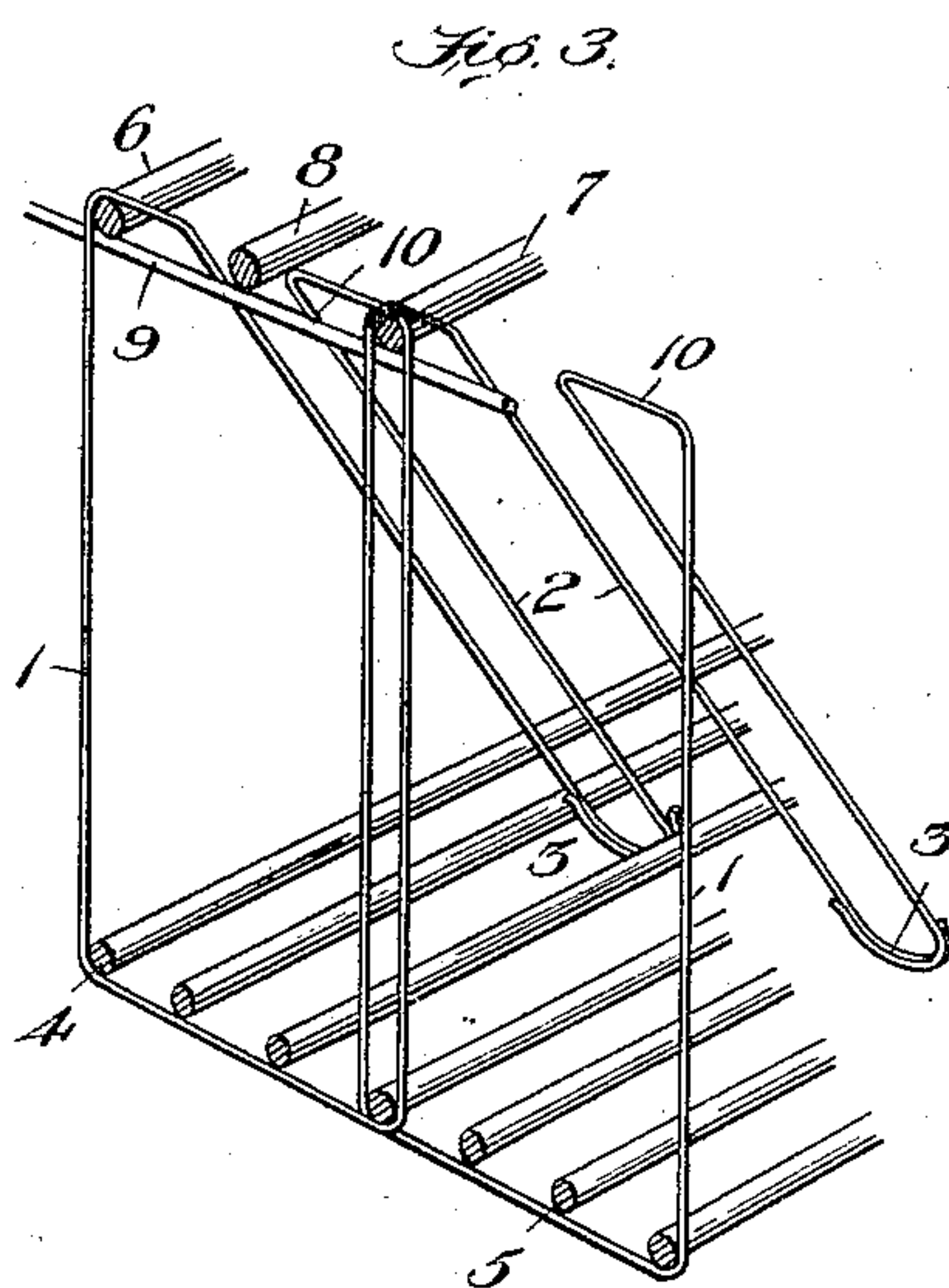
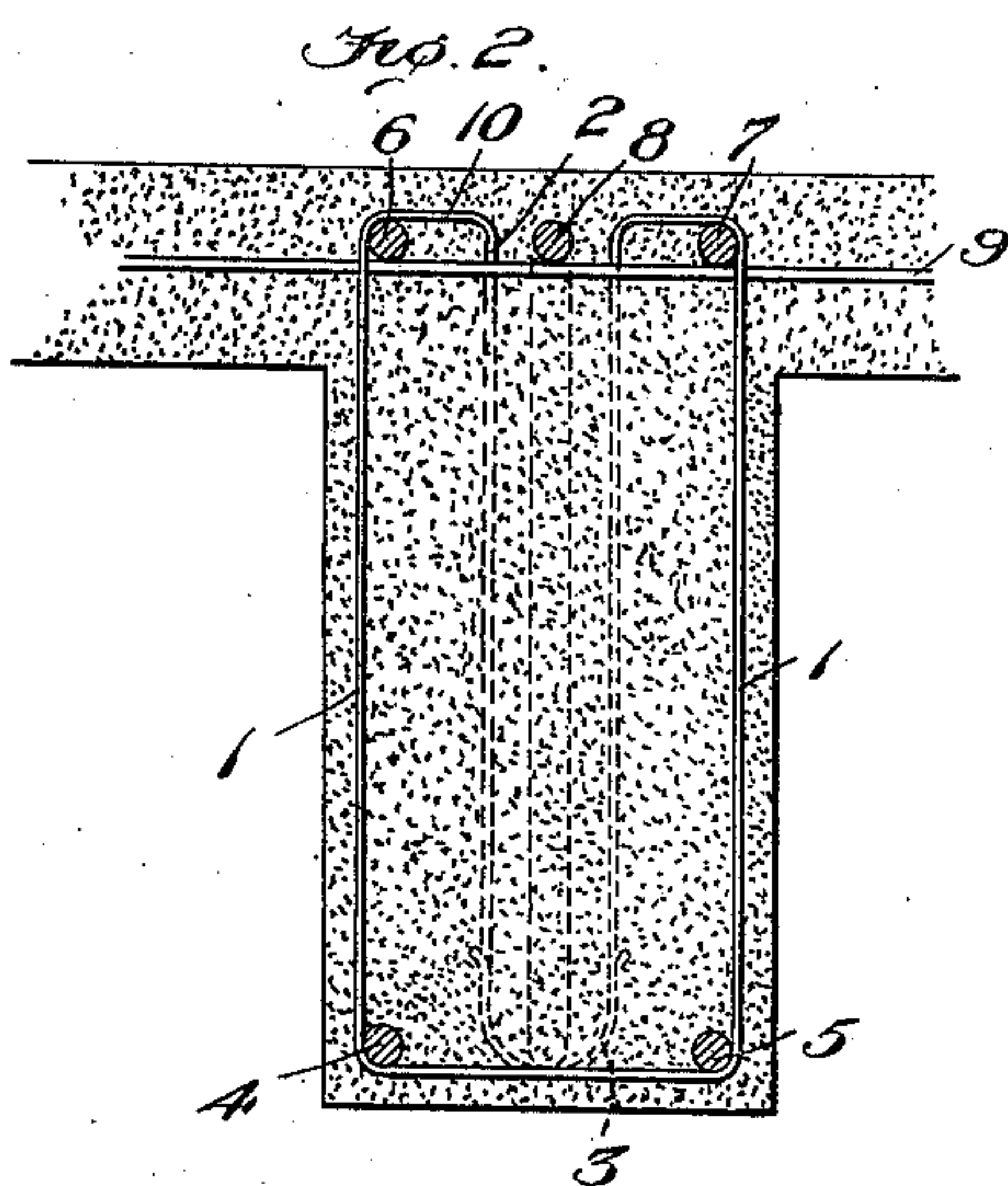
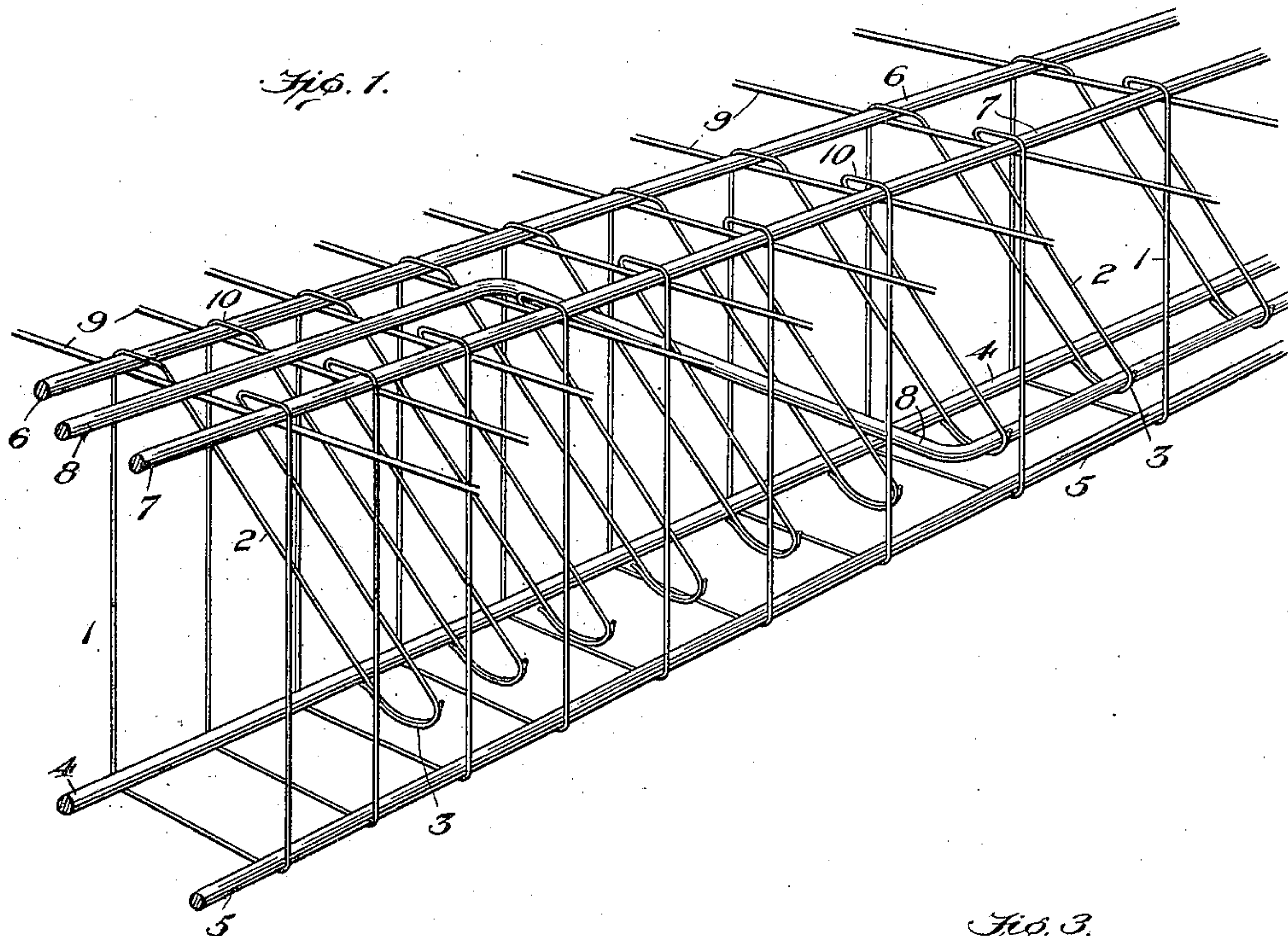


F. A. BERNE.
 REINFORCED CONCRETE CONSTRUCTION.
 APPLICATION FILED FEB. 26, 1908.

989,830.

Patented Apr. 18, 1911.



Witnesses

Edwin L. Bradford
G. L. Motherhead

By

Inventor
Frederic A. Berne

Robert Johnston
 Attorney

UNITED STATES PATENT OFFICE.

FREDERIC A. BERNE, OF BIRMINGHAM, ALABAMA.

REINFORCED CONCRETE CONSTRUCTION.

989,830.

Specification of Letters Patent.

Patented Apr. 18, 1911.

Application filed February 26, 1908. Serial No. 417,855.

To all whom it may concern:

Be it known that I, FREDERIC A. BERNE, a citizen of the United States, residing at Birmingham, in the county of Jefferson and State of Alabama, have invented new and useful Improvements in Reinforced Concrete Construction, of which the following is a specification.

My invention relates to an improvement in reinforcing beams for concrete structures and consists in a novel form of stirrup of bent metal particularly designed for reinforcing and uniformly bracing concrete beams.

It is one object of my invention to provide a stirrup comprising a vertical and an inclined member formed from an integral bent metal rod, the inclined member being disposed at right angles to the line of shear strain of the beam.

A further object is to form and dispose the inclined members so that the bars may be set so as to overlap, thereby permitting them to be arranged to cut equal surfaces for the shear diagram of the beam.

A further object is to so form the stirrups that there is an equal distribution of the reinforcing metal in transverse sections of the beam, the sides of the inclined member in end view being disposed substantially equidistantly from each other and from the sides of the vertical member of the stirrup.

A further object of my invention is to adapt the stirrups to stand alone when properly positioned so that the longitudinal reinforcing bars may be readily slipped into place through the stirrups.

My invention may be more readily understood by reference to the accompanying drawings, in which:—

Figure 1, illustrates a skeleton beam showing the manner of placing the stirrups with relation to the longitudinal and transverse bars. Fig. 2, is a vertical sectional view of the concrete beam. Fig. 3, is a detail perspective view illustrating the manner in which two or more stirrups may be overlapped and tied to the longitudinal bars when used for reinforcing broad beams.

Similar reference numerals refer to similar parts throughout the drawings.

My improved stirrup is formed from a metal rod rounded to the desired diameter and bent to form a vertical loop member 1 and a rearwardly inclined loop member 2. In forming these parts the base width of the

stirrup being determined, the sides of the member 1 are bent up at right angles and at the desired height are bent inwardly toward each other and in the same vertical plane with the base and sides. At a point about one-third of the distance from each side of the member 1, the two ends of the rod are bent rearwardly at an angle of approximately 45° and in parallelism to form the inclined member 2, the ends of the rod being bent around each other as at 3 so that they will be tied together by the concrete.

Without specifically limiting myself thereto, the longitudinal reinforcing means will consist of bars 4 and 5 which rest in the lower bottom corners of the member 1 and the upper bars 6 and 7 which rest in the upper corners of the member 1, passing between the sides of the members 1 and 2. As occasion may require however, there may be any desired number of lower bars which rest upon the bottom portion of the member 1, and there may also be two or more bars in engagement with each side of the upper portion of the member 1. In fact any desired number and arrangement of longitudinal bars are permissible with my improved stirrup. An additional longitudinal brace bar 8 passes for part of the distance between the upper ends of the sides of the members 2 and for a part of the length of the beam is bent downwardly until it rests in the loop 3 of the member 2. To tie the beam to the transverse reinforcing bars of the main body structure, I cause these bars 9 to be passed between the members 1 and 2 and under the bars 6 and 7. By reference to Fig. 3, it will be seen that these cross bars 9 have a perfect tie with the reinforcing metal of the beam in that they are held between the members 1 and 2 and beneath the longitudinal bars 6 and 7. The upper sections 10 of the member 1 are of such length as to bring the two sides of the member 2 about equidistant in end view from each other and from the sides of the member 1, which will be clearly seen by reference to Fig. 2. This gives a practically uniform distribution to the reinforcing metal of the stirrups across transverse sections of the beam. Further, the making of the rear member 2 much narrower than the member 1, permits the stirrups to be overlapped, as seen in Fig. 1, thereby providing for their being so positioned as to cause each stirrup to cut equal surfaces in the shear diagram of

the beam, thereby giving each portion of the beam a stirrup reinforcement proportionate to the strain thereon. This construction also permits of another important novel
 5 feature of my invention which is illustrated in Fig. 3, and consists in the manner in which the stirrups may be placed in two or more parallel rows, the side edges of which overlap and are tied to each other by two or
 10 more of the longitudinal bars passing between the overlapped sides of the members 1. By this means beams of any desired width may be securely braced by longitudinal rows of stirrups which are so overlapped as not only to equalize the shear
 15 strain but also to equalize the transverse strengthening of the whole beam and effect the distributing of the strengthening metal with uniformity across the beam.

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

1. A stirrup for reinforcing concrete comprising a rectangular upright body portion
 25 and an inclined member integral with said body portion, said upright member having top sections each of which is disposed in the same plane with the rest of the upright member and connects the adjacent integral sides
 30 of the upright and inclined members.

2. As an article of manufacture, a stirrup formed from a bent metal rod, the middle portion of the rod forming the bottom, sides and top members of a substantially rectangular loop, the top member being interrupted
 35 near its center by bending the free ends of the rod, before they meet, downwardly at an angle, and the sections of the top member standing in the same plane with the loop
 40 and being each in length substantially equal to the space between the downwardly inclined ends of the rod, as and for the purposes described.

3. As an article of manufacture, a stirrup
 45 formed from a bent metal rod, the middle

portion of the rod forming the bottom sides and top members of a substantially rectangular loop, the ends of the rod being bent downwardly at an angle from the central portion of said top member to form an inclined
 50 loop member closed at the bottom and open at the top.

4. A stirrup for reinforcing concrete comprising a rectangular upright body portion
 55 and an inclined member integral with said body portion, said upright member having upper portions 10 which extend inwardly in the same plane with the rest of the upright member to a point where the side members of the rear extension begin, in combination with longitudinal bars which engage in the upper corners under the members 10, and transverse bars which pass between the vertical and inclined portions of
 60 the stirrup and engage the under sides of the upper longitudinal bars, substantially as described. 65

5. A reinforcing concrete beam having four longitudinal reinforcing bars positioned near the corners thereof, and a series of stirrups comprising rectangular vertical members which receive said bars in their four corners, the upper portion of the stirrup being bent inwardly at right angles
 70 and in parallelism with the bottom of said member and then bent rearwardly to form two parallel side portions which connect at the bottom and form a narrow inclined loop member which is disposed between the longitudinal bars and extends downwardly
 75 into substantially the same plane with the bottom of the vertical member. 80

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

FREDERIC A. BERNE.

Witnesses:

ANNIE L. PEACE,
 R. D. JOHNSTON, Jr.