

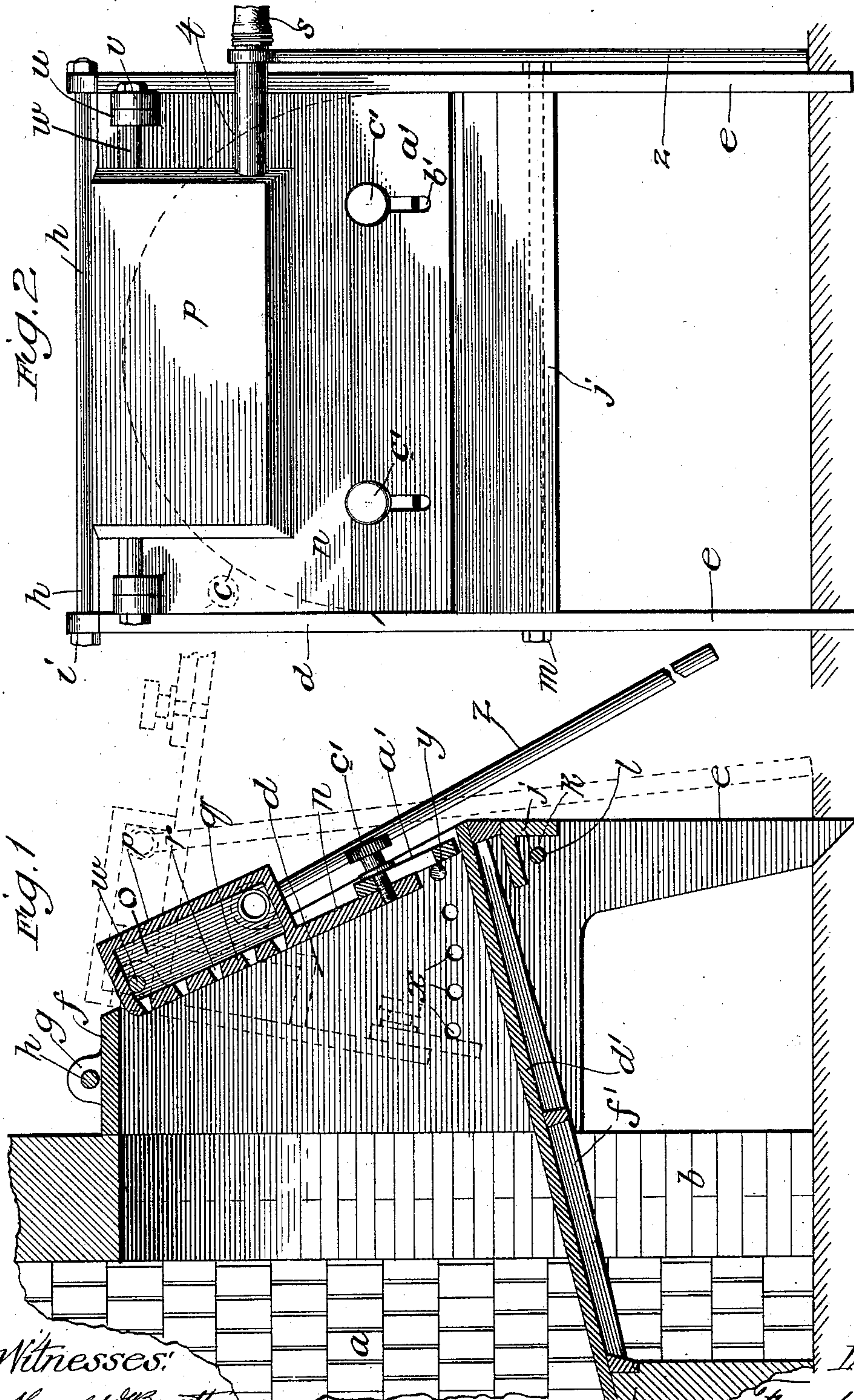
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F. ALSIP.  
KILN FURNACE.

(Application filed Feb. 8, 1901.)

(No Model.)



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# UNITED STATES PATENT OFFICE.

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## KILN-FURNACE.

SPECIFICATION forming part of Letters Patent No. 679,819, dated August 6, 1901.

Application filed February 8, 1901. Serial No. 46,530. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK ALSIP, a citizen of the United States, residing at Chicago, Illinois, have invented certain new and useful Improvements in Kiln-Furnaces, of which the following is a specification.

My invention relates particularly to kiln-furnaces having a forced draft.

The principal object of my invention is to provide a simple, economical, and efficient kiln-furnace for brick-kilns adapted to be used when desirable as a forced-draft furnace and provided with means for directing the draft to any desired point in the furnace which necessity may require and capable of being used as an ordinary natural-draft furnace when desired.

A further object of the invention is to enable the production of a high degree of heat in a short space of time and at any desired point in the arch or furnace, affording great economy of fuel and time and producing the conditions necessary to the proper burning of the bricks and for the complete combustion of the fuel.

A still further object is to provide a forced-draft furnace adapted to be used as an ordinary natural-draft furnace, with such slight alterations as may be readily made while the kiln is in process of being burned without material loss of time or injury to the bricks, all of which will more fully hereinafter appear.

The invention relates to the features, combinations, and details of construction and operation hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a sectional elevation of a portion of a kiln-furnace constructed in accordance with my improvements looking at it from the side, and Fig. 2 is an upright front view of the kiln-furnace.

In constructing my improved kiln-furnace I provide a kiln-arch *a* of the ordinary and well-known type, which forms part of the walls of the furnace. In front of the arch is the ordinary casing *b*, which is provided with an opening *c* of the desired size and shape. This casing is so intimately identified with the kiln that to avoid prolixity and ambiguity it is recognized and included herein as a part and portion thereof. At the end of each arch of

the kiln and against the casing *b* I place on each side of the arch a side frame *d*, which side frames, together with the arch of the kiln, form the side walls of the furnace. These side frames are preferably made of cast-iron or cast-steel and extend outward beyond the outer wall of the casing or kiln wall and are provided with legs *e*, which I make preferably integral with the side frames and which rest upon the ground and form a support to hold the complete frame in position. A top piece *f* extends from side frame to side frame at the top to form the top wall of the front portion of the furnace and brace the side frames.

To hold the top piece and side frames firmly in position and brace the frame, a perforated lug *g* is provided at the top of each of the side frame portions, through which is extended a stay-rod *h*, preferably screw-threaded on at least one end and provided with a nut *i*, screwed thereon tightly against the frame. A cross-piece *j* is also provided at the front of the frame, extending from side frame to side frame thereof and fastened thereto, and a second stay-rod *k* is passed through perforations *l* in the side frames and is threaded at the end and provided with nuts *m*, which are screwed tightly against the frame.

The cross-piece *j* I prefer to make of angle-iron for the sake of economy and strength, and place it in the position shown in the drawings that it may serve both as a brace for the frame and as a support for the front portion of the grate hereinafter described.

A pair of side frames, together with the top piece *f* and the cross-pieces shown and herein described, form what I choose to term a "frame" or "end frame." One of these frames is placed at each end of the arch. The arches of the kiln are built in the ordinary manner of bricks set about a quarter or three-eighths of an inch apart, so as to leave interstices between them through which the heated air from the furnace may pass upward through the kiln to the outer air. The arch is an essential part of the furnace, and the inclosing walls of the furnace are comprised in part of the walls of the arch and in part of the walls of the frames at each end of the arch. In other words, there are two metallic frames or end frames for each



furnace, and the arch and its two end frames and appliances comprise one furnace. I do not deem it necessary to show an entire arch and two frames, one at each end thereof, but consider it sufficient to show one end of the arch provided with my improvements. The opposite end of the arch (not shown) is identical with the one shown, and the frame and appliances are the same at both ends of the arch.

It is well known that much time and labor are expended in the burning of a kiln of brick by the ordinary process and with the ordinary facilities. It is also well known that much of this time is consumed, generally from one to two days, before a good draft is obtained through the kiln and before a heat such as is essential to the proper burning of the bricks can be obtained by the ordinary method and practically without accomplishing any desirable result other than the starting of the draft. In fact, the result of having a fire which will warm the kiln throughout in advance of the red or "burning" heat (sometimes called the "head") is not only often valueless, but sometimes positively bad, causing the bricks when burned to be soft, which if burned immediately and without the slow warming in advance would have been hard and durable. In order to avoid these difficulties and for the purposes of economy in fuel and time as well as to afford a more complete combustion of fuel and to provide a forced draft for a brick-kiln, I provide, in connection with the other elements herein described, a door *n*, having a compressed-air chamber *o* therein, the outer wall *p* of which is solid and the inner wall *q* of which has perforations *r* therein, through which the compressed air is forced against the burning fuel. This compressed-air chamber is connected with a source of compressed air of any suitable and well-known kind by means of a pliable hose *s*, which I connect with the air-chamber, preferably by means of a pipe *t* opening into the chamber through a perforation in the chamber-wall, into which it is tightly fitted.

It is desirable that the current of air be directed at times to the front part of the furnace and at other times far back into the arch of the kiln, which arch is generally about thirty-five feet long, or to places intermediate the two extremes, as necessity may require. To accomplish this, the compressed-air chamber and the door are pivotally mounted, preferably by means of lugs *u* upon the door near the top of the air-chamber and lugs *v* on the side frames and pins *w* passed through perforations in the lugs, upon which lugs and pins the door and air-chamber swing. As will be readily seen, the current of air may be directed to the front part of the furnace by swinging the air-chamber forward or toward a horizontal position and may be directed farther back into the arch or furnace

by swinging the air-chamber backward or toward a perpendicular position, the slant at which the air-chamber is placed determining the point in the furnace at which the current of air from the air-chamber will strike. In order to hold the air-chamber at any desired angle, one of the side frames is provided with perforations *x*, adjacent to the door, at desired intervals, into which a pin *y* is inserted to hold the air-chamber and door at any desired point. In order to admit fuel, the door may be swung open when desired, and for holding it open I provide a rod *z*, fastened to the door by means of the pipe *t*, which may be bent to allow the door to swing inward as far as desirable. Only part of the rod is shown. It should be long enough to reach from the pipe to which it is fastened to the ground when the door is swung to its highest point and is merely a convenient means of holding the door up.

It is desirable that the door should be adjustable as to length in order that the air may be admitted beneath it when necessary, regardless of the angle at which the door may be in position, and also that the amount of air thus admitted may be regulated or entirely cut off when desired. To accomplish this, a slide *a'* is mounted upon the lower end of the door, having elongated perforations *b'* therein, through which set-screws *c'* are inserted and fastened to the main portion of the door by means of threaded perforations therein, so as to hold the slide in any desired position upon the main portion of the door by clamping it tightly thereto. A plate *d'* is placed within the furnace a short distance from the ground, as shown, for holding the fuel while in process of combustion and while the forced draft is being or may be employed. This plate extends from the front of the furnace to within the arch of the kiln, the inner end resting upon an upright support *e'*, which rests upon the ground and which I prefer to make of cast-iron in the shape of a slab and which extends entirely across the arch or furnace-chamber.

It is very important that the burning of the kiln should not be interrupted in case of accident or in case the forced draft be rendered unavailable by any cause or in case the use of natural draft should prove desirable for any reason. To accomplish this, I provide a grate *f'* beneath the plate *d'*, which grate may be composed of grate-bars of the ordinary and well-known type, the front ends of which rest upon the cross-piece *j* and the rear ends upon the upright support *e'*. These grate-bars serve to support the plate *d'* when the plate is in use and as a grate when the plate is not in use and the plate removed, and the space beneath the grate serves as an ash-pit when the grate is in use and admits air through the grate-bars to the fuel on the grate in the ordinary manner.

The principal advantages of my invention



are, first, the economy of time and fuel resulting from the complete combustion caused by the forced draft and enabling the kiln to be burned quickly without devoting a long  
 5 time and great amount of fuel to the starting of a draft, as by the ordinary means known to the art; second, the providing of means whereby the current of air may be directed to any desired point in the furnace and as far  
 10 back into the arch as desired; third, it furnishes means for quickly changing from the use of the forced draft to the ordinary method of burning without injury to the kiln by reason of delay or interruption in burning, and,  
 15 fourth, it enables the production of a better quality of bricks in less time and with less fuel than by the old and well-known appliances and methods.

I claim—

20 1. In a kiln-furnace, the combination of the arch-walls provided with interstices communicating with all parts of the kiln above the arch, a metallic frame at the end of the arch, a movable compressed-air chamber having  
 25 openings into the furnace, and means for connecting the air-chamber with a source of compressed air, substantially as described.

2. In a kiln-furnace, the combination of the arch-walls provided with interstices communicating with all parts of the kiln above the  
 30 arch, a metallic frame at the end of the arch, a movable compressed-air chamber having openings into the furnace, means for connecting the air-chamber with a source of compressed air, and means for moving the compressed-air chamber, whereby the current of  
 35 air through the openings therein may be directed to any desired part of the furnace, substantially as described.

40 3. In a kiln-furnace, the combination of the arch-walls provided with interstices communicating with all parts of the kiln above the arch, a metallic frame at each end of the arch, a movable compressed-air chamber having  
 45 openings into the furnace, and means for connecting the air-chamber with a source of compressed air, substantially as described.

4. In a kiln-furnace, the combination of the arch-walls, a metallic frame at each end  
 50 of the arch, a compressed-air chamber for each of the frames provided with openings into the furnace, and a removable fuel-holding plate within the furnace, substantially as described.

55 5. In a kiln-furnace, the combination of the arch-walls, a metallic frame at each end of the arch, a fuel-holding plate for each of the frames, a compressed-air chamber for each of the frames provided with openings  
 60 into the furnace, and means for connecting

the air-chamber with a source of compressed air, substantially as described.

6. In a kiln-furnace, the combination of the arch-walls, a metallic frame at each end  
 65 of the arch, a fuel-holding plate for each of the frames, a swinging door for each of the frames, a compressed-air chamber mounted upon each of the doors and movable therewith, and means for connecting the air-chamber with a source of compressed air, substan-  
 70 tially as described.

7. In a kiln-furnace, the combination of a metallic frame, a fuel-holding plate within the frame, a compressed-air chamber movably mounted and provided with openings  
 75 into the furnace, and means for connecting the compressed-air chamber with a source of compressed air, substantially as described.

8. In a kiln-furnace, the combination of a metallic frame, a removable fuel-holding  
 80 plate within the frame, a grate beneath the fuel-holding plate, a compressed-air chamber movably mounted and provided with openings communicating with the inside of the furnace, and means for connecting the compressed-air chamber with a source of compressed  
 85 air, substantially as described.

9. In a kiln-furnace, the combination of the arch-walls, a metallic frame at each end  
 90 of the arch, a removable fuel-holding plate for each of the frames, a compressed-air chamber for each of the frames mounted upon a swinging door movable therewith and having openings communicating with the inside of the furnace, and means for connecting the  
 95 compressed-air chambers with a source of compressed air, substantially as described.

10. In a kiln-furnace, the combination of the arch-walls provided with interstices communicating with all parts of the kiln above  
 100 the arch, a metallic frame at the end of the arch, a door in the frame provided with openings communicating with the interior of the furnace, and means for connecting the openings in the door with a source of compressed  
 105 air, substantially as described.

11. In a kiln-furnace, the combination of the arch-walls provided with interstices communicating with all parts of the kiln above  
 110 the arch, a metallic frame at the end of the arch, a vertically-swinging door mounted in the frame provided with openings communicating with the interior of the furnace, and means for connecting the openings in the swinging door with a source of compressed  
 115 air, substantially as described.

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