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W. N. HUBBARD

2,078,763

PEN ARM MOUNTING

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Fig. 1.

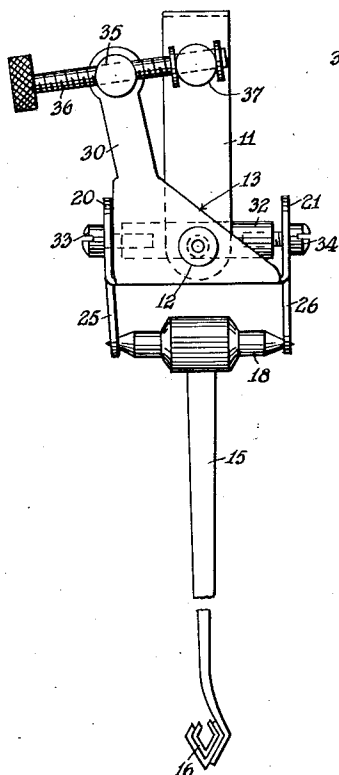


Fig. 2.

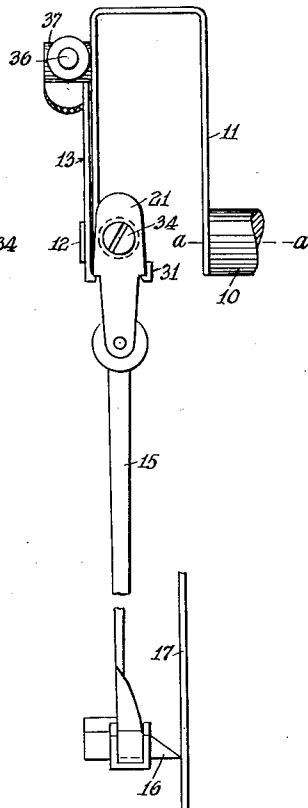


Fig. 3.

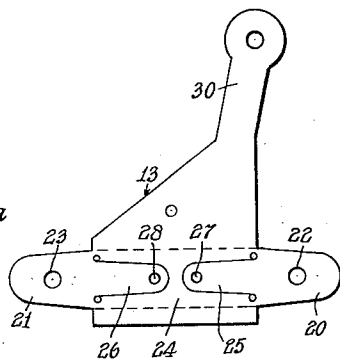


Fig. 4.

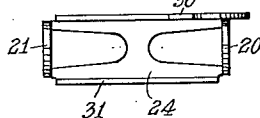


Fig. 5.

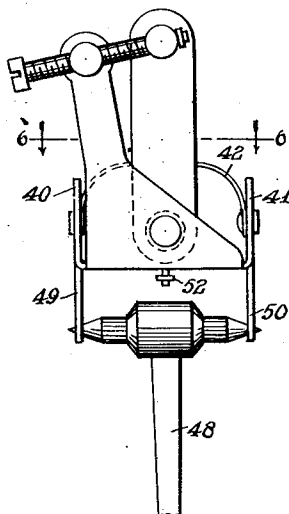


Fig. 6.

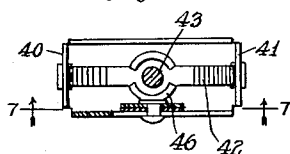
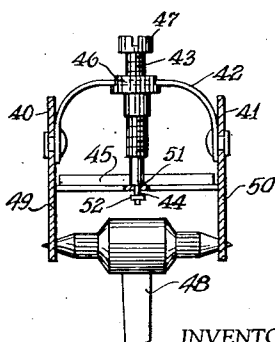


Fig. 7.



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UNITED STATES PATENT OFFICE

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PEN-ARM MOUNTING

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13 Claims. (Cl. 234—1)

The invention relates to recording instruments comprising a recording pen or stylus movable in accordance with variations in a magnitude to be measured, and more particularly to mounting means for the pen-arm of such instruments.

One of the objects of the invention resides in the provision of mounting means whereby a pen-arm may be readily detachable and replaceable with respect to its actuating support.

Another object of the invention resides in the substantial elimination of friction between the pen and its recording surface, such, for example, as a vertically disposed record chart, by the provision of a mounting for the pen-arm whereby the latter is free to swing in a plane perpendicular to the recording surface, subject only to its own weight.

Still another object of the invention is to provide for a definite adjustment of the pen-arm whereby backlash may be eliminated without consequent binding.

The invention has for a further object the provision of mounting means which will admit of the incorporation therein of zero adjustment means for the pen-arm.

In addition, the invention has for an object the provision of a device embodying the aforesaid features and which will be rugged in construction, positive in action, readily fabricated and assembled, and which withal will be composed of a minimum number of parts.

In carrying out the invention, a pen-arm assembly is provided in which the deflected element, such as a recording pen-arm with pen of the conventional type, is carried upon a retaining member or bracket mounted upon the deflecting element of the recording mechanism. This retaining member, both in its construction and manner of attachment to the pen-arm, involves elements of novelty which form the basis of the present invention.

The present application is a continuation in part of a prior application Serial #754,586, filed by me November 24, 1934.

In its manufacture, the novel retaining member is struck up preferably from a single blank of resilient metal to afford at one side thereof an upstanding arm which may be perforated for pivotal and adjustable attachment to the deflecting member of the recording mechanism. The blank, furthermore, is provided with oppositely projecting and apertured or perforated end lugs which are also bent upwardly substantially at right angles to the body of the blank, while similar lugs formed by cutting U-shaped slots convex

toward the central portion of said blank are bent downwardly substantially opposite the first-named lugs. These two pairs of lugs being thus resiliently supported will then cooperate about their lines of attachment to the body of the blank to provide in effect clamping elements of which the lower pair, also apertured or perforated, receive the conical ends of a transverse shaft to which the pen-arm is secured. By exerting pressure upon the pair of upwardly extending lugs, the lower pair may be sprung apart to permit insertion of the shaft, which shaft in its mounting therein will thus be oscillatable toward and away from the record surface over which the pen-arm is designed to operate.

In order to maintain the desired tension on the shaft in the mounting of its ends in the respective apertures of the downwardly extending pair of lugs, as by regulating the spread of these lugs, there is inserted between the upper pair of lugs suitable means for exerting tension thereon and affording a desired degree of separation thereof. By this arrangement, the downwardly extending lugs will be proportionately sprung apart to afford the desired pressure adjustment upon the pen-arm shaft.

The nature of the invention, however, will best be understood when described in connection with the accompanying drawing, in which:

Fig. 1 is a front elevation showing the novel mounting means as adapted to a recording instrument.

Fig. 2 is a side elevation thereof.

Fig. 3 is a plan view of the blank from which said mounting means is struck up.

Fig. 4 is a plan view of the blank after having been struck up.

Fig. 5 is a fragmentary elevation illustrating a modification.

Fig. 6 is a horizontal section thereof taken on the line 6—6, Fig. 5; and Fig. 7 is a vertical section taken on the line 7—7, Fig. 6.

Referring to the drawing, more especially Figs. 1-4, 10 designates a shaft forming part of the deflecting element of a recording instrument (not shown) and designed to impart an oscillating movement thereto as in rotating the same about a center line *a—a*. The extent of this deflection serves to provide a measure of a variable magnitude such as pressure, temperature, or an electrical quantity and to which the measuring instrument is adapted to respond.

Carried on the shaft 10 is an extension piece 11 in the shape of an inverted U and upon which is pivotally mounted, as by means of a metal

eyelet 12 and in the axis of rotation a —a of the deflecting member 10, the novel retainer member or bracket 13 for the pen-arm 15 of the recording instrument. The said arm carries a pen 16 of the conventional type, adapted to engage lightly the surface of a chart 17 and inscribe thereon a graphic record of its excursion within its limits of travel in the plane of the chart. Pen-arm 15 at its upper end, moreover, is provided with a transverse pivot shaft 18 having conical ends designed to be supported by the retaining member 13 as hereinafter set forth.

To this end, the said member is constructed as follows and preferably of a single blank (Fig. 3) of resilient metal, such as sheet steel or the like. Two lugs 20 and 21, having centrally disposed apertures 22 and 23 and extending from the opposite ends of the body portion 24 of the member, are bent upwardly therefrom and substantially at right angles thereto. Moreover, inward extensions 25 and 26 of these lugs are cut out of the said body portion, being bent downwardly therefrom substantially at right angles thereto to afford a further pair of lugs also provided with apertures 27 and 28. In both instances, when the lugs are bent respectively upwardly and downwardly, the respective apertures thereof are designed to lie in axes substantially parallel to each other and to the axis of shaft 18 which is to be held in the said downwardly extending lugs as in having its conical ends fitting in the said apertures thereof.

Furthermore, the blank is provided with an arm element 30 which is bent upwardly from the body portion 24 thereof along one side, as indicated, and substantially at right angles thereto, while at the opposite side a side portion 31 is similarly bent upwardly to provide a reinforcement to the structure as formed.

It will be noted that, in this conformation, there will be formed a structure substantially rigid except that as the lugs 20 and 21 may be pressed toward each other through a small angle, as by pinching with the fingers, whereby slight bending will take place about the narrow sections joining these lugs to the main body of the structure; and since there will be no tendency for relative bending between the lugs 20 and 25 or the lugs 21 and 26, the downwardly extending lugs 25 and 26 will be slightly separated. This admits of readily inserting the conical ends of the shaft 18 in the apertures 22 and 23, respectively, so that upon release of the pressure upon the upwardly extending lugs, the shaft will be suitably positioned and held to the retaining member 13.

An adjustment of this pressure upon the ends of shaft 18 may be effected by positioning between said lugs 20 and 21 a separator stud or distance piece 32 having flat ends and threaded holes therein which are adapted to be engaged by screws 33 and 34, respectively, passing through the apertures 22 and 23 such that the shanks of these screws will rest freely therein and their heads contact the outer surfaces of the respective lugs. By suitably threading these screws into the ends of the separating stud, the desired tension of the lugs 25 and 26 upon the shaft ends may be had. At the same time, the flat ends of stud 32 serve as stops for the lugs 20 and 21, so that when the latter are gripped between the fingers of an operator with a view to separating the downwardly extending lugs 25 and 26 to release the pen-arm, movement of such upwardly extending lugs will be limited, and straining of the retaining member 13 is avoided.

For effecting a micrometer adjustment of the pen-arm 15 relative to extension piece 11, the upper end of the arm 30 may carry a pivoted post 35 through which is then threaded a manually operable screw 36 engaging an abutment 37 pivoted upon the extension piece 11. By rotating the screw 36, the relative angular position of the retaining member 13, and with it the moving element of the measuring instrument, will be varied in the plane of deflection to provide thus the desired adjustment, as for the zero position of the pen 16 on the chart 17.

Or, reference being had to Figs. 5-7, the adjustment of the pressure on the shaft ends may be effected by setting a single screw. Thus, there may be mounted between the two upwardly extending lugs 40 and 41 a bowed spring element 42 which is secured at its opposite ends to the respective lugs. Provision is made for varying the tension of this element through a vertically disposed screw 43 having its end 44 rotatably and slidably secured to the body portion 45 of the retaining member and its threaded portion working in a nut 46 carried by the spring element. Its head 47 projects beyond the said element to be accessible for ready adjusting and is slotted in the usual manner to receive a screw driver or the like in effecting an adjustment of the tension on the pen-arm shaft 48 held between the downwardly extending lugs 49 and 50. The downward excursion of the screw is limited by engagement of a shoulder 51, formed on its shank, with the said body portion; while its upward travel is restricted by a small washer 52 engaged by the peened-over end. This allows the screw freedom for a certain degree of longitudinal travel. Ordinarily the bowing action of the spring holds the screw in its lowest position, with shoulder 51 in engagement; and in this position the inward travel of the lower lugs of the pen-holder is limited, so that the cross-piece or pen-arm shaft 48 is not too tightly gripped. Adjustment of the screw 43 serves to regulate to zero the compression exerted on the conical ends of the crosspiece without lost motion.

When the upwardly extending lugs are manually grasped, with a view to releasing the pen-arm, the spring is compressed, and the screw lifted off its seat, its upward limit of travel being determined by the washer 52 on its lower extremity. This prevents the lugs being compressed to an extent to strain the bending part of the holder and establish a permanent set in the metal. Thus, the travel of the lugs is definitely limited in both directions, with a free space for travel between, and these limits are, as in the previously described embodiment, established by portions of an adjustable screw member.

I claim:

1. In a pen-arm assembly for a recording instrument having an element deflecting with a measured magnitude: the combination of a retaining member mounted on said deflecting element and including a pair of resiliently supported, apertured, and downwardly disposed lugs, and a pen-arm having transversely disposed pivots adapted to engage in the respective apertures of the downwardly disposed lugs, there being provided on the retaining member a further pair of lugs resiliently supported thereby and upwardly disposed for release of the pen-arm upon mutual approach of the said upwardly disposed pair of lugs.

2. A mounting bracket for the pen-arm of a recording instrument, comprising a piece of metal

embodying a flat body portion having end-apertured bendable lugs projecting upwardly from the body portion and substantially perpendicular thereto, and end-apertured lugs projecting downwardly and substantially perpendicularly from the body portion and lying respectively in planes common with said upwardly projecting lugs, and adapted to afford for the pen-arm of the recording instrument supports bendable about their junction with the body portion.

3. A mounting bracket for the pen-arm of a recording instrument, comprising a piece of metal embodying a flat body portion having resiliently supported and end-apertured lugs projecting upwardly from the body portion and substantially perpendicular thereto, and resiliently supported and end-apertured lugs projecting downwardly and substantially perpendicularly from the body portion and lying respectively in planes common with said upwardly projecting lugs, and adapted to afford for the pen-arm of the recording instrument supports bendable about their junction with the body portion, and means fitting the apertures of the upwardly projecting lugs to limit the extent of outward movement thereof.

4. A mounting bracket for the pen-arm of a recording instrument, comprising a piece of metal embodying a flat body portion having resiliently supported and end-apertured lugs projecting upwardly from the body portion and substantially perpendicular thereto, and resiliently supported and end-apertured lugs projecting downwardly and substantially perpendicularly from the body portion and lying respectively in planes common with said upwardly projecting lugs, and adapted to afford for the pen-arm of the recording instrument supports bendable about their junction with the body portion, and a side element bent at an angle with the plane of said body portion whereby said body portion is rendered substantially rigid.

5. In a pen-arm assembly for a recording instrument having an element deflecting with a measured magnitude: the combination of a retaining member pivotally mounted on said deflecting element and having two pairs of resiliently supported lugs, one of said pairs upwardly disposed and one pair downwardly disposed, and a pen-arm having a transverse part terminating in conical surfaces adapted to be engaged by one pair of said lugs and to be released therefrom by mutual approach of the other pair.

6. In a pen-arm assembly for a recording instrument having an element deflecting with a measured magnitude: the combination of a retaining member pivotally mounted on said deflecting element and having two pairs of resiliently supported lugs, one of said pairs upwardly disposed and one pair downwardly disposed, a pen-arm having a transverse part terminating in conical surfaces adapted to be engaged by one pair of said lugs and to be released therefrom by mutual approach of the other pair, and adjustable screw means for limiting the engagement of said one pair of lugs with said conical surfaces.

7. In a pen-arm assembly for a recording instrument having an element deflecting with a measured magnitude: the combination of a retaining member pivotally mounted on said deflecting element and having two pairs of resiliently supported lugs, one of said pairs upwardly disposed and one pair downwardly disposed, a pen-arm having a transverse part terminating in conical surfaces adapted to be engaged by one pair of said lugs and to be released therefrom by

mutual approach of the other pair, and means for adjustably limiting the engagement of said one pair of lugs with said conical surfaces and including means affording abutments for the respective upwardly disposed lugs for limiting the approach thereof.

8. In a pen-arm assembly for a recording instrument having an element deflecting with a measured magnitude: the combination of a retaining member pivotally mounted on said deflecting element and having two pairs of resiliently supported apertured lugs, one of said pairs upwardly disposed and one pair downwardly disposed, a pen-arm having a transverse part terminating in conical surfaces adapted to be pivotally engaged by the apertures in one of said pairs of lugs, a crosspiece supported between the other of said pairs of lugs, and screws passing through the apertures in the same and adjustably threaded into said crosspiece, whereby said screws may provide an adjustment of engagement between said conical surfaces and cooperating lugs.

9. In a pen-arm assembly for a recording instrument having an element deflecting with a measured magnitude: the combination of a retaining member pivotally mounted on said deflecting element and having two pairs of resiliently supported apertured lugs, one of said pairs upwardly disposed and one pair downwardly disposed, a pen-arm having a transverse part terminating in conical surfaces adapted to be pivotally engaged by the apertures in one of said pairs of lugs, a crosspiece supported between the other of said pairs of lugs, and screws passing through the apertures in the same and adjustably threaded into said crosspiece, whereby said screws may provide an adjustment of engagement between said conical surfaces and cooperating lugs, together with means carried by the retaining member and engaging the deflecting element for adjusting said retaining member about its pivotal mounting.

10. A mounting bracket for the pen-arm of a recording instrument, comprising a piece of metal embodying a flat body portion having end-apertured lugs projecting upwardly from the body portion and substantially perpendicular thereto and end-apertured lugs projecting downwardly and substantially perpendicularly from the body portion and lying respectively in planes common with said upwardly projecting lugs, and adapted to afford for the pen-arm of the recording instrument supports bendable about their junction with the body portion, and means including a resilient member fitting between the upwardly projecting lugs to limit the extent of operation thereof.

11. A mounting bracket for the pen-arm of a recording instrument, comprising a piece of metal embodying a flat body portion having end-apertured lugs projecting upwardly from the body portion and substantially perpendicular thereto, and end-apertured lugs projecting downwardly and substantially perpendicularly from the body portion and lying respectively in planes common with said upwardly projecting lugs, and adapted to afford for the pen-arm of the recording instrument supports bendable about their junction with the body portion, and means including a resilient member fitting between the upwardly projecting lugs to limit the extent of operation thereof, together with means for varying the tension of said resilient means.

12. In a pen-arm assembly for a recording instrument having an element deflecting with a

measured magnitude: the combination of a retaining member pivotally mounted on said deflecting element and having two pairs of resiliently supported apertured lugs, one of said pairs upwardly disposed and one pair downwardly disposed, a pen-arm having a transverse part terminating in conical surfaces adapted to be pivotally engaged by the apertures in one of said pairs of lugs, a bowed flat spring secured at its opposite ends between the other of said pairs of lugs, a screw passing therethrough with its end rotatably and slidably secured in the retaining member, the spring having a threaded portion engaging with the threaded portion of the screw for varying its curvature.

13. In a pen-arm assembly for a recording instrument having an element deflecting with a measured magnitude: the combination of a re-

taining member pivotally mounted on said deflecting element and having two pairs of resiliently supported apertured lugs, one of said pairs upwardly disposed and one pair downwardly disposed, a pen-arm having a transverse part terminating in conical surfaces adapted to be pivotally engaged by the apertures in one of said pairs of lugs, a bowed flat spring secured at its opposite ends between the other of said pairs of lugs, a screw passing therethrough with its end rotatably and slidably secured in the retaining member and shouldered against its upper surface, and a stop on the said screw at the under side of said retaining member, the spring having a threaded portion engaging with the threaded portion of the screw for varying its curvature.

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