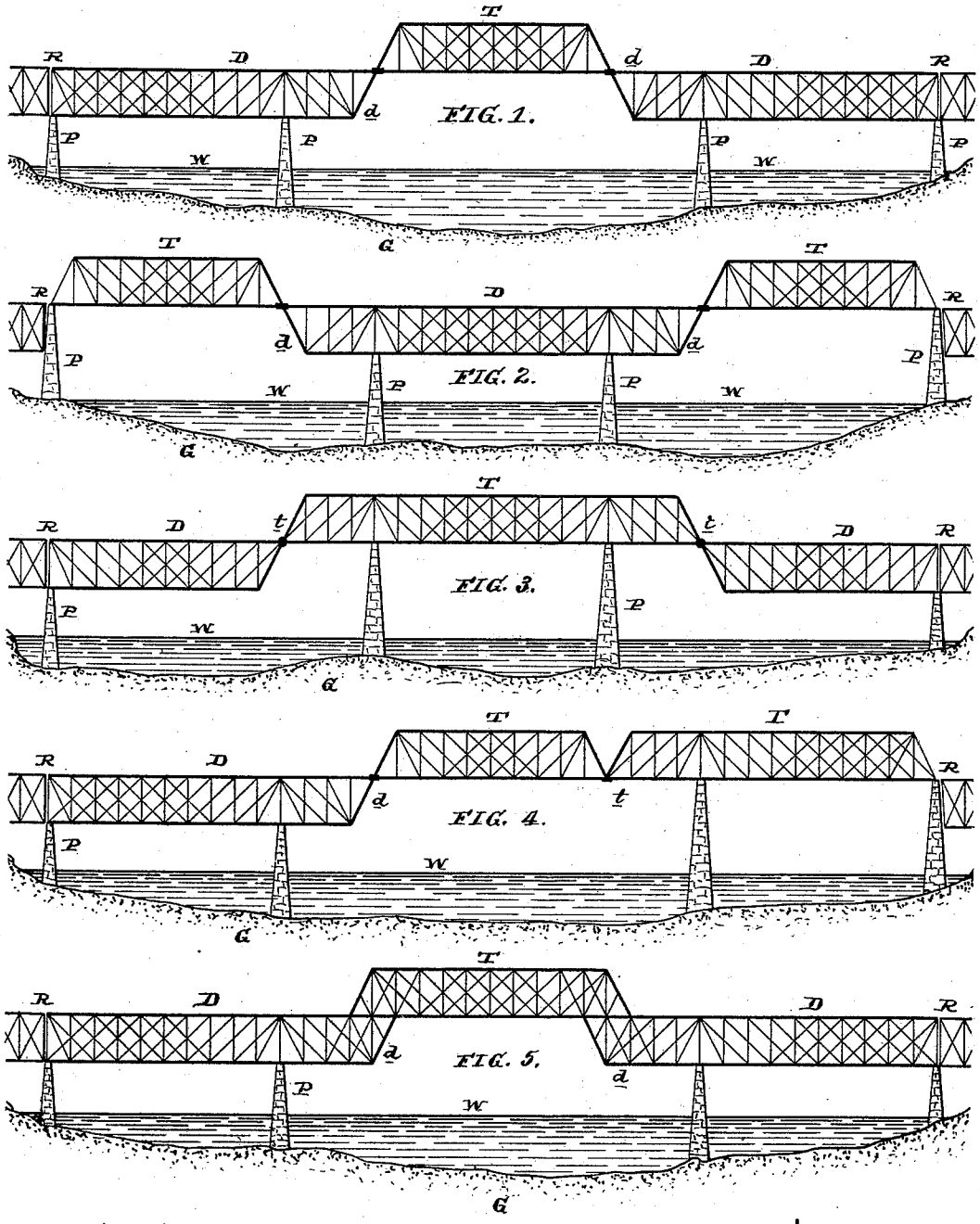
(No Model.)

G. H. PEGRAM.

CONTINUOUS GIRDER BRIDGE.

No. 424,349. Patented Mar. 25, 1890.



Attest:

Henry Drury

E. W. Breckinreed

Inventor:

Geo. H. Pegram

By his atty.

[illegible]

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

GEORGE H. PEGRAM, OF NEW YORK, N. Y.

CONTINUOUS-GIRDER BRIDGE.

SPECIFICATION forming part of Letters Patent No. 424,349, dated March 25, 1890.

Application filed November 11, 1887. Serial No. 254,878. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. PEGRAM, of the city, county, and State of New York, have invented an Improvement in Continuous-Girder Bridges, of which the following is a specification.

My invention consists of an improvement in continuous-girder bridges through which advantages of cost and construction are gained, and is essentially the combination of through and deck spans, as shown in the accompanying drawings and described in the following specification.

The object of my invention is to so form a girder bridge that it may be cheaply erected and yet attain all of the advantages of the expensive modes of construction now in use.

My invention comprehends the combination of the deck and through spans when one at least of the two are made as a cantalever-truss to act as a support for the other while building and when built. The terms "deck" and "through" spans are used in the general sense, a deck-span being understood to be a truss-span in which the roadway practically conforms to the grade and elevation of the top chord of the bridge and a through-span one in which the grade and elevation of the roadway practically conform to the bottom chord. An arch bridge in which portions of the arch or bracing rise above the level of the roadway while portions are below it is not to be construed as a combination of deck and through spans in the sense in which the terms are used in this application, even if the portions are divided by hinges. Thus the deck-spans may be the cantalevers or the through-spans may be constructed as the cantalevers; but I prefer the former. The advantages of this construction will be apparent when we consider that heretofore to obtain great clearance above high water it was necessary to build a through-span supported on the piers, and at great expense in false work used during construction; also, when we consider that to obtain a wide water-way between piers with at least a small portion of the width of great height or clearance an excessively long through-span was necessary. In my improvement only a shallow false work is required, and that, too, where the river is most shallow, and after building the deck-spans upon short piers, the adjacent ends of such spans are continued out over the main water-way toward each other without false work, and thus form cantalevers, and upon these cantalevers the through-span is supported. This through-span is much less in length than the width of the water-way, and hence its height between chords is also less and the structure as an entirety cheapened without in the least reducing its efficiency. Furthermore, this through-span may be erected upon a temporary truss hung from the two cantalevers, and thus the use of false work obviated. Even in the largest through-spans of this construction a single temporary pier alone would be required. The cost of a bridge in a large measure depends upon the cost of this false work, and hence dispensing with its use in those parts of the river where the deepest water or channel exists is a feature of great importance. The employment of the deck-truss for those parts of the bridge which rest upon the piers reduces the cost of such piers by reducing the height required, and hence in certain types of my invention the advantages to be gained are more apparent than in others.

In the drawings, Figure 1 is a side elevation of my preferred form of bridge. Figs. 2, 3, 4, and 5 are similar views showing modifications of my invention.

T T are through-spans. D D are deck-spans. P P are piers. W W are water-lines, G G ground-lines, and R R are rail or road way elevations.

Several combinations of through and deck spans might be devised under my invention to suit different conditions; but those forms shown are the most important. Three spans are shown in all of the figures; but a combination with only two spans can be made. For example, one end of the through-span in Fig. 1 might rest on a pier. From the nature of a continuous girder it is essential that there should be at least two spans. Continuous girders of this class are preferably made with hinged points of contraflexure.

Continuous-girder bridges where they span wide openings are lighter than separate spans to cover the same openings and may be made narrower, thus saving masonry through shortening the piers and admit of special modes of

erection, resulting often in great saving in the cost of the bridge. The latter is usually the determining factor in the question of their use. The advantages which the forms I propose have over those forms of bridges in common use are a saving in masonry and increased facilities of erection.

Where draw-bridges are not used, navigation requires that openings of a special clear height shall be made under the bridge. The width of this clear height required for steamboats is not great; but when in rivers like the Ohio and Mississippi large tows of barges and rafts must be accommodated the span in which the maximum height occurs should be as wide as possible to accommodate such boats, rafts, and other floating craft. The high opening is of course over the channel. Without such a construction, as shown in Fig. 1, it would be necessary to use a single through-span over the central opening, attended with great expense and danger of erection, or a through continuous girder running all of the piers up. The latter would obviously be attended with greatly increased cost of masonry and erection. Fig. 1 is especially applicable where a channel-span is required over deep water. The side spans D between the piers would be erected on false work and then extended or built over the piers as cantalevers without false work, as at *d*. The cantalever ends *d* would serve as supports for temporary trusses on which to erect the through-span T, with probably no false work in the water, or at most only a temporary pier in the middle. In rivers where ice gorges occur this is very important. The through-span T of this figure is an entirely independent span, preferably resting on the cantalevers as it would rest on piers, and is comparatively free from the temperature strains common to continuous girders.

Fig. 2 is for a case where two side-channel through-spans T T are used and the middle deck-span D is erected on false work in shallow water, the ends *d* extended over the piers, and the through-spans erected upon them, as in Fig. 1.

Fig. 3 is for a case where a very wide and high opening is required over the channel and the side spans are made deck to save masonry and false work.

Fig. 4 is for a case where two contiguous high openings are required.

In the case of Fig. 5 we have a construction very similar to that shown in Fig. 1, except that the connections between the deck and through spans are somewhat different.

By the employment of my invention I am enabled to greatly cheapen the cost of the bridge as an entirety and at the same time obtain all the existing advantages of the present modes of construction.

In all of the cases illustrated it would be necessary to use through-spans throughout with the present style of continuous girder.

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

1. In a continuous-girder truss bridge, the combination of deck and through spans with two supporting-piers for at least one of said spans, and in which one of the spans is supported upon the end of the other.

2. In a continuous-girder truss bridge, the combination of deck and through truss-spans connected end to end with at least two supporting-piers for each of one or more of said spans arranged at a distance from the juncture of the through and deck spans.

3. In a truss bridge, the combination of four piers arranged in pairs, two deck truss-spans each with a cantalever projection, and each supported upon a pair of said piers and having their cantalever projections extending toward each other, and a through truss-span arranged between said deck-spans and supported upon said cantalever projections.

4. In a truss bridge, the combination of four piers of substantially the same height arranged in pairs, two deck-spans, each with a cantalever projection and each supported upon a pair of said piers and having their cantalever projections extending toward each other, and a through truss-span arranged between said deck-spans and supported upon said cantalever projections at their extreme ends by a movable joint.

5. In a truss bridge, the combination of a pair of short piers, a deck truss-span supported upon said piers and having a cantalever projection upon one end extending beyond the piers, and a through truss-span having its end connecting with the end of the cantalever and resting thereon, whereby the same water-way is partly covered by a deck and partly by a through truss-span.

6. In a truss bridge of the continuous-girder type, the combination of a deck truss-span having a cantalever projection, a supporting-pier for said deck-span at one end, and also a second supporting-pier for the said span at a distance from its other end, and a through truss-span supported upon said cantalever at its place of contraflexure.

7. The combination of two pairs of piers or abutments, two cantalever-trusses supported each upon a pair of said piers or abutments and overhanging said piers, so as to extend toward each other, and a through-span supported upon the upper surface of said cantalevers.

In testimony of which invention I hereunto set my hand.

GEO. H. PEGRAM.

Witnesses:

ROBERT M. FUNKHOUSER,

B. R. PEGRAM.