No. 609,795. Patented Aug. 30, 1898.

A. DE MAN.

FIREPROOF STRUCTURE.

(Application filed Nov. 14, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

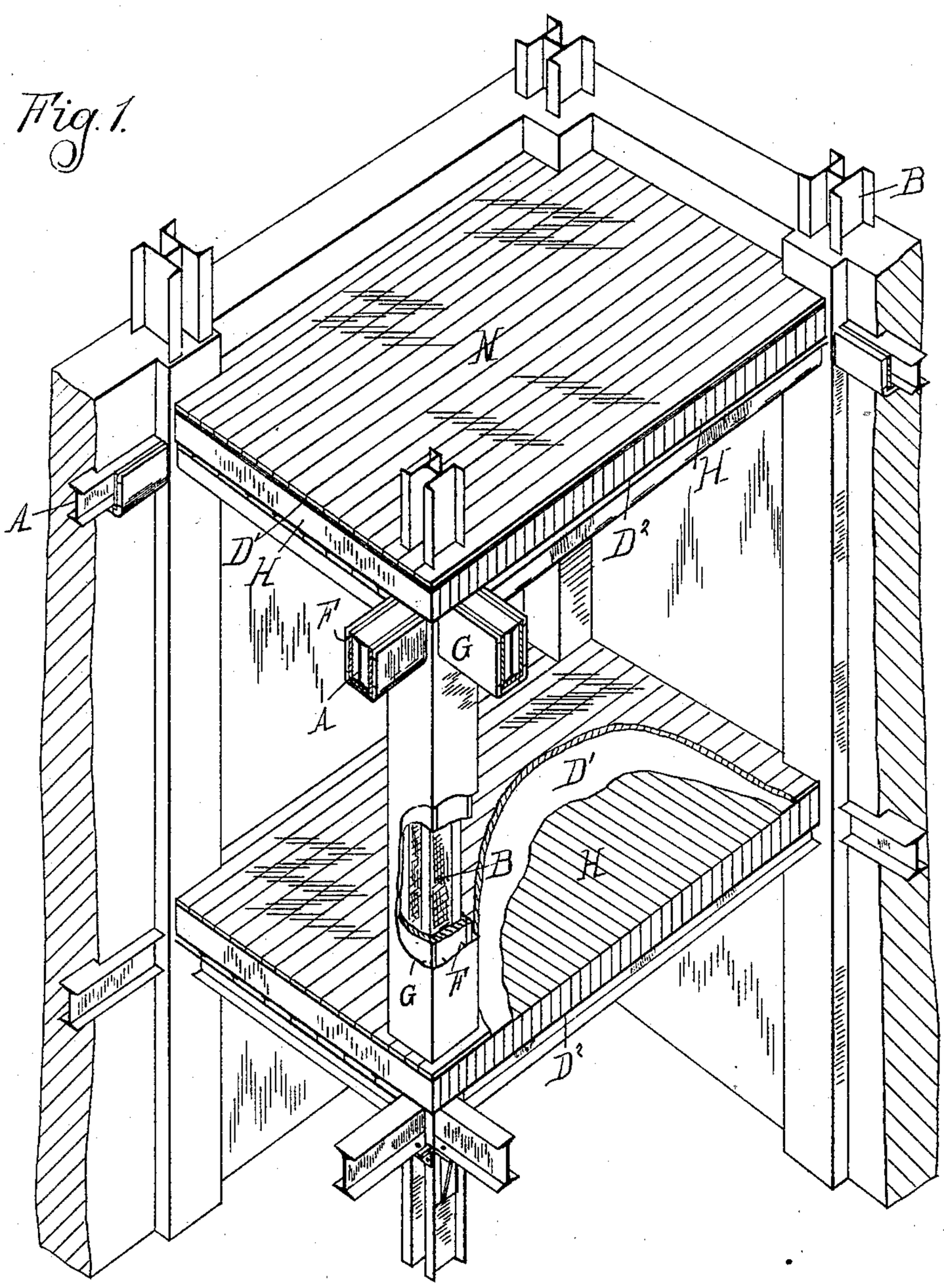

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Fig. 6.

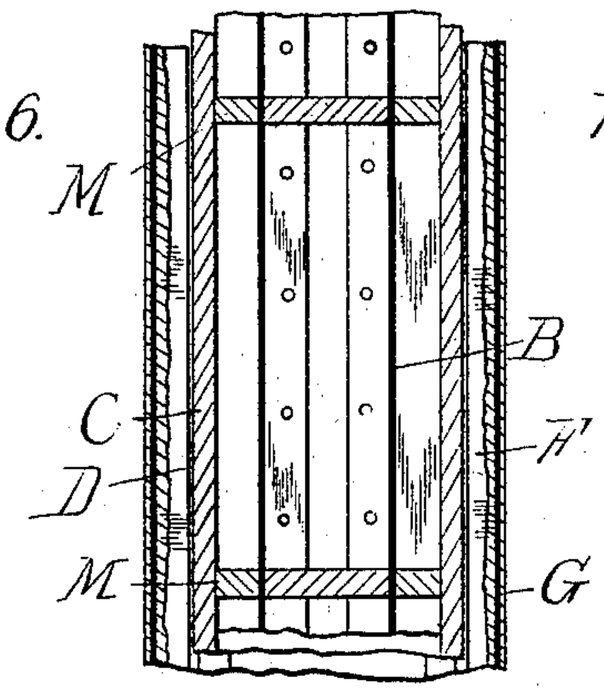


Fig. 7.

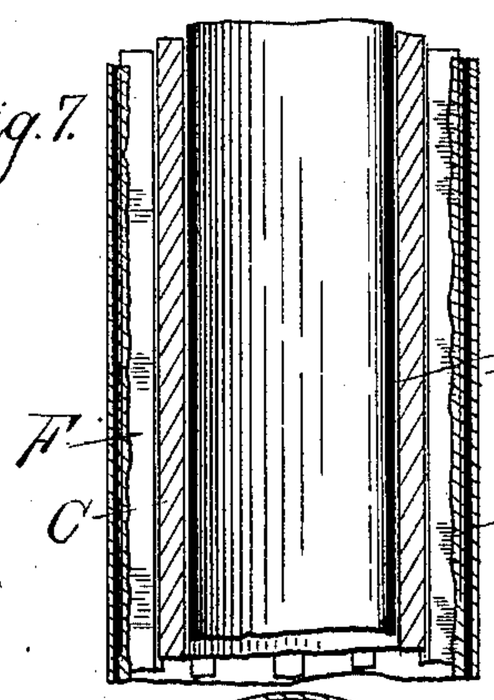


Fig. 4.

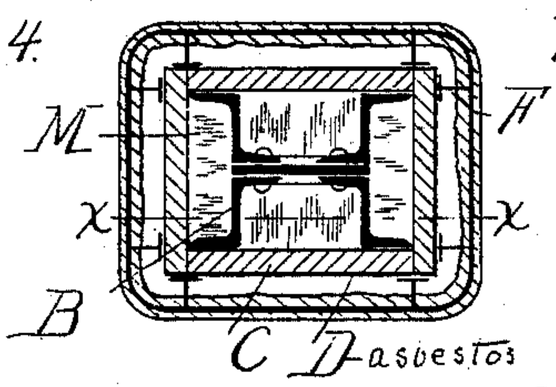


Fig. 5.

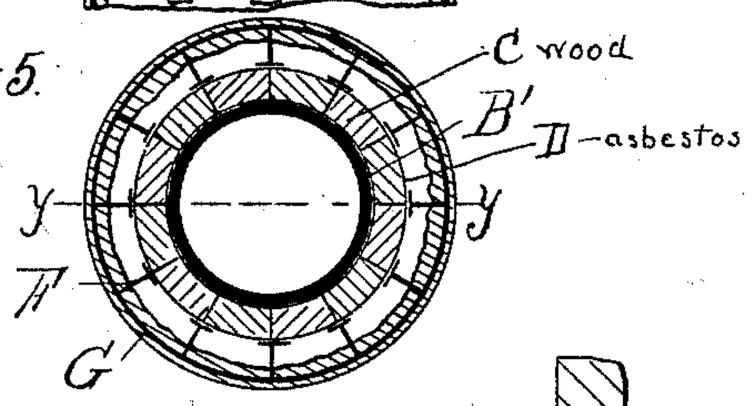


Fig. 3.

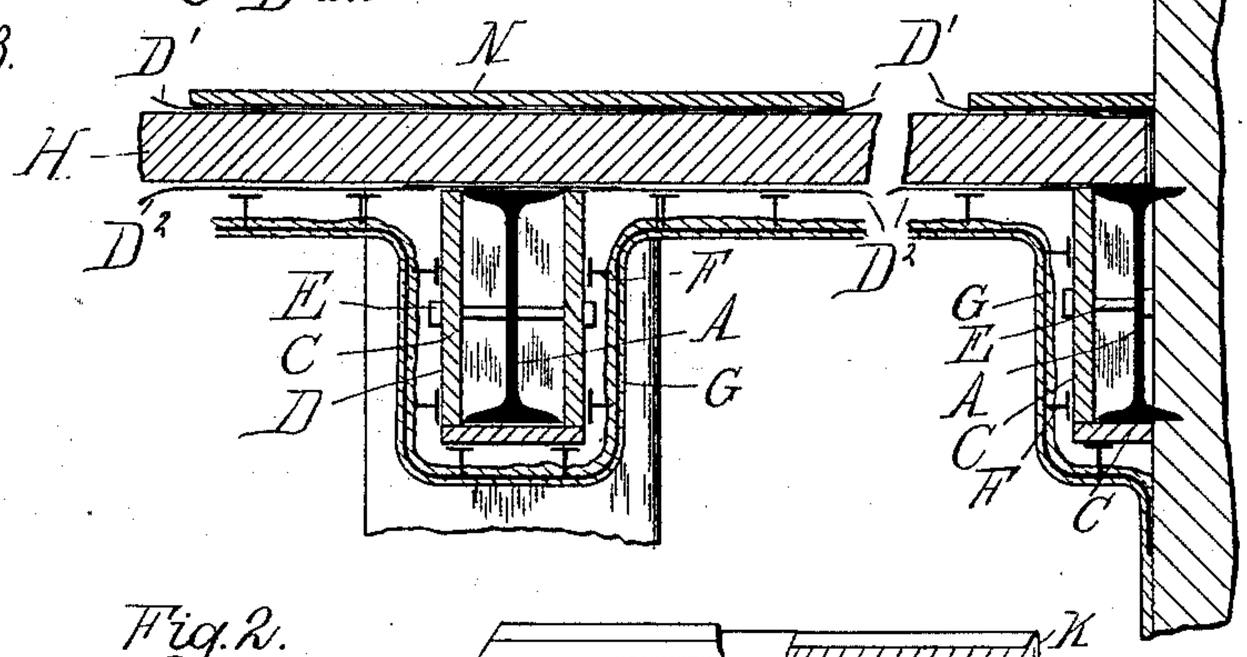
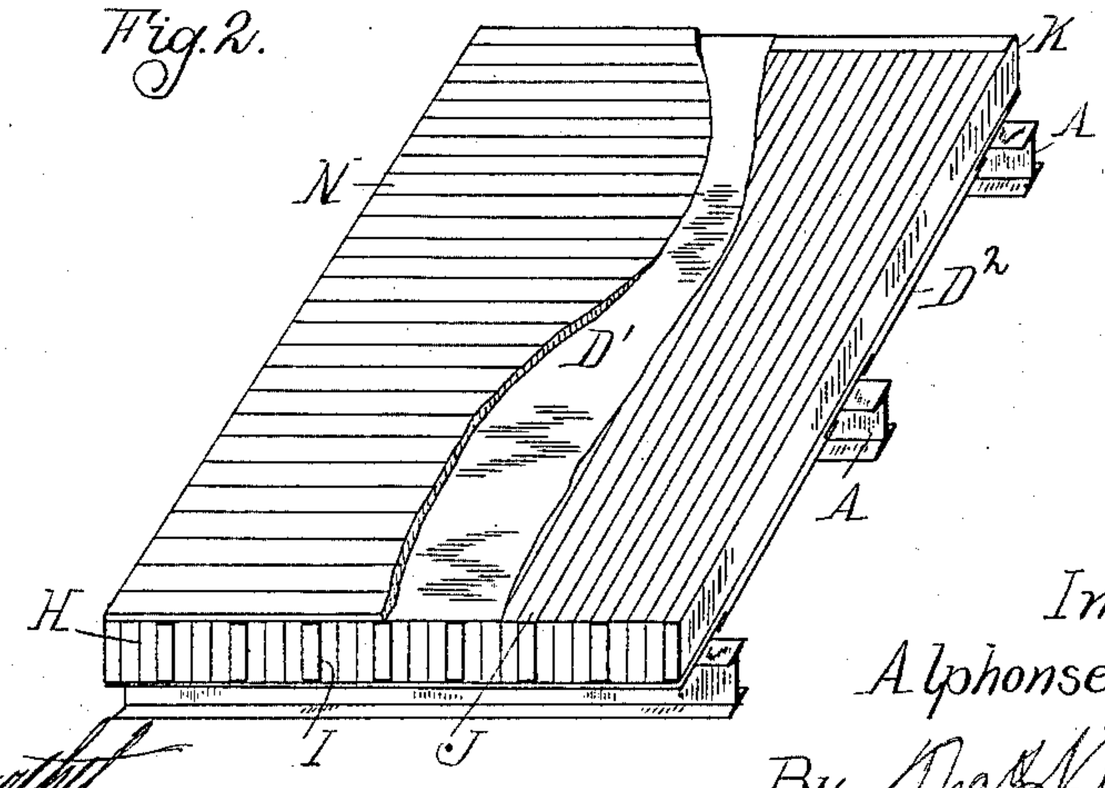


Fig. 2.



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UNITED STATES PATENT OFFICE.

ALPHONSE DE MAN, OF DETROIT, MICHIGAN.

FIREPROOF STRUCTURE.

SPECIFICATION forming part of Letters Patent No. 609,795, dated August 30, 1898.

Application filed November 14, 1896. Serial No. 612,086. (No model.)

To all whom it may concern:

Be it known that I, ALPHONSE DE MAN, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Fireproof Structures, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention consists in the construction of a fireproof structure, and particularly in the construction of a protection for metal members and in the construction of a composite metal and insulated-wood fireproof structure, all as more fully hereinafter described.

In the drawings, Figure 1 is a sectional perspective of part of a building embodying my invention. Fig. 2 is a similar perspective of part of a building, illustrating particularly the construction of the floor. Fig. 3 is a section through a portion of a floor of this construction. Fig. 4 is a horizontal section through a column B of Fig. 1, and Fig. 5 is a horizontal section through a column of different shape. Figs. 6 and 7 are vertical sections through Figs. 4 and 5 on line $x\,x$ and $y\,y$, respectively.

The modern fireproof buildings have usually for base of their construction a steel skeleton composed of columns or principals connected by girders and floor-beams. The spaces between the latter may be filled by terra-cotta arches or concrete supported by suspended metallic wires bedded in the concrete. Sometimes concrete arches are built on wire centers; but the materials used in these methods are very heavy and the spans between the floor-beams are necessarily quite limited. Also when the building has a great many stories the weight of this material requires an extra strength in the steel skeleton which carries the total load, causing a corresponding expense for structural steel. Wood as a building material is lighter and can cover greater space. The advantages of these features are obvious and solid wooden floors in connection with a steel skeleton structure are a good substitute for terra-cotta arches, provided the wood is made sufficiently slow-burning.

The protection of exposed metallic columns and beams in fireproof buildings is also usually done by covering them with a shield of terra-cotta; but when this shield gets overheated by a fire it transmits heat to the metal and causes expansion. This loosens all the fastenings which hold the terra-cotta covering in place. It soon disintegrates under the action of heat and water, the latter being the worst agent of destruction of the metallic parts in a building under fire. Wood being a good non-conductor of heat can replace with advantage the terra-cotta covering of metallic parts in a building, provided it is put in such condition as to prevent active combustion. This is obtained by insulation, in which condition only slow carbonization can take place under an intense and prolonged heat.

Insulated wood forming a covering will keep the streams of water off the metallic members in a structure during a fire, provided that they are properly boxed up with the insulated wood.

My invention consists, first, in insulating the wood used to protect the exposed metallic parts of a fireproof building by covering the wood on all its faces with a porous fireproof sheeting, excluding air for combustion, and at the same time permitting the lumber which is not thoroughly seasoned to change slowly its hygrometrical condition, preventing dry-rot of the lumber, and, second, in insulating the wood of solid floors mentioned above with fireproof sheeting, excluding air for combustion.

Figs. 1 and 3 show the preferred manner of protecting an I-beam A. Figs. 4 and 6 show the preferred protection of a compound Z-bar column B, and Figs. 5 and 7 the protection of a round column B′.

The manner of protecting the beams and columns is as follows: Planks or boards C or other suitable form of wood are first covered entirely with a porous fireproof insulating material D, preferably asbestos sheets or asbestos paper, secured onto the wood to exclude air for combustion. This insulated wood is then applied to all exposed faces of the metal.

It is a well-known fact that a non-porous casing surrounding a piece of partly-seasoned timber, so as to prevent the completion of

the seasoning of the timber, will cause it to dry-rot. Even paint will have the same effect. It is therefore necessary and essential that the fireproof sheeting used to insulate timber which is used in buildings, if it is not fully seasoned, should be of a porous nature, admitting the slow evaporation necessary to complete the seasoning of the timber, lest it should dry-rot. I do not desire to be limited to any particular way of securing this wooden structure in position. I have shown in Figs. 4 and 5 the wooden protection secured together into a box-like structure. In Figs. 4 and 6 I have shown at various points in the metal of the column blocks or cleats M of wood fitting in between the flanges of the column, preferably secured to wooden protecting members, being first previously insulated in the manner described.

Mortar or any soft fireproof material can also be used to fill up all the cavities which might be left at the foot of the column at every story between the metallic members and their insulated-wood protection in order to absolutely stop off any draft of air which might get in between the metal and the insulated wood. The above-mentioned cleats serve two purposes. They prevent the wooden protection when in the shape of plank from warping, and they also act as stops for the flues which otherwise would be formed between the wooden protecting members and the columns. In Fig. 3 I show the side protecting members secured to the I-beams by bolts E. The lower one in that case may be nailed thereto, and in this case also I prefer to employ these cleats for the same purpose.

The insulated-wood protection may be shaped to fill the hollow form of the metallic members, in which case the cleats M are dispensed with and the cells between them are taken up by the solid stock of the insulated wooden protecting-piece. On the outer face of these wooden protecting members metallic ribs or strips F may be secured, on which metal lath G may be secured and the whole plastered in the usual manner. This protection is more effective than the terra-cotta. My insulated wood can be firmly secured to the metallic members without any possible chance of being displaced by the expansion and contraction of the metallic members, neither by any ordinary blow or by the action of a stream of water during a fire. Wood is a very good non-conductor, and it will effectively prevent sufficient heat from reaching the metallic member to seriously disturb its condition. The insulation preventing the active combustion, the wood can only carbonize when submitted to intense heat, and in this state it is one of the best non-conductors. The insulated wooden boxing around the metallic members will absolutely prevent a stream of water reaching it, and will consequently prevent the destruction of the metallic member of the structure by the sudden and uneven contraction caused by the stream of water on it during the fire.

The floor construction which I preferably use is composed of wooden plank or joist set on edge close together, forming a floor of solid stock, as shown at H, and insulated by an upper and a lower fireproof sheeting D′ and D^2. The solid stock of the floor is of itself slow-burning; but when the air for combustion is excluded by the fireproof sheeting covering the upper and lower faces this construction becomes as fire-resisting as the best known fireproof construction.

The floor can also be formed, as shown, by means of timbers or planks H set on edge, separated by sheets I of insulating material (preferably asbestos paper or sheets) having their upper and lower edges turned over on the upper and lower faces of the floor members to form flaps J. Similar sheets K are applied to the ends, their edges having similar flaps, and the upper and lower faces of the floor are then covered by sheets of insulation D′ D^2. Thus the planks or timbers are insulated from each other and from any possible combustion from the outside. Instead of putting the insulating-strips between every board or plank these strips may be placed between adjacent groups of these boards and effect about the same result. On top of these solid floors may be placed the finish-flooring N.

What I claim as my invention is—

1. In a fireproof structure, a metal supporting or carrying member, and a protection therefor to cover the exposed faces and screen them from heat and water comprising wooden pieces each entirely surrounded with a non-combustible insulating material, and means for securing said pieces in place.

2. In a fireproof structure, a metal supporting or carrying member, and a fire protection therefor, consisting of insulated wooden pieces secured to cover the exposed faces, the insulating material being fireproof and at the same time porous to permit of the seasoning of the wood through it.

3. In a fireproof structure, metal columns, wooden insulated strips formed into a surrounding box, metal strips attached to this box, metallic lathing enveloping the whole and secured on these strips.

4. In a fireproof floor, the combination with supporting members, of a series of wooden planks or joists arranged closely side by side, and porous fireproof covering for the top and bottom and ends thereof, and sheets of insulating material between certain planks excluding air for combustion.

5. In a fireproof floor, the combination with supporting members, of a series of wooden planks or joists arranged closely side by side, of fireproof material between the plank members (or groups thereof) and a fireproof covering for the top and bottom thereof.

6. In a fireproof floor, the combination with

supporting planks or joists arranged closely side by side, strips of flexible fireproof material arranged between these floor members (or groups thereof) flaps at top and bottom of said strips turned over on top and bottom of the floor members, and fireproof sheets covering the top and bottom of the floor.

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

ALPHONSE DE MAN.

Witnesses:
M. B. O'DOGHERTY,
OTTO F. BARTHEL.