Aug. 17, 1943. R. M. WALTERS 2,326,906

METHOD OF SEVERING AND REMOVING RAILS AND THE LIKE

Filed Jan. 4, 1940

Fig. 1.

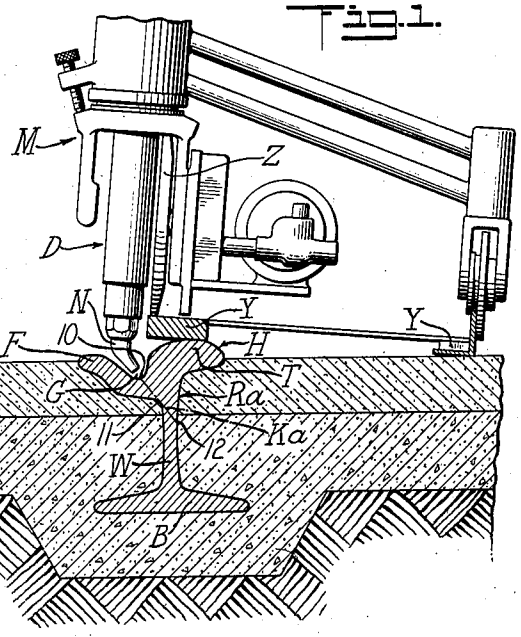
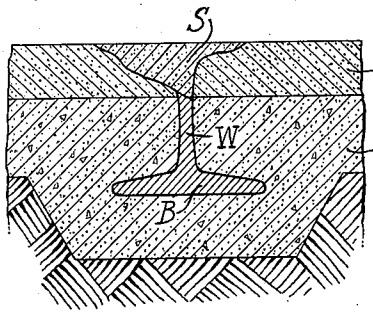


Fig. 2.



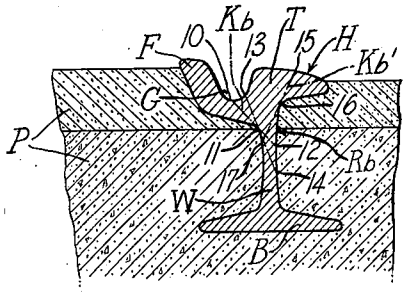


Fig. 3.

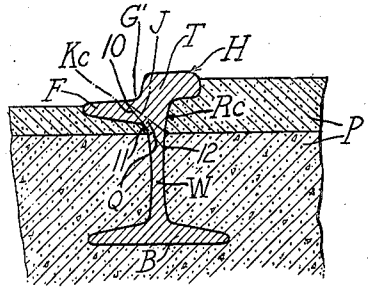


Fig. 4.

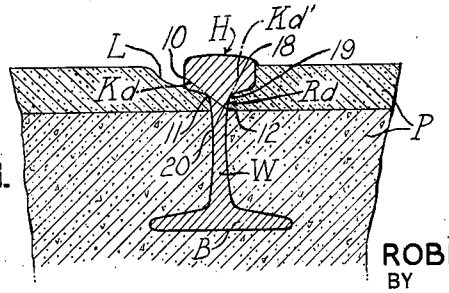


Fig. 5.

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METHOD OF SEVERING AND REMOVING RAILS AND THE LIKE

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Application January 4, 1940, Serial No. 312,364

14 Claims. (Cl. 148—9)

This invention relates to a method for severing and removing the upper portions of rails and other shaped iron or steel members, especially when the lower portions of such members are embedded in a foundation material. The invention will be described herein as it may be applied advantageously for removing, from paved streets, the upper portions of street-car rails, the lower portions of which are embedded in the pavement, but it will be understood that the principles of the invention may be utilized to advantage in other situations.

During recent years, buses and trackless trolleys have rapidly replaced street railway systems, and the unused street-car tracks are being removed from sity streets in which they are embedded. The usual method for removing such embedded rails has involved digging up the street pavement along one or both sides of each rail and working the rail out of its embedded position. This procedure is quite expensive and often interferes unduly with traffic on the street.

The principal objects of the present invention are to provide an improved method for severing and removing the upper portions of steel rails and like members, especially when the lower portions of such members are embedded in a foundation material such as the pavement of a city street; to provide a rail-removing method which is less expensive and time-consuming than the methods heretofore employed, and which does not require disturbing the foundation material adjacent and along the rail; to provide an improved method whereby a rail may be cut through diagonally and lengthwise by a single longitudinal pass of an oxy-fuel-gas cutting blowpipe, the cutting operation being performed entirely from above and along the exposed top surface of the rail, so that the upper portion of the rail may be severed quickly and without direct access to the lower portion of the rail, and without disturbing the material in which the rail may be embedded.

The above and other objects and the novel features of this invention will become apparent from the following description and the accompanying drawing, in which:

Fig. 1 is a cross-sectional view of a street railway rail and the adjoining pavement or material in which it is embedded; also showing an oxy-acetylene cutting machine having its blowpipe in position to cut the rail in accordance with this invention;

Fig. 2 is a cross-sectional view, similar to Fig. 1, illustrating a rail and the adjoining pavement after the upper portion of the rail has been cut and removed and the resulting trench has been filled level with the street surface; and

Figs. 3, 4, and 5 are cross-sectional views illustrating other types of embedded rails and the procedure of this invention in removing the upper portions of such rails.

According to this invention, the upper or exposed head portion of an embedded rail or the like is removed by first cutting through said rail from above and along a plane extending through the head portion and intersecting the vertical axial plane of the rail, and then lifting the severed portion or portions off of the lower part of the rail, which lower part may be left embedded in the foundation material or pavement. The cutting operation preferably is done thermo-chemically by means of a suitably oxy-fuel-gas cutting blowpipe, and by a single pass of such blowpipe and its heating and cutting jets lengthwise of the rail from one end to the opposite end thereof. The upper rail portions, which are quickly severed in this manner from the web and base of a rail, may be readily lifted out of their positions without digging up any of the pavement adjoining the rail. The rail base and a part of the web adjoining the base preferably are left embedded in the pavement, and the resulting trench may be filled in at once with suitable material to quickly restore a level surface and thereby eliminate any serious interference with traffic along the street.

As shown in Fig. 1, the procedure of the invention may be applied to a common type of grooved girder rail *Ra* having its base B, its web W, and most of its head H embedded in and surrounded by a foundation material or pavement P. The head H may consist of a tread portion T, a flange portion F and groove G between and coextensive with said flange and tread portions, the top surfaces of these parts usually being exposed and located approximately at the street level, to support and guide the street-car wheels in a well known manner.

To sever the upper portion of the rail, a suitable metal-cutting device, such as an oxy-acetylene cutting blowpipe D, is advanced along the rail from one end to the other so as to produce a kerf *Ka* which extends the entire length of the rail and also extends diagonally through the rail from its top surface at 10 to the far side of the web W at 12. To perform the operation rapidly and economically, the depth of the kerf is minimized by advancing the cutting medium, such as the oxygen cutting jet of the blowpipe, along the bottom of the groove G. Moreover, it is most

economical and desirable to sever the head or entire top portion of the rail by a single pass of the cutting device lengthwise of the rail, and to do this it is necessary that the cutting jet shall pass through the rail in such a manner that none of the head or upper portion of the rail will remain connected to the web. Accordingly, the cutting jet is so inclined that it will intersect or just pass through a point or region such as 11 where the under surface of the flange F and the adjoining or near side of the web W merge. The surface at and adjoining the point 11 usually is curved concavely, and therefore the kerf K*a* may be said to be disposed in a plane which intersects the main vertical axial plane of the rail and is tangent to, or passes through, merging surface portions of the head and web. Such a kerf, when completed, will result in severing the entire head from the web in one pass, though it will be evident that the flange F and the tread T will also be cut apart by the severing operation, thereby facilitating the subsequent handling of the two-piece severed upper portion of the rail to remove it from the street.

Figs. 3 and 4 illustrate other types of girder rails and the application of this method thereto. These figures diagrammatically illustrate alternative positions and inclinations of the kerf, and show that the plane of cutting may be varied, being determined generally by the degree of accessibility such cutting plane will afford to the blowpipe nozzle and by a desire to minimize the depth of the kerf to be cut. As shown in Fig. 3 lines 10—12 and 13—14 represent two different kerfs or planes of cutting, each produced by advancing a cutting jet lengthwise of the groove G and inclined so as to pass through the point 11 where the surface of the web W merges with the surface of the flange F. Obviously, the kerf represented by the line 13—14 is deeper, and therefore more time and gas would be required to cut this kerf than the preferred kerf K*b* represented by the line 10—12. The principles of this invention may also be followed by advancing the cutting jet along the tread portion T of rail R*b* to produce a kerf K*b'* as represented by the line 15—16—17, where 16 represents the point or region where the surfaces of the web W and tread T merge. However, for the rail section R*b*, cutting along the plane of line 15—16—17 obviously would involve cutting through a greater thickness of metal, and would be less economical, than cutting downwardly from and along a bottom portion of the groove G or its equivalent. An equivalent of the groove G of Figs. 1 and 3 is illustrated in Fig. 4 wherein the top surfaces of the flange F and the tread T of the rail R*c* merge into a region G' which provides a guide or bearing for the car wheel rim. Since the region G' is close to both the central vertical plane of the rail and to the region where the surfaces of the web W and the flange F merge, it will be evident that the cutting jet preferably should be advanced along the region G' and suitably inclined so as to produce the kerf K*c* represented by the line 10—11—12 on Fig. 4.

Fig. 5 illustrates the application of this severing method to another common type of rail R*d*, in which no separate flange or intervening groove is provided ordinarily, though one side of the head H may be exposed by a channel L formed in the pavement coextensive with the rail to receive the rim of a street-car wheel. If such a channel is present, a kerf K*d* may be produced by advancing along the rail a cutting jet directed against the exposed side surface of the rail and inclined so as to coincide with the line 10—11—12, as previously explained. However, if there is no channel L or its equivalent and both sides of the head H are substantially covered, the severing operation may be performed by advancing the cutting jet while it is directed against the top surface of the rail and so inclined as to coincide with a line 18—19—20, thus producing a kerf K*d'* which intersects the main vertical axial plane of the rail and severs the head from the remainder of the rail in a manner similar to the severing operations already described.

For convenience, the regions or points where the surfaces of the web W merge into the surfaces of the flange F, the tread T, or the head H, may be termed the web-head points of the rail. While the preferred and most economical procedure of this invention contemplates performing the severing operation by a single pass of the cutting blowpipe lengthwise of the rail, this involves producing a kerf which passes almost exactly through a web-head point of the rail. However, in some instances it may be desirable or necessary to make more than one cut lengthwise of the rail to sever the entire head or upper portion of the rail and render it easily removable. For example, as shown in Fig. 4, if the first cut or kerf J accidentally or intentionally misses the web-head point 11, the tread portion T may be lifted out and then a second cut or kerf Q may be produced by advancing the cutting jet along the remaining head portion while directing the jet against the exposed freshly cut surface at a point opposite the web-head point 11, so as to rapidly cut a kerf through this thin section and thereby sever the flange F or remaining unsevered head portion from the web W.

In all instances, after the head portion or portions of the rail have been severed from the more deeply embedded part of the rail and have been lifted out, the resulting trench may be filled with suitable paving material and the surface rolled smooth, as indicated at S in Fig. 2.

It will be understood that the cutting device, such as an oxy-acetylene cutting blowpipe of well known construction, may be advanced manually or mechanically along the rail to cut the latter from end to end in the manner described. However, in order to do the cutting accurately and rapidly, it is preferable to use a self-propelled and accurately guided carriage to support and guide the cutting device. As shown in Fig. 1, for example, the cutting blowpipe D may be mounted on a self-propelled machine M of the type disclosed in Patent No. 2,148,666 issued in the name of Lloyd W. Young. The machine M may travel on and be guided by a portable track Y which may be suitably positioned parallel to the rail R*a* upon which the severing operation is to be performed. Appropriate heating and oxygen cutting jets are discharged by the blowpipe nozzle N, which may be curved or otherwise formed to extend into a groove G, for example, and to direct its jets in the desired direction to produce the inclined kerf for severing the head portion of the rail according to this invention. The propelling device Z may tractionally engage one member of the track Y to propel the machine M and the blowpipe D lengthwise of the rail R*a* at a uniform and appropriate rate of speed for the severing operation.

Usually, before setting the machine M in place to start cutting with it, a short section about six inches long at the end of a rail is cut out with a hand-operated cutting blowpipe. This is done to

facilitate the proper starting of the cut and the adjustment of the machine and the blowpipe nozzle. Generally, the discharge end of the blowpipe nozzle is bent to an angle of about 38° to the vertical axis of the blowpipe, so that the cutting jet will intersect the rail section at the desired web-head point, but the angle of bend and the setting of the nozzle will depend upon the existing rail section.

While the severing procedure herein disclosed is most advantageously utilized as a step in a method of removing the head portions of embedded street-car rails, other applications of such severing procedure will occur to those skilled in these arts. Although the thermo-chemical cutting procedure has distinct advantages in the method disclosed herein, other cutting devices may be used and various changes may be made in the details shown and described, without departing from the principles of this invention.

I claim:

1. A method of severing a head portion from a steel rail or similar member having a head and a web, such method comprising applying a cutting medium against and advancing the same along a surface of said head and through said rail or similar member to produce a kerf extending through said head, lengthwise of said rail or similar member, and diagonally across the main vertical axial plane of said web to the surface of said web at the other side of said plane from the surface of said head against which said medium is applied, said cutting medium being advanced through said rail or similar member so as to produce a kerf passing substantially tangentially through merging surface portions of said head and said web.

2. A single-pass method of severing the entire head from a steel rail or similar member having a head and a web integral with said head, the side surfaces of said web merging with the under surfaces of said head, said method comprising applying a cutting medium against and along a surface of said head while inclining said medium in a direction to pass through said head and diagonally through said rail or similar member across the main vertical axial plane of said web and tangentially to one of the merging surface portions of said head and said web, so as to emerge at that surface of said web which is disposed at the opposite side of said plane from the surface of said head against which said medium is applied initially.

3. A method of severing a head portion from a steel rail or similar member having a head and a web, the rail or similar member, with the exception of the upper surface of the head, being embedded in and surrounded by a foundation material, such method comprising advancing a cutting medium lengthwise of said rail or similar member and simultaneously directing said cutting medium against the exposed surface of said head and diagonally across the main vertical axial plane of said rail or similar member so that said cutting medium passes through a web-head point of said rail or similar member and emerges in a region of said web which is surrounded by said foundation material.

4. A method as defined in claim 3 in which said cutting medium is directed so as to pass through the lowest web-head point of said rail or similar member.

5. A method of removing the upper portion of a steel rail from the remainder of such a rail which is embedded in pavement and which has only the surface of said upper portion exposed, such method comprising the step of severing said upper portion by advancing a cutting medium from one end to the opposite end of said rail and along said exposed surface while directing said medium downwardly through and diagonally across the main vertical axial plane of the rail so that said medium shall emerge in an unexposed surface of the web of said rail.

6. A method as defined in claim 5 in which the portion of said rail through which said cutting medium passes is heated to substantially its kindling temperature, and in which said cutting medium is a jet of oxygen having sufficient velocity to penetrate through said rail while being advanced lengthwise thereof and directed against successive areas of the exposed upper surface portion.

7. A method of severing a head portion from a steel rail, said head portion comprising a tread, a flange, and a groove between and coextensive with said tread and flange, said head portion being integrally connected to the upper portion of the web of said rail, and said rail, with the exception of the upper surfaces of said tread, said flange, and said groove being embedded in a foundation material, such method comprising advancing a cutting medium lengthwise of said rail while directing said cutting medium against the surface of said groove and diagonally across the main vertical axial plane of said rail so as to penetrate through said rail to that surface of said web which is on the opposite side of said plane from said groove.

8. A method as defined in claim 7 in which said cutting medium is so directed that it passes through a portion of said rail where the under surface of said flange merges with a surface of said web.

9. A method as defined in claim 7 in which said cutting medium is so directed that it passes through a portion of said rail where the under surface of said head merges with a surface of said web.

10. A method of severing a head portion from a steel rail or similar member, said head portion comprising a tread, a flange, and a groove between and coextensive with said tread and flange, said tread and flange being integrally connected to the upper end of the web of said rail or similar member, such method comprising advancing a cutting medium lengthwise of said rail or similar member while directing said cutting medium against the surface of said groove and diagonally across the main vertical axial plane of said rail or similar member so as to penetrate through said rail or similar member to that surface of said web which is on the opposite side of said plane from said groove.

11. A method as defined in claim 10, in which said cutting medium is so directed that it passes through a portion of said rail where the under surface of said flange merges with a surface of said web.

12. A method as defined in claim 10, in which said cutting medium is so directed that it passes through a portion of said rail where the under surface of said head merges with a surface of said web.

13. A method of removing an upper portion of a street-car rail which is embedded in street pavement and replacing pavement therefor, such method comprising severing such upper portion from the web of the embedded rail; lifting such severed upper portion from the remainder of the

rail, thereby leaving a trench in place of such severed upper portion and leaving said remainder of the rail embedded in said pavement; and filling said trench with paving material level with the adjoining street pavement.

14. A method of severing and removing the head from a steel rail or similar member having a head and a web, the upper surface of said head being exposed and the remainder of said rail or similar member being embedded in and surrounded by foundation material, such method comprising the steps of advancing a cutting medium lenghwise of said rail or similar member while directing said medium diagonally downward across the main vertical axial plane of said rail or similar member to produce a kerf extending from said upper surface, through said rail or similar member above a web-head point thereof, and to emerge at the embedded surface of said web on the opposite side of said plane from that on which is located the web-head point above which said kerf passes; lifting off the portion of said head severed by such severing operation from the remainder of said rail or similar member; advancing a cutting medium lengthwise of the remainder of said rail or similar member while directing said medium against the exposed freshly cut surface thereof at a point opposite said web-head point so as to sever the head portion from said remainder; and lifting such last-severed head portion off the lower portion of said rail or similar member.

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