

(No Model.)

F. VON EMPERGER.
VAULT FOR CEILINGS, BRIDGES, &c.

No. 583,464.

Patented June 1, 1897.

Fig: 1.

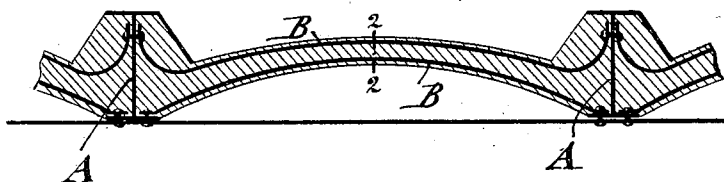


Fig: 2.

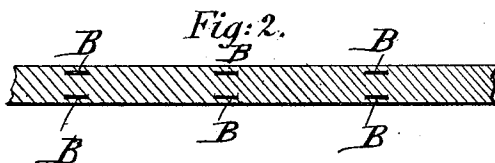


Fig: 3.

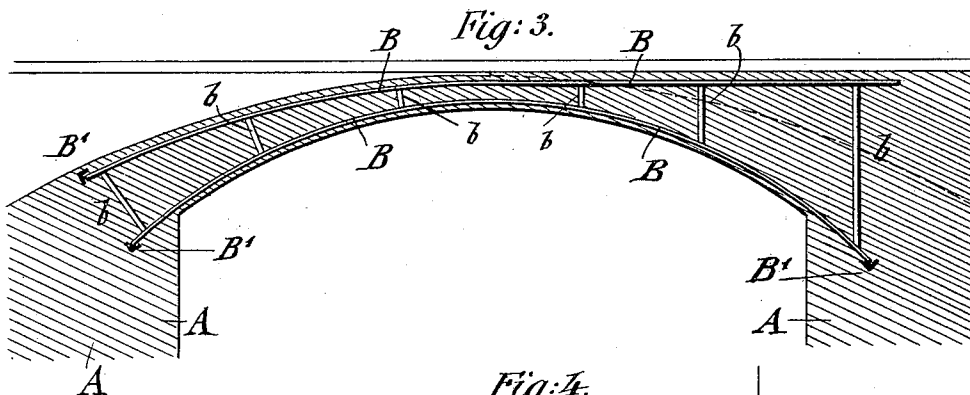


Fig: 4.

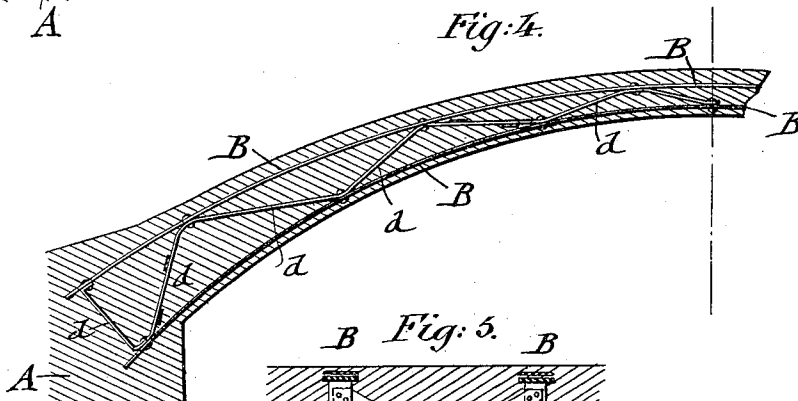
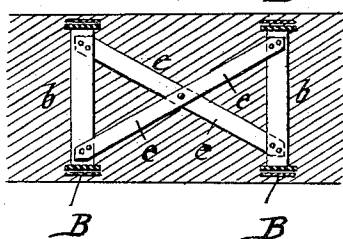


Fig: 5.



WITNESSES:
Geo. H. M. M. M.
R. F. Delouze

INVENTOR
Friedrich von Emperger
BY
George H. M. M. M.
ATTORNEYS.

UNITED STATES PATENT OFFICE.

FRIEDRICH VON EMPERGER, OF NEW YORK, N. Y.

VAULT FOR CEILINGS, BRIDGES, &c.

SPECIFICATION forming part of Letters Patent No. 583,464, dated June 1, 1897.

Application filed May 19, 1896. Serial No. 592,125. (No model.)

To all whom it may concern:

Be it known that I, FRIEDRICH VON EMPERGER, a citizen of the United States, residing in the city of New York, county and State of New York, have invented certain new and useful Improvements in Vaults for Ceilings, Bridges, &c., of which the following is a specification.

This invention relates to a new construction of vault for ceilings, bridges, viaducts, and other structures, which construction possesses equal or greater strength than the corresponding steel or iron structures and which can be quickly and easily carried out, so as to be furnished at less expense than similar structures heretofore in use.

The invention relates more specifically to certain improvements in the vaults for ceilings, bridges, &c., for which United States Letters Patent were granted to Joseph Melan, No. 505,054, dated September 12, 1893, so that the application of this system for engineering and building purposes generally can be considerably enlarged and adapted to a greater variety of local conditions. For this purpose my invention consists of a vault for ceilings, bridges, buildings, and other structures which comprises beams, girders, or abutments, an arch of masonry, cement, or other suitable material, and arched reinforcing-ribs that are located near to and following the intrados and extrados of the arch, each pair of ribs being reinforced by distance-rods between said ribs and by diagonals connecting two adjacent pairs of ribs, as will be fully described hereinafter and finally pointed out in the claim.

In the accompanying drawings, Figure 1 represents a vertical transverse section through a vault of ceilings, &c., shown as arranged between two beams. Fig. 2 is a vertical longitudinal section of the same on line 2 2, Fig. 1. Fig. 3 is a vertical transverse section of a vault supported by abutments so as to be used as a bridge, one-half of the figure being a section through the arch, while the other half is shown as a section through the face-wall of the same; and Fig. 4 is also a vertical transverse section of one half of the arch, showing a modified construction; and Fig. 5 is a vertical transverse section through a portion of the arch, showing the

diagonal connections between the two adjacent arched ribs of the arch.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A A are the beams, girders, or abutments between which the vault or arch is extended. The beams or girders are made of iron, steel, or other metal, while the abutments are made of suitable masonry, concrete, &c., as shown, respectively, in Figs. 1 and 3. The vault or arch is reinforced by a number of pairs of ribs B B, which are located at a suitable distance from each other and which are made of rolled I or T iron, flat irons, stiff rods, or the like, said ribs being arranged in pairs vertically one above the other and connected by distance-rods *b b*, so as to keep them at a proper distance from each other. The distance-rods are arranged at suitable points of the ribs at a suitable distance from each other, so as to stiffen the same and prevent their sagging under pressure.

The arched ribs B B are either riveted to the beams or girders or suitably anchored into the abutments by means of longitudinal angle-irons B' or in any other suitable way. In place of the distance-rods *b b* flat iron bars *d d* (shown in Fig. 4) can be arranged between each pair of ribs, said bars extending from a point on one rib to a point on the other rib, then back to the first rib, and so on, so as to pass in flat undulations or zigzag lines from one rib to the other, as shown in Fig. 4. These flat irons *d d* are riveted at their points of contact to the ribs and bent up at right angles to the ribs at the outer ends of the same. In place of continuous flat irons short inclined braces that are riveted to the ribs may be used. Two adjacent pairs of ribs are preferably connected by diagonals *e*, as shown in Fig. 5, so as to increase their strength in a lateral direction. The ribs B B, being arranged in pairs one above the other, serve to reinforce the vault or arch, which is either made in brickwork, masonry, concrete, or other material, and are so arranged that the members of each pair of ribs run closely to the intrados and extrados of the arch in such a manner that they are just covered with a layer of mortar for protecting the metal against exterior influences. The two members of each

pair of ribs B B will run nearly parallel with each other for the greater part of their length, but will then diverge from each other according as the intrados and extrados of the vault

5 or arch are diverging toward their haunches.

The ribs can be made of flat iron or angle-iron or any other section of iron and proportioned according to the distance of one pair of ribs from the next pair, or to the span of the vault or arch, or to the load which it is
10 intended to carry. The distance-rods, as well as the diagonals employed for stiffening the ribs, impart sufficient strength to the ribs, so that they are self-supporting, but without,
15 however, impairing the proper formation of the arch in the masonry or concrete. The distance-rods may be only temporarily inserted between the members of the ribs and removed as the forming of the arch proceeds, or they
20 may be permanently embedded, like the ribs, into the masonry or concrete of the arch. The use of solid ribs for reinforcing the masonry arches has not given satisfaction in small spans where the iron should be at a smaller
25 distance than four inches, which is the smallest I-iron in the market, while in larger spans the I-irons could not be well bent. The use of metal in the core of a vault or arch is use-

less, as only those portions of the ribs are called into action which are located near the 30 intrados and extrados of the vault or arch, and as a correctly-constructed arch should increase in cross-section toward the haunches the reinforcing-ribs should follow the shape of the arch in the same manner. 35

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

A vault or ceiling, consisting of beams, girders or abutments, an arch of masonry, concrete or other material supported by the same, 40 reinforcing-ribs embedded in said arch, distance-rods connecting the members of each pair of ribs and diagonals connecting the distance-rods of two adjacent pairs of ribs, the 45 members of each pair of ribs being so arranged as to follow closely the intrados or extrados of the arch, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses. 50

FRIEDRICH VON EMPERGER.

Witnesses:

JOHN KAFKE,

HARRY BELMONT.