(No Model.)

W. HAINSWORTH.

RAIL STRAIGHTENING DEVICE.

No. 553,237. Patented Jan. 21, 1896.

Fig. 1

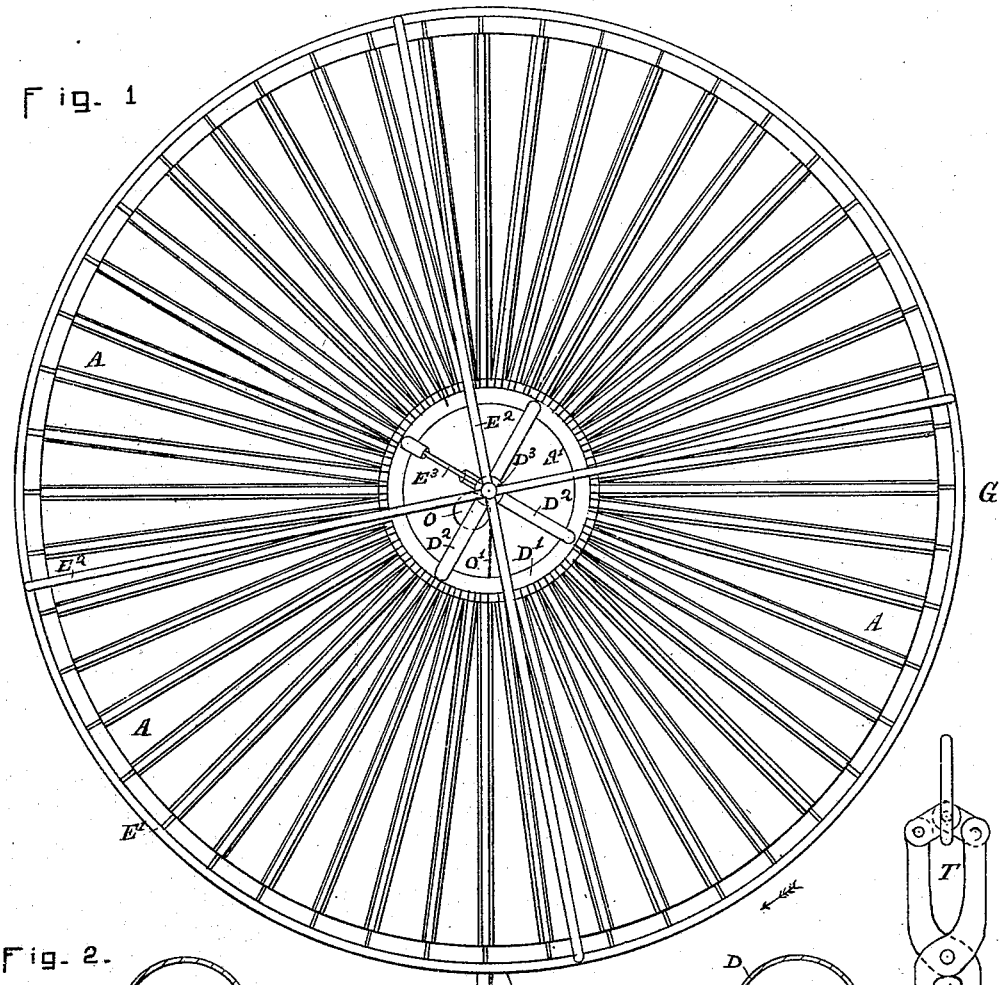
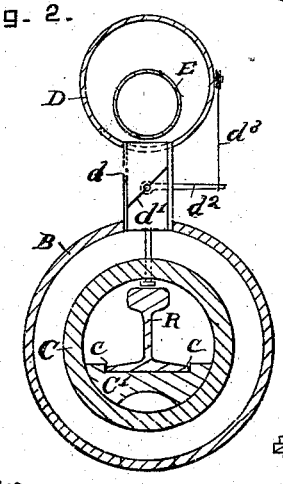


Fig. 2.



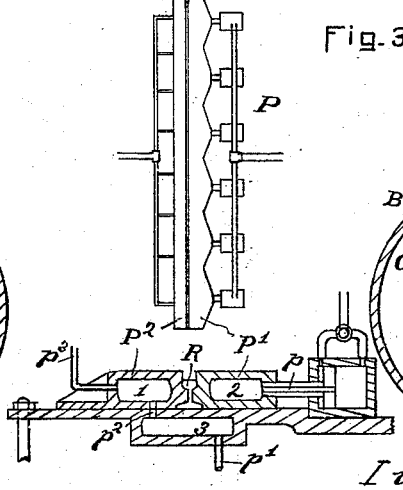
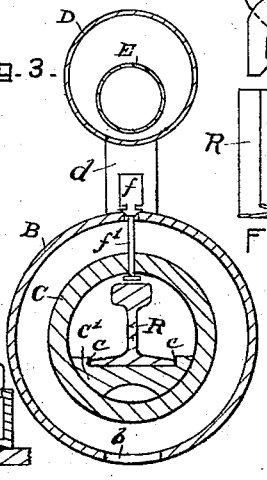


Fig. 3.



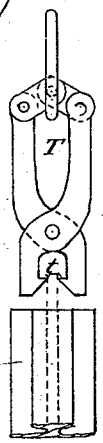


Fig. 5.

Witnesses.
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Fig. 4

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UNITED STATES PATENT OFFICE.

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RAIL-STRAIGHTENING DEVICE.

SPECIFICATION forming part of Letters Patent No. 553,237, dated January 21, 1896.

Application filed October 1, 1894. Serial No. 524,574. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HAINSWORTH, a citizen of the United States, residing at West Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Rail-Straightening Devices; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to a method of straightening railroad-rails and an apparatus therefor. The method consists essentially in first straightening them while they are yet hot from the rolls in a press, and then placing them in a closed pipe or chamber, where they will be surrounded by a cooling medium, which will ordinarily be uniform in its effect through the whole of the length of the rail, but may be varied locally as the rail departs from a straight line by reason of unequal cooling. The apparatus consists of a turn-table carrying a number of such pipes placed radially thereon and provided with proper cooling and operating devices. This will be more fully described in the specification hereinafter, reference being had to the drawings forming a part thereof, in which—

Figure 1 is a plan view of my devices for carrying out this method. Figs. 2 and 3 are sections at different points of the pipes for holding the rail while cooling. Fig. 4 is a section of a press for straightening the rails, and Fig. 5 a view of the tongs for catching the rails to pull them in and out of the pipes.

The needs and desires of the traveling public have constantly demanded faster speeds on the railways, and the necessities of higher speeds demand a more perfect road-bed. To secure this the rails must be true and straight, without kinks, waves or bends. The process of straightening rails by the use of the "gag" is as apt to put three bends into the rail, instead of one, as it is to straighten the rail. Moreover, to straighten the rail it must be given a permanent set which strains the metal beyond the elastic limit, thus weakening the rail and rendering it liable to failure in use. One great and in fact the chief difficulty in keeping the rails straight during and after cooling arises from the unequal cooling of the different parts. The head being the larger part of the rail, and in a compact shape, cools off much slower and retains the heat longer than do the thin flanges and web. This results in leaving the rail full of bends and curves, which heretofore have been removed by the use of the gag. The object of my method is to correct these faults and make the rail straight, without kinks, waves or bends, and without in any way straining it. I accomplish it in the following manner and by the following means: As the rails come from the rolls and immediately after being cut into single-rail lengths of thirty (30) feet, and while they are still hot, they are placed in the straightening-press shown at P. I have shown for this work a hydraulic press; but a mechanical press of any kind will answer equally well. The press should be, as this one is, long enough to take the entire rail at one time. The same effect might be secured by using a shorter press, but not as quickly or efficiently. The jaws P' and P^2 of this press are made hollow and provided with a water circulation so that it will be kept cool and not be warped out of true by the heat absorbed from the rail.

In Fig. 1, A represents the turn-table, which is large enough to take a length of rail between its outer edge and the central circular opening A'. This turn-table is mounted upon any convenient kind of supporting rollers or wheels, and has means provided for rotating it as desired. Any means for accomplishing this will answer. As my invention does not lie in the rotating devices, and such rotating devices are in themselves old, I have not herein shown them. Mounted upon this turn-table, running radially from the outer edge of the central opening A', are a large number of cooling-pipes in which the rails are placed after straightening. These are shown in section in Figs. 2 and 3. They consist of two sets of pipes, each set consisting of an outer and inner pipe. Each set is connected at frequent intervals by the short pipes *d*. The inner pipe of the larger set is made quite heavy, and has a casting C' extending throughout its length. This casting is made curved on the bottom to fit the curve of the pipe and flat on the top with a sunken flat surface in the central portion of its width of the size of the base of the rail. This serves to properly locate the rail, and by the pro-

jections at *c* prevent the rail from bending sidewise.

The pipe C is inside of a larger pipe B. This pipe B is connected at frequent intervals with the parallel pipe D, lying just over it. This pipe has within it a smaller pipe E. The pipes D and E are connected respectively with an air-fan and a pump for circulating some cooling liquid. This is done at their inner ends by connecting into a circular pipe D′, which in turn is connected to a central pipe by the pipes D^2. The pipes E connect similarly either by pipes within the air-pipes or otherwise. The water-pipes E either connect at their outer ends to a pipe E′, from which they are brought to the center again through the pipes E^2, or discharge freely into a trough or ditch below the outer edge of the turn-table.

The fan for the air circulation and the pump for the water circulation have not been shown. They may be located anywhere convenient, and the pipes conveyed to the center of the turn-table either overhead or underground.

The short pipes *d*, connecting pipes D and B, have each a valve *d*′, which has outside a lever d^2 connected to its stem. These are connected by the strings d^3, or in any other convenient manner, to a central point from which they may be operated.

Midway between the air-inlet pipes *d* are placed small whistles *f* or any simple device which will give warning of escaping air. The valves of these whistles are connected with stems *f*′, which pass through holes in the tube C and have connected to their inner ends small rounded heads, which, when the rail is in place and straight, are just above the top or head of the rail, removed therefrom possibly a quarter of an inch. When a rail is inserted in this tube it begins to part with its heat, and being within an inclosed tube the tube and its contents are soon raised to an even temperature. The heat is carried away from the pipe B by the current of air coming through the valves *d*′, which are slightly open. The air passes around the pipe and is then discharged through the holes *b*, which are placed on the opposite side of the pipe from the valve and half-way between two adjacent valves, so that the air must travel around the pipe and lengthwise a short distance. Now if the rail cools off uniformly, it will remain straight; but if the base cools off more rapidly than the head the rail will buckle up and the head will operate the whistles *f*, which are above the point when the rail is high. When the location of a high spot is thus indicated, the inlet-valves *d*′ on each side of and above the high part will be opened, thus admitting a current of air upon the top of the pipe over the head of the rail. This will cool the head more rapidly, and the bend will go down. The valves will then be restored to their normal condition.

The press P will be placed in the line of the backward movement of the rails as they come from the rolls and the turn-table farther back in the same line. The rail as it leaves the press is drawn into the open end of the pipe, which is in line with it, by means of a chain which has been previously drawn into it. This chain has a pair of gripping-tongs similar to those shown in Fig. 5 on one end, which grip the rail-web by the sharp points *t*. This chain O′ is operated to pull the rail into the pipe by a drum O mounted at the center of the turn-table and connected with any power. The chain is fastened to the drum and wound thereon until the rail is drawn within the pipes, when the ends of the pipe are closed. The chain is then transferred to a point at right angles thereto in the direction of G and attached by means of the tongs T to a rail which has been cooling in the apparatus while it was turning in the direction of the arrow from the press around to G. This rail is then drawn out of the outer end of the pipe and draws in the chain, which is detached from the drum and left in the pipe ready to be used in drawing in another rail. The pipes lying between the points G and the press will be empty and cooling. They will each have a chain lying in them ready to be used for drawing in another rail.

After a rail has been put in a pipe at the press and a rail been taken out at G the turn-table is rotated the distance of one pipe from another and the next pipe filled. Three-quarters of the pipes will be kept full and the other quarter empty all the time while in use. The rails after being removed at G are taken to the presses to be drilled, and then loaded on the cars for shipment.

The casting C′, upon which the rail rests, remains in the pipe while rails of the same section are being treated. If rails of a larger or smaller section are to be treated, this casting is removed and another one substituted, which holds the rail-head in the same relation to the top of the pipe and the alarm-signals *f*′.

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

1. The herein described method of treating steel rails, and other rolled forms of unequal section, which consists in first straigthening them by squeezing them while hot in a press having straight jaws, then inserting them in a closed pipe which is surrounded by a cooling fluid and maintaining them straight by regulating the amount of and location for the application of the cooling fluid, substantially as set forth and described.

2. The herein described method of cooling steel rails and other rolled bars which consists in placing the hot and previously straightened rail within a cooling pipe, surrounding said pipe with a cooling fluid and varying the amount of said cooling fluid at different points in the length of the rail as may be necessary to keep it straight, substantially as shown and described.

3. The herein described method of cooling steel rails and other rolled bars which consists in cooling said rail by the application of a cool-

ing medium to the hotter portions of the section and varying the amount of the cooling medium at different points of the length thereof as may be necessary to keep it straight, substantially as shown and described.

4. In an apparatus for cooling and straightening rails, the combination with the outer and an inner pipe, the inner pipe adapted to hold the rail, a series of rods passing through the inner pipe and normally held just out of engagement with the head of the rail when it is straight and adapted to be engaged when it buckles up, and means for controlling the admission of a cooling fluid between the pipes locally in accordance therewith, substantially as set forth and described.

5. In an apparatus for cooling and straightening rails, the combination with a pipe adapted for holding a rail therein, a series of rods projecting through the pipe at short intervals and normally held just out of engagement with the head of the rail when it is straight, a second pipe surrounding this one having air inlet openings on the side next to the rail head and air escape openings on the opposite side of an air supply pipe, with connections therefrom to the air inlet openings of the other pipe, and valves in said connections, substantially as set forth and described.

6. In an apparatus for cooling and straightening rails the combination with the turntable and means for rotating it at will, of a series of cooling pipes mounted thereon radially, a drum located at the center of the turntable, and a chain and tongs for pulling the rails within the pipes, substantially as set forth and described.

7. In an apparatus for cooling and straightening rails the combination with a turn table, and means for rotating it at will, of a series of cooling pipes mounted thereon radially and means for drawing the rail into and out of the pipes substantially as set forth and described.

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

WILLIAM HAINSWORTH.

Witnesses:

H. L. REYNOLDS,

GEO. H. ALECK.