

No. 795,218.

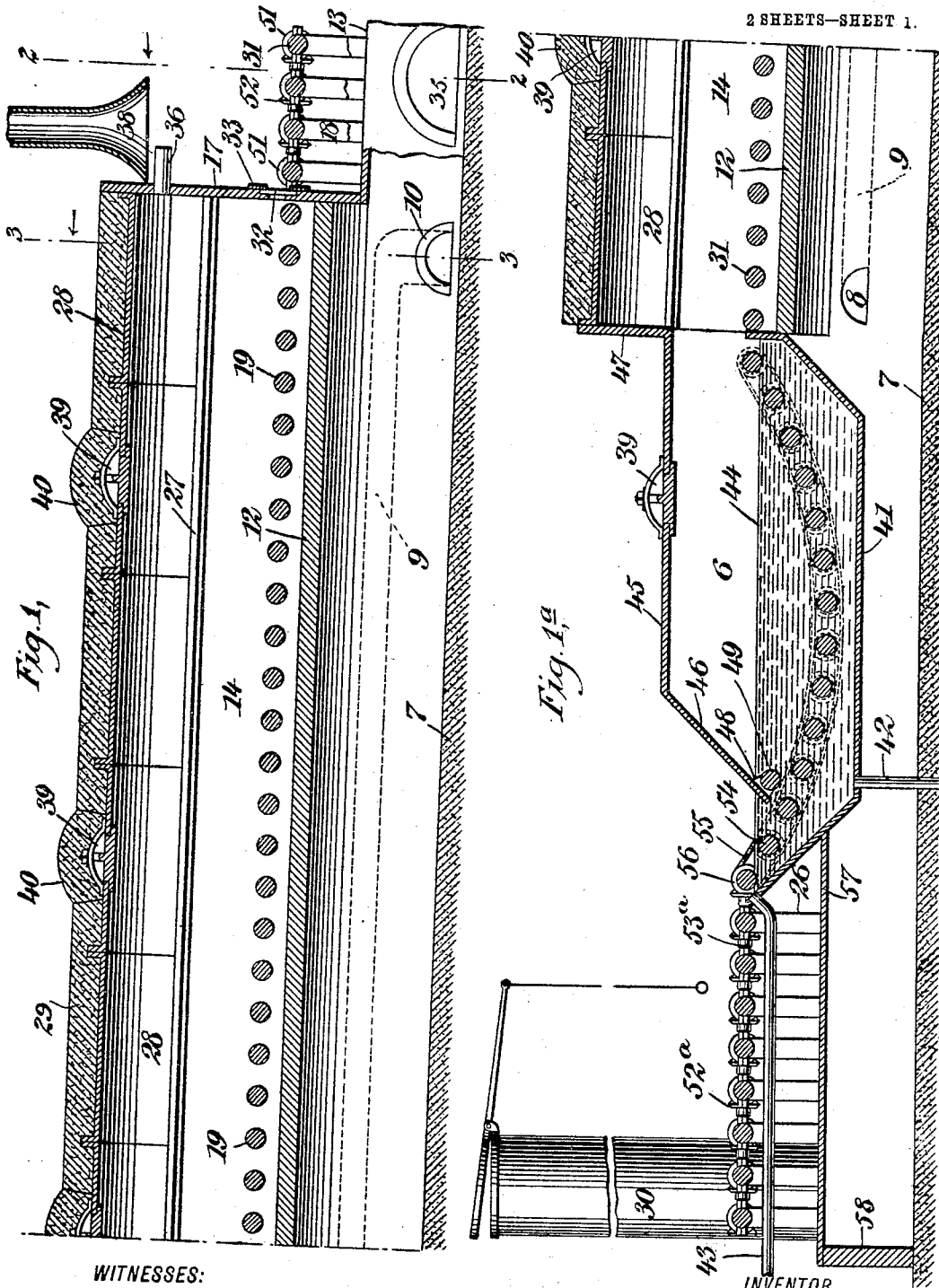
PATENTED JULY 18, 1905.

H. H. GOODSSELL.

FURNACE FOR TREATING SHEET IRON AND STEEL.

APPLICATION FILED JULY 29, 1904. RENEWED JUNE 27, 1905.

2 SHEETS—SHEET 1.



WITNESSES:

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W. H. Harrison

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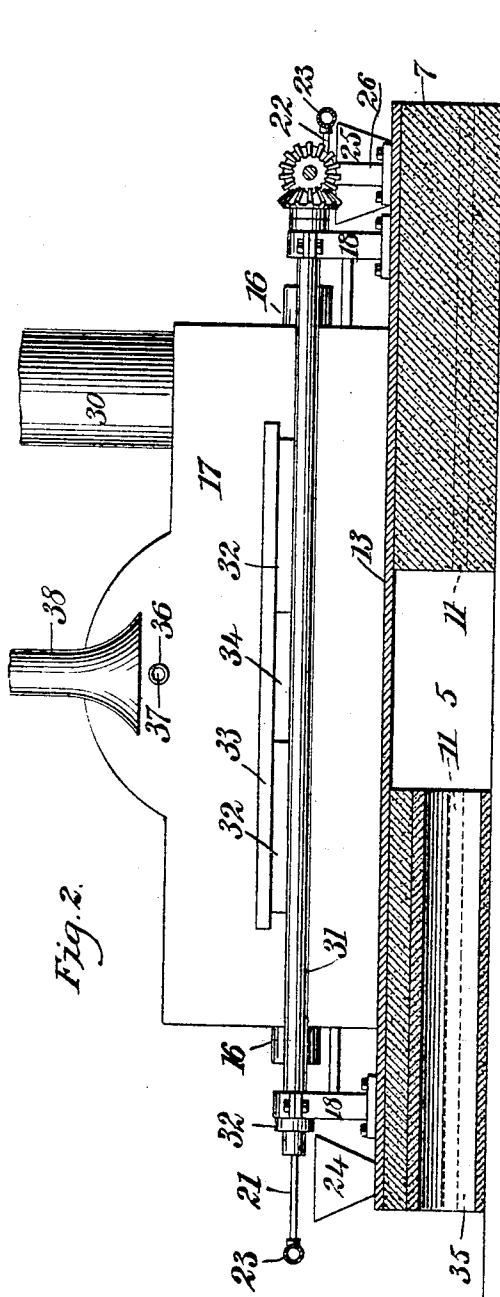


Fig. 2.

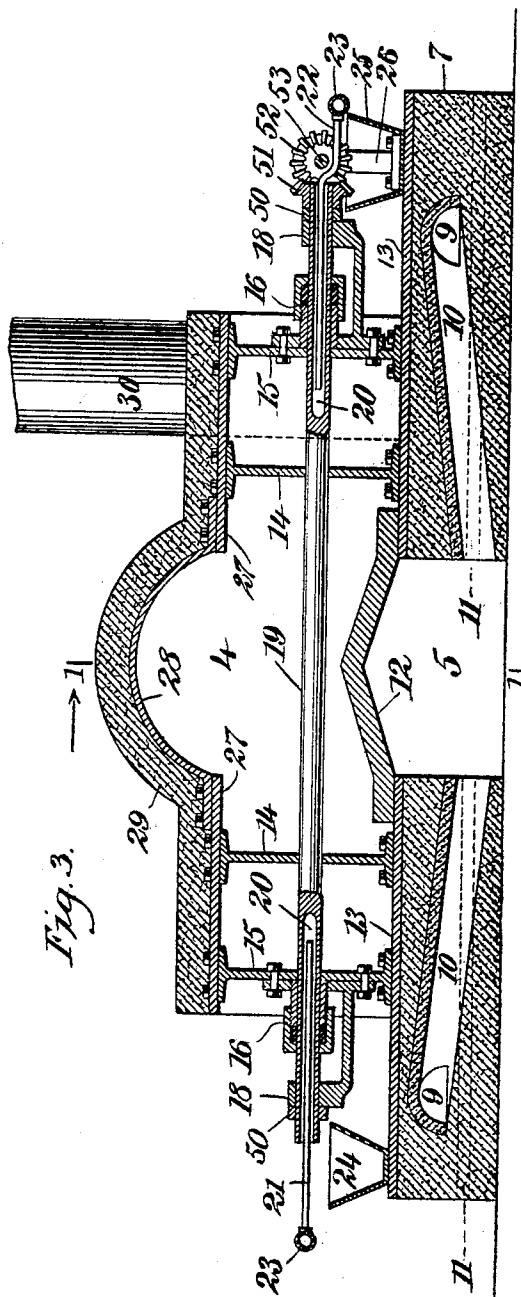


Fig. 3.

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UNITED STATES PATENT OFFICE.

HARRY HOMER GOODSSELL, OF LEECHBURG, PENNSYLVANIA.

FURNACE FOR TREATING SHEET IRON AND STEEL.

SPECIFICATION forming part of Letters Patent No. 795,218, dated July 18, 1905.

Application filed July 29, 1904. Renewed June 27, 1905. Serial No. 267,296.

To all whom it may concern:

Be it known that I, HARRY HOMER GOODSSELL, a citizen of the United States, and a resident of Leechburg, in the county of Armstrong and State of Pennsylvania, have invented a new and Improved Furnace for Treating Sheet Iron and Steel, of which the following is a full, clear, and exact description.

My invention relates to furnaces used for treating sheet iron and steel, but more particularly to an improved type of furnace which may be used advantageously in connection with the process described in my allowed application, Serial No. 180,190, filed November 7, 1903.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a fragmentary vertical section through my improved furnace, taken on the line 1 1 of Fig. 3, looking in the direction of the arrow. Fig. 1^a shows a continuation of the same section upon the same line. Fig. 2 is a vertical cross-section upon the line 2 2 of Fig. 1 looking in the direction of the arrow, and Fig. 3 is a vertical cross-section upon the line 3 3 of Fig. 1 looking in the direction of the arrow.

My improved furnace employs what I call a "bluing-chamber" 4, superposed over a heating-flue 5, as indicated in Fig. 3. A cooling-chamber 6 is located at the rear of the bluing-chamber and is heated from the heating-flue 5. The base 7, made preferably of any refractory material, is provided with passages 8, 9, and 10, connected serially, and together constituting a pair of air-flues. The passage 8 at the rear end of the furnace and the passage 10 at the front end thereof both terminate in the heating-flue 5, the passage 8 delivering the heat into this flue at an elevation somewhat higher than that at which it was received from the flue by the passage 10. The purpose of this arrangement is to cause different portions of the furnace to expand and contract equally. Were it not for this provision those parts in immediate contact with the flames would expand more rapidly

than the parts remote from the flames; but by having the heated gases pass out directly into the walls of the furnace this difficulty is obviated, as will be understood from Figs. 1 and 3. The base 7 is also provided with passages 11, extending from the heating-flue 5 to the outer atmosphere. These passages may be used for admitting natural gas to the heating-flue 5, in which event the heating-flue serves to admix the gas with the air arriving through the air-flues. In case natural gas is not used the passages 11 may be either closed or left open, as desired. If left open, they serve as air-ducts for supplying small quantities of air to the heating-flue 5. If desired, the smoke and gases from an ordinary coal-burning stove or furnace of any kind may be directed into the front end of the heating-flue 5 and carried back to this flue, so as to furnish the required degree of heat. A ground plate 12, preferably quite thick, rests upon the metallic plates 13, which are supported upon the base 7. Mounted upon the plates 13 are I-beams 14 15, disposed parallel with each other, as indicated in Fig. 3. The outer I-beams 15 are provided with stuffing-boxes 16 and at their front ends abut against the wall 17. Pillow-blocks 18 support a number of revoluble rollers 19 and 31, the rollers 19 being disposed within the bluing-chamber and provided with water-receptacles 20, made by rendering the ends of the rollers tubular. Water is supplied to the receptacles 20 by means of nozzles 21 22, which are connected with water-pipes 23 for supplying the water. Troughs 24 25 are disposed adjacent to the outer ends of the rollers 19 and serve to catch and convey away the heated water which may flow from the rollers. Pillow-blocks 26 may be mounted directly in the trough 25, as indicated in Fig. 3.

Mounted upon the I-beams 14 15 are metallic plates 27, connected together by arch-plates 28. The arch-plates abut against each other, so as to form a continuous series, as indicated in Fig. 1. A fireproof covering 29, made, preferably, of asbestos, may be placed upon the bluing-chamber, as shown. The rollers 31 do not differ materially from the rollers 19, except that being outside of the

bluing-chamber, and consequently not being subjected to high degrees of heat, it is not necessary to provide them with the water jackets or receptacles 20. The bluing-chamber 4 is provided with sliding doors 32, arranged in a slideway 33 and adapted to move apart, so as to leave a passage 34, through which may be inserted the metallic plates to be operated upon. A chimney or smoke-stack 30 is provided for the purpose of carrying away the gases of combustion which pass out of the heating-flue 5. A side passage 35 is provided in the front end of the furnace, preferably below the plates 13, so as to form an entrance for the heated air and gases should it be preferred to use them, and also to allow access to the heating-flue 5. A tubular member 36 pierces the front wall 17 and is provided with a glass disk 37, thus constituting a peep-hole through which observations may be made from the outside. A funnel 38 opens downwardly toward the rollers 31 and is used for conveying away the heated air and steam which may chance to accumulate in the region immediately in front of the wall 17. Of course the draft through the funnel may be forced, if desired, in any manner well known in the art. The top of the bluing-chamber is provided with man-holes 39, which are covered by closure members 40 of fireproof material, preferably asbestos.

The cooling-chamber 6 consists of a pan 41, provided with pipes 42, 43, used, respectively, for filling the pan 41 with water and for allowing any excess thereof to pass off without an overflow. Over the pan is a top 45, provided with a shield 46 and with a flange 47, connected upon the rear end of the bluing-chamber. Mounted upon a bracket 48, carried by the shield 46, is a revoluble roller 49. The ends of the rollers 19 are provided with collars 50, and one end of each of these rollers 19 is further provided with a bevel-gear 51, which engages another bevel-gear 52, mounted upon a longitudinal shaft 53 or 53". A number of rollers 54 are mounted in the pan 41 and arranged in the arc of a circle, as indicated in Fig. 1^a, these rollers being propelled by sprocket-gearing 55, actuated by the shaft 53^a through the medium of the bevel-gear 56. The shafts 53 and 53^a are driven by any suitable motor mechanism and are turned in such direction that the upper parts of the rollers 55 move toward the rear of the furnace.

My invention is used as follows: The plates of iron or steel to be operated upon are placed upon the rollers 31 at the front end of the furnace. This may be done in any approved manner, but preferably by means of a truck which I have specially contrived for the purpose. The rollers 31 being in motion, the plates pass into the bluing-chamber. The heat from below vaporizes the water 44 in the pan 41, thus raising steam in the cooling-chamber 6. The

temperature of this steam first approximates the boiling-point of water—to wit, 212° Fahrenheit. The steam passes from the cooling-chamber into the bluing-chamber and is gradually raised to a higher and higher temperature as it approaches the front end of the furnace. In the immediate vicinity of the door 32 the steam acquires a temperature of 900° to 1,600° Fahrenheit. At the higher temperature mentioned the steam first rapidly heats the plates to a dull cherry-red. The incandescence gradually dies down as the plates are moved along. When the plates arrive at the cooling-chamber, they are of a temperature not much higher than 212° Fahrenheit. They then pass through the water 44 and back toward the chimney, resting upon the rollers, from which they may be removed. The passage through the water insures their cooling to a point at which the atmosphere does not readily attack them.

I do not limit myself to the use of water for cooling the plates, nor in all instances to the use of any cooling-chamber 6. The water is used merely to insure that the plates before finally emerging from the furnace are brought down to a temperature not exceeding 212° Fahrenheit.

I find that by thus subjecting the plates to the action of exceedingly hot and dry steam and gradually allowing them to cool under the conditions above described each plate acquires a beautiful blue coating of oxid, which is exceedingly tenacious and which has working properties not found in a plate prepared in the usual manner.

The plates are completely oxidized by the time they leave the water. The oxidizing process ends when they enter the water. After emerging from the water at the back of the pan they are thoroughly dried by the comparatively gentle heat at this point. The general purpose of the water is to prevent any atmospheric oxidation outside of the furnace.

The process above described, it will be noted, is an annealing process as well as an oxidizing process.

My theory is that a sheet of metal coming rather abruptly into contact with steam at the high temperature mentioned is caused to expand and to open its pores, thereby allowing the subtle steam, which is an oxidizing agent of a very high order and which has great penetrative power, to enter into the body of the plate, causing oxidation to take place at a comparatively great depth within the substance of the metal. It will of course be observed that if the plate happens to be above 212° Fahrenheit at the time it reaches the water it will certainly be at 212° Fahrenheit when it emerges from the pan and is subjected to a drying heat immediately in the rear of the pan. The oxidation is practically completed prior to the time when the plate emerges from the water, so that the mere drying of the plate in the rear of the pan does not ma-

terially change the degree of oxidation. In fact, there is no increase in oxidation after the plate touches the water for the reason that hot water is a very poor oxidizing agent, and when the plate emerges from the hot water its temperature is too low to be materially affected by the action of the air. The small quantity of dry heat to which it is subjected after emerging from the bath prevents further slow oxidation after the removal of the plate from the furnace.

The plate retains to a great extent any polish which it may have at the beginning. In other processes the heating of the plates by means of a furnace destroys the polish, whereas in the use of my furnace the plates not having been previously heated are not subjected to the unequal and unsatisfactory oxidizing action of ordinary furnace heat because their temperature is raised by the steam itself a moment after the plates enter the bluing-chamber. It is important that the heating and oxidizing of the plates for the purpose of giving them the blue color should not destroy the polish upon the plates as they are originally prepared.

Among other requisites a properly-finished plate must be soft and well annealed, must have a high polish, and must be so blued as to have a compact surface. It is therefore impracticable in most other furnaces to confer all these requisites upon a plate without the necessity for polishing it up after the bluing process, and this is not only expensive, but is damaging in a measure to the plate. I avoid the necessity for rolling the plate after the bluing process, and this step alone is of considerable value.

As will be seen from Fig. 1, the metallic plates 13 constitute a sort of platform extending some distance in front of the bluing-chamber, this platform being broken away in this figure. It will also be noted that the rollers 31 extend outwardly some distance from the front end of the bluing-chamber and that the flue 5 heats these rollers independently of the temperature of the rollers inside of the furnace. The purpose of this arrangement is to enable the plates to be heated to some extent before passing into the bluing-chamber. I have found that if the plates are comparatively cool when passed into the bluing-chamber they lower the temperature of the steam in immediate contact with them and cause the same to condense and form water upon the surfaces of the plates. This action is undesirable, and I therefore find it best to raise the temperature of the plates before they pass into the bluing-chamber by means of the apparatus shown. When the plates are placed upon the rollers 31 they are at the ordinary temperature of the atmosphere, or at least at such a temperature as is endurable by the workmen standing upon the platform and handling the

plates. As the plates move over the rollers 31 toward the front door they are gradually heated, and as they pass into the bluing-chamber their temperature is such that no condensation of the steam inside will occur.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination of a bluing-chamber, means for supplying thereto steam having different temperatures, at different parts of the same, and mechanism for carrying plates from one end of said bluing-chamber to the other end thereof.

2. The combination of a bluing-chamber, a cooling-chamber, means for heating steam to different temperatures in different portions of said bluing-chamber, and mechanism for carrying plates through said bluing-chamber and into said cooling-chamber.

3. The combination of a bluing-chamber, a cooling-chamber connected therewith and provided with means for holding water, rollers disposed within said bluing-chamber and adapted to carry plates therethrough, means for heating said bluing-chamber and said cooling-chamber so as to raise steam within said cooling-chamber and to elevate the temperature of said steam within said bluing-chamber, means for directing said steam from said cooling-chamber into said bluing-chamber, rollers mounted within said cooling-chamber below the water-line thereof, and mechanism for driving all of said rollers.

4. The combination of a bluing-chamber, means for heating steam to different temperatures in different portions of said bluing-chamber, and rollers disposed adjacent to said bluing-chamber for carrying plates toward the same, said rollers being so disposed as to be heated by said steam.

5. The combination of a bluing-chamber consisting of a top portion supported upon I-beams, rollers engaging said I-beams, means for rotating said rollers for the purpose of carrying plates through said bluing-chamber, and means for subjecting different portions of said bluing-chamber to steam having different temperatures.

6. The combination of a bluing-chamber provided with rollers for engaging plates in heated condition, said rollers being provided with receptacles, means for passing water into said receptacles for the purpose of cooling said plates, and mechanism for surrounding different rollers with steam differing in temperature at different points for the purpose of treating said plates.

7. The combination of a bluing-chamber, a heating-flue disposed below the same and adapted to heat different portions thereof to different temperatures, a pan connected with said bluing-chamber and adapted to discharge steam thereinto, and means for passing plates through said bluing-chamber toward said pan.

8. The combination of a bluing-chamber, a pan disposed adjacent thereto and adapted to hold water, means for heating said pan and said bluing-chamber, so as to discharge steam
5 from said pan into said bluing-chamber, and roller mechanism for carrying plates through said bluing-chamber and into said pan.

9. The combination of a bluing-chamber, means for filling the same with steam having
10 different temperatures in different parts of said bluing-chamber, and a plurality of rollers mounted within said bluing-chamber for the purpose of carrying plates through said steam of different temperatures.

15 10. The combination of a bluing-chamber, a heating-flue disposed below the same, said heating-flue being provided with longitudinal passages having portions disposed parallel with said bluing-chamber and terminating at
20 both ends within said bluing-chamber, and mechanism mounted within said bluing-chamber for moving plates through the same.

11. The combination of a bluing-chamber, means for introducing steam into the same,
25 mechanism for passing the plates into said bluing-chamber, and mechanism for heating said plates as they move toward said bluing-chamber.

12. The combination of a bluing-chamber
30 provided with a door, means for supplying steam into one end only of said bluing-chamber, rollers mounted adjacent to said bluing-chamber for the purpose of carrying said plates toward said bluing-chamber and for heating
35 said plates as the same are thus carried, and

means for heating said rollers mounted adjacent to said bluing-chamber.

13. The combination of a bluing-chamber, means for introducing steam thereinto, rollers mounted within said bluing-chamber, 40 stuffing-boxes engaging said rollers for rendering the same steam-tight, and means for actuating said rollers.

14. The combination of a bluing-chamber, means for passing metallic plates there- 45 through, a pan disposed adjacent to said bluing-chamber and adapted to hold water, means for heating said pan and said bluing-chamber so as to discharge steam from said pan into said bluing-chamber, and roller mechanism disposed adjacent to said pan for receiving plates therefrom. 50

15. In a furnace, the combination of a bluing-chamber, rollers mounted therein, a pan disposed adjacent to said bluing-chamber and 55 adapted to contain a liquid, rollers mounted within said pan, means for actuating all of said rollers, a wall connected with said bluing-chamber and dipping into said liquid contained within said pan, and a roller connected 60 with said wall for preventing the plates from being misplaced by their tendency to float.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HARRY HOMER GOODSSELL.

Witnesses:

JAMES SAULTERS,
DAVID P. TROUT.