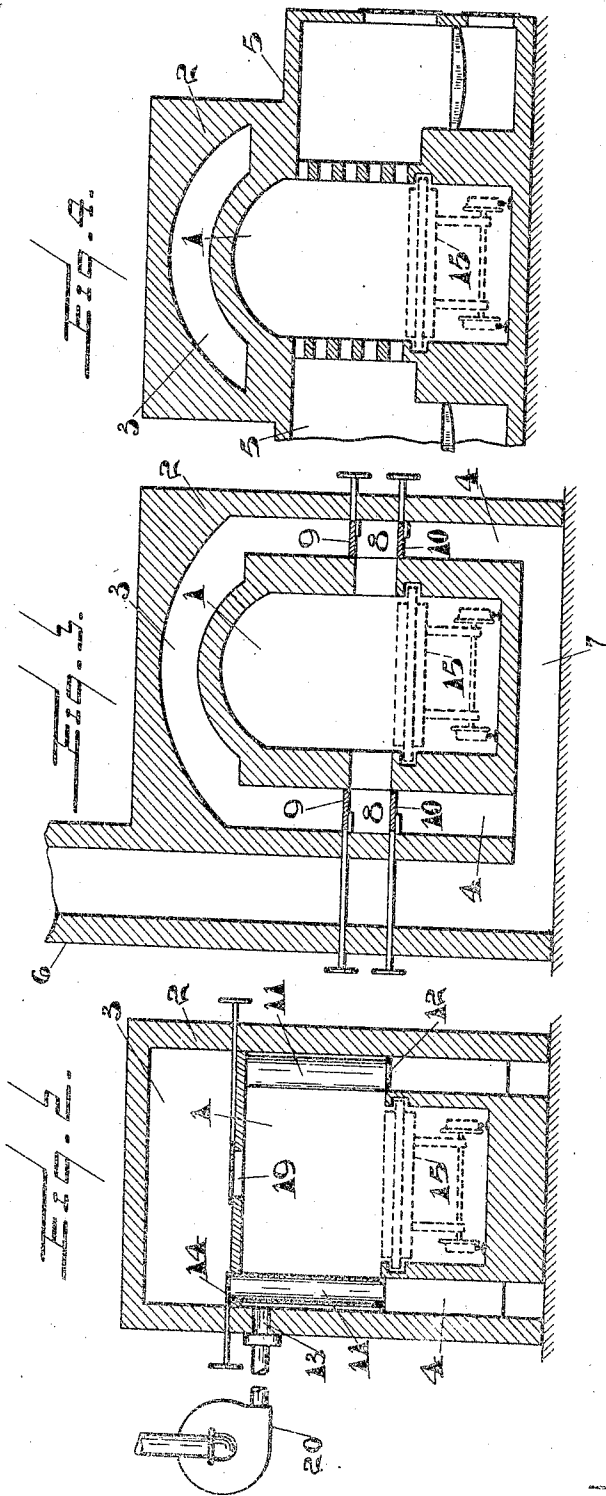
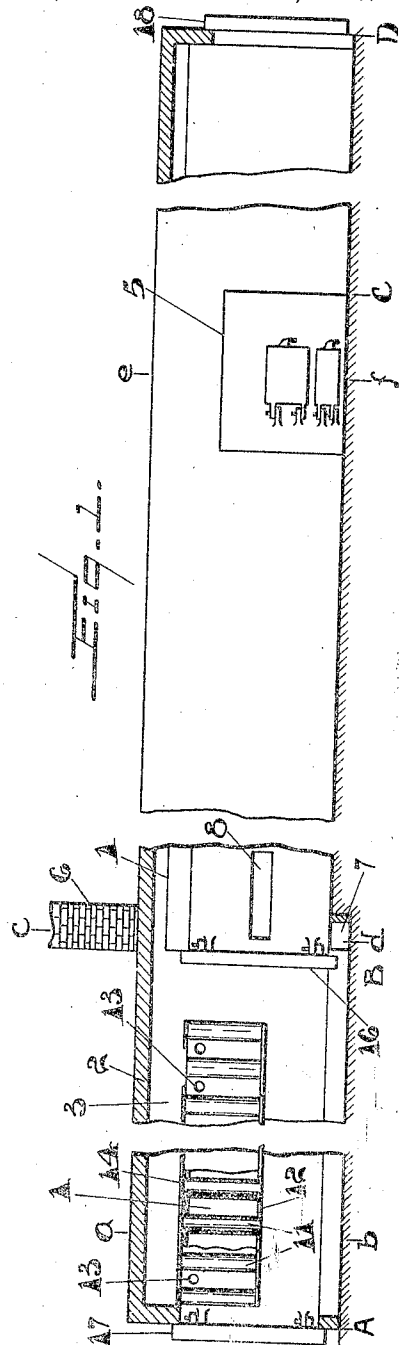


1,333,099.

G. W. BOOTH,
TUNNEL KILN.

APPLICATION FILED MAY 17, 1919.

Patented Mar. 9, 1920.



INVENTOR

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TUNNEL-KILN.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, GEORGE W. BOOTH, of Islington, in the county of York, Province of Ontario, Canada, have invented certain new and useful Improvements in Tunnel-Kilns, of which the following is a specification.

This invention relates to kilns of the type in which the goods are fired while passing through the kiln on trucks running on suitable tracks. In such kilns, it is usual to pass the goods through a pre-heating or drying zone, then through a firing zone, and subsequently through a cooling zone, and my object is to devise an economical form of kiln in which perfect control of the pre-heating, firing and cooling can be obtained and particularly in which the discoloration of the goods in the pre-heating zone can be prevented.

I attain my object by means of the constructions hereinafter described and illustrated in the accompanying drawings in which—

Figure 1 is a side elevation of a kiln constructed in accordance with my invention, partly in section and partly broken away;

Fig. 2 a cross section on an enlarged scale on the line *a—b* in Fig. 1;

Fig. 3 a cross section on the line *c—d* in Fig. 1; and

Fig. 4 a cross section on the line *e—f* in Fig. 1.

In the drawings like numerals of reference indicate corresponding parts in the different figures.

1 is the tunnel of a kiln, which extends from end to end thereof. Surrounding the tunnel is an outer casing 2 forming an air space and flues as hereinafter described. This casing in coöperation with the top of the tunnel forms the air space 3 which extends from end to end of the kiln.

The preheating zone of the kiln extends substantially from A to B, the firing zone from B to C, and the cooling zone from C to D. Throughout the length of the cooling and firing zones, the air space 3 preferably extends around the sides of the tunnel as well as over the top thereof.

Between the firing zone and the preheating zone, the lower parts of the side spaces between the tunnel and casing are separated from the similar spaces in the firing zone to form the lower flues 4.

Adjacent the end of the firing zone of the

furnace next the cooling zone are located one or more furnaces 5 of any ordinary type which communicate with the interior of the tunnel. At the other end of the firing zone is located the stack 6, to which a flue 7 leads, this flue extending under the kiln and communicating with both the flues 4.

Through the walls of the tunnel are formed the openings 8, which communicate both with the flues 4 and the air space 3, the communications being controlled by means of the dampers 9—10. By suitably operating these dampers, the products of combustion within the tunnel are either led directly to the stack or caused to pass up into the air space 3 to be disposed of as hereinafter described.

The sides and top of the tunnel in the pre-heating zone are much thinner than in the firing and cooling zones and are preferably formed of metal. At each side of the pre-heating zone, a series of passages 11 are provided leading from the air space 3 to the flues 4. These passages may be either channels formed through a solid wall, or metal tubes as shown, the latter forming more effective means for radiating heat to the interior of the tunnel from the heated air passing through the tubes.

Between the tubes openings 12 are formed leading from the interior of the tunnel to the flues 4. Through these openings moist air from the pre-heating zone of the tunnel may pass to the flues 4. A series of damper controlled openings 13 are formed in the walls of the tunnel at different points longitudinally of the pre-heating zone. Through these openings air from outside the kiln may pass to replace moist air sucked out through the openings 12 and passing through the flues 4 to the stack. Dampers 14 are preferably provided in the passages 11 so that the air from the air space 3 may be properly distributed through the tubes, as otherwise the tendency would be for the greater part of the air to pass through those passages 11 closest to the stack 6. The trucks 15 are arranged in any ordinary manner and need not be particularly described.

The mode of operation of the kiln is as follows. When the furnaces are fired, the products of combustion pass through the firing zone of the tunnel toward the stack, and the goods passing through the tunnel are suitably fired. Air enters the air space 3 at the end of the cooling zone and to this

air the goods passing through the tunnel give up their heat. The air is still more intensely heated in passing over and around the portion of the tunnel forming the firing zone. This heated air passes over the tunnel in the pre-heating zone and is led through the passages 11 to flues 4. The goods on the trucks passing through the pre-heating zone are thus indirectly heated and do not come into contact with the heated products of combustion. The staining or discoloration of the goods which is frequently caused by contact with the products of combustion is thus avoided. Through damper controlled openings 19 in the top of the tunnel heated air may be introduced into the pre-heating zone of the tunnel if goods are being dried and burnt which are not liable to discoloration by any flue gases which may leak into the air in the air space 3. If desired, more or less of the hot products of combustion may be circulated over the pre-heating zone of the tunnel by suitably operating the dampers 9 and 10 and, if desired, a certain proportion of the products of combustion may be allowed to enter the tunnel through the damper-controlled openings 19 when the character of the goods being burned will permit of their contact with the products of combustion in the pre-heating and drying zone.

It is preferable to separate the pre-heating zone of the tunnel from the firing zone by means of a door 16, which may be of any desired construction and will usually be arranged in the ordinary manner to open simultaneously with the opening of the door 17 at the inlet end of the tunnel and the door 18 at the outlet end of the tunnel.

Under some conditions it may be desirable to force a circulation of air in the pre-heating zone of the kiln. I therefore provide a fan 20, the discharge pipe of which communicates with the interior of the tunnel at some point in the length of the pre-heating zone. This fan may be used to supplement the draft of the stack to supply more or less dry air to take the place of the saturated air passing from the drying bricks.

What I claim as my invention is:—

1. A tunnel kiln having an air space formed in its walls extending longitudinally of the preheating, firing and cooling zones of the kiln; a furnace communicating with the interior of the firing zone of the tunnel adjacent the cooling zone; a stack adjacent the other end of the firing zone communicating with the interior of the tunnel; a flue located adjacent the lower part of the tunnel communicating at one end with the stack, and at its other end with the air space aforesaid adjacent the inlet end of the tunnel.

2. A tunnel kiln constructed substantially as set forth in claim 1 in which a plurality of damper controlled passages extend down

beside the tunnel from the air space to the lower flue at different points longitudinally of the preheating zone of the kiln.

3. A tunnel kiln constructed substantially as set forth in claim 1 in which the communication between the tunnel and the stack is damper controlled and a damper controlled communication is formed at substantially the same point between the tunnel and the air space.

4. A tunnel kiln constructed substantially as set forth in claim 1 in which the communication between the tunnel and the stack is damper controlled and a damper controlled communication is formed at substantially the same point between the tunnel and the air space and also a series of damper controlled openings into the tunnel from the air space at different points longitudinally of the preheating zone of the kiln and a series of moist air exit openings into the lower flue from the tunnel at different points longitudinally of the tunnel.

5. A tunnel kiln constructed substantially as set forth in claim 1 in which a plurality of damper controlled passages extend down beside the tunnel from the air space to the lower flue at different points longitudinally of the preheating zone of the kiln, and also a series of damper controlled openings into the tunnel from the air space at different points longitudinally of the preheating zone of the kiln and a series of moist air exit openings into the lower flue from the tunnel at different points longitudinally of the tunnel.

6. A tunnel kiln constructed substantially as set forth in claim 1 provided with a door whereby the pre-heating zone of the kiln may be cut off from the firing zone.

7. A tunnel kiln having an air space formed in its walls extending longitudinally of the preheating, firing and cooling zone of the kiln; a furnace communicating with the interior of the firing zone of the tunnel adjacent the cooling zone; a stack adjacent the other end of the firing zone communicating with the interior of the tunnel; a flue located adjacent the lower part of the tunnel, openings being provided leading into the tunnel from the air space and from the tunnel into the lower flue, said openings being located at different points longitudinally of the pre-heating zone of the furnace.

8. A tunnel kiln constructed substantially as set forth in claim 7 in which the communication between the tunnel and the stack is damper controlled and a damper controlled communication is formed at substantially the same point between the tunnel and the air space.

9. A tunnel kiln constructed substantially as set forth in claim 1 in which the communication between the tunnel and the stack is damper controlled and a damper con-

5 trolled communication is formed at substantially the same point between the tunnel and the air space and also a series of openings into the tunnel from the air at different points longitudinally of the pre-heating zone of the kiln and a series of moist air exit openings into the lower flue from the tunnel at different points longitudinally of the tunnel.

10 10. A tunnel kiln constructed substantially as set forth in claim 1 in which a plurality of damper controlled passages extend down beside the tunnel from the air space to the lower flue at different points longitu-

dinally of the pre-heating zone of the kiln, 15 and also a series of openings into the tunnel from the air at different points longitudinally of the pre-heating zone of the kiln and a series of moist air exit openings into the lower flue from the tunnel at different 20 points longitudinally of the tunnel.

Signed at Toronto Ont. this 2nd day of April 1919, in the presence of the two undersigned witnesses.

GEORGE W. BOOTH.

Witnesses:

J. EDW. MAYBEE,
L. M. LEWIS.