

(No Model.)

H. AIKEN.
ROLLING MILL.

No. 484,767.

Patented Oct. 25, 1892.

Fig. 1.

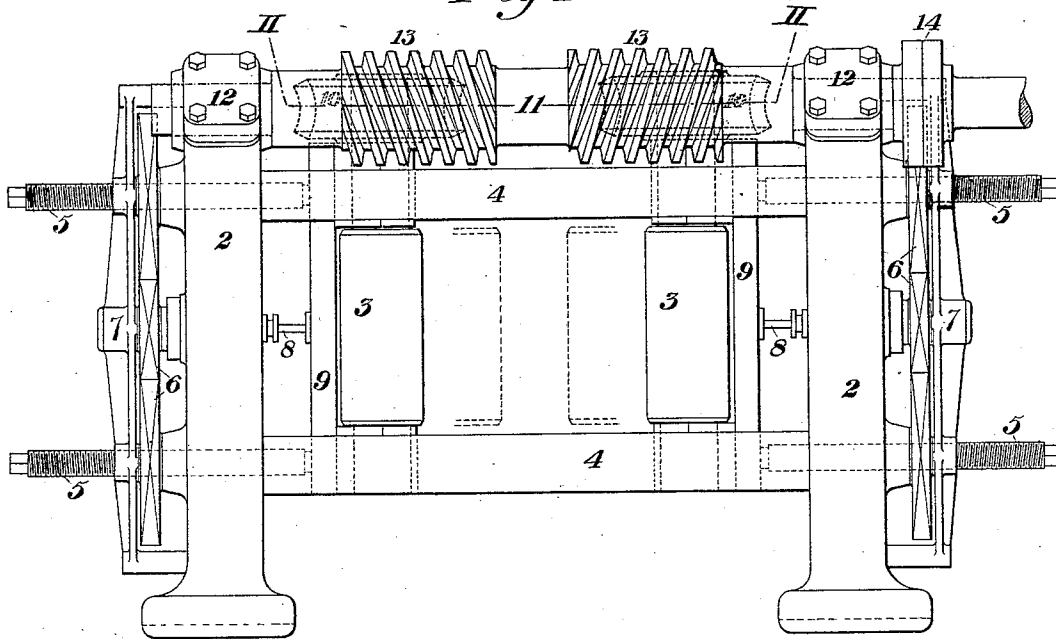
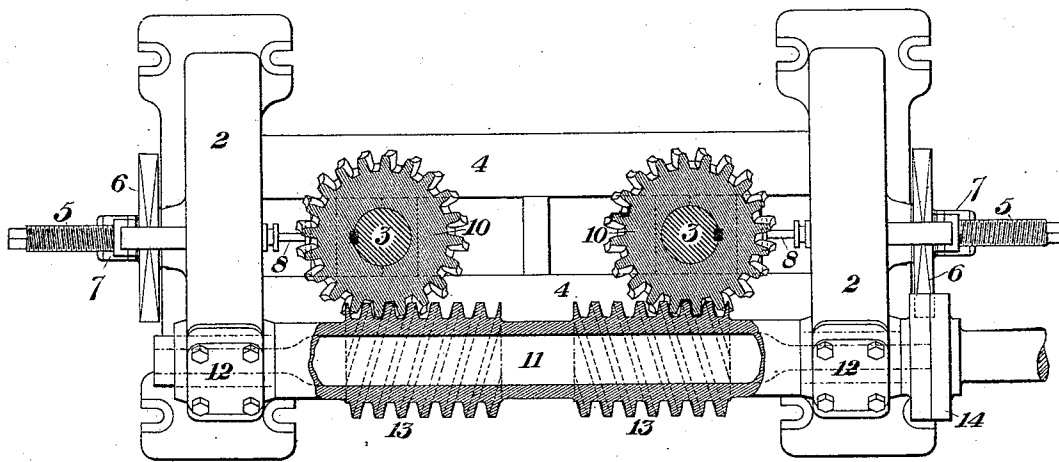


Fig. 2.



WITNESSES

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ROLLING-MILL.

SPECIFICATION forming part of Letters Patent No. 484,767, dated October 25, 1892.

Application filed December 3, 1891. Serial No. 413,857. (No model.)

To all whom it may concern:

Be it known that I, HENRY AIKEN, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Rolling-Mills, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a front elevation of my improved rolling-mill. Fig. 2 is a plan view thereof, partly in vertical section, on the line II II of Fig. 1.

My invention applies in practice particularly to vertical rolls, such as are used in universal rolling-mills. Such rolls are usually driven by bevel-gearing connecting them with a horizontal power-shaft, the gear-wheels on the shaft being set thereon with a feather and spline, thus affording a traveling power connection which enables the rolls to be adjusted laterally toward and from each other. Such construction is disadvantageous for several reasons. The connection of the pinion with the shaft by feather and spline is expensive in construction, and the vertical vibration of the shaft which occurs in use is apt to cause the gear-teeth to cut and destroy themselves very rapidly, especially when the mill is driven to its full capacity.

The advantage of my invention, as hereinafter described, is that it obviates the faults above recited, and that it provides a mill simple and cheap in construction and durable and efficient in respect of the driving-gear.

To this end the invention consists in the combination, with laterally-adjustable vertical rolls, of a transverse driving-shaft having worms formed thereon or attached thereto, in combination with worm-wheels on the rolls in gear therewith.

It also consists in certain features of construction hereinafter described and claimed.

In the drawings, 2 represents the housings of the vertical rolls of a universal mill.

3 3 are the vertical rolls, whose bearings are confined by transverse guide-bars 4, between which they are movable, so as to permit of the lateral approach and separation of the rolls.

5 5 are the usual adjusting-screws, connected by gearing 6, and 7 are the retracting-cyl-

inders, having plungers 8 fixed to the carriers 9, which connect the roll-bearings. In Fig. 1 of the drawings I show by full lines the rolls separated to their widest extent and by dotted lines the limit of their inward adjustment. Above the upper guide-bars 4 the necks of the rolls are provided with worm-wheels 10.

11 is the driving-shaft, which extends horizontally and is journaled in suitable bearings 12 in the housings. Formed on this shaft, preferably cast integral therewith, are two worms 13, so situate relatively to each other as to be adapted to mesh with the respective worm-wheels 10 and of sufficient length to permit the rolls to be adjusted laterally to the desired extent without disengaging the teeth of the wheels therefrom.

In practice I prefer to make the shaft 11 a cylindrically-hollow casting having the worms integral with it and to provide it at its end outside the housing with a coupling or clutch 14, by which it is connected with a main power-shaft. This construction may be varied—e. g., the worms may be made separate and keyed to the shaft—and instead of placing the shaft and wheels at the upper necks of the rolls they may be at the lower necks, though the constructions I have shown are best, and the forming of the shaft and worms in a single casting is claimed specifically herein. The pairs of worms and wheels are of respectively-opposite pitch—i. e., one pair is of right-hand and the other pair is of left-hand pitch, so as to drive the rolls in respectively-opposite directions.

When the shaft 11 is driven, the worms, acting on the wheels 10, will rotate the rolls, and when the rolls are adjusted inwardly or outwardly by the mechanism above described the power connection will still be maintained, owing to the length of the worms, which is greater than that required to drive the rolls in a single position.

The following is a statement of some of the advantages of my improvement: The use of the worm-gearing by enabling the driving-shaft to be set at the same level with the gearing on the rolls diminishes the distance between the shaft and roll-bearing, and thus materially increases the compactness and strength of the mill. The durability of the gearing is greater than that of any other form

of gearing heretofore used for such purposes, and as the gearing on the shaft is fixed thereto it is cheap to construct. Furthermore, as the worm-shaft transmits a relatively-slower motion to the worm I am enabled, if desired, to connect the main driving-shaft directly with the engine and to dispense with the inconvenient and expensive intermediate gearing heretofore commonly employed outside the housings for reducing the speed of the motion transmitted by the engine to the shaft. There are also other advantages resulting from the counteraction of the two sets of gearing in taking up the strain and preventing its transmission to the bearings, which are important in practice and will be appreciated by those skilled in the art.

As an equivalent of worm-gearing, I desire to include within the scope of my invention and claims what is known in the art as "skew-gearing."

I claim as my invention—

1. In a rolling-mill, the combination, with the rolls, of a driving-shaft provided with two sets of worms of opposite pitch and of sufficient length to permit adjustment of the

rolls, worm-wheels on the rolls in gear with said worms, bearings for both ends of the respective rolls movable laterally in right lines toward and from each other, and adjusting mechanism operative to move laterally the rolls with their worm-wheels, substantially as and for the purposes described.

2. In a universal rolling-mill, the combination, with the vertical rolls, of a driving-shaft provided with two sets of worms of opposite pitch and of sufficient length to permit adjustment of the rolls, worm-wheels situate at the upper ends of the rolls in gear with said worms, bearings for both ends of the respective rolls movable laterally in right lines toward and from each other, and adjusting mechanism operative to move laterally the rolls with their worm-wheels, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 1st day of December, A. D. 1891.

HENRY AIKEN.

Witnesses:

THOMAS W. BAKEWELL,
W. B. CORWIN.