

No. 677,023.

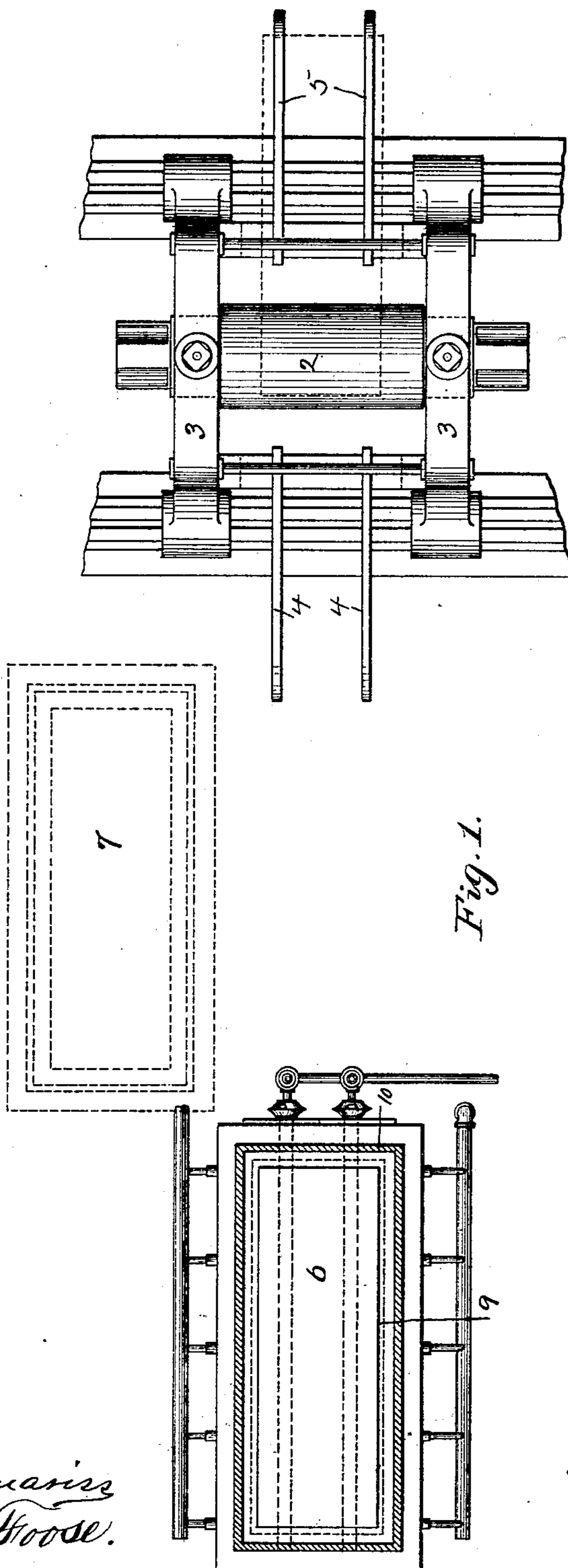
Patented June 25, 1901.

A. J. DEMMLER.
METHOD OF ROLLING SHEET METAL.

(No Model.)

Application filed Aug. 4, 1900.

2 Sheets—Sheet 1.



Witnesses:
Walter J. J. J.
Allan H. J.

Inventor:
Albert J. J.
By Kay & J.
Attorneys.

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2 Sheets—Sheet 2.

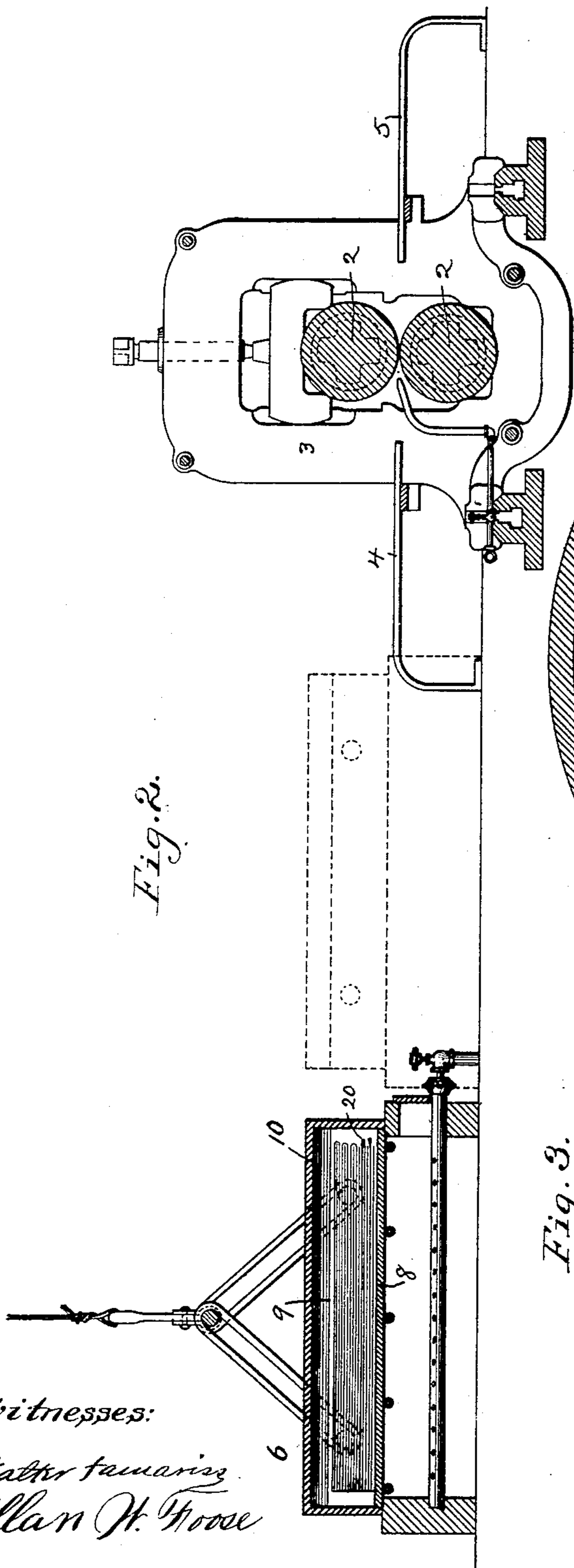


Fig. 2.

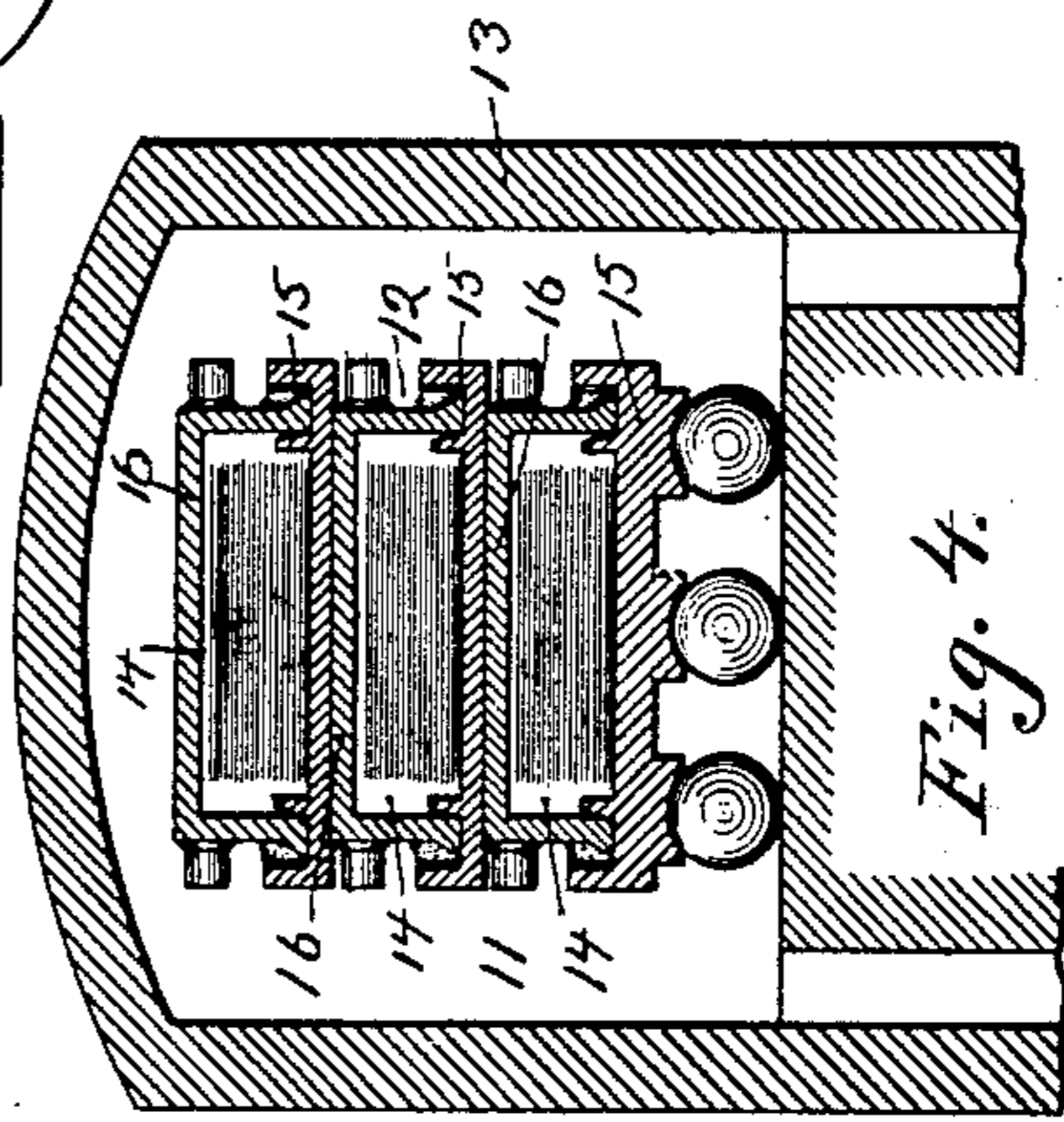


Fig. 4.

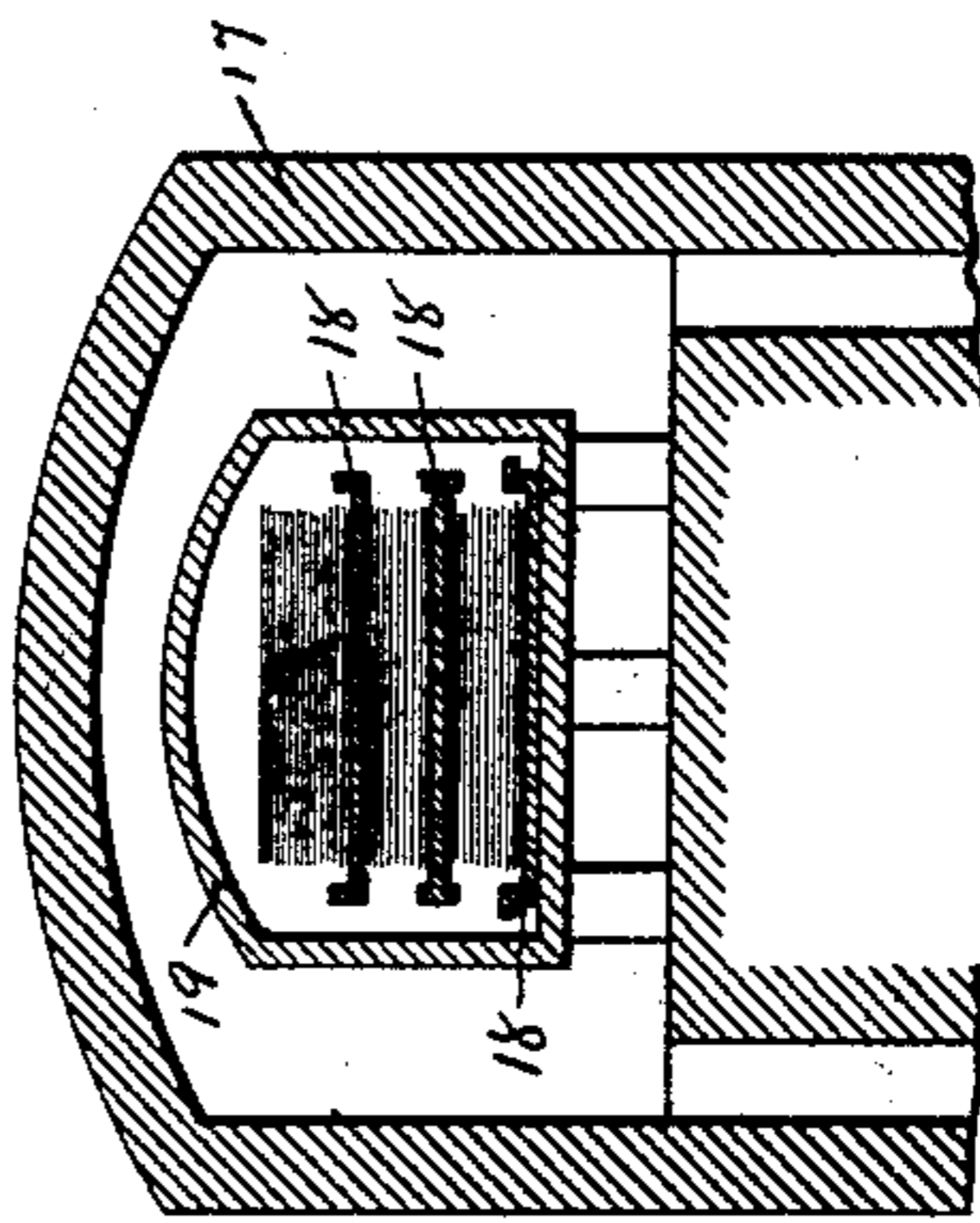


Fig. 3.

Witnesses:
Walter L. Lanning
Allan H. Hoese

Inventor:
Albert J. Demmler
By Kay & Lott
Attorneys.

UNITED STATES PATENT OFFICE.

ALBERT J. DEMMLER, OF WELLSVILLE, OHIO.

METHOD OF ROLLING SHEET METAL.

SPECIFICATION forming part of Letters Patent No. 677,023, dated June 25, 1901.

Application filed August 4, 1900. Serial No. 25,858. (No specimens.)

To all whom it may concern:

Be it known that I, ALBERT J. DEMMLER, a resident of Wellsville, in the county of Columbiana and State of Ohio, have invented
5 a new and useful Improvement in Methods of Rolling 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
10 sheet metal.

The usual custom in the manufacture of sheet iron or steel has been to heat a couple of sheet-bars and roll the two, passing them alternately through the rolls until they are
15 drawn out some length and then to match them together and roll them out to form thin plates or thick sheets. These sheets or plates were then built up into packs containing two or more sheets, which were placed in the furnace,
20 where they were brought to the proper rolling heat, when they were withdrawn successively from the furnace and fed to the rolls, being given a number of passes. They were then pulled apart and if thinner sheets were re-
25 quired were rearranged and again heated and rolled or, if necessary, doubled over, so as to form packs of sufficient thickness to maintain the necessary heat for the rolling of the same as thin as desired and then rolled, such
30 doubling, reheating, and rolling being repeated, if necessary. In this method of manufacture it was found practically necessary that the sheets should be raised up close to, but not absolutely to, the welding-point, so
35 as to make them, as it was termed, "stick together" in order to prevent the entrance of air between them and hold the heat for the subsequent passes in the rolling operation, for if the sheets did not stick such parts so
40 exposed to the air would cool quickly and would not draw out as rapidly as the other parts of the pack, this leading to buckling, folding, and other difficulties. On the other hand, if the sheets in the pack were heated
45 too high there was liability of their welding and so spoiling the pack. The heating of the sheets has required practically some of the highest skill in this line of manufacture, because of the operation of the furnace to hold
50 it to just the right temperature and the working of the sheets in the furnace to bring them just to the right condition for rolling. In case

the furnace was too smoky the smoke was liable to penetrate into the packs and form a deposit which prevented the sheets from sticking
55 together, and in some cases the sulfur fumes from the fuel would penetrate within the packs in the same way, leading to other difficulty. This class of labor was therefore very high-priced. Much time was also lost in waiting
60 for the sheets to be heated, the rolls being out of use during such time. The sheets heated in the usual manner must be rolled when they receive the proper heat, as they cannot be successfully held in the furnace for
65 an indefinite time after reaching such heat, and in case the rolls are not ready to roll the same or in case of other delay the detained sheets in the furnace are liable to become oxidized or scale and their surfaces be affected in
70 other ways, and when rolled part or all of them are spoiled.

The object of the present invention is to provide for the manufacture of such sheet iron and steel and other sheet metal through
75 the heating of the same in bulk for these different operations, so that the mass of sheets may be brought to the proper temperature and to an even heat throughout, while the furnace can be operated by unskilled labor
80 and the danger of the entrance of soot or sulfur and other elements between the sheets may be practically overcome, while though the time of heating is longer by proper arrangements the rolls can be kept practically
85 in continuous operation and the output increased.

To these ends the invention consists, generally stated, in heating the packs of sheets in bulk within any suitable furnace or oven,
90 such as within a suitable muffle-furnace or within an annealing box and oven, and carrying the packs of sheets in bulk as so heated to the rolls and withdrawing the packs successively from the pile of sheets and feeding
95 the same to the rolls.

It also consists in certain other improvements, as hereinafter more particularly set forth and claimed.

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

Figure 1 is a plan view of a plant suitable

for practicing the invention. Fig. 2 is a longitudinal section of the same. Fig. 3 is a cross-section of a muffle-furnace arranged for the heating of the packs, and Fig. 4 is a cross-section of an annealing-oven with sectional boxes for the heating of the packs.

In the practice of the invention I usually employ an ordinary set of sheet-rolls, it being preferred to have several sets of the same, so that the different piles of packs heated at one time can be quickly fed to the different sets of rolls without liability of great loss of heat. The drawings show the sheet-rolls 22 mounted in the housings 3 and having the guides 4 in front of the same and the guides 5 at the back of the same, as in the ordinary construction. Located either in front of the set of rolls or to one side of the same in position to feed the packs into the rolls is the hot bed 6, described in companion application of even date herewith, Serial No. 25,857, such hot bed being either located as shown in full lines in Figs. 1 and 2 or as shown in dotted lines at 7, Fig. 1, it being necessary to have space for the roller to operate, as each pack is usually passed two or more times through the rolls and either position being suitable for feeding to the rolls. The hot bed 6 needs but little description, it being preferred to employ a portable hot bed having a fire-chamber heated by gas or other fuel and provided with a supporting-slab 8, on which the pile of packs rest, as shown at 9. For practical purposes the pile of packs should not be too high, probably not over twelve inches in height, the pile containing, say, from thirty to sixty packs, according to the thickness of the sheets in the packs. In order to keep the pile of packs at as high a heat as practicable, I employ the cover 10, which can be lifted by any hoisting means when the pack is to be withdrawn, and for practical purposes it is preferred to utilize the covers of the annealing-boxes in which each pile of packs is heated for that purpose. For example, as shown in Fig. 4, I prefer to employ an annealing-box made up of a series of sections, as set forth in a companion application of even date herewith, Serial No. 25,854, so that each section can inclose a pile of packs of but moderate height without wasting space in the annealing-oven 11, and when the annealing-box is withdrawn the several sections can be quickly transferred to several different sets of rolls, so that the heated packs can be quickly passed through the same. For this purpose the annealing-box 12 (shown in the annealing oven or furnace 13) is formed of a series of sections 14, each section being formed of a bottom slab 15 and a cover 16, and in Fig. 2 I have shown such a bottom slab and cover as inclosing such a pile of sheet-packs. Where a muffle-furnace 17 is employed for the heating of the packs, the different slabs 18 may be interposed between the piles of packs, as shown in a companion application of even date herewith, Serial No. 25,853, and one

such pile of packs supported on a slab may be carried at a time to the sheet-rolls, a single inclosing or protecting cover 19 being employed in such case to cover the several piles of packs so transported to the rolls.

In the practice of the invention I build up the different piles of packs upon the heating slabs or supports in any suitable way. If the packs are double, it is not necessary to use any means for separating them, as the doubling of the pack gives the proper separation for grasping with the tongs, such doubled packs being shown in the upper part of the pile in Fig. 2. If the packs are made up of separate sheets, short liners, made up of short strips of sheet-iron, can be inserted at one corner of the pile, so as to separate the different packs, as illustrated at 20, in the lower part of the pile of packs in Fig. 2. After the packs have thus been arranged for heating they are either inclosed by the cover of the annealing box or section and placed in the annealing-oven or are carried by suitable means and inserted in the furnace used for heating the same—such, for example, as the muffle-furnace of Fig. 3—and the entire pile of packs is heated while thus supported in bulk within the furnace, the packs so resting one upon the other being gradually raised to the proper temperature for rolling, it being preferred that they should be heated up to a cherry-red heat in daylight or a heat at which the sheets of the pack will, as set forth above, stick together. According to the thickness and number of the sheets and other conditions this may require from two to six hours. After the packs have been brought to the proper heat they are withdrawn from the furnace either by the withdrawal of the annealing-boxes or by the carrying of the several slabs directly from the furnace and are taken to the rolls for rolling, it being preferred, as above stated, to have a sufficient number of sets of rolls to provide for the simultaneous rolling of the several piles of packs so heated. The roller then withdraws the top pack of the pile and feeds the same to the rolls, proceeding in this way until all the packs in the pile are rolled, the packs being preferably protected, as above described, both by the hot bed and the cover for the hot bed, so that there is but little loss of heat therefrom and all of the packs in the pile can be successively rolled. The packs must of course receive the number of passes found necessary to reduce them to the proper thickness, as in ordinary pack-rolling, and if the sheets are not in this way brought to the gage required the packs can again be rearranged and reheated and rolled in the same manner.

In order to keep the sets of rolls in practically continuous operation, the heating within the several furnaces or ovens can be regulated to a nicety, so as to keep up the supply of piles of packs for the rolls, this being made practicable on account of the different way of heating and the possibility of the use of an-

nealing-ovens for that purpose, as the heating in such ovens can be rendered more regular than by the operation of the ordinary sheet-heating furnace. If the rolls are not ready to receive the pack of sheets, they can be held in the furnaces or ovens until ready for such rolling operation without practical injury thereto, as the large body or mass is being subjected to a soaking heat as distinguished from the quick heating of an ordinary sheet-furnace.

One peculiarity of the method of manufacture resides in the fact that the mass of packs can be so heated without direct contact of the flame and smoke with the same, being protected either by the annealing box or muffle, thus being kept out of the course of the flame and gases, such as found in an ordinary sheet-furnace. The sheets can also be raised more gradually and by a more perfect soaking action to the necessary heat for rolling, and on account of the mass of sheets they can all be brought to a more even temperature, while the weight of the packs in the pile when approaching a higher heat will force the sheets within the packs into intimate contact, so that the more perfect sticking action of the sheets and the more even elongation and drawing out of the sheets is obtained, while liability of buckling and folding is practically overcome. Though the actual heating of any particular pack is slower than in the ordinary sheet-heating furnaces, yet the cost of heating per pack is reduced on account of the number of packs which can be heated in the furnace at one time, and the amount of perfectly-rolled sheet metal is largely increased.

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

1. The method of making sheet metal, consisting in heating a pile of packs of sheets in bulk, carrying the packs of sheets in bulk as heated to the rolls and when at a high enough temperature for reducing the same lifting the packs separately from the pile and passing them between the rolls.

2. The method of making sheet metal, consisting in heating a pile of packs of sheets in bulk, carrying the packs of sheets in bulk as heated to the rolls and when at a high enough temperature for reducing the same lifting the packs separately from the pile, and by several passes through the rolls reducing the same in thickness.

3. The method of making sheet metal, consisting in heating a pile of packs of sheets in bulk when protected from contact with the flame or gases, carrying the packs of sheets in bulk as heated to the rolls and when at a high enough temperature for reducing the same lifting the packs separately from the pile and passing them between the rolls.

4. The method of making sheet metal, consisting in inclosing a pile of packs of sheets within a suitable annealing-box, raising the same when so inclosed to a proper heat and carrying the packs so heated in bulk to the rolls and while the packs are at a temperature high enough for reducing the same withdrawing the packs separately from the pile and feeding them to the rolls.

5. The method of making sheet metal, consisting in heating a pile of packs of sheets in bulk, carrying the packs in bulk as heated to the rolls and while the packs are at sufficient heat for reducing the same, withdrawing the packs separately from the pile and passing the same between the rolls, and during such rolling operation supporting the pile of heated packs upon a hot bed.

6. The method of making sheet metal, consisting in heating a pile of packs of sheets in bulk, carrying the packs in bulk as heated to the rolls and while the packs are at sufficient heat for reducing the same, withdrawing the packs separately from the pile and passing the same between the rolls and during such rolling operation supporting the pile of heated packs upon a hot bed and covering the pile when on said hot bed.

7. The method of making sheet metal, consisting in inclosing a pile of packs of sheets within a box, raising the same when so protected to the proper heat, carrying the same when so inclosed within the box to the reducing-rolls, and when the packs are at the proper heat for rolling, opening the box and withdrawing separate packs and passing the same between the rolls, and during the rolling of such separate packs inclosing the heated pile within the box.

In testimony whereof I, the said ALBERT J. DEMMLER, have hereunto set my hand.

ALBERT J. DEMMLER.

Witnesses:

JAMES I. KAY,
J. D. BUCKLEY.