R. B. TEMPEST.

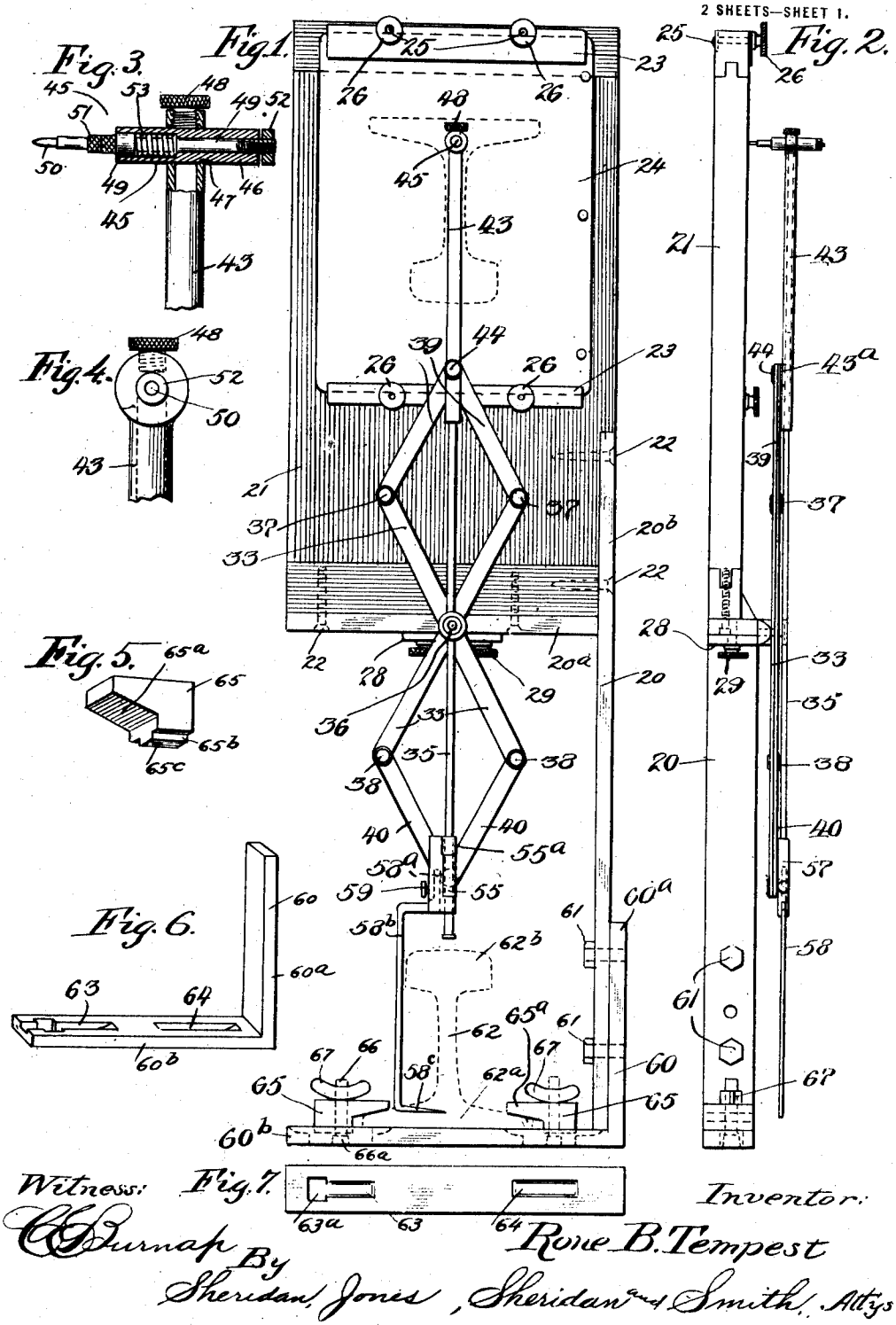
GRAPHOMETER.

APPLICATION FILED APR. 13, 1918.

1,365,868.

Patented Jan. 18, 1921.

2 SHEETS—SHEET 1.



Witness:

C. C. Burnap

Inventor:

Rone B. Tempest

By Sheridan, Jones, Sheridan and Smith, Attys

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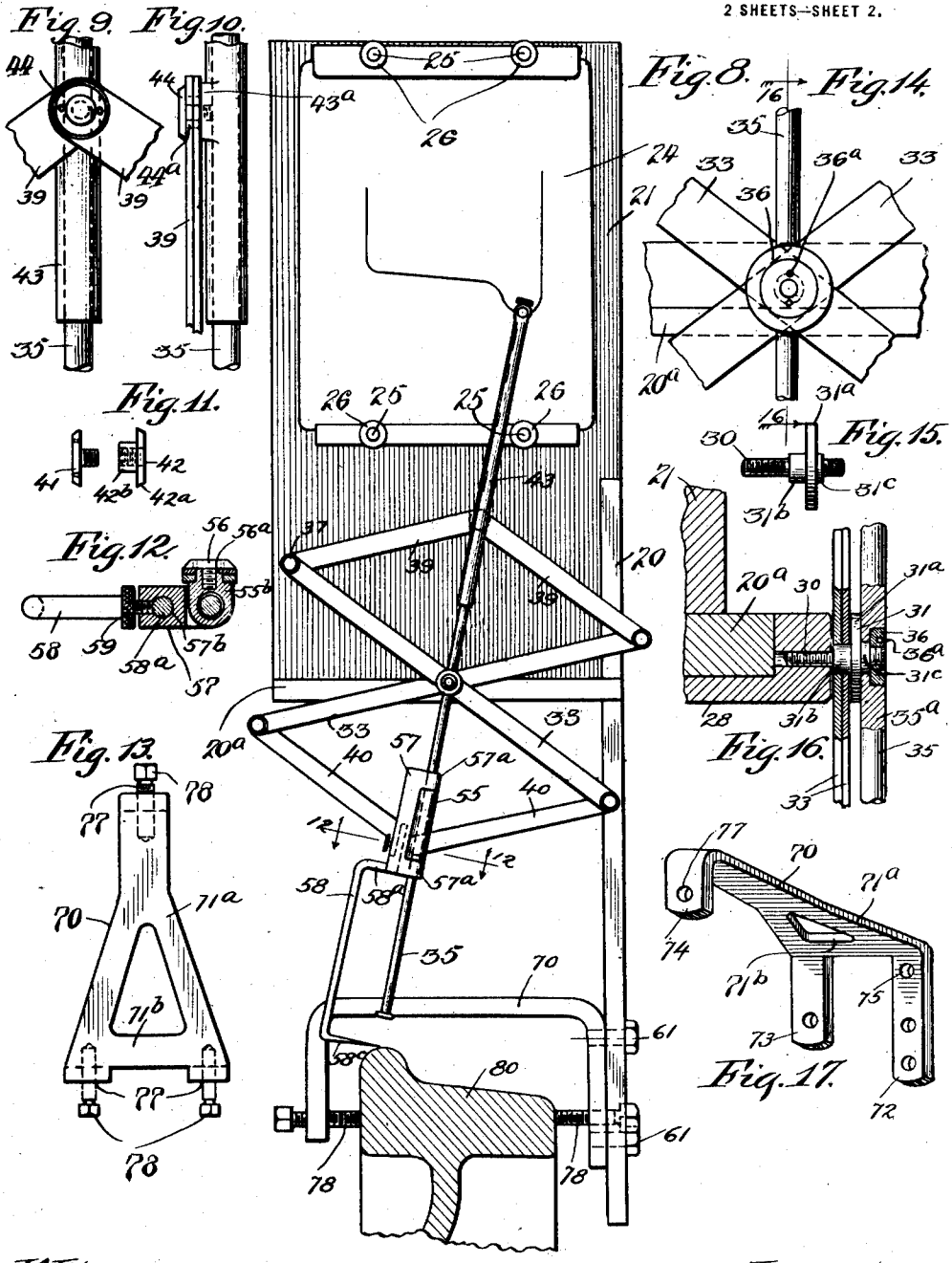
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UNITED STATES PATENT OFFICE.

RONE BRENTON TEMPEST, OF MAGNA, UTAH.

GRAPHOMETER.

1,365,868. Specification of Letters Patent. Patented Jan. 18, 1921.

Application filed April 13, 1918. Serial No. 228,327.

To all whom it may concern:

Be it known that I, RONE B. TEMPEST, a citizen of the United States, residing at Magna, in the county of Salt Lake and State of Utah, have invented certain new and useful Improvements in Graphometers, of which the following is a specification.

This invention relates to a graphometer, and its purpose is to provide improved apparatus for determining and recording the cross-sectional outline of railway rails, car wheels, and other objects to which the invention may be applied.

In railway operation, for example, it is necessary to make continued study of rail wear and composition, the elevation of curves, rail canting, the wear on car wheels and flanges, and the like, and it is therefore important that apparatus be provided for automatically determining and recording from time to time the cross-sectional outlines and other characteristics of the rails or other objects to be studied. It is the principal object of this invention to provide improved apparatus which may be applied to a railway rail, or other object, for the purpose of securing an accurate record of the cross-sectional outline of the rail. A further object is to provide a graphometer having adjustable attachments which permit the application thereof to rails, car wheels, and other objects. Still another object is to provide improved means for securing an exact correspondence of the recorded outline with the outline of the object to which the apparatus is attached. Other objects relate to various features of construction and arrangement which will appear more fully hereinafter.

The nature of the invention will be understood from the following specification, taken in connection with the accompanying drawings, in which certain embodiments are illustrated.

In the accompanying drawings—

Figure 1 shows a front elevation of the apparatus applied to a railway rail illustrated by dotted lines;

Fig. 2 shows a side elevation of the apparatus illustrated in Fig. 1;

Fig. 3 shows an enlarged detail sectional view through the upper end of the recording arm;

Fig. 4 is an enlarged elevation of the upper end of the recording arm, looking toward the left, as viewed in Fig. 3;

Fig. 5 is an enlarged perspective view of one of the movable clamps of the rail attachment;

Fig. 6 shows a perspective view of the rail attachment or bracket;

Fig. 7 shows a bottom plan view of the bracket illustrated in Fig. 6;

Fig. 8 is a front elevation, similar to Fig. 1, showing the use of the invention when applied to a car wheel;

Fig. 9 shows a fragmentary enlarged elevation of the recording arm and the actuating rods connected thereto;

Fig. 10 shows a side elevation of the structure illustrated in Fig. 9;

Fig. 11 shows a detail view of a screw and socket member by which the ends of the actuating arms are pivoted together;

Fig. 12 shows an enlarged detail sectional view, taken on the line 12—12 of Fig. 8;

Fig. 13 shows a plan view of the clamp for attaching the apparatus to a car wheel;

Fig. 14 shows an enlarged front elevation of the central connection of the actuating arms on the guide rod;

Fig. 15 shows an enlarged side elevation of the pivot on which the arms are mounted, as illustrated in Fig. 14;

Fig. 16 shows a detail sectional view, taken on the line 16—16 of Fig. 14; and

Fig. 17 shows a perspective view of the bracket illustrated in Fig. 13.

In the accompanying drawings the invention is shown as comprising a metal supporting frame 20 having a transverse arm 20^a and an upwardly extending part 20^b. A drawing-board 21 is seated upon the transverse arm, and has a part thereof cut away to receive the part 20^b, the board being secured to these parts of the frame by means of screws 22. The drawing-board is provided along the top edge thereof, and also at another point toward the bottom thereof, with metal plates or clips 23, which are adapted to overlie and hold in position a sheet 24 of paper, tracing cloth, or the like, upon which the outline is to be recorded. These plates are mounted upon threaded pins or screws 25, which extend through the drawing-board and are engaged on the front side of the drawing-board by the knurled heads 26.

A metal plate or bracket 28 underlies and engages the forward edge of the transverse arm 20^a at its middle point, and is secured

thereto by adjustable screws 29, having knurled heads adapted to be engaged by the fingers of the operator. The plate 28 is provided with a threaded recess, which is engaged by a screw 30 carrying a pivot member 31, upon which the recording mechanism is mounted. This member consists of an enlarged circular plate or flange 31^a, having cylindrical parts 31^b and 31^c projecting from opposite sides thereof concentrically with the axis of the screw 30. A pair of actuating arms 33 are rotatably mounted upon the part 31^b of the pivot member, being adapted to fill substantially the space between the part 31^a and the plate or bracket 28. A cylindrical guide rod 35 has the central portion 35^a thereof flattened and provided with an aperture adapted to be rotatably engaged by the part 31^c of the pivot member. The central portion of the guide rod is further provided with a recess adapted to receive the nut 36, which threadedly engages the screw 30, and thus secures the guide rod in position upon the pivot member. The nut 36 is provided with apertures 36^a to be engaged by projections on a suitable wrench.

The two arms 33, which are pivotally mounted on the member 31, are crossed, as illustrated in Figs. 1 and 8, and the opposite ends thereof are pivotally connected at the points 37 and 38 with upper and lower arms 39 and 40, respectively. These upper and lower arms are pivotally connected to the arms 33 at points 37 and 38 by means of screws 41 engaging socket members 42, each of which comprises a plate 42^a and a cylindrical threaded part 42^b upon which the arms of the actuating mechanism are adapted to rotate. A hollow recording arm 43 is slidably mounted upon the upper end of the guide rod 35, and is provided at an intermediate point with a boss 43^a, through which a pivotal connection is made with the inner overlapping ends of the two arms 39, by means of a screw 44, which carries a suitable bushing 44^a to permit free rotative movements of the arms thereon. The recording arm 43, which is thus movably mounted upon the guide rod 35, carries at its upper end a delineating or recording pencil or pointer 45. The pointer comprises a barrel 46, which engages an aperture 47 extending transversely through the arm 45, where it is held in adjusted position by a screw 48 engaging the upper end of the arm. The chamber of the barrel is enlarged at one end to receive a slidably mounted supporting member 49, which carries a tracing point or pencil 50 connected thereto by suitable adjustable devices 51. A stem 49^a extends from the member 49 through the barrel 46, and is engaged on its projecting threaded end by a nut 52. A coil spring 53 is seated within the enlarged chamber of the barrel, and serves normally to press the tracing point against the paper mounted on the drawing-board. The pressure of the pointer may be varied in degree by adjusting the nut 52.

A sleeve 55 is provided with a bushing 55^a which has a sliding fit on the lower part of the guide rod 35. This sleeve is provided with a boss 55^b on one side thereof, through which a pivotal connection is made with the inner ends of the lower arms 40 by means of a screw 56 and bushing 56^a. A plate 57, which serves as a carrier for the tracing point 58, is provided with arms 57^a, which are pivotally mounted upon the end portions 55^a of the sleeve 55 which are reduced in diameter. This plate is provided with a suitable socket 57^b adapted to receive the upper cylindrical extremity 58^a of the tracing pointer, which is held in position by a clamping screw 59. The pointer is bent outwardly from the portion 58^a, as shown at 58^b, and thence downwardly, with the body portion thereof lying substantially parallel to the guide rod 35. The lower end of the body portion is pointed and bent inwardly, as shown at 58^c. The part 58^c is adapted to coact with the other object whose outline is to be recorded, and as the pointer is moved over this outline the resulting movements imparted to the plate 57 cause similar reciprocatory movements of the recording arm 43, due to the parallelogram movements of the arms 33, 39, and 40. The point of the tracing pointer 58 is located diametrically opposite the point 50 of the recording pencil, and these parts are so connected to the central pivot 31 that they slide in the same straight line along the common guide rod 35. The dimensions of the arms of the recording mechanism above and below the pivot point, and the dimensions of the tracing pointer and pencil, should be symmetrical with respect to the central pivot, so that any movement of either the tracing pointer or recording pencil causes an equal but opposite movement of the other.

When the apparatus is to be used for tracing the outline of a railway rail, for instance, it is attached to the base of the rail by means of an extension of the frame 20, comprising an angular rail-attaching plate 60, having an upwardly extending arm 60^a provided with apertures adapted to register with other apertures in the frame member 20, to which it is secured by means of cap screws 61. The plate 60 has a supporting base 60^b lying at right angles to the upwardly extending part 60^a and adapted to underlie the base 62^a of the railway rail 62. Longitudinally extending slots 63 and 64 are formed in the plate 60^b adjacent the opposite edges of the rail, and a pair of clamping ears or lugs 65, having upwardly inclined parts 65^a to overlie and engage the

upper surfaces of the rail base, are adapted to engage these slots by means of the downwardly extending projections 65^b. The lugs 65 have apertures 65^c therethrough adapted to be engaged by the clamping screws 66, which have enlarged tapered heads 66^a to coact with the inclined slots 63 and 64, and which are engaged at their upper ends by the wing nuts 67. The slot 63 is provided at its outer end with an enlarged opening 63^a that permits the associated clamping screw 66 to be readily withdrawn after loosening the clamping nut 67, when it is desired to remove the apparatus from the rail. In recording the outline of the rail the operator first cleans the rail of dust, grease, and rust, and then moves the pointer 58^c over the rail, beginning at one edge of the rail base. When the highest part of the upper surfaces of the rail head 62^a, 62^b is reached, the plate 57 is reversed in its position on the guide rod to permit the pointer to pass over the surface of the opposite side of the rail. These movements cause corresponding movements to be imparted to the recording pencil 45, so that the outline of the rail is marked in inverted position upon the record paper, as indicated by dotted lines in Fig. 1.

When the apparatus is to be used for recording the outline of a car wheel, or other similar object, the rail attachment 60, previously described, is removed, and a wheel-attaching bracket 70 is connected to the frame 20. The bracket 70 comprises a Y-shaped plate 71^a having the diverging arms thereof connected by an arm 71^b. Integral flanges 72, 73, and 74 extend downwardly from opposite corners of the plate 71^a, as illustrated particularly in Fig. 17, one of the arms 72 being provided with apertures 75 adapted to be engaged by the cap-screws 61, previously described, for the purpose of securing the bracket 70 with the frame 20. The flanges 72, 73, and 74 are provided with other apertures 77 adapted to be threadedly engaged by the set screws 78. These set screws are adapted to engage opposite sides of the tire or rim 80 of the car wheel, so that the apparatus is held firmly in an upright position while the pointer 58^c is moved over the surface of the rim.

By means of this invention the contour of any wheel, rail, or other object can be recorded from time to time, in order to determine the amount of wear thereon, or secure any other desired information. The several record sheets so taken may be bound in book form, or the records may be traced over each other on a common sheet for purposes of comparison. With this apparatus the record of a section can be taken in a period of two minutes, including the attaching of the instrument, the taking of the record, and the removal of the instrument, and thus it is apparent that from the standpoint of time alone the invention provides a great improvement over the old method of taking records by plaster of Paris casts, which method was slow, tedious, inaccurate, and expensive, besides requiring a large amount of time.

Although I have shown and described particular forms and uses of the invention, it will be understood that it may be constructed in various different embodiments without departing from the scope of the appended claims.

I claim:—

1. In a device of the class described, a supporting frame, a pivot member comprising an intermediate plate having cylindrical parts extending from opposite sides thereof coaxially with each other, means for securing said pivot member to said frame with said intermediate plate spaced therefrom, a guiding member pivoted at an intermediate point on one of the cylindrical parts of said pivot member, a pair of links pivoted at intermediate points on the other cylindrical part of said pivot member, members slidably mounted on the opposite ends of said guide member, and means connecting the ends of said links with said slidable members.

2. In a device of the class described, a supporting frame, a pivot member comprising an intermediate plate having cylindrical projections extending from opposite sides thereof coaxially with each other, means for securing said pivot member to said frame with said intermediate plate spaced therefrom, a guiding member pivoted at an intermediate point on one of the cylindrical parts of said pivot member, a pair of links pivoted at intermediate points on the other cylindrical part of said pivot member, members slidably mounted on the opposite ends of said guide member, means connecting the ends of said links with said slidable members, a recording pencil carried by one of said movable members, and a tracing pointer carried by the other of said movable members.

3. In a device of the class described, a supporting frame comprising an upwardly extending arm and a transverse member, means mounted on said transverse member for supporting a record sheet, an arm secured to the lower part of said upwardly extending member and extending transversely thereof for securing said frame to a part to be traced, a tracing point movable in the space above said last-named means, a recording member movable over said record sheet, and means mounted on the transverse member of said frame for effecting movements of said recording member simultaneously with and corresponding to the movements of said tracing member.

4. In a device of the class described, a frame comprising an upwardly extending part and an arm extending transversely thereto over the object to be traced, a drawing board carried above said transverse arm, clamping means detachably secured to the lower portion of the upwardly extending part of said frame for securing said frame to said object to be traced, actuating mechanism mounted on the transverse arm of said frame, a tracing member connected to the lower part of said mechanism above said clamping means, and a recording member connected to the upper part of said actuating mechanism opposite said drawing board.

5. In a device of the class described, a vertically extending frame member having a transverse arm to extend over the object to be traced, clamping means carried by the lower end of said frame member and extending parallel to said arm for engaging said object, a drawing-board mounted above said transverse arm, actuating mechanism carried by said transverse arm, a tracing pointer carried by said mechanism below said arm for engaging said object, and a recording member carried by said mechanism above said arm for moving over said drawing-board.

6. In a device of the class described, a vertically extending frame member having a transverse arm to extend over the object to be traced, clamping means carried by the lower end of said frame member and extending parallel to said arm for engaging said object, a drawing-board mounted above said transverse arm, actuating mechanism carried by said transverse arm, a tracing pointer carried by said mechanism below said arm for engaging said object, and a recording member carried by said mechanism above said arm for moving over said drawing-board, said clamping means being bodily detachable from said frame member.

7. In a device of the class described, a vertically extending frame member, a transverse arm detachably secured to the lower end of said frame member and adapted to underlie an object to be traced, clamping jaws carried by said transverse member and adapted to engage said object, said arm being slotted to receive parts of said jaws, a drawing-board carried by said frame member above said object, and tracing and recording mechanism mounted at the lower part of said board above said object.

8. In a device of the class described, a vertically extending frame member, a transverse arm secured to the lower end of said frame member and adapted to underlie an object to be traced, clamping jaws detachably mounted on said arm and adapted to engage the upper side of said object, a drawing-board carried by the upper part of said arm, and tracing and recording mechanism carried by said frame and comprising parts movable over said board.

9. In a device of the class described, a supporting frame, means for securing said frame to the object to be traced, a guide rod pivotally mounted on said frame at an intermediate point thereof, sleeves slidably mounted on the opposite ends of said guide rod, a plate rotatably mounted on said guide rod and having parts engaging the opposite ends of one of said sleeves, a tracing pointer carried by said plate, and a recording member carried by the other sleeve.

10. In a device of the class described, a supporting frame, means for securing said frame to the object to be traced, a guide rod pivotally mounted on said frame at an intermediate point thereof, sleeves slidably mounted on the opposite ends of said guide rod, a plate rotatably mounted on said guide rod and having parts engaging the opposite ends of one of said sleeves, a tracing pointer detachably carried by said plate, and a recording member adjustably mounted on the other sleeve.

11. In a device of the class described, a supporting frame, means for securing said frame to the object to be traced, a guide rod pivotally mounted on said frame at an intermediate point thereof, sleeves slidably mounted on the opposite ends of said guide rod, a plate rotatably mounted on said guide rod and having parts engaging the opposite ends of one of said sleeves, a tracing pointer carried by said plate, said other sleeve being provided with a transverse aperture adjacent its end, a recording member engaging said aperture, and a clamping screw threadedly engaging the end of said other sleeve to secure said recording member in position.

In testimony whereof, I have subscribed my name.

RONE BRENTON TEMPEST.