

E. H. DAVIES.

Rolling-Mills for Sheet-Metal.

No. 141,701.

Patented August 12, 1873.

Fig 1

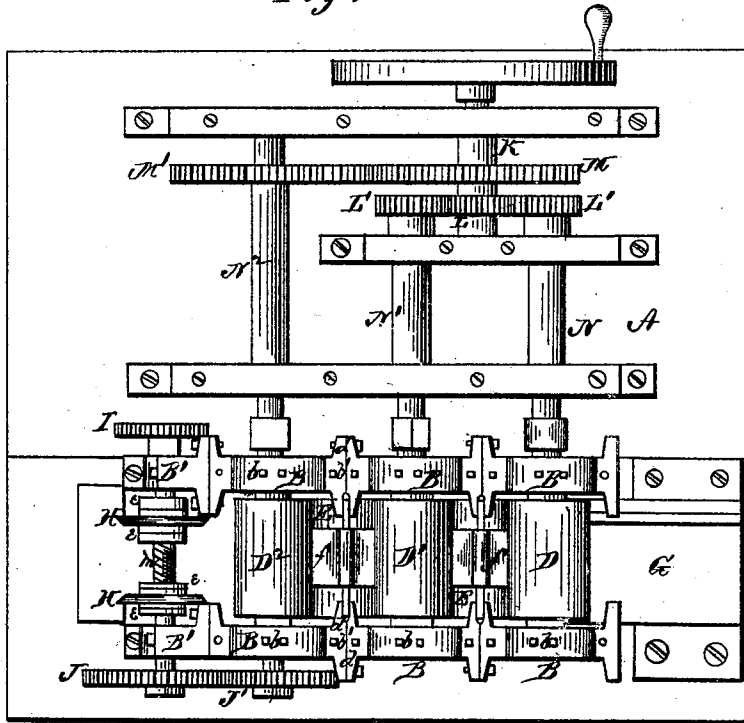
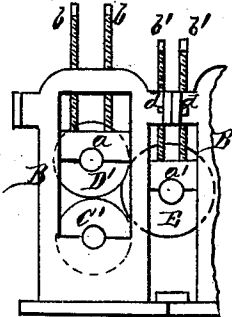


Fig 3



Witnesses:

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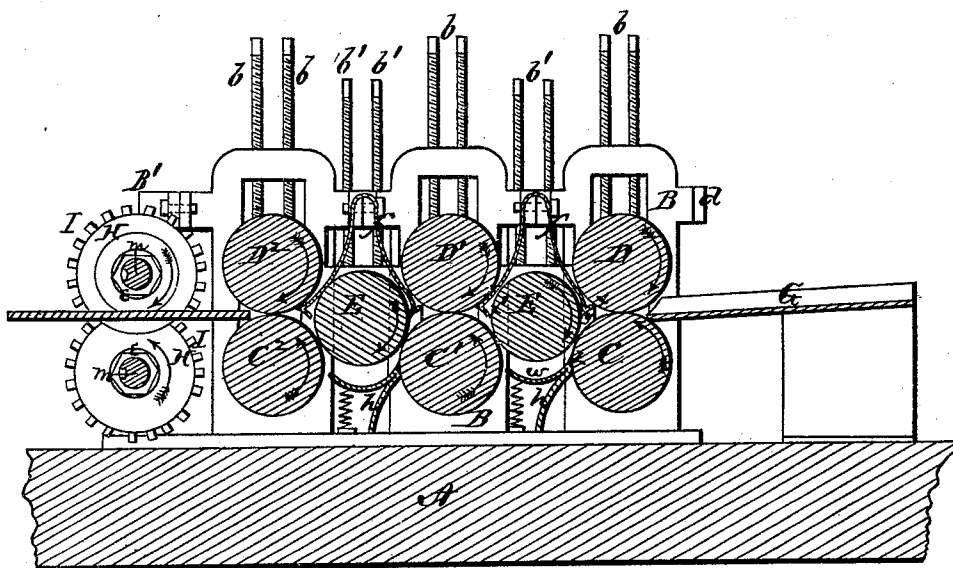
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Fig 2



WITNESSES

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UNITED STATES PATENT OFFICE.

EVAN H. DAVIES, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN ROLLING-MILLS FOR SHEET METAL.

Specification forming part of Letters Patent No. **141,701**, dated August 12, 1873; application filed May 14, 1873.

To all whom it may concern:

Be it known that I, EVAN H. DAVIES, of the city of Pittsburg, in the county of Allegheny and in the State of Pennsylvania, have invented certain new and useful Improvements in Sheet-Mills for rolling iron, tin plate, copper, brass, &c., into sheets; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings and to the letters of reference marked thereon, making a part of this specification.

The usual mode of rolling sheet metal is to roll the sheets as many times single as they are able to do. Then they are placed one sheet on another and rolled down. Three sheets are then placed together and worked, and afterward four or five, as the case may be, or the thickness wanted may require. Every time they are thus worked they have to be reheated. Sometimes even six, seven, or eight thicknesses are rolled at one time. When finished in this way there is a great deal of labor wasted in getting them separated when done. The iron is more or less damaged, and there is great waste in shearing them to size, and the iron has a rough surface.

In my machine all this waste of labor and material is saved.

The nature of my invention consists in the construction and arrangement of a mill for rolling sheet metal, in which the rolls are placed in a series of connected housings firmly bolted and fastened together, and with intermediate rollers placed between housings, and, when no metal is passing between the rolls, resting upon the bottom rolls of each two adjacent pairs. Above and below each intermediate roller is a metal guide, extending on both sides of the roller, for conducting the iron properly between the rollers. The iron, having previously been roughed down to the proper thickness, is heated and placed in the feed-end of this train, and, as it passes through each pair and under each intermediate roll, it is subjected to a continually increasing pressure as it progresses, and when leaving the rolls it at once passes through shears at the other end, where it is trimmed to an even width. Thus each single sheet is finished

by one passage without reheating and handling, and has a clean polished surface on both sides.

In order to enable others skilled in the art to which my invention appertains to make and use the same, I will now proceed to describe its construction and operation, referring to the annexed drawing, in which—

Figure 1 is a plan view, and Fig. 2 a longitudinal vertical section, of my machine. Fig. 3 is a side view, showing two of the connected housings.

A represents the bed of the machine or floor of the room in which the machine is to be placed. B B represent housings arranged in parallel rows to contain two, three, or more pairs of rollers. C C¹ C² represent the under rollers, and D D¹ D² the top rollers. The journals of the lower rollers rest in their respective housings, and the upper rollers rest directly above and revolve with the lower rollers. The journals of the upper rollers are held down by means of bearing-block *a a* placed in the housings, and operated upon by screw-shafts *b b*. The pressure of the upper rollers is to be increased gradually through the whole train from the feeding end to the other or exit end. The housings B B are on each side, near the top, provided with T-shaped projections *d d*, the arms of which are bolted together, as shown in Fig. 1, thus fastening the housings to each other. Between the housings are placed intermediate rolls E E, which, when no metal is passing between the rolls, rest upon the lower rollers of the adjoining pairs, and the journals of which have bearing-blocks on top, held down by screw-shafts *b'*. Above each of the intermediate rolls E is placed a stationary metal guide, *f*, and below the roll a flexible or yielding metal guide, *h*, which guides are constructed in the manner shown in Fig. 2. G represents the feed-table arranged at one end of the machine. The iron is fed over the feed-table G and between the rolls C and D. The arm *x* of the first upper guide *f* extends between the rolls E and D, and presses firmly on the roller D, thus preventing the iron from turning up, and the downward curve *y* of said guide sends the iron down between the rolls C and E. Here the first bottom guide *h*, rest-

ing on the roll C at *z*, scrapes off the iron, which, passing along its curved surface *w*, is directed between the rolls E and C¹, the spring below this guide allowing it to give, which is very necessary, for the iron, as it endures each succeeding pressure, is drawn out and bags or bellies between the points of pressure. As the iron goes through between the rolls E and C¹, the second arm *x'* of the first upper guide, extending between the rollers E and D¹, and resting firmly on the roller E, compels it to pass along its downward curve between the rollers C¹ and D¹. In like manner the second set of guides conduct the iron, between the rollers C¹ E E C² and C² D², out to and through the shears hereinafter described.

By the employment of the intermediate rollers E E I obtain a greater number of pressures and a quicker handling of the iron. The iron, as it passes between the rollers C and D, is subject to one pressure; between C and E, to another; between E and C¹, to still another, and so on. In the train, as shown in the drawing, there are eight rollers, giving to the iron seven distinct pressures, while in the ordinary mode of working rolls it would require fourteen rolls to secure as many pressures upon the iron. At the other end is a frame, B', in which are arranged two shafts, *m m*, one above the other. These shafts have screw-threads cut upon them for a suitable distance inward from each bearing, and they are also each provided with a longitudinal groove, as shown. Upon each end of each shaft *m* is placed a circular cutter, H, which has a feather to fit in the groove on the shaft, and thus adjusted to either side, as desired. The cutter is then held in place by a nut, *e*, on each side, and the corresponding cutters on the shafts form shears to cut the edges of the sheet metal as it passes out from the last pair of rolls C² D². The two shafts *m m* are connected on one side by cog-wheels I I, and on the other end of the upper shaft is a cog-wheel, J, gearing with a similar wheel, J', on the journal of the roller C². The lower rollers C C¹ C² receive their motion from a main shaft, K, upon which is a large cog-wheel, M, and a pinion, L, said

main shaft receiving its motion from any suitable or convenient power. The wheel M gears with a similar wheel, M', on a shaft, N², and the pinion L gears with pinions L' L' on shafts N and N¹, the three shafts N, N¹, and N² being connected with the journals of the three rollers C C¹ C², respectively. It will be seen and understood that when no metal is passing through the rollers the intermediate rollers E rest directly upon the bottom rollers of the two adjacent pairs, and that the upper rollers rest directly upon their corresponding lower rollers; also, that the screw-shafts *b b'* for the upper and intermediate rollers are arranged in such a manner that when the metal is passing through the rolls, and lifts up said upper and intermediate rolls, the pressure of the same is gradually increased from the feeding end to the discharge end of the machine.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of a series of pairs of rollers, arranged with gradually-increasing pressure, and intermediate rollers E, arranged between the pairs of rollers and resting upon the bottom rollers of the adjoining pairs, substantially as and for the purposes herein set forth.

2. The stationary guides *f f* and the yielding guides *h h*, arranged in connection with the intermediate rollers E E, substantially as and for the purposes herein set forth.

3. The combination of a series of pairs of rollers, C D, intermediate rollers E E, stationary guides *f*, yielding guides *h*, shafts *m*, and cutters or shears H, all constructed and arranged as described, to roll a single sheet of metal complete and trim the edges by once passing through the mill, as herein set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 22d day of April, 1873.

EVAN H. DAVIES.

Witnesses:

JOHN B. GEYSER,
J. G. BACKOFEN.