J. H. MILBURN.

RAILOGRAPH.

APPLICATION FILED MAR. 2, 1909.

952,922.

Patented Mar. 22, 1910.

3 SHEETS—SHEET 1.

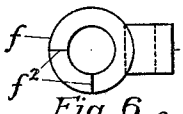

Fig. 6

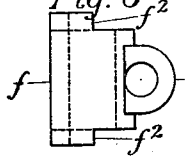

Fig. 5

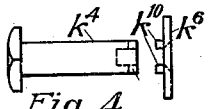

Fig. 4

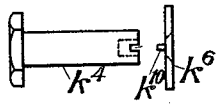

Fig. 3

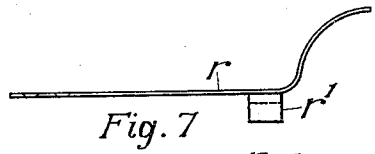

Fig. 7

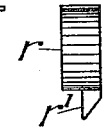

Fig. 8

Fig. 9

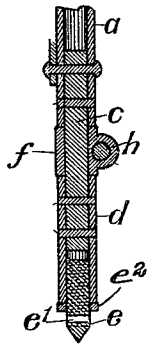

Fig. 10

Fig. 2

Fig. 1

WITNESSES:

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3 SHEETS—SHEET 2.

Fig. 11.

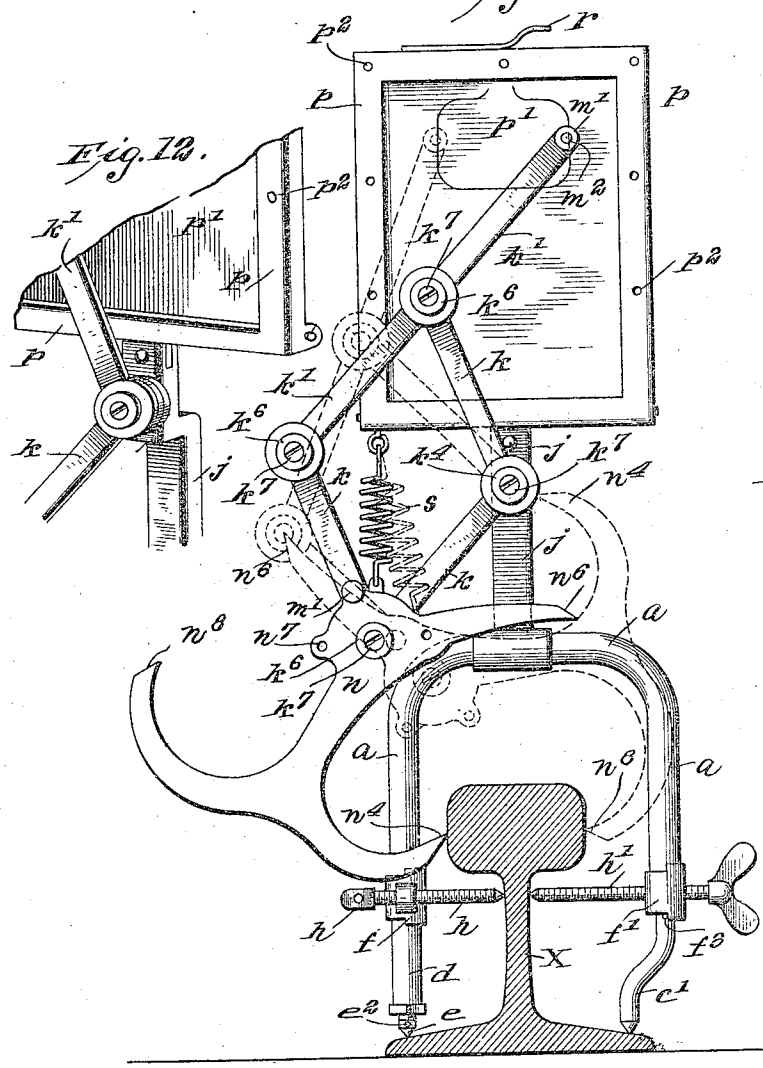


Fig. 13.

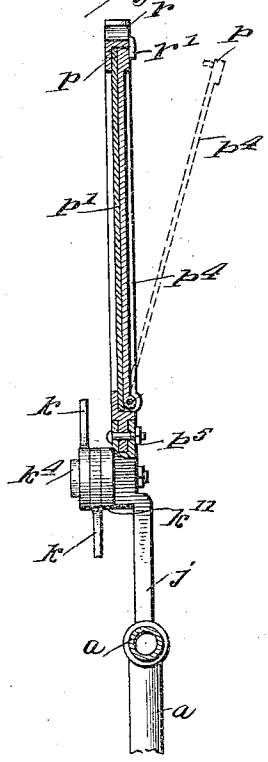


Fig. 12.

Fig. 14.

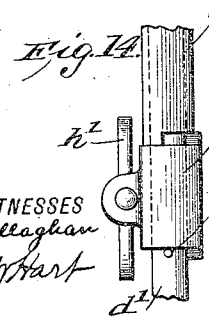


Fig. 15.

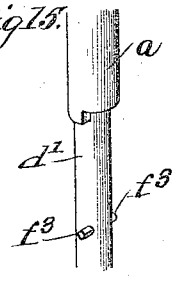
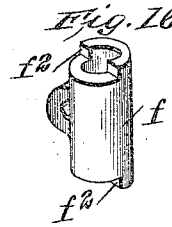


Fig. 16.



WITNESSES

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3 SHEETS—SHEET 3.

Fig. 17.

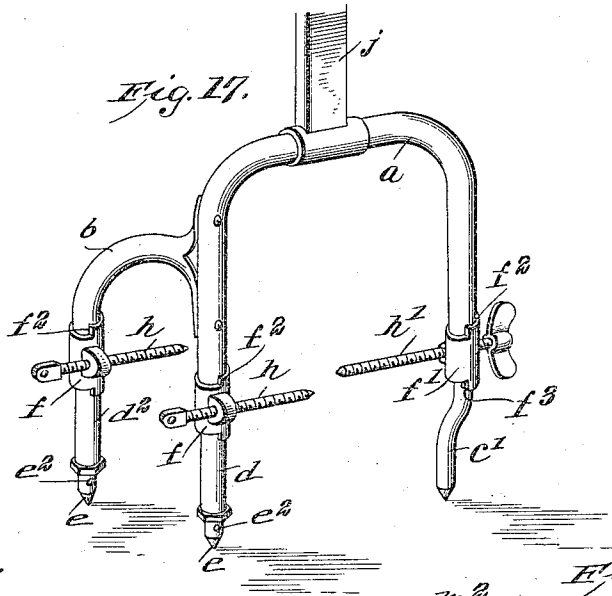


Fig. 19.

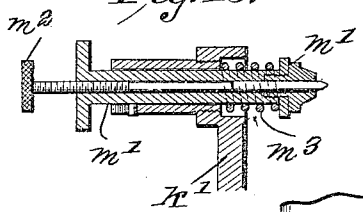


Fig. 20.

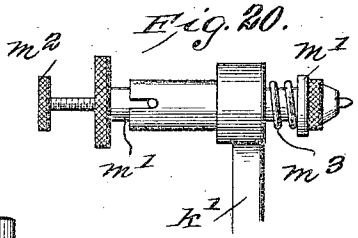
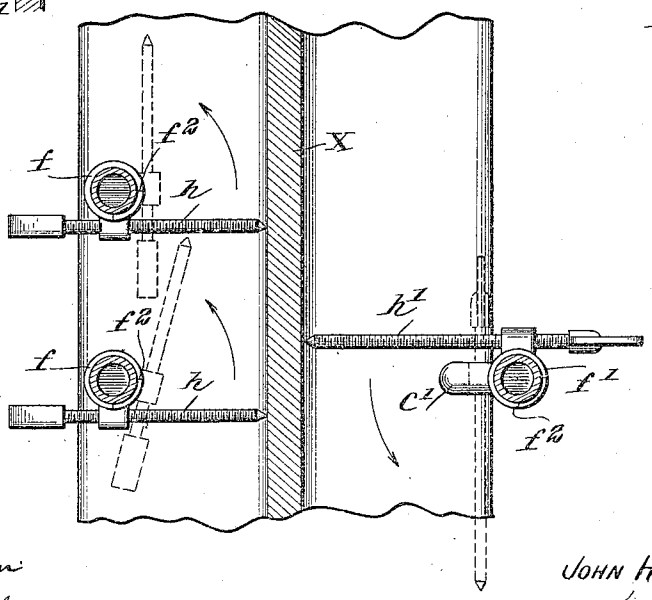


Fig. 18.



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RAILOGRAPH.

952,922. Specification of Letters Patent. Patented Mar. 22, 1910.

Application filed March 2, 1909. Serial No. 480,978.

To all whom it may concern:

Be it known that I, JOHN H. MILBURN, a citizen of the United States, and a resident of the city of Baltimore, in the State of Maryland, have invented an Improvement in Railographs or Instruments for Ascertaining and Recording on a Scribing-Surface the Transverse Contour of Railroad-Rails, of which the following is a specification.

My invention is in the nature of a pantograph adapted for application to the heads of railroad rails for ascertaining and recording their transverse contour or form upon a suitable scribing surface. This operation is performed by railroad companies at regular periods for the purpose of ascertaining the wear and distortion of rails, more particularly the heads and upper portions of the webs thereof.

Among the principal features of my invention are a pivoted rotatable, and bodily movable tracer consisting of a series of arms radiating from a common center and arranged in the same plane and having points adapted for sliding contact with a rail head, etc.; an improved holder for the pencil or scribing point, whereby it may be held out of contact with the scribing surface when not required for use; also certain improvements in the construction of the frame of the instrument and in attachments therefor, whereby the frame may be attached to and supported on a rail and readily detached therefrom when required.

In the accompanying drawings:—Figure 1 is a face view or front elevation of my improved railograph, the same being applied to a railroad rail which is shown in cross section. Fig. 2 is a side or edge view of the instrument, together with a section of a rail. Figs. 3 and 4 are side views of pivot bolts employed in connecting the bars or levers of the pantograph with each other and with the frame of the instrument. Figs. 5 and 6 are, respectively, side and end views of rotatable sleeves employed for holding the clamping-screws by which the instrument is secured to a rail. Figs. 7 and 8 are, respectively, side and end views of a spring catch for holding the hinged back of the frame in which the scribing surface is clamped. Fig. 9 is a cross section of portions of said frame. Fig. 10 is a longitudinal section of one of the legs of the portion of the frame of the instrument which is applied to the rail. Fig. 11 is a view similar in essentials to Fig. 1, save that the tracer is shown in contact with the side of the rail-head instead of the top. Fig. 12 is a detail perspective view of a portion of the instrument. Fig. 13 is a vertical cross section of the scribing surface and the frame in which it is held. Figs. 14, 15, and 16 are views showing the details of construction of the rotatable holders for the clamping screws. Fig. 17 is a perspective view of the lower portion of the frame, together with the clamping screws, which is applied to a rail-head. Fig. 18 is a horizontal section of such portion of the frame, together with a section of a rail. Figs. 19 and 20 are, respectively, a longitudinal section and side view of the scribing point holder.

The lower portion a of the frame has the form of an inverted U and is provided with a curved lateral and downwardly extended arm b. The part a is provided with legs d, c', and the arm b with a leg d^2. The parts a, b, d, d^2, are constructed of metallic pipe which is of the desired lightness, strength, and rigidity. The legs d, d^2, are secured to parts a, b, as illustrated in Fig. 10, by means of an inserted bar c which is securely riveted in place. A hardened point e is tapped into the lower end of the legs d, d^2, and provided with a transverse hole e' to receive a rod or bar for turning it to adjust it up or down. The points e are clamped in any required adjustment by means of jam nuts e^2—see Figs. 1, 2 and 17. The legs c'—see Fig. 17—is riveted in the adjacent leg of frame a and hence not adapted for vertical adjustment.

A clamp screw h is applied to one of the legs of the main frame a and to the lateral arm and leg b supporting the same, while a binding screw h' is similarly applied to the other part of the main frame a and the leg c'. When the instrument is applied to a rail, as shown in several figures, the web x of the rail is clamped between the screws, as illustrated best in Fig. 18. In order, however, to set the instrument over the head of a rail, it is necessary that the several screws shall be turned laterally so as to lie parallel or nearly so, to the rail web x, as illustrated by dotted lines in Fig. 18. To this end, each clamping screw h works in a lug forming an integral portion of a rotatable sleeve f. Each of these sleeves is provided, at each end, with a shoulder f^2, and is applied to the filling piece or bar c that connects the

legs d, d^2 with the parts a and b—see especially Fig. 10. When the screws h are adjusted in the position indicated by full lines in Figs. 1 and 18, the sleeves f are rotated to such position that their shoulders f^2 engage corresponding shoulders on the adjacent parts, and a similar engagement occurs when the screws are rotated into position parallel, or nearly so, to the rail web, as shown by dotted lines in Fig. 18. Ordinarily, the screws h are adjusted in their holders so as to strike the web of the rail at the right point, and then they are turned bodily to the position shown by dotted lines in Fig. 18, before the instrument is applied to the rail. The engaging shoulders of the sleeves f and the other parts arrest the rotation of the sleeves when the screws are turned back to the position indicated by full lines.

The sleeve f' to which the thumb-screw h' is applied is provided with shoulder f^2, as shown in Figs. 1, 11, 14–16, similar to the shoulders provided for each sleeve f. The upper shoulder of sleeve f' engages a corresponding shoulder on the frame a, and pins f^3 are set in the leg d'. The sleeve f' is arrested in its rotation by the shoulders, when adjusted in the position shown by full lines or in the position shown by dotted lines—Fig. 18. While the binding screw h' is provided with wings for convenience of rotation manually, the screws h are provided with heads having holes to receive a rod by which they may be rotated. It will be understood that when the several screws are applied and clamped with the rail, as shown in several figures, they are held in position by engagement of the shoulders so that they cannot rotate until the pressure is released by unscrewing the screw h'.

As shown best in Figs. 1, 11 and 13, the frame a is provided with a vertical extension or standard j to which in turn an oblong rectangular metal frame p is bolted and secured rigidly, as indicated at p^5. The frame p is rabbeted, as shown in Fig. 13, and provided with a series of holes p^2. The scribing surface, say, cardboard p', is fitted into the rabbet and is secured in place by a flat plate p^4 constituting the back of the frame, which is hinged at its lower edge, and thus adapted to swing outward, as indicated by dotted lines in Fig. 13. When in closed position, it is locked by a spring catch r having a lug r', as shown in Figs. 7 and 8. The lug engages the hinged back p^4. The said back is provided with a series of lugs or pins adjacent to its edge, as shown in Fig. 9, the same being adapted to enter the holes p^2 in the frame p. When the scribing cardboard p' is placed in the frame and the back p^4 closed, the pins p^3 pass through the card and enter the holes p^2, thus securing the card in the required position.

Four pivoted bars or levers constitute the pantograph proper. Three of these bars, indicated by k, are of equal length and the fourth, or longer bar, is indicated by k' and carries at its upper end, the scribing point which is held in a tubular holder m' which is adapted to slide and rotate in a tubular guide forming a rigid part or attachment of the bar k'. The head of the tubular holder is enlarged and milled for convenience in rotating the same,—see Figs. 19 and 20. A spiral spring is applied to the lower end of the holder and its upper portion is provided with a lateral pin adapted to engage a notch in the tubular guide. By lifting the holder against the tension of the spring, the pin may be raised out of the notch and will ride around on the top of the guide and thus serve to hold the scribing point out of contact with the card or other scribing surface. By this means, the scribing point may be at any time taken out of action or prevented from marking on the surface p'. For the purpose of adjusting the pencil point, or other device used for scribing, a screw having a milled head m^2 is arranged in the tubular holder, and by adjusting said screw, the tracing point may be projected from the holder more or less, as required.

The two right-hand bars k of the pantograph proper are pivoted together on the frame standard j which is offset, as shown in Figs. 12 and 13, and a washer k^{11} is arranged between the standard and the two bars k pivoted on the bolt k^4, and the multiple-pointed tracer n is pivoted to the meeting ends of the lower bars k. A spiral spring s is attached to the rectangular frame p and to the lower joint of the pantograph, as indicated at s'. The spring serves to support the weight of the pantograph to such a degree that the tracing point placed in working contact with a rail head, bears very lightly thereon.

I employ as a pivot for the pantograph, the same being applied at the several joints thereof, a bolt k^4—see Figs. 3 and 4—to which a washer k^6 having lugs k^{10} is applied and secured by a screw k^7. It will be seen that by this construction, the washer k^6 is prevented from rotation independently of the bolt k^4, and hence has no tendency to loosen the screw k^7, as would otherwise be the case in the operation of the apparatus.

The tracer n constitutes the most important feature of my invention. It has three arms, each provided with a beveled point, the same being indicated, respectively, by n^4, n^6 and n^8. The point n^6 is for contact with the top of the rail x and it is shown in working position thereon in Fig. 1. The other two points n^4 and n^8 are for use in contact with the sides of a rail, and also with the upper portion of the web, as indicated by full and dotted lines in Fig. 11.

The operation of the instrument may be

further described as follows: The horizontal screws h, h' are first turned to the rear or into a position practically parallel, so that they will be separated far enough to receive the head of the rail between them. The instrument is then placed upon the rail with the adjustable supporting points c' and e resting on the base of the rail on opposite sides of the web, as shown in Figs. 1, 2 and 11. The screws h, h' are then turned to the working position shown by full lines in Fig. 18, and the clamping thumb-screw h is then rotated so that the points of the three screws are clamped firmly against the web of the rail. It will be understood that the holder for the scribing point is adjusted with its pin in the notch of the guide and the spring applied to the inner end of the holder then serves to press the scribing point on the surface p', so that the scribing point is held practically at the place desired to begin drawing on the scribing surface p', and this point being free to move over the surface, it will indicate the contour of any portion of the rail head with which one of the tracer points is held in contact. In Fig. 1, the tracer point n^6 is in contact with the head of the rail, and consequently the scriber would indicate, in such case on the surface p', the exact contour of such portion of the rail, that is to say, whether it be flat, crowning, depressed, or distorted. In a similar manner, if one of the scribing points n^4 or n^8 be held in contact with and slided over a side of the rail head, as indicated by full and dotted lines in Fig. 11, the scribing point will indicate on the surface p', the exact shape or contour of such side. It will be understood that the three points of the multiple-pointed tracer are designed to be used in turn for tracing the head and sides of the rail. I thus provide in a single instrument, a tracer adapted for measuring different or contiguous portions of a rail head, the tracer being also adapted for easy or quick adjustment from one position or another. It is held locked in any one of the three positions by means of a pin n' which may be inserted through any one of the three holes n^7 provided in the hub of the tracer n—see especially Figs. 1 and 11.

What I claim is:—

1. In an instrument for the purpose specified, the combination with a frame adapted to be set over a railroad rail and including a vertical extension and a holder for a scribing surface, of a pantograph proper which is pivoted to the frame extension, and a multiple-pointed tracer which is pivoted to and adapted to revolve on the lower joint of the pantograph frame and comprises three arms having points for sliding contact with a rail head, two of said arms being curved inwardly and extending opposite from each other, whereby when the tracer is properly adjusted, one of said points is adapted to work in contact with one side of the rail head and the other point with the opposite side, while the third point is adapted for sliding contact with the top of the rail, and means for locking the tracer in any one of the three positions, substantially as described.

2. In an instrument for the purpose specified, the combination with the bowed frame having clamping screws applied to opposite portions of the frame, holders for said screws which are rotatable on the frame, and means for arresting the rotation of the same when brought to the proper position for engagement of the screws with a rail, substantially as described.

3. In an instrument for the purpose specified, the combination with a bowed frame adapted for application to a rail head, of clamping screws and holders supporting them in horizontal positions, said holders consisting of sleeves which are rotatable upon the frame legs, the two parts having opposite engaging shoulders for arresting rotation of the holders in turning the screws into and from engaging positions, substantially as described.

4. An instrument for the purpose specified, comprising a bowed frame adapted to embrace the head of a rail and provided with legs having points for engaging the rail base, and a supporting arm provided with a leg and point, the same being attached to one side of the bowed frame and curved laterally therefrom in a plane at right angles thereto, substantially as described.

5. In an instrument for the purpose specified, the combination with the pantographic system, of a scriber consisting of a tubular holder for a scribing point, the same having a central bore, an adjusting screw inserted therein, a spring applied to the holder for forcing it inward toward the scribing surface, and means for supporting the holder when retracted against the tension of the spring, and thereby holding the scribing point out of engagement with the surface on which it normally works, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN H. MILBURN.

Witnesses:
A. G. BOUGHNER,
J. L. BARNES.