

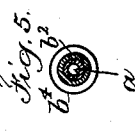
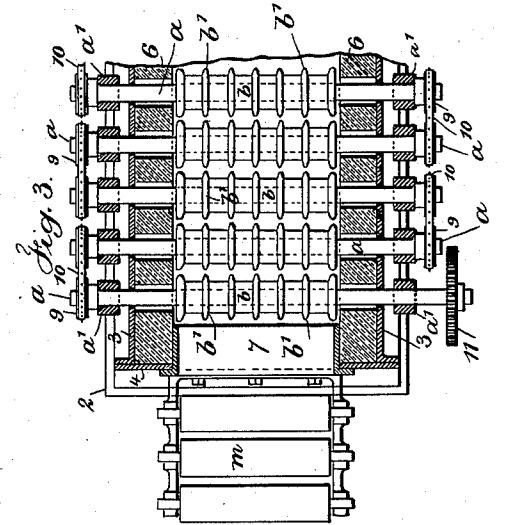
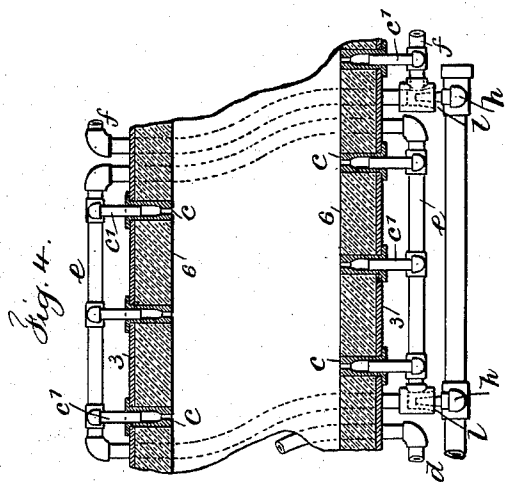
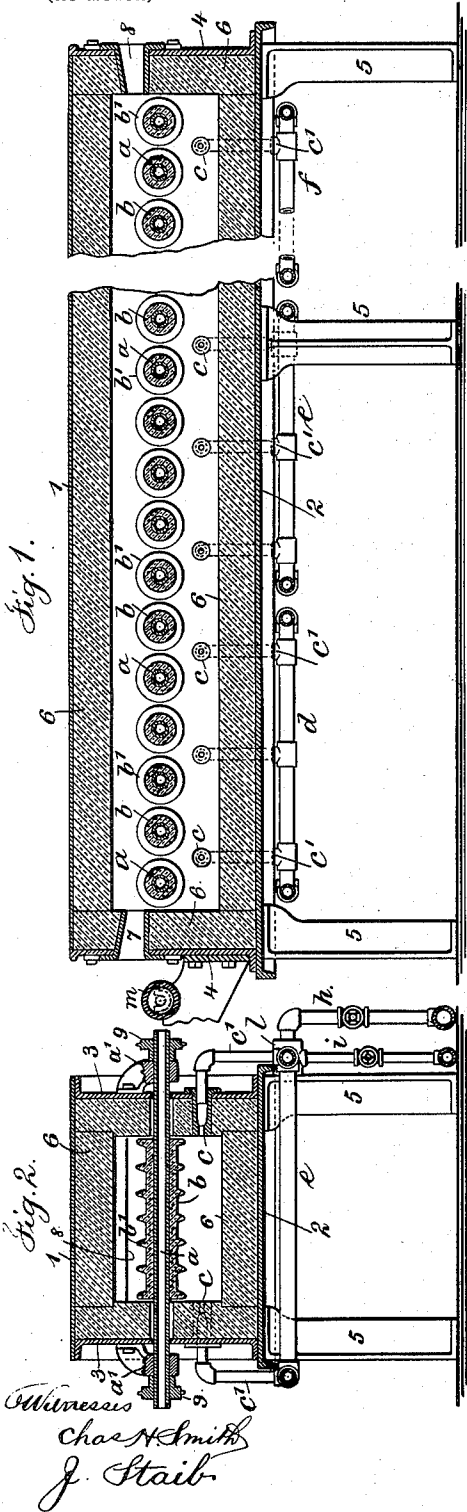
No. 669,765.

Patented Mar. 12, 1901.

E. P. REICHELTM.
GAS FURNACE.

(Application filed July 12, 1899.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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GAS-FURNACE.

SPECIFICATION forming part of Letters Patent No. 669,765, dated March 12, 1901.

Application filed July 12, 1899. Serial No. 723,630. (No model.)

To all whom it may concern:

Be it known that I, EDWARD P. REICHHHELM, a citizen of the United States, residing at Bayonne, in the county of Hudson and State of New Jersey, have invented a new and useful Improvement in Gas-Furnaces, of which the following is a specification.

My invention relates to a gas-blast furnace adapted for heating strips, bars, tubes, and similar articles of metal for annealing, tempering, drawing, or other treatment of the same in the arts. Heretofore in heating strips, bars, or tubes for such purposes it has been usual to place the same in a mass in a furnace and to apply the heat to the mass. This operation necessarily heated some parts of the mass to a greater degree than other parts. Consequently when the whole mass had been heated so that the annealing or tempering or drawing operations could be effected part of the mass was heated to too great an extent, or, in other words, there was an uneven heating that was detrimental to part of the mass; and the object of my invention is to overcome these difficulties and at the same time to lessen the period necessary for the heating operation, and thus to effect economy.

In carrying out my invention I provide a furnace through which such articles as strips, bars, and tubes of metal may be passed progressively over a series of roll conveyers and be subjected to the heat required for after-treatment. This furnace preferably comprises a metal case with a fire-brick lining, and through this case there are hollow shafts, around which there are sleeves of fire-brick, graphite, metal, or other heat-resisting material, the same forming the rolls of the conveyer. Suitable connections between the shafts of the rolls and operated by power at the outside of the furnace are provided for driving the rolls at a uniform rate of speed, and a throat is provided at one end of the furnace for the entrance of said articles of metal and another throat at the opposite end of the furnace through which the heated articles of metal are delivered for after-treatment. I also provide a series of burners projecting through the fire-brick lining and arranged so as to heat the interior of the furnace and the series of rolls to the required

heat, the said heat being communicated to the articles of metal in transit over the rolls. These burners are connected to air and gas pipes provided with means for regulating the quantity of air and gas, and these pipes may be in sections, so that one part of the furnace may be heated to a higher heat than another part.

In the drawings, Figure 1 is a vertical longitudinal broken section representing my improved furnace. Fig. 2 is a cross-section of the same. Fig. 3 is a sectional plan above the series of rolls at one end of the furnace. Fig. 4 is a sectional plan of part of the furnace above the burners, and Fig. 5 is a section of one of the conveyer-rolls wholly of metal.

The metal shell or case is preferably composed of a top 1, bottom 2, sides 3, and ends 4, fastened together in any well-known manner and supported upon legs 5, and the same is provided throughout with a fire-brick lining 6, with a throat 7 at one end and a throat 8 at the other end. Hollow metal shafts *a* pass transversely through the furnace in a horizontal plane and preferably at equal distances apart, and they are supported by bearing-brackets *a'* outside the case, there being a free way for the said shafts through the fire-brick lining and the metal sides of the furnace. Surrounding and securely connected to these shafts are rolls *b*, composed of fire-brick, graphite, or metal, according to the articles treated and the temperature employed, and these rolls are preferably made with annular ribs *b'*. The ribs *b'* are preferably spaced at equal distances apart along the rolls, and the rolls are all alike. On the ends of the hollow shafts *a* are sprockets 9, and connecting said sprockets in alternate pairs upon the opposite sides of the furnace are chains 10, so that power communicated to one shaft at a wheel 11 will operate all of the rolls of the series at the same speed and in the same direction.

I provide gas-blast burners *c*, passing through the fire-brick lining of the furnace. These are shown below the series of rolls; but this position is immaterial, as they might be placed above the rolls. I prefer to place them below the rolls, because the action of

the heating-flame is best utilized in an upward direction. These burners *c* are preferably placed in vertical planes below the spaces between the rolls of the series, and they alternate in opposite sides of the furnace. (See Fig. 4.) Pipes *c'* extend out from the burners for supplying a mixture of gas and air under pressure. The pipes *c'* may be connected to ordinary distributing-pipes; but I prefer to connect them to the pipe-sections *d, e, f*, there being, according to the illustration, six burners connected to each section, (see Fig. 4,) the pipe-sections being connected to the air-supply pipes *h*, having valves, and gas-supply pipes *i*, having valves, the air-supply pipes *h* having an injector *l*, through which the air is forced and by the action of which the gas is drawn into the section. The arrangement of these sections (see Fig. 4) is such that the commingled air and gas is obliged to pass around the sections by the action of the injector, so that the air and gas are thoroughly mixed and rise through the pipes *c* into the burners under pressure to be burned in the furnace. The special object of these pipe-sections is to be able to vary the degree of heat in different parts of the furnace by varying the amount of air and gas admitted and the pressure exerted, and in this way different degrees of temperature are maintained within the furnace at different parts thereof.

I do not limit myself to the number of burners, nor to the special construction of the burners, nor to the use of pipe-sections or the separate and regulated control of the gas and air.

In the operation of the device the speed at which the rolls of the series are driven determines the rate at which the bars, pipes, or strips of metal are passed through the furnace, and this speed can be regulated in any well-known or desired manner, the work being passed into the furnace at one of the throats and out at the opposite end of the furnace through the other throat, the office of the ribs *b'* of the rolls being to keep the bars, rods, or strips apart and separate from one another, so that the heat of the furnace has full play all around upon the said work in transit, and in no case are the said articles necessarily in contact to interfere with the full and thorough heating of every part.

It is to be understood that uniformity of heat is absolutely essential for the proper preparation of the metal bars, rods, or tubes for drawing, rolling, or other after-treatment and also that the single pieces exposed to heat from all sides simultaneously are not only heated more thoroughly and with greater uniformity, but also with greater rapidity, and these conditions effect economy in the treatment of the metal.

I prefer, as shown in Figs. 1 and 3, to provide at either or both ends of the furnace adjacent to the throats a series of supporting-rolls *m* for facilitating the introduction of the work into the throat or the exit of the heated

bars or metal from the throat, because in this way the said work is easily handled.

The shafts *a* are made hollow, so that the air will circulate freely through the shafts to cool the same and prevent overheating.

The sleeves of the conveyer-rolls may be made wholly of metal, as shown at *b²* in Fig. 5, in which case annular ribs *b⁴* are provided, the same as with the sleeves of fire-brick or graphite. These metal sleeves answer well in heating the softer metals for the after-processes.

It will be readily understood that the quantities of air and gas and the pressure at which they are admitted through the pipes *h* and *i* can be readily regulated by means of the valves in said pipes so as to produce the right flame in the furnace.

I claim as my invention—

1. In a gas or other furnace, a series of conveyers consisting of rolls of suitable heat-resisting material placed horizontally and each provided with a series of annular ribs raised upon the surface of the same forming a plurality of channels for receiving the work, a means for feeding the materials to be heated upon said rolls, means for turning the rolls to move the work along over the same and burners opening into the sides of the furnace for heating the rolls and materials thereon, substantially as set forth.

2. In a gas or other furnace, a series of conveyers comprising rolls placed horizontally and in line with each other, each of the said rolls having a hollow shaft in suitable bearings and a surrounding sleeve of heat-resisting material, and having a series of annular ribs upon the surface thereof forming a plurality of channels for receiving the work, a means for revolving the said rolls, and burners opening into the furnace at the sides and at spaced-apart intervals for heating said rolls and the material passing over the same, substantially as set forth.

3. In a gas or other furnace, a series of conveyers comprising rolls placed horizontally and in line with each other, each of the said rolls having a hollow shaft in suitable bearings and a surrounding sleeve of heat-resisting material having annular ribs raised upon the surface of the same forming channels for receiving the work, substantially as set forth.

4. A gas or other furnace comprising a long metal shell and a fire-brick lining throughout, a throat at each end forming an entrance and exit for metal bars, tubes or strips to be heated for after-treatment, a series of rolls in line and horizontally arranged through the said furnace, and of heat-resisting material provided with a series of annular ribs raised upon the surface forming channels and conveyers for supporting and moving along the said articles in transit, a series of burners projecting at spaced-apart intervals through the lining of the furnace adjacent to and below the rolls for heating the same and the metal strips thereon, means for rotating the

said rolls in the same direction and means for supplying regulated quantities of gas and air to said burners, substantially as set forth.

5 In a gas or other furnace, the combination with burners and means for supplying regulated quantities of gas and air thereto, of a series of rolls forming a conveyer, each of the rolls comprising a hollow shaft of metal through which the air may circulate for cooling, 10 bracket-bearings for the said shaft outside the furnace and a sleeve surrounding the hollow shaft within the furnace and composed of heat-resisting material provided with a series of annular ribs raised upon the surface and forming channels and conveyers for 15 the purposes and substantially as set forth.

6. In a gas or other furnace, the combination with a series of conveyer-rolls for sup-

porting and moving bars of metal through the furnace to be heated, of burners entering the 20 furnace from opposite sides placed alternately and in line with the spaces between the said conveyer-rolls so that the flames from the burners are beneath said spaces for the rapid heating of the metal upon the conveyer-rolls, 25 pipes connected to said burners and other pipes and valves connected to the aforesaid pipes for supplying regulated quantities of air and gas under pressure to said burners, substantially as set forth. 30

Signed by me this 7th day of July, 1899.

EDWARD P. REICHHELM.

Witnesses:

GEO. T. PINCKNEY,
E. E. POHLÉ.