while the grain of the board B runs crosswise to that of the board A, as is indicated clearly in Fig. 6, it being well understood among wood workers that by such a disposition of the material great firmness and rigidity are obtained in proportion to the quantity of wood used. While ordinarily a two-ply composite central sheet or core will answer every purpose where moderate linear dimensions are required; yet, where larger area is to be used, I would recommend three or four ply, each ply being rather thin in order to avoid excessive weight. So, also, the central sheet may be cleated if desired to secure

increased stiffness. C, C, represent layers or sheets of some suitable non-conducting material which is adapted for application to the sides, and preferably to the edges, of the central sheet or strip. I prefer to use, for this purpose, asbestus in sheets substantially as it is produced in the ordinary manufacture; and, preferably, with little or no admixture of foreign material. Such sheets of asbestus are especially desirable for this use because among other reasons, of its flexibility which facilitates its being made easily to conform to surfaces of irregular outline; and, further, by reason of its possessing a certain amount of compressibility and elasticity, as will be hereinafter explained. D *d d* represent strips or plates of sheet metal, preferably tin, sheet iron, or galvanized iron, of which there are enough in number and length to extend entirely around, and inclose, the edges of the central sheet and the interposed asbestus applied thereto, with the turned over edges *d d* overlapping the asbestus which is upon the opposite sides of the central sheet, as is plainly indicated in Figs. 4 and 6. In applying these metal edge-plates, as I prefer to call them, I propose to first bend the edges of the metal over toward each other into U shape forming flanges *d d* which are practically parallel to each other and about far enough apart to fit closely the outer surfaces of the asbestus upon the sides of the central plates. To facilitate putting them in place, these flanges may be, when first made, a little flaring outwardly to facilitate putting them in position without disturbing the asbestus which they overlap. E, E, are sheets of metal of such size as to practically correspond in both directions with the dimensions of the sides of the central sheet; although I usually make them a little smaller so that all of their edges shall fall a little inside of the portions D of the edge strips. When it is not practicable to obtain sheets E of proper size they may be made up of smaller sheets, preferably joined at their edges by interlocking. F, F is a series of bolts passing through all of the above referred to parts, and binding them firmly together. In these figures (4, 5, and 6) I have shown my invention in the form of a door. Around the edges of the door the bolts should be close enough together so that the metal plates can be clamped or drawn toward the central sheet and toward each other with a grip sufficient to so compress the asbestus as to form joints which, while they are not absolutely air tight perhaps, approach sufficiently close thereto so that they will practically exclude air from contact with the central sheet, while permitting the escape therefrom of any vapors or gases which may be produced by the action of heat of such character as they may be subjected to during ordinary use. It will of course be understood that owing to the porosity of the sheets of asbestus such vapors or gases can pass outward through the asbestus and between the adjacent surfaces of metal with but slight internal pressure, even though the parts fit so closely that practically no air can enter from outside under ordinary conditions of temperature.

In the manufacture of paneled doors, one illustration of which may be found in Figs. 1, 2, and 3, G is the top rail, H the middle or lock rail, I the bottom rail, J the hanging stile and K the lock stile. These parts are to be framed together in any usual or approved manner. Within the last referred to parts of the door the space is divided by a frieze rail L and mountings M M to assist in supporting the frieze panels or square panels N N, the standing panels O O and lying panels or panels P as may be preferred. In order to protect a door of this character from burning I propose to cover its sides and edges with sheets of asbestus C or other non-conducting material, together with plates or sheets of thin metal stamped or swaged into suitable shape having raised portions such as will conform substantially to the configuration produced by the paneling above described, and so that by the use of fastening devices such as clamping bolts F or their equivalents, the parts may be bound, one upon another in such manner that there shall be, practicably, no spaces for the movement or admission of air currents underneath the metal plates.

I am aware that nails have been used for holding the metal casing in position relative to a wooden core and interposed non-conducting material; but it is obvious that in carrying out my invention the employment of bolts or similar clamping devices which pass through the core, the non-conducting material upon opposite sides of the core, and the metal casing plates outside of the non-conducting material, is very important as regards enabling me to keep the component parts of the fabric so compressed one upon another as to prevent the movement of air-currents within the metal casing even though the core becomes charred; from the fact that parts of the clamps overlap and lie outside of the adjacent surfaces of the casing and therefore cannot be loosened by any tendency on the part of the materials to warp or otherwise change position under various conditions of temperature.

It is obvious that although nails which pass through the casing upon one side of the structure and penetrate the core with intent to be held from withdrawal by reason of their frictional contact with the core, but are liable to be loosened by shrinking or charring the core, do not operate in the same manner nor perform the same function as do my clamps which cannot be loosened by any of the changes of condition of the core which will be liable to materially impair the usefulness of nails or analogous devices. In order to facilitate properly binding these parts together I pre-

fer to make the bolt holes through the flanges *d d* close enough to the intermediate section D, so that it will be necessary to press those intermediate sections and the asbestus underneath them quite firmly against the edges of the board in order that the bolt holes in the flanges shall register with those in the sheets or plates E E and the wooden central plates or strips, as will be readily understood without further explanation. So, also, in order to avoid any objectionable projection of the clamping devices beyond the outer faces of the metal sheets or plates I propose, under some circumstances, to counter-sink the holes in the metals, strips and sheets and use correspondingly shaped bolt heads and nuts of such form and size that when properly screwed up their outer faces will be substantially flush with the adjacent metal, as is indicated at *c c'* Fig. 7; or rivets may be used as indicated at *b b'* Fig. 7.

In case it is desired to use moldings or beadings or other form of ornamentation of so elaborate a character that it be found impracticable or undesirable to stamp or swage the opposing sheets E to corresponding shape, part of the ornamentation may be applied to the outer surface of these sheets after they have been bolted or riveted in place. In fact, this method of procedure will sometimes be found very advantageous, especially when it is practicable to apply such supplemental or auxiliary ornamental parts so as to cover bolt heads or rivet heads. In fact, when such supplemental parts are made of metal they may be soldered to the sheets E.

Referring particularly to Figs. 3 and 8, Q, Q, are the jamb linings rabbeted as at *q*, *q*, where the door is to be hung. In case this frame or jamb lining is, as I prefer it should be, constructed with a combination of the asbestus sheet C and metal sheets D, E, both the metal and the asbestus may be cut out to receive the hinge-leaves, care being taken that the combined thickness of the asbestus and metal be about that of the hinge-leaf which is to be embedded therein; and I prefer to cut out the metal in such shape that the edges of the cut sections may be turned inward over the edges of the asbestus sheet to facilitate making smooth and finished joints at such places. While, under many conditions, the sheet metal may be, by the use of suitable tools, properly bent by hand labor; yet I prefer to use machinery for this purpose in order to obtain a more accurate shaping of parts. R R are dressings, of which those shown are of comparatively plain pattern in cross section, having a simple ogee molding at its inner edge where it joins the jamb lining; with, preferably, an architrave S, and frieze T, surmounted by a cornice T'. These latter I propose to make of sheet metal on account of the somewhat elaborate design which is desirable for such purpose; but, under many circumstances the architrave, the frieze, and the cornice above the door may be omitted; in which case the dressings R R are continued across the tops of the doors with miter-joints as is customary.

While I have only illustrated my invention as applied to doors and the parts which are ordinarily immediately adjacent thereto, it is evident that practically the entire woodwork trimmings of an apartment such, for instance, as the door-sills, the skirting board and its base molding, the sub base above the dado, when one is used, as well as the window sills and frames may be made of the same composite materials; together with many if not the entire parts of inside blinds, mantels, and such other trimmings as are usually made of wood. Thus it is practicable, by the use of my invention, to not only prevent fire from passing through doorways, but also to render practically the entire woodwork within a room substantially fire-proof.

It is obvious that an ornamental ceiling can be constructed in panel and other forms and rendered fire-proof when built in accordance with my invention. So, also, the invention may be embodied outside in ornamentations such as window sills and caps and cornices where it is desirable that, even though subjected to such heat as will char the wood throughout, the parts shall retain their shape whereby they will serve to prevent the passage of heated currents.

One of the advantages which is incident to the use of wood as the central sheet or strip is due to the fact that, even though it be converted throughout into charcoal, it will still serve as a non-conductor and preserve its form and dimensions under any strain, shock, or change of temperature or change of condition as regards moisture to which it will ordinarily be subjected.

It is obvious that my invention is adapted for use in the construction of studding in partitions; especially in cases where metal lathing is to be employed, from the fact that owing to the characteristics of charcoal, as above indicated, and that in the case of studding a stud is rectangular in cross section and is surrounded by a sheet metal tube which is also rectangular in cross section and its sides are protected against collapsing or springing in either direction laterally by being bolted to the central strip, the studding will retain its strength in both directions in a very large measure even though subjected to heat of such intensity and duration as to char it entirely through. Thus it is evident that, with studding of this character, and metal lathing, a practically fire proof partition can be made. The same thing is true, in a very great degree, in the case of stairways, from the fact that both the treads and risers are supported against downward pressure as are the studs against lateral pressure; and further than this, by reason of the risers serving as trusses to support the treads no amount

of charring would probably weaken the staircase so that it would give way under any weight which could ordinarily be imposed upon it. The fire proof plates, slabs, or panels which can be thus produced by my invention may also be advantageously used in the construction of closets within apartments; also for boxes and chests by the use of screws or bolts or straps. They can also be used for roofs, for which purpose they are specially adapted because the rafters embodying the invention will ordinarily support the roof from falling in even though charred, because a roof which is strong enough before a fire to support a body of snow will support its own weight even though subjected to severe heat. The same material may be used as a fire screen; especially where flexibility is required because the edges of the strips or plates may be hinged together in such manner that a screen, shutter, or curtain like structure, such, for instance, as is sometimes made to interpose between a burning building and an adjacent one which it is desired to protect, may be folded up into comparatively small compass.

It is apparent that the results which are accomplished by the use of my invention could not be attained by a structure in which a granular or pulverized material such as earth or ashes are employed as non-conducting material for many reasons. In the first place it would be impossible to so dispose a packing of that sort between the metal plates and the core in such manner as to practically fill the space between them under such a degree of compression as will prevent spaces for air currents. Again after a short lapse of time such pulverulent material will settle and pack by reason of its weight, thus further increasing the size of the air spaces. These objections would be met with in an increased degree whenever the article thus produced be a door or any other thing which is liable to be jarred frequently; and of course no flexibility exists in granular material which would permit its being bent to conform to surfaces of irregular configuration and having alternate raised and sunken portions.

While I prefer to make the central or intermediate section A, B, of wood yet I do not wish to be limited to that material; because when too large plates are not required and they will not be subjected to too great strain other vegetable or fibrous substances may be employed.

While I prefer asbestus as the non-conducting fire-proof layer or sheet C, yet I do not wish to be limited thereby, because some of the substances which are employed for a similar purpose in, for instance, the walls of fire-proof safes, may be substituted therefor and secure some of the advantages which are incident to my invention. For instance, the scantling to be used for studding and the joists for roof supports may be made by placing them, respectively, about centrally within metal tubes or jackets of proper size, and then filling the annular spaces between the jackets and the central strips with a semi-liquid or pasty mass of the requisite consistency.

While I have thus described the best means known to me for carrying out my invention, I do not wish to be limited to the precise details above given; because many modifications will readily suggest themselves to any one who is familiar with the art without going outside of the spirit of my improvement.

What I claim is—

1. A composite fire-proof material formed in sheets or strips, and comprising a core of fibrous vegetable material, an outer casing of sheet metal, interposed flexible non-conducting material, and clamping devices extending through the core and the metal casings on opposite sides of the core, and adapted to bind said casings to each other and to the core and non-conducting material, substantially as set forth.

2. A composite fire-proof material formed in sheets or strips, and comprising a core of fibrous vegetable material, an outer casing composed of metal sheets disposed to overlap at their edges, interposed flexible sheets of non-conducting material, and clamping devices for binding the parts together, substantially as set forth.

3. A composite fire-proof material formed in sheets or strips, and comprising a core of fibrous vegetable material, metal U shaped casing plates at the edge of the core, metal casing sheets at the sides of the core, an interposed flexible non-conducting material, and clamping devices for binding the parts together, substantially as set forth.

4. A composite fire-proof material formed in sheets or strips, and comprising a core of vegetable material having a surface formed of alternate raised and sunken portions, an outer casing of sheet metal having corresponding raised and sunken portions, an interposed sheet of flexible non-conducting material of substantially uniform thickness throughout, and clamping devices for binding the parts together, substantially as set forth.

5. The herein described composite fire-proof door, comprising a core of fibrous vegetable material disposed to form panels, stiles and rails, outer casings of sheet metal disposed to form corresponding panels, stiles and rails, edge casings which are U-shaped in cross section, interposed sheets of asbestus which are flexible, and clamping devices which pass through the opposite metal casings and are adapted to compress the parts together and bend the asbestus sheets into conformation with the configuration of the door, substantially as set forth.

6. The herein described composite fire-

proof door, comprising a wooden core disposed to form panels, stiles, and rails, one stile having hinge seats formed in the edge, sheet metal casings disposed to form corresponding panels, stiles and rails, the sheet metal being turned over the hinge seats and fitting closely thereto, an interposed sheet of flexible non-conducting material, and clamping devices for binding the parts together, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

EZEKIEL M. PRITCHARD.

Witnesses:

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WM. MARKUSKE.