

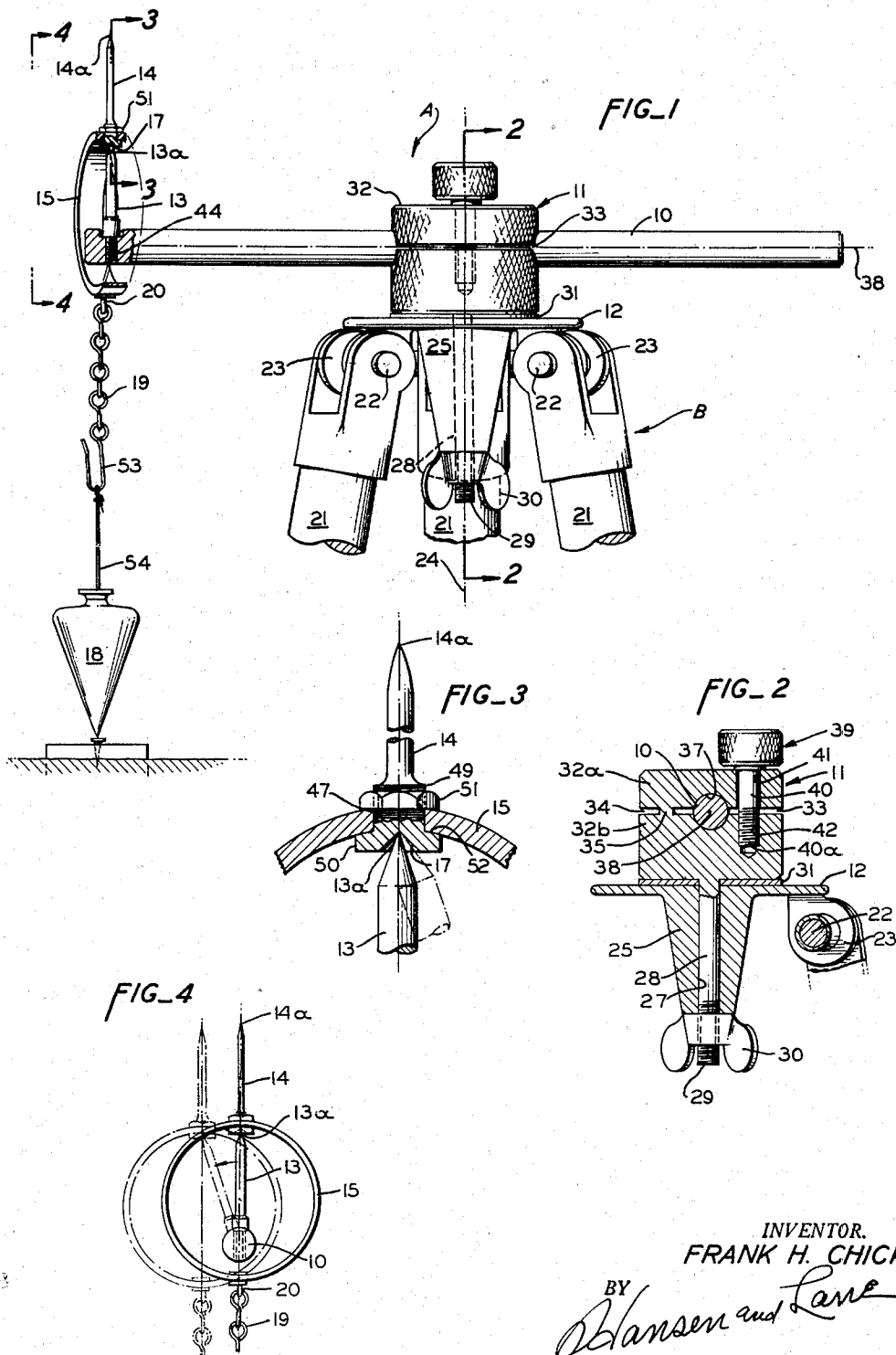
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CHAINING DEVICE FOR SURVEYORS

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CHAINING DEVICE FOR SURVEYORS

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The present invention relates to a surveyor's chaining device, and pertains more particularly to a device for defining and maintaining a point in space, and to facilitate the transferring of that point perpendicularly to the ground therebeneath.

In surveying, particularly in cities and suburban subdivisions, it is essential to define the boundaries of parcels of land such as, for example, street boundaries and building lots, with great accuracy since a slight error in the original survey may lead to the erecting of a building in improper position on a lot, or even extending beyond the lot boundaries. Such errors may lead to serious future litigation and subsequent loss and damage to the property owner.

In accurately determining the boundaries of surveyed parcels of land, it is desirable to be able quickly and accurately to define a point in space, to maintain that point for an extended period of time if desired, and then to run a perpendicular from this point of space to the ground therebeneath where it can be marked by a suitable hub, such as, for example, a point marked by a tack driven into a stake which in turn is driven into the ground at a point indicated by a plumb bob suspended from the point in space.

In running a traverse by means of a conventional surveyor's transit, chain, and some sort of sight or target, it is necessary for the transit operator to retain his transit in erected condition over a previously established point on the ground, and bearing on a desired line of sight, while being driven into the ground. This succeeding hub is driven into the ground at a selected point along the desired line of sight. The location for setting the hub may be determined by a surveyman of the crew holding a plumb bob cord in his hand while the transit operator sights on the cord or on a conventional target centered thereon, and by signals, brings the cord into the line of sight. A hub is then driven below the point of the plumb bob, but the bearing must again be checked before the tack can be driven at the finally established point. Thus the transit must remain set up and the transit operator must continue to sight until the tack has been set. The distance from the previously established point to the tack then is measured, only then can the transit be moved on to its next point of use.

By easily determining, and accurately maintaining a point in space by means of the present invention, it is unnecessary for the transit operator to maintain his transit in its set up condition, and as soon as the point in space has been accurately established the transit operator may move his transit toward its next position, and the rest of the crew may proceed with the other work pertaining to the survey. The hub can then be set by one man as the rest of the crew moves on to their next positions.

The present invention contemplates the provision of improved apparatus for quickly and easily determining a point in space, for maintaining that point in space, and for facilitating the transfer of the point in space perpendicularly to the ground therebeneath.

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The invention further provides precise means for quickly and easily determining a point in space at a convenient height perpendicularly above a previously established point on the ground.

A further object of the invention is to preserve a precisely located point in space for future use or projection perpendicularly to the ground therebeneath as required.

These and other objects and advantages of the invention will be apparent from the following description and the accompanying drawings, wherein:

Fig. 1 is a fragmentary side elevational view showing the head portion of a tripod with a chaining point support rod adjustably mounted thereon, and a self erecting sighting point balanced on the chaining point, portions being broken away.

Fig. 2 is a fragmentary sectional view taken along line 2—2 of Fig. 1.

Fig. 3 is an enlarged fragmentary sectional view taken along line 3—3 of Fig. 1.

Fig. 4 is a fragmentary elevational view from the direction of the arrows 4—4 of Fig. 1, the chaining point pin being shown in upright position in solid lines and in tilted position in broken lines.

Briefly, the illustrated chaining device A embodying the present invention comprises a support rod 10 axially and rotatably adjustable in a clamp 11, which, in turn, is mounted for rotative adjustment on the head plate 12 of a conventional tripod B. A chaining point pin 13 is fixedly secured with its axis diametrically intersecting an end of the support rod 10, and a sighting pin 14 is mounted to project diametrically from a pin-erecting ring 15 to which it is secured.

A conical depression 17 is provided coaxially of the head of the sighting pin 14 to provide a one point, universally tiltable support for the sighting pin on the point of the chaining point pin 13, and a conventional plumb bob 18 is connected by a chain 19 to an eye 20 centered diametrically opposite on the ring 15 from the sighting pin 14, and along an extension of the axis of the latter, to maintain the sighting pin axially upright.

Referring to the details of the illustrated embodiment of the invention, the tripod B consists of the head plate 12 with three conventional tripod legs 21 pivotally connected thereto by pivot pins 22 mounted in bearing flanges 23 secured to the head plate 12 at angular distances of 120° apart about the periphery of the head plate 12 so that the legs 21 may be swung inwardly or outwardly as required relative to a line 24 perpendicularly through the center of the head plate.

An integral conical extension 25 extends downwardly co-axially of the head plate 12, as best shown in Figs. 1 and 2, and has an axial hole 27 therethrough. The rod support clamp 11 has an axially extending shank 28 journaled in the axial hole 27, the lower end portion 29 of the shank 28 being threaded to receive a wing nut 30 thereon. By screwing up the wing nut 30, the clamp 11 may be drawn downwardly into tight, frictional, anchoring contact with a washer 31 interposed between the upper surface of the head plate 12 and the clamp 11.

The clamp 11 has a head portion 32 which is slotted at 33 in a plane extending transversely of the shank axis 24 a major portion of the way through. A second slot 34 also extends co-planar with and in the opposite direction to the slot 33 so that the upper portion 32a of the clamp head portion 32 is supported on the lower clamp portion 32b by a narrow neck 35. The clamp head portion 32 is made of springy deformable material such as brass or steel, and a hole 37 of a size to receive the support rod 10 slidably therein when the clamp head portion is in its normal condition is provided transversely of the head portion 32 with its axis 38 (Fig. 2) disposed medially of the slot 33.

A knurled headed clamp screw 39 has its shank portion 40 inserted in a hole 41 through the upper clamp portion 32a of a diameter slightly larger than the screw shank 40, and the lower threaded portion 40a of the shank 40 is screwed into a correspondingly threaded hole 42 in the lower clamp portion 32b. Upon loosening the knurled clamp screw 39, the support rod 10 is free to be moved slidably axially of the hole 37, and also to be moved rotatively therein to a desired adjusted position.

As shown in Fig. 1, the chaining point pin 13 may be screwed into a threaded hole 44 in the rod 10.

The sighting pin erecting ring 15 may be of suitable material such as spring brass or steel, and has a hole 47 diametrically through one side thereof in which a threaded portion 49 near the base of the sighting pin 14 is inserted. A larger diameter head portion 50 is provided on the inner end of the threaded shank portion 49, and this head portion has the conical depression 17 mentioned previously herein. The sides of this depression diverge at a substantially greater angle than that defined by the pointed end 13a of the chaining point pin 13, so that the chaining point pin may seat in the depression 17 as shown in Figs. 1, 3 and 4, with freedom for relative tilting movement without having the side of the pin engage the side of the depression.

A nut 51, screwed onto the threaded portion 49 of the sighting pin 14 after the pin has been inserted fully in the hole 47 as shown in Figs. 1 and 3 secures the sighting pin firmly on the ring.

The inner side 52 of the head 50 of the sighting pin 14 preferably is curved to conform to the inner curvature of the ring 15 as shown in Fig. 3 to insure a proper seating of the head within the ring, and to prevent relative rotation of the sighting pin.

The eye 20 is secured to the ring 15 diametrically opposite the sighting pin 14 with the eye centered on a prolongation of the axis of the sighting pin, so that when the plumb bob support chain 19 having the plumb bob 18 supported thereby, is connected to the eye 20, its weight will erect the ring 15 pivoted on the point of the chaining point pin 13 and with it the sighting point pin 14 on the ring. A hook 53 preferably is provided on the lower end of the chain 19 to facilitate attachment of a usual plumb bob support cord 54 thereto.

In using the chaining device of the present invention, the support, such as the tripod B, may be set up approximately on a desired line of sight determined by the transit operator. It need not be centered on the line of sight, however, as long as it is within reach of the line of sight by the support rod 10. The clamp screw 39 is loosened, as is also the wing nut 30 to free the support rod 10 for pivotal and axially slidable adjusting movement. The ring 15, with the plumb bob 18 suspended therefrom, then may be mounted on the chaining point pin 13, and the transit operator, sighting on the self erecting sighting point pin 14, signals to the man operating the chaining device A to move the chaining point pin one way or another until the sighting point pin is exactly centered on the transit line of sight.

It will be obvious to those familiar with the art that at close range, when the point 13a of the chaining point pin 13 is clearly visible to the transit operator, this point may be used as an aiming point and the sighting pin then would be used only to transfer this point to the ground beneath. At great distances where even the sighting pin may not be visible to the transit operator, conventional types of targets may be centered on the sighting pin to show the position of its axis.

It is not necessary that the chaining point pin 13 remain erect during this sighting in, and in fact it is frequently helpful to attain a required final fine adjustment by tilting the chaining point pin 13 slightly one way or another.

As soon as the necessary adjustments have been made to center the self-erecting sighting pin 14 on the transit

line of sight, the wing nut 30 and clamp screw 39 are tightened to secure the support rod 10, and thereby the chaining point pin 13, in adjusted position. The point 13a of the chaining point pin 13 is thus established as the determined point in space. The distance from the transit to the point of the chaining point pin may then be measured. In measuring, the calibrated portion of the chain may be brought alongside the point of the chaining point pin, and by placing the chain under predetermined tension, the distance can be read with a high degree of certainty and precision.

The transit operator then may start moving up, while the operator of the chaining device A prepares to set his hub or marker perpendicularly beneath the point 13a of the chaining point pin 13, which in turn was perpendicularly below the point 14a of the sighting point pin 14 due to the weight of the plumb bob and the axial alignment of the sighting point 14a with the apex of the conical depression 17 and the center of the plumb bob support eye 20 as explained previously herein.

While the support for the chaining device A is illustrated as the tripod B, it will be obvious to those familiar with the art that any suitable support may be employed.

Other uses for the chaining device of the present invention also will be apparent to those familiar with the art. For example, it may be used in a conventional manner for back sighting, and for such use it will provide great accuracy and simplicity in operation. The device also may be used for easily and rapidly determining a chaining point in space at a convenient height above a previously located point on the ground.

While I have illustrated and described a preferred embodiment of the present invention, it will be understood however, that various changes and modifications may be made in the details thereof without departing from the scope of the invention as set forth in the appended claims.

Having thus described the invention, what I claim as new and desire to protect by Letters Patent is defined in the following claims.

1. A surveyor's chaining device comprising a support rod, means for mounting the support rod in a substantially axially horizontal position and free for axial and rotative adjustment, and for swinging about a pivotal axis at a selected point lengthwise thereof, means for locking the support rod in adjusted position, a pointed chaining point pin mounted radially of one end of the support rod for adjustment with its pointed end upwardly, a sighting pin, a head on the sighting pin having a tapered recess therein terminating at a single low point coaxially of the sighting pin for mounting the latter on the point of the chaining point pin with the axis of the sighting pin coincident with the point of the chaining pin, a plumb bob support member secured to the sighting pin and extending around and clear of the chaining point pin to a point below the chaining point pin, and a plumb bob connection on the lower end of the plumb bob support member axially aligned with the sighting pin, whereby the weight of a plumb bob suspended centrally from said connection with the point of the chaining point pin directed upwardly and seated in said recess maintains the sighting pin with its axis erect, intersecting the point of the chaining point pin, and coincident with the axis of such plumb bob.

2. A surveyor's chaining device comprising a support rod, means for mounting the support rod in axially and rotatively adjusted position, a chaining point pin secured to project radially from one end of the support rod and pointed on a projecting end thereof, a sighting pin having a recess coaxially thereof for mounting on the point of the chaining point pin thereby to position the axis of the sighting pin coincident with the point of the chaining point pin, a plumb bob support member secured to the sighting pin and extending laterally around and below the chaining point pin and clear of other contact therewith, and a plumb bob connection on the opposite side of

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the plumb bob support member from the sighting pin and axially aligned therewith whereby the weight of a plumb bob suspended centrally from said connection with the point of the chaining point pin directed upwardly and seated in said recess maintains the sighting pin with its axis erect, intersecting the point of the chaining point pin, and coincident with the axis of such plumb bob.

3. A surveyor's chaining device comprising a support rod, means for mounting the support rod in a substantially axially horizontal position and free for axial and rotative adjustment, and for swinging about a pivotal axis at a selected point lengthwise thereof, means for securing the support rod in axially and rotatively adjusted position in the rod support means and transversely of the axis of the latter, a chaining point pin projecting radially from one end of the support rod, the free end of the chaining point pin being pointed, a ring of greater diameter than the distance from the point of the chaining point pin to the opposite side of the support rod, a sighting pin extending radially from the ring, a recess having converging sides terminating in a point exposed inwardly of the ring, the terminal point of the recess being coincident with the axis of the sighting pin, and plumb bob attaching means secured to the ring diametrically opposite the sighting pin and axially aligned with the latter, whereby, when the ring is supported on the chaining point pin with the terminal point of the recess resting on the point of the chaining point pin, the sighting pin will be erected perpendicularly by the weight of a plumb bob attached to the plumb bob attaching means, with the axis of the sighting pin intersecting the point of the chaining point pin, and coincident with the axis of such plumb bob.

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4. A surveyor's chaining device comprising a support rod, means for mounting the support rod in a substantially axially horizontal position and free for axial and rotative adjustment, and for swinging about a pivotal axis at a selected point lengthwise thereof, means for securing the support rod in adjusted position in the rod support means at right angles to the pivotal axis of the support means, a chaining point pin projecting radially from one end of the support rod, the free end of the chaining point pin being pointed, an erecting element mounted at a predetermined point thereof on the point of the chaining point pin and extending laterally clear of the latter to the opposite side of the support rod, a sighting pin mounted on the erecting member with its axis coincident with said predetermined point, and plumb bob attaching means secured to the erecting element on said opposite side of the support rod and axially aligned with the sighting pin, whereby when the erecting element is supported at said predetermined point thereof on the chaining point pin the sighting pin will be erected perpendicularly by the weight of a plumb bob attached to the plumb bob attaching means, with the axis of the sighting pin intersecting the point of the chaining point pin and coincident with the axis of such plumb bob.

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