

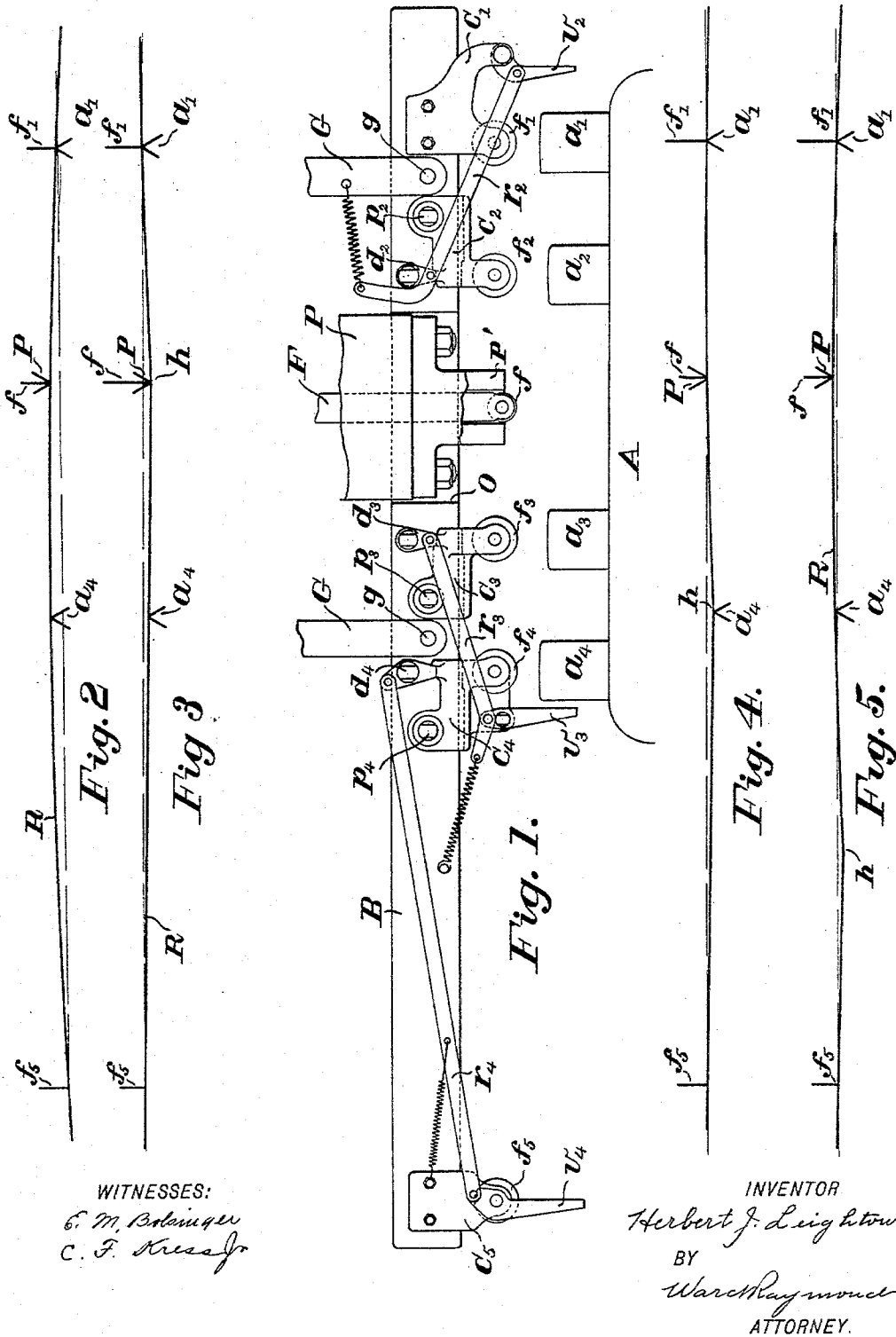
(No Model.)

2 Sheets—Sheet 1.

H. J. LEIGHTON.
MACHINE FOR STRAIGHTENING METAL BARS.

No. 533,714.

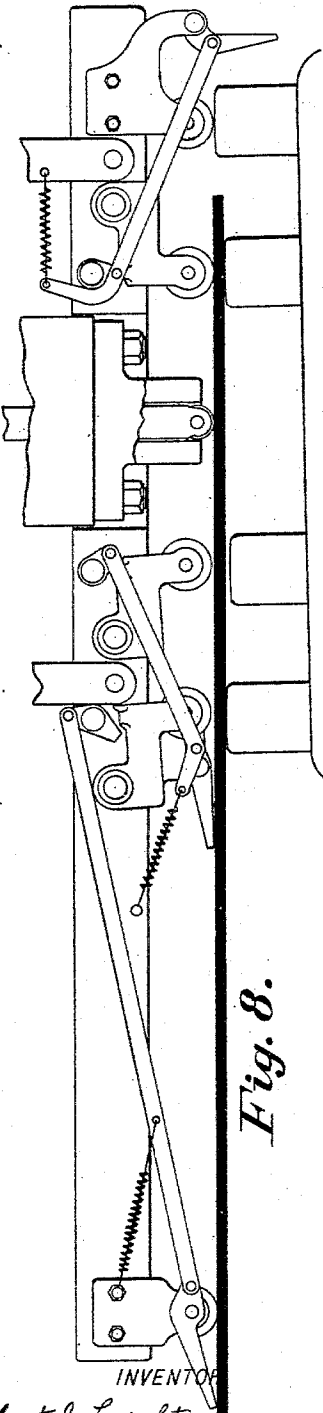
Patented Feb. 5, 1895.



2 Sheets—Sheet 2.

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MACHINE FOR STRAIGHTENING METAL BARS.

SPECIFICATION forming part of Letters Patent No. 533,714, dated February 5, 1895.

Application filed July 11, 1894. Serial No. 517,203. (No model.)

To all whom it may concern:

Be it known that I, HERBERT J. LEIGHTON, of Syracuse, county of Onondaga, State of New York, have invented new and useful Improvements in Machines for Straightening Metal Bars, of which the following specification is a true and exact description, due reference being had to the accompanying drawings.

My invention relates to certain improvements in machines for straightening rails or other metal bars, and is specially adapted to that class of rail straightening machines described in my application filed October 6, 1892, Serial No. 448,062.

The gaging device in a machine of this kind consists essentially of three feelers which reciprocate alternately with the main plunger of the machine, and the ends of which, except when a bend is encountered, are in alignment with each other. The central one of these feelers is located close to, or preferably passing through, the plunger while the others are placed one on each side. Before the plunger advances to strike the rail to be straightened the feelers are advanced and pressed against it. The central one being pushed back out of alignment with the two side feelers when a convex bend is encountered, measures the amount of bend and by suitable mechanism adjusts the length of the plunger in proportion to the amount of bend to be straightened. Heretofore these three feelers have been located equidistant from each other and such location has been fixed, and, as the central one passes through the plunger, the side ones have been the same distance away on each side of the plunger. Opposite to the plunger it has been the custom to employ two anvil blocks against which the rail rested and the plunger struck it centrally between these anvils. In operating these machines difficulty has been experienced in operating upon the extreme end of the rail and should the machine for any reason strike too hard a blow and so bend the article in the opposite direction there was no means for correcting this error in the following operation of the machine.

The object of my invention is to provide a machine in which the feelers are so arranged as to operate upon the ends of the article more carefully than heretofore and are adapted to

gage any previous inaccuracy in the work of the machine and correct it in the following blows, and in which the anvils are so arranged as to have certain advantages hereinafter described.

In the drawings: Figure 1 is a general top view of so much of a machine as embodies my invention. Figs. 2, 3, 4 and 5 illustrate the operation of the feelers upon a rail as will be later described. Fig. 6 shows a rail just entering the machine and the feelers operating upon the end. Fig. 7 illustrates the feelers operating upon the central portion of the rail, and Fig. 8 shows the last end of a rail in the machine.

I will now describe the machine and its operation. The body or frame of the machine and the mechanism for operating the plunger I have omitted as any suitable kind can be used.

In the drawings, A is the main frame of the machine, and secured to it are the four anvil blocks a^1, a^2, a^3, a^4 , against which the rail rests. Facing these anvils is the pressure plunger P having the face block P', which with the four anvil blocks, must be changeable to suit various sections or shapes of rails or bars. This pressure plunger is constantly reciprocated by driving mechanism not shown. Normally in its reciprocations this plunger is not long enough to strike a straight rail lying in the machine, but connected with it is mechanism, not shown, by which its length may be so adjusted as to strike the desired blow upon the rail.

On each side of the plunger P are the rods G, G. These are constantly reciprocated by suitable mechanism, alternately with the plunger, that is, as the plunger advances toward the rail the rods G, G are withdrawn and as the plunger retreats they advance. These are in effect the two side feelers heretofore used. The central feeler is the rod F passing through the plunger P and terminating in the wheel f. This reciprocates in unison with rods G, G and at its rear end is connected with the plunger elongating mechanism above mentioned.

Instead of the rods G, G directly engaging the rail I secure to them the feeler bar B by means of the pins g. This bar B is substantially parallel to the rail and passes beneath

the plunger P as shown at O. Carried upon this bar are the wheels f', f^2, f^3, f^4, f^5 , which wheels are really the feelers of the machine. They are made in the form of wheels that they may roll along the rail as they come in contact with it during its passage through the machine. These wheels are mounted upon the feeler bar B in a peculiar manner which I will now describe.

The wheels themselves are pivoted in the carriers c', c^2, c^3, c^4, c^5 , which carriers are in turn secured to the bar B as follows: The end carriers c' and c^5 are rigidly bolted to it but the intermediate ones c^2, c^3, c^4 , are pivoted on the pins p^2, p^3, p^4 . In the rear of the pivoted carriers are the pivoted dogs d^2, d^3, d^4 . These dogs are swung into or out of contact by the rods r^2, r^3, r^4 , which are in turn operated by the fingers v^2, v^3, v^4 . As will be seen later these fingers are swung round by the rail in passing. The springs shown return the dogs into position behind the carriers when the fingers are released from the rail. When the dogs are in position behind the carriers the five feeler wheels are all in alignment with each other, but by swinging any of the fingers v^2, v^3, v^4 , the dog will be released and the carrier and wheel will drop back out of action. Looking at the four anvils it will be noticed that the two outside ones project beyond the other two. The reason for this will appear later.

As this class of straightening machine will only remove a convex bend, I propose when the rails or other articles to be straightened are curved in both directions or in four directions to use the machines in pairs and so place them that the first machine, which I will call the first roughing, will operate upon one side of the rail, and the second machine which I will call the first finishing, will operate upon the opposite side. These two machines remove all the bends in one plane of the rail and by turning it so as to present the other two sides to the two following machines, which I will call the second roughing and second finishing the remaining bends are removed.

The feeler bar B illustrated in the drawings is intended for a finishing machine. For the roughing machine the bar would be cut off just outside of carrier c^4 and the feeler f^5 would be omitted. It is not necessary that the roughing machines do as accurate measuring as the finishing machines, and I set them so that they not only remove all convex points but also render the rail concave throughout. This insures the finishing machine meeting no concave portions as it operates upon the opposite side of the rail. Should however, the finishing machine encounter any concave places or should the finishing machine for any reason strike too hard a blow and put a slight kink in the rail the feeler f^5 notices it and corrects it as I will later explain.

I will now describe the passage of a rail through the machine.

In Fig. 6 is shown the web of a rail R just

entered. In entering it first pushed out of its path the finger v^2 which disengaged the feeler f^2 . As it has not yet reached the feeler f^4 the bend if any is gaged by the feelers f', f, f^3 and the length of the plunger set accordingly. It will be noticed that the rail lies against anvil a' and a^3 and that the blow of the plunger is struck much nearer to the anvil a^3 than a' . The effect of this is that the bending instead of taking place equally on each side of the plunger P will be thrown on the side toward the nearest anvil which is a^3 , the bend thus taking place very close to the end of the rail. This part of the rail now being straight, it passes by the face of feeler f^4 and pushes around v^3 . This throws feeler f^3 out of action. Consequently the next gaging is done by feelers f', f , and f^4 and the rail rests against anvils a' , and a^4 . After straightening this part the rail passes along in front of feeler f^5 and by pushing finger v^4 throws the feeler f^4 out of action. The rail is now gaged by feelers f', f , and f^5 . This continues until I reach the position of Fig. 8 when the back end of the rail has passed feeler f' . Here the finger v^2 has been released and it has drawn the dog d^2 in place behind the carrier c^2 and thrown feeler f^2 into action. The rail having passed anvil a' lies against a^2 and a^4 and the end is operated upon similarly to the front end.

I will now explain with the help of Figs. 2 to 5 the part that feeler f^5 plays in the operation of the machine.

The rail as it is delivered to the finishing machine from the roughing machine has a continuous camber as shown in Fig. 2. The feelers f', f , and f^5 discover this camber and set the plunger in operation to straighten it. Should the plunger strike too hard and put a hollow in the rail, as is shown at h in Fig. 3 the rail will be passed along until it reaches the position in Fig. 4. Here it will be seen that though a curve exists between the point h and f' the feeler f^5 reaches out beyond the point h and compensates for the hollow at h by gaging as straight that portion of the curve between point h and f' as the straight line drawn through the ends of the feelers shows, the line touching the rail at these three points. This is a portion of the camber of the rail made to counteract the kink at h . The rail next passes along to the position of Fig. 5. Here the kink h having been compensated for, the feelers again take cognizance of the camber as is shown by the distance the central feeler f is thrown back out of alignment with f' and f^5 and that portion of camber between anvils a' and a^4 is straightened. Thus it will be seen that the feeler f^5 acts as a compensator and corrects any inaccuracies in the work of the machine.

Having thus described my invention, what I claim, and desire to protect by Letters Patent, is—

1. In a machine for straightening metal bars, a bend gaging device consisting of a central feeler and a plurality of side feelers on

each side of the central feeler, and means substantially as described, in the movement of the rail, to throw out of action all the side feelers except one on each side.

2. In a machine for straightening metal bars, a bend gaging device consisting of a central feeler and a plurality of side feelers, the ends of said side feelers being normally in alignment with each other and the central feeler and some of said side feelers being adapted to be thrown back out of alignment with the others.

3. In a machine for straightening metal bars, a bend gaging device consisting of a central feeler and a plurality of side feelers on each side of the central feeler, said side feelers being so mounted and arranged that they are automatically thrown into and out of action by the bar in passing before them.

4. In a machine for straightening metal bars, a bend gaging device consisting of a central feeler and a plurality of side feelers on each side of said central feeler, said side feelers being so mounted and arranged that one on each side of the central feeler are in action against the bar at one time, the rest being automatically by the rail thrown out of alignment with the active feelers.

5. In a machine for straightening metal bars, a bend gaging device consisting of a central feeler, a feeler bar extending substantially parallel to the bar to be straightened and a plurality of feelers mounted upon this bar.

6. In a machine for straightening metal bars, a bend gaging device consisting of a central feeler, a feeler bar extending substantially parallel to the bar to be straightened, a plurality of feelers mounted upon the bar and a plurality of fingers extending in the path of the rail, said fingers being so arranged that when pushed by the rail out of its path they throw out of action certain of the feelers.

7. In a machine for straightening metal bars, a bend gaging device consisting of a central feeler, side feelers substantially equidistant on each side of the central feeler and a compensating feeler on one side of the central feeler and beyond the first mentioned side feelers, said first mentioned side feeler next to the compensating feeler being so arranged that when the bar reaches the compensating feeler, the aforesaid side feeler is thrown out of action and the bar is engaged by the compensating feeler, the central feeler and the other side feeler.

8. In a machine for straightening metal bars, in combination, a central and side feelers, the side feelers being arranged equidistant from the central feeler, and a feeler upon one side of said central feeler at a distance greater than the remaining feelers, the feelers being so mounted and arranged that but one feeler on each side of the central feeler is in action against the bar at one time, the

remainder being thrown out of alignment with the active feelers.

9. In a machine for straightening metal bars, in combination, a central feeler and side feelers arranged equidistant from the central feeler, and a feeler upon one side of said central feeler at a distance greater than the remaining feelers, the feelers being so mounted and arranged that but one feeler on each side of the central feeler is in action against the bar at one time, the remainder being automatically, by the rail, thrown out of alignment with the active feelers.

10. In a machine for straightening metal bars in combination with a bend gaging device, having a central feeler and a plurality of side feelers on each side of the central feeler, four faces against which the bar is bent, the two inside faces being back out of alignment with the others whereby they are adapted to engage only the end of a bar.

11. In a machine for straightening metal bars in combination with a reciprocating plunger adapted to strike and bend the rail, two faces against which the bar is bent, one of the faces being closer to the striking point of the plunger than the other whereby the greater part of the bending action of the plunger is thrown into that part of the bar lying between the plunger and the nearest face.

12. In a bend gaging device for straightening machines in combination, a bar, a plurality of feelers mounted upon the bar, some being pivotally and some rigidly mounted and fingers extending in the path of the bar to be straightened, each finger being so arranged as to throw one of the feelers in or out of operative position.

13. In a bend gaging device for straightening machines, a feeler bar extending substantially parallel to the bar to be bent, a feeler rigidly secured to the bar near each end, a plurality of feelers movably mounted upon said bar, stops behind the movable feelers adapted to throw them in or out of action and fingers operating the stops and extending in the path of the bar to be bent and operated thereby.

14. In a bend gaging device for straightening machines, in combination with a feeler bar extending substantially parallel with the bar to be straightened, a roller adapted to engage the bar to be straightened, a support for said roller, said support being pivoted upon the feeler bar, a stop pivoted behind the support and adapted to throw the roller in or out of operation and means whereby the bar in passing operates the stop.

In testimony whereof I have affixed my signature in presence of two witnesses.

HERBERT J. LEIGHTON.

Witnesses:

W. F. SALTMARSH,
J. L. CHAPMAN.