No. 736,718. PATENTED AUG. 18, 1903.

# R. GRIMM.

## CONCRETE AND IRON GIRDER, &c.

APPLICATION FILED MAR. 5, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

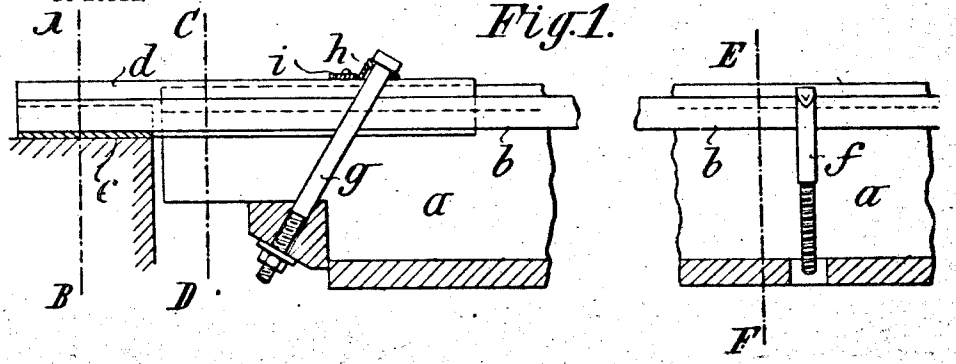
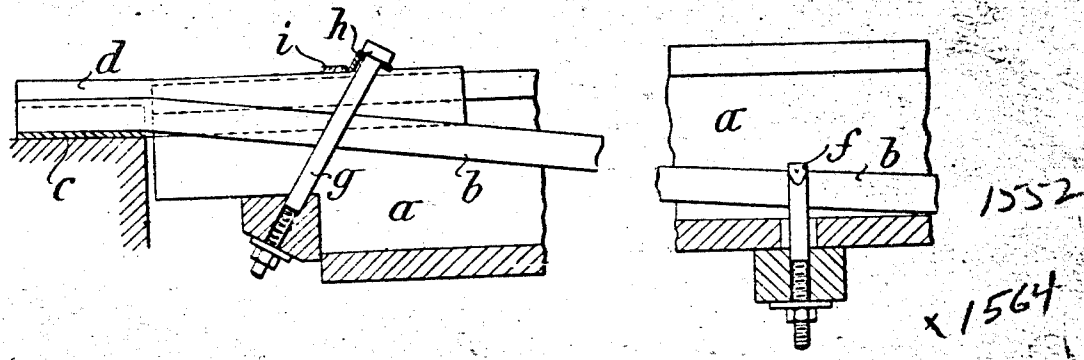



Fig. 2.




1552

×1564

Fig. 4.

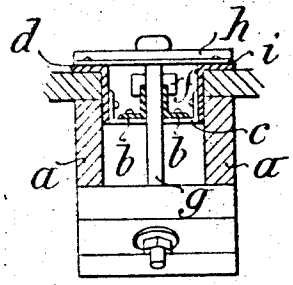



Fig. 3.

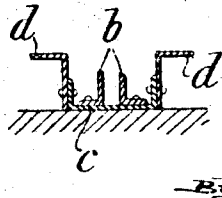
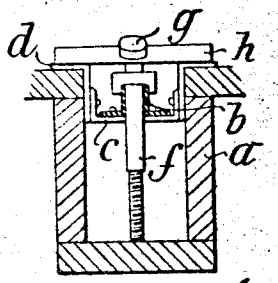



Fig. 5.




Witnesses:
W. B. Taylor
Geo. N. Rea.

Inventor
Rudolf Grimm
By James L. Norris.
Attys.

No. 736,718. PATENTED AUG. 18, 1903.

R. GRIMM.

CONCRETE AND IRON GIRDER, &c.

APPLICATION FILED MAR. 5, 1903.

NO MODEL. 2 SHEETS—SHEET 2.

*Fig. 6.*

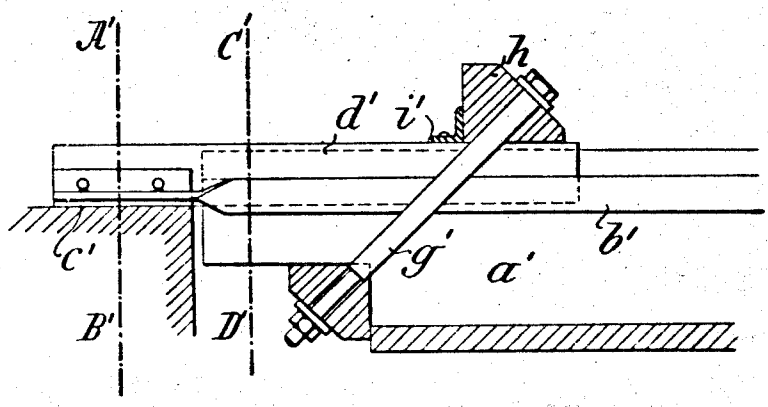



*Fig. 7.*

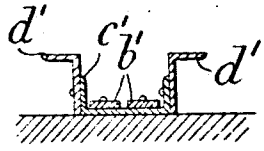
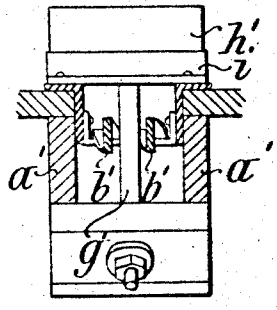



*Fig. 8.*




Witnesses:
Geo. W. Rea.

Inventor
Rudolf Grimm
By James L. Norris.
Atty.

No. 736,718. Patented August 18, 1903.

# UNITED STATES PATENT OFFICE.

RUDOLF GRIMM, OF VIENNA, AUSTRIA-HUNGARY.

## CONCRETE-AND-IRON GIRDER, &c.

SPECIFICATION forming part of Letters Patent No. 736,718, dated August 18, 1903.

Application filed March 5, 1903. Serial No. 146,332. (No model.)

*To all whom it may concern:*

Be it known that I, RUDOLF GRIMM, a subject of the Emperor of Austria-Hungary, residing at Vienna, in the Province of Lower Austria, in the Empire of Austria-Hungary, have invented certain new and useful Improvements in Roofs, Beams, Girders, and Like Structures of Concrete and Iron; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention relates to roofs, beams, girders, and like structures (hereinafter included in the term "girder") of concrete and iron.

A girder according to this invention is constructed of concrete with iron or other suitable metal insertions. Among its distinguishing features are the use of bearing or supporting plates of iron or other suitable metal, the placing of the metal insertions in tensional strain, and its method of construction with the aid of a mold or like structure without intermediate support—that is to say, which is self-supporting between the points of support of the girder.

In constructing a concrete-and-iron girder in accordance with this invention its metal insertions, consisting of metal of bar, round, or other suitable section, are embedded while under tensional strain in the concrete and the bearing portions of the girder are formed by means of the metal insertions, which project from the concrete at both ends of the girder and are connected to metal pieces of suitable section that rest freely on the supports of the girder.

The aforesaid self-supporting mold or like structure is preferably formed of wood in combination with the metal insertions that are intended to strengthen the concrete of the girder.

In the accompanying drawings, which are given solely by way of example for the purpose of enabling this invention to be more clearly understood, Figures 1 and 2 are similar longitudinal sections of a concrete-and-iron girder according to this invention, illustrating the same respectively before and after placing under tensional strain the metal insertions, which consist in this case of angle-iron. Figs. 3, 4, and 5 are cross-sections respectively on the lines A B, C D, and E F of Fig. 1. Figs. 6, 7, and 8 illustrate the same form of girder when flat or bar iron is used instead of angle-iron.

*a* represents planks or boards forming the sides of the mold.

The iron insertions *b* constitute one of the most important constructional elements or members of the unsupported structure during the building of the girder. They are arranged between the mold-planks *a*, and they serve later on to strengthen the concrete. In the present case they are shown by way of example as consisting of two angle-irons; but they may also be made of round or bar iron. These metal insertions *b* are riveted at their ends, that project freely from the mold or concrete body, to a channel-iron *c* in such a manner as to leave a predetermined suitable space between the two angle-irons *b*. The channel-iron *c*, which forms the bearing-plate or wall-plate resting free on the vertical wall or like support, is riveted with both of its side flanges to angle-irons *d*, which project for a suitable distance over the wall or like support and which are situated in the upper portion of the concrete girder when the girder is finished. The mold-boards *a*, that serve to form the sides of the girder, are pressed by suitable means, such as by a screw-bolt *g*, against the angle-irons *d*. Before the concrete is placed in the mold the iron insertions *b* are drawn down by means of suitable means, such as by one or more screw-bolts *f*, (the number of such bolts being determined by the length of the girder,) which extend through the mold and which may be connected with the iron insertions in any suitable manner—for example, as in the case shown, by means of a hooked head formed in the bolt *f* engaging with the insertions *b*. The boards *a*, forming the mold, are caused by the bolts *g* and the angle-irons *d*, riveted to the channel-irons *c* of the wall-plate, to offer resistance to an excessive inward sliding on the wall-plates caused by the drawing down of the iron insertions *b*, so that these iron insertions *b* are placed under

tensional strain, whereby the boards *a* are in their turn placed under strain. The connection of the bolts *g* (which are situated obliquely between the mold-boards *a*) with the angle-irons *d* is effected by means of angle-irons *h*, which are arranged across the said angle-irons and riveted to a bar *i* and serve as abutments for the bolts *g*. The concrete is now placed into the mold, which has been rendered entirely self-supporting by this means. If desired, the concrete may be placed only in the space above the iron insertions, in which case a girder is produced having a curved under side and in which the iron insertions are visible on the said under side, or the iron insertions to be entirely covered with concrete, so that they will be situated in the interior of the girder, in which case the girder may have either a straight or a curved under side. When the concrete surrounding the tensioned insertions has become hard and the mold is to be removed, the bolts *f* and *g* are loosened, whereupon the box forming the mold can be removed from underneath.

I claim—

1. A built-up girder comprising a longitudinally-extending reinforcing insertion under tension embedded in a mass of plastic material, and bearing-plates projecting from each end thereof.

2. A built-up girder comprising a reinforcing insertion under tension embedded in a molded mass of plastic material, and bearing-plates connected to the said insertion and projecting from each end of the girder.

3. A built-up girder comprising a longitudinally-extending reinforcing insertion under tension embedded in a molded mass of plastic material, and metallic bearing-plates connected to the said insertion and projecting from each end of the girder.

4. A built-up girder comprising a pair of longitudinally-extending angle-irons under tension embedded in a mass of plastic material, a channel-iron secured to each end of said pair of angle-irons, and a pair of angle-irons secured to said channel-irons and projecting above the same.

5. A built-up girder comprising a pair of longitudinally-extending angle-irons under tension embedded in a mass of plastic material, said angle-irons being suitably spaced apart, a channel-iron secured to each end of said pair of angle-irons, and a pair of angle-irons secured to each of said channel-irons and projecting above the latter.

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

RUDOLF GRIMM.

Witnesses:
JOSEF RUBASCH,
ALVESTO S. HOGUE.