

(No Model.)

H. KENNEDY.

PROCESS OF AND MEANS FOR REPAIRING FURNACE LININGS.

No. 350,981.

Patented Oct. 19, 1886.

Fig. 1.

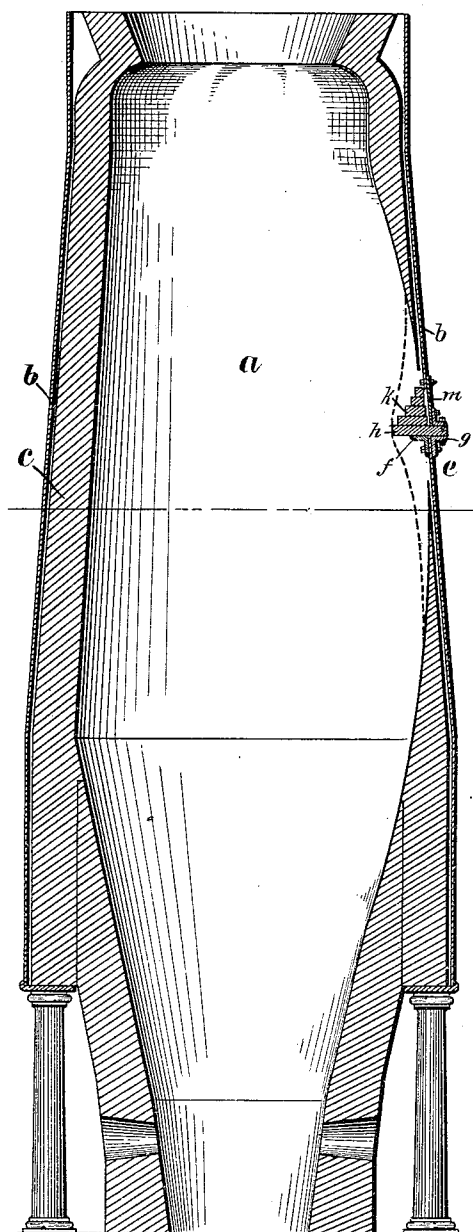


Fig. 2.

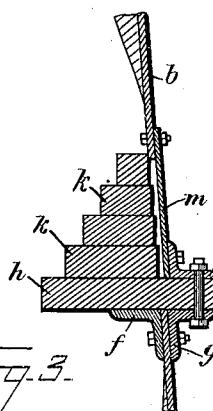
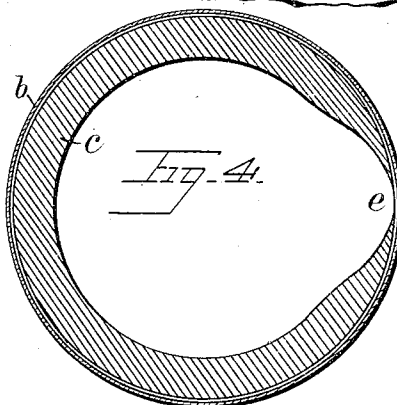
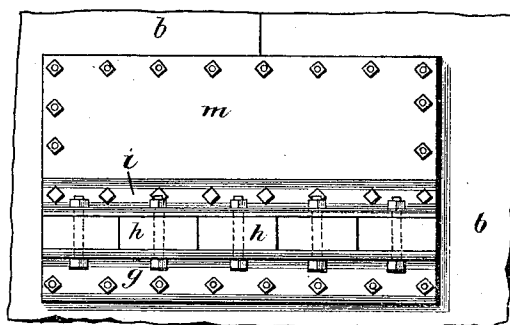


Fig. 3.



Witnesses.

J. A. Burroughs,
W. C. Conner

Inventor.

Hugh Kennedy
by his attys
Bakerwell & Kins

UNITED STATES PATENT OFFICE.

HUGH KENNEDY, OF SHARPSBURG, PENNSYLVANIA.

PROCESS OF AND MEANS FOR REPAIRING FURNACE-LININGS.

SPECIFICATION forming part of Letters Patent No. 350,981, dated October 19, 1886.

Application filed April 3, 1886. Serial No. 197,599. (No model.)

To all whom it may concern.

Be it known that I, HUGH KENNEDY, of Sharpsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Process of and Means for Repairing Furnace-Linings; and I do hereby declare the following to be a full, clear and exact description thereof.

It is not an unusual occurrence in blast-furnaces when the lining becomes thin for the casing or shell to become exposed on the inside in spots, which become heated and in a short time cut through. The formation of these "hot spots" may be due to various causes, but usually it is owing to the attrition of the stock descending in a continuous and relatively rapid stream against the wall at the side of the more slowly-descending main body of the burden. The formation of such a stream is due to a blast or stream of air from the tuyeres, which, meeting obstructions in the middle of the furnace, finds a freer channel or outlet at the side, and continues to follow the same and smelts the stock until it establishes an open channel, through which the stock descends freely and more rapidly than the main body of the charge. The attrition of this rapidly-descending continuous stream of solid matter cuts a groove in the brick lining of the furnace and often in a comparatively short time exposes the casing in spots. When this occurs, the casing in such places becomes red hot, and these are what are known in furnace parlance as "hot spots." When one occurs, it is customary to throw a stream of water upon it to protect the casing and prevent the spot from spreading. If it cannot be stopped, the furnace must go out of blast and be relined or the lining repaired. It is sometimes possible to repair such a spot without putting the furnace out by stopping the blast, cutting out the thin place down to a point where the lining is thick enough to build on, then building up the lining to a proper thickness, and riveting on a new piece of casing where it was cut away; but frequently the lining is worn so thin that it affords no foundation for new work, and the furnace must be put out, notwithstanding the lining in other parts may be thick enough to have continued the blast for weeks or months longer.

The object of my invention is to effect the repair of thin spots in the lining, even when the subjacent wall is too thin to build on.

To enable others skilled in the art to make use of my invention, I will now describe it by reference to the accompanying drawings, in which—

Figure 1 is a vertical section of a portion of a blast-furnace, showing my improved method of repairing thin spots in the lining. Fig. 2 is a view of the base-tile upon which the new work is supported. Fig. 3 is a front view of the repaired part of the furnace. Fig. 4 is a cross-section diagram of a furnace illustrating how the lining wears.

Like letters of reference indicate like parts in each.

The furnace *a* is of common form, and is provided with the usual iron shell or casing, *b*, and brick lining *c*.

At *e*, at the right side of Fig. 1, and in Fig. 4, I show a thin place where the lining is worn through to illustrate the foregoing explanation. When the shell *b* heats at this point the danger is discovered. Then the blast is stopped and the spot cooled by a stream of water thrown against it. I then cut out a piece of the shell of sufficient size to expose the thin part of the lining which requires to be repaired, and rivet or bolt a piece of angle-iron, *f*, to the inside of the shell at the lower edge of the cut or opening, and another piece of angle-iron, *g*, to the outside. On the horizontal flanges of the angles *f g*, I place a large flat tile, *h*, of sufficient strength and thickness to support the new work. I secure this tile firmly in place by an angle, *i*, placed on its outer projecting edge, and fasten such angle to the lower outer angle, *g*, by bolts or other suitable fastening devices. Then I build up new brick-work *k* on the tile *h* as a foundation until the opening is closed up and the lining is repaired. Then I repair the shell by riveting on a new piece, *m*, Fig. 2, the lower edge being riveted to the vertical flange of the angle *i*. The inner end of the tile *h* projects any desired distance into the furnace, preferably some distance beyond the inner surface of the new work. This is to place an obstruction in the path of the descending stock, to deflect it away from and prevent it rubbing against the comparatively thin part of the lin-

ing below the tile, and also to deflect the ascending stream of air out into the furnace and cause it to find a new channel. This causes a layer or pocket of partly-melted stock, furnace-dust, &c., to form below and under the cover of the tile *h* and against the subjacent thin portion of the wall, which protects it from the heat, and in that respect further insures its safety.

10 If preferred, the angle *f* may be dispensed with.

The tile *h* may be in one or more pieces, and is made of any suitable refractory material, stone or metal.

15 My invention has proved itself to be of great practical utility, as by its use I have prolonged the blast of a large furnace several months, when by the old practice no remedy existed, and it would have been necessary to blow it

20 out. By its use the irregular wearing of the lining can be controlled and the furnace kept in blast until the lining wears uniformly so thin that the entire furnace needs relining, and the loss and delay arising from abnormal wear at isolated points obviated. When the patch is

25 made in this way, the new work is supported by the shell and not by the subjacent wall, as heretofore, so that although the latter may be very thin and entirely incapable of supporting

the new work, a strong and reliable repair is effected, and the trouble heretofore experienced of the new work falling in is avoided. Moreover, the wall has not to be cut down as low as heretofore to secure an adequate foundation.

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

1. The method of repairing blast-furnace walls, which consists in cutting out the thin part, building up the opening upon a foundation-tile, and fastening the outer end of the tile to the shell, whereby it is supported thereby, substantially as and for the purposes described.

2. In a blast-furnace, the combination of a tile inserted through the shell and supported thereby, with a portion of the wall built upon such tile as a foundation, substantially as and for the purposes described.

3. In a blast-furnace, the combination of the shell *b*, angle *g*, tile *h*, patch *m*, and angle *i*, whereby the tile is secured in and supported by the shell, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 24th day of March, A. D. 1886.

HUGH KENNEDY.

Witnesses:

W. B. CORWIN,
JNO. K. SMITH.