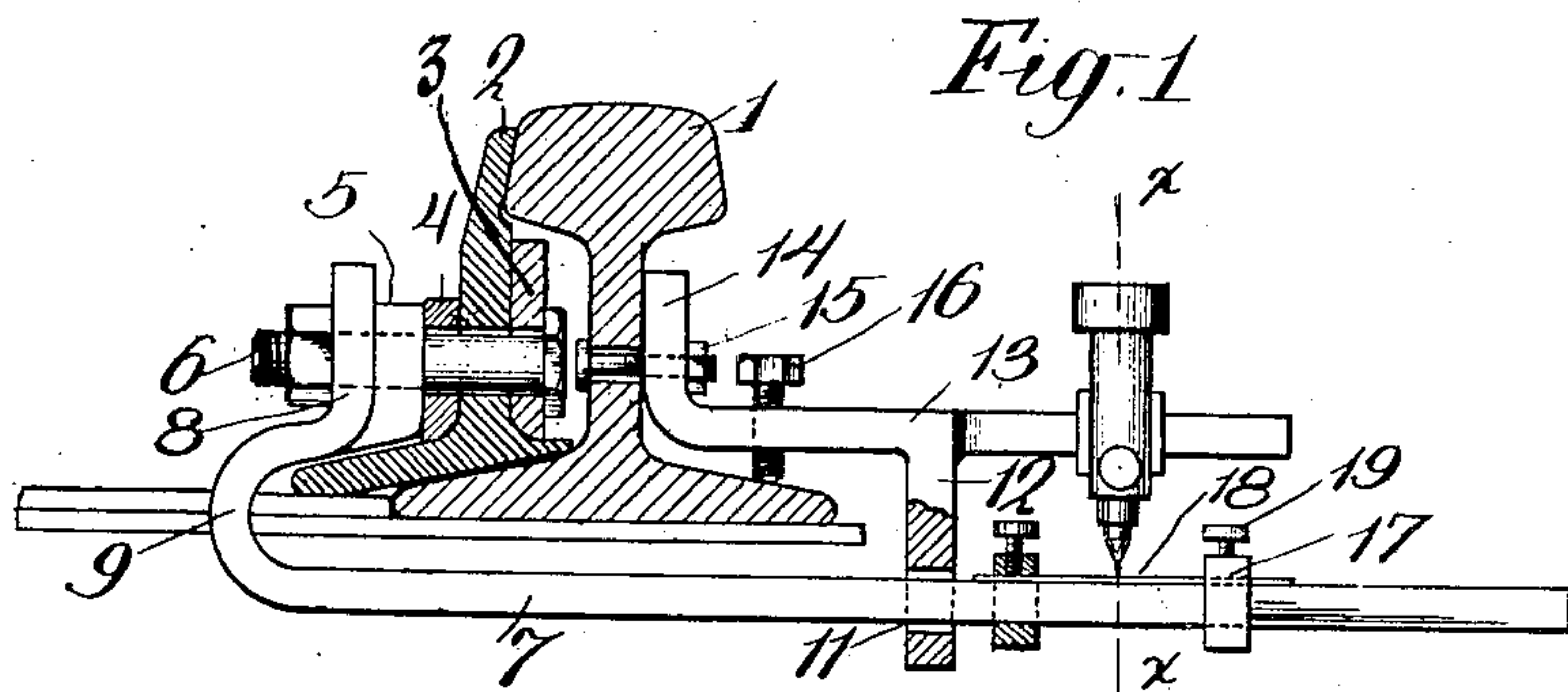


C. E. KNICKERBOCKER & W. H. HARLAND, JR.  
DEFLECTION RECORDER.

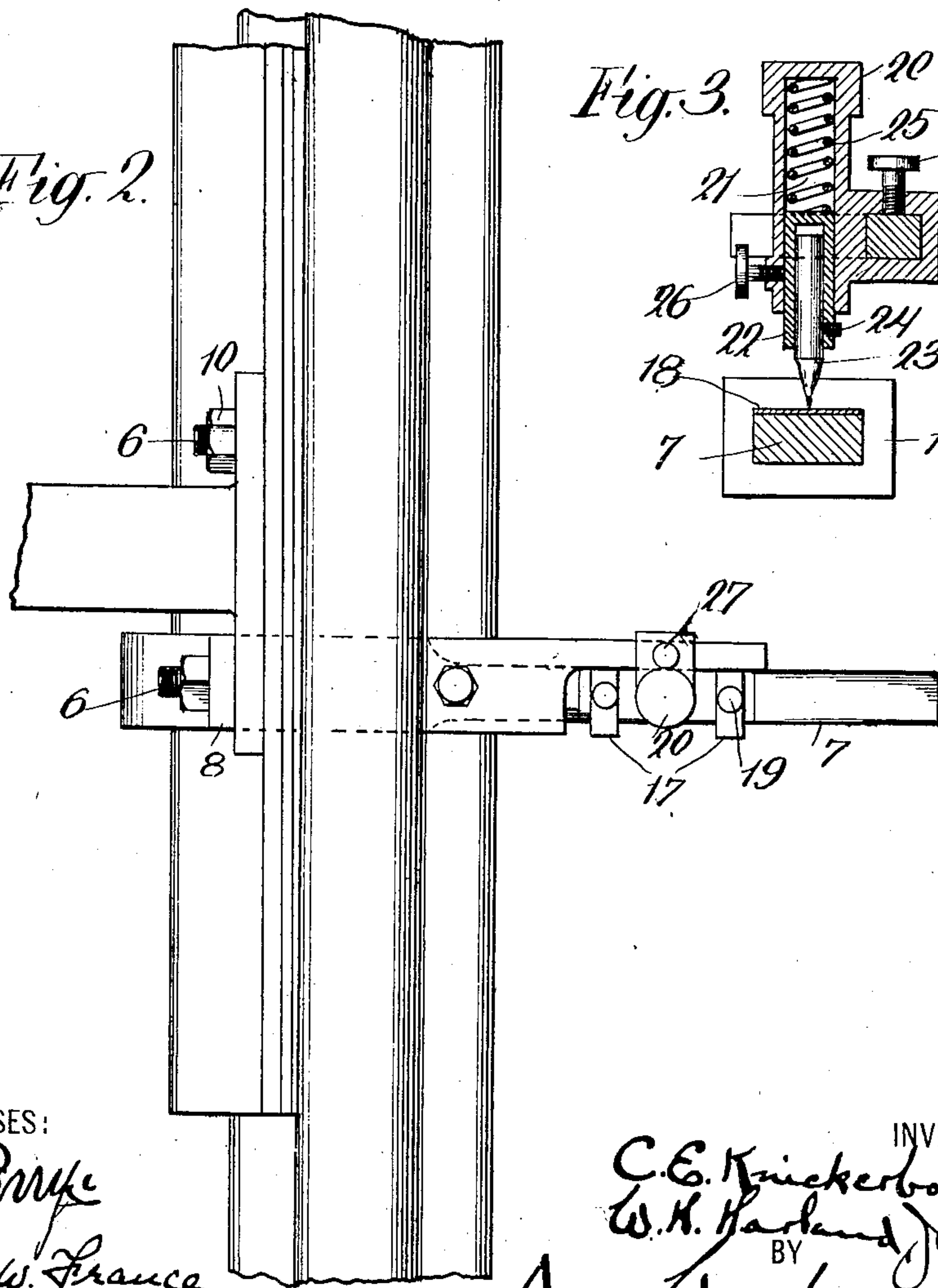
APPLICATION FILED FEB. 17, 1909.

965,911.

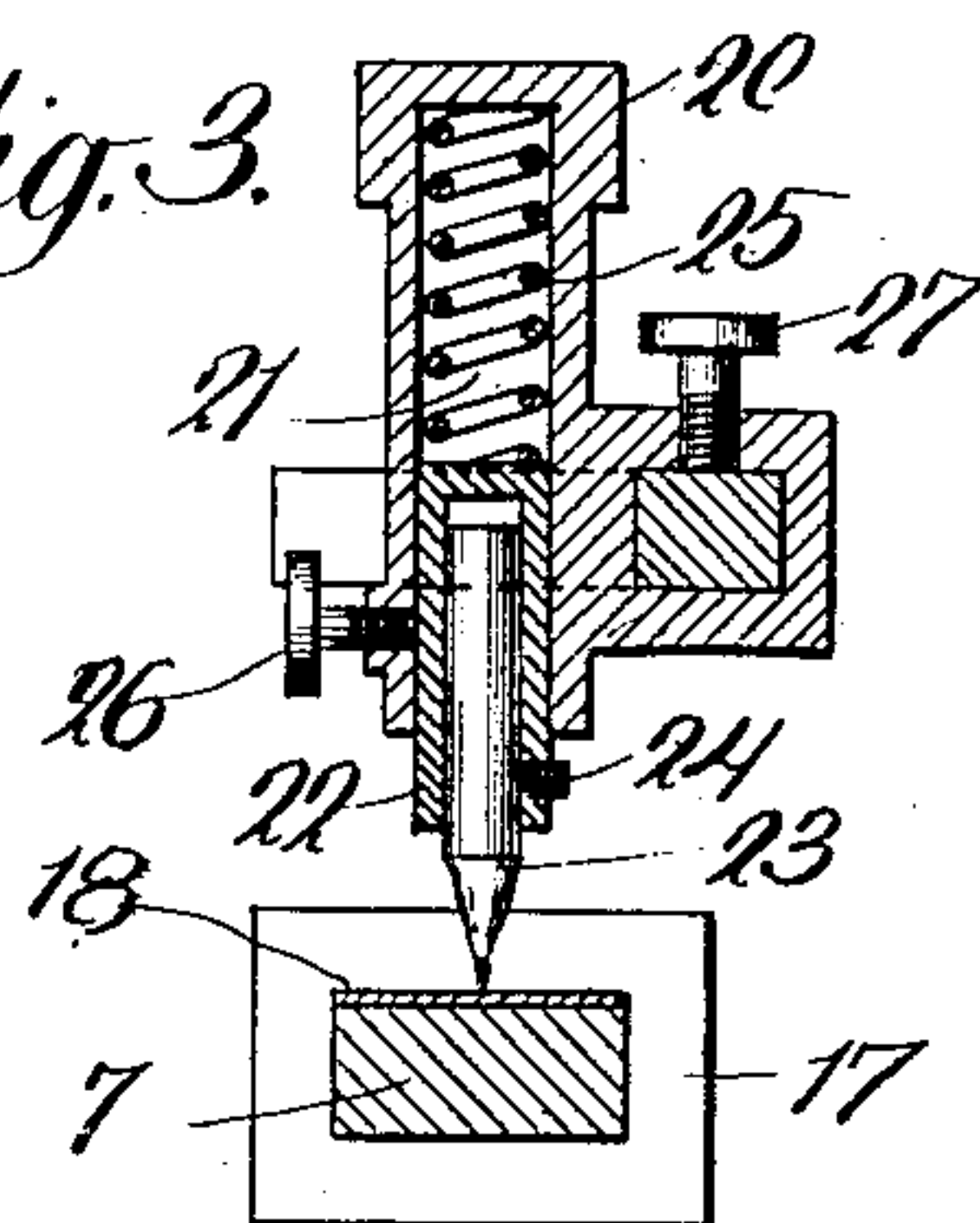
Patented Aug. 2, 1910.



*Fig. 2.*



*Fig. 3.*



WITNESSES:

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# UNITED STATES PATENT OFFICE.

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## DEFLECTION-RECORDER.

965,911.

Specification of Letters Patent.

Patented Aug. 2, 1910.

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*To all whom it may concern:*

Be it known that we, CURTIS E. KNICKERBOCKER and WILLIAM H. HARLAND, Jr., citizens of the United States, residing at Middletown, in the county of Orange and State of New York, have invented certain new and useful Improvements in Deflection-Recorders, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to an improvement in deflection recorders and more particularly to devices of this character adapted for use in connection with railroads to record the movements of switch points with respect to the fixed rail or track.

One of the objects of the invention is to provide a device of this character which may be quickly and easily attached to the track members.

Another object is to provide a device comprising few parts, which will not be liable to get out of order and which will be efficient in use.

Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, wherein is shown one of various possible embodiments of this invention, Figure 1 is a view in side elevation of the device applied to a railroad track, parts being broken away for the sake of clearness; Fig. 2 is a plan view of the device shown in Fig. 1; Fig. 3 is an enlarged sectional view taken on the line  $x-x$  of Fig. 1, parts being omitted for the sake of clearness.

As tending to render certain aims and features of this invention more readily understood, it may here be noted that owing to the wear of the various parts of the switching mechanism the switch point may become loosened with respect to the switching mechanism, thus permitting it to assume a position out of contact with the rail when the switch is in its closed position, and furthermore, when this condition exists, the vibrations due to passing trains may tend

to cause the switch point to move in a lateral direction. In either instance, the failure of the switch point to remain in contact with the fixed rail when the switch is closed may result in a derailment of trains by reason of the fact that the flanges of the wheels will be permitted to pass between the switch point and the rail. It is the duty of the section-hand or other employee of the road to inspect the mechanism of the switches in the territory assigned to him and to see that the above conditions are obviated by making the necessary repairs or renewals; but such employee may, through carelessness or inadvertence fail to do his duty. By means of the device hereinafter described, the division superintendent or other person in authority may make tests at suitable times which will give a record of the condition of the various switch points located in the section of the road which is under his supervision, which tests will not only indicate the condition of the switches, but will also enable the division superintendent to determine which section-hand or other employee, if any, has neglected to perform his duty.

Referring now to the figures, in which similar reference numerals are used to indicate similar parts in the various views, 1 indicates a fixed track member or rail and 2 indicates the switch point provided with the usual strengthening pieces 3 and 4, and which is secured to the switch-rod lug 5 by bolts 6 in the usual manner.

The recording device comprises an arm 7 provided with an opening 8 adapted to receive one of the bolts 6 whereby said arm may be secured to the switch point 2. The arm is preferably curved as indicated at 9 an amount sufficient to receive the flange of any of the switch points which are used on the various railroads. By forming the opening 8 of a size sufficient to receive the switch-lug bolt 6, it will be seen that in order to attach the arm in position it is merely necessary to remove the nut 10 from the bolt and place the arm thereon as indicated in Figs. 1 and 2, after which the nut may be replaced to hold the arm in position. The horizontal portion of the arm which extends underneath the fixed rail passes through an opening 11 formed in the depending portion 12 of the arm 13 which is provided with an upturned portion 14 adapted to engage the web of the rail 1 and is provided with a perfora-



tion registering with a similar perforation formed in the rail through which perforations a bolt 15 is adapted to be inserted to retain the arm in position. For convenience, the perforation in the web of the rail is preferably made the same size as the perforations employed in bonding the rails. A leveling-screw 16 is preferably threaded through the arm 13 and when the latter is in position engages the flange of the rail 1 to level the arm and assist in holding it in position. As clearly shown in Fig. 1 the opening 11 formed in the depending portion 12 of the arm 13 is slightly larger than the thickness of the horizontal portion of the arm 7 to permit of the latter having a slight vertical movement therein.

Upon the outer end of the arm 7 are mounted two adjustable sliding clips 17 adapted to hold a strip of paper 18 or other impression-receiving material upon the upper surface of said arm, said clips being maintained in any desired position, as by means of set-screws 19.

Slidingly mounted on the outer end of the arm 13, which is preferably reduced in width as shown in Fig. 2, is the holder 20 which is provided with a bore 21 adapted to receive a recessed member 22 within which a pencil or other suitable recording device 23 is secured in any suitable manner, as by means of a set-screw 24, and a spring 25 located within the bore 21 tends to depress the recessed member 22 to always maintain the recording device 23 in contact with the impression-receiving means. A set-screw 26 threaded in the holder 20 is adapted to engage the recessed member 22 and retain the same in position when the device is not in use, in order to prevent the parts from becoming detached from one another. The holder 20 is adjustably mounted upon its associated arm and may be maintained in any desired position, as by means of a set-screw 27 threaded therein and engaging said arm, as clearly illustrated in Fig. 3.

The depending arm 12 is preferably so positioned with respect to the upturned end 14 of the arm 13 as to permit the device to be used in connection with any of the standard rails which are in use on the various railroads.

The operation of the device, which should be largely obvious from the above description, is as follows: When it is desired to make a test of any switch point on the road it is merely necessary to remove the nut from one of the switch-lug bolts 6, place the arm 7 in position as above described, and replace the nut. The arm 13 is then placed in position with the opening 11 in the depending portion 12 embracing the outer end of the arm 7 and having its upturned end 14 positioned against the web of the rail 1 to which it is secured by means of the bolt

15, after which the leveling-screw 16 is manipulated to hold the arm steady and in a substantially horizontal position. The impression-receiving device 18 is then placed upon the upper surface of the arm 7 in its proper position, in which it is retained by means of the clips 17 and when the parts are thus positioned the thumb-screw 26 is loosened to permit the spring 25 to force the recording device 23 in contact with the impression-receiving member 18. The device will be left in position during the passage of one or more trains, as desired, and as each train passes over the switch any lateral movement of the switch point will, of course, be recorded upon the impression-receiving member which will be moved relatively to the marking means. In this manner the exact amount of movement of the switch point with respect to the fixed rail may be readily determined. If more than one train passes over this section of the track during the test, it is, of course, advisable to use a different impression-receiving member for each train, and a suitable inscription may be placed upon each of these strips to designate the particular switch at which the test was made and also to designate the speed of the train and any other data which may be suitable. After the completion of the test, the device is removed, care being taken to first tighten the set-screw 26 in the holder to prevent the recording device and its associated parts from becoming detached and possibly lost.

The device may also be employed for determining the throw of the switch to ascertain if the working conditions thereof are satisfactory, and in case there is more than one switch-lug attached to the switch, it would be advisable to attach a recording device to each, thereby ascertaining the amount of movement of the switch point at each of these points. Or, of course, instead of attaching a different device to each switch-lug, it would be possible, though more troublesome, to use one device and attach it successively to the different switch lugs to ascertain the movements of the switch at each successive point.

While the device is especially useful in connection with facing switches, it will, of course, be understood that it may be used in connection with any other form of switch or relatively movable track members, the conditions of which it is desired to ascertain.

It will thus be seen that by means of the above described device, an accurate record may be made showing the condition of any of the switches on the road, and by means of this device tests of said switches may be made as required, which will give permanent records of the actual working conditions thereof, which records may, of course,



be filed in the office for future reference, thus keeping check on the various section-hands employed on the road to ascertain if they are performing their duty in an efficient manner.

While in the embodiment shown, the recording device is mounted upon the fixed arm and the impression-receiving device is mounted upon the movable arm, it will, of course, be understood that their positions may be reversed without in any way departing from the spirit of our invention.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense. It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Having described our invention, what we claim as new and desire to secure by Letters Patent is:

1. In apparatus of the class described, in combination, a fixed track member, a movable track member, and automatic means for recording the extent of wear of one of said track members.

2. In apparatus of the class described, in combination, a fixed track member, a movable track member, and detachable means adapted automatically to indicate the extent of wear of one of said track members.

3. The combination with a fixed track member and a movable track member, both of said members being provided with a surface adapted to be engaged by the wheel-tread of a vehicle, of impression-receiving means operatively associated with one of said track members, and recording means operatively associated with the other of said track members and co-acting with said impression-receiving means for recording the movement of said second track member with respect to said first track member.

4. In a device of the class described, in combination, an arm adapted to be secured to a fixed track member, a second arm adapted to be secured to a movable track member and operatively associated with said first arm, and means for recording the relative movement of said arms upon the movement of said movable track member.

5. In a device of the class described, in combination, an arm adapted to be secured to a fixed track member, a second arm adapted to be secured to a movable track member

and slidably engaging said first arm, and means for recording the relative movement of said arms upon movement of said movable track member.

6. In a device of the class described, in combination, an arm adapted to be secured to a fixed track member, a second arm adapted to be secured to a movable track member and operatively associated with said first arm, and co-acting means carried by said arms for recording the relative movement of one with respect to the other.

7. In a device of the class described, in combination, an arm adapted to be secured to a fixed track member, a second arm adapted to be secured to a movable track member and operatively associated with said first arm, impression-receiving means mounted upon one of said arms, and recording means mounted upon the other of said arms and co-acting with said impression-receiving means for recording the relative movement of one of said arms with respect to the other.

8. In a device of the class described, in combination, an arm adapted to be secured to a fixed track member, a second arm adapted to be secured to a movable track member and operatively associated with said first arm, impression-receiving means adjustably mounted upon one of said arms, and recording means mounted upon the other of said arms and co-acting with said impression-receiving means.

9. In a device of the class described, in combination, an arm adapted to be secured to a fixed track member, a second arm adapted to be secured to a movable track member and operatively associated with said first arm, impression-receiving means mounted upon one of said members, and recording means adjustably mounted upon the other of said members and co-acting with said impression-receiving means.

10. In a device of the class described, in combination, an arm adapted to be secured to a fixed track member, a second arm adapted to be secured to a movable track member and operatively associated with said first arm, impression-receiving means adjustably mounted upon one of said members, and recording means adjustably mounted upon the other of said members and co-acting with said impression-receiving means.

11. In a device of the class described, in combination, an arm adapted to be secured to a fixed track member, a second arm adapted to be secured to a movable track member and operatively associated with said first arm, impression-receiving means mounted upon one of said arms, and recording means resiliently mounted upon the other of said arms and co-acting with said impression-receiving means.

12. In a device of the class described, in combination, an arm adapted to be secured



to a fixed track member, a second arm adapted to be secured to a movable track member and operatively associated with said first arm, impression-receiving means mounted upon one of said arms, a holder mounted upon the other of said arms, recording means supported in said holder, and means for maintaining said recording means in contact with said impression-receiving means.

13. In a device of the class described, in combination, an arm adapted to be secured to a fixed track member, a second arm adapted to be secured to a movable track member and operatively associated with said first arm, impression-receiving means carried by said second arm, means for holding the same in position thereon, and recording means mounted upon said first arm and co-acting with said impression-receiving means.

14. In a device of the class described, in combination, an arm adapted to be secured to a fixed track member, a second arm adapted to be secured to a movable track member and operatively associated with said first arm, impression-receiving means mounted upon one of said members, recording means mounted upon the other of said members and co-acting with said impression receiving means, and resilient means tending to maintain said impression-receiving means and said recording means in operative relation to each other.

15. The combination with a fixed track member and a movable track member, of a detachable device adapted to be mounted in operative relation to said track members and connected therewith and provided with means adapted to record graphically the total movement of said movable track member with respect to said fixed member whereby the extent of wear of one of said members is evidenced by the record.

16. The combination with a fixed rail and a switch point adapted to be moved into and out of engagement with said rail, of means for forming a permanent record of the extent of movement of said switch point with respect to said rail.

17. The combination with a fixed rail and a switch point adapted to be moved into and out of engagement with said rail, of impression receiving means operatively associated with one of said members, and recording means operatively associated with the other of said members and co-acting with said impression receiving means for recording the movement of said switch point with respect to said rail.

In testimony whereof we affix our signatures, in the presence of two witnesses.

CURTIS E. KNICKERBOCKER.

WILLIAM H. HARLAND, JR.

Witnesses:

D. J. TREAT,

G. H. CALEY.