

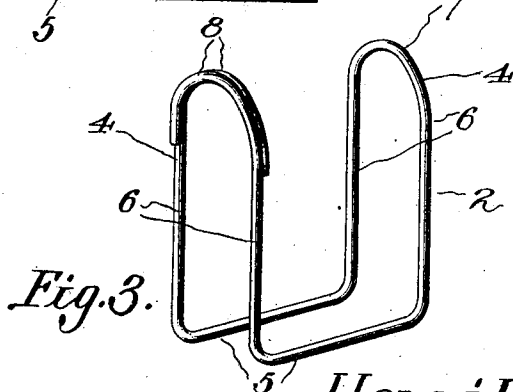
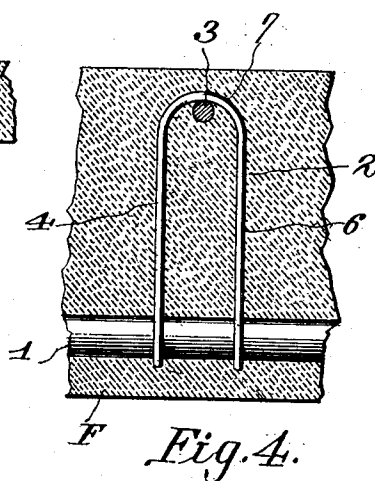
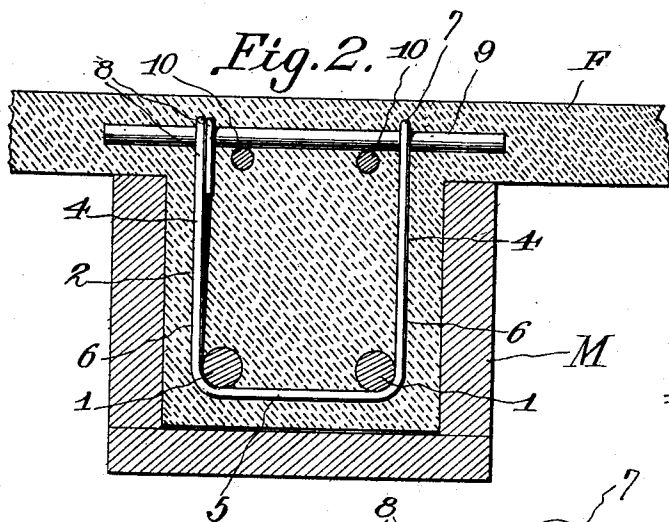
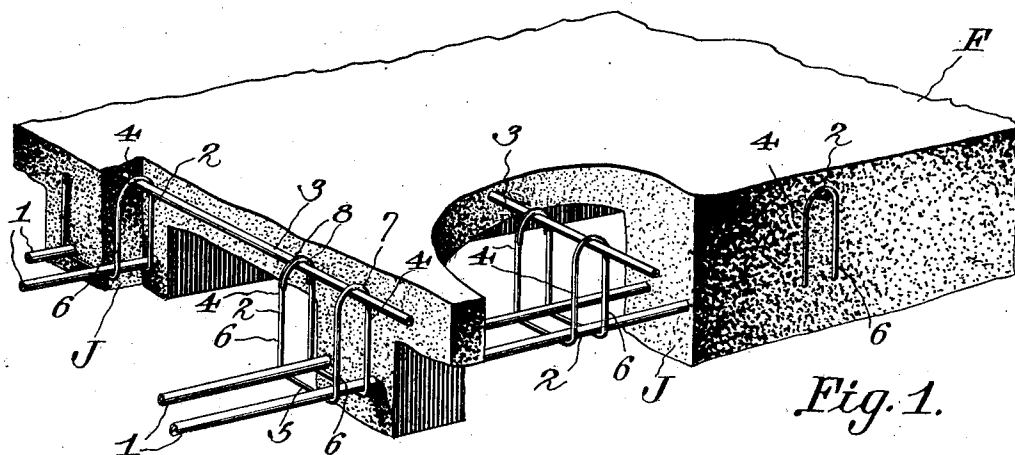
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H. KAMPMANN.
REINFORCED CONCRETE CONSTRUCTION.

APPLICATION FILED OCT. 31, 1903.

NO MODEL.



Witnesses
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UNITED STATES PATENT OFFICE.

HENRI KAMPMANN, OF BALTIMORE, MARYLAND.

REINFORCED CONCRETE CONSTRUCTION.

SPECIFICATION forming part of Letters Patent No. 762,479, dated June 14, 1904.

Application filed October 31, 1903. Serial No. 179,323. (No model.)

To all whom it may concern:

Be it known that I, HENRI KAMPMANN, a citizen of the French Republic, residing at Baltimore, in the State of Maryland, have invented a new and useful Reinforced Concrete Construction, of which the following is a specification.

This invention relates to structures of reinforced concrete; and it consists in an improved form of stirrup and a novel arrangement of strengthening-rods in the concrete.

In the construction of joists, beams, floors, and the like of concrete strengthened by metal rods or bars embedded therein it is common to employ stirrups or binders of various forms to connect the strengthening-rods in order to unite them into a single structure adapted to distribute strains throughout the different parts thereof and to afford effective resistance to any of the forces to which the structure may be subjected in use. In the construction of beams and joists especially the common practice is to employ longitudinally-disposed rods of lengths sufficient to extend from one point of support of the beam or joist to the adjacent point of support and to employ in connection with the longitudinally-disposed rods vertically-arranged stirrups of various forms which serve to bind the strengthening-rods and the concrete together or to connect the strengthening-rods in one part of the beam or joist with strengthening-rods in another part thereof.

The stirrups which have been employed heretofore for binding strengthening-rods to the concrete in structures of reinforced concrete have been, so far as I am aware, of such design that when placed in position in the mold in which the concrete is given its form the stirrups are very apt to be tilted to one side or the other from their proper position and to make it necessary for workmen to restore them to proper position after a portion of the concrete has been introduced in the mold around the bases of the stirrups. This tilting of the stirrups is objectionable not only because a loss of time is necessitated in restor-

ing them to proper position, but because the restoration of the tilted stirrups to proper position tends to form open spaces in the concrete and prevent the effective action of the stirrups in binding the strengthening-rods and concrete together.

The principal object of this invention is to provide an improved form of stirrup of such design that when placed in position within the mold there will be no tendency to tilt out of its proper position.

A further object of the invention is to provide an improved form of stirrup by means of which the longitudinally-disposed strengthening-rods in the lower portion of a beam or joist may be connected with the transversely-disposed rods in a floor formed on top of the beam or joist or with transversely-disposed short rods positioned in the upper part of the beam or joist.

A further object of the invention is to provide an improved arrangement of strengthening-rods and stirrups in structures of strengthened concrete whereby the entire strengthening structure is connected to afford resistance to strains and the ease of arranging the parts of the structure considerably increased.

In describing the invention reference will be had to the accompanying drawings, in which I have illustrated the preferred form of embodiment of the invention, the elements of the embodiment being shown in operative position within a joist and a floor supported thereon.

In the drawings, Figure 1 is a view in perspective of a portion of the joist and of a floor supported thereby, parts being broken away to show the arrangement of the strengthening elements within the concrete forming the body of the structure. Fig. 2 is a transverse sectional view through a joist and the adjacent portions of the floor, showing a modified form of the invention. Fig. 3 is a view in perspective of the stirrup, the view being made on a larger scale than the preceding views. Fig. 4 is a view in side elevation of the stirrup, showing the proper relation of a transverse strengthening-rod thereto.

Referring to the drawings, in which corresponding parts are designated by similar characters of reference, F designates a floor of concrete, and J designates a joist upon which the floor is supported. The joist is supported, as usual, with longitudinally-disposed strengthening-rods 1 1, arranged in the lower portion thereof, and stirrups 2 of the form contemplated in this invention are arranged at suitable intervals throughout the joist.

In the form of the invention illustrated in Fig. 1 the stirrups are associated with floor-rods 3, which are embedded in the concrete of the floor and extend transversely of the joist. Each of the stirrups consists, essentially, of two loops 4, the corresponding parts of which are parallel and are of the same size. Each of the loops 4 consists of a base portion 5, which is approximately straight and is connected at its ends with vertical side portions 6. The two loops 4 are preferably formed of a single rod or heavy wire and at one side of the stirrup the side portions of the loop are connected directly by a bend 7, while at the other side the terminal portions of the wire or rod of which the stirrup is made are bent into arches 8, which are parallel and lie substantially in contact with each other. The two loops 4, constituting each stirrup, are spaced apart, as best seen in Fig. 3, and may be made of any desired or preferred dimensions, the size of the stirrup being determined by the dimensions of the beam or joist in which it is to be employed. As the bases 5 of the two loops are parallel and are spaced apart the center of gravity of the stirrup lies between the planes of the two loops and sufficiently distant from each to give the stirrup a degree of stability. Consequently when a stirrup is set up in the mold M (indicated in cross-section in Fig. 2) there will be no tendency for the stirrup to tilt out of its proper position, but the concrete may be introduced in the mold without altering the position of the stirrups in any way.

The formation of the stirrup in two connected loops is of advantage, not only because a double base is thereby secured and tilting of the stirrups effectually prevented, but because the band 7 and arches 8 may be made use of to connect the longitudinally-disposed strengthening-rods 1 1 of each beam with the transversely-disposed floor-rods 3 or with short strengthening-rods 9 of the form shown in Fig. 2. By connecting the rods 1 1 of the joist with the transverse rods 3 of the floor any strain imposed upon the rods 1 1 may in part be transmitted to the rods 3, and the capacity of the entire structure to support weight will be vastly increased. Various means have been employed to connect the longitudinal rods or beams and joist with transverse floor-rods; but all the devices em-

ployed for that purpose have been, so far as I am aware, more or less objectionable because of the time and trouble required to associate the connecting devices with the rods.

When the short rods 9 (shown in Fig. 2) are employed in connection with the stirrups, the additional element of strength imparted to the structure is not as great as when the stirrups are placed over the transverse floor-rods 3; but the short rods resting on longitudinal rods 10 connect the floor and the joist and also prevent the possible displacement of the stirrups in the concrete.

While I have described and illustrated the preferred form of embodiment of my invention, it will be readily understood that changes in the form and proportions of the stirrups may be made to adapt them to use under special circumstances without in any way departing from the spirit of the invention or sacrificing any of the advantages, and I do not limit myself to the exact form and proportions shown, but reserve the right to make such changes therein as lie within the scope of the claims.

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

1. The combination in a structure of strengthened concrete, of longitudinal strengthening-rods, a transverse strengthening-rod disposed above said longitudinal rods, and a stirrup comprising a double base portion disposed beneath the longitudinal rods and arches connecting the parts of said double base portion and passing over said transverse rod.

2. In a structure of strengthened concrete, an embedded stirrup having a base composed of two straight members spaced apart.

3. In a structure of strengthened concrete, an embedded stirrup having a base composed of two spaced parallel horizontal members.

4. In a structure of strengthened concrete, an embedded stirrup having a loop at the base and arches at the top disposed at right angles to the loop.

5. In a structure of strengthened concrete an embedded stirrup consisting of two loops spaced apart at the base and connected at the top, said loops lying in parallel vertical planes.

6. In a structure of strengthened concrete an embedded stirrup consisting of two connected loops having horizontal base portions which are spaced apart.

7. In a structure of strengthened concrete an embedded stirrup consisting of two parallel loops, each consisting of a horizontal base and vertical side portions, said loops being connected at the top.

8. In a structure of strengthened concrete an embedded stirrup consisting of two parallel loops spaced apart and connected at the

top by arches disposed in planes at right angles to the plane of the loops.

9. In a structure of strengthened concrete a stirrup consisting of two parallel loops
5 spaced apart at their bases and formed from a single rod, the ends of which are overlapped to form an arch between the loops.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

HENRI KAMPMANN.

Witnesses:

J. H. JOCHUM, Jr.,

J. ROSS COLHOUN.