July 22, 1969 H. P. HOGARTH 3,456,467

PORTABLE STRAIGHTENER FOR ELONGATE MEMBERS

Filed Dec. 13, 1967

FIG. 1

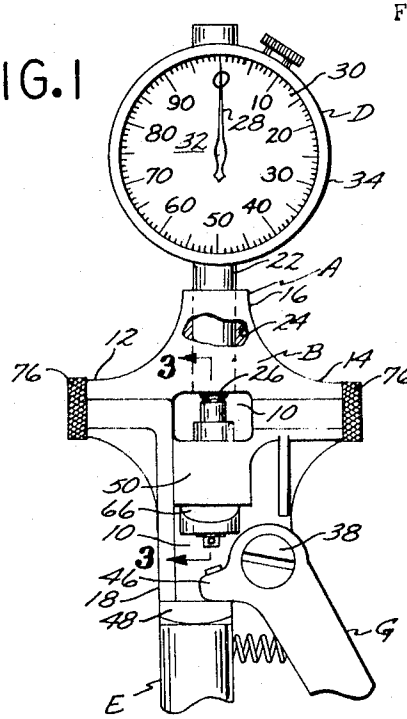
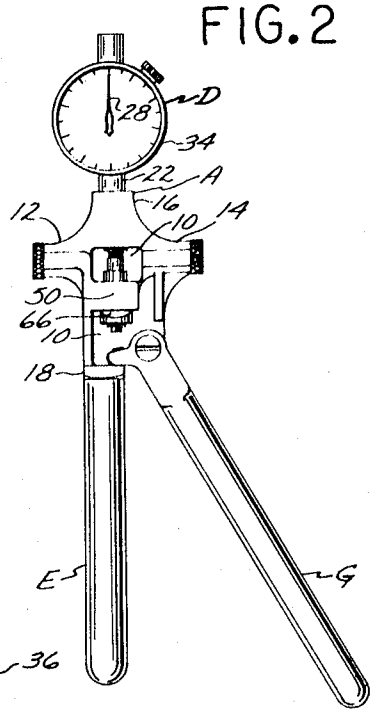


FIG. 2



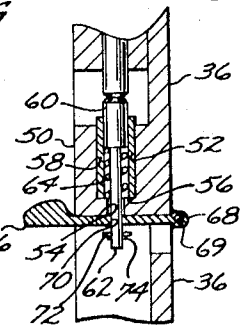
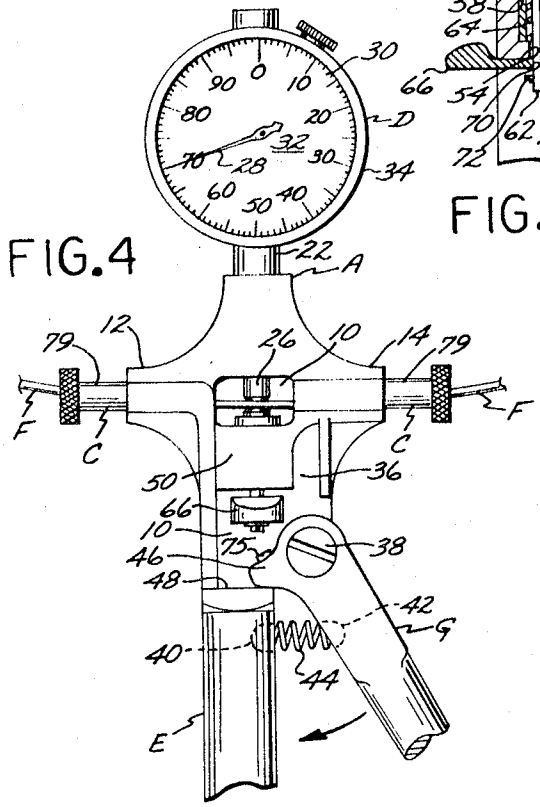


FIG. 3

FIG. 4



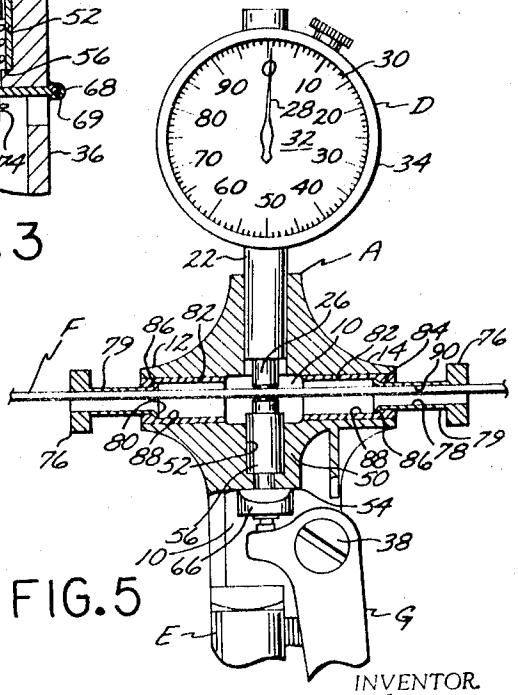


FIG. 5

INVENTOR.
HAROLD P. HOGARTH
BY
William C. Babcock
ATTORNEY

United States Patent Office 3,456,467 Patented July 22, 1969

3,456,467

PORTABLE STRAIGHTENER FOR ELONGATE MEMBERS

Harold P. Hogarth, 8605 7th St., Downey, Calif. 90241

Filed Dec. 13, 1967, Ser. No. 690,190
Int. Cl. B21d 3/10; G01b 3/22
U.S. Cl. 72—32 7 Claims

ABSTRACT OF THE DISCLOSURE

A compact portable lightweight device that may be easily carried, ready for use in straightening small diameter elongate members of circular transverse cross section, normally formed from a deformable material, which straightener may also be used to check the roundness of such an elongate member.

BACKGROUND OF THE INVENTION

Field of the invention

The present invention relates to the field of hand tools, and more particularly to a portable device for straightening elongate members of small diameter and circular transverse cross section, as well as serving as a means to check the roundness of an elongate member at any position along the length thereof.

Description of the prior art

In the manufacture of such precision products as fishing rod mandrels and the like, it is highly desirable to be able to straighten an elongate member of small diameter formed from a deformable material, as well as to be able to check the roundness of small diameter tubes, rods, wire, and the like. Heretofore no dual purpose portable, compact, lightweight device of the type described has been available that could be successfully operated after but a few minutes of training or instruction. The present invention provides a straightener that may be readily employed by a person of but limited mechanical skill to straighten a lightweight, elongate member, as well as check the roundness of any longitudinal section thereof.

SUMMARY OF THE INVENTION

A manually operable straightener, which in combination with a conventional dial indicator, permits a small diameter elongate member of circular transverse cross section to be straightened, as well as the checking of the roundness of any longitudinal section thereof.

A major object of the present invention is to provide a compact, lightweight straightener adapted to be easily carried from place to place for use in straightening elongate members of small diameter and circular cross section after but a few minutes of training in the use thereof, which device also may be used to check the roundness of any desired longitudinal portion of such an elongate member.

Another object of the invention is to furnish a device for use in straightening all or a portion of an elongate member used in precision manufacturing work.

BRIEF DESCRIPTION OF THE DRAWING

FIGURE 1 is a partial front elevational view of the straightener;

FIGURE 2 is a front elevational view of the complete device;

FIGURE 3 is a fragmentary, longitudinal, cross-sectional view of the straightener, taken on the line 3—3 of FIGURE 1;

FIGURE 4 is a front elevational view of the device with the tubular fulcrum arms in the expanded position; and

FIGURE 5 is a partial longitudinal, cross-sectional view of the straightener.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The portable straightener A for elongate members, as best shown in FIGURES 1, 2 and 5, includes a body B in which a centrally disposed, elongate recess **10** is formed. The body B also includes oppositely disposed, axially aligned first and second legs **12** and **14**, as well as axially aligned third and fourth legs **16** and **18** that are positioned in a direction normal to the first and second legs. Two tubular fulcrum arms C are slidably and adjustably supported in axially aligned bores **20** formed in the first and second legs **12** and **14**, as may best be seen in FIGURE 5. The purpose of the fulcrum arms C will be explained hereinafter.

A dial indicator D, preferably graduated in thousanths of an inch, is provided, and includes a tube **22** mounted in a fixed position in a bore **24** that extends downwardly through the third leg **16** (FIGURE 1). An actuating member **26** is movably supported within tube **22**, which actuating member when moved, causes a needle **28** forming a part of indicator D to pivot relative to a scale **30**. Scale **30** is imprinted on a circular dial **32** that forms a part of indicator D, and dial **32** is situated within a cylindrical housing **34**. Dial indicator D is commercially available on the present-day market, and accordingly, a detailed description as to movement of the actuating member **26** and how it causes the needle **28** to pivot relative to scale **30** is unnecessary. An elongate extension E is provided, which is preferably in axial alignment with the third and fourth legs **16** and **18**, respectively, as illustrated in FIGURE 2. The recess **10** is partly defined by a web **36** (FIGURE 3). A screw **38** projects outwardly from body B adjacent the upper end of extension E, which screw **38** serves as a pivotal support for an elongate handle G. Opposing recesses **40** and **42** are formed in extension E and handle G, respectively, in which the free ends of a compressed helical spring **44** are disposed.

The compressed spring **44** at all times tends to pivot the handle G in a counterclockwise direction as shown in FIGURE 4, and the extent of this pivotal movement is limited by an arm **46** forming a part of the handle when it comes into contact with a projecting portion **48** of body B (FIGURE 2). Body B includes a cylindrical portion **50** that extends outwardly from the web **36**, disposed within the recess **10** as shown in FIGURES 3 and 4. A longitudinally extending bore **52** and counterbore **54** is formed in the cylindrical portion **50**, and at the junction thereof a body shoulder **56** is defined. A cylindrical antifriction guide sleeve **58** is positioned in bore **52**, which slidably supports a cylindrical metallic plunger **60**.

A rigid pin **62** depends from the plunger **60** (FIGURE 3), with the pin being slidably supported in the counterbore **54**. A compressed helical spring **64** is situated within the confines of the guide sleeve **58**, the upper end of which is in abutting contact with the lower end of plunger **60**, with the lower end of the spring resting on the shoulder **56**. Plunger **60** is preferably in axial alignment with the actuating member **26**.

A transversely positioned trigger **66** is pivotally supported on a pin **68** that is supported by conventional means **69** (FIGURE 3) from the web **36**. An opening **70** extends the length of trigger **66** through which the pin **62** projects downwardly. A washer **72** is mounted on the lower end of pin **68** and is in abutting contact with the lower surface of the trigger **66** when the trigger is pivoted downwardly. Washer **72** is held in position on the pin **68** by a conventional fastener **74**, as best shown in FIGURE 3. The arm **46** (FIGURE 4) supports a protuberance **75** formed from a hard metal that pressure contacts the lower end of the pin **62** when the handle G is pivoted

towards the extension E in the manner illustrated in FIGURE 5.

When the handle G is in a first position (FIGURE 4) the trigger **66** can be pivoted downwardly to move the plunger **60** away from the actuating member **26** to permit an elongate member F to be threaded through the two fulcrum arms C. When pressure is released on the trigger **66**, the spring **64** moves the plunger **60** upwardly into contact with the section of the elongate member F to be straightened that extends between the fulcrum arms C, situated within the confines of the recess **10**. For ease in the slidable adjustment thereof relative to the first and second legs **12** and **14** respectively, the fulcrum arms C are provided with knurled heads **76** (FIGURE 5) on the outer ends thereof.

A longitudinally extending passage **78** is formed in each of the arms C that is slightly larger in transverse cross section than that of the largest elongate member F which will be straightened by means of the present invention. When a short bend or kink in member F is to be straightened, the fulcrum arms C are disposed in a first position as shown in FIGURE 2, where the heads **76** are in abutting contact with the body B. However, when a long bend in the member F must be removed, the fulcrum arms C are adjustably moved outwardly to second positions such as shown in FIGURE 4. Each of the arms C, in addition to the heads **76**, includes an elongate tube **79** that terminates on the free end thereof in a flare **80**.

Two identical sleeves **82** are provided that are mounted in the bores **20** in first and second legs **12** and **14** (FIGURE 5). The outer ends of sleeves **82**, as also shown in FIGURE 5, define longitudinally aligned bores **84** which snugly but slidably support the tubes **79** of the fulcrum arms C. The adjacent ends of bores **84** develop into circumferentially extending body shoulders **86** that serve as stops when contacted by the flares **80** to limit relative outward movement of the fulcrum arms C.

The body shoulders **86** develop into second longitudinally extending bores **88** of substantially larger transverse cross section than that of the bores **84** (FIGURE 5). The passages **78** extend longitudinally through not only tubes **79** but heads **76** as well, with the transverse cross section of these passages being of sufficient size as to receive the elongate workpiece F to be straightened. The transverse cross section of the workpiece F to be straightened by means of the present invention, which is either a tube, wire or rod, ranges between 0.140 to 0.030 inch in diameter.

Operation of the straightener is most simple. The extension E and handle G are gripped together by the operator, and by exerting pressure on the trigger **66** with his thumb, causes it to pivot downwardly to separate the plunger **60** from the actuating member **26**. The workpiece F to be straightened is then threaded through the fulcrum arms C (FIGURES 4 and 5), and the trigger **66** then released. Thereafter workpiece F is slowly rotated, with that portion thereof to be straightened being located between fulcrum arms C. This rotation is continued until a minimum reading is attained as indicated by the needle **28** on scale **30**. The handle G is then pivoted towards the extension E to cause the plunger **60** to move upwardly into pressure contact with the workpiece F.

Rotation of the workpiece F is continued until it is straightened. Workpiece F is substantially straight when the needle **28** moves no more than a single graduation relative to scale **30**. If a number of bent portions are formed in workpiece F, each bend is sequentially subjected to the same operation in the straightener in the manner just described. In the event a long bend is found in the workpiece F, the fulcrum arms C must be adjusted outwardly to the positions shown in FIGURES 4 and 5. However, when the bent portion of workpiece F is a short kink, the fulcrum arms C are moved inwardly to the positions shown in FIGURE 1. However, the fulcrum arms C may be so adjusted for a straightening operation to occupy intermediate positions between the fully out and the fully in positions.

Also, when the straightener is being used for correcting bends in an elongate member, the member F when straight can be disposed in the device in the manner shown in FIGURE 5 and slowly rotated until any out-of-roundness in the cross section of the member or workpiece is indicated by the needle **28** relative to scale **30**. If the workpiece F is perfectly round in transverse cross section, this can be ascertained by reference to the scale **30**.

I claim:

1. A portable compact device for straightening elongate, axially deformed members of small circular transverse cross section, including:

(a) first and second tubular fulcrum arms in which bores are formed of slightly larger tansverse cross section than that of the largest deformed member to be straightened;

(b) first and second tubular sleeves that slidably and adjustably support said fulcrum arms;

(c) a rigid body in which a central recess is formed and from which first, second and third bores extend, with said first and second bores being in axial alignment and of such cross section as to grip said sleeves, and with said third bore being disposed in a direction normal to said first and second bores;

(d) dial indicator means embodying a tube and an actuating member movably supported in said tube which extends therefrom, with said tube being disposed in a fixed position in said third bore and a projecting portion of said actuating member being disposed in said recess;

(e) an elongate rigid extension projecting from said body in a direction away from said indicator means;

(f) an elongate plunger movably supported in said recess, positioned in a direction normal to said fulcrum arms;

(g) first means for movably supporting said plunger in said recess;

(h) an elongate handle pivotally supported from said body and spaced from said extension; and

(i) second means on said handle for forcing said plunger to exert a transverse force on a section of said elongate deformed member when a longitudinal section thereof is disposed in said first and second fulcrum arms and said member is rotated, which force is generated by movement of said handle towards said extension and is of sufficient magnitude to straighten at least that part of said member extending across said recess, with said straightening being completed when so indicated by said dial indicator means, which fulcrum arms are adjustable relative to one another to increase the distance therebetween when said elongate member being straightened has a long bend formed therein, yet with said fulcrum arms being adapted to be spaced a lesser distance when said elongate member has a short kink formed therein.

2. A device as defined in claim **1** which further includes:

(j) flares formed on the adjacent ends of said fulcrum arms; and

(k) circular body shoulders formed in the interior of said first and second tubular sleeves that act as stops when contacted by said flares to limit the extent of movement of said first and second fulcrum arms away from one another.

3. A device as defined in claim **1** wherein said body includes first, second, third and fourth legs arranged in the form of a cross, with first and second bores being formed in said first and second legs, said third bore being in said third leg, and with said extension projecting outwardly from said fourth leg.

4. a device as defined in claim 1 wherein said dial indicator means is of the type in which said tube supports a cylindrical housing having a circular face that incorporates a grated scale, together with a pivotally supported needle that responds to movement of said actuating member to movement of said actuating member to sweep over said graduations, with indication of the straightened condition of that portion of said elongate member being worked being determinable when little or no movement of said needle occurs as said elongate member is rotated in said fulcrum arms.

5. A device as defined in claim 1 wherein said first means includes:

(j) a portion of said body that extends outwardly into said recess, in which portion a bore and counterbore are formed that are axially aligned with said third bore, with a body shoulder being defined at the junction of said bore and counterbore;

(k) a guide sleeve mounted in said bore in said portion of said body, which guide sleeve slidably supports said plunger and said sleeve includes an inwardly extending body shoulder in that portion thereof most adjacent said extension;

(l) a compressed helical spring disposed in said sleeve, with a first end of said spring abutting against said plunger and a second end of said spring resting on said body shoulder, which spring at all times urges said plunger upwardly to contact said actuating member;

(m) a pin connected to said plunger, which pin extends through a counterbore formed in said guide sleeve and outwardly therebeyond; and

(n) trigger means pivotally supported from said body that engage said pin, with said trigger means when pivoted away from said portion of said body in said recess, moving said plunger away from said actuating member to permit said elongate member to be straightened to be threaded through said first and second fulcrum arms.

6. A device as defined in claim 5 wherein said second means comprise an arm that extends from said handle and contacts said pin, which arm exerts a force on said pin and plunger when said handle is pivoted from a first position relative to said extension to a second position wherein said extension and handle are more closely spaced than when said handle is in said first position.

7. A device as defined in claim 6 which further includes:

(o) spring means extending between said extension and handle that at all times tend to maintain said handle in said first position.

References Cited

UNITED STATES PATENTS

1,840,237	1/1932	Leighton	72—389
2,876,822	3/1959	Groves	72—389

RONALD D. GREFE, Primary Examiner

U.S. Cl. X.R.

72—389