No. 879,354. PATENTED FEB. 18, 1908.

S. BARNETT, R. J. HADLINGTON & S. HINTON.

CONTINUOUS BRICK KILN.

APPLICATION FILED MAR. 1, 1907.

2 SHEETS—SHEET 1.

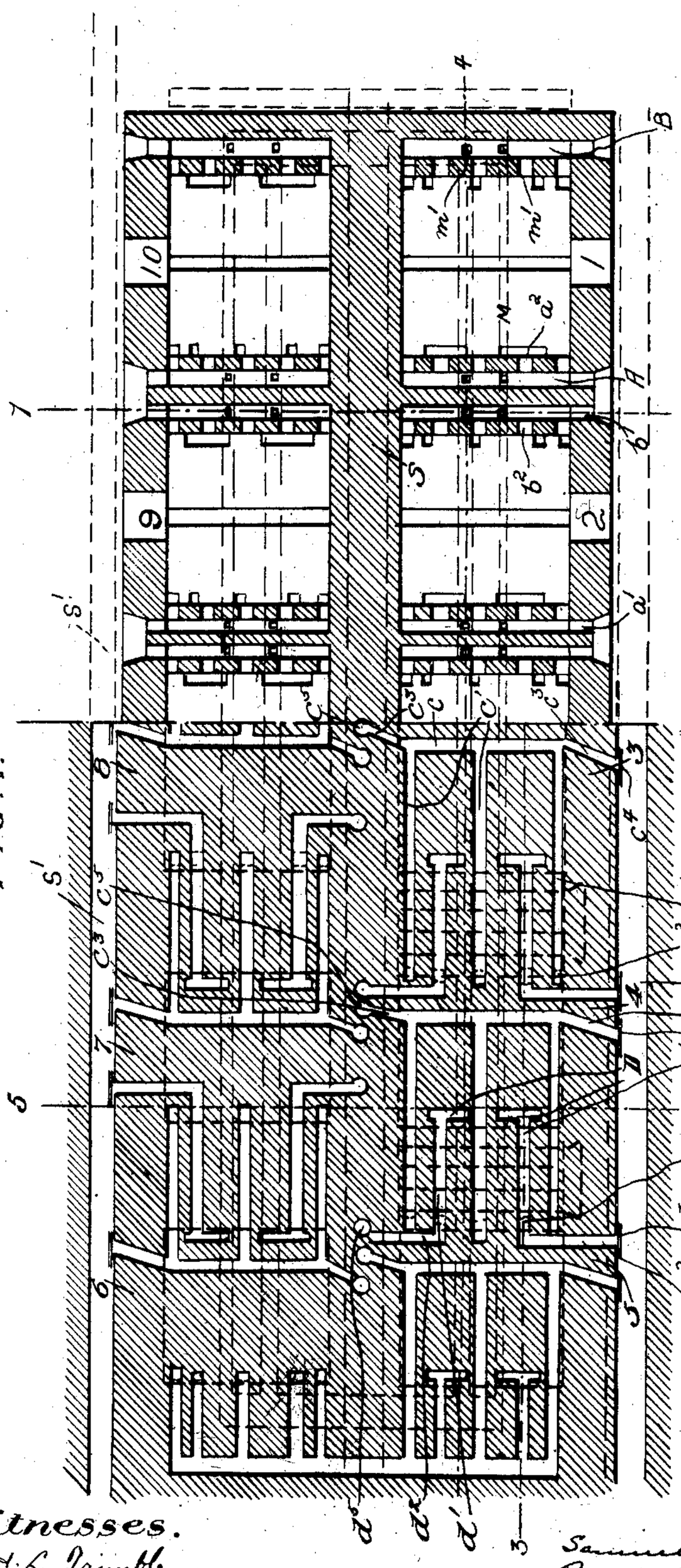

FIG. 1.

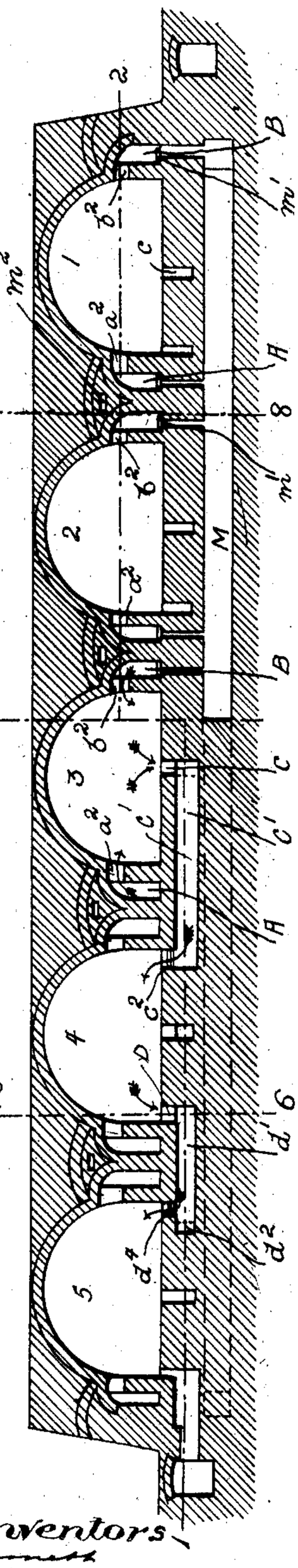

FIG. 2.

Witnesses.
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Samuel Barnett
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2 SHEETS—SHEET 2.

FIG. 5.

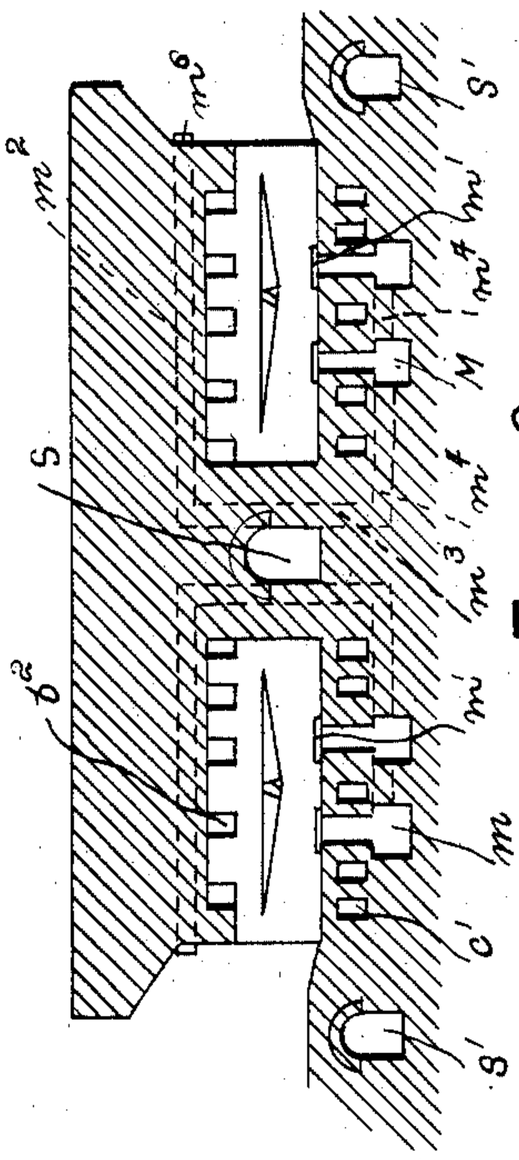


FIG. 6.

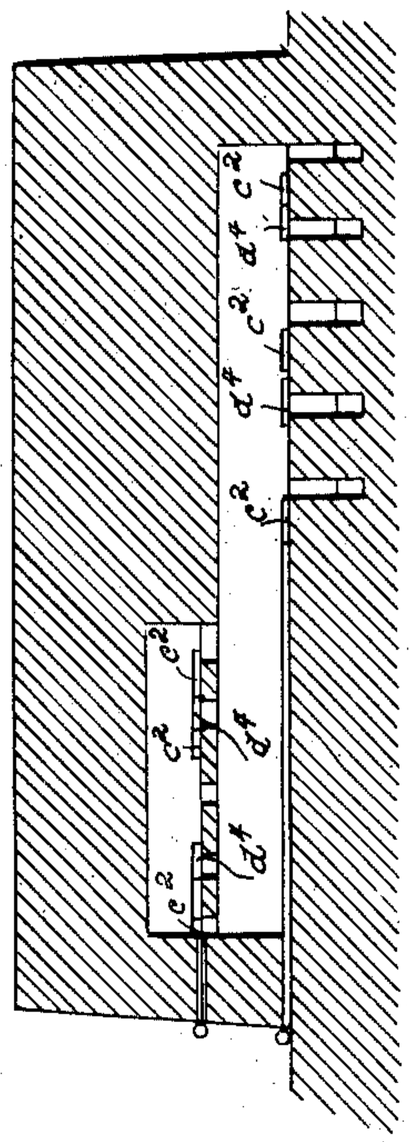


FIG. 3.

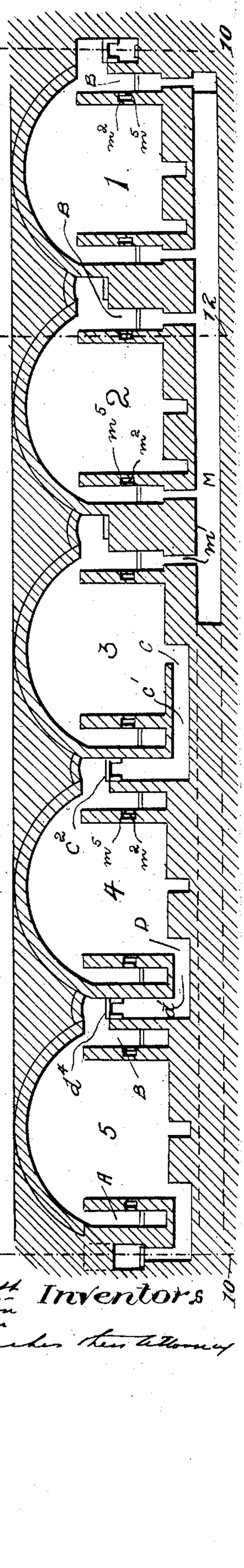


FIG. 4.

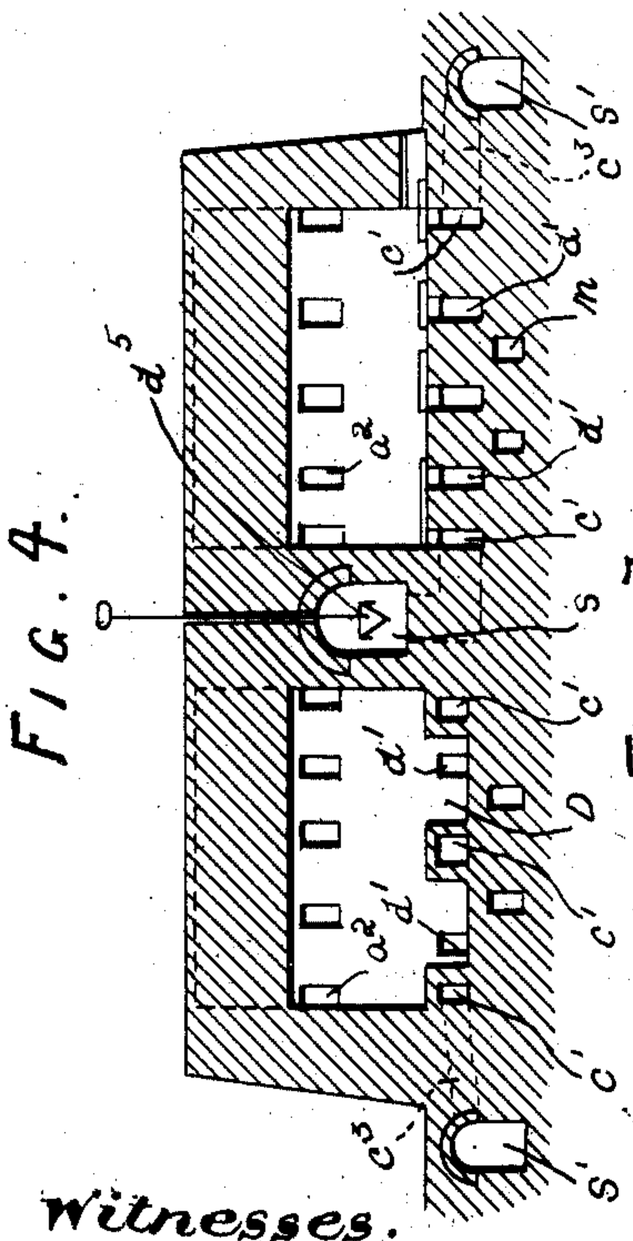
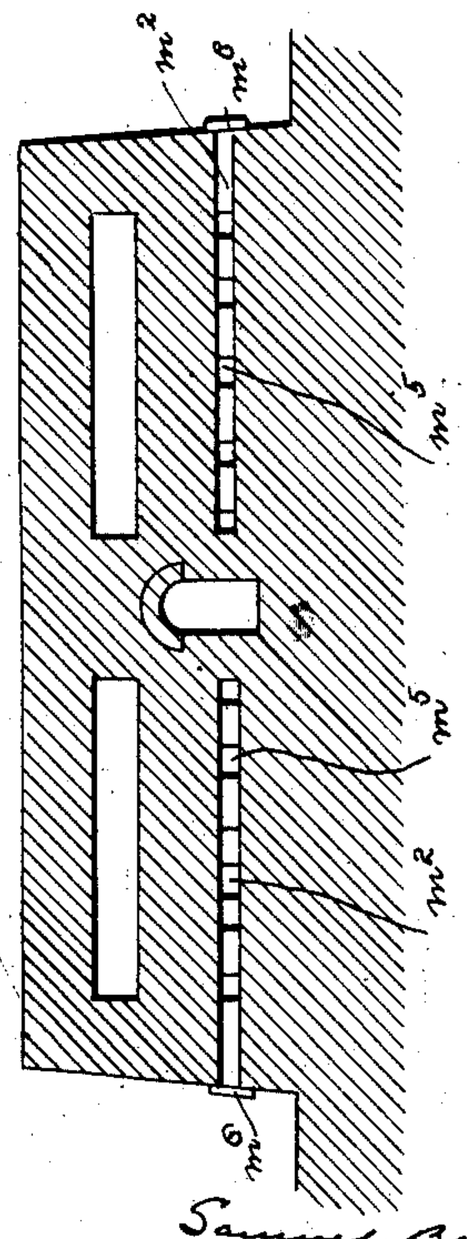


FIG. 7.



Witnesses.
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UNITED STATES PATENT OFFICE.

SAMUEL BARNETT, OF TIPTON, AND RICHARD J. HADLINGTON AND SAMUEL HINTON, OF WEST BROMWICH, ENGLAND.

CONTINUOUS BRICK-KILN.

No. 879,354. Specification of Letters Patent. Patented Feb. 18, 1908.

Application filed March 1, 1907. Serial No. 359,950.

To all whom it may concern:

Be it known that we, SAMUEL BARNETT, brickmaker, of Orchards Burnt Tree, Tipton, and RICHARD JASPER HADLINGTON and SAMUEL HINTON, continuous-kiln builders, both of 34 Oxford road, West Bromwich, all in the county of Stafford, England, subjects of the Kingdom of Great Britain, have invented a certain new and useful Improvement in Continuous Brick-Kilns and the Like, (for which we have applied for a patent in Great Britain, Patent No. 6,333, March 16, 1906,) of which the following is a specification.

This invention relates to those brick kilns in which the spent heat from one kiln is utilized for effecting the earlier processes connected with successive kilns, the present improvements consisting of an arrangement of two or more grates or furnaces in conjunction with the respective kilns, in combination with an arrangement of flues and dampers whereby the waste heat from the one kiln may be conveyed through the successive kilns until completely spent, while at the same time the heat from the intermediate grates or furnaces may be gradually passed through the succeeding kilns as required for increasing the temperature until the necessary process of burning is effected. By this improved arrangement the starting of the intermediate grates or furnaces may also be assisted by the passing of the whole or a portion of the left heat from one or several cooling chambers through the grates or furnaces of a succeeding kiln.

In order that this invention may be clearly understood and more easily carried into practice, reference may be had to the accompanying drawings which illustrate our invention as applied to a group of ten kilns which are consecutively numbered one to ten.

Figure 1 is a sectional plan showing one arrangement of a series of ten continuous kilns, being on the line 1—2 of Fig. 2. Fig. 2 is a sectional elevation on the line 3—4 of Fig. 1. Fig. 3 is a similar sectional elevation to that of Fig. 2 but showing the preferred arrangement whereby the grates are arranged within the span of the main arch of the kiln. Fig. 4 is a sectional end elevation on the line 5—6 of Fig. 1. Fig. 5 is a sectional end elevation on the line 7—8 of Fig. 1. Fig. 6 is a section on the line 9—10 of Fig. 3. Fig. 7 is a section on the line 11—12 of Fig. 3.

In carrying the invention into effect the kiln is provided with a central flue S and two side flues S′ extending lengthwise of the kiln and the kiln chambers. The kiln chambers, numbered 1 to 10 inclusive, are arranged in two rows of five kiln chambers each on opposite sides of the central flue S with the kiln chambers of each set between the central flue and one of the side flues. Ten of such kiln chambers are shown in the drawings arranged in two series of five each, but the number may, of course, be varied to meet the requirements and capacity for which the kiln is designed.

Each kiln chamber is provided with furnaces A B at opposite sides thereof and preferably transverse to the length of the kiln. These furnaces, as shown in Fig. 3, are built within the span of the arches of the kiln chambers, but they may, as shown in Fig. 2, be built within the supporting walls of the kiln chambers, and, in this case, they communicate with the interior of the kiln chambers through apertures a^2 and b^2 respectively. Each kiln chamber can be made independent of those adjoining it, by closing the dampers of the connecting flues C, c' and d' as hereinafter described. Each kiln chamber is provided with a set of these connecting flues C c', d' formed below the floor thereof to conduct the hot waste gas from one kiln chamber to the other until the gas is spent, at which stage it is in the form of steam, and is directed to the stack as hereinafter described. Two sets of connecting flues are provided for each kiln chamber. One set consists of a central flue C and three cross flues c', c', c', The central flue C extends through the floor of the kiln chamber 1 and beneath it, parallel to the transverse sides thereof, and is connected with the central and side flues S and S′ by means of outlet flues c^3 having dampers c^4, c^5 respectively. The flues c' provided with dampers c^2 are connected with the flue C and extend beneath the floor of the kiln chamber 1 and into the kiln chamber 2 at one side of the partition separating them. The second set of flues consists of two flues d' having openings D through the floor of the kiln chamber 1, preferably at the opposite side of the kiln chamber to the openings for the flues c', and the flues d' have dampers d. The flues d' open into the kiln chamber 2 at the same side thereof as the flues c'. The flues d' are connected to the central and side flues S, S′ by outlet flues d^3

having dampers d^5 and d^3 respectively. The dampers d^5 and c^5 may be of conical form d^5 being shown in Fig. 4, and provided with suitable rods to effect their operation from the top of the kiln.

Assuming the furnaces A, B, in Number 3 kiln chamber are in operation, with the dampers c^4 and c^5 closed, and the dampers c^2 opened, the gases from the furnaces pass directly as shown in Fig. 3, or through the apertures a^2, b^2, as shown in Fig. 2, to the kiln chamber and then from it, by means of the flues C and c' to the next kiln chamber 4. The hot gases leave kiln chamber 4 through the flues D and d', the dampers d^4 being opened and the dampers d^3 and d^5 being closed, and then pass to kiln chamber 5, or if the heat be spent, through the flues C, c', to the central flues S or the side flues S' or both central and side flues by properly positioning the dampers c^4 and c^5 of the flues C, c' of kiln chamber 5.

The latent heat of one kiln chamber and its contents may be utilized as a hot draft for the burning of the furnaces of another kiln chamber, and in this case the dampers of the flues C, c' and d' are closed so that the hot air from the kiln chamber will be obliged to pass through the furnaces to flues m and flues M formed in the foundation of the kiln below the plane of the flues c' and d', the dampers m' of which are open for the purpose of allowing the hot gases to pass from the kiln chamber containing the burned contents to the furnaces of the kiln chamber to be burned—the dampers m' of the remaining kiln chambers being closed, each of the furnaces A, B of the various kiln chambers below the grate bars thereof being provided with flues m having dampers m'. By this arrangement the heat left in one kiln chamber after the burning of its contents may be utilized for the combustion of the fuel in the furnaces of any other kiln chamber. Taking, for instance, kiln chambers 1 and 2, and assuming that kiln chamber 1 is full of articles that have been burned and are to be cooled and kiln chamber 2 is to be burned. The dampers m' of the flues M connecting the kiln chambers 1 and 2 are opened and the dampers of the remaining kiln chambers are closed and the dampers c^2, c^4, c^5, d^4, d^3 and d^5 of kiln chamber 1 are also closed so that the hot gases pass from the kiln chamber 1 to the kiln chamber 2 by way of the flues M, a continuous current of air being maintained from kiln chamber 1 to kiln chamber 2 by kiln chamber 1 being opened to the atmosphere so that the air can pass over the contents of kiln chamber 1 and enter furnaces A, B and flues m of that kiln chamber and then pass to the flue M and then through the flues m and furnaces of kiln chamber 2 to the interior of the last mentioned kiln chamber to assist the combustion of the fuel in the furnaces of kiln chamber 2 and then from the kiln chamber 2 by means of flues C, c'.

In some cases it is desirable to pass the hot air from the flue M into the furnaces above the grate bars instead of through the latter and for this purpose flues m^2, m^3, m^4 are provided in the partition walls separating the kiln chambers to communicate with one another and with the hot air flue M. The flues m^2 are provided with damper controlled outlet flues m^5. The dampers of the outlet flues m^5 are operated through doors m^6 at the end of the flues m^2. In some cases air may be led to the furnaces direct from the exterior of the kiln chamber through the flues m^2 by opening the doors m^6.

Figs. 6 and 7 illustrate slight modifications in the construction and arrangement of the flues, which are rendered necessary when applying the same to kiln chambers with furnaces constructed as illustrated in Fig. 3. In these figures the flues m^2 are shown extending through the upright outer walls of the furnaces and these flues are in this case only provided with a single damper m^6. After the first kiln chamber has been fired from its furnaces, and when such fires are being let out, the kiln chamber next to it of the series can be fired, hot air being supplied to the furnaces of the second kiln chamber from the furnaces of the preceding kiln chamber through the flues M, m. One row of kiln chambers is sometimes used, in this case the furnaces may be fired from both ends, the hot gases and hot air being conveyed to the succeeding kiln chamber of the row in the manner hereinbefore described.

Having now described our invention, what we claim is:

1. A continuous brick kiln comprising two rows of kiln chambers with furnaces for each kiln chamber, a center flue extending longitudinally of the kiln between the rows of kiln chambers, side flues extending longitudinally of the kiln at the outer sides of the kiln chambers, transverse flues for the kiln chambers connected with the center and side flues, dampers for the transverse flues, a cross flue for each kiln chamber opening, at one end, into the transverse flue of the kiln chamber, and, at the other end, directly into the succeeding kiln chamber of the series, and a damper for each cross flue.

2. A continuous brick kiln comprising two rows of kiln chambers with furnaces for each kiln chamber, a center flue extending longitudinally of the kiln between the rows of kiln chambers, side flues extending longitudinally of the kiln at the outer sides of the kiln chambers, central transverse flues for the kiln chambers connected with the center and side flues, dampers for the central transverse flues, a cross flue for each kiln chamber opening, at one end, into the central transverse flue of the kiln chamber, and, at the other

end, directly into the succeeding kiln chamber of the series, and a damper for each cross flue.

3. A continuous brick kiln comprising two rows of kiln chambers with furnaces for each kiln chamber, a center flue extending longitudinally of the kiln between the rows of kiln chambers, side flues extending longitudinally of the kiln at the outer sides of the kiln chambers, central transverse flues for the kiln chambers connected with the center and side flues, dampers for the central transverse flues, a cross flue for each kiln chamber opening, at one end, into the central transverse flue of the kiln chamber, and, at the other end, directly into the succeeding kiln chamber of the series at one side thereof, a damper for each cross flue, a second set of cross flues opening, at one end, into one kiln chamber at the opposite side to the openings of the first mentioned cross flue from the preceding kiln chamber, and, at the other end, into the succeeding kiln chamber of the series at the same side thereof as the openings of the first mentioned cross flues, dampers for the second mentioned cross flues, outlet flues connecting the second mentioned cross flues with the center and side flues, and dampers for the outlet flues.

4. A continuous brick kiln comprising two rows of kiln chambers with furnaces for each kiln chamber, a center flue extending longitudinally of the kiln between the rows of kiln chambers, side flues extending longitudinally of the kiln at the outer sides of the kiln chambers transverse flues for the kiln chambers connected with the center and side flues, dampers for the transverse flues, a cross flue for each kiln chamber opening, at one end, into the transverse flue of the kiln chamber, and, at the other end, directly into the succeeding kiln chamber of the series, a damper for each cross flue, a hot air flue, a damper controlled furnace flue connecting the hot air flue with the furnaces below the grates thereof.

5. A continuous brick kiln comprising two rows of kiln chambers with furnaces for each kiln chamber, a center flue extending longitudinally of the kiln between the rows of kiln chambers, side flues extending longitudinally of the kiln at the outer sides of the kiln chambers, transverse flues for the kiln chambers connected with the center and side flues, dampers for the transverse flues, a cross flue for each kiln chamber opening, at one end, into the transverse flue of the kiln chamber, and, at the other end, directly into the succeeding kiln chamber of the series, a damper for each cross flue, a hot air flue, a damper controlled furnace flue connecting the hot air flue with the furnaces above the grates thereof.

6. A continuous brick kiln comprising two rows of kiln chambers with furnaces for each kiln chamber, a center flue extending longitudinally of the kiln between the rows of kiln chambers, side flues extending longitudinally of the kiln at the outer sides of the kiln chambers, transverse flues for the kiln chambers connected with the center and side flues, dampers for the transverse flues, a cross flue for each kiln chamber opening, at one end, into the transverse flue of the kiln chamber, and, at the other end, directly into the succeeding kiln chamber of the series, a damper for each cross flue, a hot air flue, a damper controlled furnace flue connecting the hot air flue with the furnaces below the grates thereof.

7. A continuous brick kiln comprising two rows of kiln chambers with furnaces for each kiln chamber, a center flue extending longitudinally of the kiln between the rows of kiln chambers, side flues extending longitudinally of the kiln at the outer sides of the kiln chambers, central transverse flues for the kiln chambers connected with the center and side flues, dampers for the central transverse flues, a cross flue for each kiln chamber opening, at one end, into the central transverse flue of the kiln chamber, and, at the other end, directly into the succeeding kiln chamber of the series at one side thereof, a damper for each cross flue, a second set of cross flues opening, at one end, into one kiln chamber at the opposite side to the opening of the first mentioned cross flues from the preceding kiln chamber, and, at the other end, into the succeeding kiln chamber of the series, at the same side thereof, as the openings of the first mentioned cross flues, dampers for the second mentioned cross flues, outlet flues connecting the second mentioned cross flues with the center and side flues, dampers for the outlet flues, a hot air flue, a damper controlled furnace flue connecting the hot air flue with the furnaces below the grates thereof.

8. A continuous brick kiln comprising two rows of kiln chambers with furnaces for each kiln chamber, a center flue extending longitudinally of the kiln between the rows of kiln chambers, side flues extending longitudinally of the kiln at the outer sides of the kiln chambers, central transverse flues for the kiln chambers connected with the center and side flues, dampers for the central transverse flues, a cross flue for each kiln chamber opening, at one end, into the central transverse flue of the kiln chamber, and, at the other end, directly into the succeeding kiln chamber of the series, at one side thereof, a damper for each cross flue, a second set of cross flues opened, at one end, into one kiln chamber at the opposite side to the openings of the first mentioned cross flues from the preceding kiln chamber, and, at the other

end into the succeeding kiln chamber of the series, at the same side thereof, as the openings of the first mentioned cross flues, dampers for the second mentioned cross flues, outlet flues connecting the second mentioned cross flues with the center and side flues, dampers for the outlet flues, a hot air flue, a damper controlled furnace flue connecting the hot air flue with the furnaces above the grates thereof.

9. A continuous brick kiln comprising two rows of kiln chambers with furnaces for each kiln chamber, a center flue extending longitudinally of the kiln between the rows of kiln chambers, side flues extending longitudinally of the kiln at the outer sides of the kiln chambers, central transverse flues for the kiln chambers connected with the center and side flues, dampers for the central transverse flues, a cross flue for each kiln chamber opening, at one end, into the central transverse flue of the kiln chamber, and, at the other end, directly into the succeeding kiln chamber of the series at one side thereof, a damper for each cross flue, a second set of cross flues opening, at one end, into one kiln chamber at the opposite side to the opening of the first mentioned cross flues from the preceding kiln chamber, and, at the other end, into the succeeding kiln chamber of the series, at the same side thereof, as the openings of the first mentioned cross flues, dampers for the second mentioned cross flues, outlet flues connecting the second mentioned cross flues with the center and side flues, dampers for the outlet flues, a hot air flue, a damper controlled furnace flue connecting the hot air flue with the furnace below the grates thereof, and damper controlled furnace flues connecting the hot air flue with the furnaces above the grates thereof.

In witness whereof we have hereunto set our hands in the presence of two witnesses.

S. BARNETT.
R. J. HADLINGTON.
S. HINTON.

Witnesses:
LEWIS W. GOOLD,
ROWLAND L. GOOLD.