

No. 693,826.

Patented Feb. 25, 1902.

E. BÖTTGER.
BRICK FOR BUILDING ARCHES.

(Application filed Sept. 18, 1900.)

(No Model.)

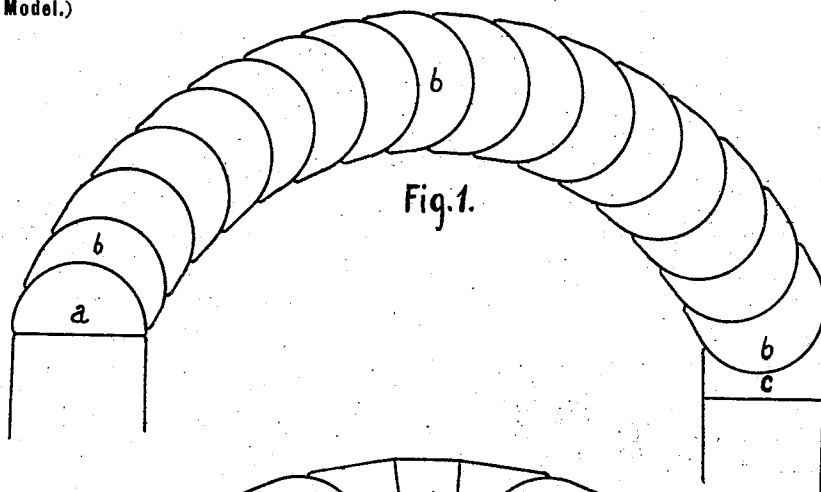


Fig. 1.

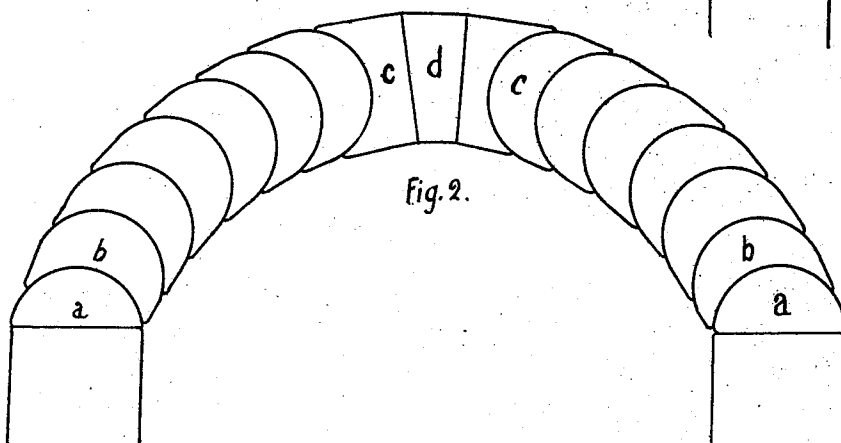


Fig. 2.

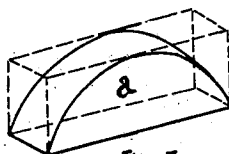


Fig. 3.

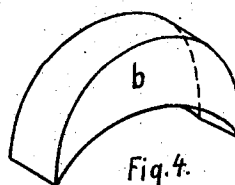


Fig. 4.

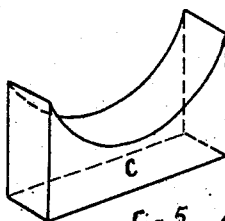


Fig. 5.

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EDUARD BÖTTGER, OF BERGISCH-GLADBACH, GERMANY.

BRICK FOR BUILDING ARCHES.

SPECIFICATION forming part of Letters Patent No. 693,826, dated February 25, 1902.

Application filed September 18, 1900. Serial No. 30,414. (No model.)

To all whom it may concern:

Be it known that I, EDUARD BÖTTGER, manufacturer, a subject of the King of Prussia, Emperor of Germany, and a resident of Bergisch-Gladbach, in the Province of Rhineland and Kingdom of Prussia, Germany, have invented Improved Bricks for Building Arches, of which the following is a specification.

Up to the present, arches, especially those that are fireproof for brick-kilns, retort-furnaces, and kilns of all kinds, have always been built of wedge-shaped bricks, the inclined sides of which had accurately to have the right inclination one to another in order to have tight and closed, but not gaping, joints, a matter of the greatest importance in the case of fireproof material; but as the dimensions for the bricks were frequently taken or measured from small drawings, and the bricks easily change their shape and thickness a little when being put down out of the mold, dried, and burned, they often did not fit when ready. Furthermore, special wedge-bricks had to be made for almost each arch, necessitating thus the continual making of new molds and the altering of old ones, &c., and in this way the brick-manufacturer finally had in stock a large number of different molds and often also a considerable quantity of wedge-bricks of all possible shapes which were almost useless, while he could never make bricks for keeping in stock. All these advantages are obviated by the present invention.

This invention consists, as shown by the accompanying drawings, in the use of bricks, of which the sides lying one against another are bent like the arc of a circle, and thus have an envelop forming part of a cylinder. Thus the joints corresponding to the usual radial arch-joints (when wedge-bricks are used) are in the arches built with the new bricks of the shape of an arc.

In the accompanying drawings, Figures 1 and 2 show two different kinds of arches built with the new bricks, while in Figs. 3, 4, and 5 the three chief fashioned bricks which are used for making the arches are drawn in perspective.

For building arches three shapes of the new bricks are necessary: first, the bottom brick *a*; second, the main or standard brick *b*, and third, the end brick *c*.

The bottom brick *a* has a flat side with which it lies on the side wall of the arch, and over that a side bent like an arc, its shape in cross-section being a semicircle or a segment of a circle.

The main or standard bricks *b* are, as may be seen, of the shape of a sickle or half-moon, the outer and inner curve, (extrados and intrados,) however, having the same radius.

The end or support brick *c* has a flat side fitting on the brick pillar, or on the side wall of the arch, or on the wedge side of a special keystone used in the crown of the arc, and the opposite side of the support-brick *c* is held and bent like an arc of a circle, the section of this brick therefore being trough-shaped.

The extrados of brick *a* and the intrados of *c* have likewise the same radius. The result of this is that since the curved back of the preceding brick fits into the curved hollow of the next one and can be moved to and fro in it by using these bricks one can accurately follow any center scaffolding, no matter of what radius or with what ratio between gage and height of arch, and place the arch accurately along the center scaffolding, the succeeding bricks *b* turning around the preceding ones until they lie correctly. In case the curve is very sharp, such as may exceptionally occur in an arch with very small radius and proportionately great height, the lower point of bricks *b* or *c* which prevents them from getting into the right position can be easily knocked off by the brick-layers.

As shown by the dotted lines in Fig. 3, the bricks are equal in their chief dimensions (length, breadth, and height) to the dimensions of ordinary bricks, the parts which are completed by the dotted lines to a four-sided prism being omitted.

It goes without saying that the arches, just as is the case with arches that are built of wedge-bricks, are built on center scaffolding. This can be done in different ways, as is shown in Figs. 1 and 2. The first method consists in beginning on one side of the center scaffolding—i. e., at one end of the arc of the arch—with a series of bottom bricks *a*, at the other end of the arc with a series of support-bricks *c*. After these bottom or sup-

port bricks then follow the main or standard arch-bricks *b* in an upward direction from both the sides about the center scaffolding, and the operation is finished by placing in position in the crown of the arch the last or highest series of standard bricks *a*, which serve as keystones and are pushed in from the front side of the arch, as they cannot be put into position from above between the other bricks like ordinary wedge-bricks. In the second method shown in Fig. 2 a special wedge-brick is used as a keystone, and instead of only one brick *a* and *c* two of each are used for each row of arches. One begins at both the side walls or pillars with the bottom brick *a*. Then working upward and toward the crown the standard bricks *b* are laid. Thereupon as the last brick next to the keystone a trough-shaped brick *c* is placed on both sides, such as was used in the method first described as final support, and between these two bricks *c* a suitable wedge-brick is put in as keystone of the whole arch. In the first method if the crown-joint is too large or too small for one brick expedients are adopted, as shown in Fig. 2. The key-joint can be so arranged that a proportionately thicker ordinary brick can be used, and no special keystone is necessary, the latter otherwise in any case having to be specially molded for every arch or be cut down to the required shape by the builders.

The arches built with the new bricks besides the advantages mentioned above in comparison with the wedge-brick arches hitherto in use also possess the especially-important advantage that when they are exposed alternately to very high temperatures and subsequent cooling, thus expanding very much, but not contracting to an equal degree after the cooling, it is quite impossible for single bricks

to fall out, and therefore the troublesome repairs which often stop the traffic can never become necessary.

The fact that the single bricks in consequence of their peculiar shape fit firmly into each other and that a single brick cannot fall out alone makes it possible not only to build vaults and single arches, but also straight horizontal bearing-pieces of brickwork, the end bricks *a* or *c* of such pieces resting on the pillars or abutments, the standard bricks *b* being fitted in between these two end bricks, while the center, for instance, is formed by two bricks *a*, having their straight sides facing each other, or by a single brick of circular shape corresponding to the two bricks. Such a construction can be used for making summers over door and window openings, and besides being of great strength, so that it works as if the whole were a single stone, it possesses a pleasing appearance, the curved lines of the joints looking like ornamentation.

The bricks, as shown in Fig. 1 of the drawings, may be used for any circular purposes and can be used for forming circles in building wells and the like.

What I claim as my invention, and desire to secure by Letters Patent, is—

An arch formed of intermediate bricks having concave and convex opposite edges with plain sides, and end bricks with plain lower edges and upper edges coinciding with the abutting edge of the adjacent intermediate brick, substantially as described.

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

EDUARD BÖTTGER.

Witnesses:

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