No. 710,308. Patented Sept. 30, 1902.

M. WATSON.

FIREPROOF FLOOR CONSTRUCTION.

(Application filed May 14, 1902.)

(No Model.)

Fig. 1.

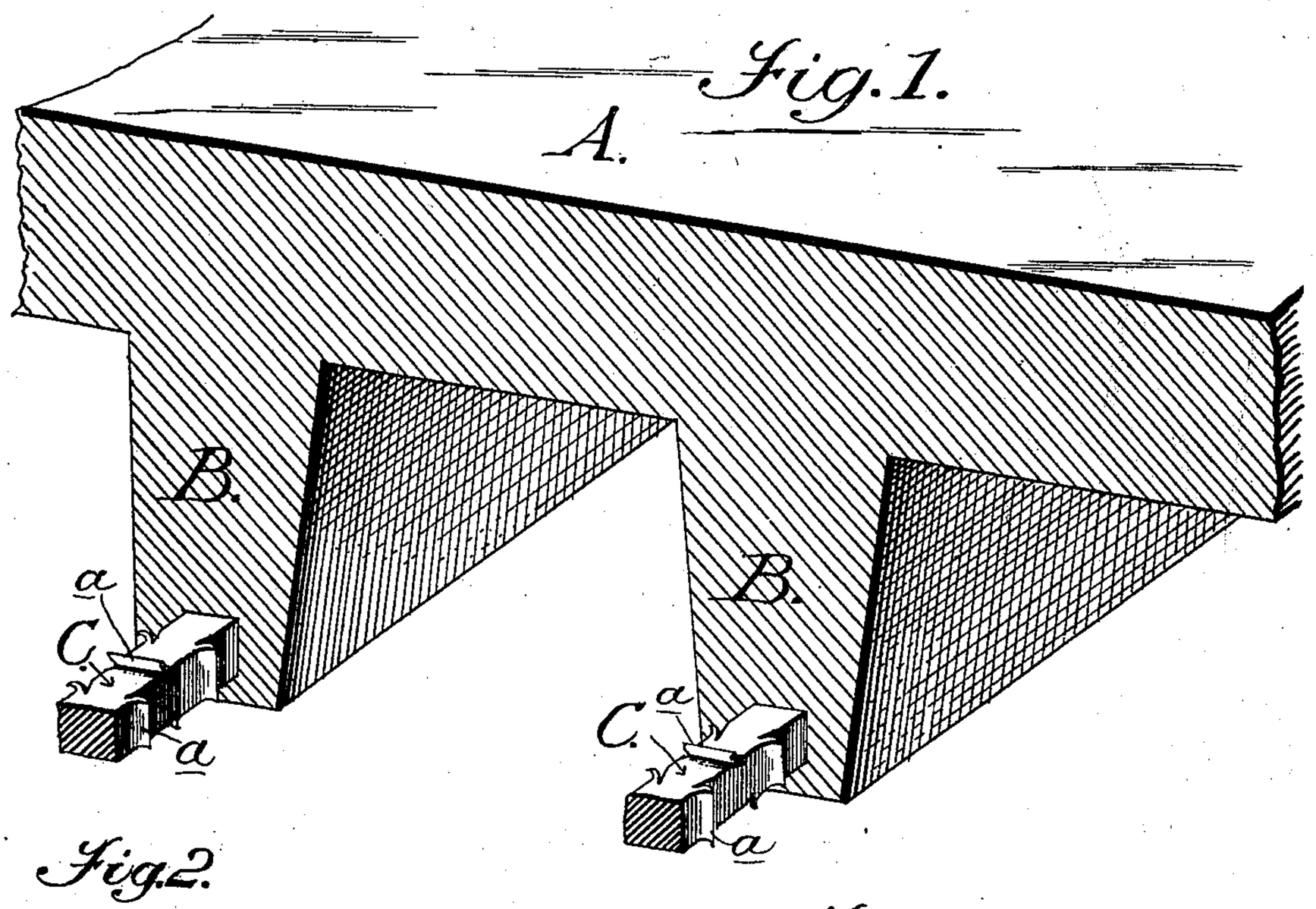


Fig. 2.

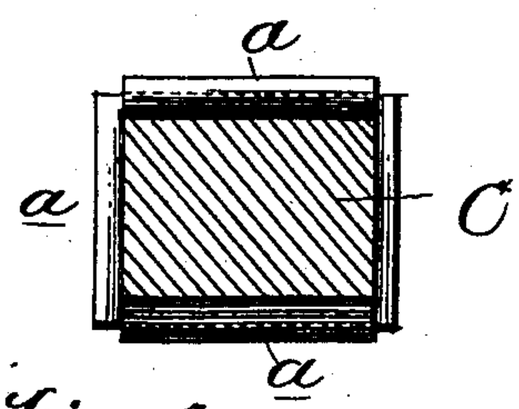


Fig. 3.

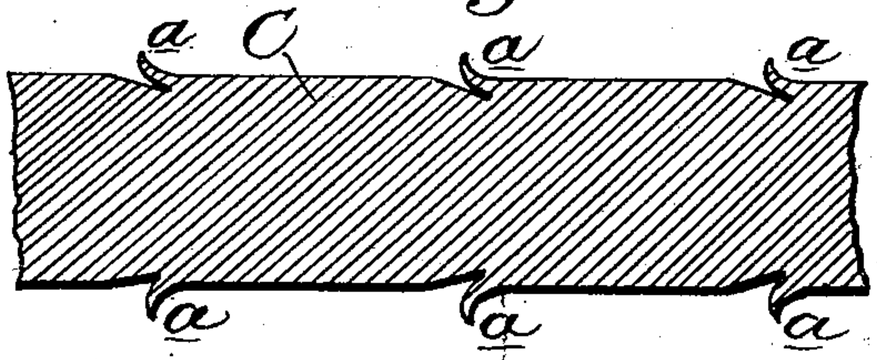


Fig. 4.

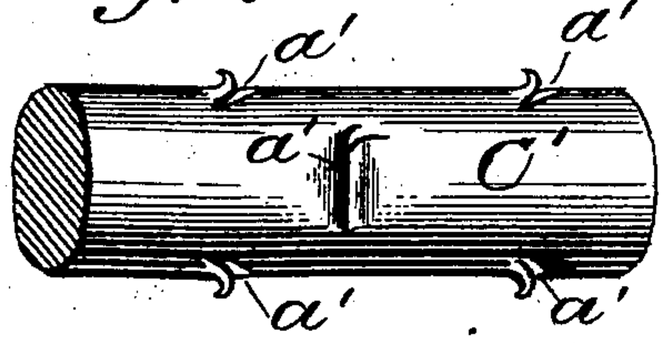
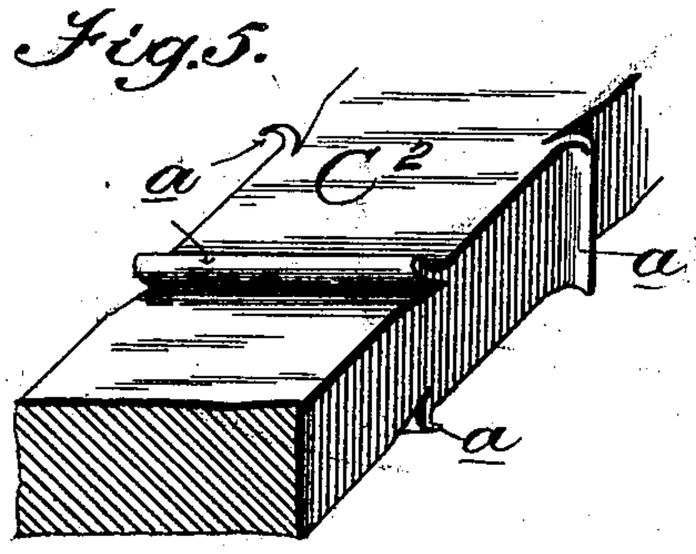


Fig. 5.



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UNITED STATES PATENT OFFICE.

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FIREPROOF FLOOR CONSTRUCTION.

SPECIFICATION forming part of Letters Patent No. 710,308, dated September 30, 1902.

Application filed May 14, 1902. Serial No. 107,339. (No model.)

To all whom it may concern:

Be it known that I, MERRILL WATSON, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented new and useful Improvements in Fireproof Floor Construction, of which the following is a specification.

This invention relates especially to fireproof floor and ceiling construction, and has for some of its objects to economize labor and material, to reduce the weight of such structures as much as practicable, and at the same time increase the strength and durability of the structure; and the invention consists, essentially, of the improved bar or stock forming part of the fireproof construction, which I will hereinafter describe and claim.

In the accompanying drawings, in which similar letters of reference indicate like parts in the several views, Figure 1 is a perspective view of a monolithic or concrete structure—say a part of a floor system—showing the improved strengthening-bar embedded therein. Fig. 2 is an enlarged cross-section of the bar of Fig. 1 detached. Fig. 3 is an enlarged longitudinal section of a portion of the bar. Figs. 4 and 5 represent modified forms of bars.

The system commonly employed in fireproof construction is well known to those skilled in this art and need not be specifically described.

In the floor constructions the haunches of concrete rest upon appropriate metal beams which form members of the skeleton framework, and such haunches are usually formed with concrete ribs which run from beam to beam, while the main slab of concrete fills the space between the beams, and thereby forms a solid integral structure of concrete and metal. Expanded metal or other metal work may also be used when the employment of such material is desired.

In the said drawings, A represents the main slab or floor sheet, and B the strengthening-ribs, formed on the lower portion in the usual and well-known manner. Within these ribs B, I embed my improved bar C for strengthening the ribs, so that they will more effectively resist tensile stress. These bars may be of various forms in cross-section, and the one I prefer to use is a bar square or rectangular in cross-section, as shown in Figs. 1, 2, and 3. While bars of various forms, some corrugated transversely in continuous lines, have been heretofore used in connection with the ribs B, I preferably form my improved bar with a roughened or barbed surface, whereby when the bar is incorporated in the rib or other monolithic or concrete structure I not only form a secure bond, but I am enabled to use substantially the full tensile strength of the bar. This bar C, I cut, incise, indent, or roughen in a peculiar manner, and I may use for the purpose a cold-chisel or other appropriate tool of sufficient hardness to incise or upset the bar when the latter is in cold state, thus economizing in the manufacture of the complete bar by omitting all rolling and heating processes, presenting newly-cut surfaces to the action of the concrete and permitting the corrugating or roughening to be done under special conditions, as during the erection of the building, when a specially-located bar may be barbed or roughened for monolithic or concrete embedding.

In the bar C—say at four points on its circumference—I form an incision by holding the tool at an angle whereby the cut produced by the edge of the tool will be oblique or slightly undercut, and the displaced metal will be raised above the plane of the outer face of the bar to form a barb or feather *a*, which forms an effective key for the concrete and with the accompanying sloping incision makes a most secure form of bonding-surface between the metal and concrete. While the cuts or incisions are made oblique or undercut in Figs. 1 to 3, the line of incision is transverse or in planes perpendicular to the axis of the bar; but I do not wish to be understood as limiting myself to this precise arrangement, for any spur or barb struck up from the surface of the bar plus the inclined incision of the bar at the base of the barb will make a secure bonding medium between metal and concrete that will be useful in various forms of metal and concrete work.

In making the incision I preferably "stagger" the position of the same by making the incisions and barbs in two adjacent sides. The effect of this is to preserve substantially the whole cross-sectional area or dimension of the bar, as a cross-section at any line of isolated

non-continuous incision or cut will be very slightly diminished from the true cross-section at a point between adjacent depressions, while the raising of the displaced metal beyond the plane of the outer sides of the bar to form the barbs or spurs makes a most secure and double form of bond between the metal and concrete.

While I prefer to use a bar square or rectangular in cross-section, the shape of the bar is essentially immaterial in use and will depend largely upon economic considerations, and while I prefer a bar of uniform or substantially uniform thickness throughout its length I can apply the roughened or barbed feature of the bar with good effect in other shapes of bars.

In Fig. 4 I illustrate my invention as applied to a bar C′ of round form in cross-section, and in Fig. 5 I show the bar C^2 as of substantially rectangular form in cross-section. Both of these forms, as well as a flat form, (not shown,) are formed with the cuts or incisions on preferably all sides, but the staggered feature of the incisions and barbs is present, and is preferred in all instances. Also in the case of the bars shown in Fig. 4 the oblique cuts or incisions a' are in reverse order—that is, those in two opposite sides of the bar—are inclined or undercut in one direction, while those on the remaining opposite two sides are inclined in a direction the reverse of those first named.

It will be apparent from the foregoing description that my bar is not, properly speaking, a corrugated bar. It is essentially a barbed bar, with the barbs or spurs made out of the body of the metal in the bar. When the bar is purely corrugated and it is embedded in a block of concrete and the attempt is made to pull the bar out, there are to be met two forces of resistance—namely, first, the adhesion of the concrete to the bar, and, second, the little lumps or lobes of concrete lying in the corrugations. These lumps or lobes represent ordinarily and according to their size not more than one-fifth of the surface area of the concrete at the point of contact with the bar, so that if the adhesion of concrete to the bar is broken there are but left the little lobes to be broken off by the pull.

With my improved bar made with its outstanding barbs having, say, an elevation of one-sixteenth of an inch, more or less, I have not only the adhesive resistance of concrete to pull, but it will be necessary to break away and crush all of the concrete which lies between each pair of barbs or between two of the barbs or spurs, and this represents practically the whole of the surface or area of the concrete. The barbing of the bar is therefore to increase the adhesive or frictional resistance against a pull in the material, which is concrete or wood, and the building of a flat slab of concrete reinforced with a barbed bar, as I describe, effects results that are not present when using purely a corrugated bar without barbs. It is desirable that two adjacent sides of the bar be barbed in a reverse order from the other two opposite sides. It is also essentially immaterial as far as practical results go that the slopes or incisions are presented to the direction of pull; but in practice it may be desirable that the barbs be burred or rolled backwardly slightly, so that it makes but little difference in which direction they stand; but for symmetry and certain mechanical reasons I prefer to make the incisions in adjacent sides slope in opposite directions to form balancing cuts.

In effect I produce in my bar a larger working section than originally existed in the bar-section, and the barbs will be sufficiently near together that at any pull the rupture or shear of concrete must be continuous or substantially as long as the bar itself. By making incisions, as before pointed out, I also produce fresh metallic surfaces at the cuts, and these surfaces are more easily subjected to the clinging action of the concrete or cement than the natural oxid surfaces of bars which are corrugated in the mill. This gives me a more intimate and assured connection between the two essential components of the structure. The sloping incisions also are to be preferred to the square "nicking," so avoided or dreaded in engineering, since obviously relief is afforded to the metal at the point acted upon instead of the usual strains which occur in the bars having square nickings. Also from the nature of my barbs I obtain a surface of contact much exceeding that of the bar before formed with the cuts and barbs, and where the barbs are substantially close together I obtain as much as fifty to seventy-five per cent. more surface of contact than the bar originally had.

The foregoing-described bars may be embedded and used wherever available, either for interior construction or for sidewalk and other outside work, and such bars may be used with the usual and well-known forms of hangers, beams, and other complemental features which enter into concrete and metal construction without departing from the spirit of my invention.

What I claim as new, and desire to secure by Letters Patent, is—

1. In concrete and metal construction a monolithically-embedded bar having sloping incisions and outstanding barbs at opposite sides and with the incisions in adjacent sides out of line.

2. In concrete and metal construction, an embedded bar having a slopingly-incised and barbed surface to form a bond between the metal and concrete.

3. In concrete and metal construction, a monolithically-embedded bar having a barbed surface and with the barbs extending transverse of the bar and having their points burred or rolled backward.

4. In concrete and metal construction, a monolithically-embedded bar having a combined incised and barbed surface, the incisions whereof extend obliquely into the bar and the barbs project beyond the plane of the outer sides of said bar.

5. In concrete and metal construction, a bar having sloping incisions in its surfaces and with the incisions in two adjacent surfaces out of line and made in reverse order, the walls of the corrugations forming barbs which project beyond the plane of the surfaces.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

MERRILL WATSON.

Witnesses:
N. M. FLANNERY,
W. H. HAM.