(No Model.)

J. R. JACKSON.

MODE OF MANUFACTURING SHEET METAL.

No. 418,371. Patented Dec. 31, 1889.

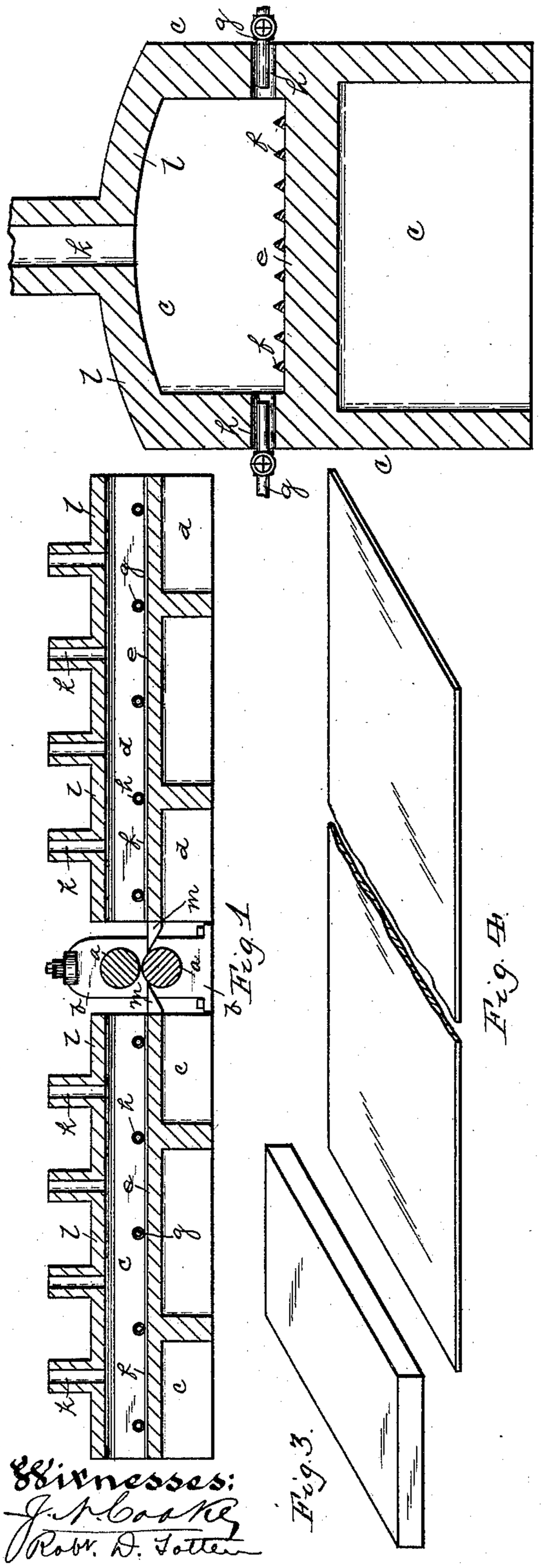

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

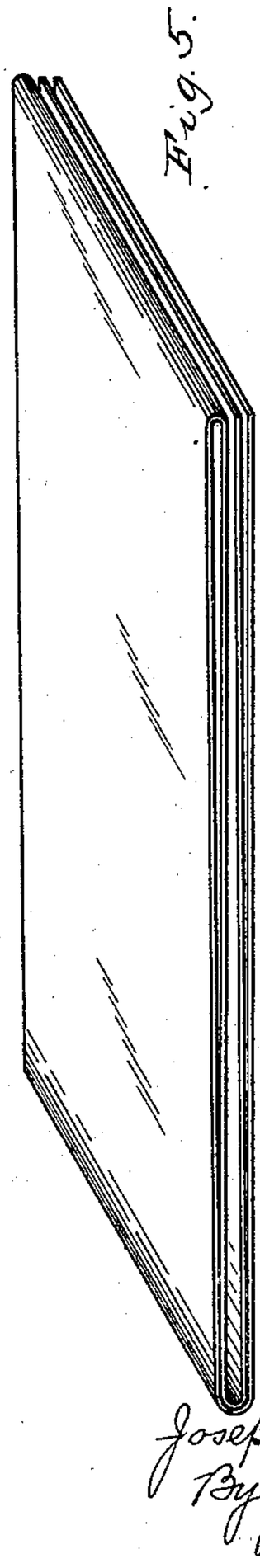

Fig. 5.

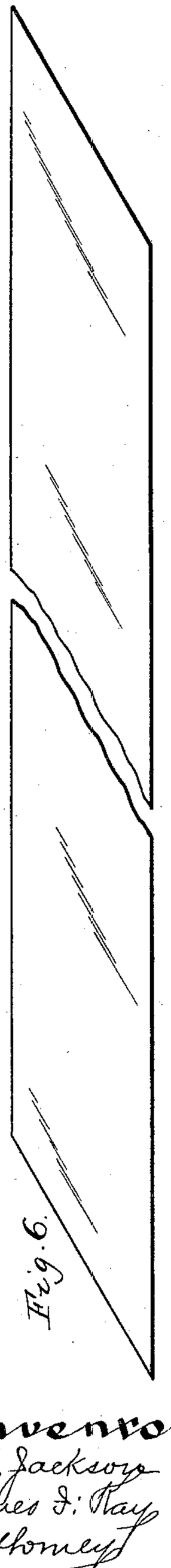

Fig. 6.

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UNITED STATES PATENT OFFICE.

JOSEPH R. JACKSON, OF PITTSBURG, PENNSYLVANIA.

MODE OF MANUFACTURING SHEET METAL.

SPECIFICATION forming part of Letters Patent No. 418,371, dated December 31, 1889.

Application filed June 5, 1889. Serial No. 313,160. (No specimens.)

To all whom it may concern:

Be it known that I, JOSEPH R. JACKSON, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in the Manufacture of Sheet Metal; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to the manufacture of sheet metal, being specially applicable to the manufacture of sheet iron and steel, its object being to provide means for forming the same rapidly and at low cost.

Heretofore in the manufacture of sheet metal the following have been the ordinary steps practiced: From a suitable pile or bloom a flat bar has been rolled out, the bar being generally from three-eighths of an inch to an inch thick, and this bar was then cut into lengths corresponding to the finished sheet to be produced. The short bars were then reheated in a suitable furnace and fed singly or in pairs crosswise to suitable plating-rolls and reduced by such rolls to a plate or sheet of thick gage and having a length of about two to three feet or more. Several of these plates were then piled to form a pack, and the pack so formed was reheated in a suitable furnace and fed to the plating-rolls and the pack of plates rolled out into sheets of the desired gage, being generally reheated several times to form thin gages. The pack was then trimmed on the sides and the ends, so obtaining the finished sheet metal of the gage desired. The cost of manufacture was considerably increased by the cost of reheating the bars, plates, or sheets, as this reheating requires skilled laborers who receive high wages.

By the above method of operation it is seen that several reheatings of the metal are required, adding to the expense, while the cost of manipulation is large and the output obtained from any ordinary plant is small. The object of my invention is to save the cost of these reheatings and the other manipulations heretofore found necessary in producing the sheet metal, and yet provide a method for rolling the sheets to the desired gage, no matter how thin a gage may be required.

To these ends my invention consists, generally stated, in rolling the heated slab, bloom, or pile to a thick sheet at one operation, then forming therefrom two or more lengths suitable for producing the desired length in the finished sheet, and passing the same, singly or in packs, first through a heating-furnace, then through plating-rolls into another heating-furnace, and back and forth from one furnace through the rolls into the other furnace until reduced to the desired gage, so maintaining the proper heat for rolling without the necessity of removing the same at intervals to a reheating-furnace.

It also consists in certain steps of the process which will be more fully hereinafter set forth.

To enable others skilled in the art to practice my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a longitudinal view of the combined furnace and plating-rolls suitable for practicing my invention. Fig. 2 is a cross-section of the furnace. Fig. 3 shows the slab from which the sheet metal is to be formed. Fig. 4 is a view of the sheet rolled from that slab. Fig. 5 is a view of the pack formed from such sheet, and Fig. 6 shows the finished sheet obtained.

Like letters of reference indicate like parts in each.

The rolls employed for reducing the slab to plate are the ordinary three-high tongue and groove rolls having a suitable number of passes, and, if desired, two or more sets of these rolls being employed, the slab being reduced and elongated in these rolls until brought to a plate and then fed to suitable plating-rolls.

The combined furnace and rolls shown in Figs. 1 and 2 have, generally stated, the following construction: The rolls *a* are mounted in suitable housings *b*, a two-high mill being employed, and being provided with suitable adjusting and reversing mechanism for regulating the pass between the rolls and reversing the direction of their movement. On each side of said rolling-mill is placed a long furnace, as at *c* and *d*, and the furnaces *c d* being similar in construction and each having the hearth *e*, which may either be formed flat or, if desired, may have a series of ribs,

as at *f*, extending longitudinally through the same, so as to form a support for the sheet and reduce friction between the same and the furnace-hearth. These furnaces are formed of sufficient length to receive the finished sheet, being generally forty or more feet in length, and they may be heated in any suitable way, the method of heating shown in the drawings consisting of the series of gas-pipes *g*, entering through ports *h* in the side walls, and a series of cylindrical stacks or chimneys *k* in the arched roof *l* of the furnace. The inner ends of the furnaces are placed close to the rolling-mill, and each furnace has a suitable guide-plate *m* leading therefrom to the base of the rolls, so that when the plate is fed from the furnace it will be directed into the rolls, and it will be forced by the rolls over the guide-plate of the other furnace into the heating-chamber thereof. The heat maintained in the furnaces is such as to maintain the plates at about a cherry-red heat or proper heat for rolling.

In practicing the said method of forming sheet-iron I take a slab, bloom, or pile of steel, iron, or other suitable metal—such as shown in Fig. 3—this slab being of a width corresponding to the width of the finished sheet to be produced and allowing for shrinkage and trimming, the size of the slab of course varying according to the width, length, and thickness of sheets to be formed. This slab is heated in a suitable furnace, and is then fed to tongue and groove rolls and reduced therein to plate and at the same heat is fed to and reduced in plating-rolls to a rather thick sheet—such, for example, as 18-gage, as shown in Fig. 4.

By this method of rolling I can at one operation produce a sheet of a length sufficient to produce several sheets of thin gage, the sheet formed being generally from thirty to forty or more feet in length. I then either fold the sheet so obtained to form a package containing several sheets, as shown in Fig. 5, or, if desired, cut the sheet into the proper lengths, and the sheets so obtained are then fed either singly or in packages to the combined furnace and reducing-rolls, such as shown in Figs. 1 and 2. I prefer to feed the sheets to the same in packages formed either by the folding of the long sheet or the piling together of the several sheets cut therefrom. The sheet or pack then rests within the furnace into which it is fed—such as in a furnace *c*—until it is raised by the heat therein to the proper temperature for rolling, when the operator, by pushing at the rear of the sheet by a suitable tool, feeds it over the guide-plate *m* and to the rolls *b*, by which it is reduced and fed into the furnace *d*. The rolls are then reversed and the pack fed from the furnace *d* back through the rolls into the furnace *c*, and this is continued, the pack being heated in the two furnaces or maintained therein at the proper temperature for rolling until reduced to the proper gage, 24, 28, 32, or other gage, as desired, such as shown in Fig. 6. After the rolling of the pack it may be trimmed, if necessary, being trimmed at the ends where the pack has been formed by folding in order to separate it into single sheets. As the sheets or packs are thus forced from one furnace into the other through the reducing-rolls, the necessity of carrying them away from the rolls and reheating is overcome, and, as the same operators who feed the sheets or packs to the rolls also care for them in the furnace, the cost of manipulation is very materially reduced, sheets produced according to my invention costing from ten to fifteen dollars less per ton than in the old method of manufacture. The sheets may also be formed much longer than those produced by such method.

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

1. The herein-described method of forming sheet metal, consisting in rolling the slab, bloom, or pile to a thick sheet, then forming therefrom two or more lengths suitable for producing the finished length of sheet, and passing the same, singly or in packs, first through a heating-furnace, then through plating-rolls into another heating-furnace, and back and forth through the rolls and into the furnaces until reduced to the desired gage, substantially as and for the purposes set forth.

2. The herein-described step in the manufacture of sheet metal, consisting in passing thick sheets or plates, singly or in packs, first through a heating-furnace, then through plating-rolls into another furnace, and back and forth through the rolls into the furnaces until reduced to the desired gage, substantially as and for the purposes set forth.

In testimony whereof I, the said JOSEPH R. JACKSON, have hereunto set my hand.

JOSEPH R. JACKSON.

Witnesses:
JAMES I. KAY,
ROBT. D. TOTTEN.