No. 822,380. PATENTED JUNE 5, 1906.

W. R. MILLER & P. V. COLE.

CONTINUOUS INGOT HEATING FURNACE.

APPLICATION FILED JULY 27, 1905.

3 SHEETS—SHEET 1.

Fig. 2.

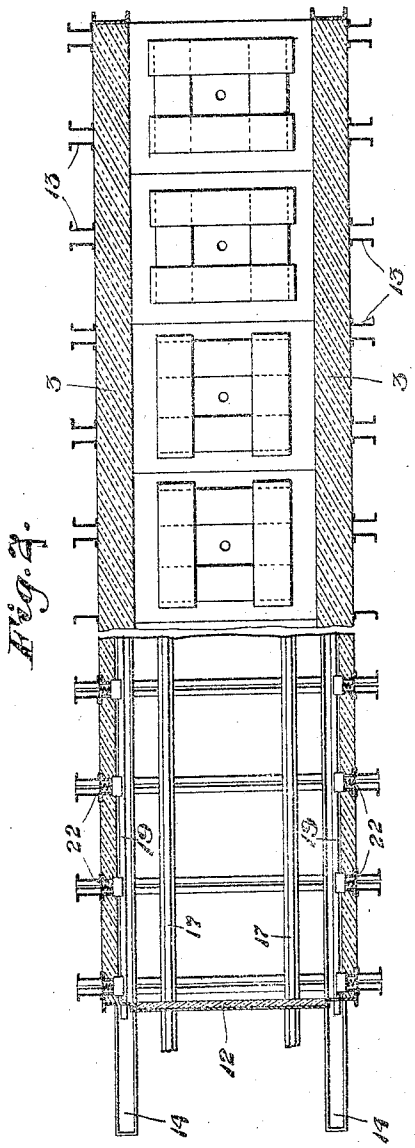
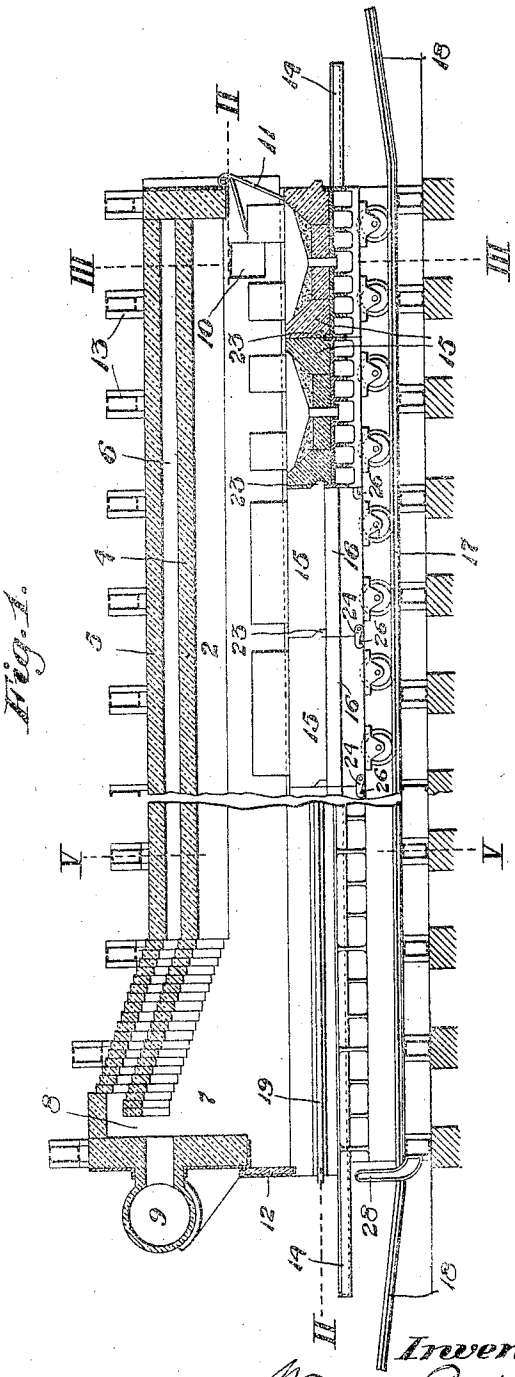


Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 3.

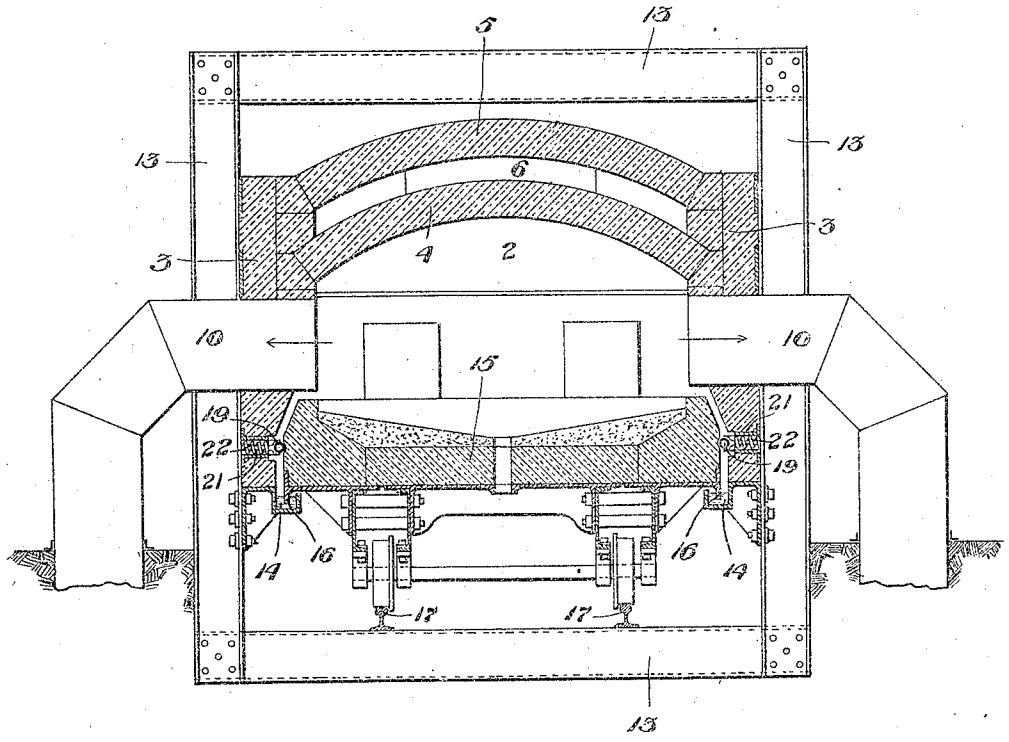
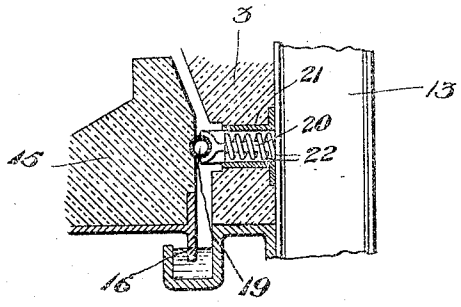


Fig. 4.



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3 SHEETS—SHEET 3

Fig. 5.

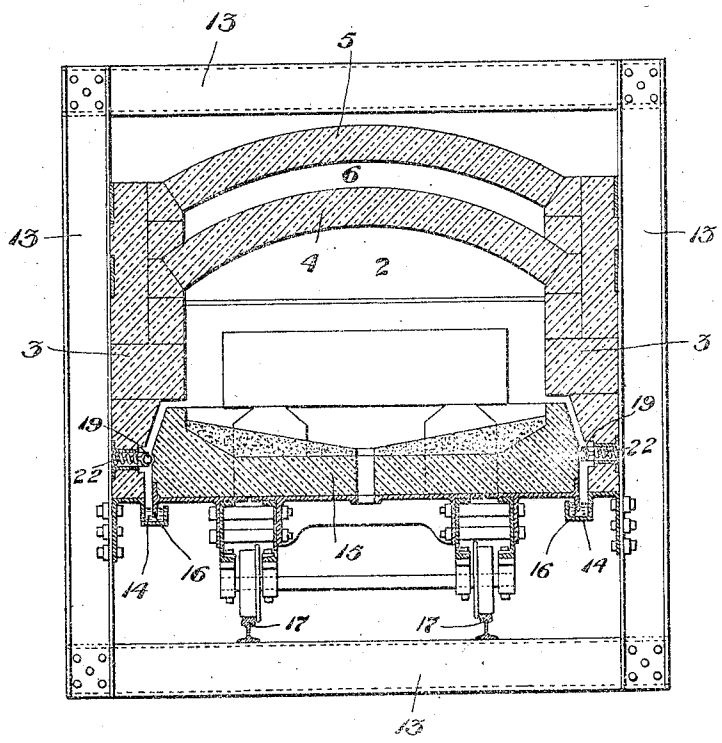
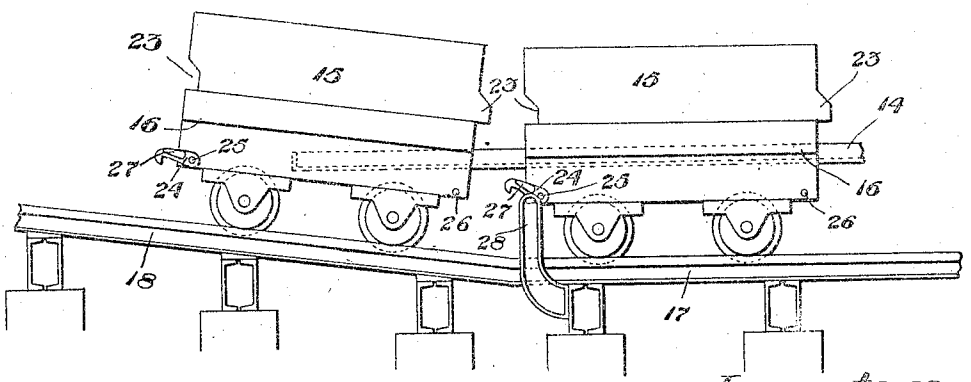


Fig. 6.



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UNITED STATES PATENT OFFICE.

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CONTINUOUS INGOT-HEATING FURNACE.

No. 822,380. Specification of Letters Patent. Patented June 5, 1906.

Application filed July 27, 1905. Serial No. 271,507.

To all whom it may concern:

Be it known that we, WILLIAM R. MILLER, residing at Pittsburg, and PAUL V. COLE, residing at Allegheny, in the county of Allegheny, State of Pennsylvania, citizens of the United States, have invented certain new and useful Improvements in Continuous Ingot-Heating Furnaces, of which the following is a specification, reference being had therein to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical longitudinal sectional view, partly broken away, of our improved continuous ingot-heating furnace. Fig. 2 is a similar horizontal sectional view, indicated by the line II II of Fig. 1. Fig. 3 is an enlarged cross-sectional view, indicated by the line III III of Fig. 1. Fig. 4 is a sectional detail view showing one of the resilient mountings for the side bearing-rod. Fig. 5 is a view similar to Fig. 3, indicated by the line V V of Fig. 1. Fig. 6 is a detail view illustrating the automatic uncoupling of the ingot-buggy and also showing the operation of emerging from the water-seal trough.

Our invention relates to improvements in continuous heating-furnaces for ingots, billets, &c., and comprises a longitudinal furnace open at each end, provided with an areaway through which the ingot-buggies and ingots pass upon supporting-tracks laid along the foundation, the furnace being provided along its inner sides with water-seal troughs with which downwardly-projecting water-seal flanges of the buggies coöperate in the manner hereinafter described.

The invention also refers to the arrangement of tracks whereby said flanges enter and emerge from the troughs at the ends of the furnace, also to the lateral bearings for the buggies, together with other features of advantage and improvement, as shall be more fully hereinafter set forth.

Referring now to the drawings, 2 represents the furnace-chamber contained within longitudinal parallel side walls 3 3 and having a double arched roof composed of lower and upper sections 4 5, with an intervening longitudinal air-heating passage 6. At one end of the furnace the roof structure is sloped upwardly toward the end, as shown at the left side of Fig. 1, providing a gas and air mixture chamber 7, into which the previously-heated air is introduced through the terminal air-port 8, forming the delivery end of air-space 6, while gas is supplied from a pipe 9, leading from a producer or any suitable source of supply. The fuel in combustion circulates throughout the interior of the furnace toward the opposite end, the products of combustion passing outwardly at one or both sides through outlet-pipes 10, connected with a stack in any suitable manner. At each end the furnace is provided with swinging or otherwise suitably-mounted doors 11 12, adapted to fit down over or across the ends of the ingot-buggies and to close the ends of the furnace against entrance of air or escape of the gases. The entire furnace structure is preferably provided with a supporting framework of structural elements 13, as shown, or may be braced with the ordinary buckstaves, as desired.

Located along the inner side walls of the furnace and preferably projecting outwardly at each end are the water-seal troughs 14, of any suitable construction, but which may be conveniently made of castings, as shown, incorporated with the furnace in such a manner as to extend inwardly beyond the inner-wall line, as clearly shown in Fig. 3, said troughs being kept filled with water by any suitable pipe connections. (Not shown.)

15 is the ingot-buggy provided with a superimposed ingot-supporting structure of refractory material, the foundation of the buggy being of any suitable construction, such as shown in the drawings, and particularly in Figs. 3 and 5. The supporting-plates of the buggy or any suitable portion thereof are provided at each side with downwardly-projecting flanges 16, adapted to be immersed in water contained in troughs 14 at each side, whereby a water seal is provided, so as to effectually prevent the passage of air or gas to or from the furnace-chamber entirely along each side thereof.

As heretofore stated, the troughs 14 extend outwardly beyond the ends of the furnace, and for the purpose of immersing the flanges thereinto and causing them to emerge outwardly therefrom the supporting-tracks 17, upon which the buggies are mounted, slope upwardly at each end of the furnace, as

clearly shown at 18, Fig. 1, by which arrangement it will be seen that as the buggies are advanced toward the furnace they will be gradually lowered, correspondingly lowering the flanges 16 into the troughs at the point of entrance, in which relation they will be maintained during the longitudinal travel of the buggies due to the horizontal parallelism of the troughs and tracks. Likewise the flanges will be gradually raised upwardly and out of engagement with the troughs as each buggy is drawn forwardly away from the other end of the furnace. It will be seen that by this arrangement the immersing and emergence of the sealing-flanges is accomplished entirely automatically, thereby avoiding the necessity of any supplemental dams or sealing apparatus.

For the purpose of providing an additional seal along each side of the buggies, and preferably in engagement with the superimposed refractory beds thereof, I provide longitudinal bearing elements, preferably pipes 19, mounted at intervals upon the inner ends of stems 20, horizontally arranged in receiving-bearings 21, mounted against the inner sides of the structural frame elements 13. These stems 20 are provided with coiled or spiral springs 22, which bear outwardly against the ends of the stems or against collars thereof and also against inner suitable bearings. As thus mounted the rods or pipes 19 are forced outwardly into bearing engagement with the sides of the buggies, as shown, and tend to steady them, providing a resilient bearing throughout the entire interior of the furnace and preventing contact with the sides thereof by the buggies. The device also provides a supplemental sealing construction.

The buggies make an interfitting engagement with each other at the ends by means of a male and female joint 23, as clearly shown in Fig. 1, the abutting faces of the buggies neatly fitting against each other, whereby gas-tight joints are provided.

The buggies are coupled together by means of a latch 24, pivoted at one end of each buggy on opposite sides at 25 and adapted to fit downwardly over suitable pins 26, correspondingly arranged at the meeting end of the adjacent buggy. By these devices the buggies are coupled and held tightly together as they are pushed or drawn through the furnace, and for the purpose of automatically uncoupling them as each succeeding buggy arrives at the exit end of the furnace the latches 24 are provided with sloping cam-abutments 27, arranged to engage over the tops of stationary posts or interfering-abutments 28. By these means the latches are disengaged as each buggy arrives at the end of the furnace, so that the forward buggy may be drawn away.

The operation will be readily understood from the foregoing description.

The invention as a whole is simple, efficient, and capable of long-continued operation without liability to get out of order.

The features of improvement may be applied to various constructions of furnaces or incorporated with existing structures and may also be changed or varied by the skilled mechanic as to different details; but all such changes or variations are to be considered as within the scope of the following claims:

What we claim is—

1. A continuous furnace provided with a longitudinal water-seal trough and traveling supporting mechanism provided with a sealing-flange arranged to be lowered into and raised from said trough as the traveling mechanism enters and leaves the furnace, substantially as set forth.

2. A continuous furnace provided with a longitudinal water-seal trough along each inner side and traveling supporting mechanism provided with sealing-flanges arranged to be lowered into and raised from said trough as the traveling mechanism enters and leaves the furnace, substantially as set forth.

3. A continuous furnace provided along its bottom with horizontal tracks sloping upwardly at each end and longitudinal water-seal troughs along its inner side walls, with traveling supporting mechanism having sealing-flanges arranged to be immersed into and raised from the troughs, substantially as set forth.

4. The combination with a continuous furnace having water-seal troughs along its inner sides, and a supporting-track along its bottom: of carrying-buggies mounted on the track provided with sealing-flanges, and means for lowering the buggies as they enter the furnace and for raising them as they leave the other end thereof, substantially as set forth.

5. The combination with a continuous furnace having water-seal troughs along its inner sides, and a supporting-track along its bottom sloping upwardly at each end: of carrying-buggies mounted on the track provided with sealing-flanges arranged to enter within said troughs, substantially as set forth.

6. A continuous furnace provided with a longitudinal water-seal trough and traveling supporting mechanism provided with a sealing-flange arranged to be lowered into and raised from said trough as the traveling mechanism enters and leaves the furnace, and provided along its inner walls with longitudinally-arranged resiliently-mounted bearing devices adapted to make contact with the sides of said supporting mechanism, substantially as set forth.

7. A continuous furnace provided with a longitudinal water-seal trough and traveling supporting mechanism provided with a sealing-flange arranged to be lowered into and raised from said trough as the traveling mech-

anism enters and leaves the furnace, and provided along its inner walls with longitudinally-arranged bearing elements provided at intervals with supporting-stems, and bearings therefor mounted in the wall structure and provided with compression-springs arranged to press said bearing elements against the sides of said supporting mechanism, substantially as set forth.

8. The combination with a furnace having water-seal troughs along its inner sides and a supporting-track along its bottom sloping upwardly at each end: of a series of buggies provided with sealing-flanges, means for coupling the buggies together, and means for uncoupling the foremost buggy as it emerges from the furnace, substantially as set forth.

9. The combination with a furnace having water-seal troughs along its inner sides and a supporting-track along its bottom sloping upwardly at each end: of a series of buggies provided with sealing-flanges and pivoted coupling-latches having disengaging cams, with a stationary interfering-abutment arranged to make contact therewith to effect the automatic uncoupling of the buggies, substantially as set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

WILLIAM R. MILLER.
PAUL V. COLE.

Witnesses:
CHAS. S. LEPLEY,
O. M. CLARKE.