May 5, 1970 EIJI SHIMOYAMA 3,509,631

ADJUSTABLE SLIDING COMPASSES

Filed March 18, 1968 3 Sheets-Sheet 1

FIG.—1

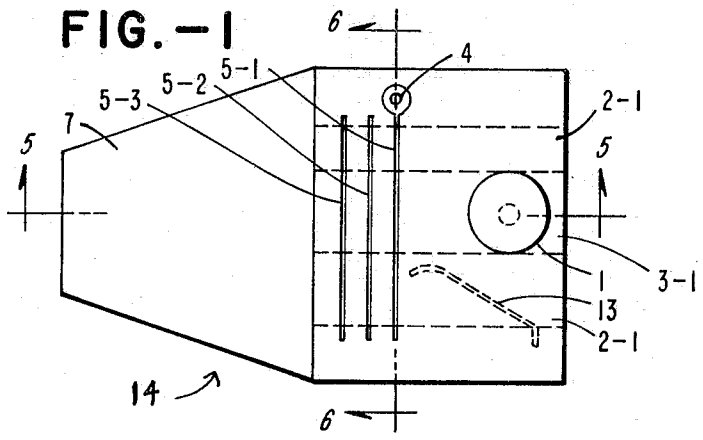
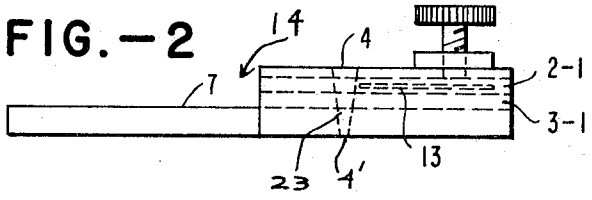


FIG.—2



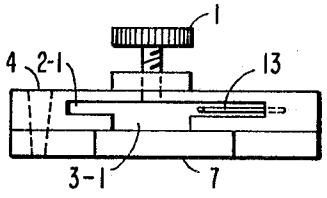


FIG.—3

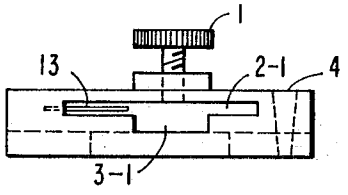


FIG.—4

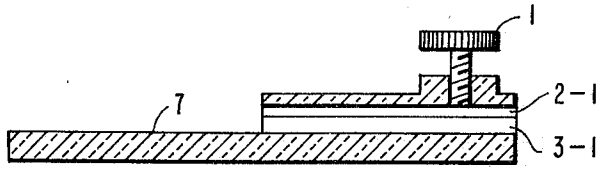


FIG.—5

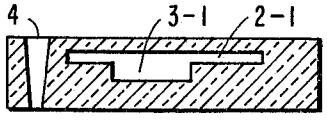


FIG.—6

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ADJUSTABLE SLIDING COMPASSES

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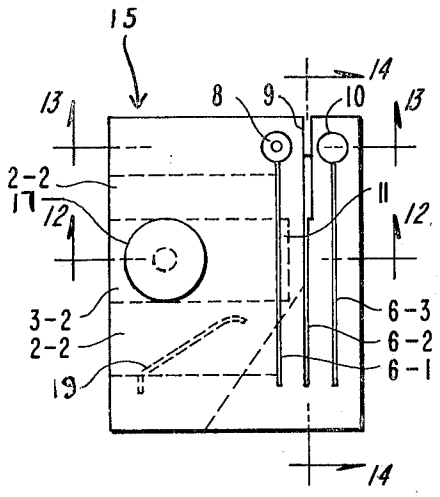


FIG.—7

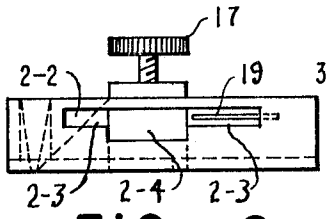


FIG.—9

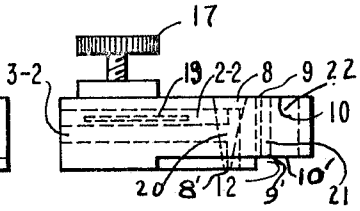


FIG.—8

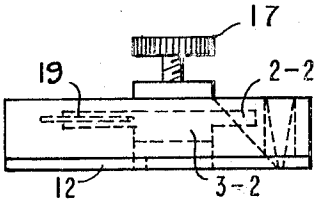


FIG.—10

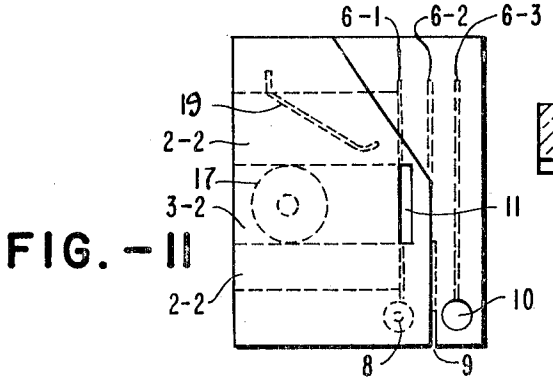


FIG.—11

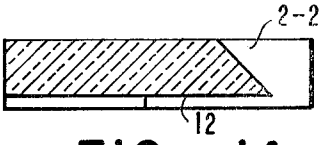


FIG.—14

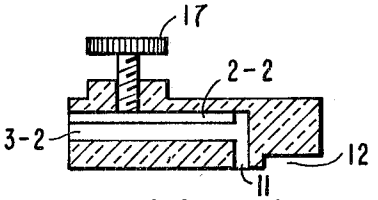


FIG.—12

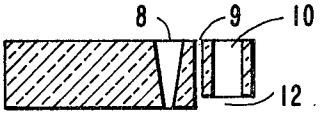


FIG.—13

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FIG.—15

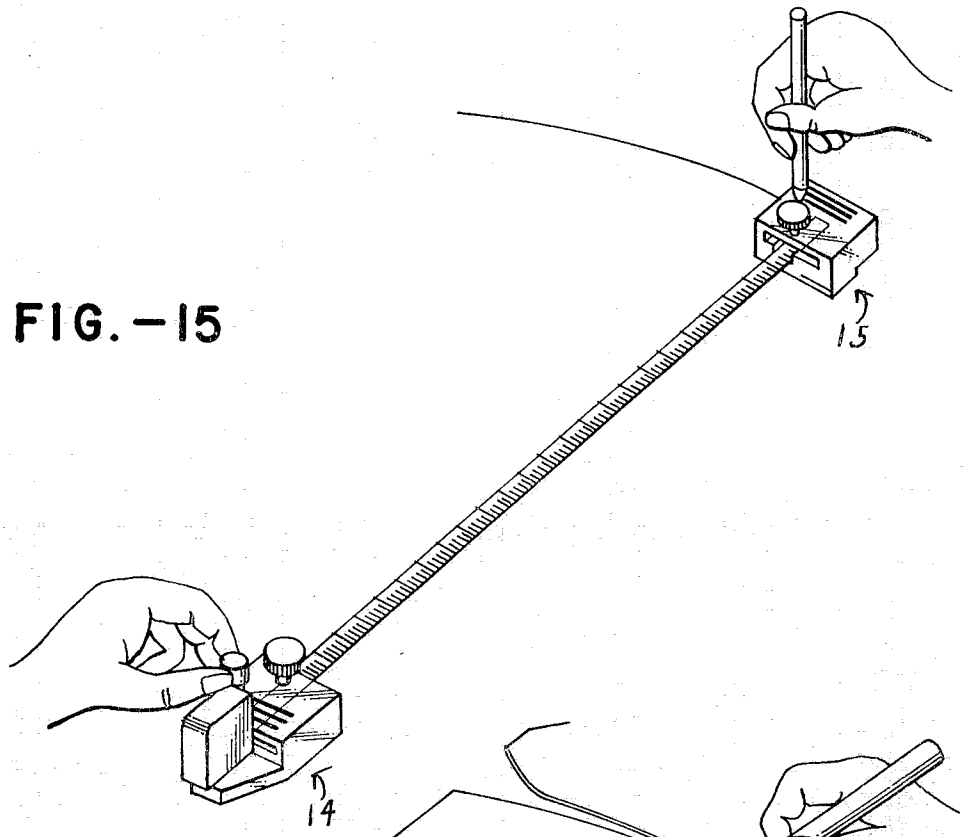
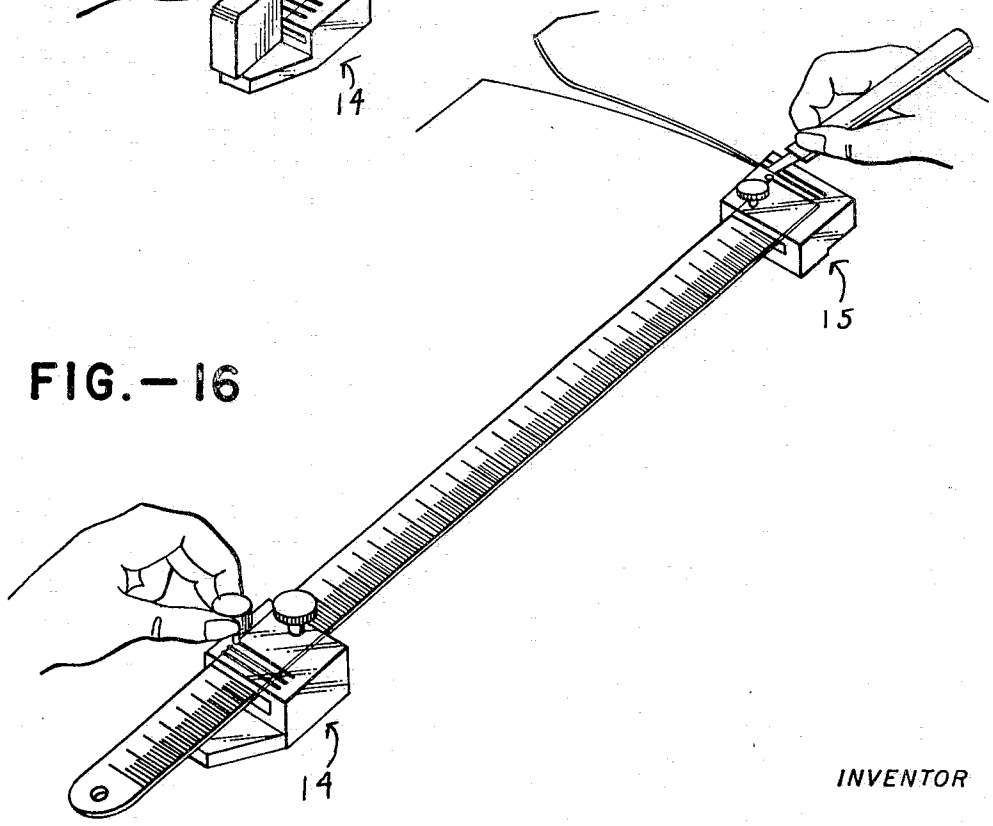


FIG.—16



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United States Patent Office 3,509,631 Patented May 5, 1970

3,509,631

ADJUSTABLE SLIDING COMPASSES

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Claims priority, application Japan, Mar. 20, 1967, 42/22,845; July 1, 1967, 42/56,217
Int. Cl. B43i 9/04
U.S. Cl. 33—27 7 Claims

ABSTRACT OF THE DISCLOSURE

A compass is provided for describing arcs of selected radius length, comprising two separate elements adapted to be connected by a standard measuring means such as a tape measure or a straightedge. One element establishes the center of the arc to be described. The other element holds an arc-describing means, as for example a pencil, pen or knife edge. The measuring means defines the radius of the arc.

BACKGROUND OF THE INVENTION

This invention relates to adjustable sliding compasses, and more particularly to a new and improved compass for describing large radius arcs.

Conventional two-leg compasses become unwieldy in drawing large radius arcs. Accordingly, strings, beam compasses, or curve rules are generally used for this purpose, but known devices are inaccurate and expensive.

SUMMARY OF THE INVENTION

The purposes of the present invention are realized by an improved adjustable compass which can be operated easily and accurately and which may be manufactured inexpensively.

An aspect of the invention is its provision of an instrument for drawing arcs and for cutting arcs out of paper, cloth, and other materials.

Another aspect is its provision of an improved adjustable compass capable of convenient use with a flat measuring means of conventional type, such as a metal straightedge or tape measure.

In accordance with the invention, a compass is provided for describing (i.e., drawing or cutting) arcs of selected radius length, including two separate elements which are adapted to be mounted on, and connected by standard measuring means, such as a tape measure or a straightedge. One element serves as a holder for a pivot pin, which establishes the point about which the arc is described. The other element comprises a drawing instrument which has a plurality of apertures for receiving arc-describing devices, as for example, a pencil, pen or knife edge. The measuring means is held within the two elements by an arrangement of slots, clamps, and springs, so as to define the radius of the arc to be described. Index lines inscribed on the elements of the compass provide reference points for each of the different arc-describing means so that by reference to an appropriate index line on the element holding the pivot pin, the length of the radius of the arc to be described may be ascertained. Radius length is adjusted by sliding the device containing the pivot pin along the measuring means to a selected position.

BRIEF DESCRIPTION OF THE DRAWINGS

A better understanding of the invention may be had from a reading of the following detailed description and inspection of the drawings in which:

FIG. 1 is a top view of a sliding holder in accordance with the invention;

FIG. 2 is a side view of the sliding holder of FIG. 1;

FIG. 3 is a back view of the sliding holder of FIG. 1;

FIG. 4 is a front view of the sliding holder of FIG. 1;

FIG. 5 is a sectional view taken along line **5—5** of FIG. 1;

FIG. 6 is a sectional view taken along line **6—6** of FIG. 1;

FIG. 7 is a top view of a drawing instrument in accordance with the invention;

FIG. 8 is a side view of the drawing instrument of FIG. 7;

FIG. 9 is a front view of the drawing instrument of FIG. 7;

FIG. 10 is a back view of the drawing instrument of FIG. 7;

FIG. 11 is a bottom view of the drawing instrument of FIG. 7;

FIG. 12 is a sectional view taken along line **12—12** of FIG. 7;

FIG. 13 is a sectional view taken along line **13—13** of FIG. 7;

FIG. 14 is a sectional view taken along line **14—14** of FIG. 7;

FIG. 15 is a perspective view of an embodiment of the invention arranged for use with a pencil and a tape measure; and,

FIG. 16 is a perspective view of an embodiment of the invention arranged for use with a knife and straightedge.

DETAILED DESCRIPTION OF THE INVENTION

The embodiment of the invention shown in the drawings comprises two elements, a sliding holder **14** (FIG. 1) and a drawing instrument **15** (FIG. 7) containing a first slot **2–1** and a second slot **2–2**, respectively, for receiving conventional measuring means connecting the sliding holder **14** and the drawing instrument **15**. The slots **2–1**, **2–2** are arranged to receive measuring means of a conventional straightedge type. Beneath the slots **2–1**, **2–2** are narrow channels **3–1**, **3–2** which are arranged to receive narrow measuring means of the conventional tape measure type. The first slot **2–1** and its associated first narrow channel **3–1** in the sliding holder **14** extend longitudinally throughout the extent of the sliding holder **14** terminating in apertures at the front and back longitudinal ends as shown at the right and left, respectively, in FIG. 1. The second slot **2–2** in the drawing instrument **15** terminates in an aperture at the front of the drawing instrument **15** (shown at the left in FIG. 7) and in a first planar end surface **2–3** whose plane is perpendicular to the slot **2–2** and includes the center of an aperture **8** (FIG. 7). The second narrow channel **3–2** terminates in a front aperture and a second planar end surface **2–4** which is parallel to the plane of end surface **2–3** and spaced longitudinally from end surface **2–3**. Several top apertures **8**, **9** and **10** (FIG. 7) are disposed in the top surface of the drawing instrument **15** and are adapted to receive marking and cutting devices as described below. Top apertures **8**, **9**, **10** communicate with vertical passageways **20**, **21**, **22**, respectively. Vertical passageways **20**, **21**, **22** are directed perpendicularly to second slot **2–2** and communicate, respectively, with bottom apertures **8′**, **9′**, **10′** disposed in the bottom surface of the body of the drawing instrument **15**.

In using the adjustable compass with a straightedge ruler, the end of the straightedge bearing the zero reference point is inserted into the front aperture of the second slot **2–2** in the drawing instrument **15** and is pushed through the slot **2–2** until it comes to rest against the end surface **2–3**, and is fixed in place by tightening a

clamp screw **17** (FIG. 7). Thus, the zero point end of the straightedge ruler is in the plane of the center of the aperture **8**. The other end of the straightedge ruler is inserted into the front longitudinal end aperture of the first slot **2–1** (FIG. 1) in the sliding holder **14** so that a graduation line on the straightedge ruler corresponding to the desired radius length is aligned with one of several index lines **5–1, 5–2, 5–3** (FIG. 1) inscribed on the top surface of the sliding holder **14** depending on which of the top apertures **8, 9** or **10**, respectively, is used to receive the marking or cutting device. The alignment is achieved by adjusting the position of the selected graduation line until it is aligned with the selected index line. The body of the sliding holder **14** may be made of transparent material, to allow visual aligning of the measuring means with the index lines. The straightedge ruler is fixed in place by tightening a clamp screw **1** (FIG. 1). Springs **13** (FIG. 1) and **19** (FIG. 7) have the function of pushing the measuring means against the clamp screws **1** and **17**, respectively, and of properly aligning the measuring means by urging the measuring means portions in the sliding holder **14** and the drawing instrument **15** to the same positions relative to the width of the slots **2–1** and **2–2**.

In use with a conventional tape measure, the zero point end of the tape, whose case is placed on a rest space **7** at the back longitudinal end of the sliding holder **14** (FIG. 1), is threaded through the narrow channel **3–1** in the first slot **2–1** from left to right, as seen in FIG. 1. The tape is then inserted into the narrow channel **3–2** of the drawing instrument **15**. The tape measure is pushed through slot **2–2** until it strikes the planar end surface **2–4**. The hook of a conventional tape measure is received in an opening **11** adjacent planar end surface **2–4** (FIG. 7), and the tape is fixed in place by tightening the clamp screw **17**. The planar end surface **2–4** is spaced at a distance from a plane including aperture **8** and perpendicular to slot **2–2** to accommodate the length of the hook assembly of a conventional tape measure. Thus, the zero point of the tape is located in the same plane as the plane in which the zero point end of the straightedge ruler was located in the example discussed above.

Top apertures **8, 9, 10** with their respective vertical passageways and bottom apertures are adapted to receive a pencil point with an adjacent tapered pencil portion, a pen point with an adjacent tapered portion and a knife edge, respectively. After the compass has been assembled in the manner described above, a pivot pin is inserted into a top aperture **4** (FIG. 1) disposed in the top surface of the sliding holder **14** and communicating with a bottom aperture **4'** through a vertical passageway **23** directed perpendicularly to the first slot **2–1**. The pin is pushed through vertical passageway **22** until it emerges at bottom aperture **4'**. If the invention is to be used with a pencil, the point portion of the pencil is inserted in the aperture **8** of the drawing instrument **15** and pushed through vertical passageway **20** until it emerges at bottom aperture **8'**. The pivot pin is fixed by pressure into the material in which the arc is to be inscribed, and the pencil point is pressed into contact with the material, the pivot pin and pencil being adjusted so that the measuring means is substantially parallel to the plane of the material. The drawing instrument **15** is then rotated about the pivot pin.

For cutting arcs out of substantially planar surfaces, a knife edge is inserted through the slot **9** in the drawing instrument **15** and pushed through vertical passageway **21** until the edge emerges through bottom aperture **9**.

In use with a drawing pen, the pen is inserted through the aperture **10** of the drawing instrument **15** and pushed through the vertical passageway **22** until the point emerges through bottom aperture **10'**. A pared step **12** (FIG. 8) is provided to protect the working surface from any dripping ink. The pared step **12** is the form taken by the bottom surface in the area of the aperture **10** due to the presence of an extra layer of structural material in that area. The extra layer allows for the complete containment of the pen point assembly exposing only the actual point to the surface.

The center of the aperture **4** is at the same distance from the first slot **2–1** as the centers of the apertures **8, 9** and **10** are from the second slot **2—2**. The straight edge, or other measuring means, should be so placed as to be parallel to a line drawn through the apertures **4, 8, 9** and **10**. The index lines **5–1, 5–2, 5–3** are spaced at equal distances in the preferred embodiment; also, a set of zero point indicating lines **6–1, 6–2, 6–3** (FIG. 7) pass through the centers of apertures **8, 9, 10**, respectively, and are spaced at equal distances from one another, the distances between the index lines being equal to the distances between the zero point indicating lines. Therefore, the distance between lines **6–2** and **6–1**, the radius of the arc described by the knife edge in aperture **10**, is determined by reference to the distance between **5–2** and **6–1**, which can be read directly from the measuring mark of the measuring means aligned with the former line; similar considerations apply to pairs of lines **6–3, 5–1** and **6–1, 5–3**. Thus, zero point radius length measure is provided for each of the apertures **8, 9, 10**; in case of use with a pencil, a knife or a drawing pen, radius length may be selected by reference to the reading graduation lines **5–1, 5–2, 5–3**, respectively. For this reason, in a preferred embodiment the line pairs **6–1, 5–1**; **5–2, 6–2**; and **5–3, 6–3** are the same color, the color of every line pair differing from that of every other line pair.

A further feature of the invention is its usefulness under conditions of difficult operation due to lack of space or to the curvature of the surface in which the arc is to be described. The invention provides the possibility of cutting the desired arc out of another surface and using the arc as a curve rule on the surface in which the arc is to be described.

The adjustable sliding compass can be used in conjunction with substantially flat straight edges, tape measures, and other measuring means of conventional type. Such measuring means having differing widths. The slots in the drawing instrument **15** and the sliding holder **14** which receive such measuring means are of dimensions which will allow the passage into them of a wide range of conventionally used measuring means.

Although a detailed description is given above of certain preferred embodiments in accordance with the invention by way of example, any and all modifications, improvements or alternative arrangements falling within the scope of the appended claims should be considered to be a part of the invention.

What I claim is:

1. A sliding compass for adjustably describing an arc of a selected radius length comprising:

a sliding holder and a drawing instrument adapted to be connected by a measuring means, said sliding holder having:

a body with first front and back longitudinal ends;

a first slot with a first front aperture at said first front longitudinal end for receiving measuring means extending longitudinally along the length of said sliding holder body and terminating in a back aperture at said first back longitudinal end;

a plurality of index lines disposed on said sliding holder body and directed substantially perpendicularly to the direction of the first slot;

a first aperture in said sliding holder body for receiving a pivot pin, said aperture communicating with a first vertical passageway extending in a substantially perpendicular direction to the plane of said first slot, said pivot pin aperture lying along said index line closest to a first aperture of said first slot;

first adjustable clamping means for fixing in place measuring means in said first slot;

said sliding holder body having a transparent portion for facilitating visual alignment of a measuring mark on said measuring means with a selected index line;

and said drawing instrument having a body with second front and back longitudinal ends;

a second slot with a second front aperture at said second front longitudinal end for receiving measuring means, said second slot extending longitudinally through said drawing instrument body;

a plurality of second apertures disposed along the length of the drawing instrument body, each second aperture communicating with its own second vertical passageway directed substantially perpendicularly to the plane of said second slot in said drawing instrument body, said second apertures and second vertical passageways being adapted to receive arc describing means, the number of said second apertures and said index lines being equal, the spacing of said index lines and said second apertures being related in that for each of said second apertures spaced at a given interval from a second aperture nearest said second slot front aperture there is an index line equally spaced from an index line closest to said first slot front aperture;

said drawing instrument body having a transparent portion for facilitating visual alignment of a mark on said measuring means with a related second aperture.

2. A sliding compass for adjustably describing an arc of a selected radius length comprising:

a sliding holder and a drawing instrument adapted to be connected by a measuring means, said sliding holder having:

a body with first top and bottom surfaces and first front and back longitudinal ends;

a first slot with a first front aperture at said first front longitudinal end for receiving measuring means extending longitudinally along the length of said sliding holder body and terminating in a back aperture at said first back longitudinal end;

a multiplicity of index lines spaced along the top surface of said sliding holder and directed substantially perpendicularly to the direction of said first slot;

a first top aperture in said top surface for receiving a pivot pin, said top aperture communicating with a first vertical passageway extending between said top and bottom surfaces of said sliding holder body in a substantially perpendicular direction to the plane of said first slot, said first vertical passageway terminating in a bottom aperture, the center of said top aperture lying along said index line closest to the front aperture of said first slot;

a first adjustable clamping means for fixing in place measuring means in said first slot;

said sliding holder body having a transparent portion for facilitating visual alignment of a measuring mark on said measuring means with a selected index line;

and said drawing instrument having a body with second top and bottom surfaces and a second front longitudinal end;

a second slot with a second front aperture at said second front longitudinal end for receiving measuring means, said second slot extending longitudinally through said drawing instrument body and ending within said drawing instrument body at a first planar end surface;

a multiplicity of second top apertures in said top surface each communicating with its own second vertical passageway directed substantially perpendicularly to the plane of said second slot and extending between said top and bottom surfaces in said drawing instrument body, each of said second vertical passageways terminating at a second bottom aperture in said bottom surface, each said second top aperture with its communicating second vertical passageway and second bottom aperture being adapted to receive arc describing means, the center of said second top aperture closest to said second slot front aperture being substantially in the same plane as said planar end surface and the number of said second top apertures and said index lines being equal, the spacing of said index lines and said second top apertures being related in that for each of said second top apertures spaced at a given interval from said second top aperture nearest said second slot front aperture there is an index line equally spaced from said index line closest to said first slot front aperture;

a second adjustable clamping means for fixing in place measuring means in said second slot.

3. The invention as set forth in claim 2 wherein at least one of said second top apertures and its associated second vertical passageway and second bottom aperture are adapted to receive a knife edge.

4. The invention as set forth in claim 2 wherein at least one of said second top apertures, its communicating second vertical passageway, and second bottom aperture are adapted to receive a conventional fountain pen, said second vertical passageway tapering to the dimensions of a conventional fountain pen point at said second bottom aperture to expose only said fountain pen point to contact with objects outside the drawing instrument.

5. The invention as set forth in claim 2 wherein first and second springs communicating with said first and second slots, respectively, are adapted to urge measuring means in said slots in a substantially transverse direction to that of said slots and in a plane substantially parallel to them so as to align said measuring means within said sliding holder and said drawing instrument, respectively, and wherein a multiplicity of zero point indicating lines are disposed on said top surface of said drawing instrument body and directed substantially perpendicularly to the direction of said second slot, one of said zero point indicating lines passing through the center of each one of said second top apertures and corresponding to the related index line of said second top apertures.

6. A sliding compass for adjustably describing an arc of a selected radius length comprising:

a sliding holder and a drawing instrument adapted to be connected by a measuring means, said sliding holder having:

a body with first top and bottom surfaces and first front and back longitudinal ends;

a first slot with a first front aperture at said first front longitudinal end for receiving measuring means extending longitudinally along the length of said sliding holder body and terminating in a back aperture at said first back longitudinal end;

at least one index line disposed on said top surface of said sliding holder body and directed substantially perpendicularly to the direction of said first slot;

a first top aperture in said top surface for receiving a pivot pin, said top aperture communicating with a first vertical passageway extending between said top and bottom surfaces of said sliding holder body in a substantially perpendicular direction to the plane of said first slot, said first vertical passageway terminating in a bottom aperture, the center of said top aper-

ture lying along said index line closest to the front aperture of said first slot;

a first adjustable clamping means for fixing in place measuring means in said first slot;

a first narrow channel for receiving narrow measuring means said first narrow channel extending longitudinally substantially parallel to said first slot through said sliding holder body and terminating in apertures at said front and back longitudinal ends of said sliding holder body;

said sliding holder body having a transparent portion for facilitating visual alignment of a measuring mark on said measuring means with a selected index line;

and said drawing instrument having a body with second top and bottom surfaces and a second front longitudinal end;

a second slot with a second front aperture at said second front longitudinal end for receiving measuring means, said second slot extending longitudinally through said drawing instrument body and ending within said drawing instrument body at a first planar end surface

at least one second top aperture in said top surface communicating with a second vertical passageway directed substantially perpendicularly to the plane of said second slot and extending between said top and bottom surfaces in said drawing instrument body, said second vertical passageway terminating at a second bottom aperture in said bottom surface, said second top aperture, second vertical passageway, and second bottom aperture being adapted to receive arc describing means, the center of said second top aperture closest to said second slot front aperture being substantially in the same plane as said planar end surface;

a second adjustable clamping means for fixing in place measuring means in said second slot;

and a second narrow channel for receiving narrow measuring means, said second narow channel extending longitudinally through said drawing

instrument body substantially parallel to said second slot and terminating in an aperture, at said front longitudinal end of said drawing instrument body and at a second planar end surface plane is substantially parallel to that of said first planar end surface and spaced longitudinally from the plane of said first planar end surface to provide room between said planar surfaces to accommodate a hook assembly of a conventional tape measure.

7. The invention as set forth in claim 6 wherein a longitudinal extension of said sliding holder is provided to serve as a rest space for a spool of conventional tape measure and wherein a third bottom aperture disposed within said drawing instrument body, adjacent said second planar end surface and communicating with said second slot is adapted to receive a hook assembly of a conventional tape meausre.

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HARRY N, HAROIAN, Primary Examiner

U.S. Cl. X.R.

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PO-1050
(5/69)

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,509,631 Dated May 5, 1970

Inventor(s) Eiji Shimoyama

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, line 68, for "9" read --9'--. Column 4, line 17, for "6-2 and 6-1" read --6-2 and 5-1--. Column 7, line 23, after "surface" insert a semicolon; line 41, for "narow" read --narrow--. Column 8, line 5, before "plane" insert --whose--.

SIGNED AND
SEALED
AUG 25 1970

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents