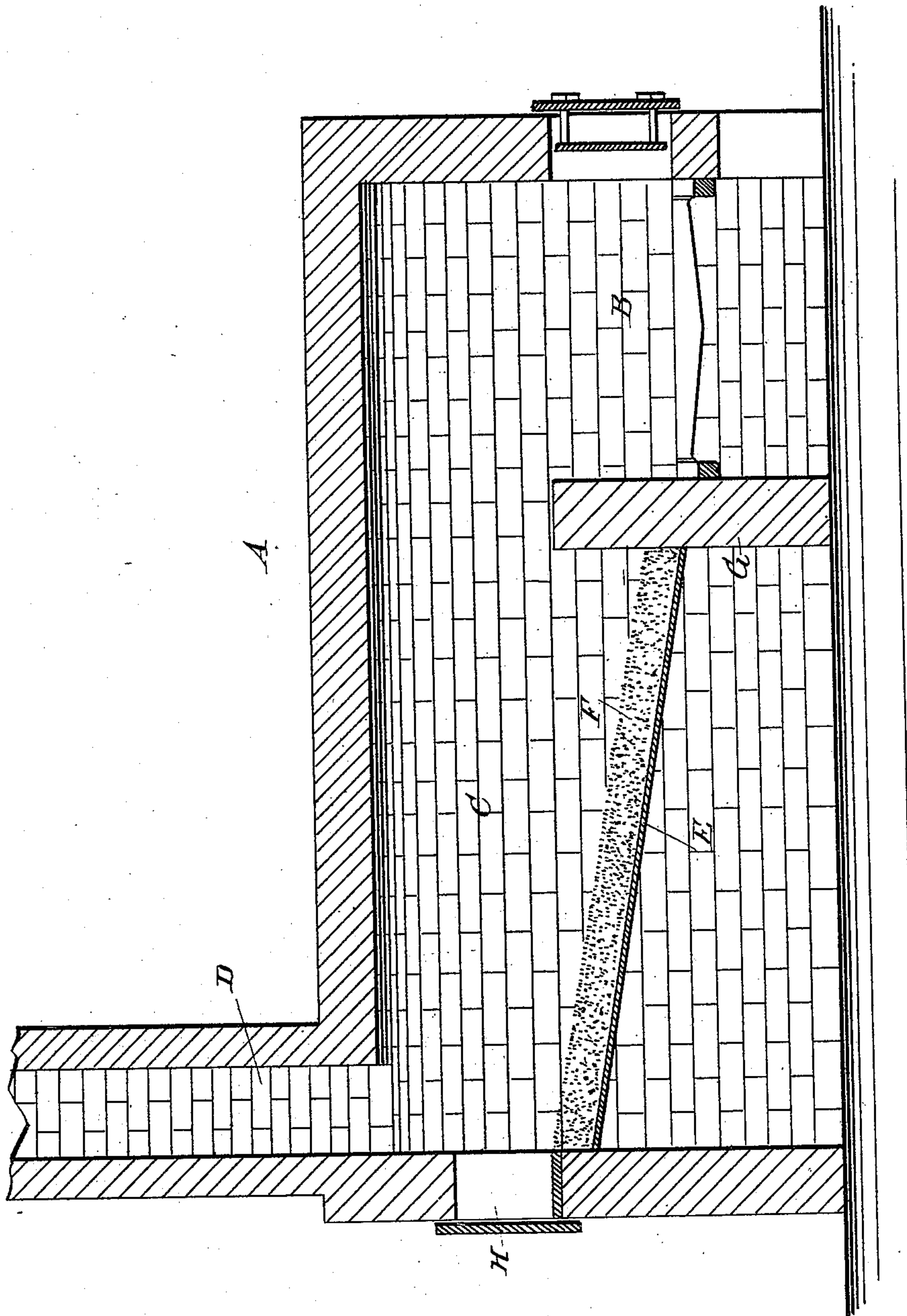


(No Model.)

E. J. FRANCIS & C. BANFIELD.
SHEET HEATING FURNACE.

No. 408,475.

Patented Aug. 6, 1889.



WITNESSES:

Chas. Nida
C. Sedgwick

INVENTOR:

E. J. Francis
C. Banfield
BY *Munn & Co.*
ATTORNEYS.

UNITED STATES PATENT OFFICE.

EVAN JAMES FRANCIS AND CHARLES BANFIELD, OF LEECHBURG,
PENNSYLVANIA.

SHEET-HEATING FURNACE.

SPECIFICATION forming part of Letters Patent No. 408,475, dated August 6, 1889.

Application filed December 23, 1887. Serial No. 258,825. (No model.)

To all whom it may concern:

Be it known that we, EVAN JAMES FRANCIS and CHARLES BANFIELD, both of Leechburg, in the county of Armstrong and State of Pennsylvania, have invented certain new and useful Improvements in Sheet-Heating Furnaces, of which the following is a full, clear, and exact description.

The object of the invention is to provide certain new and useful improvements in sheet-heating furnaces by which the heat is permitted to heat the sheets to be annealed very uniformly.

The invention consists in a bottom for the heating-chambers of sheet-heating furnaces formed of segregated masses, broken pieces or fragments of non-combustible material having interstitial passages, and presenting a broken or uneven surface, as will be herein-
after fully described and claimed.

Reference is to be had to the accompanying drawing, forming a part of this specification, in which the figure illustrates a sectional side elevation of a sheet-heating furnace provided with our improvements.

In heating sheets in annealing or heating furnaces, it is necessary to have a bottom made of some material that will allow the heat to pass freely under the sheets in order to heat them uniformly. The material at present employed is generally coke made from coal. This material is broken up into small pieces and spread over the bottom of the furnace to a depth of about six inches, and presents a broken or uneven surface, which allows the heat to pass readily under the sheets, thus furnishing a very even heat. The coke, on account of the great heat in itself, causes the bottom of the heating-chamber to become hotter than the rest thereof, and consequently the bottom sheets will become too hot, thereby causing the sheets to be spoiled. Besides this, the coke soon burns away and leaves a residue, which has to be removed frequently, and the bottom has to be renewed. Unless extreme care is taken the residue unites with the sulphur and adheres to the sheets, so as to cause them to become marked and spotted,

and frequently causes the several sheets to stick together, thereby spoiling said sheets, which have to be thrown away. The daily and almost hourly renewal of the bottom entails a great expense upon the manufacturer, besides causing a great amount of extra labor for the workmen. With our improvement, presently to be described, the difficulties above mentioned are overcome.

The sheet-heating furnace A, of any approved construction, is provided with a fireplace B, connected with the space C, in which the sheets to be heated for the rolling-mill are placed in any suitable manner. The space C connects with the chimney D, and the bottom of the said space C is formed by a non-combustible material F, placed on the bottom plate E, preferably made of metal and having its supports in the sides and the end of the furnace A and in the bridge-wall G. At the front end of the furnace A is formed an opening H for the introduction of the sheets to be heated into the space C, and which also serves for the renewal of the bottom F whenever necessary.

The non-combustible material F, forming the bottom of the space C, may be broken pieces or fragments of cinder or slag, or oxide of iron, or the said material may be asbestos, soapstone, &c. The non-combustible substances described furnish a clean and remarkably cheap and durable bottom, and, as the said substances will not burn away, their durability is unlimited. A bottom made of such substances does not get hotter than the rest of the furnace, and consequently the bottom sheets to be heated, which are held in the space C, are heated to the same degree as the top sheets. The segregated character of these pieces or fragments causes interstitial passages to be formed, through which the heated gases are free to pass, and the upper side of the bed presents a broken or uneven surface. The pile of sheets therefore will, as above stated, be heated to the same degree at the bottom as at the top. The bottom does not furnish any dust, ashes, or sulphur, and hence the sheets to be heated or annealed are not

marked or spotted and do not stick together.
A bottom made, as described, will last a long
time, thus saving a great expense to the man-
ufacturer and labor for the workman.

5 Having thus described our invention, what
we claim as new, and desire to secure by Let-
ters Patent, is—

A bottom for heating furnaces formed of
segregated masses, broken pieces or frag-
10 ments of non-combustible material having in-

terstitial passages, and presenting a broken
or uneven surface, substantially as set forth.

EVAN JAMES FRANCIS.

CHARLES ^{his} × BANFIELD.
mark

Witnesses:

JAS. A. LONG,
J. JENKINS.