No. 890,769. PATENTED JUNE 16, 1908.

W. S. HEWETT.

BRIDGE CONSTRUCTION.

APPLICATION FILED MAR. 4, 1907. RENEWED OCT. 21, 1907.

2 SHEETS—SHEET 1.

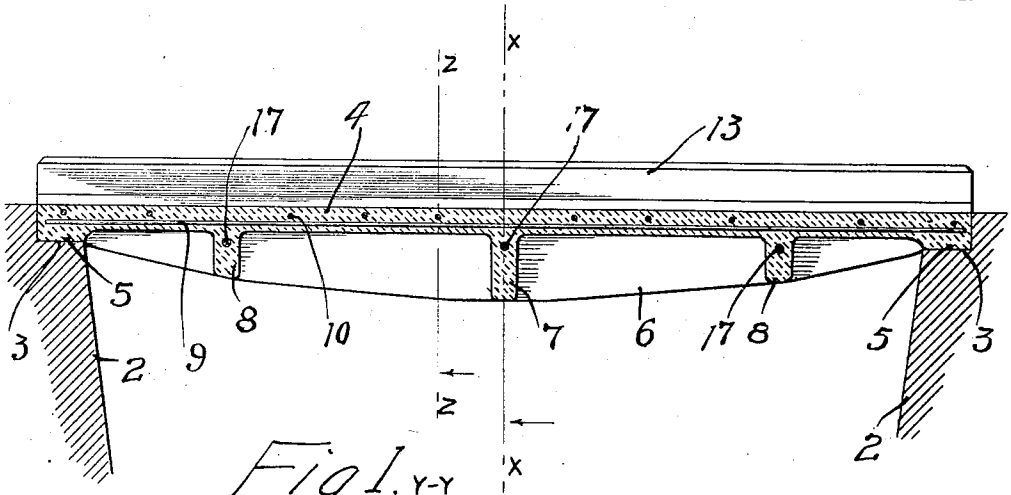


Fig 1. Y-Y

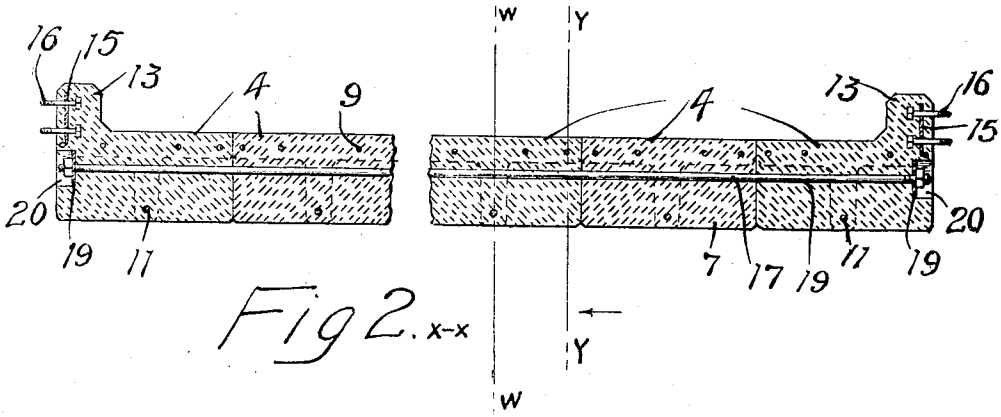


Fig 2. X-X

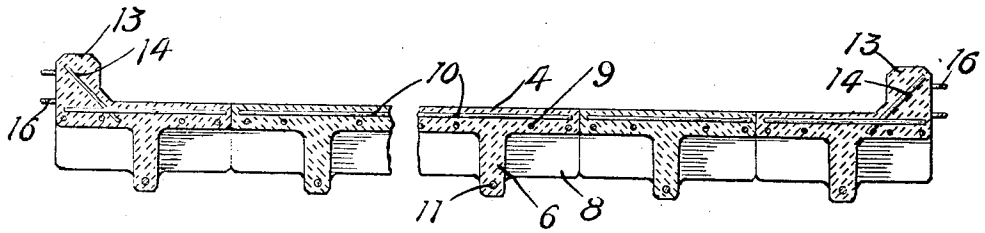


Fig 3. Z-Z

WITNESSES

C. M. Walstrom

J. B. Erw.

INVENTOR

WILLIAM S. HEWETT

BY Paul & Paul

HIS ATTORNEYS

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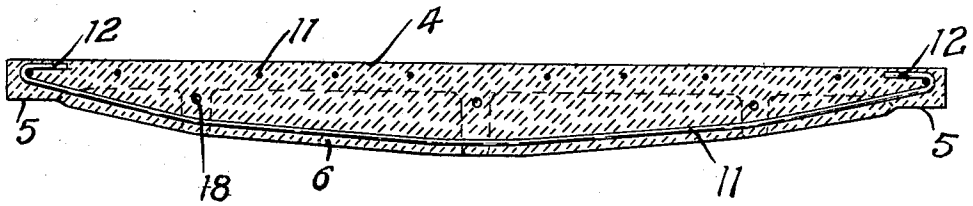


Fig 4. W-W

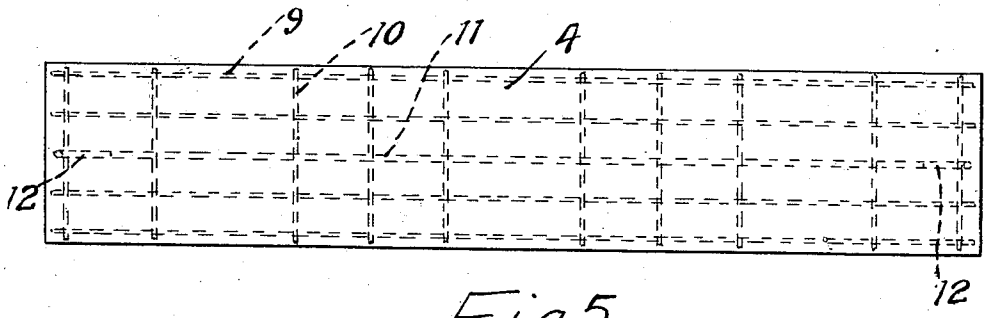


Fig 5.

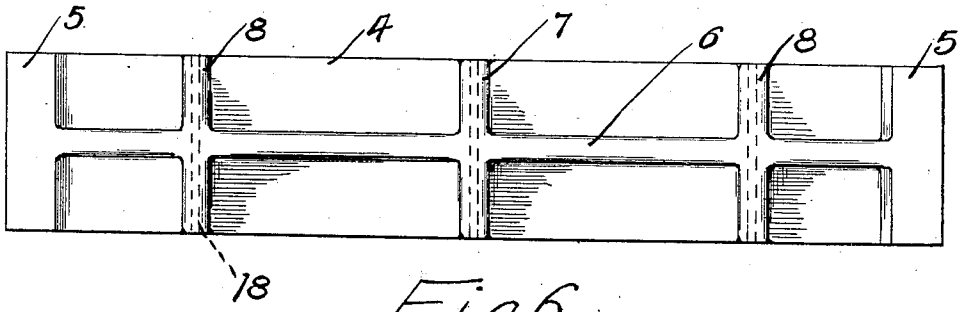


Fig 6.

WITNESSES
A. M. Walstrom
J. B. Era

INVENTOR
WILLIAM S. HEWETT
BY Paul & Paul
HIS ATTORNEYS

UNITED STATES PATENT OFFICE.

WILLIAM S. HEWETT, OF MINNEAPOLIS, MINNESOTA.

BRIDGE CONSTRUCTION.

No. 890,769. Specification of Letters Patent. Patented June 16, 1908.

Application filed March 4, 1907, Serial No. 360,592. Renewed October 21, 1907. Serial No. 398,509.

To all whom it may concern:

Be it known that I, WILLIAM S. HEWETT, of Minneapolis, Hennepin county, Minnesota, have invented certain new and useful Improvements in Bridge Construction, of which the following is a specification.

The object of my invention is to provide a bridge of simple, economical construction and one that can be easily and quickly erected without the employment of skilled labor.

A further object is to provide a bridge that will be strong and durable and one that by reason of its ease of erection is particularly adapted for single span bridges on country highways.

A further object is to provide a beam having an elongated comparatively narrow tread surface adapted when a series of the beams are placed together with contacting edges, to form a continuous floor or roadway.

My invention consists, generally, in a bridge composed of a series of reinforced concrete beams running lengthwise of the bridge, and rods passing transversely through the beams composing the bridge and tying or binding them securely together.

Further, the invention consists in various constructions and combinations, all as hereinafter described and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a sectional view illustrating a single span bridge embodying my invention, substantially on the section line *y*—*y* of Fig. 2. Fig. 2 is a transverse sectional view on the line *x*—*x* of Fig. 1. Fig. 3 is a similar view on the line *z*—*z* of Fig. 1. Fig. 4 is a detail sectional view on the line *w*—*w* of Fig. 2. Fig. 5 is a top view of one of the concrete beams of which the bridge is composed. Fig. 6 is a bottom view of the same.

In the drawings, 2 represents the bridge abutments having suitable seats 3 formed therein, and 4 are the beams which, when placed side by side, form the roadway of the bridge. The beams are made of suitable length and width, but for convenience in handling them, I prefer to mold them two feet in width, though the length and width may be varied according to the size of the bridge to be built and the facilities for handling the beams. I do not wish to be confined to any particular dimensions.

The ends of the beams will have flattened under surfaces 5 to rest upon the seats of the abutments where there is only a single span, and the beams are laid side by side lengthwise of the roadway, there being for a roadway of 16 feet, 8 of the beams, assuming that they are molded two feet in width. The number of beams employed, however, will be varied according to the width of the roadway and the dimensions of the beams.

I prefer to make the beams substantially T-shaped in cross section, there being a centrally arranged longitudinal web 6 depending from each beam and gradually decreasing in depth from the middle of the beam, each end merging into the flattened surfaces 3. At intervals transverse webs are formed, there being preferably three on each beam, a middle one 7, and one at each end indicated by reference numerals 8. These transverse webs are substantially at right angles to the middle one and extend to the longitudinal edges of the beam and merge into the center web as indicated in Fig. 6.

The upper surface or tread of each beam is reinforced and strengthened by a series of small rods or wires 9 running lengthwise thereof at intervals and further strengthened by a series of short cross rods 10 extending through the tread of the beam from side to side, substantially at right angles to the rods 9. These rods 9 and 10 lie in a plane parallel substantially with the top of the beam and serve to resist the crushing strain or load on the beam, and their number may be varied according to the size of the bridge and the probable load to which it will be subjected. The longitudinal web of each beam is provided with a rod 11 preferably of larger gage than those described, and having its end 12 bent up around the cross rods 10 at the extremities of the beam. The rod 11, as indicated in Fig. 4 is curved or bowed downwardly following the configuration of the web and having a truss effect to resist the longitudinal strain or tension on the beam. I prefer to mold a curb 13 on the beams for use at the sides of the roadway and brace the same by rods 14 embedded therein at an angle to the tread of the beam, as indicated in Fig. 3, and also provide plates 15 in each having bolts 16 to which the guard rails of the bridge may be secured.

The beams are molded in the manner described above and shipped from some con-

venient distributing point to the place where the work is to be done, and when the desired number of beams have been assembled for the bridge I secure them together to make one homogeneous support or roadway by means of a series of cross rods 17 fitting within holes 18 formed in the transverse webs 7 and 8 and through the center web, the ends of said rods being threaded and having lock nuts that are tightened against plates 19 provided in sockets 20 in the outer beams of the series. When the nuts on the cross rods are turned up the abutting edges of the beams will be drawn snugly together and their upper surfaces will form a smooth continuous roadway that will be practically indestructible. The reinforcing rods being embedded in the beams will be thoroughly protected and when the bridge is completed the holes 20 will be filled with cement covering the ends of the rods 17 and protecting them from rust and deterioration by exposure to the weather.

In some instances when suitable appliances are at hand and weather conditions permit, the beams may be molded at the work and the bridge constructed in the same manner as it would be when the beams are molded and brought from a distance. I do not therefore, in this application wish to be confined to the idea of molding the beams and shipping them to the point where used, as I may at times find the other method of handling the work preferable.

In place of the transverse rods securing the beams together and preventing their lateral separation I may provide any other suitable means for accomplishing this same end, and in various ways the details of construction may be modified without departing from the spirit of my invention.

I claim as my invention:

1. A bridge composed of a series of concrete beams having flat upper surfaces and reinforcing rods extending lengthwise and cross wise thereof in said surfaces, and said beams having webs depending from their under sides and extending lengthwise of the beams, said webs having curved lower edges and decreasing in depth from the middle toward each end, and rods embedded in said webs and bowed or curved downwardly to coincide with the curve of said webs, said rods having their ends anchored in the ends of the beams, and cross rods passing through holes provided in said beams and having threaded ends and lock nuts therefor and adapted when tightened to draw the abutting edges of said beams snugly together, substantially as described.

2. A bridge composed of a series of beams of reinforced concrete construction, said beams being substantially T-shaped in cross section and adapted to be placed side by side to form the roadway of the bridge and having under surfaces at their ends to rest upon the bridge abutments or piers, the outer beams on each side having curbs formed integrally therewith, and cross rods fitting within holes in said beams and whereby the said beams may be drawn snugly together to form a smooth continuous roadway, substantially as described.

3. A bridge comprising a series of beams having flat upper surfaces and composed of concrete having reinforcing rods embedded therein and adapted to resist the crushing strain, said beams having webs extending lengthwise thereof on the under side, and rods embedded in said webs and curved or bowed downwardly and having their ends anchored in the ends of said beams and said web rods having a truss effect to resist the longitudinal stress or tension, and said beams having cross webs at intervals extending from side to side and merging into said longitudinal webs, and said cross webs having holes extending from side to side of the beams, and rods fitting within said holes and having threaded ends and lock nuts therefor, and adapted to draw the beams snugly together and form a continuous roadway, substantially as described.

4. A bridge composed of a series of concrete beams arranged lengthwise of the roadway and each consisting of a flat upper portion having reinforcing rods extending lengthwise and transversely therein, and a web depending from the under side of each beam and extending lengthwise thereof along its middle line, and a truss rod embedded in said web and curved or bowed downwardly and having its ends bent around the transverse reinforcing rods at the ends of the beam, and the rods embedded in said upper portion resisting the compression strain, and the truss rods embedded in said webs resisting the tension strain or stress, and said beams having holes extending therethrough from side to side, and cross rods passing through said holes and binding the edges of said beams snugly together, whereby a continuous roadway will be formed for the bridge.

5. A bridge span composed of a series of comparatively narrow beams of reinforced concrete construction extending lengthwise of the bridge, there being a series of the beams with contacting edges from side to side of the bridge and each beam having a web depending from its under side and extending lengthwise thereof along the middle line of the beam, reinforcing and truss rods embedded in said beam and web, and means preventing lateral movement of the beams and the separation of their contacting edges, substantially as described.

6. A bridge composed of concrete beams having longitudinally arranged depending webs on their under sides, and reinforcing

rods extending transversely of said beams near their upper surfaces and lengthwise thereof in said webs to resist the crushing and tensile strains, said beams extending lengthwise of the bridge and contacting with one another from side to side of the bridge to form a continuous roadway and means preventing lateral movement of said beams and separation of their contacting edges.

7. A bridge comprising a series of beams composed of concrete having reinforcing rods embedded therein and adapted to resist the crushing strain, said beams having webs extending lengthwise thereof on the under side, and rods embedded in said webs and curved or bowed downwardly and having their ends anchored in the ends of said beams, and said web rods having a truss effect to resist the longitudinal stress or tension, and said beams being adapted to be placed side by side lengthwise of the bridge, and means for binding them together to form a continuous roadway, substantially as described.

8. A bridge composed of concrete beams having reinforcing rods near their upper surfaces, said beams having webs extending lengthwise thereof, on their under side, and rods embedded in said webs with their ends anchored in the ends of the beams and their middle portions curved or bowed downwardly to form a truss effect, and said beams having transverse webs on each side of said longitudinal web and said beams being arranged lengthwise of the bridge with their edges in contact with one another to form a continuous roadway and means preventing the separation of said beam edges.

In witness whereof, I have hereunto set my hand this 23d day of February 1907.

WILLIAM S. HEWETT.

Witnesses:

RICHARD PAUL,

J. B. ERA.