

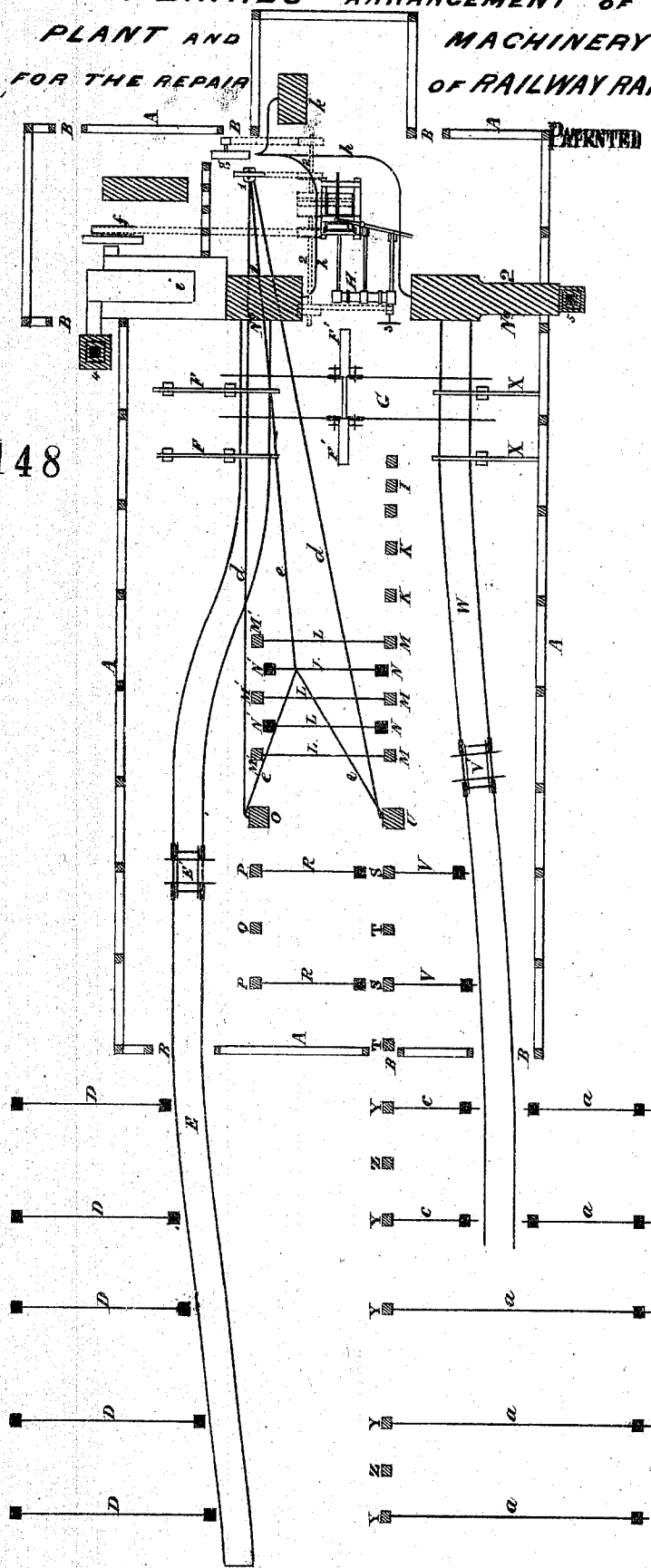
HUGH BAINES' ARRANGEMENT OF
PLANT AND MACHINERY
FOR THE REPAIR OF RAILWAY RAILS

PATENTED MAY 23 1871

115148

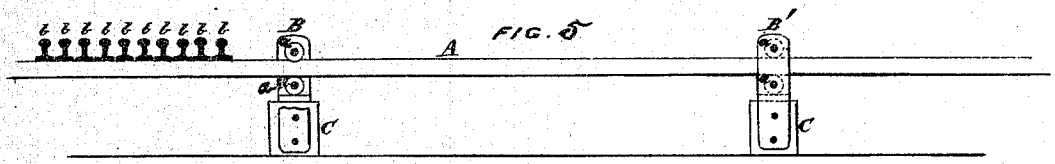
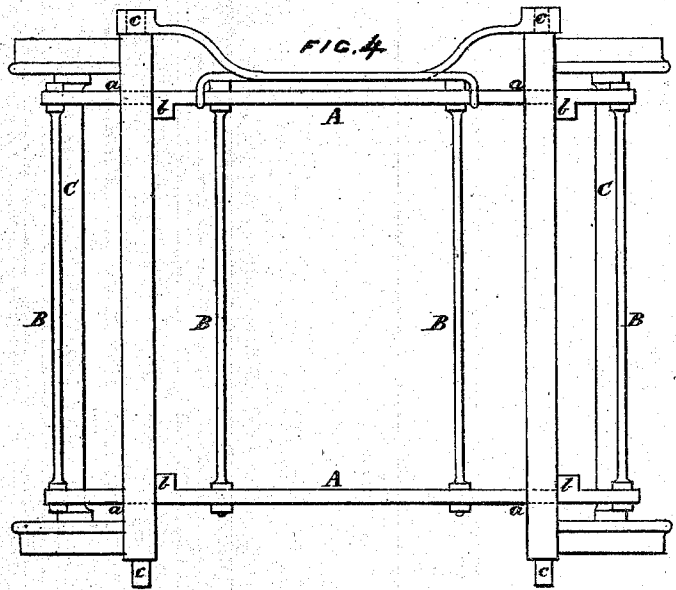
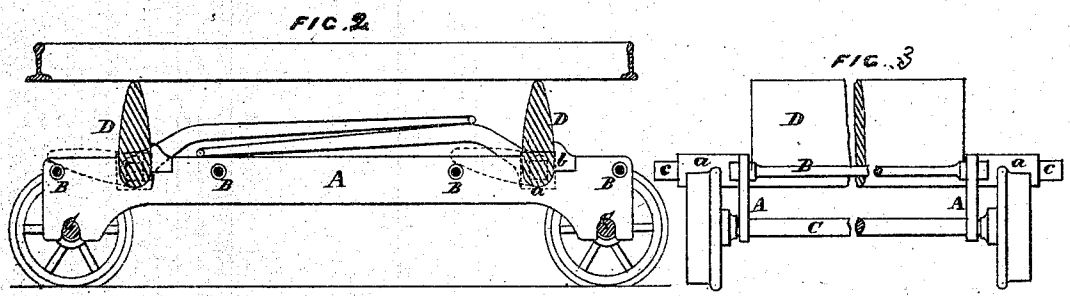
Fig. 1.

Inventor
Hugh Baines



Witness
Edward H. Lumsden
Charles M. Mason

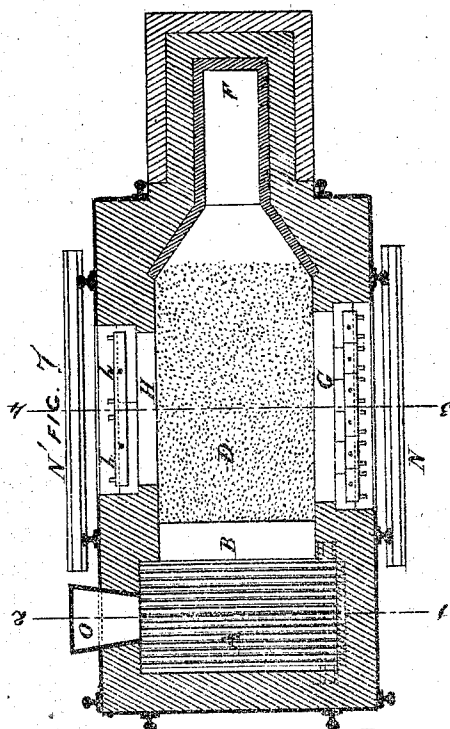
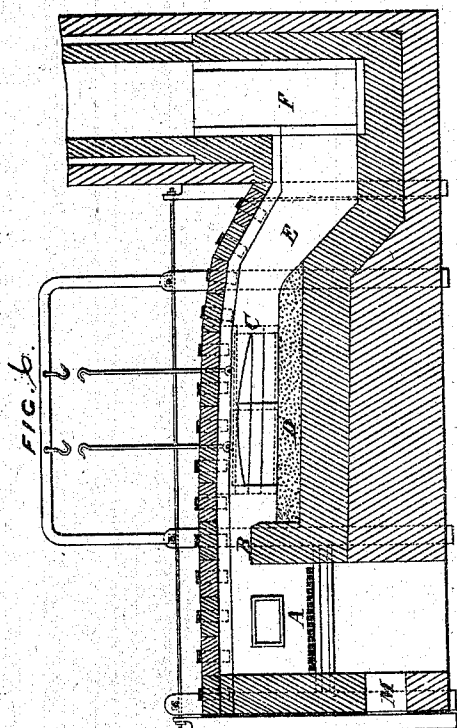
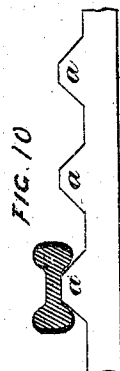
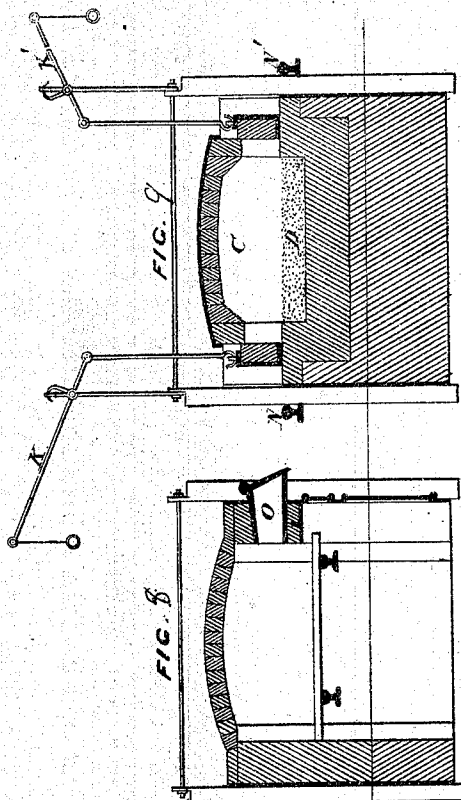
SHEET. 2. 4 sheets



HUGH BAINES' LORRY **AND SLIDING SKID RAILS**

SHEET 3.

HUGH BAINES' **HEATING FURNACE** FOR HEATING DAMAGED RAILWAY RAILS ALONG WITH THEIR PATCHES



SHEET. 4.

HUGH BAINES' RAIL CARRIAGE AND SAW GAUGE

FIG. 13

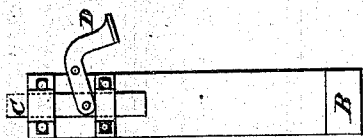


FIG. 11

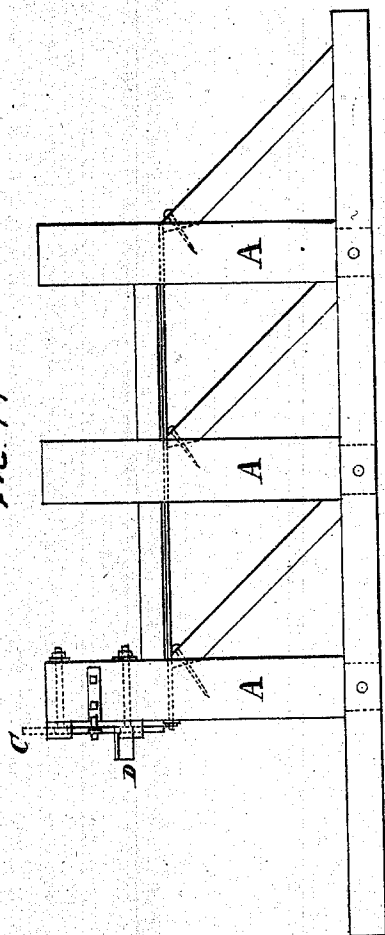


FIG. 12

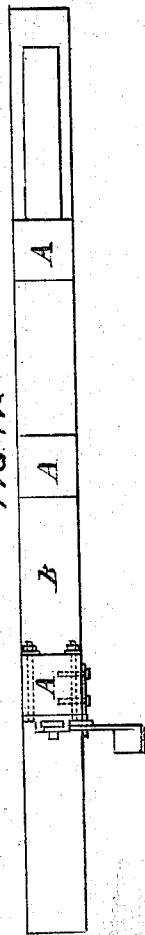
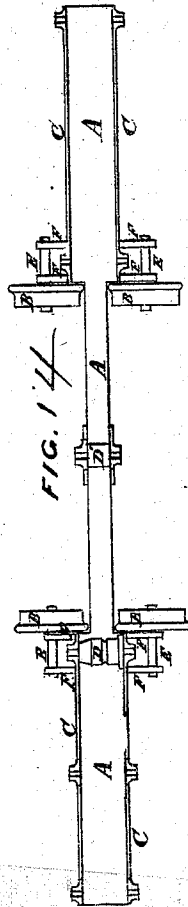


FIG. 14



UNITED STATES PATENT OFFICE.

HUGH BAINES, OF TORONTO, CANADA.

IMPROVEMENT IN PLANTS FOR REPAIRING RAILWAY RAILS.

Specification forming part of Letters Patent No. 115,148, dated May 23, 1871.

To all whom it may concern:

Be it known that I, HUGH BAINES, of Toronto, in the county of York, Province of Ontario and Dominion of Canada, engineer, have invented an arrangement of plant for the ready repair of damaged railway rails and the reducing the sections of old rails without cutting them up, a patent having been granted to me in England for the same invention, dated July 15, 1870.

Nature and Objects of the Invention.

My invention consists in an arrangement of plant, comprising reversing-rolls, furnaces, fan, engine, boiler, straightener and punch, lorries and tracks, rail-carriage and track, skids and rollers, gauges, and swinging hooks, whereby worn or damaged railway rails are economically, efficiently, and expeditiously repaired or reduced in section ready for use with minimum amount of manual labor.

Description of the Accompanying Drawing.

Figure 1, Sheet 1, is a plan, showing one arrangement of reversing-rolls, furnaces, fan, engine, boiler, straightener, punch, lorries and track, rail-carriage and track, skids, rollers, and gauges. Fig. 2, Sheet 2, is a side elevation of a peculiar lorry that I prefer using in the conveyance of rails, but an ordinary lorry is made to do the same work. Fig. 3 is an end elevation thereof. Fig. 4 is a plan thereof. Fig. 5, sheet 2, is a side elevation of sliding skids employed for supporting rails while heating. Fig. 6, Sheet 3, is a sectional side view taken through the center of the furnace employed by me for heating the worn or damaged parts of railway rails. Fig. 7, Sheet 3, is a sectional plan thereof. Fig. 8, Sheet 3, is a transverse section thereof taken through the line 1 and 2 on Fig. 6. Fig. 9, Sheet 3, is a transverse section thereof taken through the line 3 and 4 on Fig. 7. Fig. 11, Sheet 4, is a side elevation of the gauge-posts and gauges employed by me for gauging the lengths of rails when repaired. Fig. 12 is a plan thereof. Fig. 13 is an end view thereof. Fig. 14, Sheet 4, is a plan for a rail-carriage employed by me for the conveyance of heated rails from the furnaces to the rolls.

General Description.

A A A A A are the walls of the building,

and B B B B B B B are door-ways. C is a track or siding, along which the rails to be repaired are brought into the yard outside the building in railway trucks or wagons. D D D D D are fixed skids or rails, supported on posts driven into the ground, and resting on the surface thereof, onto which the damaged rails are laid as they are unloaded from the truck. E is a lorry-track, situated on the opposite side of the fixed skids D D D D D to that on which the siding is laid, for the passage along it of a peculiarly-constructed lorry, E', hereinafter described, which travels to and fro between the skids D and one of a pair of peculiarly-constructed furnaces, marked No. 1 and No. 2, respectively, Fig. 1, Sheet 1, (also hereinafter described,) in which the rails to be repaired are heated, each rail having a properly-shaped patch of iron placed upon the damaged part before it is introduced into the furnace, so that the damaged part of the rail and its patch are both heated together at the same time and in the same furnace. F F are sliding skids, hereinafter described, for supporting the rail ends when in the furnace. A peculiarly-constructed rail-carriage, F', (hereinafter described,) receives each rail singly from the furnace so soon as it is sufficiently heated and conveys it along a track, G, (at right angles to the lorry-track,) in front of the rolls H, which weld the patch to the rail and impart the desired shape or contour to the repaired part, as hereinafter described. These rolls, which are of the ordinary construction, are worked or made to revolve either vertically or horizontally, and are reversible, by means of belts or gear, and are turned to suit any pattern of rail. I is a peculiarly-constructed gauge, hereinafter described, situated opposite to a circular saw carried on the housings of the rolls, between which gauge and the saw the repaired rail on its carriage must pass, thereby insuring the rail being cut to the proper length. K K are posts, provided each with a single-flanged roller on its upper end, and situated in a line with the saw-gauge, for the purpose of enabling the sawn rails to be run directly off the carriage in front of a hot bed, which consists of a number of stationary rails, L L L L L, supported upon the other posts M M M M' M' M' and N N N' N'. The posts M M M are in line with the posts K K, and carry single-flanged rollers. The posts shown in

black merely serve as supports to the skids, and do not carry rollers. Those marked Z Z Z T T Q carry rollers only, and do not serve as supports to the skids, while those posts marked Y Y Y Y Y S S P P M M M M' M' M' not only carry rollers, but at the same time serve to support the skids, as hereinafter more fully described. O is a hydraulic straightener, into which the rails are run singly along the rollers on the posts M' M' M' in a line with the straightener, in order to be straightened, after which they are run along other rollers on the posts P P and Q, also in a line with the straightener. The posts P P also serve to support the fixed skid-rails R R, which receive the straightened rails. Should the rail require still further repair at the center or at the opposite end, it is pushed along the skids R R and is lifted onto another set of posts and rollers, S S and T, immediately in a line with the hydraulic punch U, which punches the bolt and spike holes therein.

The rails, as fast as they are punched, are turned round end for end and slid onto the skids V V, along which they are pushed onto a second lorry, V', (like the one first referred to,) running along the track W, which conveys them, in batches of ten, say, to the furnace marked No. 2, which is similar to that marked No. 1, where they are supported while being heated by resting upon the overhanging sliding skid-rails X X, similar to those already referred to in connection with No. 1 furnace. After having been duly heated with its patch, each rail is placed singly upon the rail-carriage running along the track G, as before mentioned, and is again conveyed to the rolls, and afterward gauged and sawn, or not, as is found requisite. The rail having been thus repaired in every part is again passed through the straightener O and punching-machine U, as before described, and thence out of the works along single-flanged rollers on the posts marked S T S T Y Z Y Y Z Y Z Y, in line with the saw-gauge, and pushed thence onto skids *a*, which incline upward toward their outer ends to a convenient elevation for transferring them into trucks or wagons running along the tracks or sliding *b*, which convey them to their destination.

Should there not be sufficient rails requiring repair at both ends to keep both furnaces No. 1 and No. 2 going, then some of the rails to be repaired should be placed on the skids *c c*, so as to keep the furnace No. 2 constantly at work.

The hydraulic straightener and punch are connected, by circulating-pipes *d d* and *e e e*, (shown in black lines,) with pumps worked by a counter-shaft and pulleys 2 2, driven by main belt from engine-shaft at *f*, whereby a constant supply of water to both the machines is maintained and brought into use as required.

In cases where hydraulics would be inapplicable I then, by means of the same counter-shaft and pulleys, employ a geared punch and straightener in lieu thereof. The counter-shaft

also drives, by means of pulleys, the fan *g*, the rolls H, and the saw 3. The draught for the heating-furnace is obtained either by means of a high chimney or by means of the fan *g*, connected by pipes *h h* with each furnace.

The waste heat from the furnace No. 1, Fig. 1, serves to generate the steam in the boiler *i*; but in case such furnace be out of work a grate is fitted under the boiler at the smoke-box end, which enables the boiler to be heated independently, a damper in the neck of the furnace No. 1 communicating with the boiler being then shut down. A double forge for scarfing is erected at *k*.

Having given a general description of the plant for the ready repair of damaged rails and the reducing the sections of old rails without cutting them up, I shall now proceed more fully or particularly to describe various elements of which such plant is composed, reference being had to the illustrative drawing hereunto annexed.

Fig. 2 on Sheet 2 of my drawing represents a sectional elevation of one of the lorries or charging-carriages marked E' and V' on Sheet 1, which I prefer using in bring up the damaged rails to the furnace and introducing them therein; but ordinary lorries can be employed for the same purpose; or the rails may be either carried by hand, hooks in overhead tracks, or slid on skids, or by any other convenient mode.

Fig. 3 is an end elevation of Fig. 2, and Fig. 4 is a plan thereof.

This lorry consists of two side frames, A A, connected together by tie-rods B B B B and mounted upon axles C C, the wheels of which are gauged to fit the tracks marked E and W on Sheet 1. In notches on the upper edges of the frames A A are fitted the journals *a a a a* of the cams D D, upon which the rails to be conveyed to, say, No. 1 furnace, Fig. 1, Sheet 1, are deposited, as shown in Fig. 2. These cams lean slightly out of the perpendicular against the stops or lateral supports *b b b b* on the frames A A when loaded with rails. The dotted lines show the cams turned down for the purpose of passing under the movable skid-rails, as hereinafter explained. A square end, *c*, is formed on each end of the cam-shafts, and a lever or wrench is fitted thereon for turning the cams. The surface of the various skids, (with the exception of the upper ends of the inclined skids,) as also the tops of the various rollers in the parts hereinbefore referred to in reference to Sheet 1, should be all on the same level, which I prefer to be about one foot eleven inches above the ground line. The hearths of the two heating-furnaces should also be at the same level. The apexes of the cams D D in the lorries should be a trifle higher than the tops of the sliding skids, marked F and X on Sheet 1, or, say, two feet above the ground line.

The rails to be repaired are lifted from the skids D D, Fig. 1, Sheet 1, and deposited on the upright cams on the lorry in batches of, say, ten or more. The lorry, with its load, is

then run along its track ²E, Fig. 1, Sheet 1, up to the furnace No. 1, Fig. 1, Sheet 1; but before this the overhanging ends of the skids F F, Fig. 1, Sheet 1, are pushed back in order to admit of the lorry, with its load, being brought up to the furnace. The doors of the furnace are now opened and the rails pushed into it sufficiently far to enable the damaged part, with a proper patch deposited thereon, to be heated. The movable skids F F, Fig. 1, Sheet 1, are now run out so as to come underneath the ends of rails which overhang the front of the furnace. By turning down the cams D D of the lorry the rails will be lowered onto and supported by the overhanging skids, while the lorry is free to pass under the overhanging skids back again for a fresh batch of rails.

Fig. 5, Sheet 2, is a sectional elevation of one of the pairs of rails and its supports constituting the movable overhanging skids. It consists of two parallel rails, A, confined between top and bottom rollers *a a a a*, carried in brackets B B', bolted to posts C C', driven into the ground. The rails A are free to run in or out between the anti-friction rollers *a*, as may be required. In Fig. 9 I have shown them run out, their overhanging ends supporting ten rails, *b b b b b b b b b b*, which are undergoing the process of heating. In order to prevent this overhanging load from loosening or lifting the hind posts C', I dowel the lower ends of these posts into wooden platforms about five feet beneath the surface, and weight the same with blocks of stone, metal pigs, or other heavy bodies. Where ordinary lorries are used for the conveyance of rails to the furnaces for the purpose of heating, or where rails are carried by hand-hooks in overhead tracks; or slid on skids or rollers for the same purpose, then these sliding skids are dispensed with and stationary skids substituted; or the rails projecting from the furnace supported by any other convenient method.

Fig. 6, Sheet 3, represents a vertical section of the furnace for heating the damaged parts of rails along with their patches. When old rails require heating the whole length for the purpose of reducing their sections the furnace is made of sufficient length to take them in. Fig. 7 is a corresponding sectional plan of the same. Fig. 8 is a transverse section taken along the line 1 2 in Fig. 6; and Fig. 9 is a similar section taken along the line 3 and 4.

A is the fire-place. B is the fire-bridge; C, the heating-chamber over the bottom D, on which the rails to be heated are placed. This bottom is composed of fire-sand, and the chamber C communicates at one end, by the neck E, with the flue and chimney F. G is the front end of the furnace, and H is the back entrance, situated opposite thereto. The front entrance is closed by multiple small doors, *g g g g g g*, so as to expose as small a space as practicable for the inlet of air when withdrawing the rails, each door being capable of being opened or closed independently by means of the levers K K'. In my drawing I have represented six

doors for the front entrance; but, of course, their number may be varied according to the width of the entrance. The doors *h h*, which cover the back entrance H, are each made in one piece, and are lifted by similar levers, K', to those employed for the multiple front doors *g*. M is a hole leading into the ash-pit, under the fire-place, for the admission of the fan-blast through the pipes marked *h* on Sheet 1 of my drawing. In front of the front and back entrances to the heating-chamber there is fitted a rail or horizontal bearer, N N', the top edge of which should be slightly above the level of the furnace bottom, and serves as a rest or support for the rails while being heated. These rests should be on the same level with the various skids and rollers before referred to, or, say, one foot eleven inches above the ground line, whereby a great facility is afforded for the ready maneuvering or handling of the rails. O is a firing-hole. When heating flat-bottomed and U-rails the bearers N N have plain surfaces; but when heating double-headed rails these bearers should be shaped in the manner shown at Fig. 10, Sheet 3, which represents, on an enlarged scale, a portion of such rail-bearer. In this bearer a number of projections, *a*, is formed on its bearing surface, which fit the web only of the rail, thereby allowing the pieces intended to be welded to the rail to remain undisturbed by the act of moving the rail in and out of the furnace. Fig. 14, Sheet 4, represents a plan of the rail-carriage, marked P' on Fig. 1, Sheet 1, which travels along the track marked G on the same sheet, and receives each heated rail separately from the heating-furnace in order to carry it to the rolls marked H on Sheet 1. This carriage consists of a wooden or wrought-iron beam, A, supported upon four running wheels, B B B B, gauged to run on the track G, Fig. 1, Sheet 1. If made of wood, as shown, the two overhanging ends of the carriage are cased with cast-iron plates C supporting the rollers D D', two of which only are shown in Fig. 14. These rollers should be shaped to suit the shape of the rails under repair. Thus, for example, when a double-headed rail is being repaired, the rollers D of the carriage should correspond in contour to the bearer shown in Fig. 10. The center roller D', which may be plain, is carried between separate brackets bolted to the sides of the carriage. The axles E of the running wheels are keyed into the brackets F F, and the wheels B B B B run loose upon them. When the rail is to be withdrawn from the heating-furnace the rail-carriage, Fig. 14, is run in front of the furnace, and the rail to be removed is then slightly raised at its outer end and the carriage brought under it so as to receive its weight. The rail is then drawn out of the furnace along the rollers D D', the tops of which should be about one inch above the top of the skid-rails. The heated rail and its patch thus resting upon the rollers D D', the carriage is run along its track opposite to the rolls marked H, Fig. 1, Sheet 1. I also employ forked hooks con-

nected with overhead travelers for the purpose of conveying the rails from the furnaces to the rolls and transferring the same to the hot beds; but I prefer using the rail-carriage before described. The rail is presented to these rolls by the rail-carriage, before described and illustrated by Fig. 14, Sheet 4, and, the rolls being in motion, that portion of the rail and its patch which have been heated together are passed through the rolls and repaired. When the rail, whether a flat, double-headed, or bridge rail, has been rolled, it is conveyed, while still upon the carriage, Fig. 14, Sheet 4, to the circular saw, 3, Sheet 1, to be cut to the proper length, the rail end resting upon a saw-bracket, and, as it passes across the saw, its opposite end passes just in front of the gauge marked I on Sheet 1, which regulates the length of the rail.

I shall now proceed particularly to describe this gauge, of which Fig. 11, Sheet 4, represents a side elevation; Fig. 12 is a plan; and Fig. 13, an end view.

This gauge is adapted for cutting rails of three different lengths, and consists of three posts, A A A, mortised into a longitudinal piece, B, and sunk in the ground so as to leave the tops of three posts about one inch lower than the several rollers and skids referred to on Sheet 1, Fig. 1. To each of these posts there is fitted a vertical slide, C, which constitutes the actual gauge-piece, such slide being connected to a foot-lever, D, so that when the lever is depressed the slide will be elevated and the rail end brought just up to it, and when the lever is released the slide will drop to a level with the top of the gauge-post. In Figs. 11 and 13 I have shown the slide or gauge-piece in dotted lines in its elevated position. I have

only shown one slide, as those on the other two posts will be precisely similar. I increase the number of these gauge-posts as required to suit the different lengths of rail to be repaired. These gauges can be made of various shapes, but I prefer using the one described. The rail having been sawn and gauged, the slide C of the gauge is dropped down and the rail is run along the rollers on the posts shown on Sheet 1, marked, respectively, K K M M M, whence it is removed by being pushed onto the hot bed or skids L L L L L, Fig. 1, Sheet 1. From this hot bed the rails are pushed onto the rollers M' M' M', Sheet 1, and run along them to the straightener, marked O on Sheet 1, Fig. 1, where they are straightened.

Having now given a general description of my arrangement of plant and machinery adapted for the ready repair of damaged railway rails without cutting them up and re-rolling them, I would observe, in conclusion, that I do not in this application claim separately as my invention pressing-rolls, furnaces, fan, engine, boiler, straightener or punch, lorries or tracks, skids or rollers, rail-carriages or gauges, or any other device; but

What I do claim as my invention—

The plant, comprehending by this the arrangement of machinery, fixtures, and appurtenances generally, substantially as hereinbefore described, for the ready repair of damaged railway rails, without cutting them up and re-rolling them.

The above specification of my invention signed by me.

HUGH BAINES.

Witnesses:

EDWARD C. FARRELL,
CHAS. C. WILSON.