2 Sheets—Sheet 1.

A. HOOVEN & W. H. ADLE.

Rolling-Mill.

No. 206,330. Patented July 23, 1878.

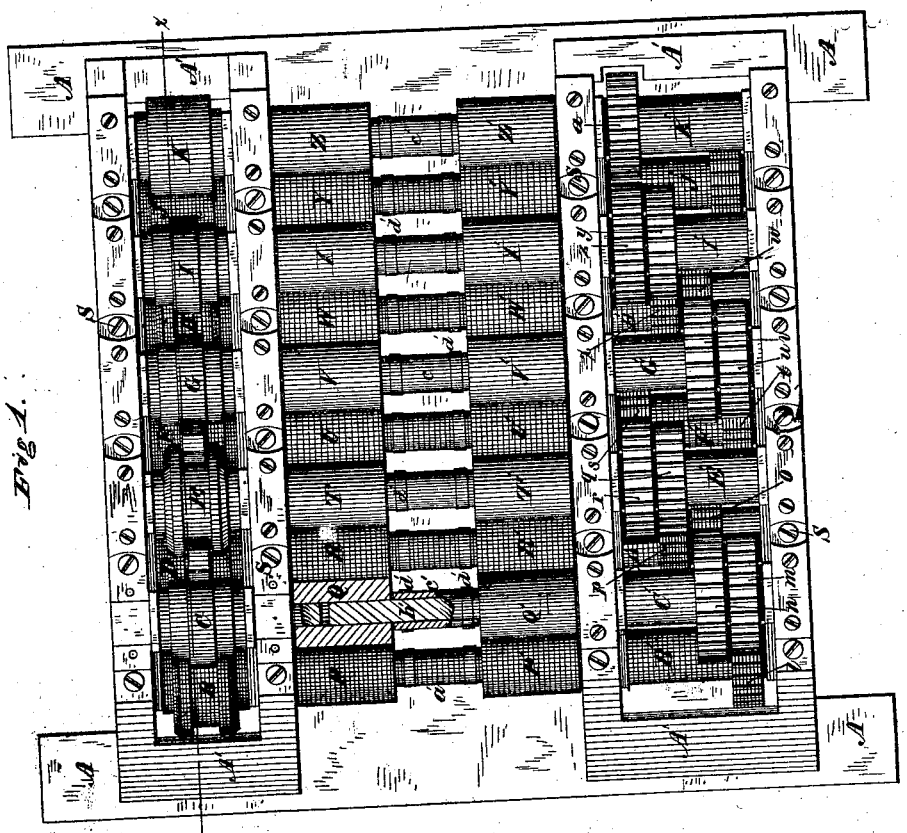


Fig 1.

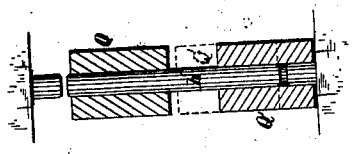


Fig 4.

Fig 5.

Witnesses

Harry King

D. P. Cook

Inventor.

Alex. Hooven & Wm. H. Adle,

By their Attorneys,

Bansbury & Munn.

2 Sheets—Sheet 2.

A. HOOVEN & W. H. ADLE.

Rolling-Mill.

No. 206,330. Patented July 23, 1878.

Fig 2.

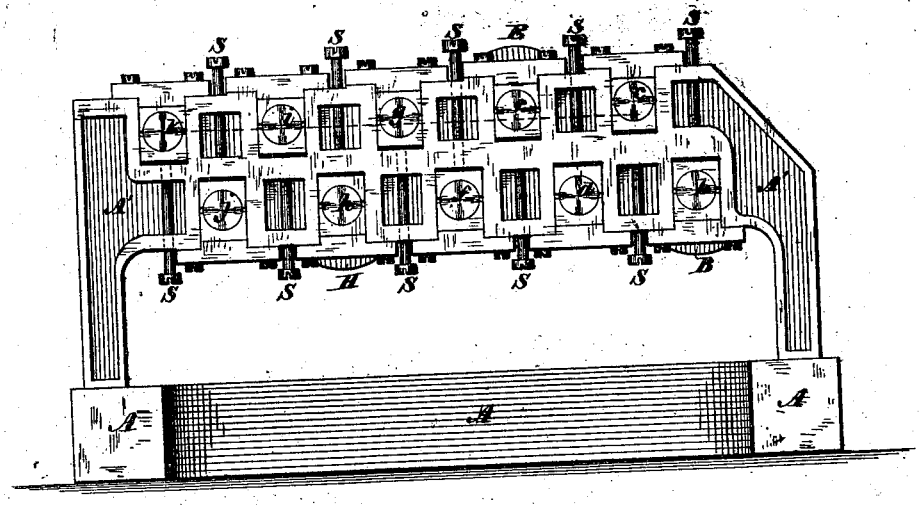
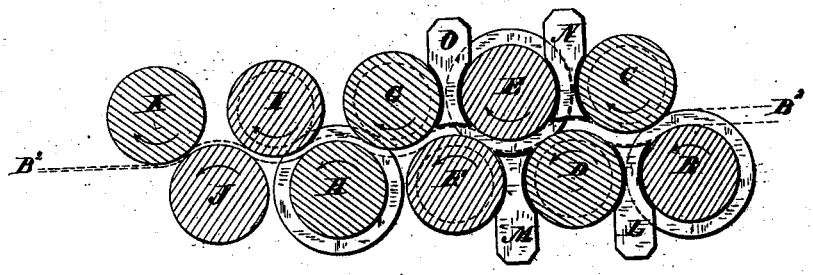


Fig 3.



Inventor.

Witnesses.

Harry King

D. P. Lowe

Alex. Hooven & Wm. H. Adle,

By their Attorneys,

Bransbury & Munn

UNITED STATES PATENT OFFICE.

ALEXANDER HOOVEN AND WILLIAM H. ADLE, OF NORRISTOWN, PA.

IMPROVEMENT IN ROLLING-MILLS.

Specification forming part of Letters Patent No. **206,330**, dated July 23, 1878; application filed January 15, 1878.

To all whom it may concern:

Be it known that I, ALEXANDER HOOVEN and WILLIAM HENRY ADLE, of Norristown, in the county of Montgomery and State of Pennsylvania, have invented certain new and useful Improvements in a Machine for Rolling Iron or other metals; 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 which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

Figure 1 is a top or plan view of the machine. Fig. 2 is a side elevation of the same. Fig. 3 is a vertical section on line *x x* of Fig. 1, showing the relative position of the rolls. Figs. 4 and 5 are details of the shaft-coupling device.

The same part is indicated by the same reference-letter wherever it occurs in the drawings.

In mills for rolling metals, as heretofore constructed, the rolls are arranged in pairs, and two rolls are required for each reduction of the metal.

Our invention consists in an arrangement of the rolls whereby two reductions are effected by three rolls throughout the process of rolling, all as hereinafter more fully set forth.

In the drawings, A marks the bed-plate of the machine, and A′ the frame in which the operative parts are supported. In this frame are adjustably fixed the journal-boxes of the rolls B C D E F G H I J K, whose journals *b c d e f g h i j k* are seen in end view in Fig. 2, supported in their respective boxes, which are fixed in the desired position by the screws S S, &c. Guides L M N O are introduced between the rolls, as shown in Fig. 3, for the purpose of directing the bar of metal in the proper path in its passage through the machine.

The train of gears by which the rolls are driven is hung in the opposite side of the frame, and the journals of the shafts are supported and adjusted by screws S in the same manner as the journals of the rolls. They are coupled to the shafts of the rolls by means of the sleeves P P′, Q Q′, &c., provided with bars *b′*, and with the strips *c′* and bands *d′* for keeping the sleeves in position when the shafts of the rolls and gears are coupled. The opening through the sleeves is angular, and corresponds in shape and size with the bar *b′* and with the inner ends of the journals of the rolls and driving-gears, on which the sleeves are, respectively, placed. This arrangement is clearly shown at Q Q′, Figs. 1, 4, and 5, the sleeve Q being placed on the inner end of the journal of roll C and sleeve Q′ on the inner end of the journal of shaft C′. The bar *b′* enters both sleeves and connects them, and the strips *c′*, bound to the bar *b′* by the straps *d′*, hold the sleeves apart and on the journals which they respectively receive.

To uncouple the journals of rolls C and C′, or any other pair in the series, it is only necessary to remove the strips *c′* and bring the sleeves together, when they, with the bar *b′*, can be removed from between the ends of the journals to which they had been applied.

The rolls B C D E F G H I J K are arranged relatively to each other in the manner shown in Fig. 3, roll C being nearer to D than to B, roll E being nearer to F than to D, and so on throughout the series, J and K, the final pair, being separated by a distance equal to the final thickness of the rolled metal. The gears on shafts B′ C′ D′ E′ F′ G′ H′ I′ J′ K′ are so timed as to give increased speed over its predecessor to each successive roll from B to K, so as to produce a combined drawing and compressing action upon the metal.

B^2, Fig. 3, marks the bar of metal passing through the machine. It receives its first reduction between rolls B and C, the next between C and D, then between D and E, E and F, F and G, G and H, H and I, I and J, and finally between J and K, each group of three rolls throughout the series effecting two reductions, as clearly shown.

The guides L M N O guide the bar in the proper path through the machine, preventing it from following around either of the rolls which are operating upon it.

We are aware of the existence of a patent, dated August 12, 1873, No. 141,701, to E. H. Davies, for a machine for rolling sheet metal, in which is shown a series of pairs of rollers, with gradually-increasing pressure, and having intermediate rollers arranged between the pairs of rollers and resting upon the bottom

rollers of the adjoining pairs. Such construction we do not claim; but

We claim—

1. In a machine for rolling metal, the combination, in the manner described and shown, of a series of rollers arranged relatively to each other, so that each roller shall be nearer the roller which follows than to the one which precedes it, and so that two reductions of the metal are effected by three rollers at one operation, all as specified.

2. In a rolling-machine, the reducing-rolls, arranged as described, and geared to run at different speeds, for the purpose of producing a combined drawing and compressing action upon the metal, all as specified.

In testimony that we claim the foregoing as our own we hereto affix our signatures in presence of two witnesses.

ALEXANDER HOOVEN.
WILLIAM HENRY ADLE.

Witnesses:
ROBT. MCGONAGLE,
WM. C. STOKES.