

No. 757,386.

PATENTED APR. 12, 1904.

T. V. ALLIS.

METHOD OF REDUCING METAL BARS INTO SHEETS.

NO MODEL.

APPLICATION FILED DEC. 31, 1903.

2 SHEETS—SHEET 1.

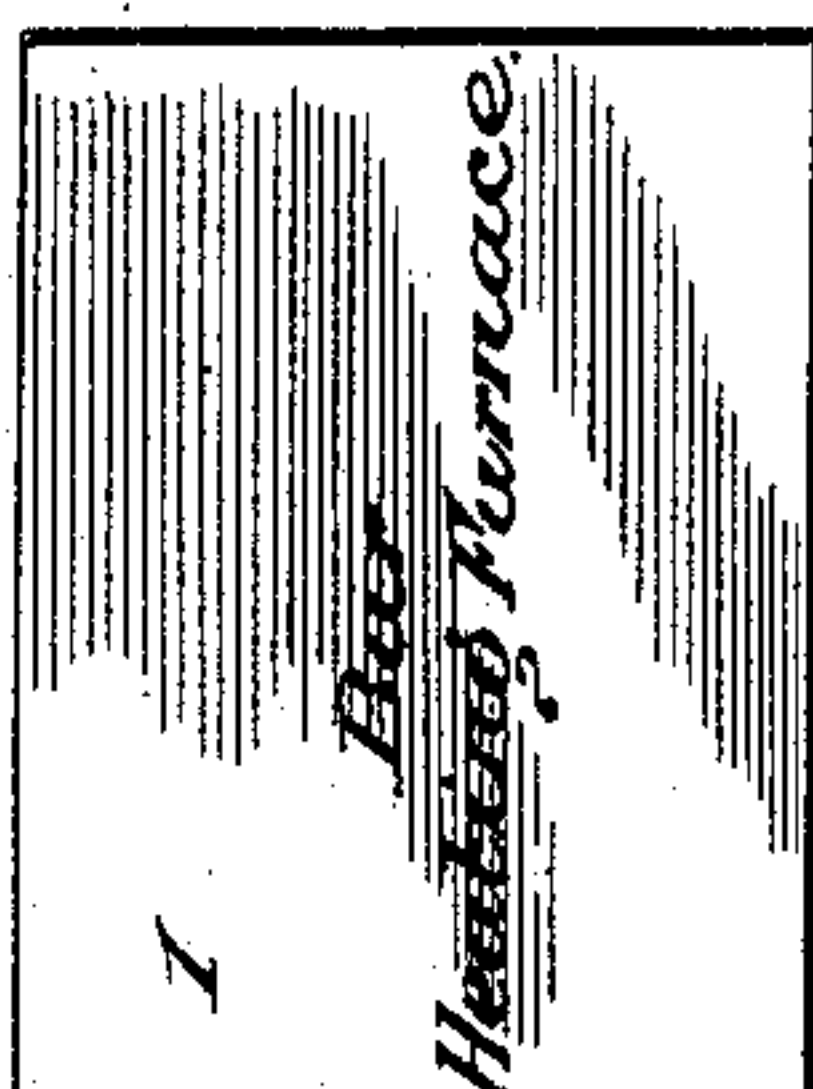
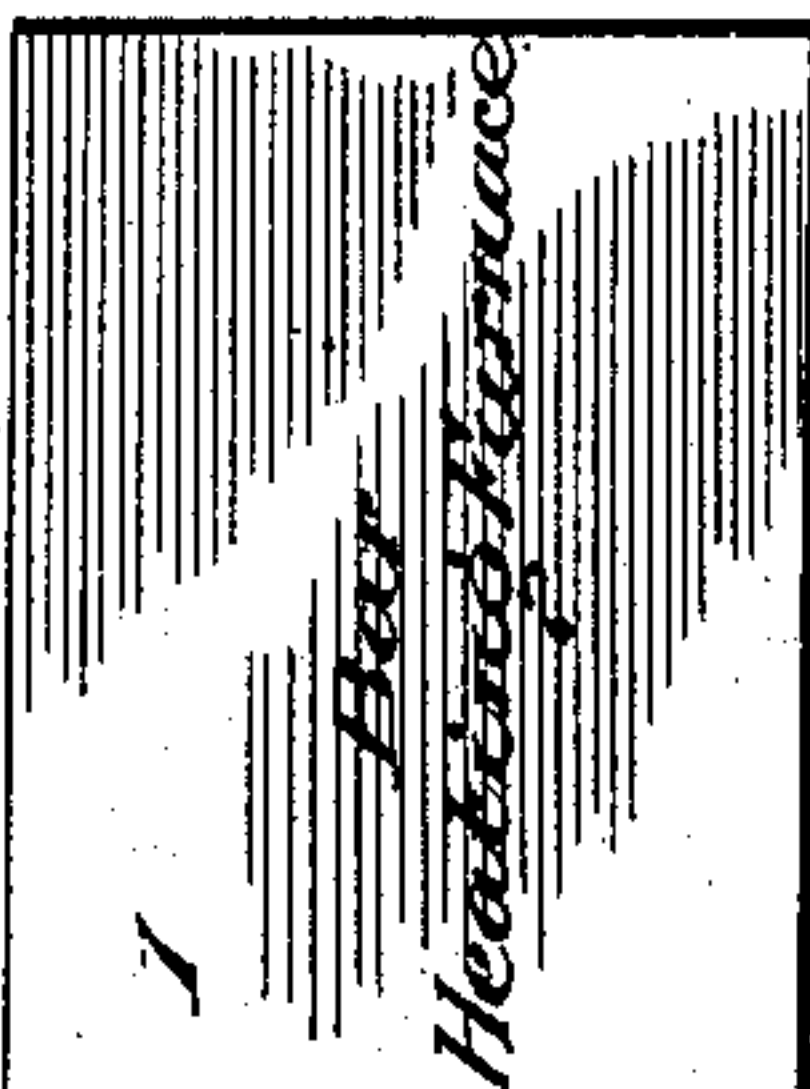
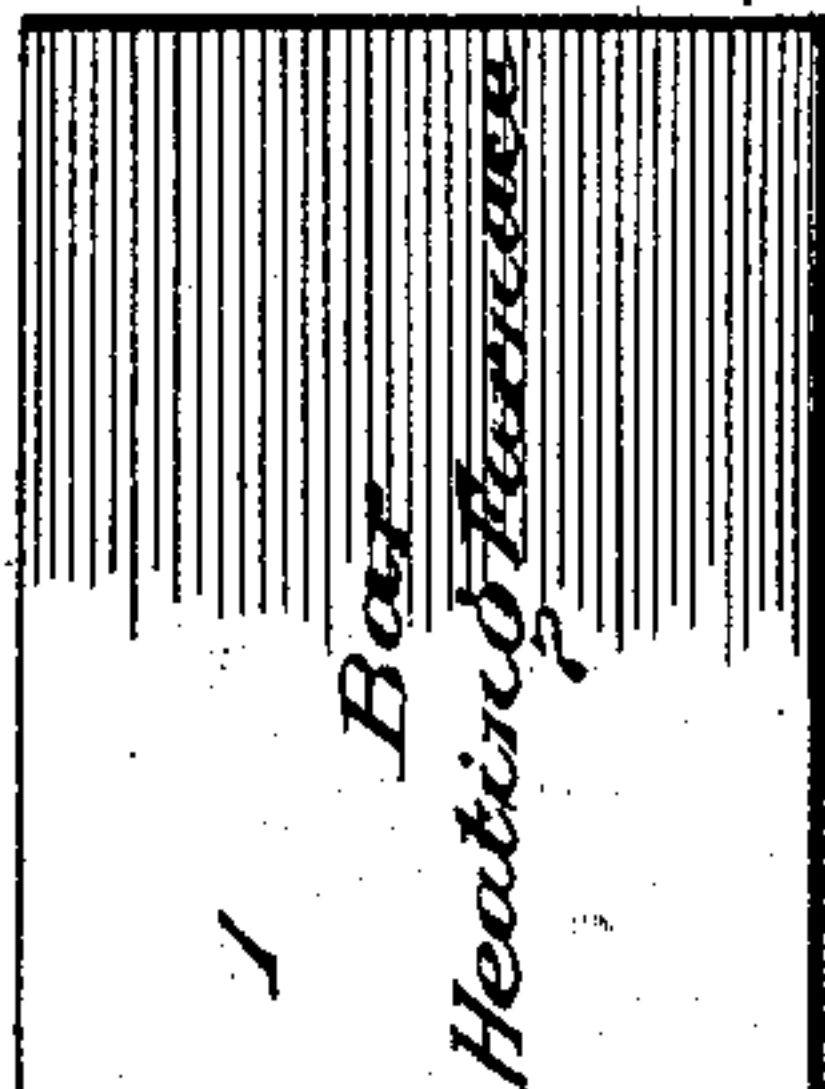
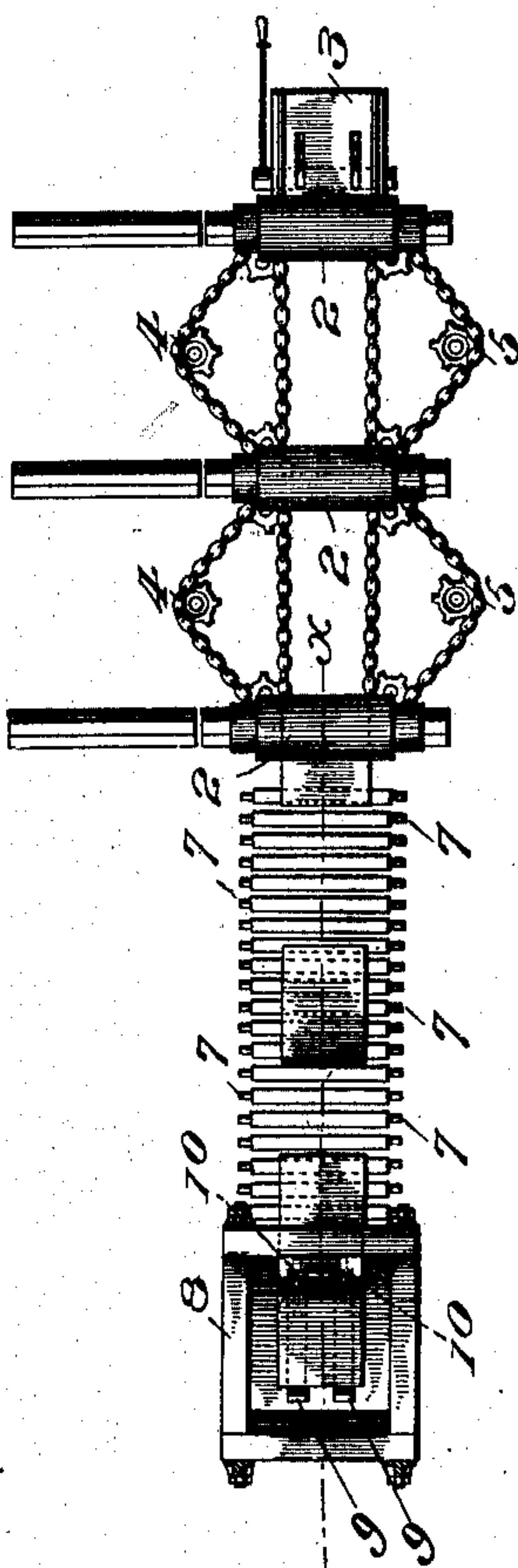


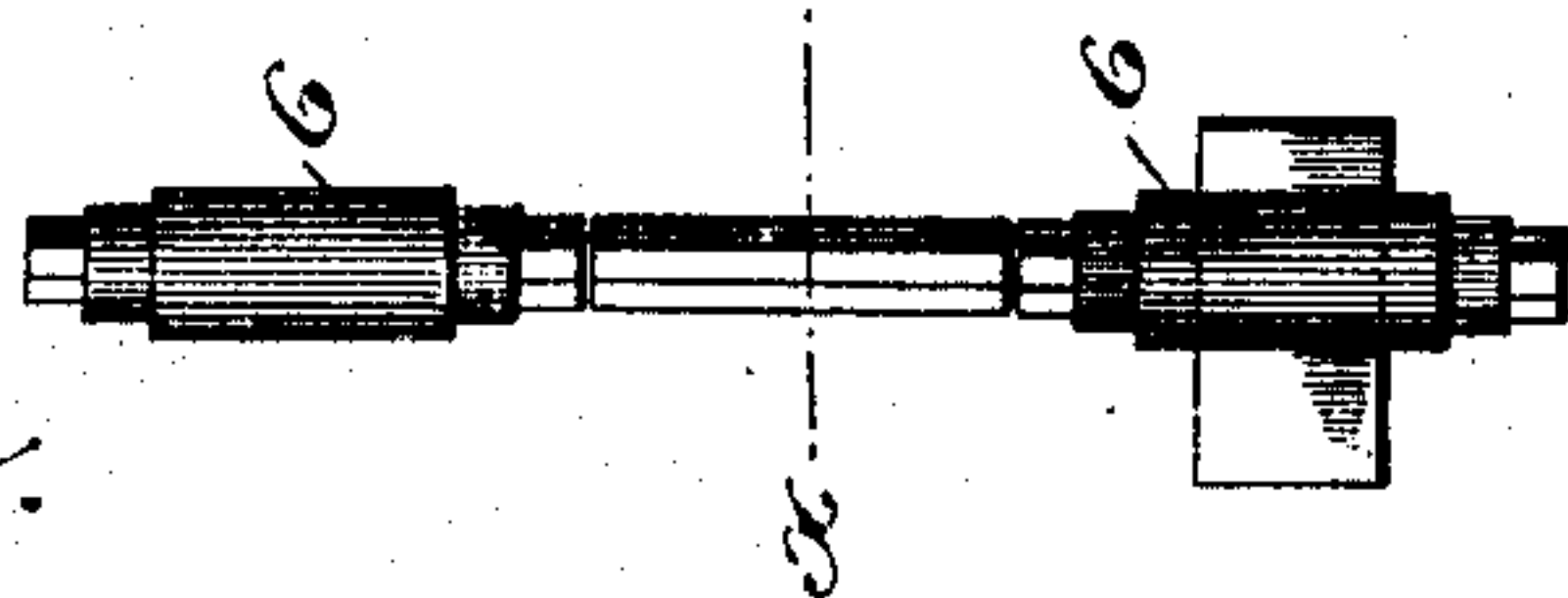
Fig. 1.



Witnesses
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UNITED STATES PATENT OFFICE.

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METHOD OF REDUCING METAL BARS INTO SHEETS.

SPECIFICATION forming part of Letters Patent No. 757,386, dated April 12, 1904.

Application filed December 31, 1903. Serial No. 187,380. (No model.)

To all whom it may concern:

Be it known that I, THOMAS V. ALLIS, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Methods of Reducing Metal Bars into Sheets; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the art of reducing metal bars into sheets in pile in a heated state, and has for its object economy in manufacture.

The terms "pile" and "pack" are used in the following sense: The word "pile" refers to a plurality of plates assembled one upon another and the word "pack" refers to such a pile doubled or folded back upon itself.

In the art of producing thin metal sheets in a heated state as at present practiced the hot bars are subjected to the action of rolls to reduce them to "singles"—i. e., plates. Said plates are then collected and "matched" by hand in pile in the open air and after being reheated are reduced and elongated by rolling. They are then separated and doubled into a pack of four laminæ. This pack of "fours" is then reheated and rolled to approximately twice its length after being doubled, then again opened and doubled into eight laminæ, reheated and rolled to completion. At each doubling the scrap end is sheared off.

In producing sheets in the manner above described it is well understood by those engaged in their manufacture that bars cannot be successfully "roughed" into single plates and matched in numbers greater than two and the rolling continued without restoring the heat lost from the first pair of plates while lying on the floor waiting for the second pair to be rolled, because the variation of time in the delivery of a number of plates greater than two results in such differences of temperature of the plates rolled in excess of that number that the pile must be reheated before its reduction can be continued. Recognizing these conditions my invention has for its object to provide means by which the heat

in the single plates as roughed in any number required to constitute a pile may be preserved or augmented and the pile presented to the action of reducing-rolls in such condition as to insure uniform reduction of its several contained plates. The resultant advantage of presenting a pile comprised of three or more plates to the action of reducing-rolls resides in the fact that the individual plates therein can be reduced to thinner gage than would be possible if only two plates in pile were acted upon.

In producing "plates" by the method now in universal use the first pair of plates when roughed and in condition to be matched are detained in the open air while waiting for others to be rolled for a period of time, greater or less, according to the number of plates greater than two to be collected and matched in pile, and are consequently subjected to a cooling action before they are put in the usual reheating-furnace.

My invention is designed to economize by avoiding difficulties and disadvantages heretofore experienced and consists, first, in roughing hot bars into singles—i. e., plates—by well-known means; second, depositing the plates as thus produced and while hot in a pile within a heating-furnace, and, third, delivering the plates thus piled and heated directly to the action of any ordinary or desirably-arranged reducing-rolls, as will be presently explained.

In practicing my invention to the best advantage it is of course necessary to employ a special plant to perform the successive steps or operations of the method. However, any plant suitable for the purpose may be used; but I prefer such a one as is shown and described in Letters Patent No. 733,112, granted to me July 7, 1903, for "process of reducing hot metal bars into sheets," supplemented with a heating-furnace located between the delivery end of the tandem train of roughing-rolls and the auxiliary reducing-rolls and in convenient juxtaposition to both.

In the accompanying drawings, Figure 1 is a plan view of a rolling-mill plant such as may be advantageously employed, and Fig. 2 is a central longitudinal section on the line *xx* of Fig. 1.

Similar reference-numerals indicate like parts in both figures of the drawings.

1 1 1 are primary bar-heating furnaces, 2 2 2 are pairs of roughing-rolls arranged in tandem train, 3 is a feed-table, 4 and 5 are pairs of chain conveyers, and 6 represents auxiliary reducing-rolls, all constructed and arranged to operate as fully described in the Letters Patent hereinbefore referred to. In lieu of the receiving-table at the delivery end of the train of roughing-rolls, as shown in said patent, I substitute suitably arranged and geared "live" feed-rolls 7, adapted to transfer the hot plates as they are delivered from the rolls 3 directly to a heating-furnace 8, which is located in convenient proximity to the said rolls 3 and the auxiliary rolls 6.

The heating-furnace is of the construction illustrated at Fig. 2 and is so designed that when the plates are delivered therein from the live feed-rolls 7 said plates will fall by gravity with their lower edges against the stops 9, which operates to automatically adjust the plates endwise. The stops 9 are formed at the lower end of the bearing-bars 10 10, having ribs 10', which are let into the tile bottom 11. The body of the bearing-bars project above the tile, as shown, in order that the pile of plates in the furnace may rest in convenient position to be seized with tongs and conveyed to the auxiliary rolls 6.

Having described such a plant as I deem best adapted for carrying out my improved method, I will now particularly describe the various steps employed in its operation.

The plates as delivered from the roughing-rolls are while hot immediately placed automatically or otherwise within a heating-furnace to retain or augment their heat, and when the required number of plates to constitute a pile have been collected within the furnace the pile is withdrawn and the plates therein further reduced by passing it between pairs of rolls. By collecting the plates in pile within a furnace wherein most of the initial heat at which the plates were rolled is retained and utilized it is obvious that several advantages are gained and economies effected over collecting and matching the plates in pile in the open air, as heretofore practiced and explained, because when according to my in-

vention the plates are placed directly in a heating-furnace as delivered from the roughing-rolls and are collected in pile within said furnace, but little of their initial rolling heat is lost, and consequently the fuel required to raise the temperature of the plates collected and matched in pile in the open air to the proper degree for rolling is saved, as is also the time which would be necessary to restore such lost heat, and consequently I secure an increase in the output of the mill, thereby decreasing fixed charges per ton and increasing the tonnage upon which profits are made.

While I prefer that the plates as delivered from the roughing-rolls should, as I have hereinbefore explained, be automatically collected in a heating-furnace and have shown a furnace constructed to secure this result, I wish it to be understood that I do not limit myself to automatically collecting the plates within such a furnace, but that the gist of my invention resides in the generic step of transferring the plates as they leave the roughing-rolls and while they are hot directly to a heating-furnace and collecting the plates in pile in the heated zone of such a furnace in contradistinction to collecting and matching the plates in the open air as now practiced.

The intermediate heating-furnace 8 constitutes the subject-matter of another application filed by me on the 23d day of March, 1904.

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

The method herein described of reducing metal bars into sheets in pile in a heated state, which consists in first reducing hot bars to plates by passing the bars between "roughing-rolls," second, collecting while hot the plates thus produced one upon another in pile within a heating-furnace and finally transferring and subjecting such pile so heated and while hot to the action of rolls to reduce the plates therein to sheets.

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

THOMAS V. ALLIS.

Witnesses:

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