



(No Model.)

2 Sheets—Sheet 2.

# F. H. DANIELS. ROLLING MILL.

No. 355,390.

Patented Jan. 4, 1887.

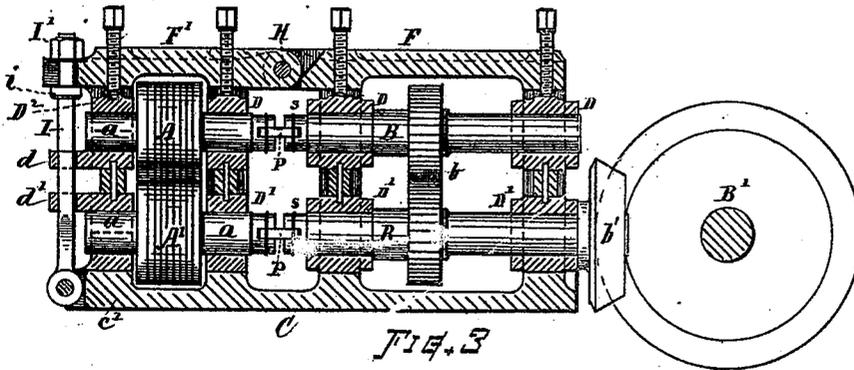


FIG. 3

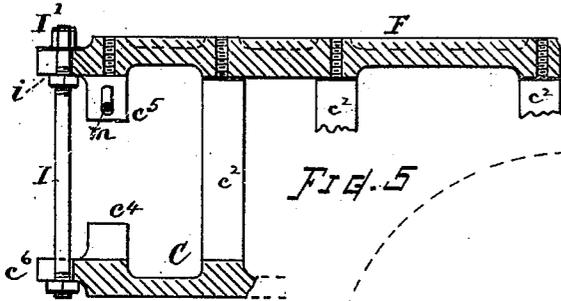


FIG. 5

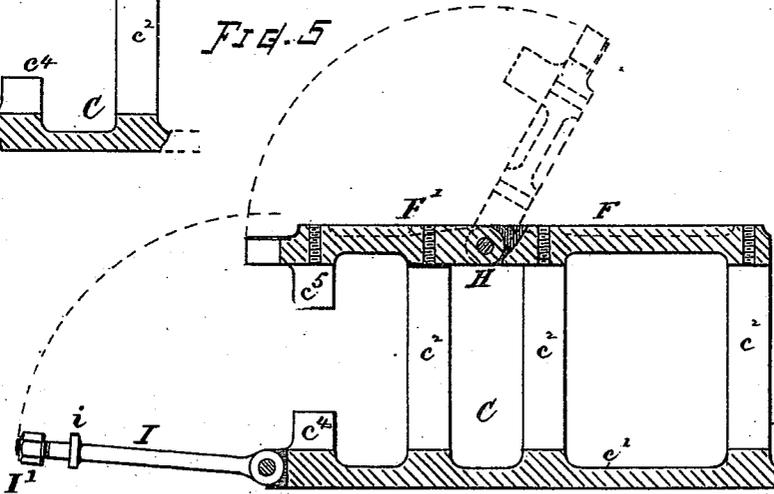


FIG. 4

WITNESSES

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# UNITED STATES PATENT OFFICE.

FRED H. DANIELS, OF WORCESTER, MASSACHUSETTS.

## ROLLING-MILL.

SPECIFICATION forming part of Letters Patent No. 355,390, dated January 4, 1887.

Application filed March 15, 1886. Serial No. 195,340. (No model.)

*To all whom it may concern:*

Be it known that I, FRED H. DANIELS, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Rolling-Mills, of which the following, together with the accompanying drawings, is a specification sufficiently full, clear, and exact to enable persons skilled in the art to which this invention appertains to make and use the same.

This invention relates to the construction of the housings by which the roll-journals are supported and to the manner of connecting the driving-shafts and roll-shafts, the objects of my invention being, first, to provide a mechanism which will permit ready and convenient access to the rolls and guides in a continuous rolling-mill, and thereby to greatly facilitate the adjustment and removal of said rolls and guides; second, to provide a housing for continuous rolling-mills with a hinged or movable cap or top piece that can be conveniently raised to permit taking out and replacing the rolls, as required; third, to provide a housing for continuous rolling-mills in which the upright at the front end is adapted to swing outward or is removable from the front of the rolls, so as to permit of the rolls being conveniently removed from the rear portion of the housing or from their shafts; fourth, to provide a peculiar connection or coupling for conveying the driving-power from the operating-shafts to the roll-shafts in a rolling-mill. These objects I attain by mechanism the nature, construction, and operation of which is herein explained, the particular subject-matter claimed being hereinafter definitely specified.

In the drawings, Figure 1 is a plan view of a rolling-mill housing illustrating my invention. Fig. 2 is a front view of similar housings. Fig. 2<sup>v</sup> is a vertical section through the front roll-bearings at line *w w*, Figs. 1 and 3. Fig. 2<sup>x</sup> is a vertical section at line *x x*, Figs. 1 and 3. Fig. 3 is a vertical section of the housing and bearings longitudinally with roll-shaft. Fig. 4 is a similar section of the housing-frame, with the rolls and journal-bearings removed. Fig. 5 is a modification of Fig. 4, showing the cap-piece removable instead of hinged to swing upward. Fig. 6 is a longitudinal section

through the shaft-coupling devices in the direction of line *y y*. Fig. 7 is a transverse section of the same at line *z*, Fig. 6, and Fig. 8 is a view of the coupling-plate separately. The three latter figures, 6, 7, and 8, are drawn to larger scale than the others.

In referring to parts, *A A'* denote the rolls; *a*, the roll-shafts; *B*, the operating-shafts; *b*, the gears; *B'*, the main driving-shaft having bevel-gears, as *b'*, for connecting the several sets of shafts *B* therewith, for operation in the ordinary manner, to impart motion to the several sets of rolls, of which any desired number of pairs may be employed in the mill.

As the construction of the housings and coupling devices are similar for each pair of rolls, description and illustration of a single one will herein be sufficient for giving a clear understanding of the nature of my invention.

*C* indicates my improved housing, which consists of a suitable base, *c'*, having uprights *c''*, that serve as guides and supports for the journal-boxes *D D'* and as supports for the top or cap plate, *F*, which latter is secured thereto by the bolts *f f'*, or in other suitable efficient manner.

The forward portion of the cap-plate *F*, which extends over the rolls, is jointed or hinged to the rear portion in such manner that it can be removed or swung upward from its normal position in a ready and convenient manner, as indicated by dotted lines in Fig. 4, to give access to the parts beneath. The hinge or joint is preferably arranged as shown at *H*, the bolts *f'* being forward of the hinging.

The forward end of the swinging cap *F'* is provided with dependent guides or lugs *c''*, for confining the journal-box of the top-roll shaft, and the base *C'* is fitted with upward projections or guides, *c''*, for confining the journal-box of the lower roll.

The forward end of the movable cap *F'* is secured to the base *c'* by a removable or hinged standard or bolt, *I*, that is preferably hinged to the forward end of the base in a manner similar to that shown, so that it can be swung downward, as indicated in Fig. 4. The upper end of the standard is fitted with a collar or shoulder, as *i*, and with a nut, *I'*, and the forward end of the swinging cap *F'* is made with a recess to receive the neck of the bolt *I*, and with jaws or surfaces, which can be clamped

between said nut and shoulder, so that when the parts are in normal position (see Figs. 1, 2, and 3) and the nut tightened, the cap-plate F' and standard I will form a rigid support and housing for the front journals and journal-boxes.

The front journal-boxes are shown herein as provided with ears *d d'*, or suitable connections, by which the inner half of each of the boxes is attached to the standard I, so that when said standard is swung downward the portions of the boxes so attached goes with the standard, and vice versa, the box being drawn longitudinally from the roll-shafts. I do not, however, confine my invention to the use of boxes having the ears *d d'*, as such may be omitted, if preferred. If desired, the upper half of the top roll journal-boxes D<sup>2</sup> may be connected with the removable cap F', so as to be lifted off from the roll-journals when the cap-plate is raised. This can be accomplished by swiveling the box to the pressure-bolt, or by a pin and slot through the dependent guide *e'*, as indicated in Fig. 5, the pins *m* being fixed in the sides of the bearing-cap and projecting into or through the slots.

By making the housings with the removable or hinged cap-piece F' and the swinging standard I, as shown and described, the front of the mill can be quickly and conveniently thrown open in a complete manner, and free access thereby allowed to the rolls and guides to facilitate their adjustment, removal, or repair, or for removing blocked or tangled rods from any part of the mill. When the front of the housing is opened, as described, the rolls can be swung out horizontally by means of a suitable crane or lifting mechanism.

As a modification, in lieu of making the cap F' with a hinge-joint, it may in some instances be made simply removable, the standard-bar I being employed for retaining its forward end and the bolts *f f'* for retaining its rear end, as in Fig. 5. Said standard may also be made so as to lock between jaws *e'* of the front of the base, in lieu of having a pivot or hinge pin. The standard I may also in some cases be of cast-iron, if desired, properly formed to give the requisite strength. I prefer, however, the bolt-formed standard, as shown. The lower part of the standard I is preferably bifurcated or extending laterally where it hinges to the base, in the manner indicated, (see Fig. 2;) but, if desired, said standard may be made as a straight bolt or bar. The bifurcated form, however, gives the more rigid support and is less subject to vibration. In place of the rigid collar or shoulder *i*, a nut fitted on a screw formed on the standard may be employed, if desired.

Another feature of my invention consists in the peculiar device for and manner of connecting or coupling the roll-axes *a* to their operating-shafts B, which coupling is as follows: A transverse recess, groove, or notch, *n*, is formed across each of the adjacent ends on the shafts B and roll-axes *a*, and a flat

plate of cast-iron, P, is inserted with its ends in said notches, as indicated in Figs. 3 and 8, which plate P forms the driving-connection. The ends of the plate are fitted comparatively close in the notches, but are sufficiently loose to allow slight play to accommodate any irregularity in the running or alignment of the shafts and roll-axes. The plate P is retained in position by means of a small wire, S, bound around the ends of the parts, as indicated. A slight annular groove or depression around the shaft prevents the wire from slipping out of place.

The central portion of the coupling-plate P is preferably reduced by a transverse groove or depression, *r*, so that while the ends properly fill the notches *n* there will be an intermediate portion of weaker structure between the ends. This weakest central part of the plate is given sufficient strength to drive the rolls under normal conditions of work, but not enough to transmit a great excess of power. Thus, if the rolls become blocked by tangling of the rod or other abnormal conditions, the plate F becomes broken across its center *r* and the coupling thereby released, and the motion of the rolls at the point where the difficulty occurs is thus immediately stopped, and continuation or increase of the trouble is obviated. The coupling-plates are cheap, easily made and inserted, and form a very desirable form of automatic relief coupling for the purpose specified.

The driving-shaft B' and gears B' and the guides intermediate between the rolls may be constructed and arranged in any suitable or well-known manner, or substantially as heretofore employed in continuous rod-rolling mills. Such parts are therefore not shown in the present specification, as any one conversant with this class of machines will fully understand their construction and arrangement.

What I claim as of my invention, and desire to secure by Letters Patent, is—

1. A housing for rod-rolling mills, the front upright or standard which consists of a single removable upright rod arranged in front of the ends of the roll-axes, the top end thereof being screw-threaded and provided with a supporting ledge and nut and its lower end jointed or hinged to the base, in the manner substantially as and for the purposes set forth.

2. A housing for rod-rolling mills wherein the cap-plate is constructed, as herein described, with a hinge at H, on which that portion of said cap-plate above the rolls can be swung upward and backward longitudinally with the roll-operating shafts, substantially in the manner and for the purpose set forth.

3. A housing-frame for rolling-mills having a hinged cap-plate, as F', in combination with a movable front standard, substantially as and for the purpose set forth.

4. The housing for the roll-shaft journal-boxes in a rod-rolling mill, provided with a hinged cap-plate, in combination with a mov-

able front standard and means for connecting and detaching said cap and standard to and from each other, substantially as and for the purpose set forth.

5 5. The combination, substantially as hereinbefore described, with the rolls, roll-operating shafts, and their journal-bearings, in a wire-rod-rolling mill, of the housing-frame, the hinged cap-plate, the hinged front stand-  
10 ard, and fastening devices for rigidly securing said cap and standard when in normal position, for the purpose set forth.

6. The combination, in a housing for rod-rolling mills, of the base  $c'$ , having the up-  
15 rights  $c^2$  and lugs  $c^4$ , the cap-plate  $F$ , jointed as at  $H$ , and the movable section provided with dependent guides  $c^3$ , the movable front standard provided with the supporting-ledge  
20  $i$ , the nut  $I'$ , and the fastening-bolts  $ff'$ , as and for the purpose set forth.

7. The combination, with the movable stand-  
ard  $I$ , roll-journals  $a a$ , and journal-box guides,  
of the journal-box caps having projections, as  
25  $d d'$ , that connect with said standard, substan-  
tially as and for the purpose set forth.

8. The combination, with the roll-axle  $a$  and hinged or movable cap-plate  $F'$ , having dependent ears  $c^3$ , of the journal-bearing  $D^2$ , loosely connected therewith by swivel or pins  
30  $m$ , substantially as hereinbefore set forth.

9. In a rod-rolling mill, the combination, with the roll-axes and operating shafts provided with transverse recesses in their adjacent ends, of a coupling-plate, the ends of  
35 which are fitted in said recesses, and a fastening device for retaining said plate, as and for the purpose set forth.

10. The coupling-plate  $P$ , having the transverse groove or depression  $r$ , in combination with the roll-operating shaft, substantially as  
40 and for the purpose set forth.

Witness my hand this 10th day of March,  
A. D. 1886.

FRED H. DANIELS.

Witnesses:

CHAS. H. BURLEIGH,  
O. C. WHITE.