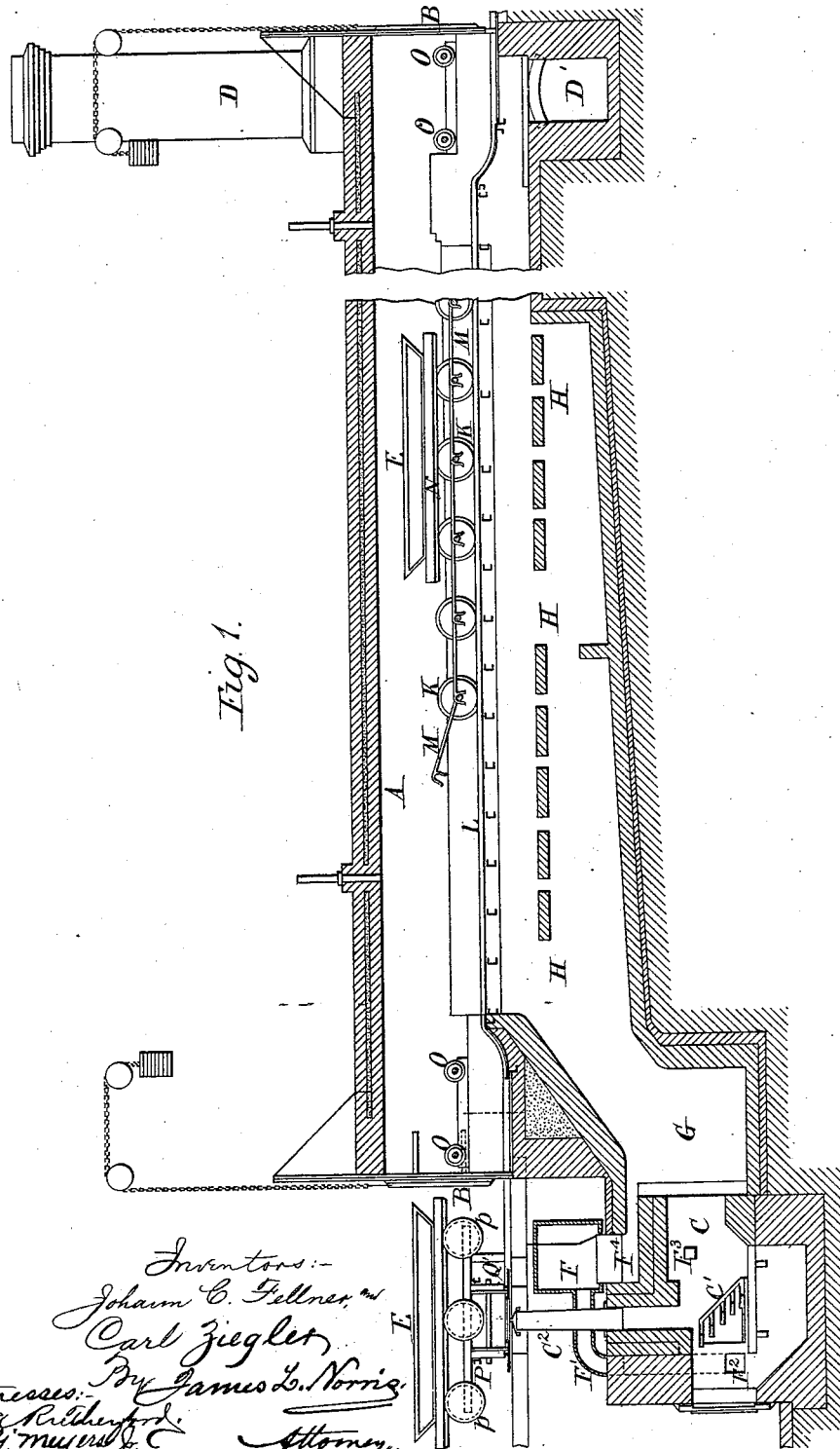


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KILN FOR DRYING OR BAKING PURPOSES.

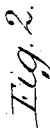
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Patented June 30, 1891.



4 Sheets—Sheet 2.

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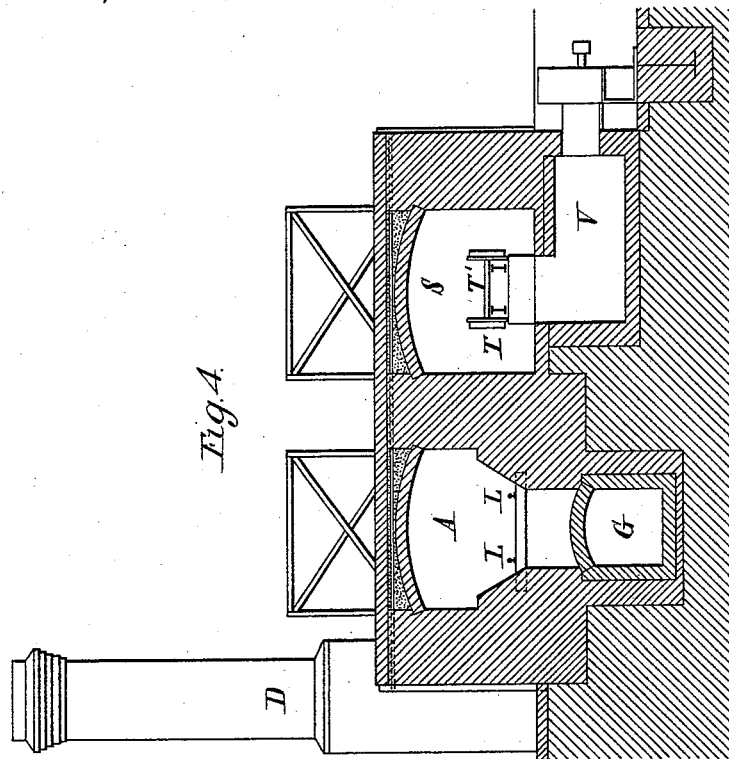
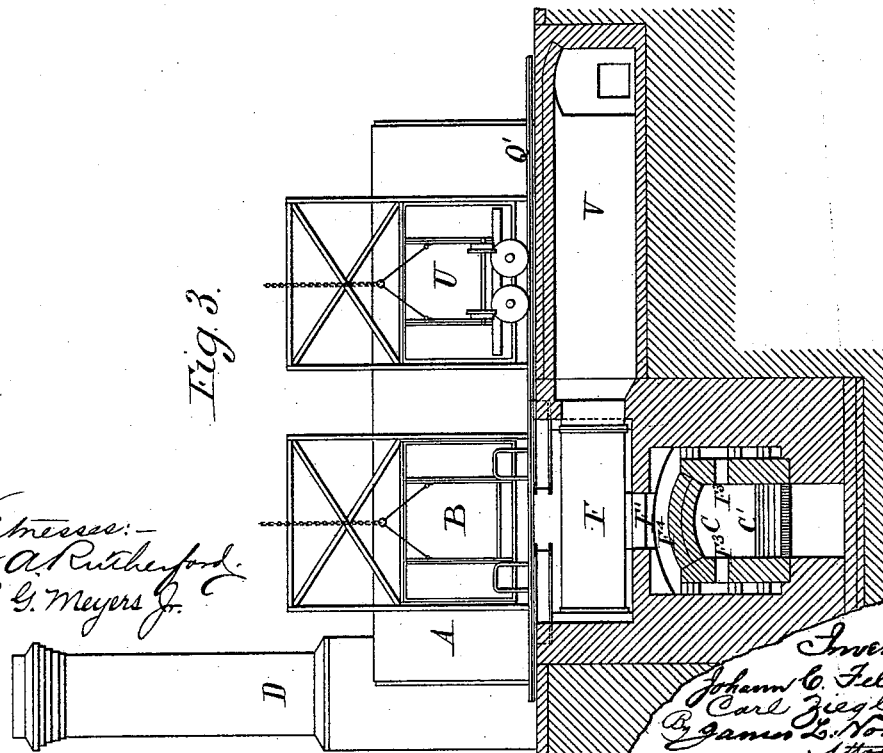


Fig 3.



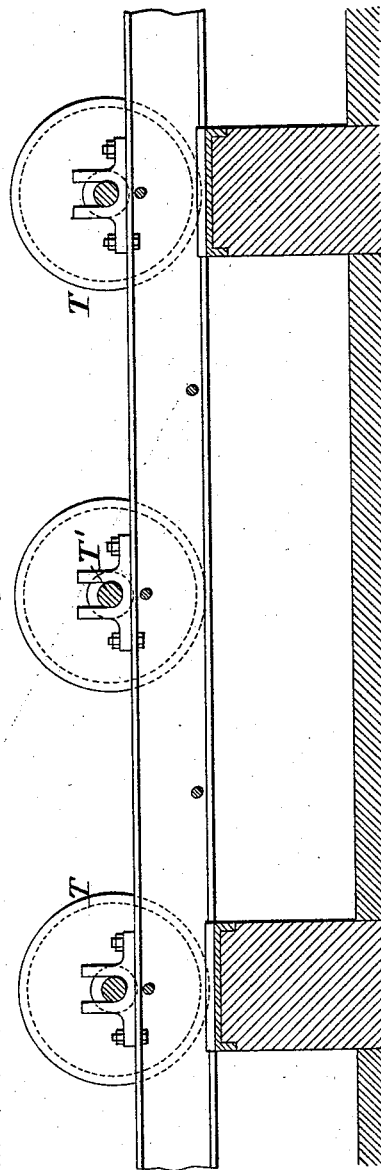
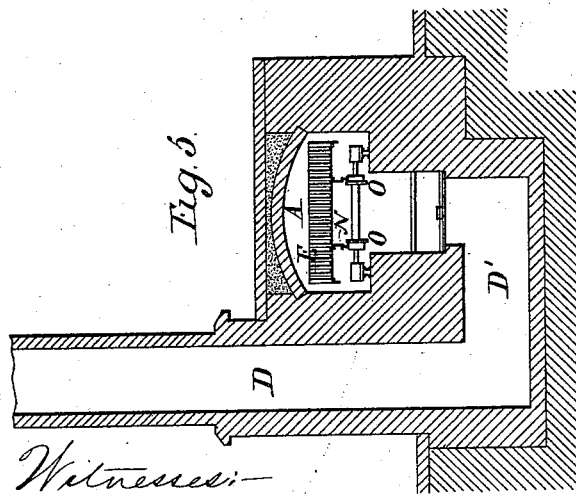
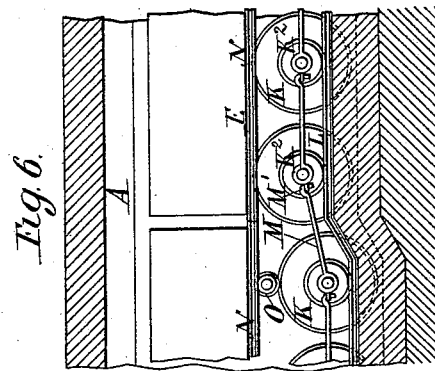
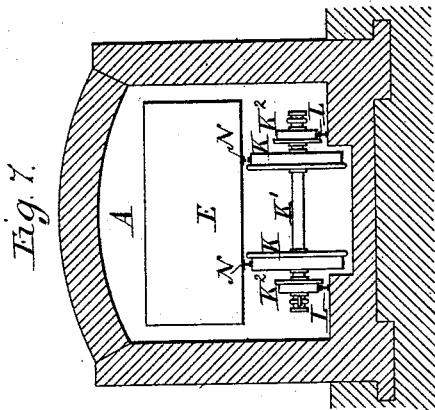
Witnesses:—
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UNITED STATES PATENT OFFICE.

JOHANN CHRISTIAN FELLNER AND CARL ZIEGLER, OF BOCKENHEIM,
GERMANY.

KILN FOR DRYING OR BAKING PURPOSES.

SPECIFICATION forming part of Letters Patent No. 455,191, dated June 30, 1891.

Application filed December 22, 1890. Serial No. 375,505. (No model.) Patented in Germany July 17, 1888, No. 47,113; in England April 25, 1889, No. 6,938, and in Austria-Hungary May 4, 1889, No. 20,197.

To all whom it may concern:

Be it known that we, JOHANN CHRISTIAN FELLNER and CARL ZIEGLER, citizens of Germany, both residing at Bockenheim, near Frankfort-on-the-Main, in the Empire of Germany, have invented new and useful Improvements in Kilns or Ovens for Burning, Firing, Baking, or Drying Materials, (for which the same has been partly patented to us by Letters Patent in Great Britain, dated April 25, 1889, No. 6,938; in Germany, dated July 17, 1888, No. 47,113, and in Austria-Hungary, dated May 4, 1889, No. 20,197,) of which the following is a specification.

This invention relates to kilns or ovens for burning, firing, baking, or drying materials, consisting of a long horizontal tunnel or passage, into one end of which the materials to be treated are introduced on trucks or traveling platforms, while at the other end hot combustion-gases, with or without admixture of air, are introduced so as to travel in the contrary direction to the motion of the materials to be treated, thus causing the freshly-introduced materials to be brought in contact with gases that have already given off the greater portion of their heat, while the more or less highly-heated gases entering the kiln are brought in contact with materials that have already been subject to the heating process for some time, and thus the heat of the gases is utilized in the most economical manner, while at the same time the materials are acted upon by the heat in the most advantageous manner.

We will proceed to describe our improved construction of such kilns or ovens, with reference to the accompanying drawings, in which—

Figure 1 shows a longitudinal section; Fig. 2, a sectional plan; and Figs. 3, 4, and 5, cross-sections taken, respectively, on lines *a a*, *b b*, and *c c*, Fig. 2. Figs. 6 and 7 show a modification of the traveling platform, and Fig. 8 shows an enlarged detail of the stationary wheels.

A is the tunnel-shaped kiln or oven, closed at each end by vertically-sliding doors B B and provided at the one end with a furnace C,

the hot gaseous products of combustion from which are to pass through the kiln, while the other end of the latter communicates by a flue D' with a chimney-shaft D. While the hot combustion gases are made to travel along the kiln toward D, the platform is made to travel in the contrary direction, so that the freshly-introduced materials will come in contact with the gases after they have given off a great part of their heat, while the materials that have traversed through the length of the kiln will, near the front end, be brought in contact with the entering highly-heated gases, which will consequently effectually complete the burning, firing, baking, or drying of the materials.

The furnace C for producing the combustion-gases may be of any suitable known construction in which complete combustion, with or without excess of air, can be carried out; but we prefer to employ for this purpose the construction shown. This consists of a stepped grate C' within the fuel-chamber C, onto which grate fuel is fed in a deep layer through the chute C², while air is supplied by a fan F through flues F' F² F³ F⁴ partly to below the grate C', partly through the sides of the fuel-chamber, and partly beyond and above the latter. With this arrangement the combustion is partly carried out in the fuel-chamber, resulting in the production of combustion-gases, together with a considerable quantity of combustible gases, which in issuing from the fuel-chamber meet the air-supply passing in through flue F⁴, which effects their complete combustion in the combustion and mixing chamber G, from which the resulting highly-heated combustion-gases, with or without excess of air, enter the kiln A through a number of openings H H H, extending along the floor of the kiln. By regulating the supply of fuel and the volume of the air supplied by the fan the quantity of combustion-gases and the heat and chemical composition thereof, as also the proportion of excess of air, if required, can be accurately adjusted to the requirements of the operation.

The traveling platform is composed of platform-sections E and flanged wheels K, mount-

ed on axles K' and adapted to run upon rails L, laid on the bottom of the furnace. The platform-sections E rest upon the peripheries of the wheels K, and the latter are maintained at equal distances apart during their travel by means of rods M M, one end of which is formed as an eye embracing the axle close against the inner side of the wheels, while the other end is formed as an open loop or hook, which is hooked on the axle of the next pair of wheels. According to another modification of these wheels, (shown to an enlarged scale in the part-longitudinal section at Fig. 6 and in cross-section at Fig. 7,) the axles K' carry, in addition to the wheels K K, a smaller pair of wheels K² K², which run upon the rails L, the wheels K K being mounted on the axle K' and serving merely to support the platform-sections, as will be presently described. By this construction it will be seen that the advance of the wheels K K will be considerably less in proportion to a certain advance of the platform-sections than is the case with the single pair of wheels. The hooked ends of the rods M in this case, instead of being hooked onto the axle, as before, are hooked into small eyes M', formed on the looped ends of the rod of the contiguous axle.

The platform-sections E have rails N fixed to their under sides, by means of which they rest upon the upper part of the periphery of the wheels K, the sections being formed either as trays, boxes, or otherwise, as may be desired. It will be seen that as the platform-sections run with rails upon the wheels, while these also run upon rails, the whole system will be accurately guided in its motion. There are provided at each end of the kiln two or more rollers O O, the axles of which run in bearings at the sides of the kiln, and which are arranged at such a height that the platform-sections can be slid from outside trucks P onto the rollers O and thence onto the wheels K. The floor of the kiln, together with the rails L, are made with a drop underneath the rollers O, as shown, so as to leave room below the latter for the axles K', with their wheels K, to pass into and out of the kiln.

It will be seen that with the above-described construction of traveling platform the advantages are gained, first, that the platform-sections can butt closely against each other, thus economizing the spaces required at the ends of ordinary wheeled trucks for buffers; secondly, as there are no journals of the axles working in axle-boxes all lubrication is dispensed with, and consequently the resistance to motion caused by the clogging of such lubricant when subject to heat is obviated. As the pairs of wheels come out of the kiln, at the front end they are uncoupled from the forks of the rods M belonging to the next pair of wheels within the kiln, as shown, and are then conveyed back to the rear end of the kiln again along rails Q at the side of the kiln to be attached by the hooks of their rods to the axle of the first pair of wheels in the

kiln. The issuing platform-section E is received upon a truck P, running on the cross-rails Q', by which the section, with its charge, is brought in front of a cooling-chamber S. In this chamber are a number of pairs of wheels T, carried by axles T', supported in fixed bearings, as shown to an enlarged scale at Fig. 8, the upper part of the periphery of these wheels being arranged at such a height that the platform-sections E can be run from the trucks P onto them. The chamber S is closed by a sliding door U at the front end, while at the rear end it is open for the entrance of air down to just below the level of the platform-sections. At the front end the chamber communicates by a passage V with the suction-inlet of the fan F. From this arrangement it will be seen that the fan will draw a strong current of cold air through the chamber S, thereby cooling the material on the platform-sections, and at the same time providing a supply of hot air to the furnace C, whereby a great economy in fuel will be effected. Assuming the chamber S to be filled with platform-sections, then on the introduction of the next one with a heated charge at the front end a section with a cooled charge will be pushed out at the rear end onto a truck stationed on the rails Q², on which it is then conveyed to wherever required. The trucks P are provided with rollers p p for facilitating the placing and removal of the platform-sections upon and from them. R R are turntables for transferring the pairs of wheels K and the trucks P from one line of rails to another.

In some cases, where the heat employed in the kiln is moderate, the arrangement of stationary pairs of wheels T, described with reference to the cooling-chamber S, may also be employed in precisely the same manner in the kiln A in place of the traveling pairs of wheels.

We do not herein broadly claim the combination, in a kiln or oven, of a horizontal tunnel or shaft, means for supplying heated air at one end of the tunnel, a chimney or flue at the other end thereof, and a traveling platform consisting of sets of wheels traveling along the length of the tunnel, and platform-sections having attached rails which rest directly against the peripheries of the sets of wheels that travel along the tunnel, so that the rails of the platform-sections run upon and are propelled by the wheels which travel along the length of the tunnel. Nor do we herein broadly claim the combination, in a kiln or oven, of a horizontal tunnel or shaft having sunk or depressed ends, a series of rotating wheels in the tunnel or shaft, a series of rollers suspended in fixed bearings over the sunk or depressed ends of the tunnel or shaft, and a series of detachably-connected platform-sections having rigidly-united side rails traveling on the wheels in the tunnel or shaft, so that such platform-sections travel under the suspended

rollers which overhang the sunk or depressed ends of the tunnel or shaft, as such combinations are described and claimed in our application filed of even date herewith, Serial No. 375,506.

What we claim is—

1. The combination, in a kiln or oven, of a horizontal tunnel or shaft having sunk or depressed ends, means for supplying a heating medium at one end of the tunnel, a chimney or flue at the other end thereof, a traveling platform within the tunnel or shaft, consisting of sets of four wheels on an axle, two of which wheels run upon rails on the floor of the tunnel or shaft, while the other two wheels are of greater diameter and support platform-sections carrying the materials and adapted to be moved along on the upper part of the periphery of the wheels of greater diameter, and rollers suspended by fixed bearings over the sunk or depressed ends of the tunnel or shaft and located at such height that the platform-sections travel thereover into and out of the tunnel or shaft, substantially as described.

2. In kilns or ovens for drying or baking materials, consisting of a horizontal shaft or tunnel, a traveling platform consisting of sets of four wheels on an axle, one pair of which are of smaller diameter and are adapted to run upon rails in the tunnel, while the other pair are of larger diameter and are adapted to support platform-sections having rails on their under side which rest upon the flanged

periphery of the said wheels, substantially as described.

3. In kilns or ovens for burning, firing, baking, or drying materials, the combination of a horizontal kiln having a furnace for the supply of hot air and combustion-gases at one end, a chimney for the escape of the said gases at the other end, a traveling platform within the kiln, consisting of pairs of wheels at equal distances apart, on the upper part of the periphery of which rest separate platform-sections adapted to be moved along upon the said wheels, a cooling-chamber at the side of the said kiln, having pairs of wheels at equal distances apart for receiving the platform-sections charged with hot material coming from the kiln, trucks for receiving the said platform-sections from the kiln and for delivering them into the cooling-chamber, and a fan for supplying air to the said furnace, such fan having its suction connected to one end of the said cooling-chamber, so as to draw the air-supply for the furnace through said chamber, substantially as described.

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses, this 2d day of December, A. D. 1890.

JOHANN CHRISTIAN FELLNER.
CARL ZIEGLER.

Witnesses:

WM. VON DEN VERDEN,
AUG. ABELE.