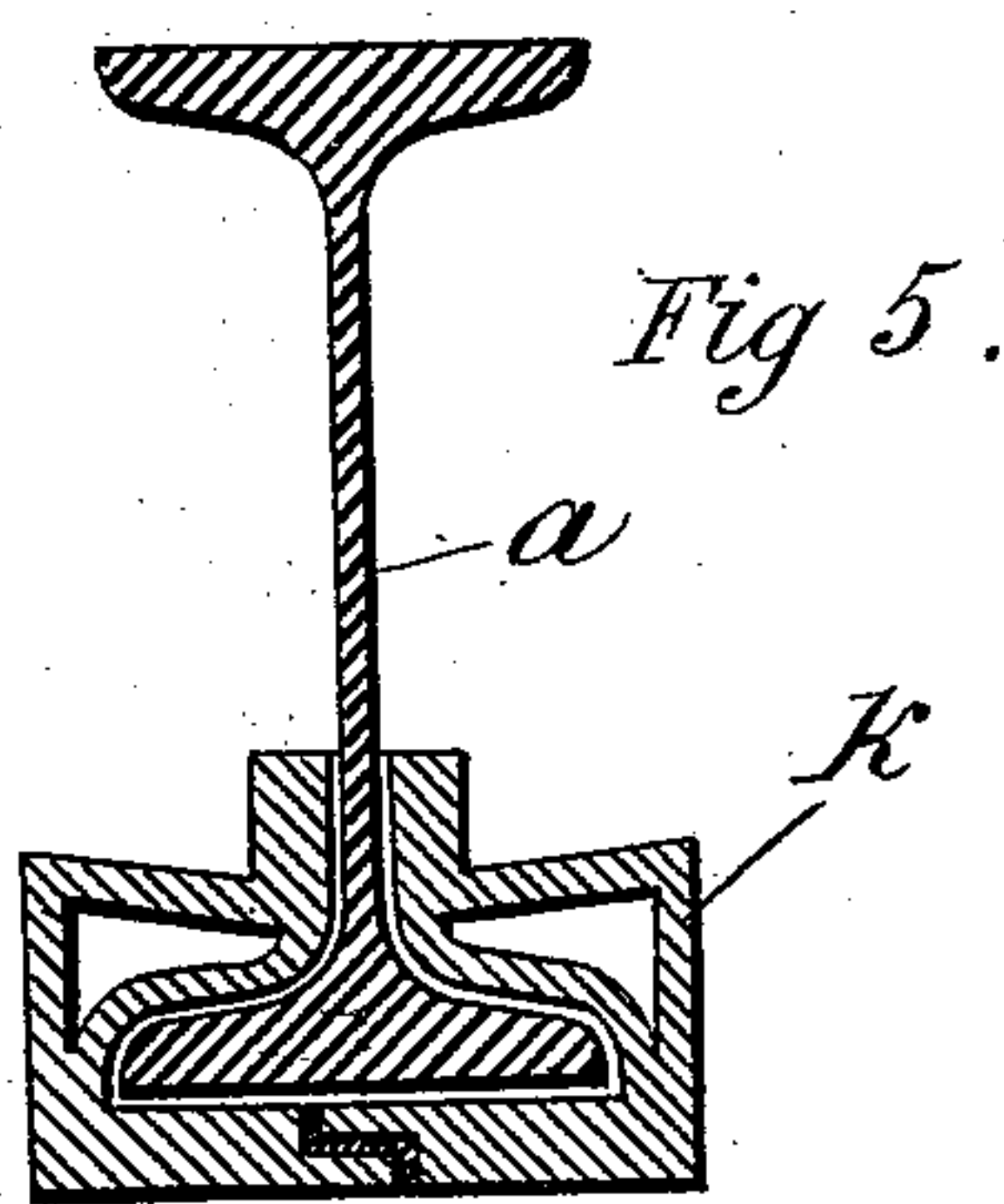
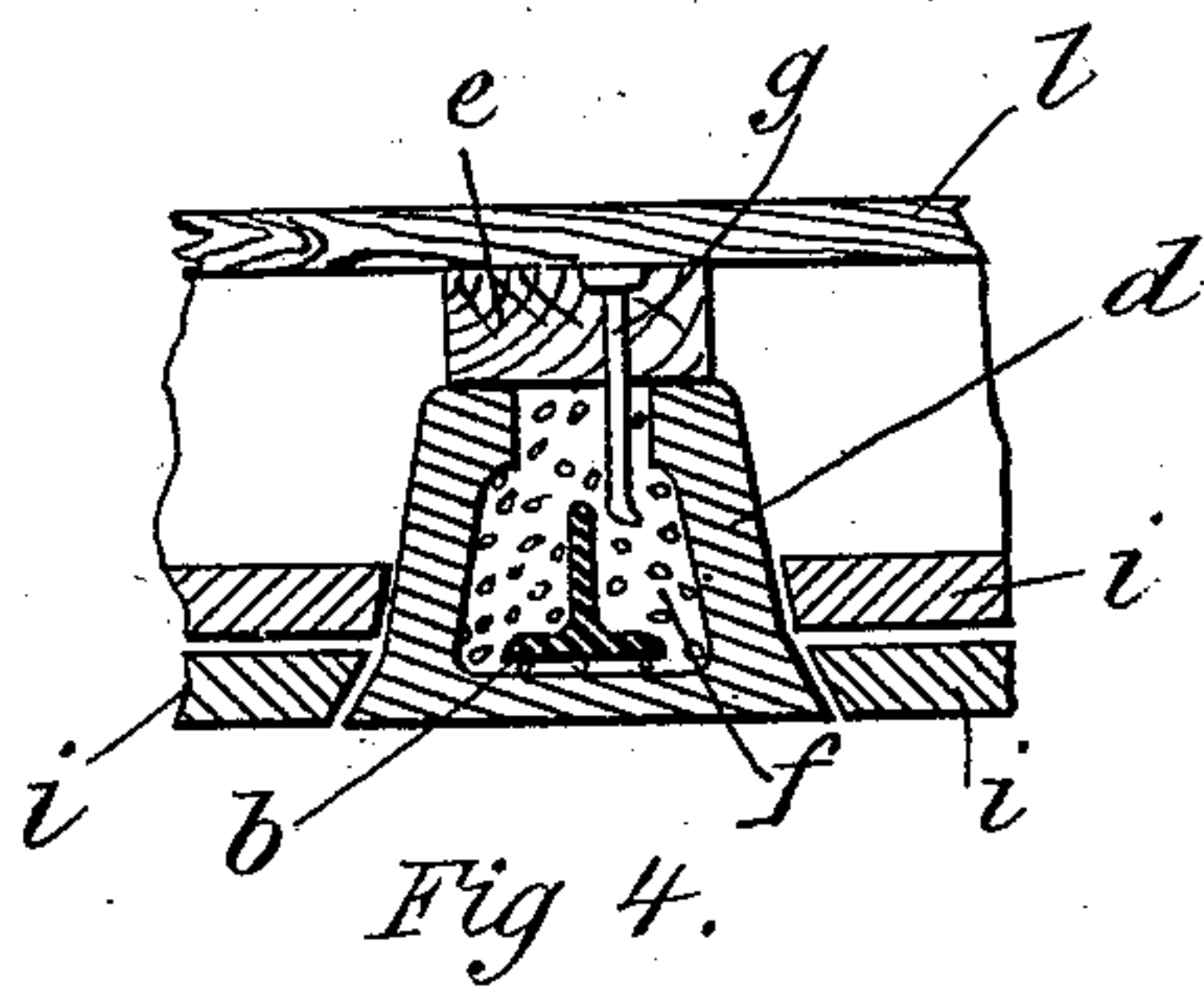
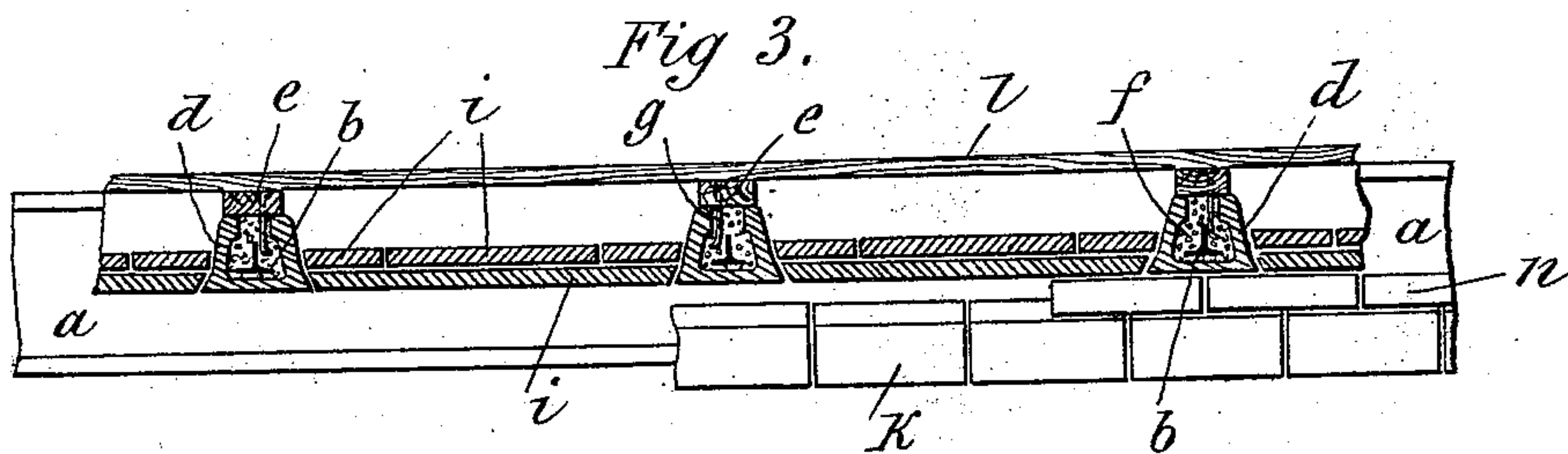
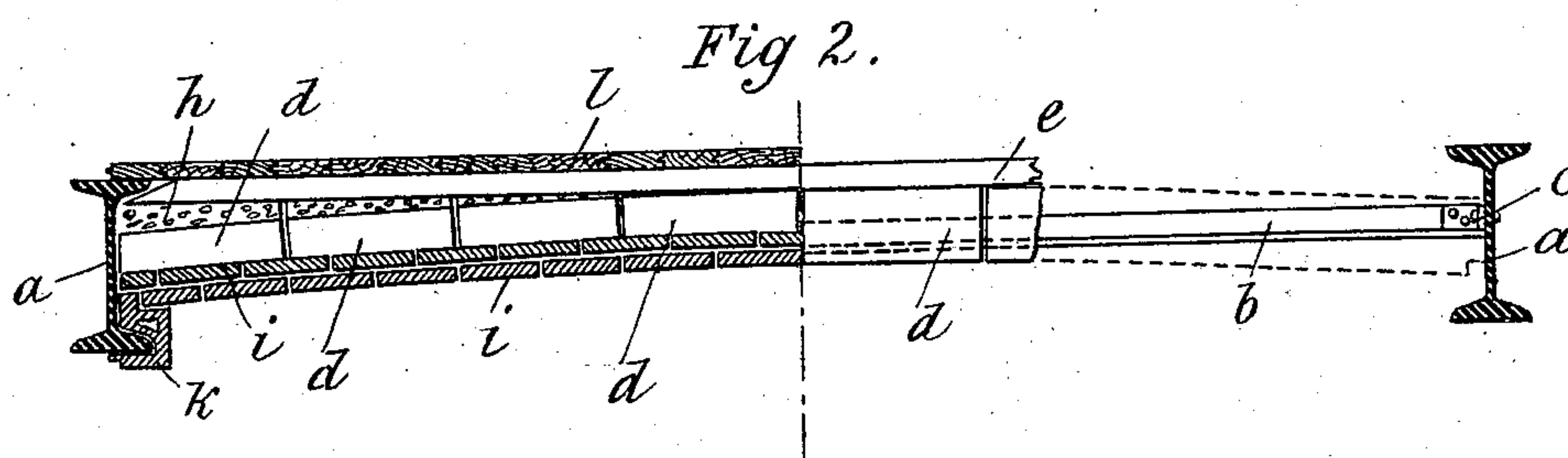
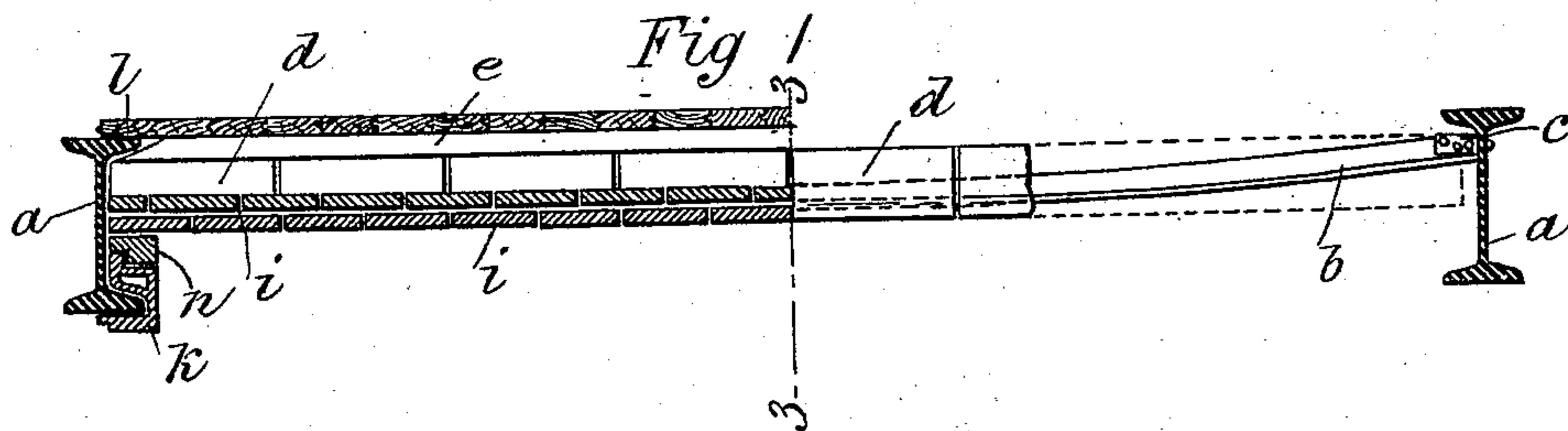


(No Model.)

R. GUASTAVINO, Jr.  
COHESIVE CEILING FLOOR.

No. 466,536.

Patented Jan. 5, 1892.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

RAFAEL GUASTAVINO, JR., OF BOSTON, MASSACHUSETTS.

## COHESIVE CEILING-FLOOR.

SPECIFICATION forming part of Letters Patent No. 466,536, dated January 5, 1892.

Application filed March 11, 1891. Renewed December 10, 1891. Serial No. 414,552. (No model.)

*To all whom it may concern:*

Be it known that I, RAFAEL GUASTAVINO, Jr., a citizen of the United States, and a resident of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Cohesive Ceiling-Floors, of which the following is a specification.

My invention relates to certain improvements in the construction of the floors and ceilings of buildings, more particularly fire-proof buildings.

The improvements may be incorporated into buildings of all descriptions, such as dwellings, school-houses, warehouses, factories, &c.

The object I have in view is to produce a cohesive ceiling-floor which shall be fire-proof and not liable to be detrimentally affected by any of the incidents of a fire, and which shall possess maximum strength with minimum weight.

A further object is to render the structure self-deafening, so that sounds occurring in one apartment may not be heard in the apartments above or below.

A further object is to devise a composite sleeper possessing certain advantages and certain peculiarities of construction.

One of the disadvantages attending the erection of flat ceilings as they are now constructed is the necessity for the employment of so many different kinds of workmanship thus calling for the exercise of several different trades, such as arch-building with hollow bricks and the like, the art of concreting, and the wood-work, where the finished floor is intended to be wooden. In floor-ceilings embodying concrete-work and wooden sleepers it is always a difficult and inconvenient task to secure the sleepers in place on the concrete so as to prevent the movement of the elements of the structure during or after the completion of the same. A serious drawback to this character of structure embodying a concrete base and wooden sleepers secured thereto is the fact that wood is subject to dry rot. The permanency of such a construction cannot, therefore, be depended upon, and a further objection is the great weight and thickness of the structure, deemed essential under

the common modes of constructing this type of floor and ceiling.

I overcome the several inconveniences above enumerated by the peculiarities of construction described herein, wherein there are employed sleeper-supporting T-iron rods acting in conjunction with I-beams in one embodiment of the invention, and in another embodiment arched sleeper-supports co-operating with T-iron tie-rod, likewise acting in conjunction with I-beams having their abutments in the side walls of the building. The sleeper-supporting rods and arched sleeper-supports serve to tie the beams together, while at the same time sustaining the weight of the material of the ceiling. The T-iron rods are incased in jackets of fire-clay, the rods and jackets being permanently secured together by means of cement, and the wooden sleepers, over which the flooring is laid, resting on the top surfaces of such fire-clay jackets and fixed in place by metallic pins passing through the sleepers and embedded in the cement surrounding the T-iron rods within said jackets. The wooden sleepers have thus a firm foundation to rest upon, and in conjunction with the fire-clay jackets enveloping the tie-rods form the principal element of the structure. I have shown the wooden sleepers secured to the fire-clay jackets by long anchors or bolts of metal. This combined fire-clay, wood, iron, and cement sleeper provides a rigid support for the ceiling and floor elements of the construction which possesses great strength and permanency. The construction of my composite sleeper also possesses the advantage that all the elements of which it is composed—iron, cement, fire-clay, and wood—work according to their most favorable conditions, each contributing directly to strengthen the ceiling. I thus produce a light structure possessing a high degree of strength.

In the accompanying drawings, forming part of this specification, and wherein like features are indicated by like letters of reference in the several views, Figure 1 is a longitudinal sectional view, partly in elevation, of a structure embodying my invention, showing the application of the sleeper-supporting



T-iron rods in a ceiling-floor flat on both surfaces. Fig. 2 is a view similar to Fig. 1, the sleeper-supports being arched, this view embodying the same elements as Fig. 1, but arranged or disposed differently, thus giving to the structure a slightly-arched configuration on the ceiling-surface and greater strength than in the construction of Fig. 1. Fig. 3 is a transverse section on the line 3 3 of Fig. 1. Fig. 4 is a detail showing the construction of the fire-clay jacket surrounding the T-iron rod, the manner of securing the wooden sleeper to said jacket, and the relation of the floor and ceiling material to the aforesaid elements; and Fig. 5 is a detail, on an enlarged scale, of one of the I-beams and the fire-clay jacket surrounding its lower flanges.

Referring to the drawings, *a a* indicate iron beams of small section, preferably in the form of I-beams. These beams extend between the walls of the building and may, if deemed necessary, have intermediate supports between such walls.

*b b* indicate T-iron tie-rods of small section having a wide lower flange. These tie-rods are bolted to angle-irons *c*, secured to the beams *a*, and extend between the beams *a*, thus serving to tie said beams together.

In Fig. 1 the point of attachment of the T-iron tie-rods *b* to the beams *a* is just beneath the upper flanges of said beams, and in this view the tie-rods are not straight, but are bowed downwardly, as indicated.

In Fig. 2 the T-iron tie-rods *b* are secured to beams *a* about midway between their flanges and extend between the beams in a straight line, instead of being bowed, as in Fig. 1. In both these views, Figs. 1 and 2, the T-iron tie-rods *b* work by tension to sustain the weight of the structure.

In case the T-iron tie-rods *b* in jackets of fire-clay material *d* of such outer configuration as will best adapt them to support the ceiling material and to furnish the required foundation for the wooden sleepers *e* to rest upon. As shown in the drawings, these jackets *d* are flat at the bottom, have sloping sides, and are open at the top. They are made in short sections to facilitate handling. They are large enough interiorly to receive a sufficient quantity of cement *f* to secure the inclosed T-iron tie-rod and jacket together, and thus permanently fix them in proper relative position to each other. The jackets *d* are formed open at top to facilitate the insertion of the cement *f* and to permit of the passage into the cement of the long nails *g*, secured to the wooden sleepers *e*, as seen in the drawings. The top edges of the jackets *d* are flat to provide a good seating-surface for the wooden sleepers *e*, and when said sleepers are thus placed, with the nails *g* or other anchoring means projecting into the cement within the jackets, a positively-rigid foundation for the sleepers is provided, and when the cement

has fully set the connection between the said fire-clay foundation and the wooden sleepers is an effectual and permanent one.

The fire-clay jackets *d* extend the entire length of the tie-rods *b* and abut at their ends against the sides of the beams *a*, and thus said clay material, which works by compression, will brace between beams and strengthen the supporting function of the tie-rods *b*, which are working by tension.

In both Figs. 1 and 2 the sleepers *e* are of such thickness as to bring their top surfaces on a level with the top flanges of the beams *a* or higher, if necessary, and they may be beveled at their ends to conform to the shape of the under surface of such flanges and thus provide a neat and secure point of connection between beam and sleeper. In Fig. 1, the top surface of jackets *d* being straight, the sleepers *e* lie in contact with said jackets their entire length, while in Fig. 2 the arched form of the inclosing jackets prevents the sleepers from resting in contact throughout their length with the said jackets. At and near their ends where the sleepers and jackets are not in contact the intervening space is filled in with cement *h*, as shown.

The ceiling-tiles *i*—there being preferably two courses—are laid in panels in cement between the fire-clay jackets *d* and the beams *a*, the outer surface of the finishing course of said tiles *i* being flush with the bottom surface of said jackets, as best seen in Fig. 3. The edges of the tiles *i*, where they come in contact with the jackets *d*, are beveled or sloped to conform to the slope of the walls of said jackets, thus furnishing support to the ceiling.

The lower flanges of the beams *a*, which depend below the ceiling, are protected and concealed by means of fire-clay shoes *k* of peculiar form. These shoes are made in sections and are provided with overlapping flanges, as seen in Fig. 5, the joints between said flanges when the shoes are brought together being made of cement or plaster. These shoes *k* are of sufficient height to completely cover all of the beams below the ceiling, or finishing-pieces *n*, of fire-clay, may be inserted between the shoes and ceiling-tiles, if preferred, as seen in the drawings, Figs. 1 and 3. The floor of wood *l* is laid over the sleepers *e* and upon the flanges of the beams *a* and secured in place by nailing the same to the sleepers.

By the above-described construction spaces are provided over the ceiling and beneath the floor, by which means the ceiling-floor is rendered self-deafening, as will be readily understood. When the ceiling is built of finishing-tiles, it will of course require no plastering or other decoration, and is therefore an economical construction. It is also plain that my construction has the merit of simplicity, and, embodying comparatively a small amount of material, is light in weight. The construction permits me to dispense with the



use of arches as supports for the floor without sacrificing strength or stability.

One advantage of my invention is that all the parts essential in the erection of the ceiling-floor, including the composite sleeper embodying iron, clay, and wood, may be constructed at the shops or factory and brought to the building in complete condition to be put in place, thus avoiding the delays and other drawbacks incident to the usual modes of ceiling and floor construction when the same is required to be performed in inclement weather.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a cohesive ceiling-floor, the combination, with longitudinal metallic beams of small section supported between the walls of the building and metallic T-iron rods extending between said beams and serving to tie and brace the same together, of fire-clay jackets inclosing said T-iron rods and wooden sleepers resting on and anchored to said fire-clay jackets, substantially as set forth.

2. In a cohesive ceiling-floor, the combination, with longitudinal metallic beams of small section supported between the walls of the building and metallic T-iron rods extending between said beams and serving to tie and brace the same together, of fire-clay jackets open at top and inclosing said T-iron rods and filled with cement, whereby the inclosed T-iron rods are fixed in proper position within the jackets, wooden sleepers resting on the top surfaces of the fire-clay jackets, and anchors or similar devices secured to said sleepers and projecting into the cement within the fire-clay jackets, substantially as set forth.

3. In a cohesive ceiling-floor, the combination, with longitudinal metallic beams of small section supported between the walls of the building and metallic T-iron rods bolted to said beams below their upper flanges and extending between the beams, of fire-clay jackets inclosing said T-iron rods throughout their entire length, and wooden sleepers supported on and anchored to said fire-clay jackets and of a thickness to bring their top surfaces about on a level with the upper flanges of the supporting-beams, the ends of such sleepers beveled and fitting under such upper flanges of the beam, substantially as set forth.

4. In a cohesive ceiling-floor, the combination, with longitudinal metallic beams of small section supported between the walls of the building, a series of metallic T-iron rods extending between said beams and serving to tie the same together, and fire-clay jackets inclosing said T-iron rods, of wooden sleepers resting on and anchored to the fire-clay jackets and serving to give support to a wooden floor passing over the upper flanges of the aforesaid beams, and a ceiling of thin tiles laid in panels in cement between said fire-clay jackets and supporting-beams, the exposed

surface of the ceiling being flush with the bottom surfaces of said fire-clay jackets, substantially as set forth.

5. In a cohesive ceiling-floor, the combination, with longitudinal beams of small section supported between the walls of the building, metallic T-iron rods extending between said beams and serving to tie the same together, and fire-clay jackets inclosing said T-iron rods, of wooden sleepers resting on and secured to the fire-clay jackets and giving support to a wooden floor passing over the upper flanges of the beams, a ceiling of thin tiles laid in panels in cement between said fire-clay jackets and supporting-beams, and fire-clay shoes concealing and protecting such portions of the supporting-beams, including their lower flanges, as depend below the tiling of the ceiling, substantially as set forth.

6. In a cohesive ceiling-floor, the combination, with longitudinal beams of small section supported between the walls of the building, metallic T-iron rods extending between said beams and bolted thereto about midway between their flanges, and curved or arched jackets of fire-clay inclosing said T-iron rods and anchored thereto by cement filling, of wooden sleepers supported on and anchored to the arched fire-clay jackets, and concrete filling placed between said jackets and sleepers contiguous to the supporting-beams, substantially as set forth.

7. In a cohesive ceiling-floor, the combination, with longitudinal beams supported between the walls of the building and metallic T-iron rods extending between the beams and bolted thereto and serving to tie said beams together, of fire-clay jackets inclosing said T-iron rods and firmly connected therewith by cement filling and provided with flat top and bottom surfaces and beveled sides, a ceiling of thin tiles laid in panels in cement between the said fire-clay jackets and beams, the edges of the tiles in contact with the jackets sloped or beveled to conform to the sloping sides of the jackets, and sleepers of wood supported upon and anchored to the aforesaid fire-clay jackets, substantially as set forth.

8. The combination, with the supporting-beams and the floor and ceiling, of a series of T-iron rods extending between beams and incased in and anchored to fire-clay jackets whose bottom surfaces are flush with the exposed surface of the ceiling, and a series of wooden sleepers resting on and anchored to the top surfaces of the aforesaid fire-clay jackets and furnishing support to the floor passing over the upper flanges of the supporting-beams, substantially as set forth.

9. A composite sleeper for use in the construction of ceiling-floors of fire-proof buildings, consisting of a metallic T-iron rod inclosed within a jacket of fire-clay, said jacket and T-iron rod secured in proper relation to each other by a filling of cement, and a wooden sleeper resting on the top of said fire-clay



jacket and anchored thereto, substantially as set forth.

10. A composite sleeper for use in the construction of ceiling-floors of fire-proof buildings, consisting of a metallic T-iron rod enclosed within a jacket of fire-clay having an open top, said jacket and T-iron rod secured together by a cement filling, as explained, and a wooden sleeper resting on top of said fire-clay jacket and anchored to the same by nails

or like devices inserted in the sleeper and embedded in said cement filling within the fire-clay jacket, substantially as set forth.

Signed at Boston, in the county of Suffolk and State of Massachusetts, this 3d day of 15 March, A. D. 1891.

RAFAEL GUASTAVINO, JR.

Witnesses:

WILLIAM E. BLODGETT,  
FRIEDRICH SCHLÜNS.