

No. 615,634.

Patented Dec. 6, 1898.

E. L. PEASE.

CONSTRUCTION OF FLOORS OR SIMILAR STRUCTURES.

(Application filed Dec. 23, 1897.)

(No Model.)

2 Sheets—Sheet 1.

FIG. 1.

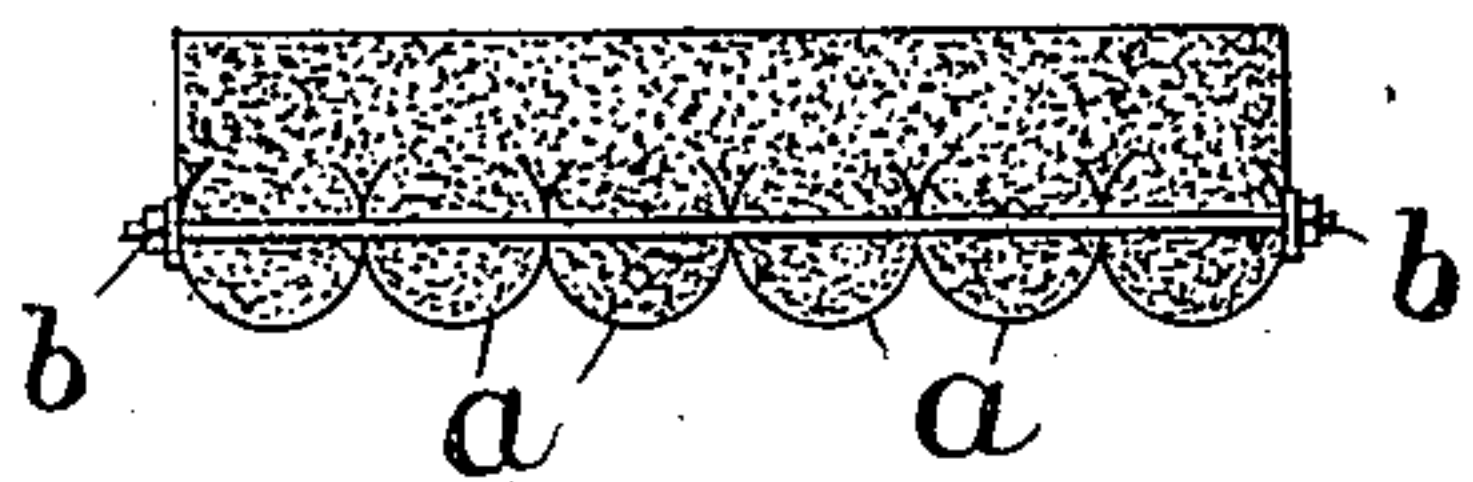


FIG. 2.

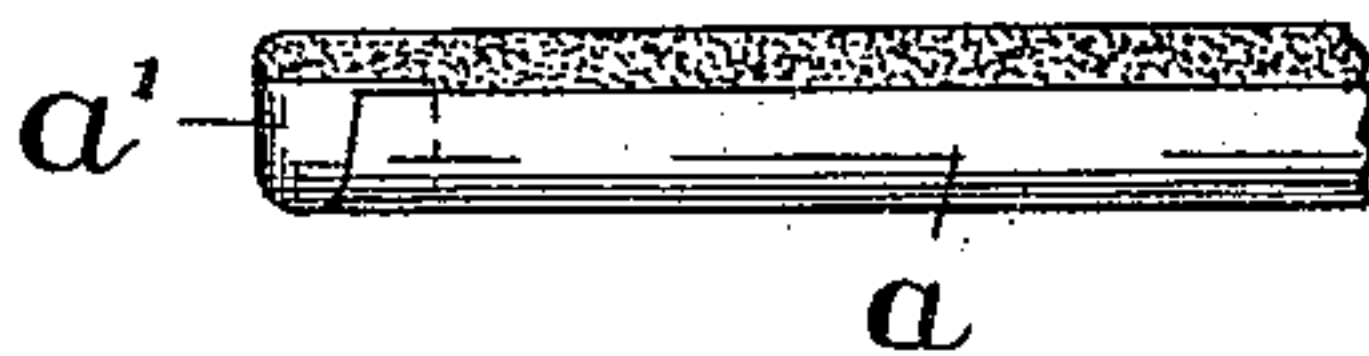


FIG. 3.

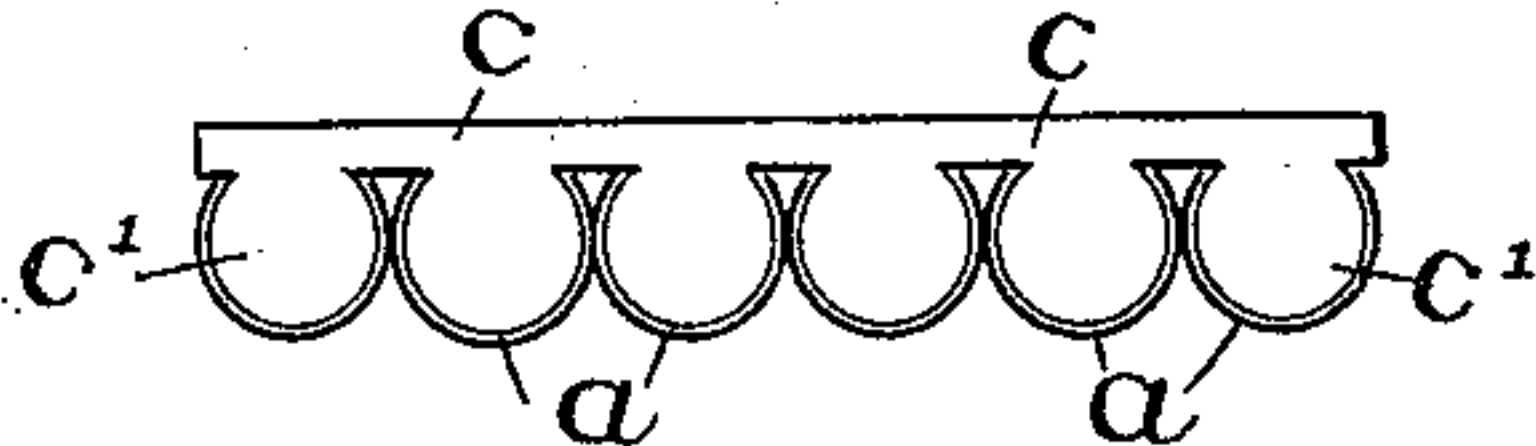


FIG. 4.

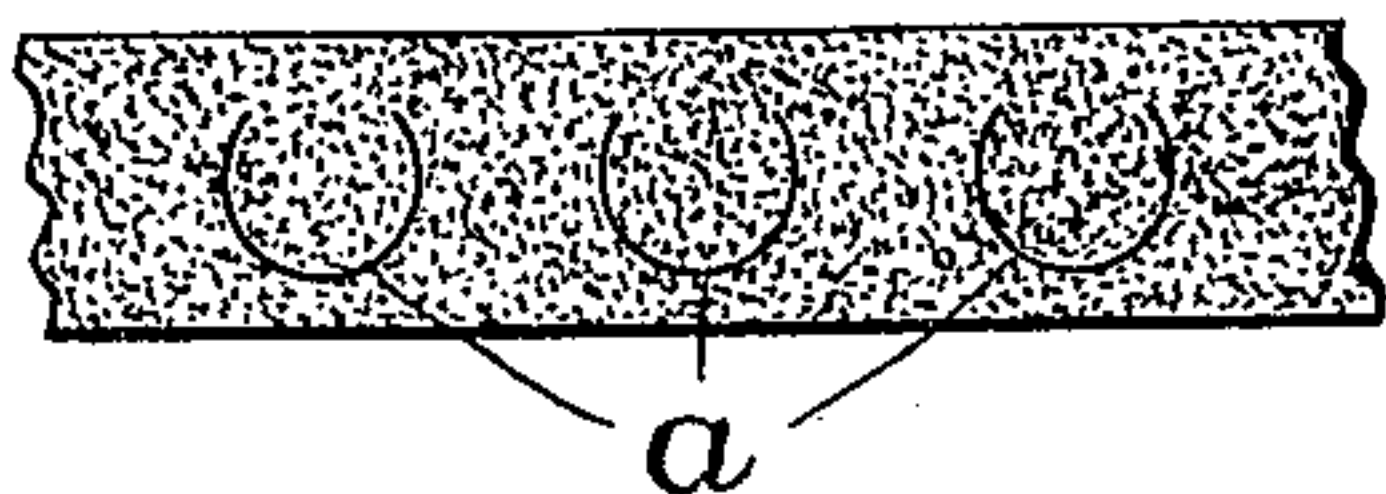


FIG. 5.



FIG. 6.

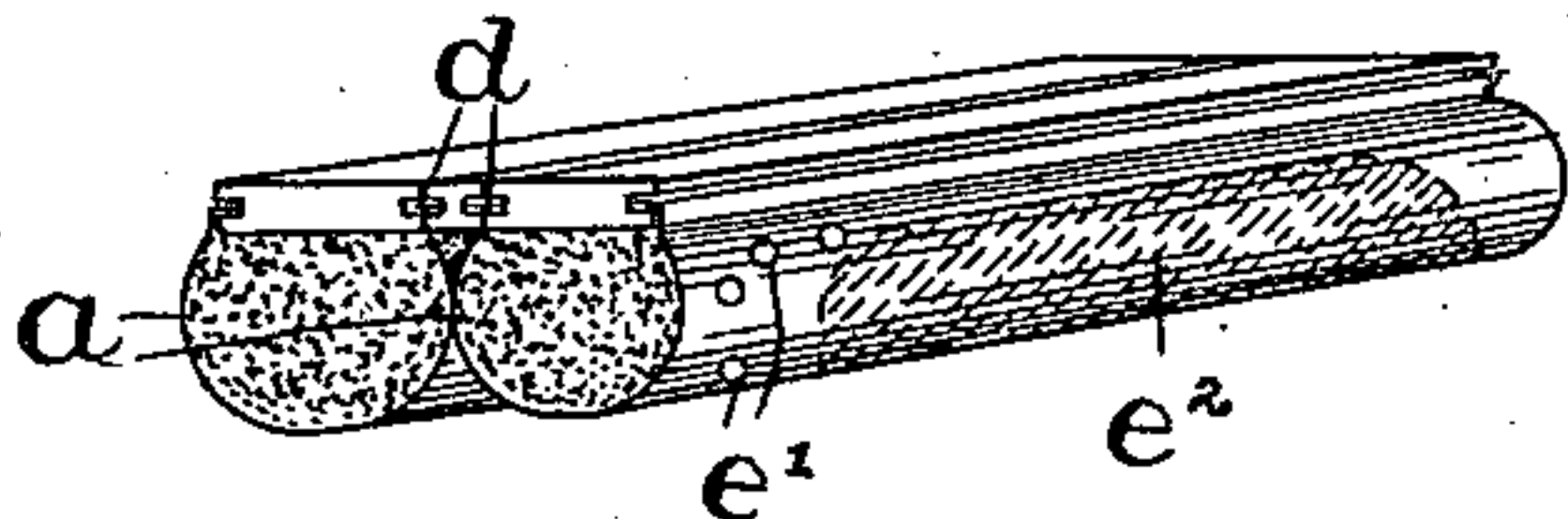


FIG. 7.

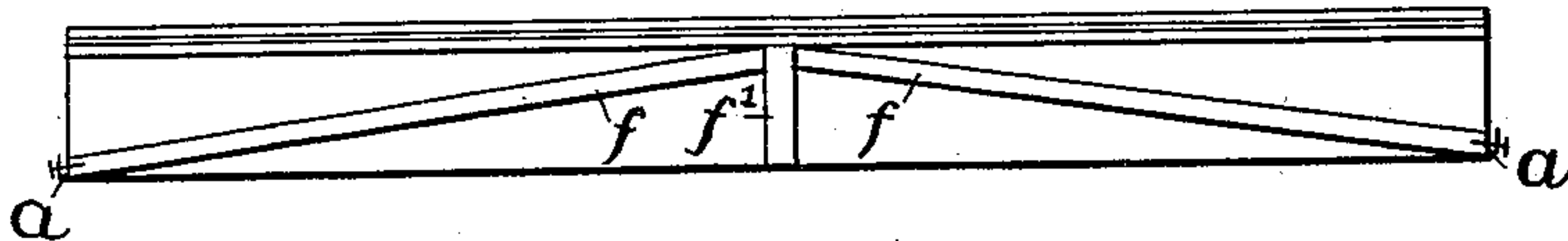
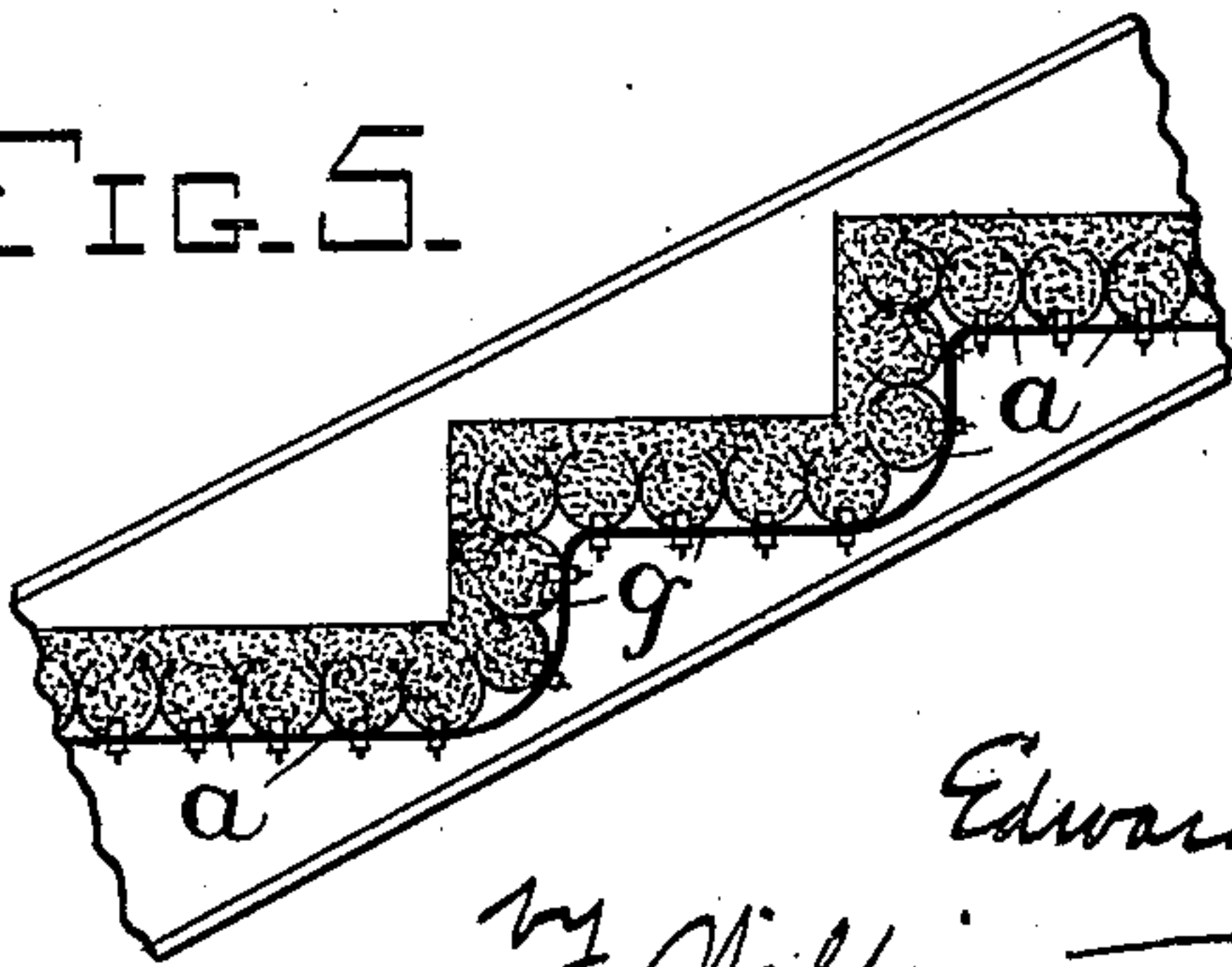


FIG. 8.



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2 Sheets—Sheet 2.

FIG. 9.

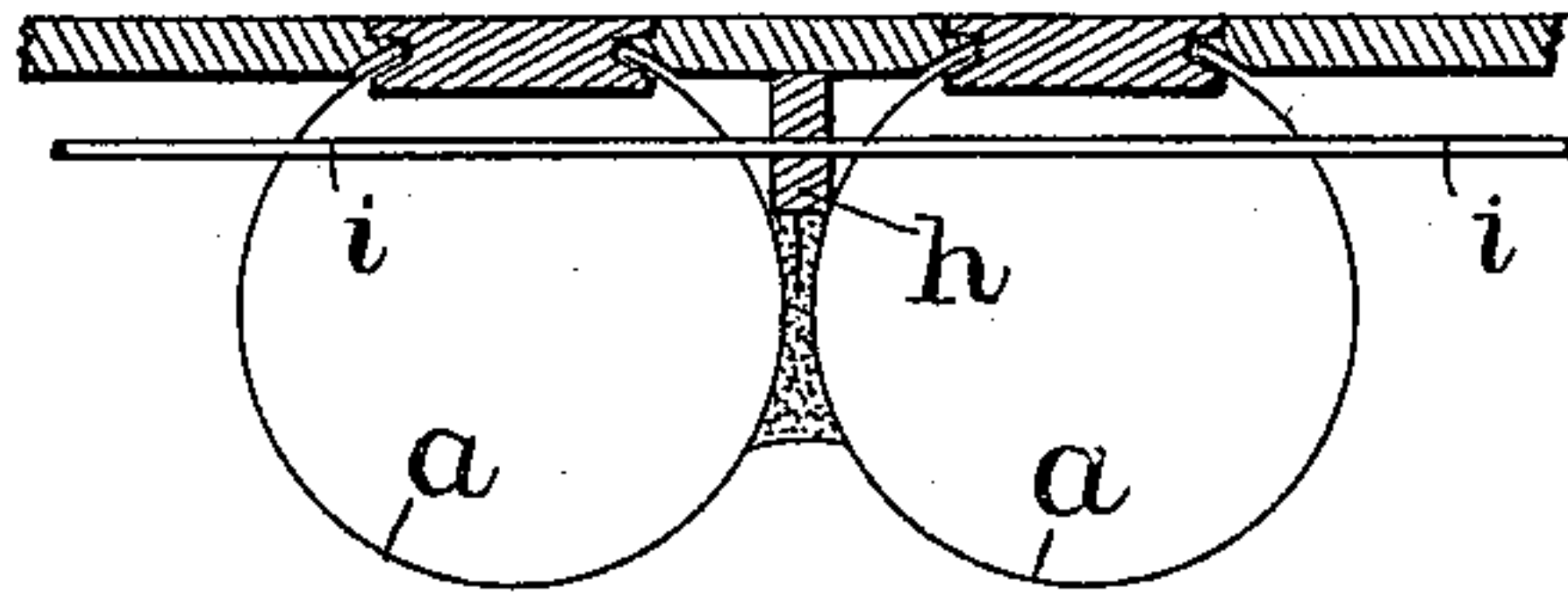


FIG. 9a

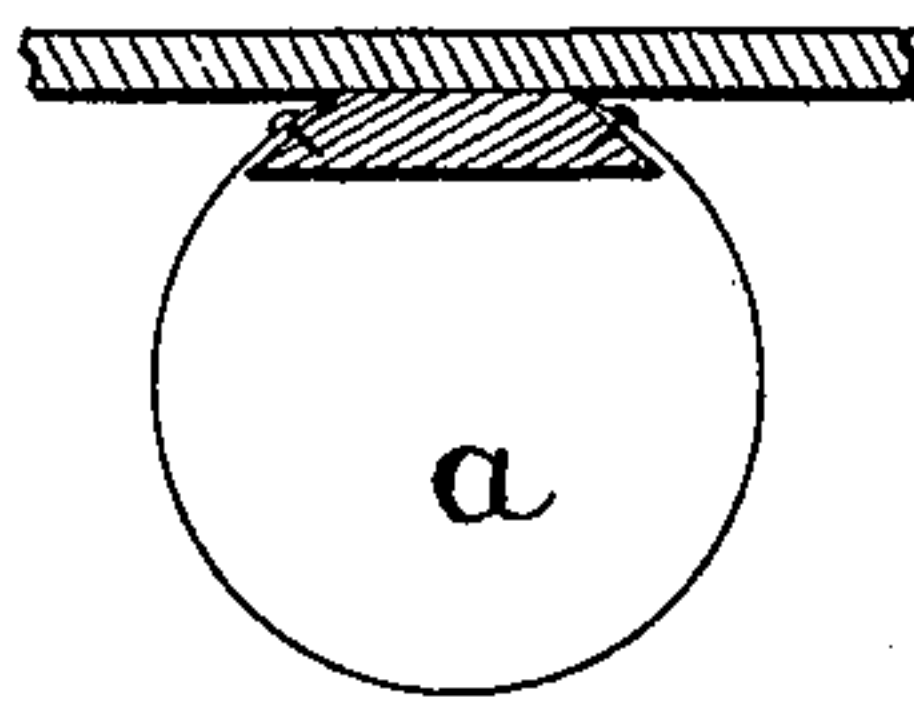
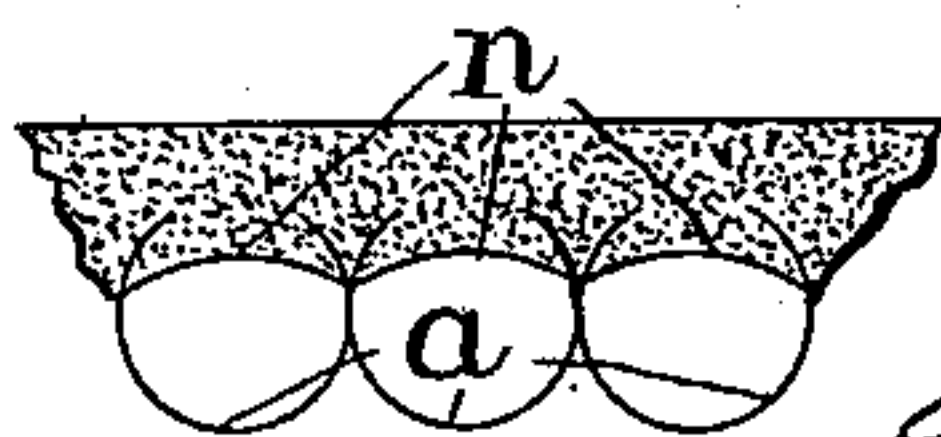


FIG. 10.



FIG. 11.



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UNITED STATES PATENT OFFICE.

EDWARD LLOYD PEASE, OF HURWORTH-UPON-TEES, ENGLAND.

CONSTRUCTION OF FLOORS OR SIMILAR STRUCTURES.

SPECIFICATION forming part of Letters Patent No. 615,634, dated December 6, 1898.

Application filed December 23, 1897. Serial No. 663,214. (No model.)

To all whom it may concern:

Be it known that I, EDWARD LLOYD PEASE, a subject of the Queen of Great Britain and Ireland, residing at Hurworth-upon-Tees, in the county of Durham, England, have invented certain new and useful Improvements in the Construction of Floors and Similar Structures, (for which I have obtained a British patent, No. 10,783, dated May 31, 1895;) and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention comprises certain improvements which are applicable with advantage to various kinds of structural arrangements in which the tubular vessels of the kind described in my Letters Patent No. 540,186, dated May 28, 1895, and illustrated in the drawings annexed thereto are employed in combination with cement and the like hard-setting material or with other means for securing the said tubular vessels in their several positions as members of one structure, such as a floor or the like.

By the improvements constituting my present invention the features and principle of the above-cited invention are modified and adapted for use in cases in which the continuous interlocking of tubes may be advantageously dispensed with, whether on the score of economy and simplicity or otherwise, and the modification is admirably adapted for a system of construction which may be designated "trough-flooring."

The nature of my invention and the means for carrying it into effect are to be understood from the description of the following modifications, taken with reference to the drawings hereto annexed.

Figure 1 illustrates in transverse sectional view a series of separate or detached tubular vessels or troughs *a a*, connected together transversely by through-bolts *b*. The ends *a'* of these troughs may be turned in, as shown in Fig. 2, to prevent the concrete pushing out at the ends when under strain, the concrete being filled in the trough right to the end. This adds greatly to the strength when

there is only a single span and no abutment for the concrete to thrust against. Bars suitably serrated and attached in the manner shown also in transverse sectional view in Fig. 3 may be employed, in which *c* is the transverse or interlocking bar with serrations, disk or hoop shaped extensions *c'*, which are inserted endwise into the loose or detached tubular vessels *a a*. The ironwork or tension-resisting material as arranged in these figures is easily filled with concrete or the like hard-setting material, which is united with the enveloping material constituting the floor or other structure, thus forming a solid mass through the entire thickness of the said floor or the like structure; but inasmuch as the concrete contains the ironwork or tension-resisting material in its tubular and beam-like form, it being understood that the said tubular vessels interlock the cement or concrete within their converging sides, as shown more especially in Fig. 1, the tubular vessels *a* are sometimes simply set apart, as shown in transverse sectional view in Fig. 4, being secured in their several positions and practically all interlocked together by the hard-setting material in which they are embedded. Arranged in this way they serve as substitutes for solid bars or complete tubes, securing the same or greater tensile strength for the same weight of material in the former case and at less expense than tubes can be provided for in the latter case. Floor-tiles of suitable form may be embedded into the cement or concrete charged into the tubular vessels.

Fig. 5 illustrates an arrangement of tubular vessels for staircases in which the tubes themselves form the treads of the stairs in combination with concrete or the like hard-setting material, which is charged into them. Each tube *a* is bolted to a suitably-arranged support *g* on the bearer, but is otherwise secured in position, and the tubes are all interlocked together in the manner described with reference to Fig. 4. In the construction of a spiral staircase the tubes would be tapered, the larger ends being on the outside, and the bearers and tubes would be suitably propor-

tioned. Each tubular vessel *a* is secured in position by any convenient means, such as by being bolted to a bearer, as described with reference to Fig. 5, or by other equivalent means; but the said tubular vessels are all locked in their several positions as members of a structural arrangement by the contour which they impart to the cement embedded into them, all transverse movement being obviously impossible in this combination.

Figs. 6 to 9^a, inclusive, illustrate a mode of trough-flooring in which the tubular vessels or troughs are secured to boarding or concrete by tongue-and-groove arrangement, the combination constituting a floor of great strength.

Fig. 6 illustrates the tubular vessels *a* with their edges turned inward, so as to fit into the grooves of the boards, and an iron tongue *d* can be used to unite two flooring-boards together, at the same time interlocking the turned-in edges of the tubular vessels, the whole when suitably packed forming a strong light fireproof floor; but where there are no boards the said edges of the tubular vessels may be interlocked by being turned into the concrete or hard-setting material, and holes *e'* are provided for uniting the concrete in one tube with that of another or giving a better hold to the concrete on the iron. Where weight is to be saved, the bottom part *e*² of the tubes is suitably packed with straw or the like fibrous material or left vacant, mill-board being used to support the concrete while setting. Fig. 7 is a longitudinal sectional view of a similar tube, the ends of the tube *a* being turned up and nailed to the struts, which abut against a central post *f'*.

Fig. 8 illustrates in transverse sectional view the tubular vessels *a*, similar in arrangement and mode of connection with Fig. 6, but with the under sides flattened, which can obviously be generally substituted for the more cylindrical form shown in the other figures of the drawings annexed to this specification, with the advantage of increasing the power of each such vessel to resist strains through the under side thereof, approximating more nearly to the form of a bottom flange.

Fig. 9 illustrates in transverse sectional area how my improved construction of trough-flooring can be adapted by simple devices to present a finished appearance on the under side thereof. The tubes *a* are separated by a longitudinal lath *h*, which is studded with nails, so as to give a holdfast to the plaster. The whole is secured by a through-bolt *i*.

Fig. 9^a is a modification of the connection between the tubular vessel *a* and the flooring of a more simple and cheaper character, inasmuch as the tongue-and-groove arrangement is dispensed with and the tubular vessel *a* is secured direct to a beam the edges of which are overlapped by the edges of the tubular vessel.

Figs. 10 and 11 illustrate in transverse sectional area a modification of flooring where concrete only is used with the tubular vessels. In this case *n* is a thin sheet of wood-pulp board inserted in the tubes *a* before the concrete is filled in to support it while setting, the lower part of the tube or trough remaining empty or filled with water.

It will be observed from the foregoing description, taken in conjunction with the several figures of the drawings hereto annexed, that the essential feature throughout the modifications of my invention is the use of open tubular vessels as beam-like elements of strength in various structural arrangements of trough-flooring, and the several constructions described and shown are to be taken as illustrating how readily such tubular vessels are combined with other elements of construction for the purpose of forming easily-constructed fireproof and durable structural arrangements of this description; but I would here remark that although the tubular vessels will consist in many cases of thin sheet-iron, yet strawboard coated with hard-setting material, such as "petrifite," may be advantageously used in some of the constructions embodying my invention, as hereinbefore described.

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

1. In a structural arrangement forming a floor or ceiling, the combination with open tubular vessels having their edges turned inward, of grooved boards, and a tongue interlocking the tubular vessels to the said flooring, substantially as described.

2. In a structural arrangement forming a floor the combination of open tubular vessels *a* with tongue-and-grooved flooring-boards, the grooves of one board receiving the edges of the tubular vessels as well as the corresponding tongues of the adjoining boards substantially as described.

3. In a structural arrangement forming a floor the combination of open tubular vessels *a* with flooring-boards in which each tubular vessel is secured directly to a plank the edges of which are overlapped by the corresponding edges of the tubular vessel substantially as described.

4. In a structural arrangement forming a floor, the combination with open tubular vessels *a*, of grooved flooring-boards, the edges of the tubular vessels engaging the grooves of said flooring and a mass of hard-setting material between adjacent tubular vessels and the flooring, substantially as described.

5. In a structural arrangement forming a floor, the combination with tubular vessels *a* having their edges turned in, of grooved flooring, the grooves of said flooring engaging said edges, a tongue interlocking the said vessels to the flooring; a mass of hard-setting material

rial carried inside of said vessels and occupying the space between adjacent vessels and the flooring, substantially as described.

6. In a structural arrangement for floors,
5 the combination with open tubular vessels arranged side by side and having their edges turned in, of a hard-setting material filling said vessels and the space between them and

means for securing said vessels together, substantially as described.

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

EDWARD LLOYD PEASE.

Witnesses:

GEORGE JAMES CLARKSON,
EDWARD THOMAS ELCOAT.