No. 751,801. PATENTED FEB. 9, 1904.

A. J. MASKREY.

METHOD OF ROLLING METAL PLATES.

APPLICATION FILED JAN. 5, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

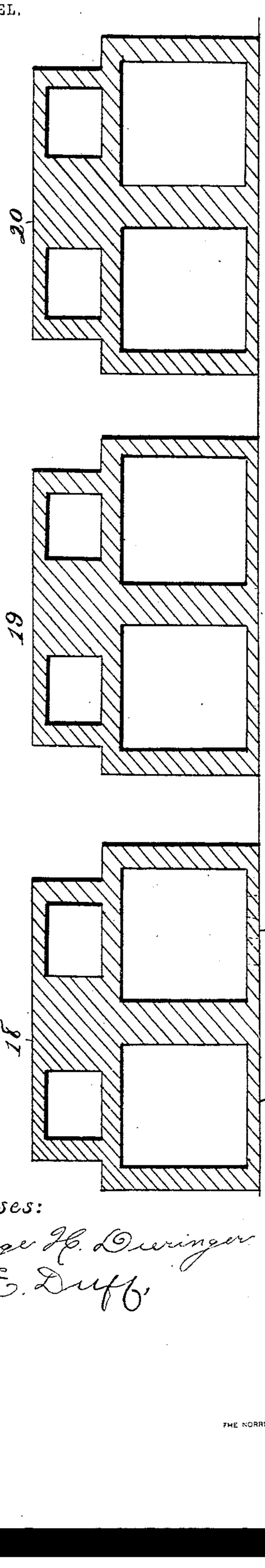
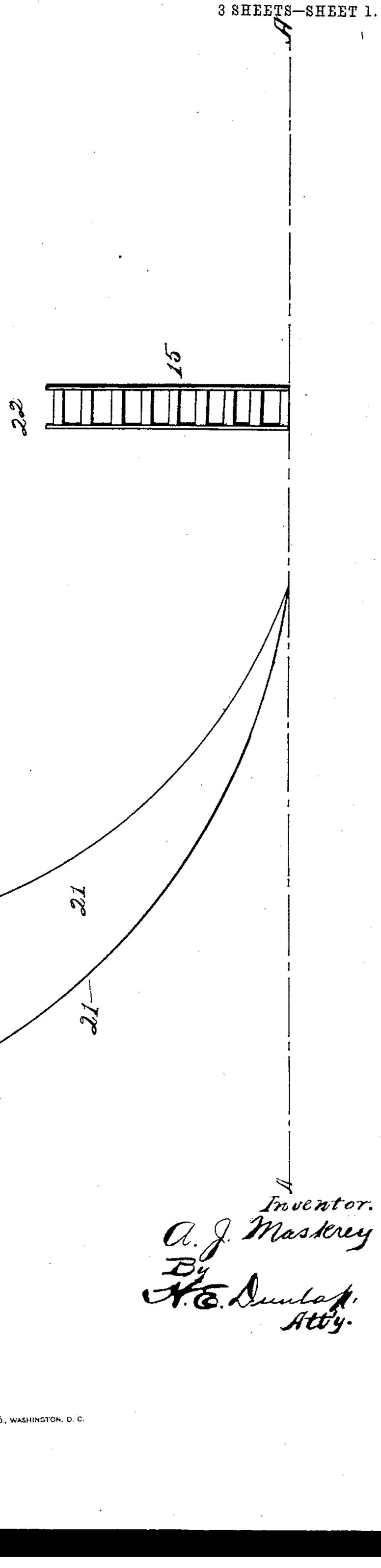



Fig. 1.

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NO MODEL. 3 SHEETS—SHEET 2.

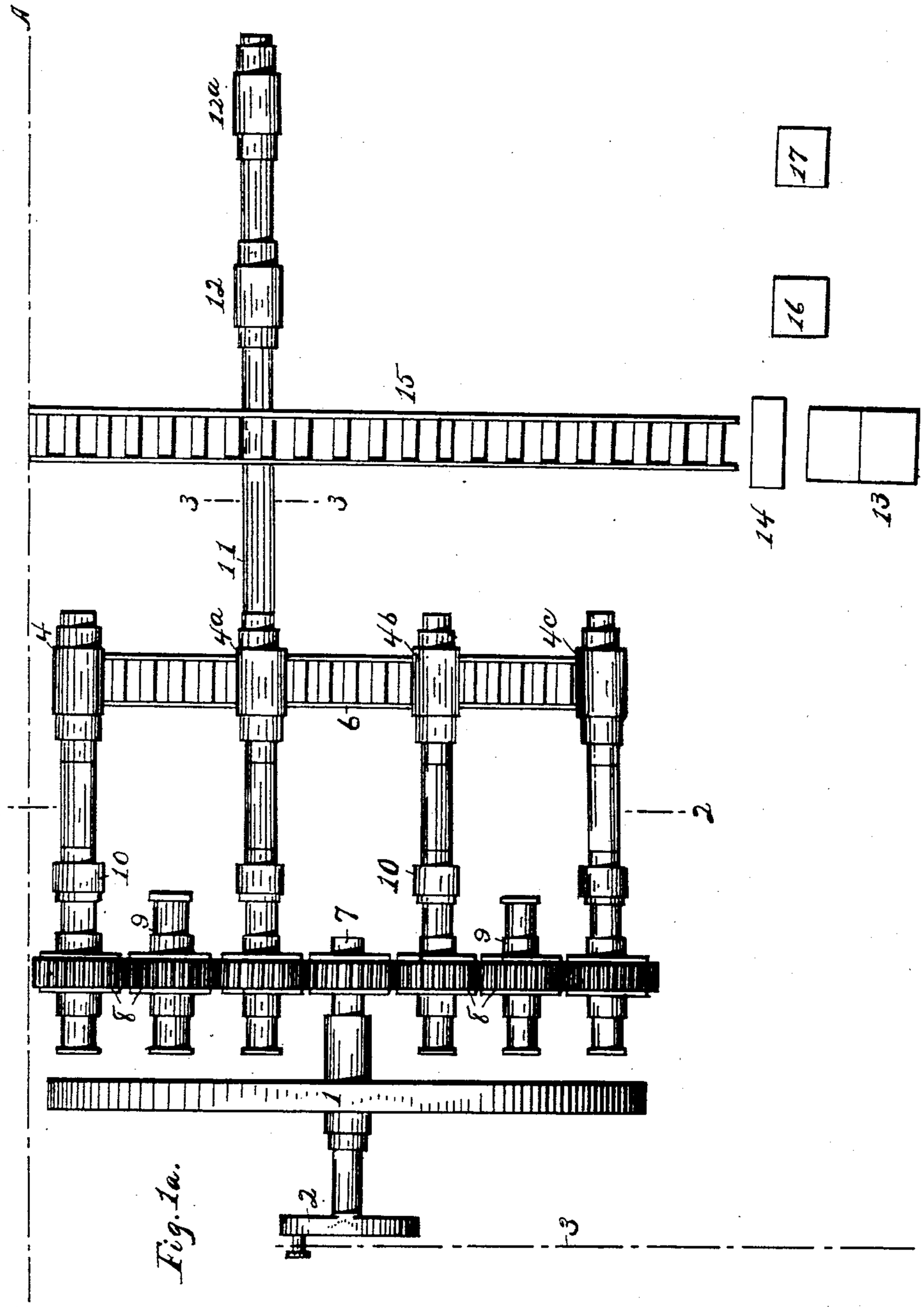


Fig. 1a.

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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 2.

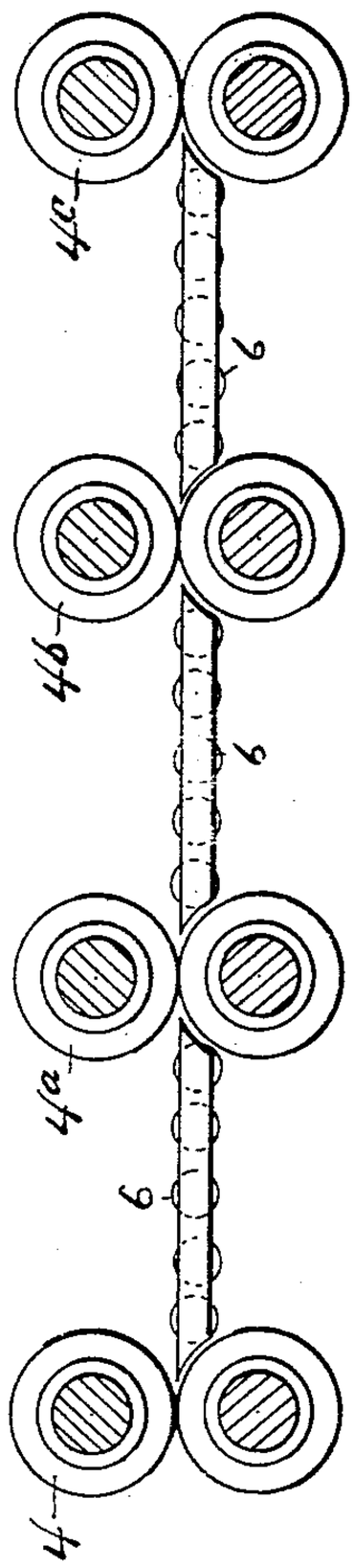
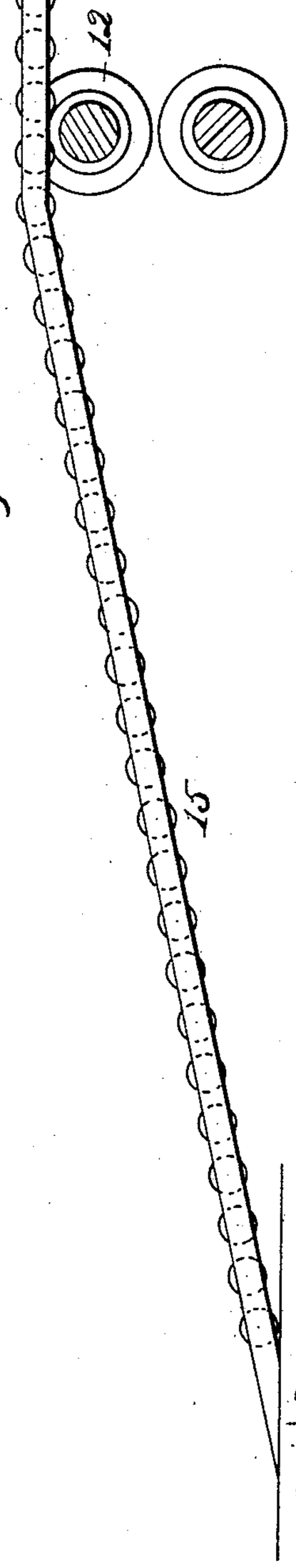



Fig. 3.

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# UNITED STATES PATENT OFFICE.

ARTHUR JAMES MASKREY, OF MARTINS FERRY, OHIO.

## METHOD OF ROLLING METAL PLATES.

SPECIFICATION forming part of Letters Patent No. 751,801, dated February 9, 1904.

Application filed January 5, 1903. Serial No. 137,852. (No specimens.)

*To all whom it may concern:*

Be it known that I, ARTHUR JAMES MASKREY, a subject of the King of Great Britain, and a resident of Martins Ferry, county of Belmont, and State of Ohio, have invented certain new and useful Improvements in Methods for Rolling Metal Plates, of which the following is a specification.

My invention relates to a method of rolling thin metal sheets; and its object is to provide a method of working the metal whereby the handling of the sheets is greatly facilitated, rendering it possible to economize labor, time, and fuel, and consequently materially reducing the cost of production.

I am aware that others have produced various methods of rolling sheet metal wherein a system of furnaces and continuous rolls are used; but with such methods the continuous feature is carried too far, since it is impossible in the rolling of thin sheets to keep the metal at a proper heat through a long series of continuous rolls, and this is fatal to the success of a continuous mill.

In my invention I confine myself to as few rolls in a series as possible and stop the operation after rolling the bars into sheets, reheat them, and roll them out in two or more thicknesses in the same set of rolls. By this means I get a good length on the pack before doubling and by so doing am enabled to keep the rolls in more even temper. This relieves the excessive work on the finishing-rolls, as the reheating of the pack after the first pass through the short series of rolls renders said pack longer when rolled the second time than as if said pack had been continued through a longer series and had not been reheated. In a continuous mill with a long series of rolls without reheating the pack would be much shorter after doubling, and this would be fatal to producing successful work in the last pairs of finishing-rolls. The shorter the pack before the final rolling the greater the amount of reduction necessary in the finishing-rolls to bring the sheets to the proper length, the greater the difficulty in separating the finished sheets, and the greater the liability of making waster-sheets.

In describing my invention reference is had to the accompanying drawings, illustrating the machine which I employ in carrying out my method, wherein—

Figures 1 and 1ª, taken together, show a top plan view of the machine or mill, illustrating the arrangement thereof. Fig. 2 is a cross-section of the continuous reducing-rolls, taken on the line 2 2, Fig. 1; and Fig. 3 is a similar section on line 3 3, Fig. 1, showing the conveyers for returning the partly-reduced product to the furnaces.

Referring to said drawings, in which like reference-numerals designate like parts throughout the several views, 1 indicates the fly-wheel, and 2 the disk or crank for driving the rolls of the mill, and 3 indicates the center line of the engine furnishing motive power thereto.

4, 4ª, 4ᵇ, and 4ᶜ represent the respective pairs of rolls of a continuous set of reducing-rolls, which set will hereinafter be referred to as 5, said rolls being in alinement. Between each pair of said rolls are live rollers, or, if preferred, endless conveyer-chains 6. Said reducing-rolls are all driven from the main or fly-wheel shaft 7 through gear-wheels 8, provided on the respective shafts of the rolls, counter-shafts 9 being provided between the shafts of the rolls 4 and 4ª and the rolls 4ᵇ and 4ᶜ, respectively. Suitable shaft-couplings 10 are provided for driving said rolls from the gear-wheels 8. Coupled to one of the reducing-rolls of the continuous set 5, preferably to the roll 4ª, in order to eliminate undue strain, is the shaft 11 of two sets of finishing-rolls 12 and 12ª.

13 and 14 indicate the respective positions or ground plans of a folding device or doubler and of shears for trimming off the ends of the sheets of metal after passing through the set 5 of continuous reducing-rolls.

15 indicates a set of live rollers or endless chains, which are elevated over the shaft 11, as shown in Figs. 1 and 3, for returning the sheets or packs which have passed through the set 5 of reducing-rolls, said live rollers being located in a position for delivering the sheets or plates at a point between the respective working positions of the heaters for the running-over furnace and the finishing-

furnace, this point being not only convenient to both heaters, but also out of the way, so that said heaters are not hindered by the sheets or packs when so delivered. The end of said set 15 next the furnaces is preferably inclined to the floor, as shown, in order that the sheets may be delivered directly on the floor without falling.

16 and 17 indicate the respective positions or ground plans of two sets of shears for trimming the finished packs into the sizes required after they have passed through the finishing-rolls.

18 indicates a double bar-heating furnace, 19 a double running-over furnace, and 20 a double finishing-furnace, all said furnaces being of suitable construction and preferably arranged in a row or line, as shown, in front of the reducing-rolls and at a right angle to the alinement of the set 5, so as to be convenient to their respective feeding positions.

22 indicates the line or position of the overhead trolley or trackage for carrying the heated bars from the respective doors of the bar-heating furnace 18 to the leading pair 4 of the continuous set 5.

As illustrated, the set 5 of continuous rolls are located in front of the running-over furnace 19, so as to be as convenient as possible thereto when the sheets are removed therefrom for the second rolling. As is obvious, since the sheets from the running-over furnace 19 will cool much more readily and quickly than the bars from the bar-heating furnace 18, I secure in this manner a most advantageous arrangement.

Now the method which I employ for forming plates or sheets from a bar of metal is as follows: The heated bars of metal in one of the bar-heating furnaces, 18, are removed to the leading-rolls 4 of the continuous set 5. Being fed into said rolls, the bars are carried forward separately by means of the said rolls and the live rollers or chains 6 until they emerge from the rolls $4^c$. The bars will then have been rolled down to about the same thickness as is done in the present method in a single mill in four or five passes. Having passed through this series of rolls the pieces will have become chilled to such an extent that a further rolling without reheating is impracticable. I therefore take up these pieces and place them on the conveyer 15, by which they are returned to the running-over furnace and are deposited on the floor at 22. At this point they are matched in two, three, or four thicknesses, according to the thickness desired for the finished sheet, and are placed in one of the running-over furnaces, where they are at once reheated. Removed from this furnace they are again run through the continuous set 5 in two, three, or four thicknesses, according to the thickness desired for the finished sheets, and emerging from the rolls $4^c$ the pack is opened, matched together again in two, three, or four thicknesses, as desired, and placed on the folding device 13, where they are doubled. After doubling the ends of the packs are squared up by the shears, which are in line with the live rollers or conveyers 15 at the rear end thereof. The pack is then placed on said rollers and is conveyed to the mill-floor at 22, where it is taken up and placed in the finishing-furnace. Being reheated therein, the sheets are finished through the finishing-rolls by a series of passes therethrough, this final passing being done in the ordinary manner.

As is obvious, immediately one side of the furnace 18 is emptied it may again be refilled with bars to be heated, and at the same time the heated bars in the other side of the furnace may be fed through the reducing-rolls 5. Each of the other furnaces may be operated in like manner, thus utilizing the heat of the furnace to the greatest possible extent, and consequently effecting a considerable saving in fuel, much of which has hitherto passed off in unutilized heat.

It will further be seen that by my method only three furnaces are necessary to do the work which has hitherto in the ordinary method required four, thus effecting a still further saving of fuel.

Having thus described my method of rolling metal sheets or plates, what I claim as new, and desire to secure by Letters Patent, is—

The method of producing sheets from a bar of metal which consists in first heating the bar and passing it through a short series of reducing-rolls arranged in tandem, returning the partly-reduced product to a reheating-furnace, reheating the product, passing it through said short series of reducing-rolls a second time in a plurality of thicknesses, opening the pack, matching the sheets thereof together again in a plurality of thicknesses, doubling the pack, returning said pack to a reheating-furnace, reheating it, and finishing the sheets in packs by a series of passes through the finishing-rolls, substantially as described.

Signed by me at Wheeling, West Virginia, this 2d day of January, 1903.

ARTHUR JAMES MASKREY.

Witnesses:
H. E. DUNLAP,
GEORGE H. DIERINGER.