No. 672,379. Patented Apr. 16, 1901.

M. KOENEN.

MANUFACTURE OF FLOORS.

(Application filed Sept. 1, 1900.)

(No Model.)

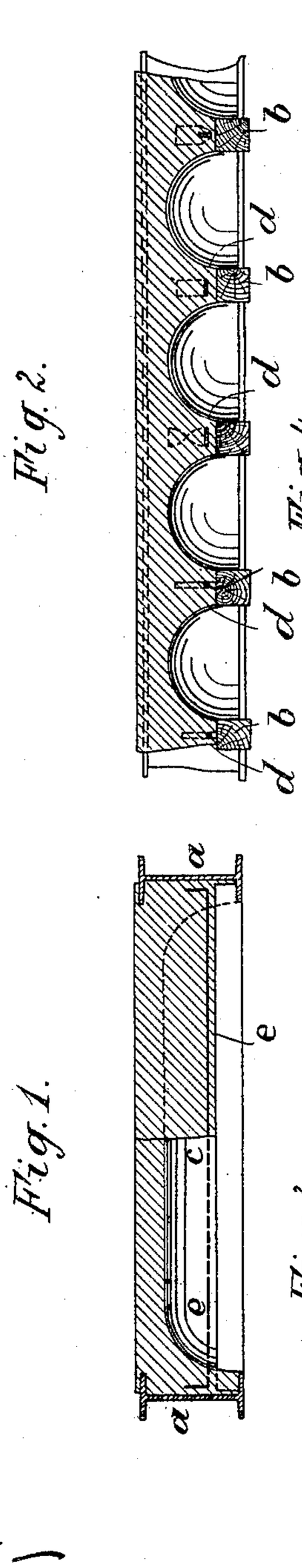

Fig. 1.

Fig. 2.

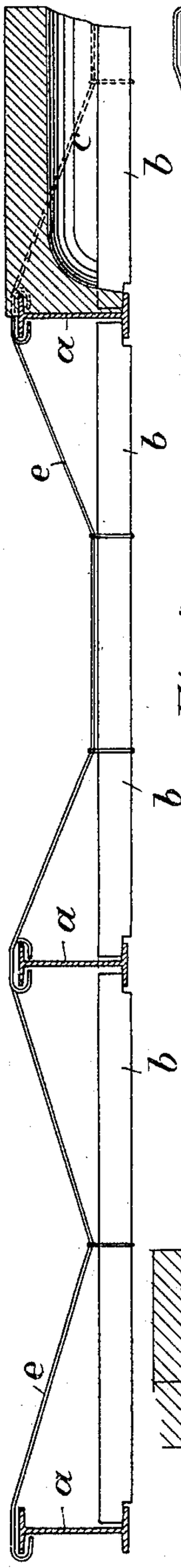

Fig. 4.

Fig. 3.

Fig. 5.

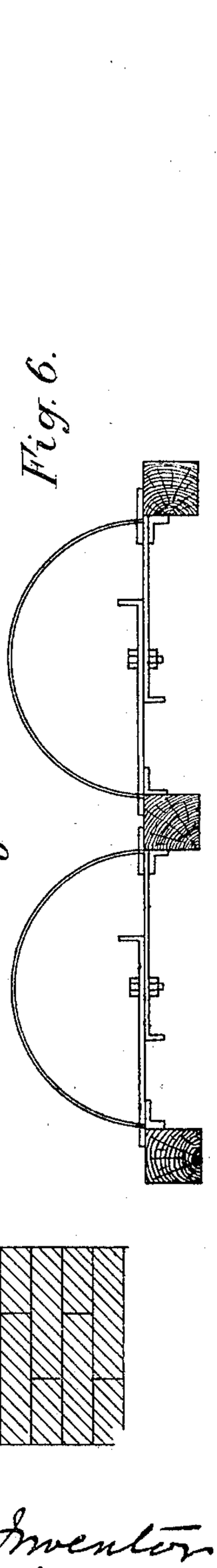

Fig. 6.

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UNITED STATES PATENT OFFICE.

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MANUFACTURE OF FLOORS.

SPECIFICATION forming part of Letters Patent No. 672,379, dated April 16, 1901.

Application filed September 1, 1900. Serial No. 28,795. (No model.)

To all whom it may concern:

Be it known that I, MATTHIAS KOENEN, a subject of the King of Prussia, Emperor of Germany, residing at Berlin, in the Kingdom of Prussia, Germany, have invented certain new and useful Improvements in the Manufacture of Floors, of which the following is a specification.

This invention has reference to floors made from composition stone, the so-called "beton," and which are rib-shaped and provided with interior iron strengthening-bars, the whole floor being secured upon wooden rafters.

I am aware that composition floors are old and that this kind of floor is, for instance, described in the specification to Swiss Patent No. 6,533, the composition floor therein described being provided with strengthening-ribs and wooden rafters at its base for the fastening of the ceiling thereto. It is, however, apparent from an inspection of the drawing and from a perusal of the specification of the patent cited that the construction therein described will not resist bending strains and is not intended for it. Furthermore, in this construction there is still the necessity of special vaulting patterns and scaffolds. A composition floor with iron girders is also described in the specification to United States Patent No. 520,490, which is likewise provided with ribs or cavities. This construction does not disclose the use of wooden beams or rafters so arranged and constructed as to resist bending strains, which form a most essential feature of the present invention and serve for the strengthening of the composition floor and for the prevention of undue strains. The United States patent referred to makes use of round iron bars embedded in the flooring and unable to withstand bending strains, these round iron bars only serving for the strengthening of the section of the composition flooring subjected to a pulling strain. I may also mention the prints of the *Actien-Gesellschaft für Beton und Monier Bau* published in 1892, wherein the so-called "Koenen" ribbed floor is described, (forming the subject of the later German Utility Model Patent No. 74,937 of August 13, 1895,) which discloses the use of solid ribs with iron I supports or girders for the compensating of pulling strains, wooden rafters being placed upon the lower flanges of the said I-supports for the attachment of the ceiling and across the ribs, but only after the ribs are finished and have become hardened. From these constructions as heretofore practiced my invention, in which the floor is made up of composition, iron, and wood, is distinguished by the following features:

The composition floor, in which iron girders are embedded in the usual manner and which is provided with ribs, is put upon the wooden beams or rafters, Figures 1 and 2, placed upon the abutments or upon the supporting-bars at certain intervals from each other, the arrangement of the floor being such that the ribs in their whole length are resting upon the wooden rafters, which are safe against bending strains, and in a transverse direction to the supporting-bars or floor-supports *a*. The beams are also supporting the vaulting-patterns required for the construction of the ribs and for the composition flooring thereto attached, Fig. 6. There is, however, no necessity of applying the vaulting-pattern directly to the base of the floor.

By the weight of the fresh composition flooring the wooden beams or rafters are submitted to an elastic or spring-like bending strain proportionate to the weight resting thereon. With the progress of the hardening process of the composition, however, the weight decreases in consequence of the evaporation of water incident thereon. This has the effect that the beam or rafter which was at first curved a little by the bending strain is now beginning to react in the opposite direction, and by this resiliency it exerts a pressure from below upon the now hardened composition flooring, thus giving rise to a certain initial bending strain in an inverse or opposite direction, which though not very considerable is still very favorable. The employment of the wooden beams or rafters also allows of the easy attachment of the ceiling, as in the Swiss patent above referred to.

The wooden beams or rafters may be resting on two or more supports, or they may be suspended from the sides or in the middle, as shown in Figs. 3 to 5 of the drawings. In the latter instance the hangers, which are embedded in the composition ribs, serve both for the support of the wooden rafters or beams

and for the strengthening of the part subjected to the pulling strain.

Figs. 1 and 2 represent a composition flooring constructed according to my invention in longitudinal and in cross section. The wooden rafters *b* are single beams upon two supports and safe against bending strains. The composition flooring itself is fitted with two half-cylindrical cavities *c* and with ribs *d*, in the interior of which special iron bars *e* are embedded for the strengthening of the composition against pulling strains. Figs. 3 to 5 show suspended beams between supports or between walls. Fig. 6 shows the vaulting-pattern arranged upon a slide upon the beams and dropping off the beams when the slides are released.

What I claim, and desire to secure by Letters Patent of the United States, is—

The combination with a composition flooring provided with ribs, of wooden rafters on which the ribs rest and by which they are supported, and strengthening-bars, embedded in the flooring above the rafters, the said bars being suspended from the floor-supports and supporting the rafters, substantially as described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

MATTHIAS KOENEN.

Witnesses:
WOLDEMAR HAUPT,
HENRY HASPER.