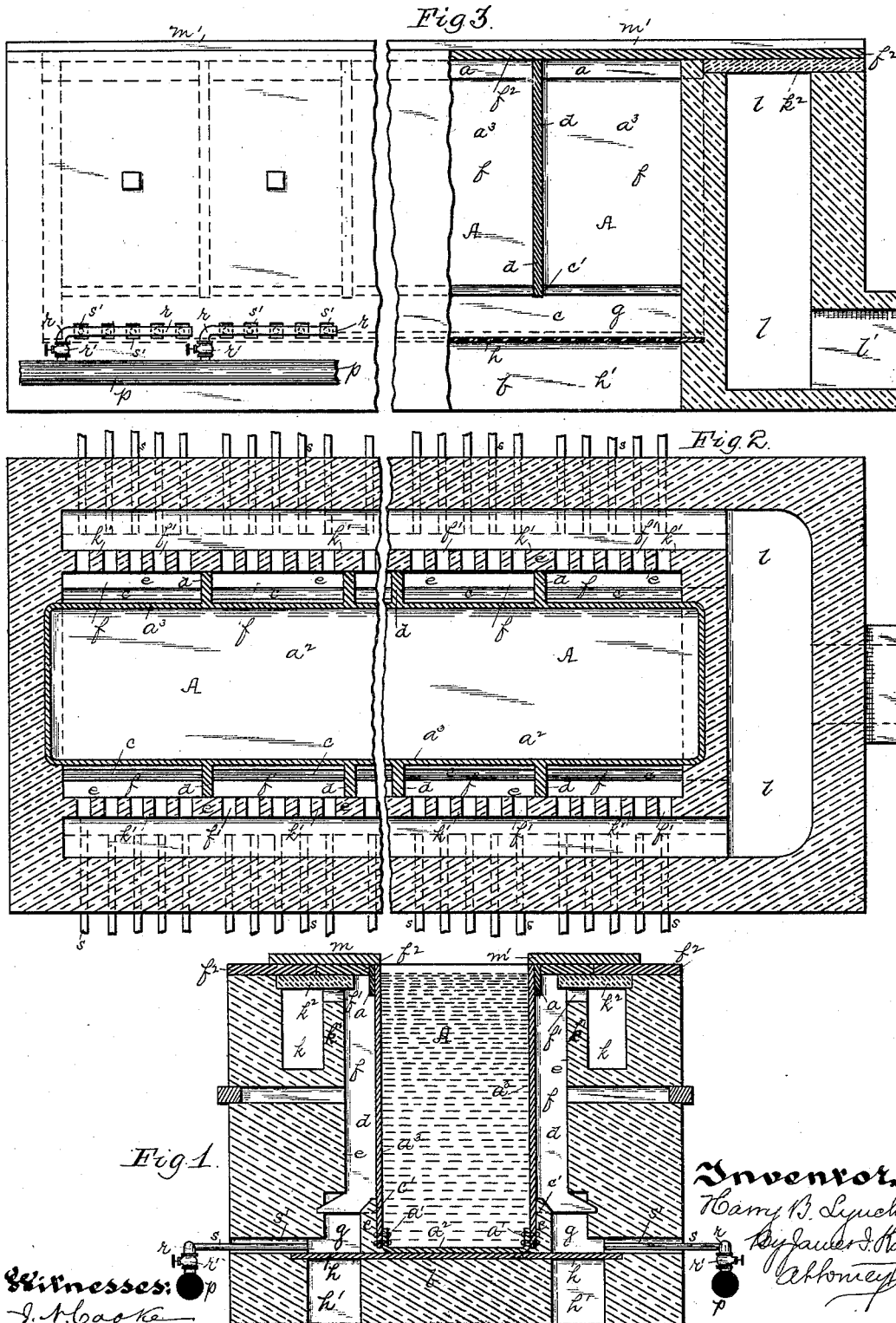


(No Model.)

H. B. LYNCH.
FURNACE FOR COATING METAL.

No. 419,695.

Patented Jan. 21, 1890.



UNITED STATES PATENT OFFICE.

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FURNACE FOR COATING METAL.

SPECIFICATION forming part of Letters Patent No. 419,695, dated January 21, 1890.

Application filed October 29, 1888. Serial No. 239,434. (No model.)

To all whom it may concern:

Be it known that I, HARRY B. LYNCH, a resident of McKeesport, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Furnaces for Coating Metals; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to the heating of pots for galvanizing or coating with metals, its object being to provide a suitable furnace for heating these pots with gaseous fuel and to do away with many of the objectionable features heretofore found in heating with coke or like solid fuel. These galvanizing-pots have heretofore been heated almost exclusively with coke, the coke being fed in at the top of the furnace around the outer edges of the pot and descending in the space between the furnace-walls and the body of the pot, and the heat from the coke passing through the walls of the pot into the molten metal therein, while the ashes, &c., were drawn out through flues or ash-pits at the base of the furnace. When the pot was so constructed, it was found that the zone of highest heat was near the base of the pot, as that was the point where the greatest heat was generated from the coke, the coke being fed at the top, and being gradually raised to incandescence as it descended in the space between the pot and the furnace-walls, and that in order to raise the upper part of the galvanizing-pot to the necessary heat the lower part thereof was raised to too high heat, thus causing the excessive drossing of the metal, and causing a very large loss in the galvanizing and like processes from this source. Though natural gas has been tried in the heating of these pots, it has heretofore been generally abandoned as not suitable for the purpose, because it was liable to cause the burning out of the rivets at the base of the pot, the pots being actually ruined from this cause, and also because the products of combustion from the gas passed out into the atmosphere around the upper end of the pot, and as they were much higher in heat than those arising from the coke and were more noxious, they were found extremely objec-

tionable to the workmen. There was also liability of the loss of the pot and its contents, such as where the supply of gas was cut off for a time, or where some of the gas-pipes of the furnace became clogged or inoperative.

The object of my invention is to provide a galvanizing-furnace in which the natural gas may be employed without the objectionable features above set forth, and in which the heat can be so regulated that the upper part of the bath of metal is held at a higher temperature than the lower part thereof and the drossing of the metal so prevented, as well as a furnace in which the coke or like solid fuel can be used in case the gas-supply should be cut off or the pipes to any part of the furnace become clogged, the coke or like fuel being employed in that part of the furnace without interfering with the use of gas in the other parts thereof.

In my improved furnace for heating, galvanizing, and like pots, I employ a tile sheathing or armor to protect the riveting of the pot from injury by the flame and heat, and I introduce the gas in such way that it is reflected by this tile sheathing or armor upwardly along through a series of vertical chambers formed by partition-walls around the pot into the flues extending longitudinally of the pot and leading to a stack, it being found that when so constructed the flame is spread within the heating-chamber around the pot, and so acts directly upon the pot to raise the heat thereof and of the metal therein, the greatest heat being generated in the upper part of the chamber, so that the zone of highest heat of the coating metal is in the upper part of the pot, and that the heated products of combustion are all conducted away from the pot, the heat in the upper part of the furnace-chamber being increased by radiation from the escape-flues, and the working of the pot being rendered much easier than in the old-style furnaces.

The furnace is improved in other particulars, as will be hereinafter more particularly set forth.

To enable others skilled in the art to make and use my invention, I will describe the same

more fully, referring to the accompanying drawings, in which—

Figure 1 is a cross-section of my improved pot. Fig. 2 is a top view thereof, and Fig. 3 is a side view, partly broken away.

Like letters of reference indicate like parts in each.

I have illustrated my invention as applied more particularly to a pot for galvanizing pipe or tubing, and for this reason have shown a long narrow pot; but it is evident that my invention can be applied to the ordinary or any suitable form of galvanizing-pot. The pot A is formed of plate metal, being supported around the top by the band *a*, and having at the base thereof the series of rivets *a'*, which unite the base-plate *a*² to the side plates *a*³ of the pot. This pot is supported upon the bed *b* of the furnace, which is preferably made wider than the pot, so as to provide a support for the tile sheathing or armor C, which fits around and protects the rivets *a'* of the pot from the heat generated within the furnace, and from the direct action of the gas-flame thereon, this tile sheathing having preferably a depression therein, as at *c'*.

In order to brace or support the body of the pot, it is generally provided with the ribs or brace-plates *d*, which extend out at intervals of about two feet from the body of the pot, and in building the furnace around the pot the brick-work of the furnace is brought up in contact with these ribs *d*, as shown in the drawings, the side walls *e* of the furnace acting with said base-plate or partition-wall *d* to divide the heating-chamber around the pot into a series of separate chambers *f*, which communicate with each other at the base thereof in the fire-chamber *g*. The grate-bars *h* separate the ash-pit *h'* from the fire-chamber *g*. Said several heating-chambers *f* also communicate with the flues *k*, extending through the upper part of the side walls *e*, and leading to the escape-flue *l*, which opens by the tunnel or passage *l'* to the stack, which is not shown. The chambers *f* communicate with the flues *k* over the bridge-walls *k'*, and to form a support for the tile *k*² above said flues *k* the ports *f'*, opening from the chambers *f* to said flue *k*, are formed of checker-work openings, so giving a support to said covering-tile *k*². Above said tiles *k*², extending over and closing the heating-flues *f*, are the bricks or tiles *f*², which extend from the tiles *k*² over to the body of the pot, and in order to protect said tiles *f*² *k*² from wear by the feet of the operators suitable cast-iron plates *m m'* are placed along the top of the furnace, so providing means for the workmen to walk over the furnace thereof, as is necessary in galvanizing pipe and like articles, and to protect them from the heat of the furnace.

In order to arrange the gas-supply to the furnace, I generally employ a main pipe *p*, extending along the base thereof on each

side of the furnace-body, and having leading up therefrom a separate supply-pipe *r*, controlled by valves *r'*, for regulating the supply to each section or heating-chamber *f* of the furnace. These pipes are provided with a series of jet-pipes *s*, leading from them into the ports *s'*, which open into the fire-chamber *g* of the furnace, and in the construction found well adapted for the purpose there being about five of these jet-pipes entering a separate port *s'* between each brace-plate *d* of the furnace. The heat of each section *f* of the furnace can be thus regulated, and consequently the highest heat applied at the parts of the furnace at which it is found necessary. The grate-bars *h* extend across and below the fire-chamber from the bed *b* to the side walls *e*, and I prefer to employ long grate-bars, each bar extending under the pot A and below each fire-chamber, as I find that these grate-bars act to brace or strengthen the furnace and give a firmer support to the galvanizing-pot.

When my improved furnace is in operation, the gas enters through the jet-pipes *s*, while the air enters through the ports *s'* around said jet-pipes, part of it also entering through the ash-pit, combustion being formed in the fire-chamber *g* and the flame striking directly against the tile sheathings *c*, which protect the rivets from the high heat generated and the "blow-pipe" action of the flame, and direct the flame and products of combustion upwardly through the several heating-chambers *f* along the side of the pot, spreading the flame within said chambers. It is found that as the flame with the unconsumed gas and air pass upwardly within said heating-flues the air is heated, and the gas and air form combustion, and the highest heat is generated in the upper part of the heating-chamber and near the top of the pot, this heat being increased by the radiation from the flues *k* through the bridge-walls *k'*, and quite a high heat being thus maintained in the upper part of the pot, while the heat in the lower part thereof is not so high, and as it is only necessary that the metal in the upper part of the pot be maintained at a proper temperature for coating, the heat of the entire pot of metal need not be maintained as high as with the ordinary coke-pot, as the heat is applied at the point or zone of metal which is required to do the greatest amount of coating—namely, in the upper part of the pot. As the upper part of the body of metal is thus maintained at the highest heat instead of the lower part thereof, the liability of drossing is to a great extent overcome, there not being the liability of the iron uniting with the zinc at the lower temperature, which was found to take place very rapidly at the high temperature necessarily maintained in the lower part of the pot when heated with coke. For this reason, as has been found by actual practice, the tonnage obtained from the same weight of coating metal is largely increased and the

drossing is reduced to a minimum. At the same time the temperature of the furnace can be accurately regulated to obtain the desired heat in the parts thereof which are most liable to be rapidly cooked or chilled by the dipping of the metal to be coated into the molten metal, as the supply of gas to each heating-chamber *f* is regulated by its own supply-pipe, and the heat can be increased or diminished at any part of the furnace to hold the entire body of metal at an even heat. A much higher heat can also be generated, if necessary, since all the products of combustion are carried off through the flues *k* and none permitted to escape into the room, while by the regulation of the damper the necessary heat in the furnace may be controlled and a dead or live heat be used, as is found necessary in the treatment of the metal. At the same time the pot is fully protected at its weakest point by the tile sheathing or armor, which acts to deflect the heat into the several heating-chambers and to spread the flame over the pot, giving a practically continuous flame all around the pot and obtaining practically all the heat from the gas.

My improved furnace also provides for the heating with the solid fuel in case any difficulty is experienced with the gas, either through the clogging of certain supply-pipes or where the entire supply of gas is cut off, as the heating-chambers *f* extend to the top of the furnace, being only closed by the tile *f*², and by removing these tiles and the cover-plates *m* access can be obtained to this chamber, or to any particular one of the heating-chambers, and the coke may be employed either for heating the entire body or for heating any part thereof, so that there is no liability of the cooling down of the pot and the solidifying of the contents thereof, and the loss of the pot from any such cause.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A furnace for heating galvanizing and like pots, having the heating-chambers at the sides of the pot divided vertically by partition-walls into a series of chambers, and having a separate valve-controlled gas-supply pipe for each section or chamber of the heating-chamber, substantially as and for the purposes set forth.

2. A furnace for heating galvanizing and like pots, having the vertical heating-chambers *f* formed of the partition-walls *d*, the horizontal escape-flues *k*, extending through the upper part of the side walls, the bridge-wall *k'*, separating said heating-chambers from said escape-flues, and the covering-tiles *k*² *f*², closing the upper ends of said heating-chambers and escape-flues, substantially as and for the purposes set forth.

3. A furnace for heating galvanizing and like pots, having the ash-pits *h'*, the grate-bars *h* above the same, fire-chambers above the grate-bars having gas-pipes and air-ports communicating therewith, a series of heating-chambers formed by the partition-walls *d*, extending up from said fire-chambers and communicating with the horizontal escape-flues extending through the upper part of the side walls, and the removable tiles covering the upper ends of said heating-chambers, whereby coke may be employed in some of the said heating-chambers, while gaseous fuel is employed in the other, substantially as and for the purposes set forth.

In testimony whereof I, the said HARRY B. LYNCH, have hereunto set my hand.

HARRY B. LYNCH.

Witnesses:

J. K. SPANGLER,
GEORGE MARS.