J. S. FASTING.

ROTARY KILN.

APPLICATION FILED JULY 27, 1910.

997,381.

Patented July 11, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

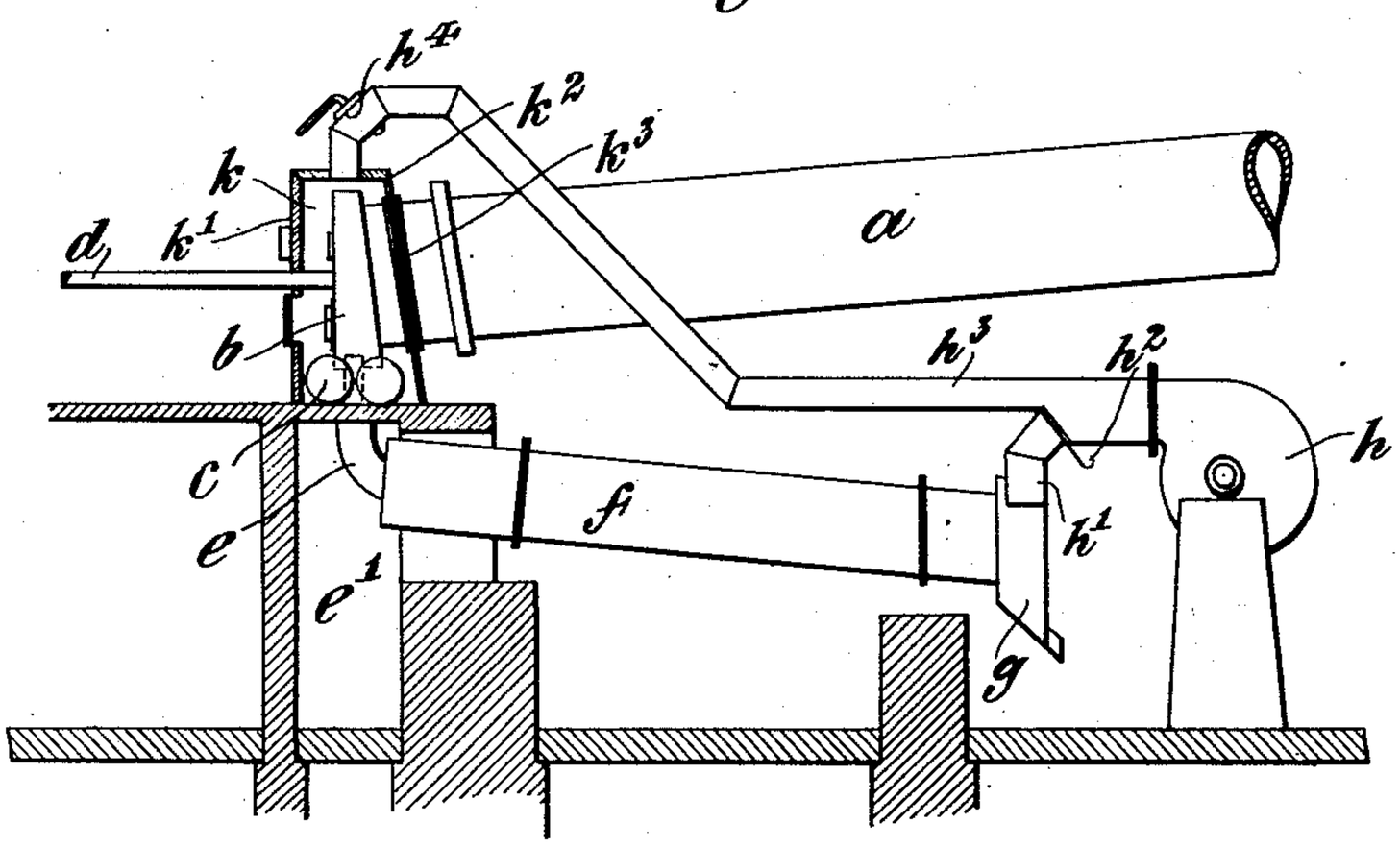
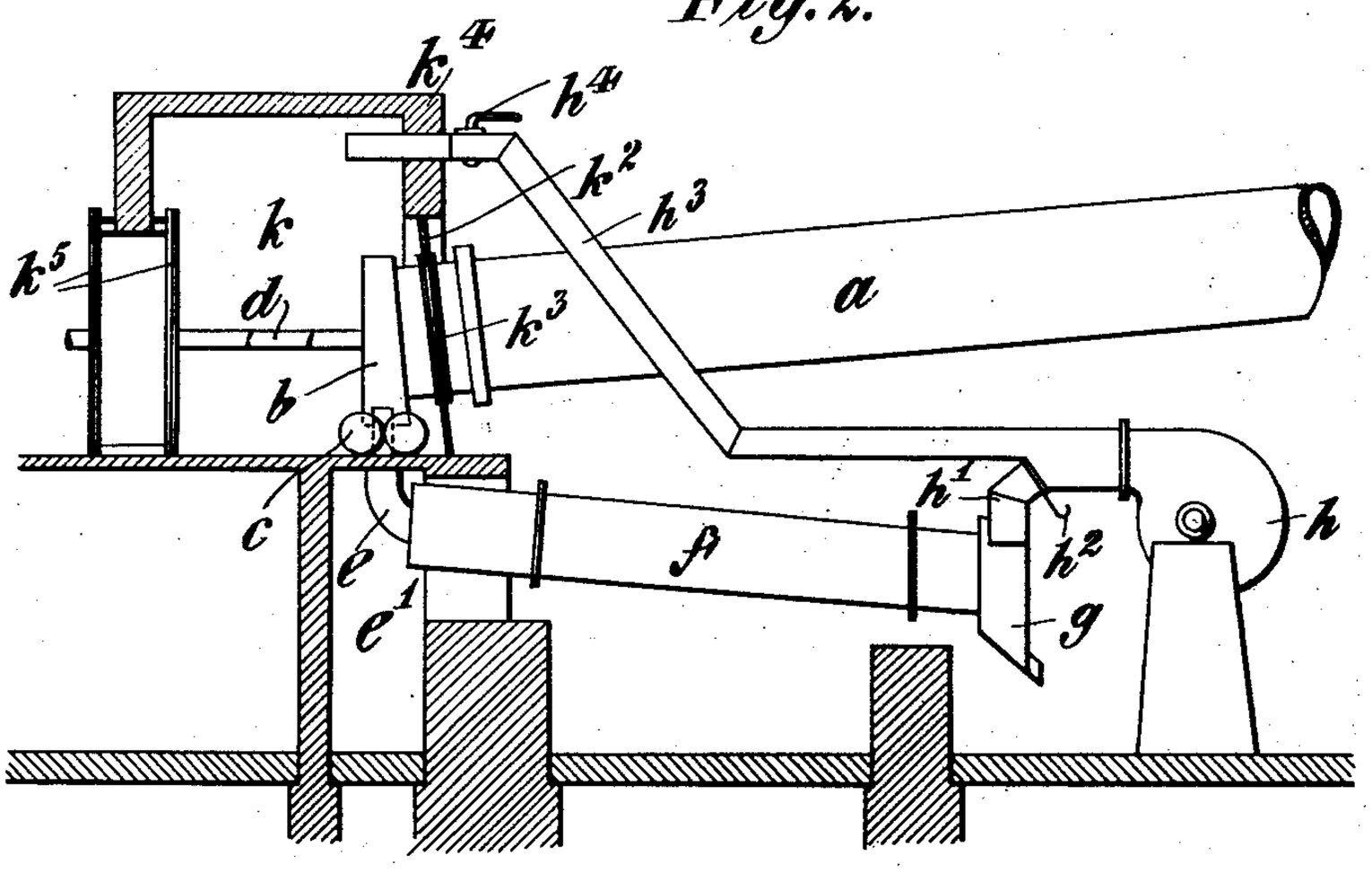


Fig. 2.



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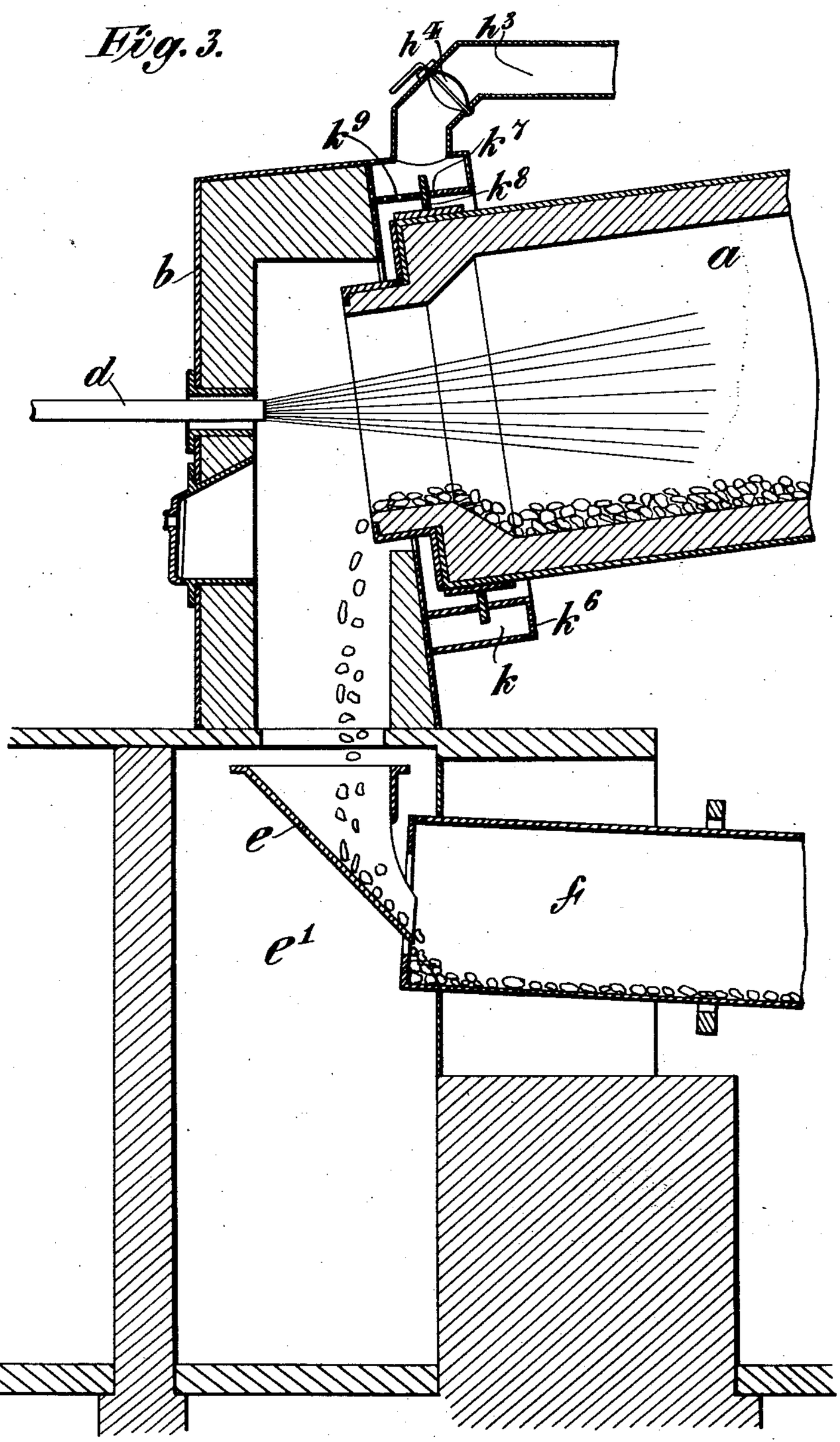
2 SHEETS—SHEET 2.

Fig. 3.



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UNITED STATES PATENT OFFICE.

JOHAN SIGISMUND FASTING, OF FREDERIKSBERG, NEAR COPENHAGEN, DENMARK, ASSIGNOR TO F. L. SMIDTH & CO., OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

ROTARY KILN.

997,381. Specification of Letters Patent. Patented July 11, 1911.

Application filed July 27, 1910. Serial No. 574,048.

To all whom it may concern:

Be it known that I, JOHAN SIGISMUND FASTING, a subject of the King of Denmark, and a resident of Fredericksberg, near Copenhagen, Denmark, have invented certain new and useful Improvements in Rotary Kilns, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

This invention relates to rotary kilns for the burning of cement and other materials and in which the powdered, gaseous or liquid fuel is supplied under pressure at the lower or discharge end of the kiln and in which the lower or discharge end of the kiln is closed during the burning by a closure which is movable in order to permit access to the interior of the kiln when necessary. It is practically impossible to make the joint between the end of the kiln and the closure tight and the result is that when an attempt is made to use a forced draft to supply the air which supports the combustion within the kiln, the pressure under which the air is supplied is necessarily limited by reason of the fact that when the pressure within the kiln much exceeds atmospheric pressure the hot gases escape between the end of the kiln and the closure and quickly burn away the iron plates with which they come in contact. The difficulty is overcome to some extent by carrying the stack or chimney to a height sufficient to give the requisite suction, but this involves expense and is otherwise objectionable.

It is the object of this invention to provide means for overcoming the difficulty referred to without requiring a lofty stack or chimney, and this object is attained by forming about the joint between the kiln and the closure a chamber to which air is supplied under such pressure as to prevent the escape of hot gases from the kiln through the joint.

The invention will be more fully explained hereinafter with reference to the accompanying drawings in which it is illustrated and in which—

Figure 1 is a view partly in outline and partly in section of so much of a rotary kiln and its appurtenances as is necessary to enable the application of the invention thereto to be understood. Fig. 2 is a similar view showing a slightly modified arrangement. Fig. 3 is a view in section, on a larger scale than Figs. 1 and 2, illustrating a further modification.

The kiln *a* is supported for rotation and may be rotated by any usual or suitable means not necessary to be shown or explained herein. The closure *b* is supported in position against the lower or discharge end of the kiln, being represented in Figs. 1 and 2 of the drawings as mounted movably upon suitable wheels *c* and it is shown as provided with a suitable nozzle *d* through which the powdered, gaseous or liquid fuel may be introduced. The burned clinker or other material, discharged from the open end of the kiln *a*, falls, as usual, through the closure *b* into a chute *e* by which it is directed into the cooler *f*, which is also preferably mounted so as to be rotated and may be provided at its discharge end, as shown in Figs. 1 and 2, with a chamber *g*, which may be opened from time to time to discharge the cooled clinker. A blower *h* is shown as connected with the chamber *g* by a pipe *h'* which may be provided with a damper h^2 to regulate the admission of air to the chamber *g*. The air which is thus supplied under pressure to the chamber *g* passes through the cooler *f*, absorbing heat from the clinker therein, and passes through the chute *e*, and, it may be through the dust chamber *e'*, into the interior of the closure *b* and thence into the kiln *a*, thus creating, in conjunction with the pressure of the powdered, gaseous or liquid fuel, which is also discharged under pressure, the desired forced draft. Obviously, if the pressure within the kiln much exceeds atmospheric pressure, the hot gases would be forced out from the interior of the kiln through the joint between the end of the kiln and the closure, which joint, under practical working conditions, cannot be made tight. The escape of the intensely hot gases through the joint quickly causes the destruction of the iron plates with which such gases come in contact and in order to prevent the escape of such gases through the joint there is formed, in accordance with the present invention, an air chamber about the joint to which air is supplied under such pressure as is necessary to prevent the escape

of the gases. This chamber may be arranged in various ways, as indicated in the several figures of the drawings.

Referring first to the arrangement shown in Fig. 1, the wall of the chamber k which surrounds the joint between the kiln and the closure is assumed to be formed of metal plates, the front wall k' being hinged or otherwise movable to permit the necessary movement of the closure b, while the rear wall k^2 surrounds the kiln a between rings k^3 so as to form a reasonably tight joint to prevent loss of air pressure. Air under pressure may be supplied to the chamber k from any convenient source. As shown in Figs. 1 and 2, the blower h may be connected by a pipe h^3 to supply the air under pressure, such pipe being preferably provided with a regulating damper as indicated at h^4 in Figs. 1, 2 and 3.

In the arrangement shown in Fig. 2, the wall k^4 which forms the chamber k is represented as built mainly of brick, the rear wall being formed in part of an iron plate k^2 so as to form with the rings k^3, a reasonably tight joint about the kiln, while the front wall is provided with double doors k^5, through which the workman may enter the chamber k when necessary.

In the arrangement shown in Fig. 3 the air chamber k is much reduced in size and is located wholly in rear of the closure b. As there represented, it consists of an annular casing k^6 supported at the rear of the closure b. For the purpose of forming a reasonably tight joint with the kiln the inner wall of the annular casing may be slotted to receive a ring k^8 which may rotate with the kiln a while that portion of the wall k^7 between the ring k^8 and the closure may be perforated, as at k^9, to permit the passage of air into the subsidiary chamber around the joint between the end of the kiln and the closure.

The air pressure within the chamber k should be at least as great as the pressure within the end of the kiln and, if desired, it may be greater. The pressure may be regulated in any suitable manner. As indicated in Figs. 1 and 2 the relative pressure of air in the chamber k and of the forced draft may be regulated easily by properly adjusting the dampers h^2 and h^4 in the pipes h' and h^3 by which the air is conducted to the cooler and to the chamber k from the blower h.

Obviously it is not necessary that the joint between the wall of the chamber k and the kiln a be any tighter than is necessary to prevent waste of air, for the air in the chamber k, although it may have been preheated, is nevertheless relatively cool and can have no destructive effect even if it should escape at the joint.

It will be understood that the invention can be realized in many different forms of structure adapted to special conditions of use and that it is not restricted to the particular arrangements shown and described herein.

I claim as my invention:

1. The combination with a rotary kiln and a closure therefor, of means for maintaining air under pressure about the joint between the kiln and the closure.

2. The combination with a rotary kiln and a movable closure therefor, of an air chamber surrounding the joint between the kiln and the closure and means for maintaining air under pressure within said chamber.

3. The combination with a rotary kiln and a movable closure therefor, of an air chamber surrounding the joint between the kiln and the closure, and means for supplying air under pressure to said chamber.

4. The combination with a rotary kiln and a closure therefor, of an annular chamber surrounding the joint between the kiln and the closure in rear of the closure, means for forming a reasonably tight joint between the wall of the annular chamber and the kiln, and means for supplying air under pressure to said annular chamber.

5. The combination with a rotary kiln, a closure and a cooler, of an air chamber surrounding the joint between the kiln and the closure and a blower and connections for delivering air under pressure to the kiln through the cooler and to said air chamber.

This specification signed and witnessed this 21st day of June A. D. 1910.

JOHAN SIGISMUND FASTING.

Signed in the presence of—

HERMANN RÉE,

JULIUS LEHMANN.