(No Model.) 2 Sheets—Sheet 2.

C. J. & H. GREEN.

ROLLING MILL.

No. 538,775. Patented May 7, 1895.

Fig. 3.

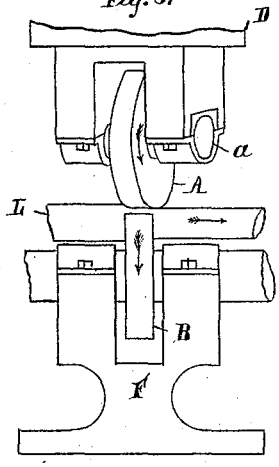


Fig. 4.

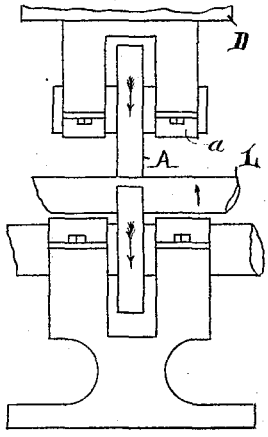


Fig. 5.

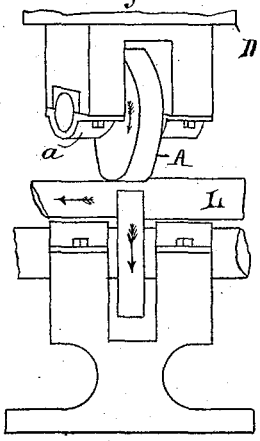


Fig. 6.

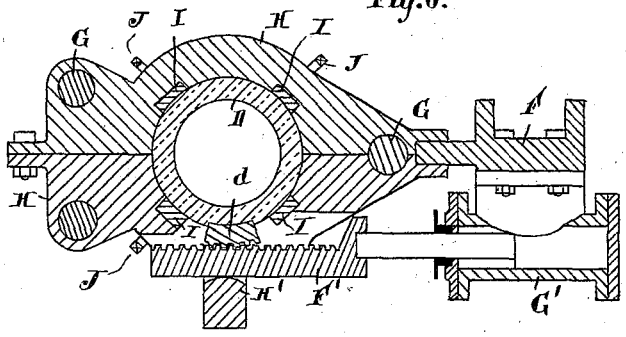
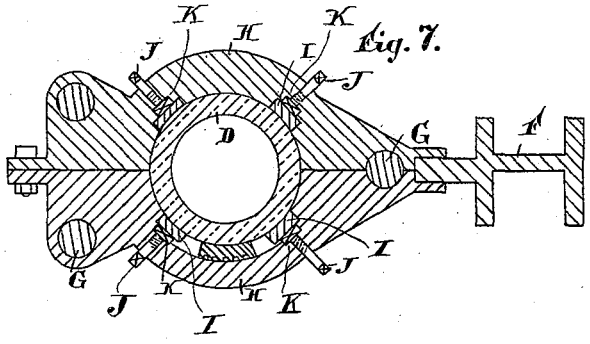


Fig. 7.



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UNITED STATES PATENT OFFICE.

CHARLES J. GREEN AND HENRY GREEN, OF ECCLESFIELD, ENGLAND.

ROLLING-MILL.

SPECIFICATION forming part of Letters Patent No. 538,775, dated May 7, 1895.

Application filed September 26, 1893. Serial No. 486,540. (No model.)

To all whom it may concern:

Be it known that we, CHARLES JOSEPH GREEN and HENRY GREEN, subjects of the Queen of Great Britain, residing at Ecclesfield, near Sheffield, in the county of York, Kingdom of England, have invented certain new and useful Improvements in Rolling-Mills, of which the following is a specification.

This invention has for its object to approximately form railway axles, bicycle axles, lathe spindles and other articles of various longitudinal configuration, but having circular cross sectional area, and with even or varying concentric diameters, such as are now forged out under the hammer and afterward turned to the required shape.

The invention is best set forth by the aid of the accompanying drawings, in which—

Figure 1 is a front elevation of a mill constructed according to our invention; Fig. 2, a side elevation of the same. Figs. 3, 4, and 5 are elevations of a portion of the mill, showing the top roller in three different positions; and Figs. 6 and 7, horizontal sections through the lines *x x y y*, respectively, of Fig. 1.

In the drawings, A B and C are narrow rollers. Rollers B and C run in fixed bearings *b c* which are preferably adjustable laterally by set screws while roller A rotates in bearings *a*, adjustable also not merely vertically but also, to some extent, capable of rotation round a fixed vertical axis *z z*. These three rollers may be in such a position that, their axes being parallel, lines drawn between the centers of their axes would describe an equilateral triangle, or, if one be moved away, such as the top one A being moved vertically, lines drawn between the centers would then describe an isosceles triangle. The bearings *a* are carried by the cylinder D, and the latter is caused to move up and down on the ram E actuated by hydraulic power, so as to press the roller A with any required force and to any required extent down on to the rollers B C. The ram E is fixed to a plate *e* by nut *e'*, the plate being fastened to the bed plate F and further secured by strong bolts G.

Attached to the cylinder D or forming part thereof is a segmental pinion *d* extending its whole length for purposes hereinafter described.

F' is a rack adapted to engage this pinion *d* and to partially rotate the cylinder D say through from ten to fifteen degrees maximum. This is done by means of a piston working in a hydraulic cylinder G' (shown more particularly in Fig. 6) the latter being secured to the bed plate F by bolts *f*.

H is a frame encircling cylinder D (supported by rods G and frame F) and H' is a projection therefrom, which serves to guide the rack F' in its backward and forward movement.

I are brasses in which the outside part of cylinder D works, and J set screws for regulating the same, the latter working in square nuts K which are held by recess in casting H.

L is the piece of metal being rolled.

The mode of action is as follows: The ingot, bar, or other approximately round piece of iron or steel L is placed in the space between the three rollers A B and C and the roller A is forced down by hydraulic pressure on to the metal to the required extent. The two rollers B and C are now made to revolve in the same directions, being driven by pinions on their shafts *b c* or any other suitable gearing. (Only one or all three shafts can be driven by pinions if desired.) These cause the bar of metal L also to revolve and if the roller A be slowly brought nearer to the other rollers the diameter of the bar will be reduced, its revolution keeping it circular in section. If the axes of the rollers be kept parallel as shown in Fig. 4, the bar L will be merely turned in the direction of its circumference and will not move in the direction of its length, but if the movable roller A be turned or twisted about its center in either direction as shown in Figs. 3 and 5, by means of the rack F as hereinbefore described, the bar will travel in the direction of its length either backward or forward according to the position given to the top roller A (as shown by the arrows in Figs. 3 and 5) so as to be worked upon over its entire length.

It will be evident that if desired the pressure may be applied to one roller and the twisting motion to another, or either or both of these motions may be applied to any or all of the rollers, the chief object of this invention being that the article being worked may be caused to revolve rapidly to move lengthwise either backward or forward as required, and to re-

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H. G. GRIER.

PANTOGRAPH MACHINE.

No. 538,776. Patented May 7, 1895.

FIG. 2.

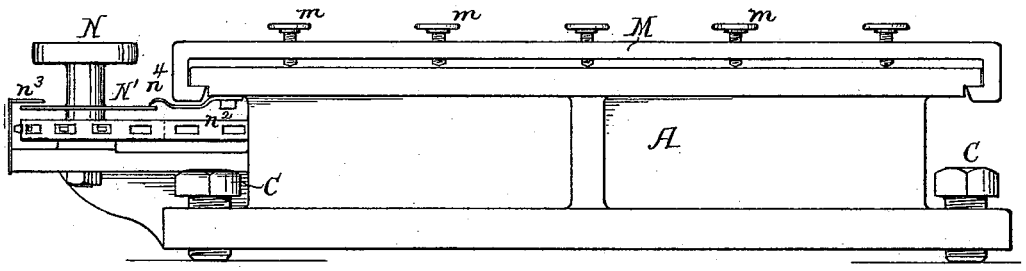
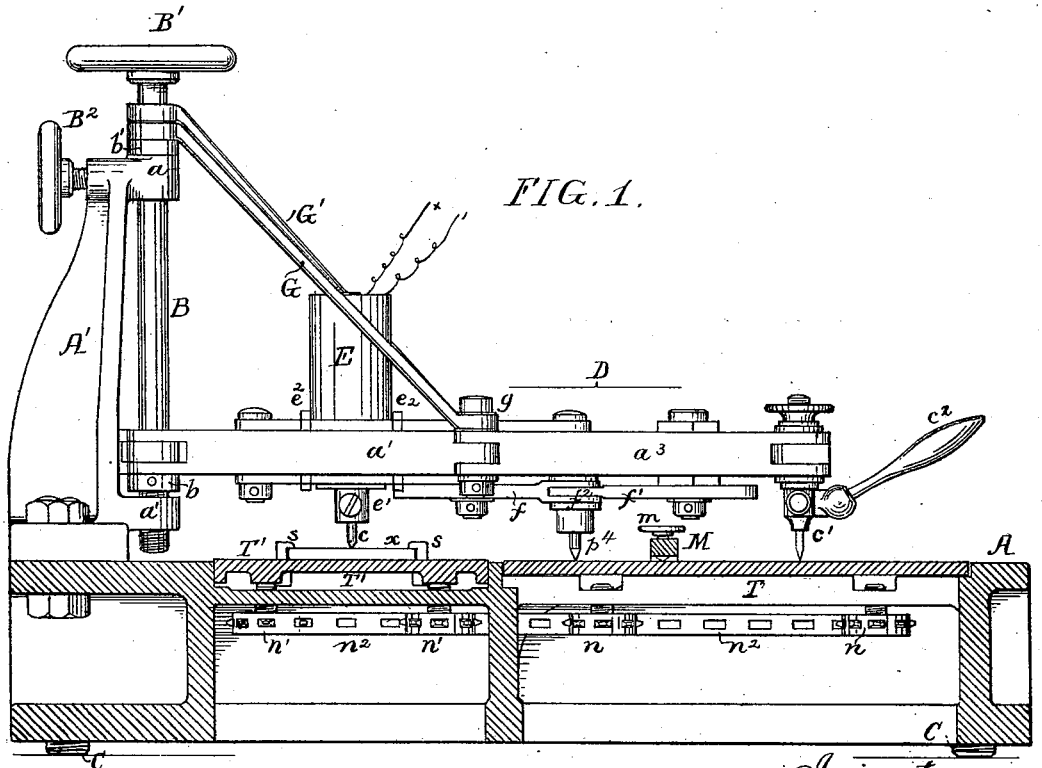


FIG. 1.



Witnesses.
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Albert Popkins

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