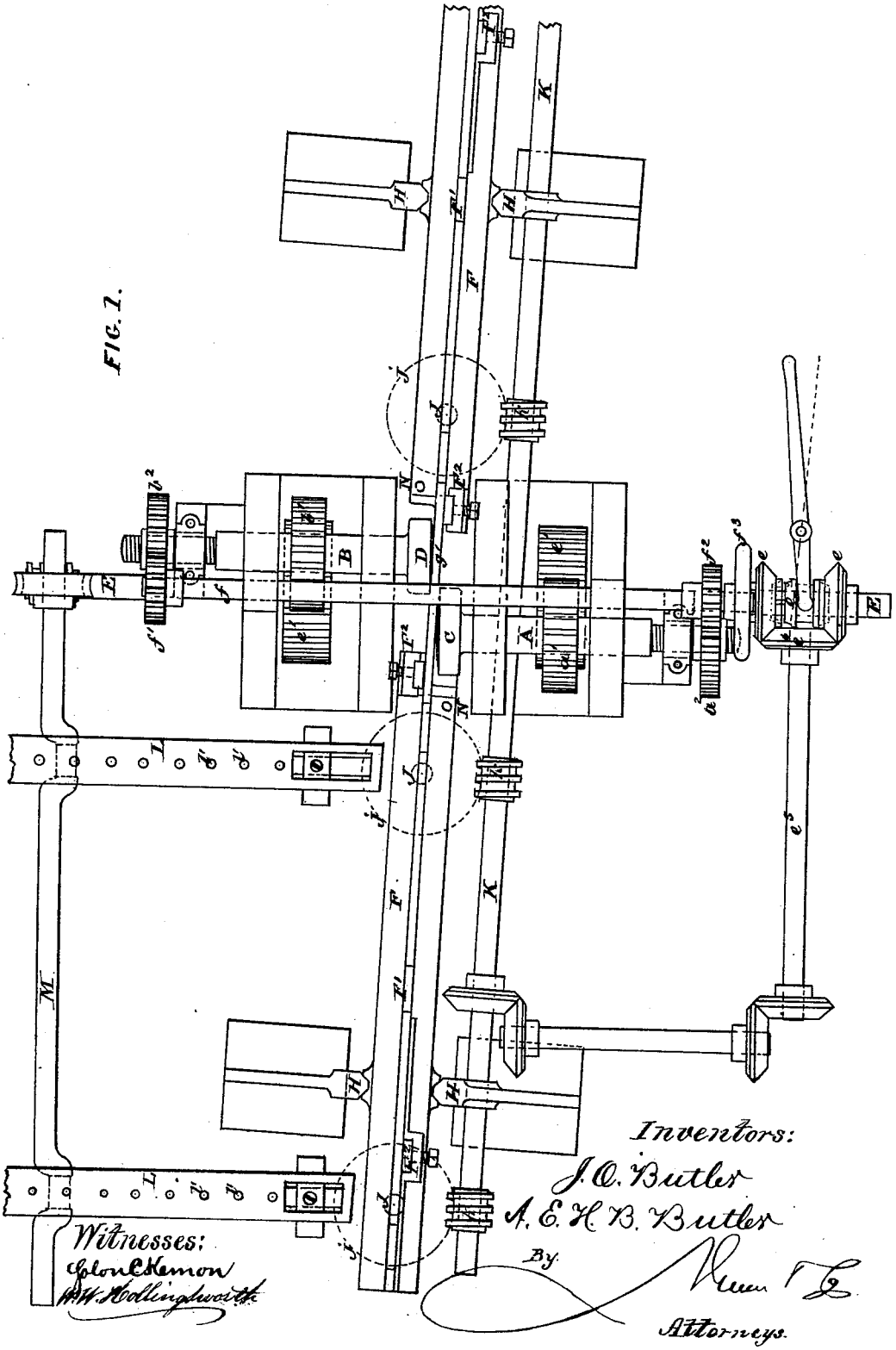
2 Sheets—Sheet 1.

J. O. & A. E. H. B. BUTLER.

Machine for Rolling Tubes and Bars.

No. 197,094. **Patented Nov. 13, 1877.**

FIG. 1.



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2 Sheets—Sheet 2.

J. O. & A. E. H. B. BUTLER.

Machine for Rolling Tubes and Bars.

No. 197,094 **Patented Nov. 13, 1877.**

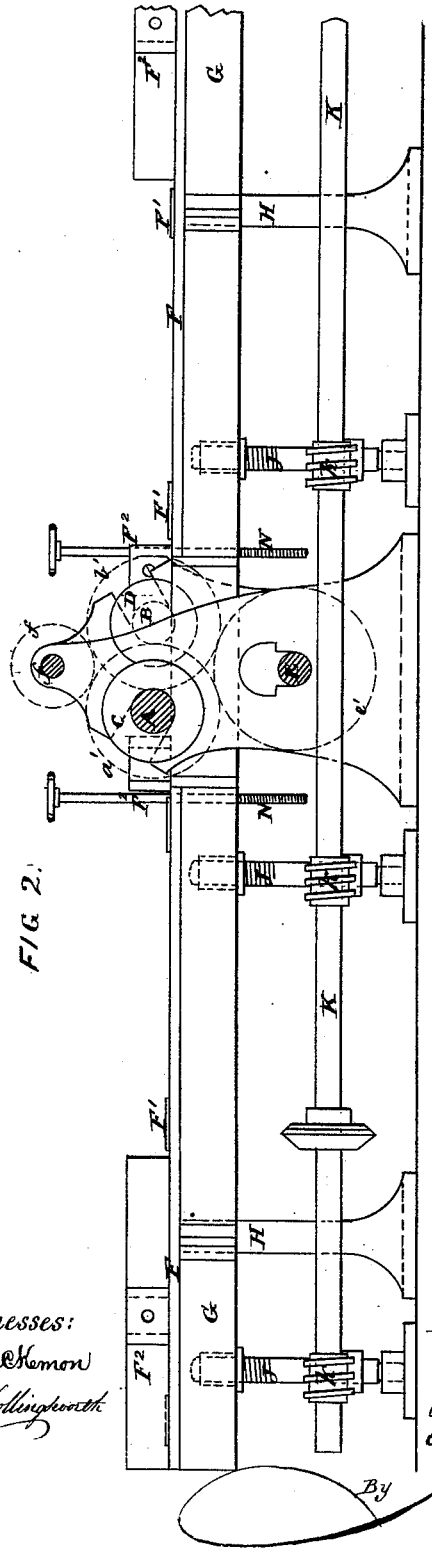

FIG 2.

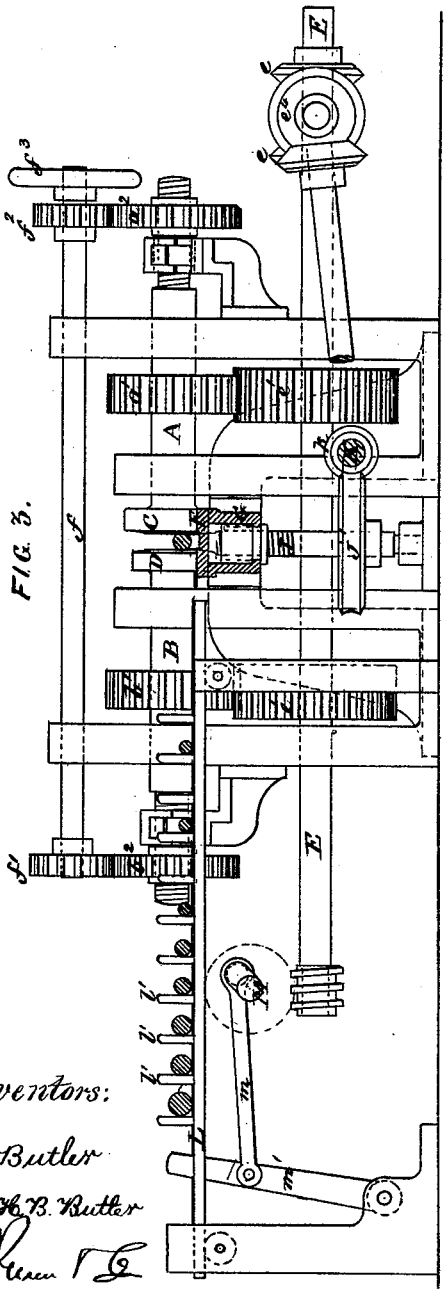

FIG 3.

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UNITED STATES PATENT OFFICE.

JOHN O. BUTLER AND AMBROSE E. H. B. BUTLER, OF KIRKSTALL FORGE, LEEDS, ENGLAND.

IMPROVEMENT IN MACHINES FOR ROLLING TUBES AND BARS.

Specification forming part of Letters Patent No. **197,094**, dated November 13, 1877; application filed September 5, 1877.

To all whom it may concern:

Be it known that we, JOHN OCTAVIUS BUTLER and AMBROSE EDMUND HEATH BUCKLEY BUTLER, both of the Kirkstall Forge, Leeds, in the county of York, in England, iron masters, have invented certain new and useful improvements in and applicable to machinery for rolling, straightening, grinding, polishing, and finishing bars and tubes of iron and other metals; and we hereby declare the following to be a full, clear, and exact description thereof, reference being had to the annexed drawings, forming part of this specification.

Our invention relates partly to the machinery for rolling, straightening, and finishing bars or tubes of iron and other metals for which Letters Patent were granted in England to James Robertson on the 20th day of December, 1869, No. 3,677, and to George Walter Dyson and Henry Arthur Hall on the 31st day of October, 1870, No. 2,856, and in America to Jacob Reese, of Pittsburg, in the State of Pennsylvania, in the United States of America, on the 18th day of June, 1867, No. 65,832; and it consists in the construction and arrangement of parts hereinafter described and claimed.

Another part of our invention consists in applying to the said machinery for rolling, straightening, and finishing bars or tubes of metal, a table or rocking frame, on which the bars or tubes are placed after leaving the machine, and on which they are made to roll backward and forward while cooling by means of our rocking arrangement, to prevent warping and to keep them true.

On Sheet 1 Figure 1 is a plan, and on Sheet 2 Fig. 2 is an elevation, and Fig. 3 is an end view, of a machine for rolling, straightening, and finishing bars and tubes of iron and other metals to which our improvements are applied.

A and B are the axles of the two disks C and D, which are similar to those described in the specifications of Letters Patent granted to James Robertson, and to George Walter Dyson and Henry Arthur Hall, and to Jacob Reese, hereinbefore referred to. Both the axles A and B are driven from the main shaft E, on which are keyed the broad wheels e^1 e^1, gearing into the wheels a^1 and b^1 fixed on the axles A and B.

In the patents above referred to the disks were provided with separate adjusting-gearing for moving them to and fro laterally, so as to to vary the distance between the faces of the disks according to the diameter of the bar or tube under operation.

Both axles A and B are connected by gearing, as follows: To the cross-shaft f are fixed the pinions f^1 and f^2 and the hand-wheel f^3, by which the shaft f is turned round. Each pinion gears into one of the wheels a^2 and b^2, the bosses of which are screwed on the ends of the axles A and B.

In order to support the bar or tube during the operation of rolling, straightening, and finishing, we apply to each side of the disks C and D a long table, F, the level of which can be varied according to the diameter of the bar or tube under operation, so that the axis of the bar or tube can be kept in any horizontal plane parallel to and either above or below the axes of the disks. Each table F is secured to the bed G, and as the face of the disks C D is slightly tapered or beveled, as shown in Figs. 1 and 3, the tables and beds are set at a corresponding angle to a line drawn at right angles to the axes of the axles A and B.

Each table has three or other convenient number of V-shaped grooves in its sides, in which fit the guides H, which are supported by frames fixed to the foundation. The guides can be set up by regulating-screws.

In the beds G are fixed screw-nuts for the vertical screws J, and at the lower end of each screw is keyed a worm-wheel, j. All these worm-wheels are turned round simultaneously by the worms k on the side shaft K, which is driven by gearing from the main shaft E in the following manner: On the shaft E are mounted loose the miter-wheels e e, to each of which is cast a friction-box, as shown in Fig. 1. Between these friction-boxes is the double friction-cone e^3, which is connected to the shaft E by a key and groove; and by moving the cone e^3 into contact with the friction-box on either of the wheels e the direction of rotation of the screws J can be reversed. Both the wheels e gear into a similar wheel, e^4, on the shaft e^5, and this shaft is connected by bevel-wheels and a short diagonal shaft to the side shaft K.

By this arrangement the tables F can be raised or lowered simultaneously; or, we obtain this vertical adjustment and support by hydraulic rams, or any other convenient and suitable equivalent.

The bar or tube under operation is supported by the short bearings F^1, which are let into the tables F, and the guide-blocks F^2 are also fixed to the tables F to guide the bar or tube laterally. The screws N passing through the table and bed G are to support them when set to the proper level; or this support for the tables, when adjusted to the proper level, can can obtained by any other suitable and convenient means.

The machinery for imparting a revolving motion to the bars or tubes while cooling, to prevent them warping, consists of two or more tables, N, placed at any convenient distance apart, and fitting in grooves in a bed-plate.

The tables will, in practice, be supported on anti-friction rollers, and are moved to and fro by cranks on the main shaft M. These cranks are connected by the links *m* to the vibrating levers *m'*, the upper ends of which pass through slots in the tables L; or the to-and-fro motion may be obtained in any other convenient manner. The bars or tubes to be operated upon are laid on racks, (not shown,) which are, in practice, placed parallel to the tables and raised a little higher than they, so that the bars do not rest on the bed-plate, and the pegs *l'* are inserted into the tables L to keep the bars or tubes apart. The to-and-fro motion of the tables then causes the hot bars or tubes to revolve alternately in contrary directions on the rack while cooling, thereby preventing warping.

We do not claim, broadly, the employment of a vertically-adjustable table for supporting bars or tubes while being acted on by disks or rolls; nor do we claim, broadly, the employment of screws for adjusting a table or platform vertically.

We claim—

1. In a machine for rolling and straightening bars or tubes, the combination of the separate grooved tables F, having guide-blocks for supporting the bars or tubes laterally, the vertical guides H, the screw-shafts J, located beneath the tables and provided with worm-wheels *j*, the worm-shaft K, having worm-pinions *k*, and the rotating disks, all as shown and described.

2. The reciprocating horizontal bars or tables L L, provided with holes to receive pegs, the crank-shaft M, and connecting rods or links, substantially as shown and described, for the purpose of revolving the bars or tubes while hot or cooling, to prevent their warping, as set forth.

3. The method herein described for preventing bars or tubes from warping while cooling, consisting in imparting reciprocating rotary motion to the same by a rectilinear reciprocating motion of the bed whereon they are supported.

In testimony whereof we have hereto set our hands before two subscribing witnesses.

J. O. BUTLER.
AMB. EDM. H. B. BUTLER.

Witnesses:
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Solicitor, Leeds;
JOHN WILLIAMSON,
His Clerk.