

(No Model.)

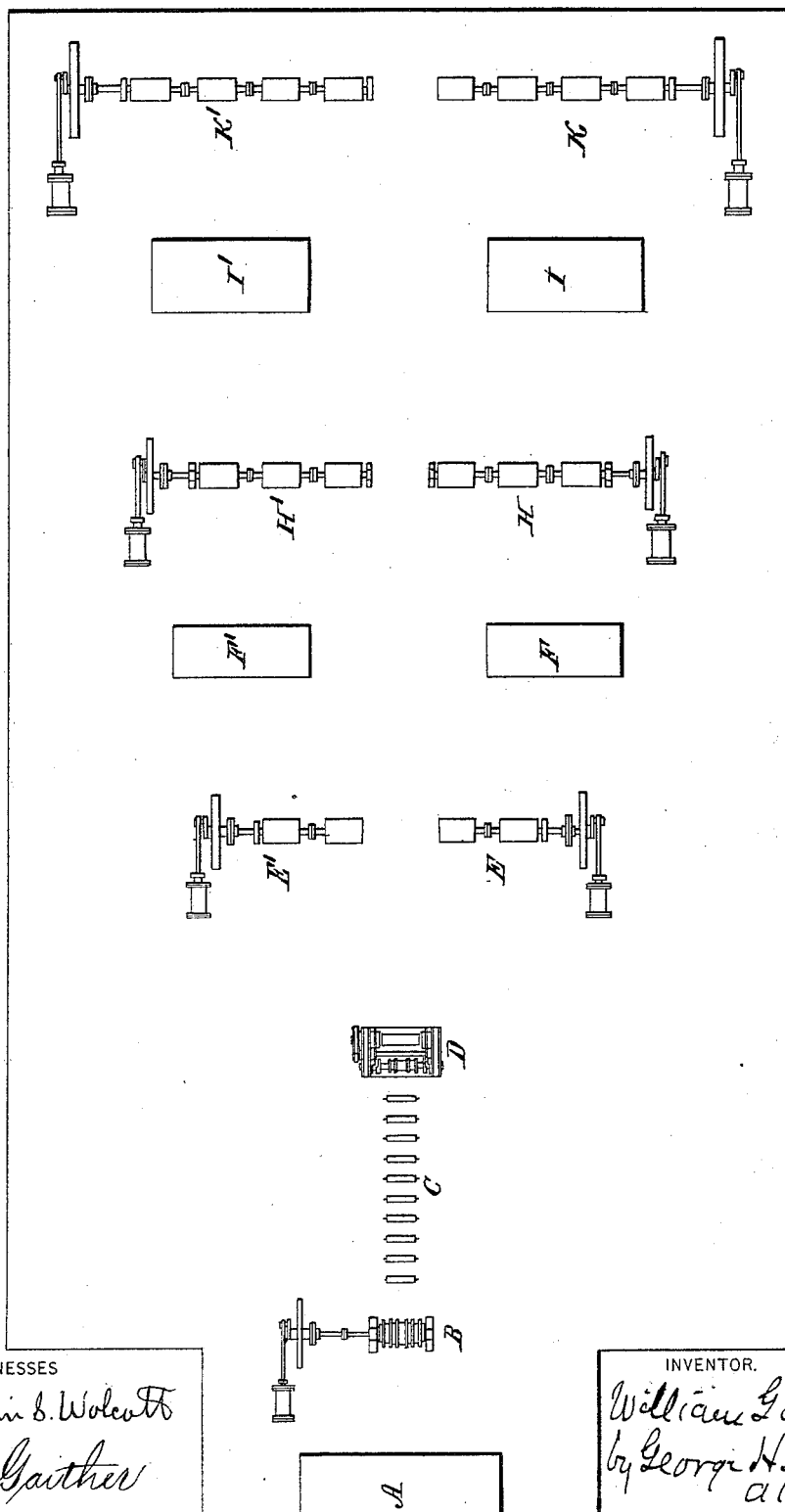
2 Sheets—Sheet 1.

W. GARRETT.
ROLLING MILL PLANT.

No. 419,008.

Patented Jan. 7, 1890.

FIG. 1.



WITNESSES

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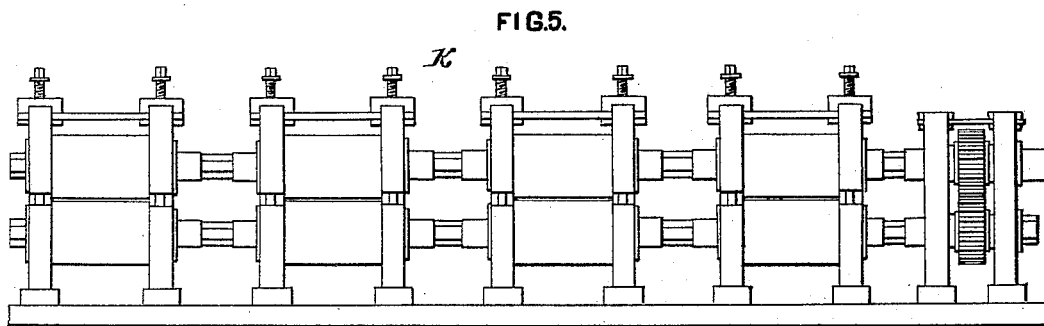
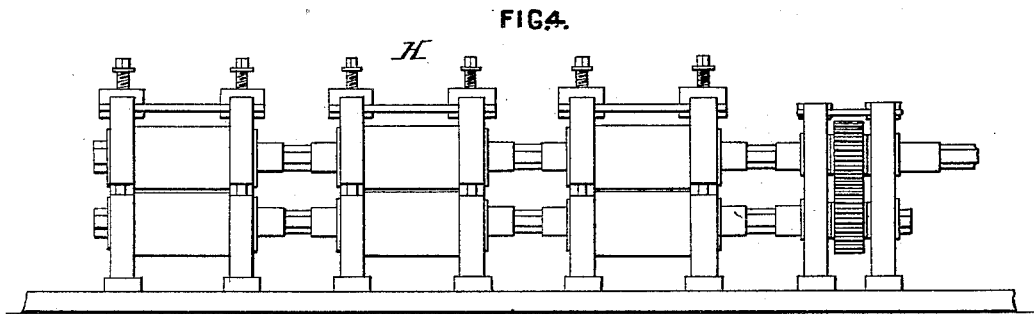
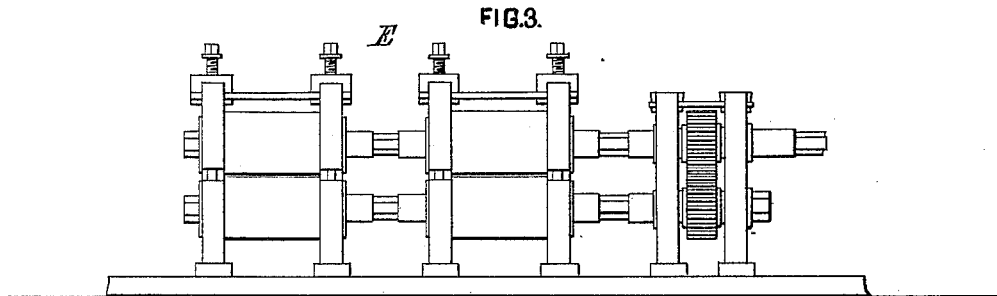
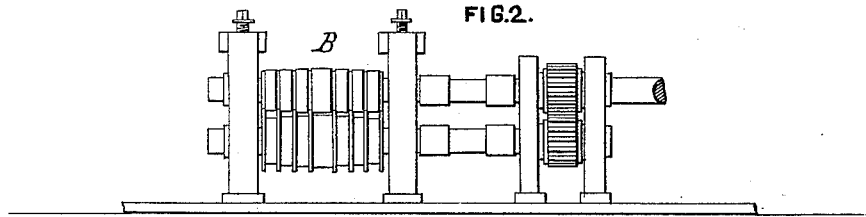
(No Model.)

2 Sheets—Sheet 2.

W. GARRETT.
ROLLING MILL PLANT.

No. 419,008.

Patented Jan. 7, 1890.



WITNESSES

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UNITED STATES PATENT OFFICE.

WILLIAM GARRETT, OF JOLIET, ILLINOIS.

ROLLING-MILL PLANT.

SPECIFICATION forming part of Letters Patent No. 419,008, dated January 7, 1890.

Application filed January 30, 1889. Serial No. 298,084. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM GARRETT, a citizen of the United States, residing at Joliet, in the county of Will and State of Illinois, have invented or discovered a certain new and useful Improvement in Rolling-Mill Plants, of which improvement the following is a specification.

The invention described herein relates to certain improvements in mills for the manufacture of metal sheets and tin plates.

The method of manufacturing such sheets or plates as at present practiced consists, generally stated, in reducing a bloom or billet about four or five inches square (more or less) to what is termed a "sheet-bar" five or six inches wide and one-half or three-quarters of an inch in thickness, (more or less.) These bars, when sufficiently cold to handle, are then sheared into blanks of a length dependent upon the width of the sheets or plates desired. The blanks are then placed in a suitable furnace, heated, and reduced in suitable rolls to comparatively thin sheets, the bars being fed sidewise to the rolls. The general practice is to reduce two bars at a time, the bars following each other in quick succession through the rolls, the upper roll being screwed down after each pass until it is tight against the lower roll. The screws for adjusting the upper roll are then slackened up a little, and the two sheets previously reduced are placed one on top of the other and passed through the rolls, the temperature of the sheets being so reduced in the previous rolling operation as to prevent their welding together. As soon as all the blanks forming one heat or charge of the sheet-bar furnace have been reduced to sheets, as hereinbefore stated, three or four of such sheets are placed one on top of the other, heated in a special furnace, and then rolled as thin as possible. The sheets are then separated, arranged in piles of five or six, again charged into the furnace, heated, and again rolled. The heating of the sheets in piles of three or four and in piles of five or six, and the subsequent reduction of such piles in the manner hereinbefore stated, is usually effected in the same furnace and by the same set of sheet-rolls. While the bars are being reduced, as above stated, to sheets, an operation requiring considerable time, the

rolls employed in reducing the bloom or billet and the blank and the furnaces for heating the same are idle.

The object of the invention herein is to provide such an arrangement of furnaces and trains that the reduction of the bloom or billet to a metal sheet or plate may be so carried on that each part of the mill or plant may be kept in continuous operation, and thereby avoid any stoppage or delay in the operation of the billet-rolls or other parts of the mill.

In the accompanying drawings, forming a part of this specification, Figure 1 is a plan view of a mill for the practice of my invention. Figs. 2, 3, 4, and 5 are views in elevation of the billet and of the trains of sheet-bar rolls employed.

In the practice of my invention the blooms or billets are heated in a suitable furnace, as at A, and then reduced by a series of back-and-forth passes between suitably-grooved rolls B to a bar approximately five or six inches wide and from a half to three-quarters of an inch in thickness, (more or less.) The furnace A is located in convenient proximity to the rolls B, preferably in front of said rolls, as shown in Fig. 1. From the last pass of the billet-rolls B the bar is passed along, preferably by a series of feed-rolls C arranged in line with the last pass of the rolls B, to a shearing mechanism D, located in or approximately in line with the last or delivery pass of the billet-rolls, where the bar while hot is cut up into a series of blanks of a length equal, or approximately, so to the width of the plates or sheets desired. As the bar is fed quickly to the shearing mechanism and rapidly cut into blanks, the latter will still be sufficiently hot to permit of further reduction. The blanks are therefore carried immediately after the shearing operation to one of the sets of rolls of the trains E E'. Two blanks are taken to each set of rolls and fed therethrough, one after the other sidewise in quick succession, as in the usual practice. The blanks are passed separately through these rolls a number of times, the upper roll being adjusted down after each pass until as great a reduction as is possible with the upper roll adjusted down tight against the lower roll has been effected. The two sheets thus produced are then placed one on top of the

other and, the upper roll being slightly raised, again passed through the rolls, the upper one being again screwed down after each pass.

In order to prevent the blanks from so cooling as to require reheating before being reduced, as above described, a sufficient number of sets of rolls are employed to permit of the immediate reduction of all the blanks—as, for example, a sheet-bar will be generally long enough to furnish eight blanks of such a length as is required in the manufacture of the sheets or plates of commerce; hence in a mill for the manufacture of such sheets I provide four sets of rolls, two blanks being reduced in each set of rolls, as hereinbefore stated. These sets of rolls are preferably arranged in two trains E E', arranged, as shown in Fig. 1, in the rear of the shearing mechanism D, one train on one side of the shearing mechanism and the other train on the opposite side. This arrangement will permit the operator's ready access to the shearing mechanism to obtain the blanks produced thereby without interfering with each other.

It will be understood that the number of sets of rolls E may be varied as circumstances or the number of blanks produced from one bar may require. The plates after their reduction in the rolls of the train E E', as above described, are separated and arranged in piles of three or four, (more or less,) and charged into furnaces F F' of any suitable construction adapted for the heating of sheets. Two furnaces are preferably employed in the rear of each train of rolls E E', the sheets reduced in the train of rolls E being charged into the furnace F and those reduced in the rolls E' being charged into the furnace F'. After being properly heated in the furnaces F F', care being taken that they are not raised to a welding heat, the sheets, arranged as stated, in piles of three or four, are passed through the rolls composing the trains H H', the piles of sheets from the furnace F being taken to the train H and those from the furnace F' to the train H'. The trains H and H' consist of two, three, or more sets of rolls, and each pile is preferably reduced to its full extent in the same set of rolls, the upper roll being screwed down after each pass. After being reduced in trains H or H' the sheets are separated and again arranged in piles of five or six (more or less) and then charged into the furnaces I I', where they are properly heated. From the furnaces I I' each pile is taken to one of the sets of rolls of the trains K K', where the sheets are reduced to the required gage by a number of passes, the upper roll being screwed down after each pass, as hereinbefore described.

In operating my improved mill the billet-train B is to be kept in such continuous operation as to maintain a constant supply of sheet-bars for the trains of rolls E E', in which the bars—two in each set of rolls—are reduced to sheets without reheating. The trains H H' should consist of such a number

of sets of rolls as will be capable of reducing the sheets in the manner above stated as fast as they are supplied by the trains E E', the furnaces F F' being made of sufficient capacity to receive and heat the sheets arranged in piles as rapidly as supplied thereto. In like manner the number of sets of rolls composing the trains K K' should be such as to reduce the sheets as fast as they are reduced in the trains H H' and heated by the furnaces I I'. As I now believe, a suitable proportioning of the sets of rolls in the several trains to insure the constant and continuous operation of each part of the mill or plant would be two sets of rolls in the trains E E', three or more sets of rolls in the trains H H' and K K'. The number of sets of rolls in each train would vary, however, in accordance with the amount of reduction to be effected in each train, and also on the capacity of the billet-train B; the skilled roller can, however, readily adapt the number of sets of rolls in each train to the requirements of his mill practice; and it may be desirable, in the event of the rolls getting too hot with continuous working, to have a spare set of rolls in each train, to be employed while one of the other sets runs idle for cooling.

While I prefer to arrange the several trains of rolls and furnaces one behind the other in the order of their operation upon the metal being rolled, it will be readily understood that as the sheets require reheating after reduction in the trains E E', the furnaces F F', with their trains H H', need not be in close proximity to the trains E E' nor in the relative positions shown. And the same is true of the furnaces I I' and their trains K K', but the relative arrangement of the furnaces and trains of rolls should always be such that little time will be lost in transferring the sheets from the furnaces to the trains of rolls and from the latter to the furnaces.

I claim herein as my invention—

1. A rolling-mill plant for rolling metal plates and tin sheets, consisting of billet-rolls B, a shearing mechanism D, arranged in or approximately in line with the last or delivery pass of the billet-rolls, and trains E E', of sheet-rolls, arranged in the rear of and on opposite sides of the shearing mechanism, substantially as set forth.

2. A rolling-mill plant for rolling metal plates and tin sheets, consisting of billet-rolls B, a shearing mechanism D, arranged in or approximately in line with the last or delivery pass of the billet-rolls, a line of two or more trains consisting of sheet-rolls arranged in the rear and on one side of the shearing mechanism, and an additional line of two or more trains consisting of sheet-rolls arranged in the rear and on the opposite side of the shearing mechanism, substantially as set forth.

3. A rolling-mill plant for rolling metal plates and tin sheets, consisting of billet-rolls B, a shearing mechanism D, arranged in or

approximately in line with the last or delivery pass of the billet-rolls, a line of two or more trains consisting of sheet-rolls arranged in the rear and on one side of the shearing mechanism, an additional line of two or more trains consisting of sheet-rolls arranged in the rear and on the opposite side of the shearing mechanism, and reheating-furnaces

arranged between adjacent trains, substantially as set forth.

In testimony whereof I have hereunto set my hand.

WILLIAM GARRETT.

Witnesses:

F. S. PACKARD,

E. K. HENRY.