

No. 676,796.

Patented June 18, 1901.

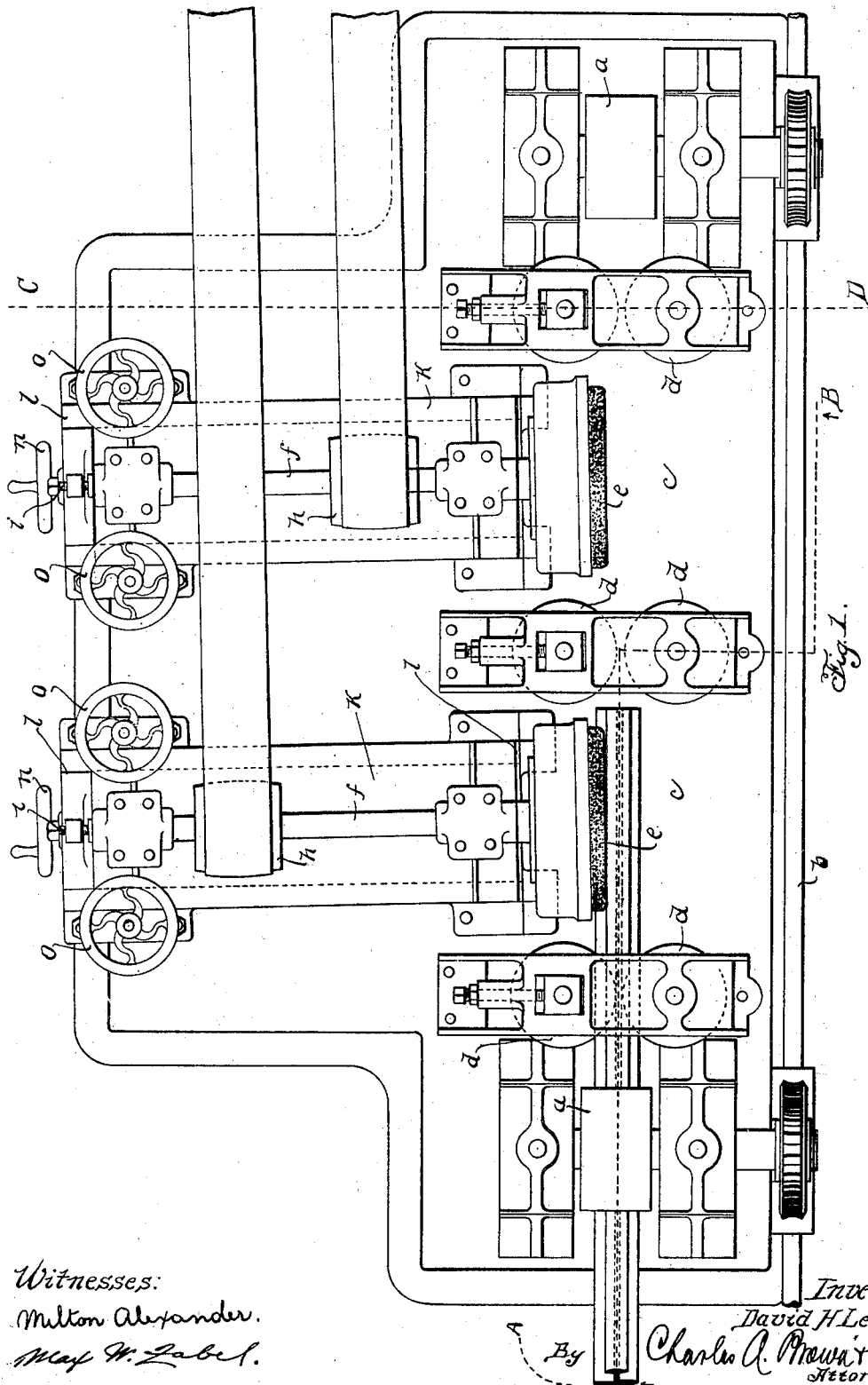
D. H. LENTZ.

PROCESS OF RENEWING STEEL RAILS.

(Application filed Aug. 1, 1900.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses:

Milton Alexander.

Max W. Zabel.

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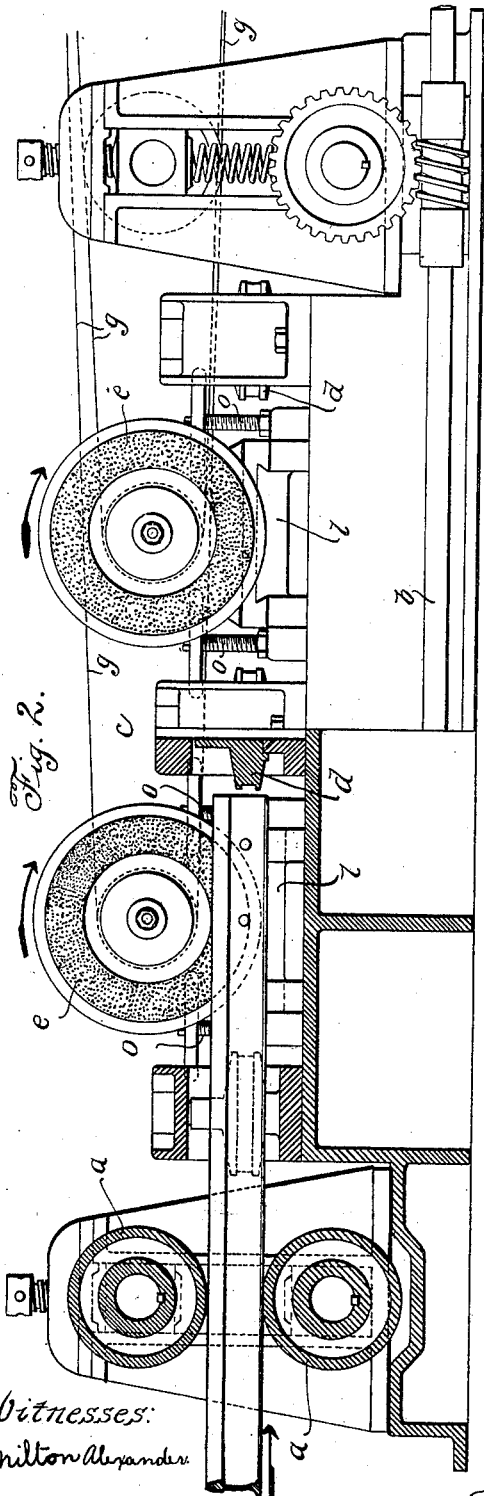
Charles A. Mowbray & Co.
New York, N.Y.

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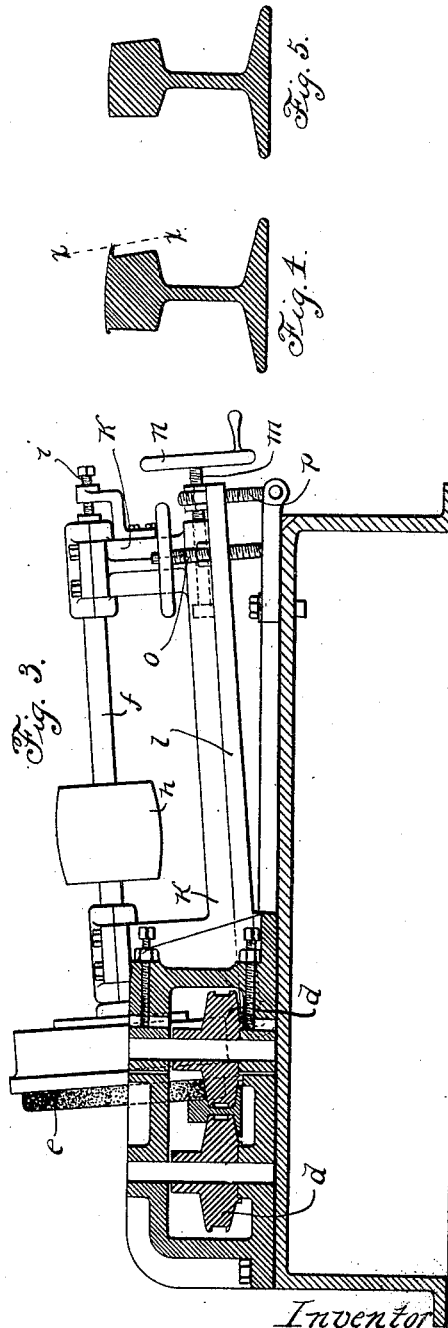
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Witnesses:
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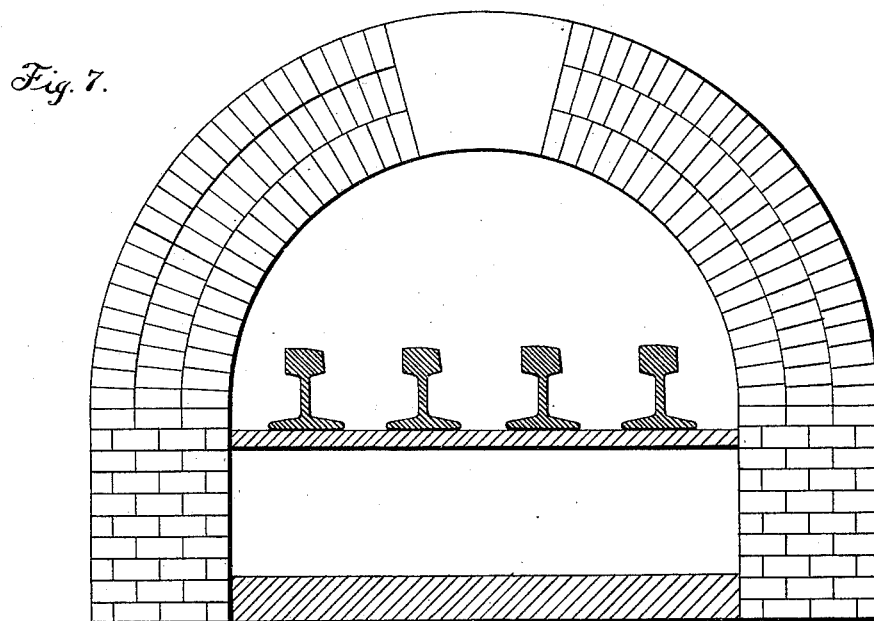
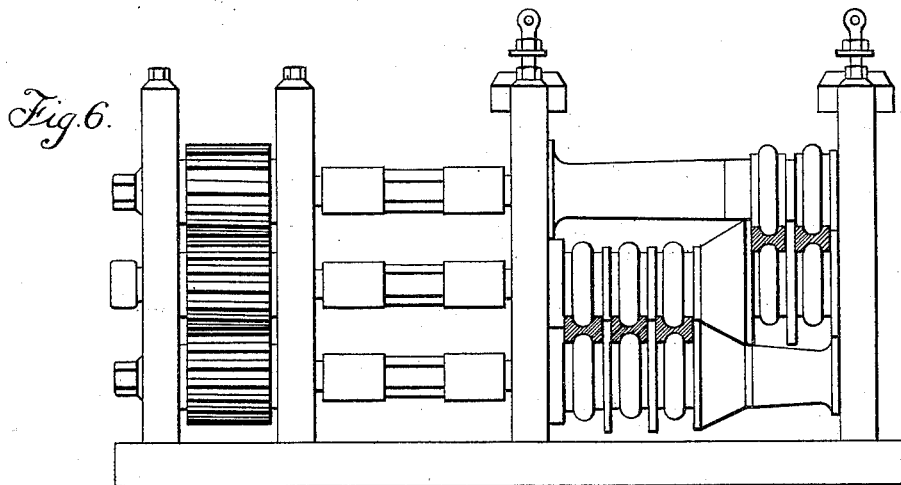
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

DAVID H. LENTZ, OF JOLIET, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS,
TO AMERICAN MCKENNA PROCESS COMPANY, OF MILWAUKEE, WIS-
CONSIN.

PROCESS OF RENEWING STEEL RAILS.

SPECIFICATION forming part of Letters Patent No. 676,796, dated June 18, 1901.

Application filed August 1, 1900. Serial No. 25,545. (No specimens.)

To all whom it may concern:

Be it known that I, DAVID H. LENTZ, a citizen of the United States, residing at Joliet, in the county of Will and State of Illinois, have
5 invented a certain new and useful Improvement in Processes of Renewing Steel Rails, (Case No. 9,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings,
10 ing, forming a part of this specification.

My invention relates to steel rails, and has for its object the provision of an improved method of rerolling old steel rails, which by processes practiced prior to my invention were
15 incapable of being satisfactorily rerolled.

My invention is designed to reroll that class of railroad-rails wherein the metal in the heads of the rails and along the upper tread-surfaces thereof is shouldered out of place to
20 form fins, usually along the outer edge of the rail, which project from one-sixteenth to one-half an inch from the rails. These fins are the result of heavy concentrated wheel-loads on lines of heavy traffic. As the fins are cold-
25 rolled by the action of the wheels, they are exceedingly tough and tenacious.

The process of Patent No. 522,228, granted to E. W. McKenna July 3, 1894, was well
30 adapted to reroll the old steel rails that were clean in cross-section or, in other words, in which the displacement of metal was downward in a vertical line from the tread; but where the metal was displaced in a horizontal direction this method was insufficient, as
35 the exceedingly tough fins could not be properly merged with the body of the rail, although the requisite contour and cross-section could be secured. These fins were thus merely pressed back into place. The rails
40 thus renewed were speedily impaired when restored to service, as the compressed fins or exfoliated metal would be shouldered out of place or shelled out, leaving the tread and head portions of the rail uneven and pitted,
45 thereby imparting an irregular cross-section to the rails, the rails thus being unfitted for further efficient service.

It is impossible in rerolling rails to raise them to a welding heat. In practicing my invention instead of retaining the fins upon the
50 rails I effect the complete removal of the fins,

so that none of the metal can be molded or pressed back into shape without having it thoroughly merged with the entire body of the rail to form an integral homogeneous
55 structure without cracks or fissures. The rail thus treated is then heated to a temperature near to but below the point at which the carbon contained therein would be materially affected, after which the rail is subjected to
60 proper rerolling mechanism to secure the desired cross-section and uniformity of cross-section thereof, the metal being filled into the voids formed by removing the fins. The importance of my improved process will be ap-
65 preciated when it is understood that frequently over thirty per cent. of large lots of rails that are to be renewed have the tough fins, which would prevent the rails from being satisfactorily rerolled by the processes
70 hitherto employed. I have found that it is impossible to effect the removal of these fins by means of hand-tools, which is a process very slow and expensive and, furthermore, ineffective, as loose material is bound to be
75 left along the tread. Moreover, it is impossible to employ machine-lathes, even though cutting-tools made of the best Mushet tool-steel are employed.

I will more fully explain the manner of
80 prosecuting my invention by the accompanying drawings, which illustrate the preferred mechanism employed for this purpose, in which—

Figure 1 is a plan view of the machine. 85
Fig. 2 is a side elevation thereof, partly in section on line A B of Fig. 1. Fig. 3 is a sectional elevation on line C D of Fig. 1. Fig. 4 is a view in cross-section of a worn rail before its passage through the grinding-machine. 90
Fig. 5 is a similar view to that illustrated in Fig. 4, showing a rail with the fin removed. Fig. 6 is a front elevation of a three-high train that may be employed to effect the desired rerolling. Fig. 7 is an end
95 view of a furnace that may be employed for heating the rails.

The same characters of reference are used to designate like parts throughout the different figures.

The rail to be ground is entered between the upper and lower rollers *a a* (illustrated

at the left in Figs. 1 and 2) and is fed forward by the rotation of the lower roller, which may be driven slowly by an arrangement of worm-gear connected with a driven shaft *b*.

5 As the rail reaches the grinding-table *c* it is caught and held tightly against lateral displacement or chattering by the idler-rollers *d d*, of which three pairs may be provided, as shown. These rollers are preferably so formed

10 that they will engage only the web of the rail near the fishing-angles, so that they will not interfere with the maker's name, which usually appears in raised letters along the central portion of the web. One of the rollers of

15 each pair is preferably so mounted that it may be adjusted toward or from the other to accommodate rails of varying sizes. The speed at which the rail is fed past the grinding-wheels is to a certain extent automatically regulated, since the rail is held so firmly

20 against lateral displacement by the guiding-rollers *d d* that no hump on the side of the rail may pass the grinder until the latter has evenly taken its predetermined cut along the

25 edge. Thus if the grinder strikes an enlarged part of the fin the feed-rollers will merely slip upon the rail and the latter will not be pushed forward until this hump has been ground away.

30 Two grinding-wheels *e e* are illustrated as arranged in tandem upon the grinding-table *c*, the corundum or emery faces of which are adapted successively to engage the side of the head of the rail as the latter is carried

35 forward and past them by the driven rollers. These grinding-wheels are illustrated as mounted upon the ends of shafts *f f*, which may be driven by driving-belts *g g*, passing over pulleys *h h*, fixed upon the said shafts.

40 The longitudinal thrust of the shafts *f f* may be sustained by the set-screws *i i*, mounted upon the grinder-frame *k* at the opposite ends of the shafts from the grinding-wheels *e e*, these set-screws also permitting slight

45 longitudinal adjustment of the shafts. The shafts are journaled to rotate in bearings provided in the grinder-frames or standards *k k*. The latter are mounted to slide to and fro along the bed-plates *l l*, whereby the faces

50 of the grinders may be adjusted toward or from the line of travel of the rail to accommodate rails of different sizes, to compensate for the wearing away of the corundum grinding-surfaces, and to regulate the depth of cut.

55 This movement of each standard or grinder-frame *k* in its bed-plate may be effected by means of an adjusting screw-shaft *m*, engaging with the grinder-frame, operated by a hand-wheel *n*.

60 The grinding-surface of each grinding-wheel is perfectly disposed in a plane transverse to the shaft *f* on which it is mounted. In the drawings the grinding-surface is illustrated as disposed in a plane at right angles

65 with the axis. The shafts *f f* then are arranged substantially at right angles with the

line of travel of the rail. In practice it is better not to place these shafts at exact right angles with the rail, but inclined a little, as shown in Fig. 1, so that the annular grinding-surfaces will touch the rail only on one side of the vertical diameter of such grinding-surface, letting the rail clear it on the other side of such diameter. By this adjustment, as will be seen by reference to Fig. 2, the

70 grinding action upon the rail is all in one direction, preferably upward.

Since many railway-rails are formed with the sides of the heads slanting at an angle instead of vertical, as in other cases, I have

80 provided means for adjusting the faces of the grinders at varying angles. This may be done by employing the construction shown most clearly in Fig. 3, wherein the bed-plate *l* of each grinder-frame is hinged at one end

85 to swing about the same, throwing the face of the grinder into a slanting position. Hand-screws *o o* are provided at the rear end of each bed-plate for the purpose of effecting this adjustment, and hinged bolts *p p*, with

90 their threaded nuts, serve to lock the parts in any position to which they may be adjusted.

In some cases a single grinding-wheel may be sufficient, but generally it is more satisfactory to employ two or more such wheels,

95 each cutting a little deeper than the one immediately preceding it. Thus the first grinder may cut as deeply as is indicated by the line *x x* of Fig. 4, and the second grinder may finish the cut, leaving the edge of the rail as indicated in Fig. 5. Usually the fin is developed only upon the outer edge of the rail, but occasionally it may be desirable to grind the other edge also, although it is very seldom that the inner edge need be touched.

100 The rails after having the fins removed therefrom may then be heated in the furnace illustrated in Fig. 7 to a temperature that will permit the metal thereof to be pressed into the desired shape, but will not materially

110 affect the carbon of the steel. After the rails have thus been heated they may be passed through the rollers of the three-high train illustrated in Fig. 6, or through other re-rolling device to secure the desired cross-section of the rails, and to effect the proper

115 flow of metal into the worn places and into the places from which the fins were removed, to secure rails that are adapted for further service.

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

1. The method of renewing worn rails having fins or exfoliated portions, which consists

125 in removing the fins, heating the rails to a temperature near to but below the point at which the carbon contained therein would be materially affected, and then pressing the heated rails to secure the desired cross-section thereof, and to effect the flow of the

130 metal into the portions of the rails from which

the fins were removed, substantially as described.

2. The method of renewing worn rails having fins or exfoliated portions, which consists in removing the fins, heating the rails to a temperature near to but below the point at which the carbon contained therein would be materially affected, and then pressing the

heated rails to secure the desired cross-section thereof, substantially as described.

In witness whereof I hereunto subscribe my name this 7th day of June, A. D. 1900.

DAVID H. LENTZ.

Witnesses:

GEORGE L. CRAGG,
MAX W. FABEL.