

(No Model.)

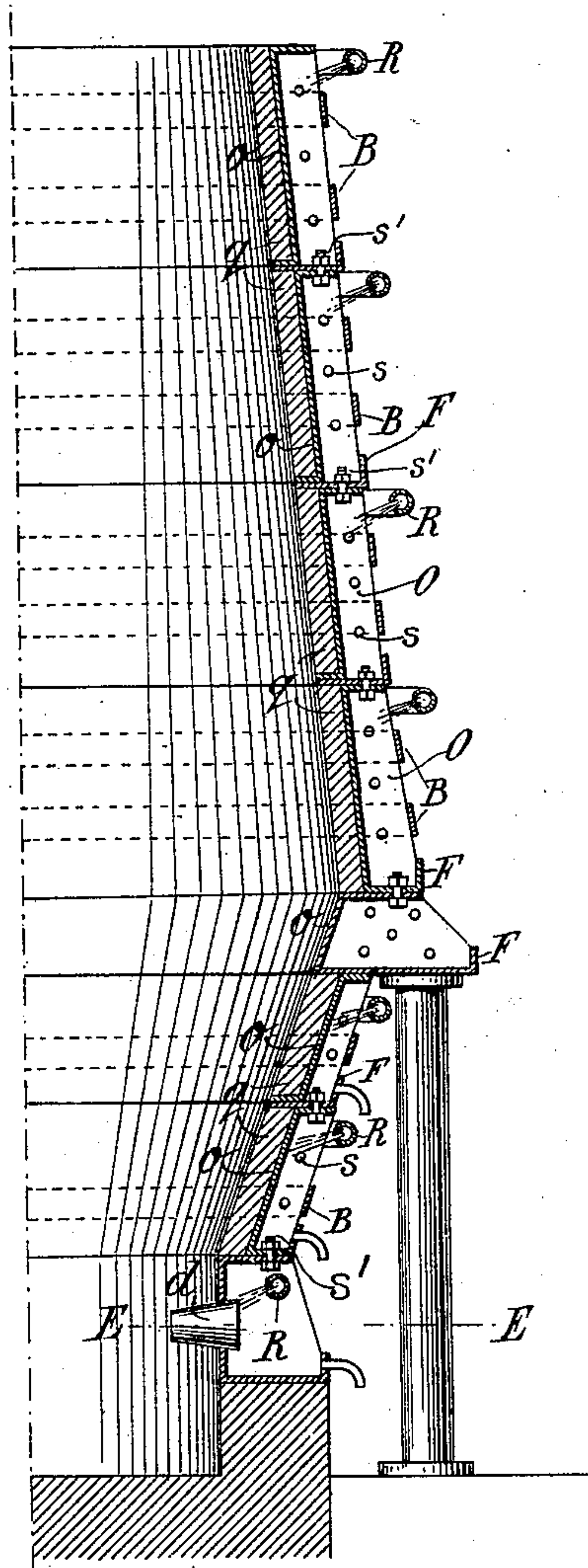
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F. BURGERS.
SHAFT OR BLAST FURNACE.

No. 591,524.

Patented Oct. 12, 1897.

Fig. 1.



WITNESSES:

Fred White
Thomas F. Wallace

INVENTOR:

F. F. Burgers,

By his Attorneys.

Arthur C. Francis & Co.

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2 Sheets—Sheet 2.

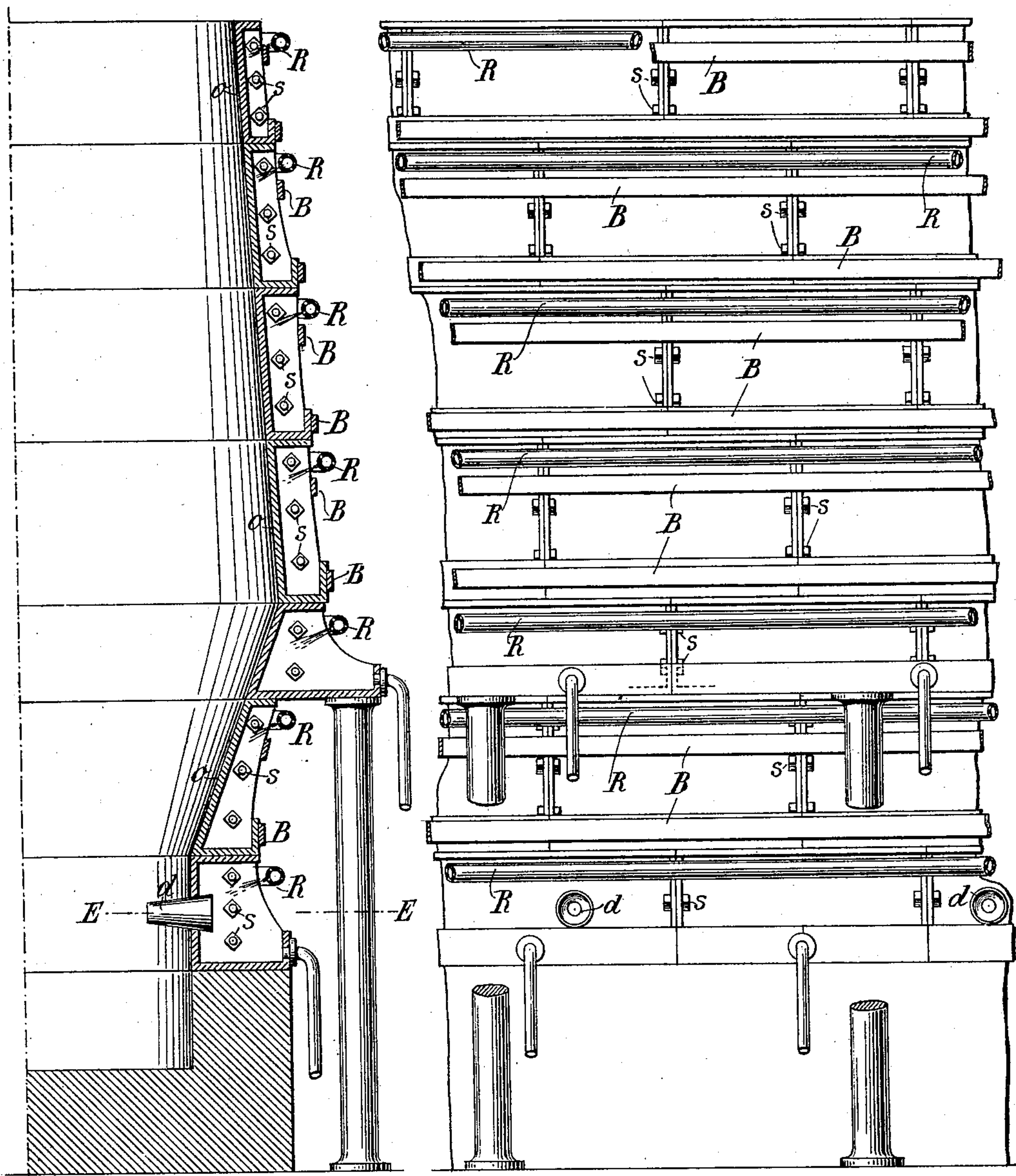
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Fig. 2.

Fig. 3.



WITNESSES:

Fred White
Thomas F. Wallace

INVENTOR:

Framy Burgers,

By his Attorneys.

Arthur C. Fraser & Co.

UNITED STATES PATENT OFFICE.

FRANZ BURGERS, OF GELSENKIRCHEN, GERMANY.

SHAFT OR BLAST FURNACE.

SPECIFICATION forming part of Letters Patent No. 591,524, dated October 12, 1897.

Application filed July 8, 1896. Serial No. 598,415. (No model.) Patented in Luxemburg April 16, 1896, No. 2,488.

To all whom it may concern:

Be it known that I, FRANZ BURGERS, smelting-works manager, of Gelsenkirchen, in the German Empire, have invented certain new and useful Improvements in Shaft or Blast Furnaces and the Like, (which invention is the subject of Letters Patent in Luxemburg, No. 2,488, dated April 16, 1896,) of which the following is a specification.

This invention relates to improvements in shaft and blast furnaces and other devices, which improvements are designed to obviate the necessity for frequent repairs and alterations whereby interruptions of working easily arise.

To this end in carrying out my present invention I provide certain improvements, which will be hereinafter fully set forth with reference to the accompanying drawings, in which—

Figure 1 is a fragmentary vertical section of a furnace embodying the preferred form of my present improvements. Fig. 2 is a similar view of another furnace, and Fig. 3 is a fragmentary side elevation thereof.

Heretofore shaft-furnaces, and especially blast-furnaces for the smelting of iron, have been built with the outer wall of massive fire-brick about one-half of a meter to one meter thick. It is known that the boshes and also the shaft or stack are so acted upon by the molten mass that the interior of the furnace changes its form, and thus irregularities in working result, frequently causing great loss. To obviate this disadvantage, the boshes have been protected by building into the same hollow metal plates, in which water is circulated for cooling. The boshes have also been inclosed or surrounded by a sheet-iron casing having annular hollow spaces arranged therein, in which water has been circulated for cooling. These means of cooling have the great disadvantage that if they become defective the water can penetrate into the furnace without this fact being noticed soon enough to prevent damage. Moreover, repairs are very difficult. By my invention I obviate all these disadvantages by applying hollow and outwardly-open iron segments to the furnace, which segments are preferably arranged together to form complete rings around the furnace. These rings can form the entire shaft-

furnace, (hearth, boshes, and shaft or stack.) It is obvious that, if desired, any of these segments and rings can be replaced by brick-work if others are retained. Fig. 1 is a vertical section showing a shaft-furnace wall which, as an example, consists entirely of such iron rings. However, the invention is not limited to shaft-furnaces built entirely from these hollow outwardly-open segmental rings, as above mentioned. In the following description the invention will be explained with reference to an example which relates to a furnace consisting entirely of these rings. By this arrangement, to be hereinafter described, the walls of the furnace (hearth, boshes, and shaft or stack) are made substantially thinner and all these parts can be cooled with water. This is effected by forming the wall of the furnace of iron-ring sections. Each iron ring consists of segments *o*, which are connected to each other by bolts *s* and are held together by bands *B*. The several ring-sections or furnace-rings, when they lie directly one upon the other, are secured together by flanges and bolts *s'* along their upper and lower edges. The lower flange *F* is preferably bent up and forms at the foot of each segment a trough or channel for the reception of the cooling-water, which is squirted against the segments or ring-sections from a circular pipe *R*, having openings directed toward the wall of the furnace. At the level *E E* the tue-irons or twyers *d* pass through the segments. At the place, however, where the boshes lean against the shaft or stack and where previously the brickwork was especially thick in the new form of construction a furnace-ring can be formed which serves as a bearing-ring for the stack and offers a special advantage over the previous old construction, since in this manner extraordinarily thick brickwork is no longer necessary at this place, which was sometimes as much as two meters thick and was very difficult to cool or could scarcely be cooled at all and exceedingly liable to be acted upon by the molten masses resting thereon. The internal surface of the furnace is formed, in this method of construction, entirely or partly of these segments or rings, which can, if desired, be protected against direct contact with the furnace-charge by a thin lining of fire-resisting material *q*. The uppermost ring of the boshes, which

serves as the supporting-crown for the shaft or stack, can also be provided with a lining of this kind on the inside of the furnace. This, however, can be dispensed with at will, 5 so that the interior surface of the furnace consists of iron at this place. A similar arrangement can, if desired, be also adopted at other places or with other of the said segments or furnace-rings, and especially at the furnace- 10 ring at the level of the tue-irons or twyers and carrying the same. This modification is shown by Figs. 2 and 3. Fig. 2 is a vertical section analogous to Fig. 1. This modification differs from the construction shown in 15 the latter by the fact that the inside of the furnace-segments is not covered by a fire-resisting lining, so that the inner face of the furnace consists of iron. Fig. 3 is a side elevation of the furnace. Like letters indicate 20 like parts in Fig. 3 as well as in Fig. 1. From known arrangements, in which, by hollow water spaces or chambers closed on all sides, and particularly on the whole periphery, the massive furnace-wall or brickwork or particu- 25 lar parts of the furnace were to be cooled, the furnace of this invention differs by the fact that the furnace-walls are wholly or partly composed of single segments, which are hollow and outwardly free and open and arranged together for forming complete rings 30 on which the drizzling or sprinkling tubes act, and the drizzled or sprinkled faces being free to the open air can be controlled, while the under flange of these outwardly-open segments form a water trough or channel in order to regularly drain off the water. There- 35 fore every damage or trouble can always be easily seen and readily repaired without interfering with the continuity of the work of the furnace. In the old arrangement, wherein 40 the boshes are built up by fire-resisting brickwork outwardly provided with a sheet-metal covering or casing against which water is drizzled or sprinkled, the construction does not 45 possess the necessary solidity for preventing glowing and does not give opportunity to remove and replace single parts for repairing the same, as may readily be done by means of the present invention, the cast-iron rings 50 according to which latter can be very easily repaired. As above stated, by my improvements the furnace-walls, shaft, or stack, and boshes and hearth are built up by outwardly-open and hollow segments, which can be easily 55 replaced. When these iron segments are provided with a lining on the inside of the furnace, the free surface of this lining lies in the internal surface of the furnace—i. e., it is continuous with the adjacent part of the internal 60 surface of the furnace. If the segment or furnace-ring in question be not provided with a fire-resisting lining on the inner furnace side, the iron inner furnace side of this segment or ring lies exactly in the adjacent interior sur- 65 face of the furnace—i. e., it is continuous with the latter. This can be easily seen from Fig. 1 of the drawings.

In operation the cooling-flow may be directed against the outer surfaces of all of the segments, or of such as may from time to 70 time be desired, either continuously or periodically, as desired, suitable means for controlling the flow being employed.

It will be seen that my invention provides improvements which can be readily and ad- 75 vantageously availed of, and it will be understood that the invention is not limited in details of construction, arrangement, or operation to the particular embodiment shown and described as embodying its preferred 80 form, but that it can be availed of in whole or in part, according to such modifications as circumstances or the judgment of those skilled in the art may dictate, without departing from the spirit of the invention. 85

What I claim is the following-defined novel features and combinations, substantially as and for the purpose hereinbefore set forth, namely:

1. In shaft or other furnaces, the arrange- 90 ment of an iron ring composed of hollow outwardly-open iron segments for replacing the corresponding part of the furnace-wall, which segments are fitted or adapted to the inner furnace-profile and can be provided on the 95 inner surface with a thin fire-resisting lining while outwardly a water-pipe for supplying cooling-water and for drizzling or sprinkling the same against the free and outwardly-visi- 100 ble segment-surface of the externally-open hollow segments is arranged in such a manner that it can be freely seen and controlled, the lower bearing-flange of the segments forming a water-trough or collecting-channel 105 for regularly draining off the cooling-water, such iron ring being provided with a supporting construction (such as pillars) for supporting the part of the furnace, which part is arranged over such construction.

2. In the hearth of shaft or other furnaces, 110 the arrangement of an iron ring composed of hollow outwardly-open iron segments having twyers passing through it for replacing the corresponding part of the furnace-wall, which segments are fitted or adapted to the inner 115 furnace-profile and can be provided on the inner surface with a thin fire-resisting lining while outwardly a water-pipe for supplying cooling-water and for drizzling or sprinkling the same against the free and outwardly-visi- 120 ble segment-surface of the externally-open hollow segments is arranged in such a manner that it can be freely seen and controlled, the lower bearing-flange of the segments forming a water-trough or collecting-channel 125 for regularly draining off the cooling-water.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

FRANZ BURGERS.

Witnesses:

WILLIAM ESSENWEIN,
ERNEST ANDRÉ.