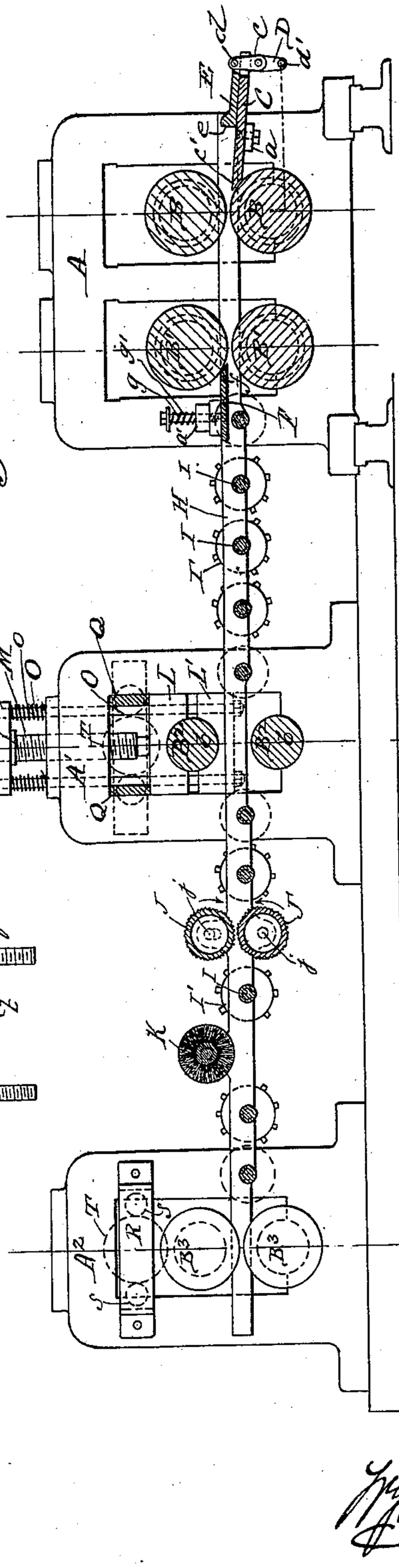
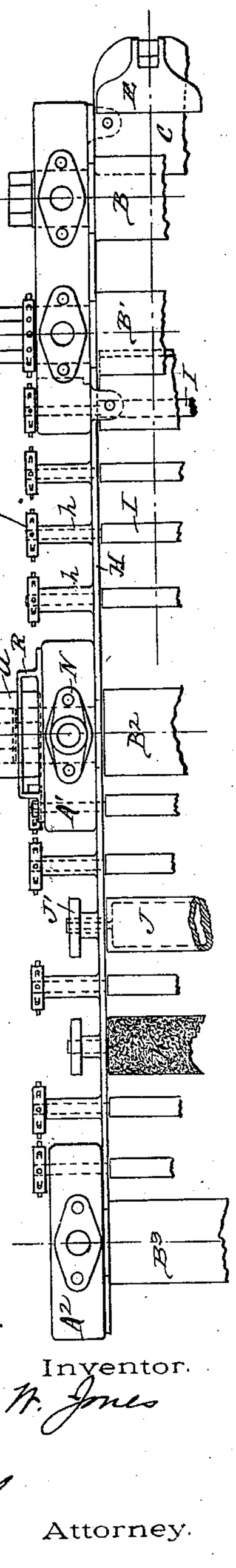
(No Model.)

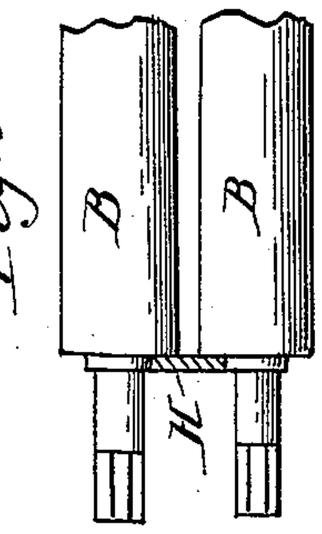
G. W. JONES.

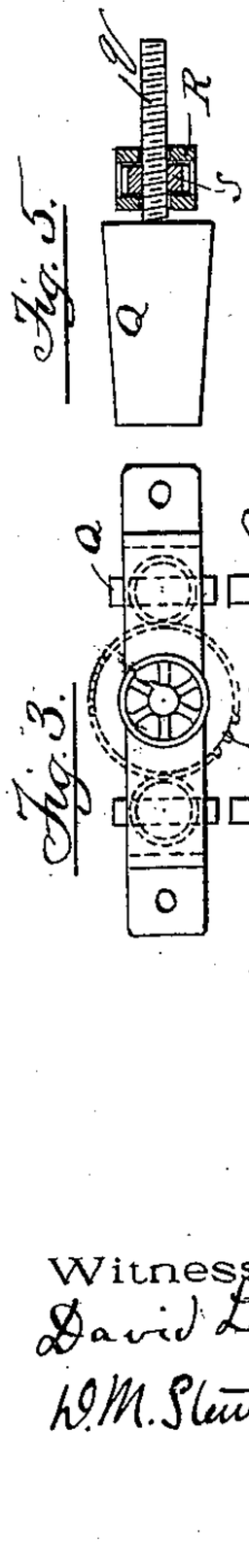
ROLLING MILL.

No. 560,585. Patented May 19, 1896.









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UNITED STATES PATENT OFFICE.

GRIFFITH W. JONES, OF READING, PENNSYLVANIA.

ROLLING-MILL.

SPECIFICATION forming part of Letters Patent No. 560,585, dated May 19, 1896.

Application filed June 13, 1895. Serial No. 552,642. (No model.)

To all whom it may concern:

Be it known that I, GRIFFITH W. JONES, a citizen of the United States, residing at Reading, county of Berks, State of Pennsylvania, have invented certain Improvements in Rolling-Mills, of which the following is a specification.

My invention relates particularly to continuous rolling-mills adapted for rolling thin metal plates for tinning and other purposes by successive reductions in two or more series of rolls; and it consists in certain improvements which are especially applicable to the general form of mill shown and described in Patent No. 483,926, issued to me October 4, 1892, though not limited to such use. These improvements are particularly described in connection with the accompanying drawings and are set out in the claims.

Figure 1 is an elevation of a train of rolls embodying my improvements, the initial or roughing rolls being shown in cross-section midway of their length and the intermediate rolls in cross-section through the journal-bearing. Fig. 2 is a half plan view of the same. Figs. 3, 4, and 5 show separately the adjustable liner mechanism for the upper journal-box. Fig. 6 is a partial end view of a pair of rolls, showing the relative arrangement of one of the side guides.

A, A′, and A^2 represent the housings for several separate series of rolls, arranged in line, so as to form a continuous mill. In the housing A, as shown in the drawings, are mounted two pairs of roughing-rolls B B and B′ B′, while a single pair of rolls B^2 B^2 and B^3 B^3, respectively, are mounted in each of the other housings, the several pairs or series of rolls being so arranged as to distance from each other and as to surface speed of rotation when in operation as to enable plates of any desired length to be continuously rolled. In connection with the intermediate pair of rolls I have indicated my improved manner of adjustably suspending the top roll and of rigidly supporting the same when adjusted, so as to prevent yielding or spring when in operation.

L L′ represent the upper and lower journal-boxes, in which rides the journal *b* of the upper rolls. These boxes are guided in the window or opening of the housing, as usual, the upper box being backed by the adjusting-screw M, which turns in a nut set in the top of the housing. Upon the upper end of this screw is mounted a cross bar or head N between a fixed collar *m′* and a removable collar *m*. Adjustably connected to the ends of this cross-head are vertical carrier-rods O O, which extend downward through the top of the housing and through the journal-boxes L and L′, which, together with the rolls B^2, are thus carried by the rods. Strung upon the latter between the cross-head and the top of the housing are springs *o o*, which are adjustable in tension by means of nuts on the carrier or suspension rods, so as to somewhat more than counterbalance the weight of the upper roll and its journal-boxes, and thus normally raise the latter against the end of the adjusting-screw M. In order to overcome the objectionable spring common in rolling-mills, I provide adjustable liners Q Q on either side of the screw M between the journal-box and the housing, as shown most clearly in Figs. 3, 4, and 5. The liners Q Q are wedge-shaped and are preferably located between the inner side walls of the housing and the carrier-rods. They are provided with extensions *q*, which are screw-threaded and pass transversely through a frame R, fixed to the outer face of the housing, and through interiorly-screw-threaded pinions S, located in the space *r* of this frame. These pinions S mesh with a central spur-wheel T, which is rotated by means of a hand-wheel *t*, so as to simultaneously move the liners Q Q in or out as required to suit the adjustment for different gages and to form a rigid backing for the box L.

In connection with the housing A and the rolls mounted therein I have shown improved mechanism for automatically feeding the billet to the roughing-rolls. This consists, essentially, of a fore plate C, carried on suitable supports *a*, projecting inwardly from the housings, and a pushing device E, sliding thereon, with means for operating said device. The beveled front *c′* of the fore plate is arranged adjacent to the top surface of the lower roll, and the plate extends rearward therefrom with a downward incline, which tends to hold the heated metal against the head *e* of the pushing device E. This latter is connected at *d* to one end of a lever or arm D, which is

pivoted intermediately to a lug on the fore plate and operatively connected at its lower end to any suitable driving mechanism, whereby a regular reciprocating motion is imparted to the pushing device, this being effected, as indicated in the drawings, by means of an eccentric-rod connection to the roll B.

At the discharge side of the second pair of rolls I have shown an improved top guide mechanism for preventing the curling upward of the rolled sheet, this mechanism consisting of a plate F, extending between the housings and adjustably supported from brackets or lugs a' thereon by means of bolts g, which are attached to the plate and pass upward through said brackets or lugs and are provided with springs g', the tension of which is adjusted so as to balance the weight of the guide-plate and raise its beveled inner edge f into contact with the curved face of the upper roll B', thus effectually preventing upward curving of the sheet as it leaves the rolls. In connection with this top guide I employ a series of bottom rollers I I to carry the rolled sheet from one pair of rolls to the next, these being mounted in side plates H, which serve as side guides for the moving sheet. These rollers are operated by any suitable mechanism, so as to carry the sheet to the succeeding set of rolls, this being accomplished in the construction indicated by means of sprocket-chains which pass over sprocket-wheels I', fixed to the guide-roller shafts, and which may be driven from the rolls. The side guides H extend from one end of the series of rolls to the other, being suitably secured to the inner face of the housings and passing between the upper and lower rolls of each set, as shown in Fig. 1, the rolls being reduced in diameter adjacent to the inner faces of the housings, so as to clear the side guide, the edges of which are thus brought nearer to the center of the rolls than the working faces of the latter. This permits the rolls to be formed without collars, the edges of the sheets which are operated upon being allowed to contact with the side guides instead.

Before passing the rolled sheet between the finishing-rolls B^3 B^3 the scale should be thoroughly removed, and in order to effect this satisfactorily I employ, in connection with a rotary brush, such as is shown in my prior patent referred to, a pair of scale-removing rollers J J', arranged in the path of the rolled sheets and rotated by suitable driving mechanism in the direction of the arrows. The surface of each of these rollers is longitudinally grooved or otherwise roughened, so as to produce a scraping action upon the surface of the sheet which contacts with it in passing between the two, and the scale thus loosened is swept off of the upper surface of the sheet by the succeeding action of the rotary brush.

The successive sets of rolls may be geared together and driven from a single source of power; but I prefer to operate them independently by separate motors, as indicated in Fig. 2, in connection with the intermediate rolls B^2, which are represented as being driven from an engine-shaft W, which is connected by a clutch mechanism W' V' to the rolls, so as to enable the latter to be rotated at any desired speed with relation to the other sets of rolls.

What I claim is—

1. In a rolling-mill the combination with the roll and journal-boxes, and with the adjusting-screws of horizontal adjustable liners located between the top box and the housing on either side of said screws and means for simultaneously adjusting said liners to rigidly support the box substantially as set forth.

2. In a rolling-mill the combination with the roll and journal-boxes, and with the adjustable screw of horizontal wedge-shaped liners located between the top box and the housing, on either side of the screw, and an operating mechanism for said liners mounted on the outer face of the housing and adapted to simultaneously adjust the same, substantially as set forth.

3. The combination with two or more series of rolls and mechanism between the same for guiding the rolled plate to the succeeding rolls, of side guides extending unbrokenly between the successive housings and across the inner faces of the latter between the upper and lower rolls, said rolls being of reduced diameter in the plane of said side guides and overlapping the same, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

GRIFFITH W. JONES.

Witnesses:
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F. PIERCE HUMMEL.