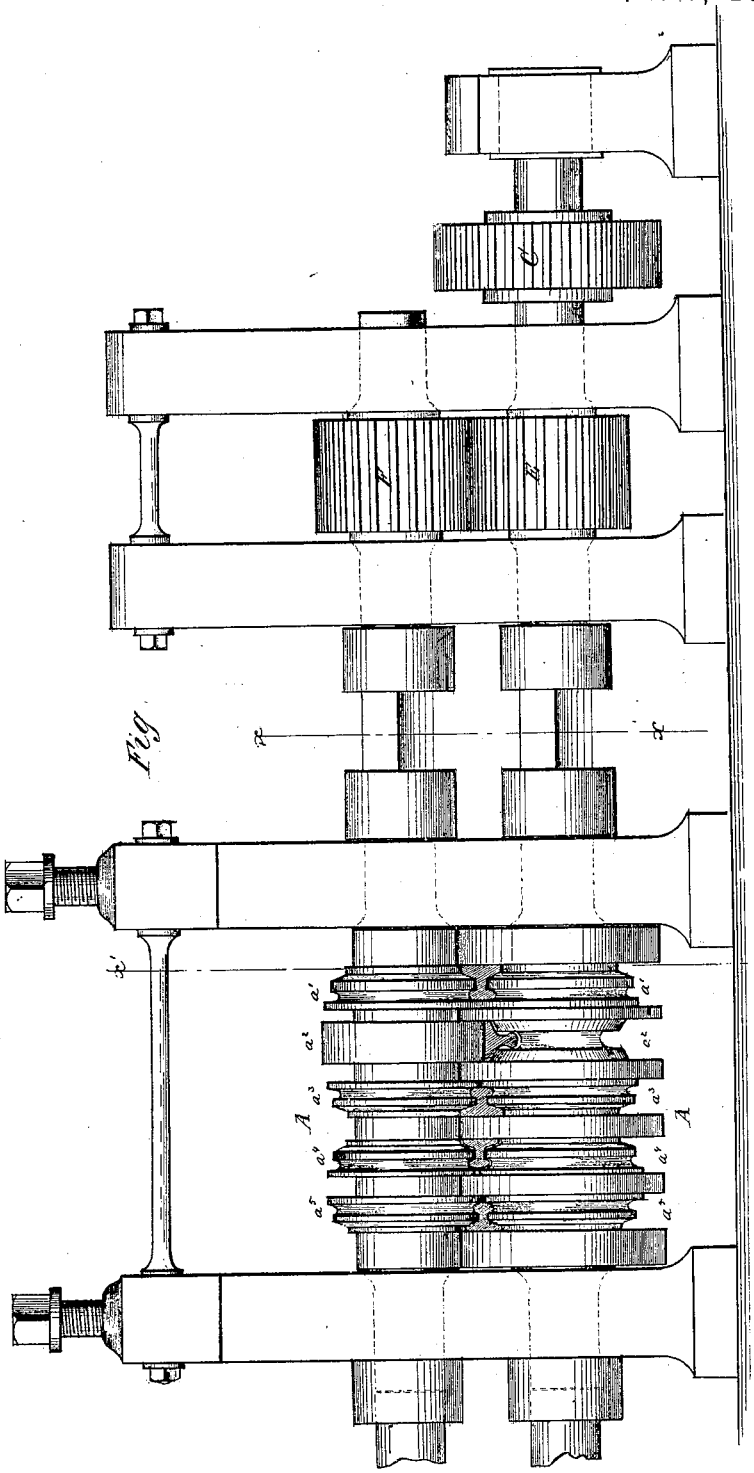
3 Sheets—Sheet 1.

W. & D. BROWN.

ROLLING MILL.

No. 106,992. Patented Sept. 6, 1870.



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3 Sheets—Sheet 2.

W. & D. BROWN.

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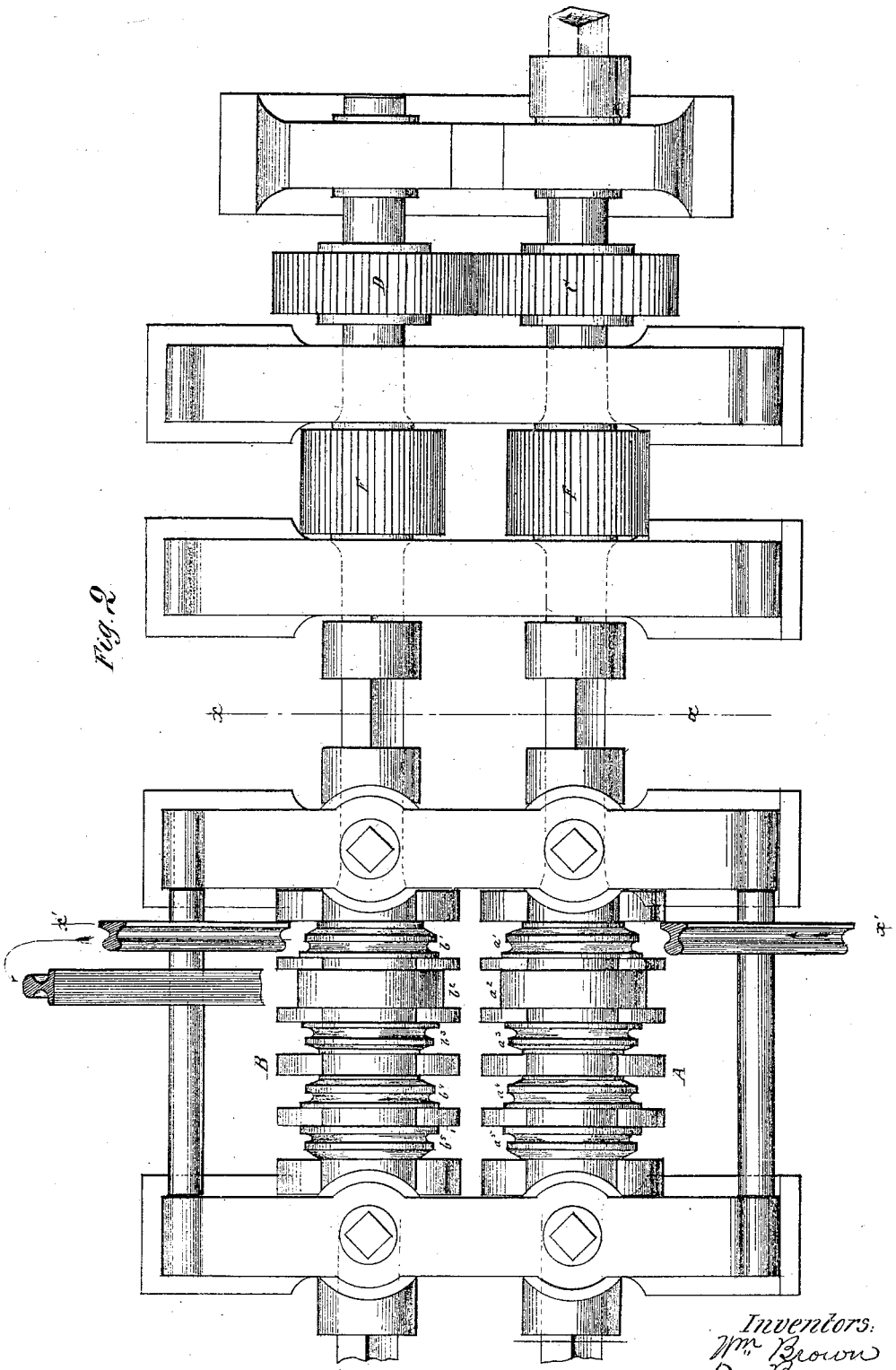

Fig. 2

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Fig. 3

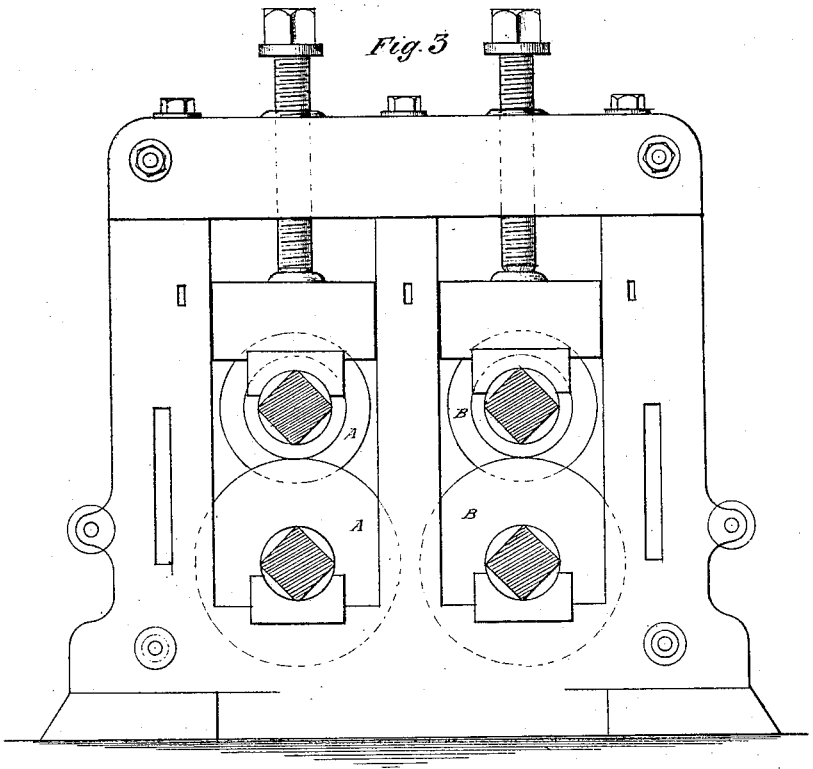
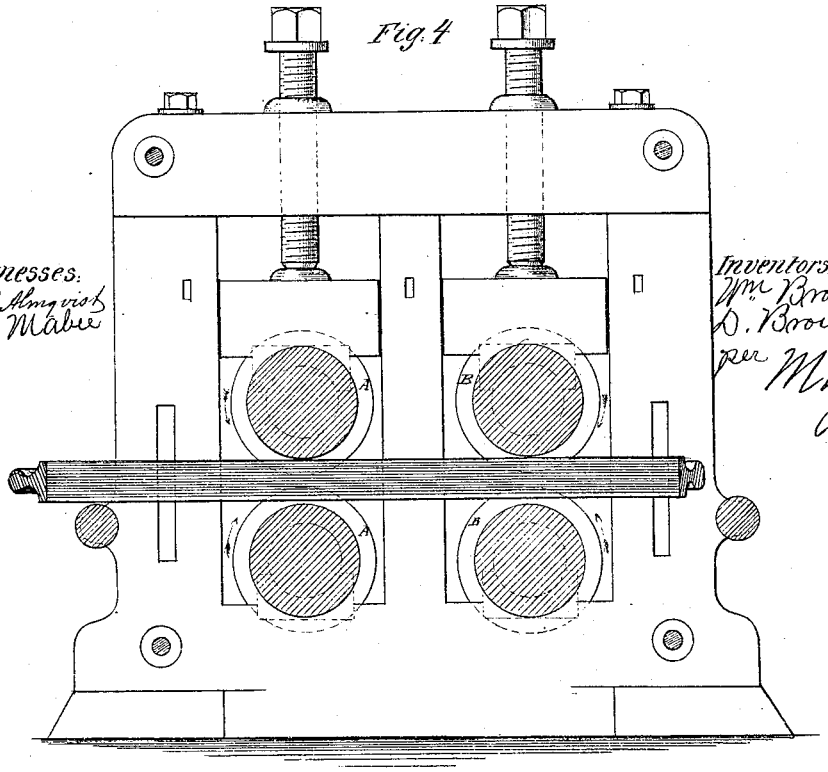


Fig. 4



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United States Patent Office.

WILLIAM BROWN AND DAVID BROWN, OF SMITHWICK, ENGLAND.

Letters Patent No. 106,992, *dated September* 6, 1870.

IMPROVEMENT IN ROLLING-MILLS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that we, WILLIAM BROWN and DAVID BROWN, of Smithwick, in the county of Stafford, England, have invented a new and useful Improvement in Rolling-Mills; and we do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawing forming part of this specification, in which—

Figure 1, Sheet I, is a front view of our improved machine.

Figure 2, Sheet II, is a top view of the same.

Figure 3, sheet III, is a vertical cross-section of the same, taken through the line $x\ x$, figs. 1 and 2.

Figure 4, Sheet III, is a vertical cross-section of the same, taken through the line $x'\ x'$, figs. 1 and 2.

Similar letters of reference indicate corresponding parts.

Our inuention has for its object to facilitate the rolling of large and heavy masses or bars of iron, steel, and other metals, and to obviate the necessity of lifting the said heavy bars or masses from one groove to another of the rolls, as is necessary in rolling by the ordinary machinery, and to dispense with the three-high rolls and the heavy machinery required for the ordinary reverse gear; and

It consists in the construction, combination, and arrangement of the rolls, as hereinafter more fully described.

A and B are two pairs of rolls, which are mounted preferably in the same standards or housings, and in the ordinary manner, one pair being placed in advance of the other pair, and in the same horizontal plane.

One pair of the rolls A B rotates in an opposite direction to that in which the other pair rotates; that is to say, one pair rotates in a direction proper to seize the pile, bloom, or bar, and carry it through the rolls, while the other pair rotates in a direction proper to push the advancing pile, bloom, or bar back again to the pair of rolls from which it has just passed.

The grooves $a^1\ a^2\ a^3\ a^4\ a^5\ b^1\ b^2\ b^3\ b^4\ b^5$ of the two pairs of rolls A B are situated in the same horizontal line.

The pile, bloom, or bar, being passed between a groove, as a^1, of the one pair of rolls A, from the front, is seized by the said pair of rolls A and operated upon by them, and is carried through a corresponding groove, as b^1, of the second pair of rolls B, placed in advance of the first pair A.

The pile, bloom, or bar, in passing through the groove b^1 of the second pair of rolls B, is not operated upon by them, parts of said rolls being cut away to make the said groove b^1 larger than the corresponding groove a^1, to allow the pile, bloom, or bar to pass through the said rolls B without being seized by them, the groove b^1 of the second pair of rolls B acting as a guide for the said pile, bloom, or bar delivered from the first pair of rolls A.

The pile, bloom, or bar is received by the workman in front of the second pair of rolls B as it passes out of the groove b^1 and is returned through a second groove, as b^2, of the said second pair of rolls B, which rolls B now seize the pile, bloom, or bar, operate upon it, and deliver it to the corresponding groove a^2 of the first pair of rolls A, parts of said rolls A being cut away, making the groove a^2 larger than the corresponding groove b^2 to allow the pile, bloom, or bar, to pass through the rolls A, without being operated upon by them, and so on, the pile, bloom, or bar being passed backward and forward through the grooves of the two pairs of rollers until it is sufficiently reduced and finished, being operated upon by only one pair at each passage through the two pairs, the pair that does not act upon it serving as guides to it while passing through the other pair.

If desired, the pile, bloom, or bar may be first passed through the larger or guide groove, and then into the smaller or working groove.

This arrangement of rolls can be applied to all the rolls of the mill; that is to say, to the blooming rolls, roughening and billeting rolls, and finishing rolls.

The reverse motion is given to the two pairs of rollers A B by the gear-wheels C D attached to the shafts of the two lower rolls respectively, and the teeth of which mesh into each other.

To the shafts of the two lower rollers are also attached gear-wheels, E, the teeth of which mesh into the teeth of the gear-wheels F, attached to the shafts of the two upper rolls, as shown in figs. 1 and 2.

Power is applied to the machine in the ordinary manner.

By the arrangement of rolls herein described great facility is offered for passing heavy masses of metal through the rolls, as the grooves of both pairs of rolls being in the same horizontal plane, no lifting of the pile, bloom, or bar is required to pass it from one groove to another, as is required when rolls three high are used.

The rolls can also work at a much quicker speed, and there will always be a good end of the bar to enter the grooves instead of the end of the pile or bar opening and catching upon the guards, as sometimes happens in ordinary rolling.

This arrangement also enables bars to be rolled of a much greater length than usual, and effects a great saving in crop-ends.

Two bars moving in opposite directions may be operated upon by the rolls at the same time; that is to say, while one bar is being passed through the rolls

in one direction, and being operated upon by one pair of rolls, another bar may be passed through the rolls in the opposite direction, and being operated upon by the outer pair of rolls.

Although this invention is especially applicable for rolling heavy masses of iron and steel, yet the same arrangement may be applied to the rolling of small bars or sections of iron and steel, and to the rolling of other metals.

We are aware that a patent was granted in England, September 11, 1863, to William Taylor, for an improved rolling-maching, which consisted of two sets of three-high rolls, arranged, the one set in in advance of the other, and of which both sets are used alternately as the initial rolls; that is to say, the bar or billet being entered into a groove of the front set, passes thence to and through a groove in the rear set, and then being entered into a groove in the rear set, passes thence to and through a groove in the front set, and so on; but in this case both sets of rolls are constantly used as reducing rolls, whereas, in our machine, reduction of the metal is accomplished only by that pair in which for each pass the bar or billet is entered, the other pair serving for said pass, simply as carrying and guiding rolls.

Disclaiming, therefore, all right to the invention patented to the said William Taylor,

We claim as our improvement—

The machine consisting of two pairs of grooved rolls, arranged, the one pair in advance of the other, and operating in conjunction in the manner hereinbefore described.

The above specification of our invention signed by us this 21st day of February, 1870.

WILLIAM BROWN.
DAVID BROWN.

Witnesses:
J. B. GOULD,
J. BRAMS.