Apr. 10, 1923. 1,451,589

W. M. SCHWARTZ ET AL

DRIER

Filed Jan. 28, 1922 3 sheets-sheet 1

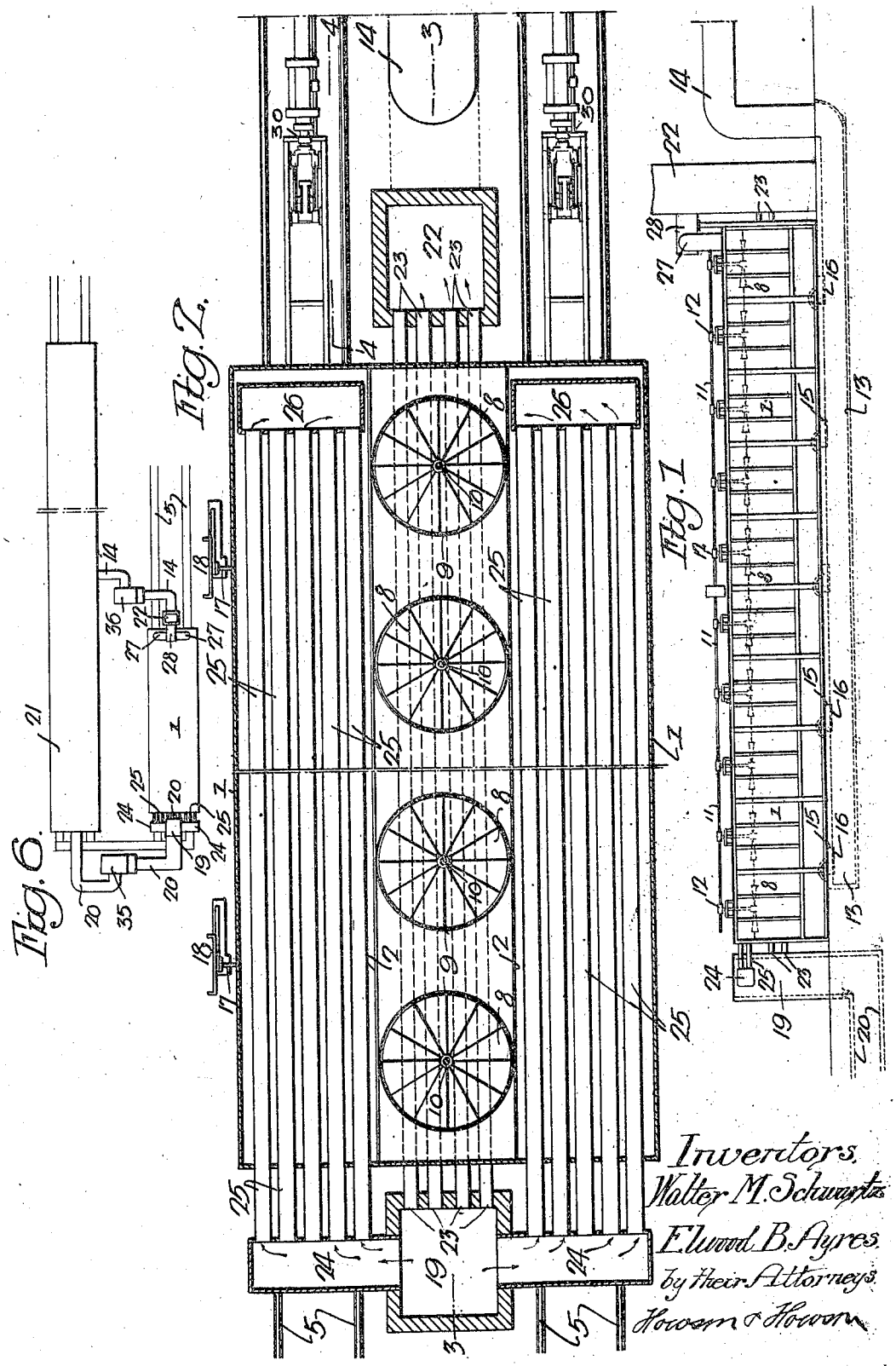

Fig. 6.

Fig. 2.

Fig. 1.

Inventors.
Walter M. Schwartz
Elwood B. Ayres.
by their Attorneys.
Howson & Howson

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Filed Jan. 28, 1922 3 sheets-sheet 2

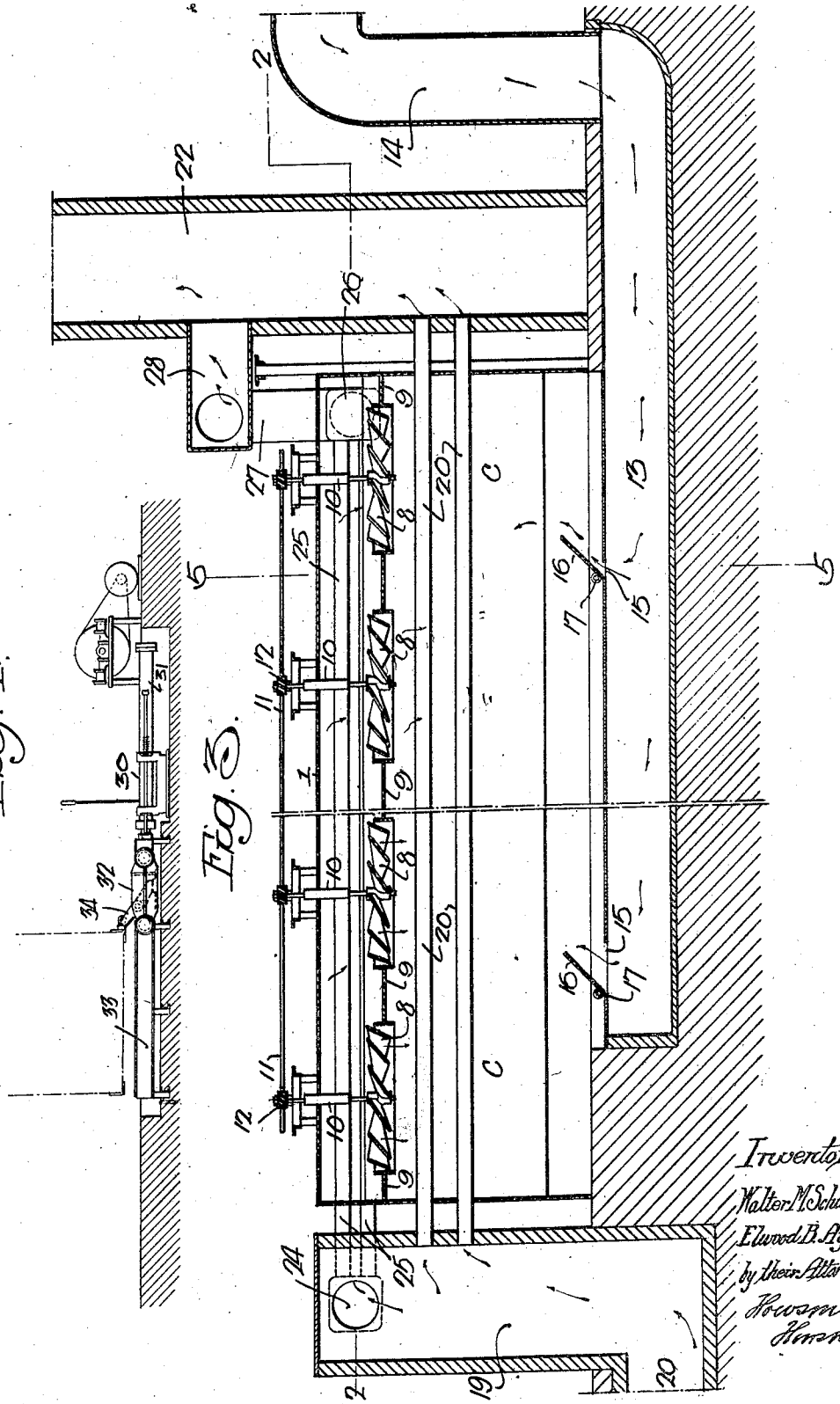

Fig. 4.

Fig. 5.

Inventors.
Walter M. Schwartz
Elwood B. Ayres
by their Attorneys.
Howson & Howson

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DRIER

Filed Jan. 28, 1922 3 sheets-sheet 3

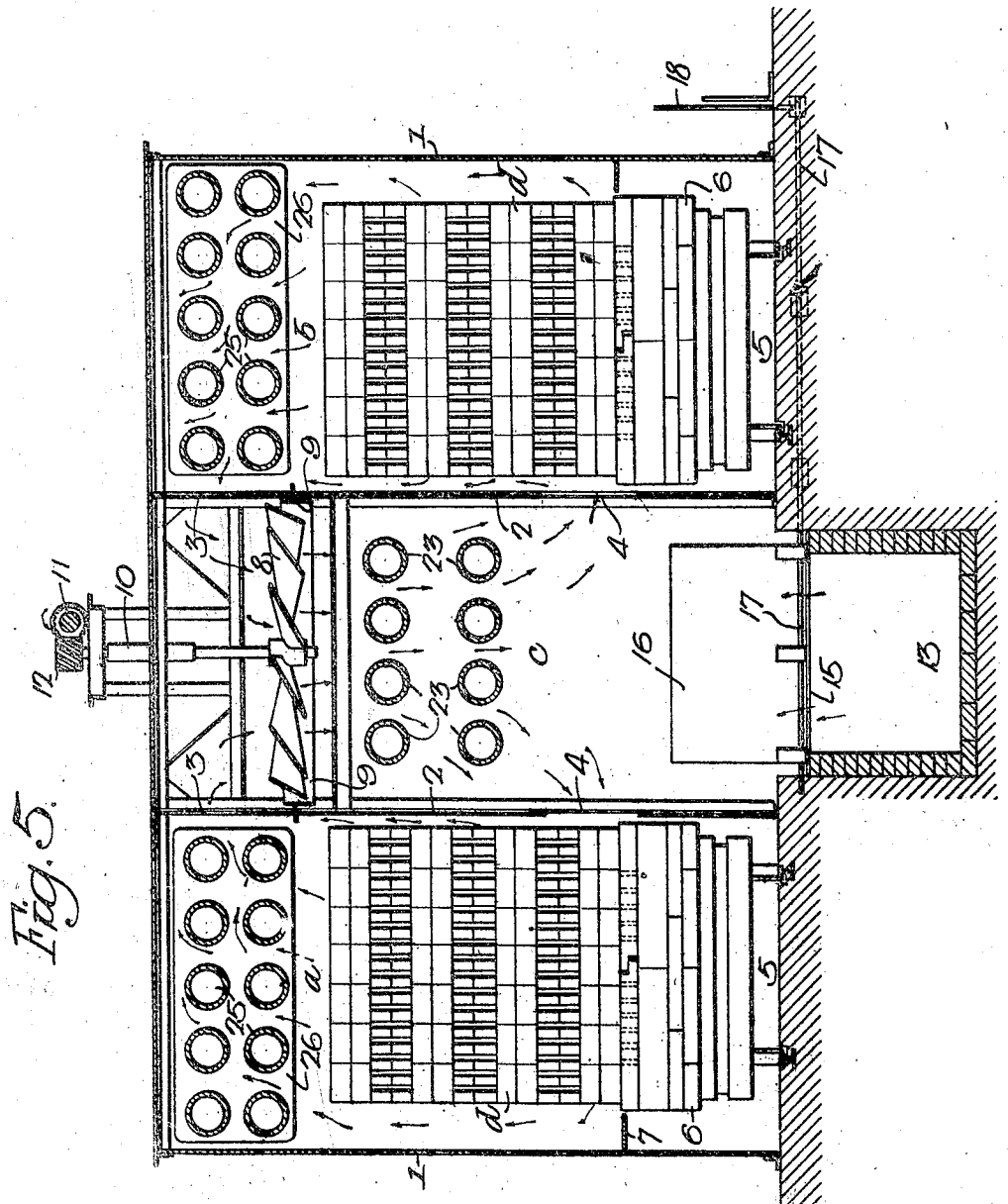

Fig. 5.

Inventors
Walter M. Schwartz
Elwood B. Ayres.
by their Attorneys
Howson & Howson

Patented Apr. 10, 1923. 1,451,589

UNITED STATES PATENT OFFICE.

WALTER M. SCHWARTZ AND ELWOOD B. AYRES, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO PROCTOR & SCHWARTZ, INCORPORATED, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

DRIER.

Application filed January 28, 1922. Serial No. 532,388.

To all whom it may concern:

Be it known that we, WALTER M. SCHWARTZ and ELWOOD B. AYRES, citizens of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Driers, of which the following is a specification.

This invention relates to certain improvements in driers, particularly adapted for drying bricks and other clay, or pottery ware, prior to being baked in a kiln.

One object of our invention is to design the drier so that the waste heat of a kiln can be utilized to dry material prior to the introduction of the material into the kiln.

A further object of the invention is to design the drier so that the heat obtained from the cooling zone of the kiln can be circulated in the drying chamber and the waste heat from the products of combustion can be used by passing the products of combustion through flues in the drier.

The invention also relates to details of construction, which will be fully described hereinafter.

In the accompanying drawings:

Fig. 1 is a side view of our improved drier;

Fig. 2 is a sectional plan view, showing the two ends of the drier, the section being on the line 2—2, Fig. 3;

Fig. 3 is a longitudinal sectional view on the line 3—3, Fig. 2;

Fig. 4 is a longitudinal sectional view on the line 4—4, Fig. 2, illustrating the mechanism for pushing the cars into the drier;

Fig. 5 is a transverse sectional view on the line 5—5, Fig. 3; and

Fig. 6 is a diagram plan view, showing the drier in connection with a kiln.

Referring to the drawings, 1 is the casing of our improved drier. This casing, in the present instance, encloses two longitudinal drying chambers *a* and *b* and an intermediate circulating chamber *c*. Partitions 2 separate the drying chamber from the circulating chamber. These partitions have upper openings 3 and lower openings 4 for the free circulation of the air. In the present instance, the drier is designed for drying bricks prior to their passage to the kiln where they are baked.

In each drying chamber is a track 5 on which the cars 6 are moved through the drier. These cars are shown as designed especially to carry the bricks *d*, which are stacked in courses so that the air will pass freely through the stacks of bricks, thoroughly drying the entire load. Deflectors 7 extend from each side of the drier casing towards the cars so as to prevent the air circulating below the stack of bricks. The lower openings 4 in the partitions are on a line with the lower courses of bricks.

In the upper portion of the circulating chamber *c* are a series of fans 8, which are located in openings in a horizontal partition 9. The fans are mounted on vertical shafts 10, extending through the roof of the drier and each fan is driven from a longitudinal shaft 11 by worm gearing 12, although the method of driving the fans and their location, may be changed without departing from the main features of the invention.

13 is a hot air flue extending longitudinally under the circulating chamber *c* of the drier in the present instance. Connected with the flue is a pipe 14 leading from the cooling zone of a kiln. The upper portion of the flue 13 is closed by sheet metal. In this upper portion are passages 15, which communicate with the circulating chamber *c*, as shown clearly in Figs. 3 and 5. These passages 15 may be closed, or partly closed, by dampers 16.

17 are a series of shafts to which the dampers 16 are attached. These shafts extend to one side of the drier and are provided with hand levers 18, by which they are operated. By having a series of passages throughout the length of the flue 13 and by providing independent dampers for the flues, the flow of the hot gases into the drier can be regulated. The opening near the inlet is preferably somewhat smaller than those near the outlet, as shown in Fig. 3, to aid in controlling the gases.

At the discharge end of the drier is a stack 19, which communicates with a flue 20, which, in turn, communicates with the outlet end of the combustion chamber of the kiln 21, Fig. 6, in the present instance.

22 is a stack at the inlet end of the drier. Extending through the circulating chamber *c*, below the series of fans 8, are a series of flues 23 of comparatively large diameter. These flues 23 communicate with the stacks 19 and 22, as shown. Projecting from each

side of the stack 19 is a header 24 and communicating with these headers are flues 25, which extend through the upper portion of each drying chamber *a* and *b*. Each set of flues communicates with a header 26 located within the drying chamber at the feed end. Each header 26 communicates with the stack 22 through pipes 27 and 28.

It will be seen that, by this construction, the products of combustion pass through the flues 20 and 25 and that the air in circulation in the drier is heated by coming in contact with the flues. Only the hot gases from the cooling zone of the kiln come in direct contact with the bricks being dried.

In the present instance, the cars 6 are pushed into the drier by hydraulic pushing apparatus 30 located between the tracks 5 at the feed end of the drier. Each pushing apparatus consists of a cylinder 31, a head 32 having a plunger adapted to the cylinder, and ways 33 for the head. On the head 32 is a pivoted pusher 34 so arranged as to engage the rear of a car when raised and capable of being tilted when a car is moved over the pushing apparatus. The mechanism is shown clearly in Figs. 2 and 4. It will be understood that the cylinder may be connected with a pump or other power apparatus.

It will be noted that the fans, or other suitable appliances, are located in the flues connecting the cooling zone of the kiln with the interior of the drier and the pipes leading from the combustion chamber of the kiln communicate with the flue tubes of the drier. The fans are indicated at 35 and 36, Fig. 6.

While our improved drier is described as being connected with a kiln for baking bricks, it will be understood that the flues may be connected with other apparatus without departing from the spirit of the invention, as the drier can be used for drying other articles.

At each end of the drying chambers of the drier are doors, which can be manually operated. The doors at the delivery end of the drier may be pushed open by the cars as they are forced out of the drier by succeeding cars.

We claim:

1. The combination in a drier, of a drying chamber; means for circulating air in said chamber; a flue communicating directly with the lower portion of the chamber; a series of flues extending through the upper portion, but not communicating therewith; and means, in the chamber, for supporting the articles to be dried, said first mentioned flue admitting heated air to the drier and the other flues radiating heat derived from the products of combustion passing through the flues.

2. The combination of a drier having a drying chamber; means for traversing articles to be dried through the chamber; means for circulating air in the chamber; a hot air flue communicating directly with the drying chamber through a series of passages; dampers in said passages; and a series of heating flues extending through the upper portion of the drying chamber for the passage of products of combustion and indirectly heating the drying chamber.

3. The combination in a drier, of a casing; two longitudinal partitions separating the casing into a central circulating chamber and side drying chambers; passages in the partitions for the circulation of air; means for circulating the air; longitudinal flues extending through the casing in the path of the air in circulation; and a flue communicating with the lower portion of the drier for the introduction of heated air.

4. The combination in a drier, of a casing; two longitudinal partitions separating the casing into a central circulating chamber and side drying chambers; tracks extending through the drying chambers for cars carrying articles to be dried; a horizontal partition in the upper portion of the circulating chamber having fan openings therein; fans located in the openings; means for driving the fans, said longitudinal partitions having openings to allow for the free circulation of air; longitudinal flues in the upper portion of each drying chamber; and longitudinal flues in the circulating chamber below the fans.

5. The combination in a drier, of a casing; two longitudinal partitions separating the casing into a central circulating chamber and side drying chambers; tracks extending through the drying chambers for cars carrying articles to be dried; a horizontal partition in the upper portion of the circulating chamber having fan openings therein; fans located in the openings; means for driving the fans, said longitudinal partitions having openings to allow for the free circulation of air; longitudinal flues in the upper portion of each drying chamber; longitudinal flues in the circulating chamber below the fans; and a longitudinal flue under the center of the drier communicating with the circulating chamber for the introduction of heated air.

6. The combination in a drier, of a casing having two longitudinal partitions therein dividing the casing into a central circulating chamber and side drying chambers; means for conveying material to be dried through the drying chambers; a series of fans for circulating air in the casing; means for admitting heated air to the interior of the casing; a series of longitudinal flues in the upper portion of each drying chamber; a series of flues in the circulating chamber; a stack at

each end of the drier communicating with the flues extending through the circulating chamber; and headers at each end of the drier with which the flues extending through the drying chambers communicate, said headers, in turn, communicating with the stacks.

7. The combination of a drier having a central circulating chamber and side drying chambers; means for conveying material through the drying chambers; a series of flues extending longitudinally through the several chambers; a series of fans in the upper portion of the circulating chamber; a flue for heated air extending under the drier and having a series of passages therein communicating with the drier; dampers for said passages; and means extending outside of the drier for operating the dampers.

8. The combination in a drier, of a casing; two longitudinal partitions therein separating the casing into three chambers, the side chambers being the drying chambers and the central chamber being a circulating chamber; circulating fans in the last mentioned chamber; upper and lower openings in the partitions for the free circulation of air; a flue extending longitudinally under the center of the drier and communicating at intervals with the circulating chamber and with the cooling zone of a kiln; flues extending longitudinally through the upper portion of each of the drying chambers; a series of central flues extending through the circulating chamber; a stack connected at one end with said flues and with the combustion chamber of a kiln; and a stack communicating with the opposite end of said flues.

WALTER M. SCHWARTZ.
ELWOOD B. AYRES.