H. E. RIISAGER.

ROTARY KILN.

APPLICATION FILED APR. 18, 1912.

1,103,381.

Patented July 14, 1914.

2 SHEETS—SHEET 1.

Fig. 3.

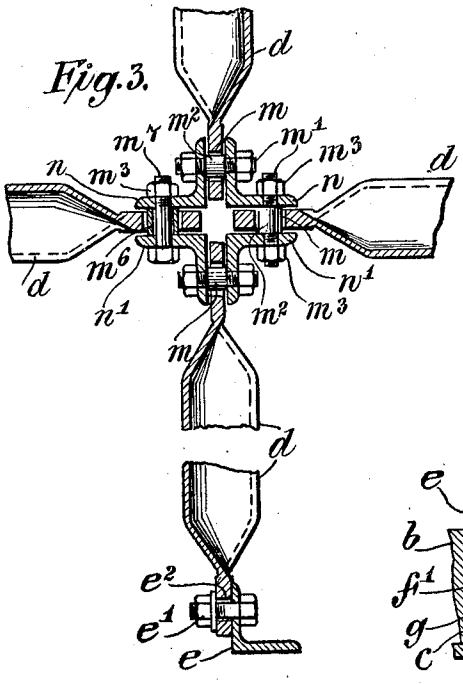


Fig. 4.



Fig. 5.

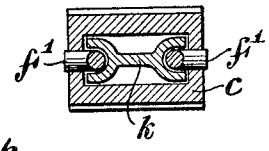


Fig. 6.

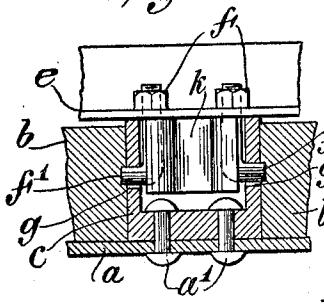


Fig. 7.

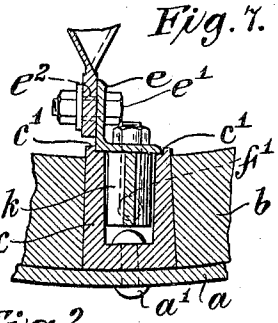


Fig. 1.

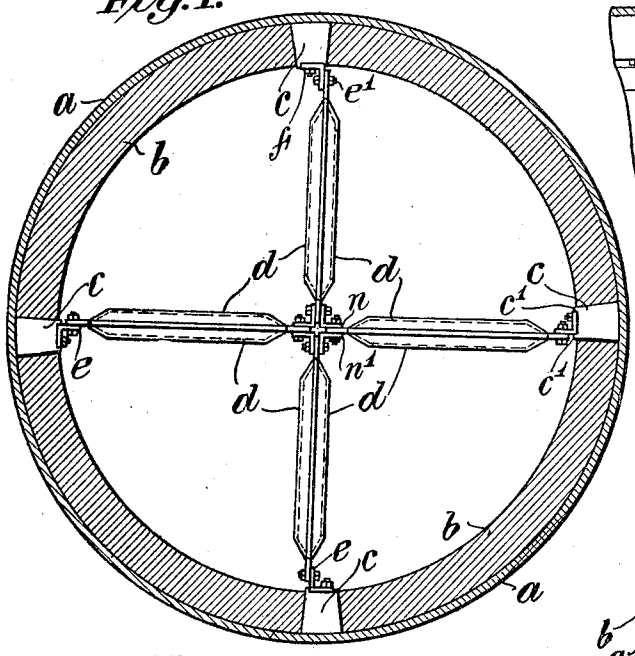
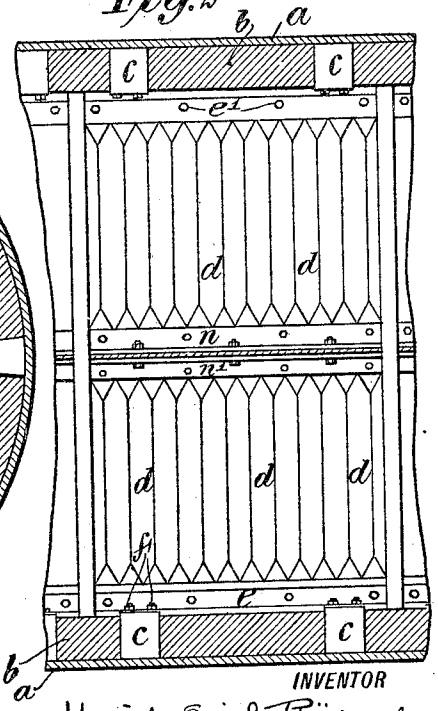


Fig. 2.



WITNESSES

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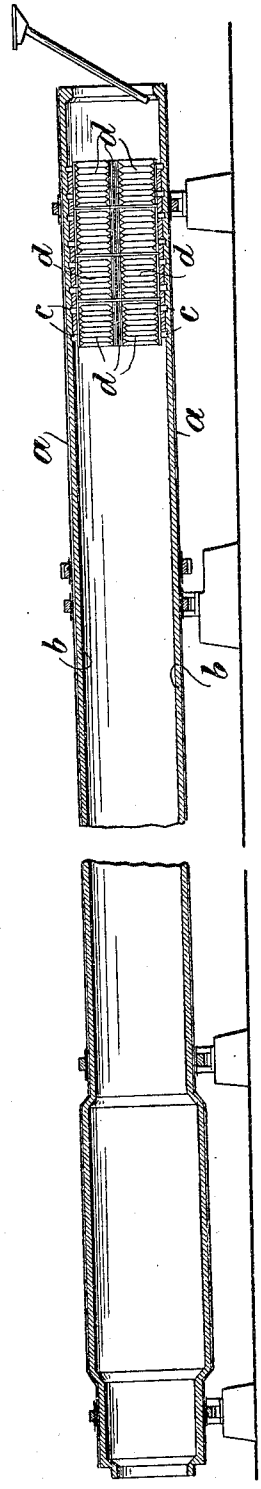


Fig. 8.

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UNITED STATES PATENT OFFICE.

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ROTARY KILN.

1,103,381. Specification of Letters Patent. Patented July 14, 1914.

Application filed April 18, 1912. Serial No. 691,620.

To all whom it may concern:

Be it known that I, HENRIK EMIL RIISAGER, a subject of the King of Denmark, residing in Bredegage No. 5, Frederiksberg, Denmark, have invented certain new and useful Improvements in Rotary Kilns, &c., of which the following is a specification, reference being had to the accompanying drawings which form a part hereof.

This invention relates to the construction of rotary kilns, driers, etc., in which provision is made for more extensive exposure of the material which is being treated or dried than is afforded by a plain cylinder. It has been proposed to accomplish this general purpose heretofore by the employment of longitudinal partitions in the cylinder and the constructions heretofore devised have been satisfactory where no great strength in the kiln or drier is required and where the kiln or drier is not subjected to high temperatures or to considerable variations in temperature.

The present invention is concerned with kilns and driers intended for use where great strength is required and in which there are or may be considerable changes of temperature and has for its especial object the formation of the longitudinal partitions and the securing of the partitions in the cylindrical shell in such manner that the necessary strength is afforded and that they shall not be distorted or have their fastening devices sheared off by contraction or expansion of the partitions.

The improved construction has been designed with especial reference to its use in rotary kilns for the drying and burning of cement materials, etc., and is illustrated in the accompanying drawings as embodied in a kiln of this character.

In the drawings—Figure 1 is a view in transverse section of a kiln which embodies the invention. Fig. 2 is a fragmentary longitudinal sectional view of the same, Fig. 3 is a detail view showing the method of fastening the inner ends of the partition, Fig. 4 is a view in section, showing the peculiar form of partition employed, Figs. 5, 6 and 7 are detail views on a large scale showing the method of fastening a partition to the wall of a kiln. Fig. 8 is a view in longitudinal section of a kiln provided with the partitions.

In setting the fire-brick lining b in the outer cylindrical shell a, certain of the bricks have substituted therefor cast metal hollow blocks c of similar size and form which may be securely fastened to the shell a by suitable rivets a'. In the construction illustrated, in which four radial partitions d are used, four series of blocks c are spaced equi-distant on the shell a, each series preferably being parallel to the longitudinal axis thereof. The blocks c are chambered and the inner face of each is open and may have a recessed seat at c' to receive snugly an angle iron e which serves to support the corresponding section of one of the partitions d as will later appear. Each angle iron e is fastened to two adjacent blocks c by means of nuts f and hooked bolts f' which engage apertures g formed in the blocks c. These bolts may be held in spaced relationship by spacing blocks k which are dropped in between the bolts. The several sections d of each partition are independent of each other so as to permit longitudinal expansion and contraction of each independently and each is preferably corrugated transversely so as to permit expansion without buckling and at the same time to give necessary stiffness without undue weight. At their outer longitudinal edges the sections are secured to the angle iron e by bolts e' which pass through enlarged apertures e^2 so as to permit relative movement of the members c and d without shearing the bolts. The inner edge of each section d has a plurality of enlarged bolt holes m in each of which is a bolt m' which has an enlarged mid-section m^2 of greater length than the thickness of the partition plate to form a spacing block for the angle irons n and n'. Nuts m^3 are applied to the ends of the bolts. From this description it will be understood that free relative movement of the several sections of each partition d and the retaining angle irons l, n, n', etc., is permitted.

In assembling the partitions it will be seen that three of the radial sections and their angle irons n and n' may be fastened together readily. It is necessary, however, that the fourth partition first be placed between the corresponding angle irons n and n' and its bolts then inserted. To permit this and at the same time to properly space the angle irons, a spacing sleeve m^6 of the same external dimensions as the mid-sec-

tions m^2 is placed in the bolt hole m before the partition is positioned. A bolt m^7 is then run through the angle irons and the spacing sleeve m^6 and the nut m^3 applied.

By the peculiar form of the partition plates used, all buckling and warping due to contraction or expansion are minimized while an increased drying surface for the material is afforded. Further, the peculiar method of fastening the partition sections relieves the same and the kiln from strains usually present, since all radial stresses are compensated for. The partitions are securely fastened at their outer ends by means of blocks c which are of such a form as to maintain the continuity of the inner surface of the kiln.

Although the improvement herein set forth has been devised as an improvement in rotary kilns for the burning of cement materials and with especial reference to such use, not being restricted, however, to that particular use, it will be understood that when the improvement is applied to a rotary kiln for the burning of cement materials it is located near the upper or inlet end thereof where the temperature of the gases is much lower than it is in the region of the burning zone where the calcining and clinkering take place. The structure in which the invention particularly consists extends for only a portion of the distance from the inlet end of the kiln toward the burning zone and does not reach a region of temperature sufficiently high to melt or burn the metal plates. Nevertheless it does extend to a region of temperature which is sufficiently high to render possible the undesirable results which the invention obviates.

Various modifications in the structural features may be employed without departing from the spirit of the invention.

What I claim is:

1. The combination with a rotary kiln, of a transversely corrugated longitudinal partition and means to secure the same in the kiln.

2. The combination with a rotary kiln, of chambered blocks secured to the interior of the kiln, a longitudinal partition plate, an angle iron to which the plate is secured and hooked bolts passing through the angle iron and engaging the chambered blocks interiorly.

3. The combination with a rotary kiln, of chambered blocks secured to the interior of the kiln, a longitudinal partition plate, an angle iron to which the plate is secured, two hooked bolts and spacing blocks positioned between the bolts to hold them in engagement with the first named block.

4. The combination with a rotary kiln comprising a shell and a lining, of chambered blocks secured to the shell and replacing portions of the lining, a longitudinal partition formed of independent sections and means to secure the sections separately in the kiln.

5. The combination with a rotary kiln of partition plates longitudinally and radially disposed, means to secure the partition plates to the kiln at their outer edges, opposite longitudinal members embracing between them adjacent edges of opposite partition plates and bolts to secure the longitudinal members and partition plates, together with spacing members interposed between the opposing longitudinal members.

This specification signed and witnessed this 2nd day of April A. D., 1912.

HENRIK EMIL RIISAGER.

Signed in the presence of—

CHR. ENGELHART,

VILH. OLSEN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."