(No Model.) 3 Sheets—Sheet 1.

H. AIKEN.

APPARATUS FOR STRAIGHTENING METAL PLATES.

No. 492,951. Patented Mar. 7, 1893.

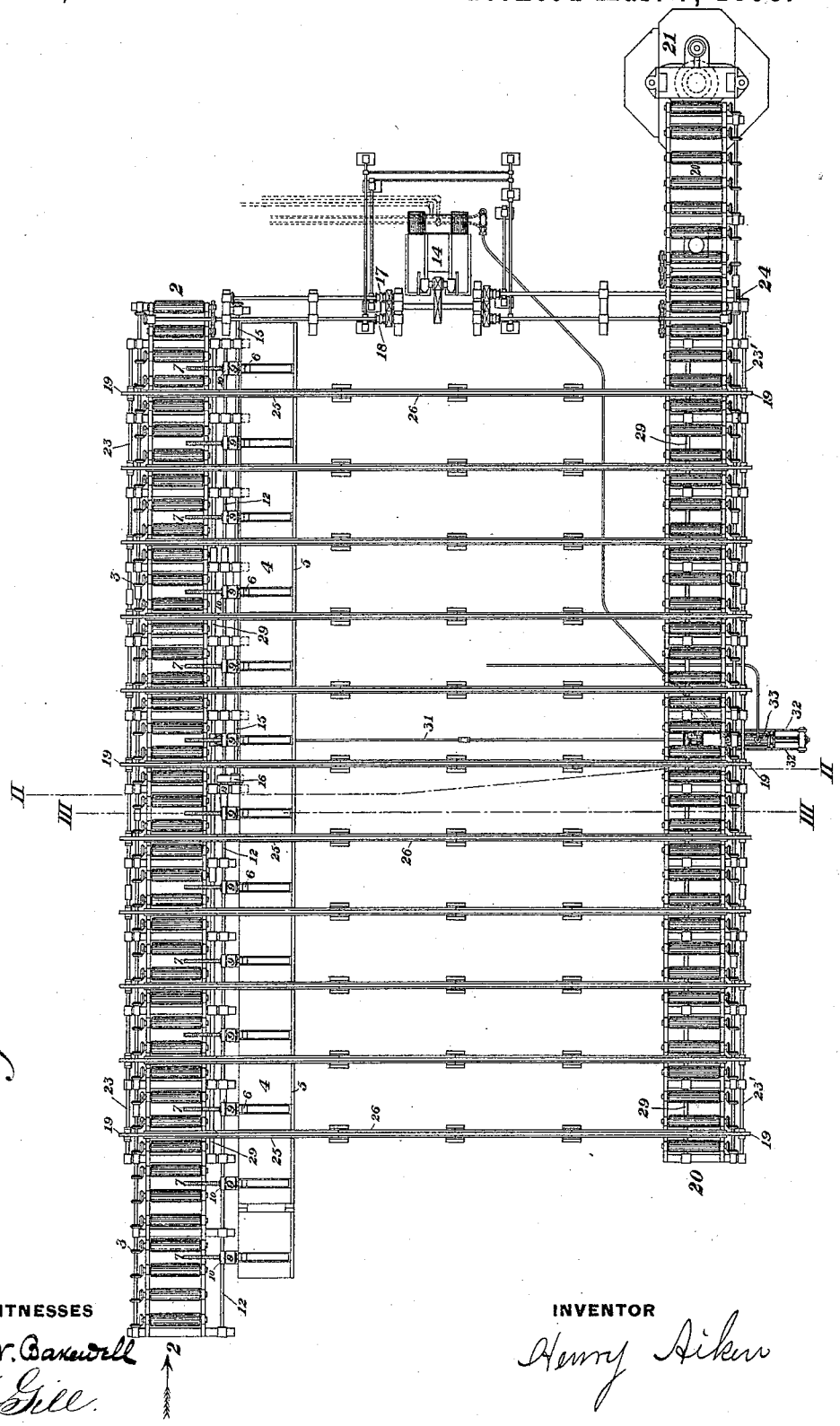

Fig. 1.

WITNESSES

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(No Model.) 3 Sheets—Sheet 2.

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Fig. 2.

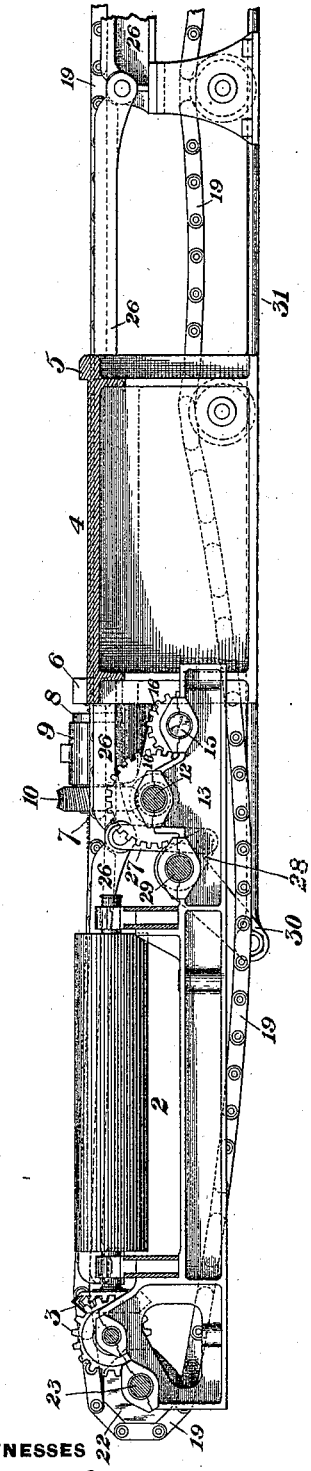
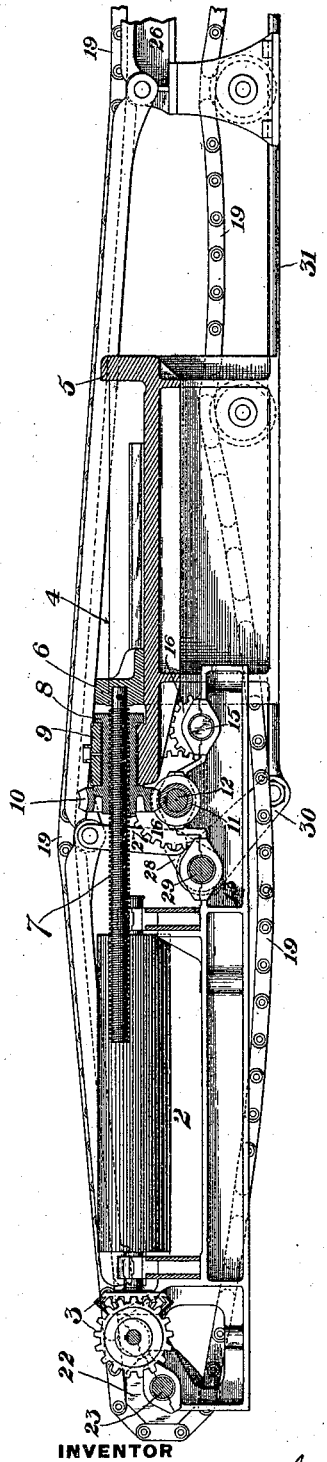


Fig. 3.



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(No Model.) 3 Sheets—Sheet 3.

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Fig. 2.ª

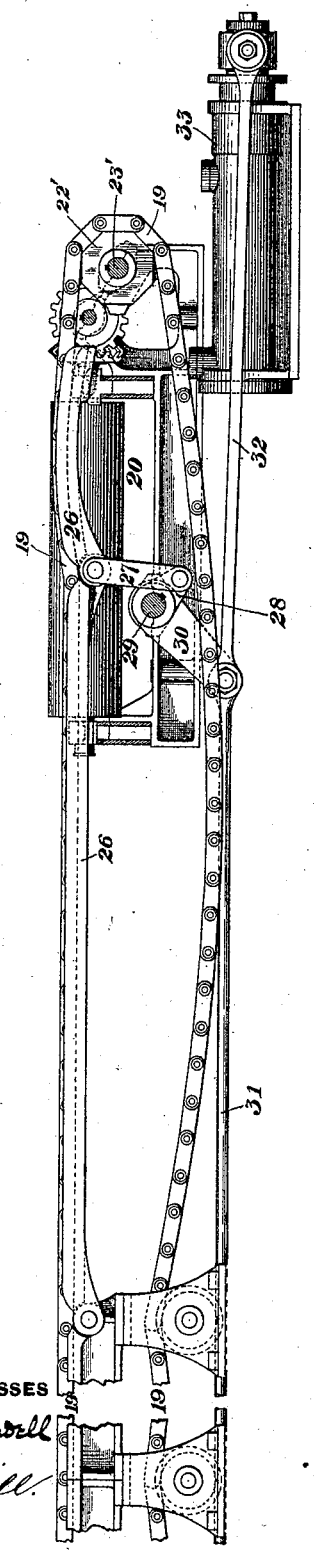
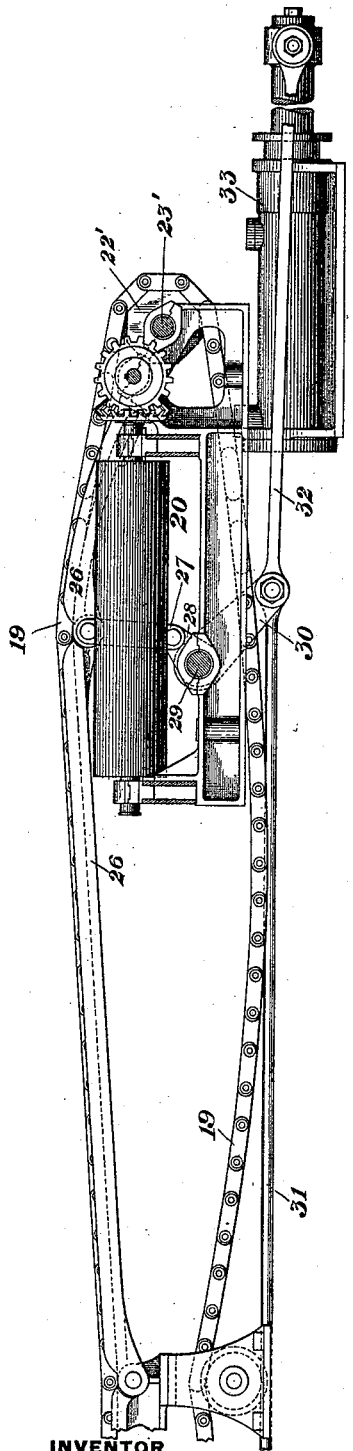


Fig. 3.ª



WITNESSES

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UNITED STATES PATENT OFFICE.

HENRY AIKEN, OF PITTSBURG, PENNSYLVANIA.

APPARATUS FOR STRAIGHTENING METAL PLATES.

SPECIFICATION forming part of Letters Patent No. 492,951, dated March 7, 1893.

Application filed June 13, 1892. Serial No. 436,451. (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 Apparatus for Straightening Metal Plates, 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 plan view of apparatus embodying my invention. Figs. 2 and 2^a, which are parts of the same view, show the apparatus in vertical section on the line II—II of Fig. 1; and in like manner Figs. 3 and 3^a show it in vertical section on the line III—III of Fig. 1.

Like symbols of reference indicate like parts in each.

The object of my invention is to provide convenient apparatus for plate-mills, by which the metal plates, after they have been delivered from the rolls, can be straightened and removed from the straightening press, without the difficult and tedious hand labor heretofore employed in straightening and handling them.

To this end my invention consists mainly in the combination with a straightening press for the plates, of a conveying table or carrier which leads up to the straightening press lengthwise thereof, so as to bring the plates from the rolls to or in close proximity to the press; and also in the combination with such devices, of a transfer mechanism adapted to shift the plates from the conveying table to the press.

It also consists in an improved straightening-press and in certain other combinations and features of construction hereinafter described.

The advantages of my invention will be appreciated by those skilled in the art. It results in a saving of labor and time in the straightening of the plates and thus is a means of economy and profit to the maufacturer.

In the drawings, (Fig. 1) 2 represents a conveying table, comprising feed-rollers driven by suitable gearing 3 and adapted to carry a metal-plate in the direction of the arrow, from the table of the plate-rolling mill, not shown.

Extending parallel to the feed-table 2 is the bed 4 of a straightening press, which may be coextensive with the table and of sufficient length to receive the rolled plate. Its preferable structure is sufficiently illustrated in Figs. 1, 2 and 3. As shown in these figures it is made in sections and has a flat top on which the plate to be straightened is laid, and at the edge a rib or shoulder 5 against which the edge of the plate is forced to remove the irregularities and curves usual in the plate as it is received from the rolls, and to reduce the edge to a true straight line.

The straightening mechanism consists of a series of movable heads 6, 6, set in transverse guide-ways in the bed of the machine, and adapted to be moved therein by the following mechanism. Each head has a rearwardly projecting screw-shaft 7, which passes through a nut 8 journaled in suitable bearings 9 in the frame of the straightening press and having fixed to or integral with it a worm-gear-wheel 10. The worm-wheels of the several screw shafts of the press are in gear with and adapted to be driven by worms 11 on a shaft 12, which extends along the straightening press, parallel therewith, and is journaled in suitable bearings 13. When this shaft is driven, its worms acting on the worm-wheels simultaneously rotate the nuts 8, thus projecting or retracting the screw shafts, and moving the heads 6 up to the shoulder 5 of the straightening bed to straighten an interposed plate, or retracting the heads therefrom, accordingly as the shaft is driven in one direction or the other. The shaft 12 is driven from an engine 14, the power being transmitted to the shaft, preferably by a second shaft 15 connected by gearing 16 to the shaft 12 at a middle point, so as to reduce the torsion of the shaft to as low degree as possible.

17 represents a clutch by which the shaft 12 can be connected with the engine so as to rotate in either direction or disconnected from it, and 18 is a similar clutch, performing like functions for the gearing of the feed-table 2.

The capacity for simultaneous motion of the heads 6 described above, is of advantage, because of the rapidity of action of the machine, and the accuracy with which the plates are straightened by reason thereof.

The plates are transferred from the table 2 to the straightening-press bed by mechanism, preferably constructed as follows:—Parallel

endless chains 19 extend between some of the rollers of the conveying-table and within transverse grooves or gaps 25 formed in the surface of the straightening-press bed, and preferably extend also to and across a second conveying-table 20, having driven feed-rollers and leading to shears 21. The figures on Sheets 2 and 3 of the drawings show how the upper and lower branches of the chain may be supported and show the chain sprocket-wheels 22 and 22′ set on shafts 23 and 23′ at the outer sides of the tables 2 and 20. The sprocket-wheel-shaft 23′ is driven by appropriate gearing 24, and by actuating the same the chains may be caused to move and to perform their conveying function as hereinafter explained.

To lift the upper branches of the endless chains in order that the plates to be carried thereby may be lifted from or lowered upon their supports (the conveying tables 2 and 20 and the press-bed 4), I may use the following mechanism, though other devices for the purpose may be substituted: The upper branch of the chain is supported by guide or channel pieces 26, and at the ends of the course of the chain, near the two conveying-tables, the channel-pieces are made of pivotally connected sections supported by links 27 from crank-arms 28 on shafts 29. The two shafts 29 are connected with each other by arms 30 and a connecting rod 31, and the latter is connected also by rods 32 with the plunger of a motive cylinder 33. By actuating this cylinder, the shafts are oscillated and the guides carrying the chains are lifted above the level of the conveying-table and straightening-press bed, or lowered below the same, accordingly as the cylinder is actuated in one direction or the other.

I shall now describe the operation of the parts when constructed as described above. The metal plate is delivered from the rolling-mill feed-table upon the rollers of the conveying-table 2, and is carried thereby opposite to the straightening-press bed and over the endless chains. Then to transfer the plate to the straightening-press, the guides 26 are elevated as already explained, so as to lift the plate from the feed-rollers, and the endless chains are driven sufficiently to carry the plate directly above the bed 4. The guides are then lowered, the effect of which is to deposit the plate upon the straightening-press bed, whereupon, by driving the shaft 12, the several heads 6 will be projected simultaneously and will force the plate edgewise against the shoulder 5, thereby straightening the edges and bringing them into proper alignment. The heads 6 may then be retracted by reversing their shaft 12, and the chain lifted so as to raise the plate above the press-bed and to permit it to be carried by the chain to and over the table 20 upon which it is deposited by lowering the guides, and by which it may be carried to the shears 21. In practice I prefer to operate the conveying mechanism step by step, advancing the plate each time upon the chains a distance about equal to its width. In this way, at each step a plate is deposited on the table 20, one put upon the press-table 4 and another removed therefrom, a succession of plates being upon the apparatus at once. In this way the work is rendered continuous, and opportunity given to the plates to cool uniformly, with both sides exposed to the air before they reach the shears, thus preventing warping and distortion which are apt to result when the plates are thrown upon the floor to cool.

The apparatus constructed as shown in the drawings is made the subject of specific claim herein, and possesses many inherent advantages in respect of compactness of arrangement and ease and efficiency of operation. The broader claims of this application are, however, not limited thereto and the constructions referred to therein may be modified. For example, the mechanism may be arranged so that the plate after being straightened is carried back to the table 2 and thence removed, or may be carried off from the straightening-press by a conveying mechanism extending otherwise than at right angles to the press-bed, and changes in the details of construction of the parts may be made.

I claim—

1. In apparatus for manufacturing metal plates, the combination with a straightening bed provided with transverse gaps, a conveying-table, and transfer chains extending in the gaps of the bed, mechanism for driving the chain, and mechanism for moving the same vertically to engage and deposit the plates; substantially as and for the purposes described.

2. In apparatus for manufacturing metal plates, the combination of two parallel conveying-tables, an intermediate straightening press, and transfer chains extending between the tables and across the press, and adapted to shift the plates from the first table to the press, and from the press to the second table, mechanism for moving the chains to transfer the plates, and mechanism for lifting the chains; substantially as and for the purposes described.

3. In apparatus for manufacturing metal plates, the combination of conveying tables, leading from the rolls and to the shears respectively, a transverse transfer device, and an interposed straightening-press; substantially as and for the purposes described.

4. In apparatus for manufacturing metal plates, the combination with a straightening-press having a bed adapted to receive a metal plate, and heads movable to straighten the plate, of a conveying-table leading up to the straightening-press, transfer mechanism leading across the conveying-table and press, and mechanism for moving the same vertically; substantially as and for the purposes described.

5. In apparatus for manufacturing metal

plates, the combination with a straightening-press having a bed adapted to receive a metal-plate, and heads movable to straighten the plate, of a conveying-table leading up to the straightening-press, and transfer mechanism consisting of endless conveyer chains; extending across the press-bed substantially as and for the purposes described.

6. In apparatus for manufacturing metal plates, the combination of a straightening bed having transverse gaps, a feed-table, comprising driven rollers, adjacent thereto, endless conveying chains extending through the gaps and between the rollers, guides for the chains, and mechanism for lifting the guides; substantially as and for the purposes described.

7. A straightening-press bed, having vertical gaps, and transfer mechanism adapted to move in the gaps above and below the surface of the bed; substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 2d day of June, A. D. 1892.

HENRY AIKEN.

Witnesses:
HENRY M. CORWIN,
THOMAS W. BAKEWELL.