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PATENT SPECIFICATION (11) 1 533 349

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(21) Application No. 24295/77 (22) Filed 19 Nov. 1976
(62) Divided out of No. 1526566
(23) Complete Specification filed 27 June 1977
(44) Complete Specification published 22 Nov. 1978
(51) INT CL² B43L 9/16
(52) Index at acceptance
B6P H2A2

(19)



(54) A DRAWING INSTRUMENT

(71) We, HELIX INTERNATIONAL LIMITED, a British Company, of Helix Works, Engine Lane, Lye, Stourbridge, West Midlands, DY9 7AJ, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to drawing instruments in the form of drawing compasses or dividers, of that kind (hereinafter called "the kind referred to") which has a leg and an arm, or two legs, pivoted together at inner ends thereof, and which has a pivotally-mounted upwardly projecting top terminal part which can be grasped between finger and thumb when using the instrument and which is hereinafter termed a "bow top", said bow top having fork limbs embracing the assembly of pivoted ends of the leg and arm or of the two legs, and there being provided a centralising member held between, and keyed by keying means to, the pivoted-together inner ends of the leg and arm, or of the two legs, said centralising member projecting up into an interior aperture or recess in the bow top whereby angular movement of the leg, or of the one leg, relatively to the arm, or to the second leg, causes the centralising member to press against a side wall of said interior aperture or recess to cause the bow top to turn to keep central.

We have previously proposed a drawing instrument which is of the aforesaid construction and in which the keying means for keying the centralising member comprises two die-cast keying projections, the leg, or the one leg, being provided at its inner end with a first one of said die-cast keying projections and with a first one of said die-cast keying projections and with a first arcuate recess or aperture, and the arm, or the second leg, being provided at its inner end with the second die-cast keying projection and with a second arcuate recess or aperture, said first keying projection engaging said second arcuate recess or aperture, and said second keying projection engaging said first arcuate recess or aperture, and the two die-cast keying projections acting as stops engageable with the ends of the respective arcuate recesses. Such construction is robust, but if the instrument is misused by applying excessive opening-out force, there is a possibility that such excessive force might cause shearing of the die-cast projections, in which case the centralising plate would become inoperative, as it would no longer be keyed in place.

The object of the present invention is to provide a drawing instrument, of the kind referred to, which is of a construction such as to enable it to be inexpensively made as a mass-produced article having means whereby the possibility of the keying means, for keying the centralising member, shearing, in the event of excessive opening-out force being applied to the instrument, is reduced or obviated.

According to the invention, there is provided a drawing instrument of the kind referred to, wherein the bow top is preferably of plastics material and has stop means engageable with the inner ends of the leg and the arm, or of the two legs, whereby to act against angular opening-out movement of the leg, or the one leg, relative to the arm, or the other leg, beyond a pre-determined angular limit, and the said stops means on the bow top are so located that if the intrument is opened out to the predetermined angular limit the said stop means on the bow top take at least part of the shock or strain resulting from said opening-out to the angular limit.

In an exemplary embodiment of the invention, the keying means for keying the centralising member comprise two diecast keying projections, the leg, or the one one leg, being provided at its inner end with a first one of said die-cast keying projections and with a first arcuate recess or aperture, and the arm, or the second leg, being provided at its inner end with the second

die-cast keying projection and with a second arcuate recess or aperture, said first keying projection engaging said second arcuate recess or aperture, and said second keying projection engaging said first arcuate recess or aperture, and the stop means on the bow top being so located that, an opening out of the instrument, the two die-cast projections cannot bear against the ends of the respective arcuate recesses or apertures before the said stop means on the bow top bear against the inner ends of the leg and arm, or of the two legs.

The bow top may have shoulders or projections which are provided one, and are integral with, inside faces of the fork limbs of the bow top, and which have oblique lower faces which constitute the stop means on the bow top and which faces are engageable with straight edge portions of the inner ends of the leg and arm, or of the two legs.

In the accompanying drawings, which show, by way of example, a drawing compass constructed in accordance with the invention:—

Figure 1 is a front view of a compass;

Figure 2 is a section on the line II—II, Figure 1;

Figure 3 is an inside face view of the upper portion of a leg of the compass shown in Figure;

Figure 4 is an outside face view of the upper portion of an arm of the compass shown in Figure 1 (Figures 3 and 4 are on a larger scale than the other Figures);

Figure 5 is a fragmentary view shown in the leg and the arm, of the compass shown in Figure 1, opened-out angularly relatively to each other to a predetermined angular limit position;

Figure 6 is a side view of a bow top of the compass shown in Figure 1; and

Figures 7 and 8 are sectional views on the lines VII—VII, Figure 6, and VIII—VIII, Figure 6, respectively.

Referring to the drawings, a drawing compass comprises a die-cast metal leg 1 provided with a pointed element 2 at its one end and pivoted at its other or inner end, by means of a pivot screw 3, to one end of a shank 4 of a diecast arm 5, said shank having at its other or outer end on integral laterally-projecting stub or barrel 6 which has an external screw thread 7 thereon and which is formed with a socket hole 8 for receiving a pencil or the like. An internally screw-threaded knurled clamping ring 9 is mounted on the stub or barrel 6 and is operatively engaged with the external screw thread 7, said ring 9 being for clamping the pencil or the like in place in the socket hole 8 in the stub or barrel 6.

The leg 1 of the compass shown is provided at its pivoted end with an integral die-cast projection 10 and an arcuate recess 11, and with a plain hole 12 for the pivot screw 3, said projection 10, recess 11 and hole 12 being formed in the die-casting of the said leg 1. The arm 5 is, in the die-casting of said arm, provided at its pivoted end with an integral die-cast projection 13 identical with the projection 10, an arcuate recess 14 identical with the recess 11, and a plain hole 15 for engagement by the pivot screw 3. The projection 10 engages into the recess 14 and the projection 13 engages into the recess 11.

The compass shown is provided with a bow top 16 which is of nylon and which has integral fork limbs 17, 17^1 which embrace the assembly of pivoted ends of the leg 1 and arm 5, and said bow top 16 is held in place by the pivot screw 3, which engages holes in the said fork limbs 17, 17^1. The bow top 16 has therein an interior recess 18 having a mouth presented towards the pivoted-together ends of the leg 1 and arm 5; and mounted on the pivot screw 3, and held between said pivoted-together ends of the leg 1 and arm 5, is a steel centralising plate 19 provided with a pair of elongate holes which are respectively engaged one with each of the projections 10, 13, whereby the plate 19 is keyed to said pivoted-together ends of the leg 1 and arm 5. The plate 19 has an integral upper tongue portion 20 which projects into the interior recess 18 in the bow top, whereby angular movement of one of the members 1, 5 relatively to the other of said members 1, 5 causes the tongue portion 20 of the centralising plate 19 to press against a wall of said recess 18 to cause the now top 16 to turn, about the axis of the screw 3, to keep central with respect to the parts 1, 5. The screw 3 passes through a hole 21 in the centralising plate 19, said hold 21 being elongated to permit the plate 19 to move transversely to the pivot screw 3 when turning about said screw 3. The pivot screw 3 is held in place by a nut 22 thereon adjacent the outer face of one of the fork limbs of the bow top 16.

Provided on, and integral with, the inside face of the one fork limb 17 of the nylon bow top 16 is a shoulder or projection 23 having an oblique lower face constituting a stop surface 24 engageable with a straight edge portion 1^a of the leg 1; and provided on, and integral with, the inside face of the other fork limb 17' of the bow top 16, but at the opposite side of the pivotal axis, of the pivot 3, to the said shoulder or projection 23 is an identical shoulder or projection 25 having an oblique lower face constituting a stop surface 26 engageable with a straight edge portion 5^a of the arm 5. When the leg 1 and arm 5 are opened out angularly, relatively to each other, to the

predetermined angular limit position shown in Figure 5, the stop surfaces 24, 26 respectively engage the edges 1^a, 5^a and act against angular opening-out movement of the leg 1 and arm 5 beyond said predetermined angular limit position. The stop surfaces 24, 26 are so located, in the example shown, that the two die-cast projections 10, 13 cannot bear against the ends of the respective arcuate recesses 14, 11 before the said stop surfaces 24, 26 bear against the edges 1^a, 5^a. At least part of the shock or strain resulting from such opening out to the limit is taken by the stop surface 24, 26 of the nylon bow top and the possiblility of opening out with excessive force causing shearing of the die-cast projections 10, 13 is considerably reduced or is obviated.

The compass shown is of a neat and robust construction which can be inexpensively-manufactured by mass production.

In the arrangement shown, each fork limb, 17 or 17^1, has a further integral shoulder or projection, 27 or 28, identical to the shoulders or projections 23, 25. The downwardly presented oblique surfaces of said further shoulders or projections 27, 28 do not act as stop surfaces for engaging the edges 1^a, 5^a, but the shoulders or projections 27, 28, in conjunction with the shoulders or projections 23, 25, act as means for aligning the pivot holes in the leg, arm and bow top, during assembly of the compass, in a manner described in our co-pending Application Number 24294/77 Serial No. 1,533,348.

If desired, the centralising plate may be keyed in placed by keying means otherwise than by two diecast projections.

The predetermined angular limit position may if desired be other than that shown in Figure 5, the locations of the obliquely-presented stop means being chosen accordingly.

The material of the die-cast leg 1 and arm 5 may, for example, be a zinc-based metal alloy.

The parts of the compass shown may be of any other material, but it is preferred that the leg 1 and arm 5 be of die-cast material and that the bow top be of plastics material.

The invention is also applicable to dividers. Dividers constructed in accordance with the invention may, for example, be of a construction similar to that shown in the drawings except that a second leg, similar to the leg 1, takes the place of the arm 5.

WHAT WE CLAIM IS:—

1. A drawing instrument of the kind referred to, wherein the bow top has stop means engageable with the inner ends of the leg and the arm, or of the two legs, whereby to act against angular opening-out movement of the leg, or the one leg, relatively to the arm, or the other leg, beyond a pre-determined angular limit, and the said stop means on the bow top are so located that if the instrument is opened out to the predetermined angular limit the said stop means on the bow top take at least part of the shock or strain resulting from said opening-out to the angular limit.

2. A drawing instrument as claimed in Claim 1, wherein the bow top is of plastics material.

3. A drawing instrument as claimed in Claim 1 or 2, wherein the keying means for keying the centralising member comprise two die-cast keying projections, the leg, or the one leg, being provided at its inner end with a first one of said die-cast keying projections and with a first arcuate recess or aperture, and the arm, or the second leg, being provided at its inner end with the second die-cast keying projection and with a second arcuate recess or aperture, said first keying projection engaging said second arcuate recess or aperture, and said second keying projection engaging said first arcuate recess or aperture, and the stop means on the bow top being so located that, on opening out the instrument, the two die-cast projection cannot bear against the ends of the respective arcuate recesses or aperture before the said stop means on the bow top bear against the inner ends of the leg and arm, or of the two legs.

4. A drawing instrument as claimed in any one of the preceding claims, wherein the bow top has shoulders or projections which are provided on, and are integral with, inside faces of the fork limbs of the bow top, and which have oblique lower faces which constitute the stop means on the bow top and which faces are engageable with straight edge portions of the inner ends of the leg and arm, or of the two legs.

5. A drawing instrument as claimed in claim 1, substantially as herein described with reference to the accompanying drawings.

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Printed for Her Majesty's Stationery Office, by the Courier Press, Leamington Spa, 1978
Published by The Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

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2. A drawing instrument as claimed in Claim 1, wherein the bow top is of plastics material.

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4. A drawing instrument as claimed in any one of the preceding claims, wherein the bow top has shoulders or projections which are provided on, and are integral with, inside faces of the fork limbs of the bow top, and which have oblique lower faces which constitute the stop means on the bow top and which faces are engageable with straight edge portions of the inner ends of the leg and arm, or of the two legs.

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