J. I. D. BRISTOL.

AUTOMATIC HAND LEVEL.

APPLICATION FILED MAY 13, 1916.

1,205,705. Patented Nov. 21, 1916.

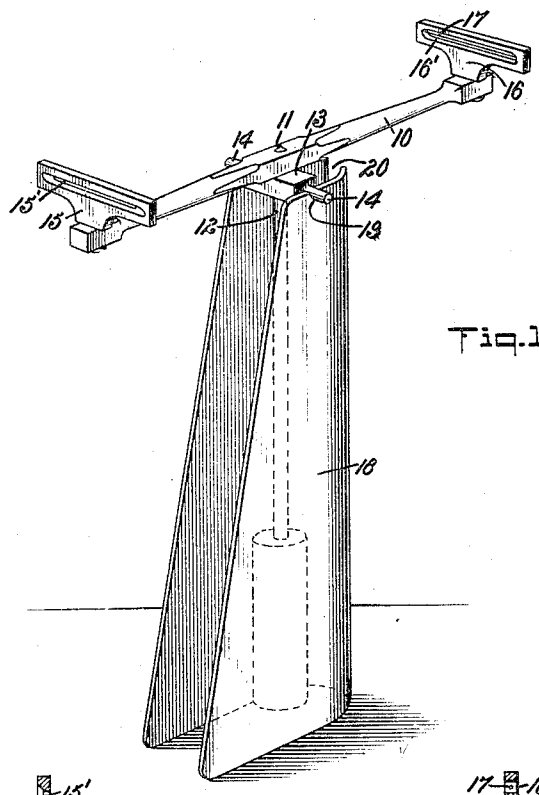


Fig. 1.

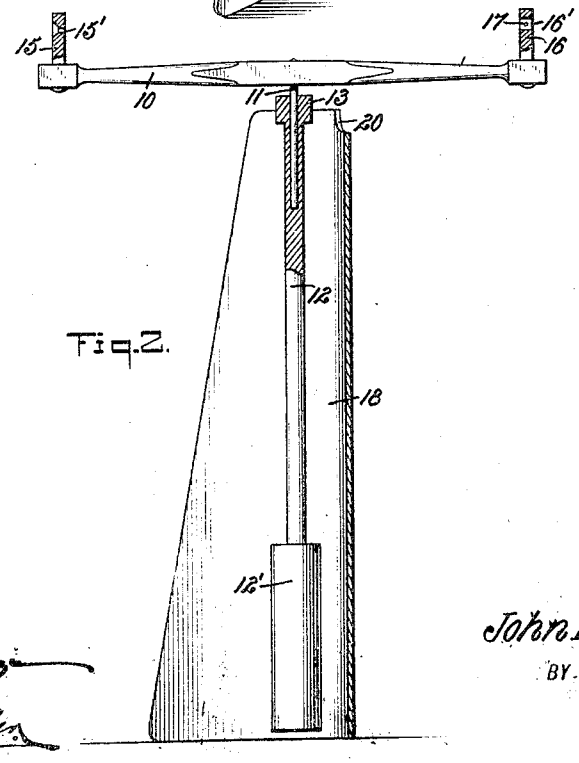


Fig. 2.

WITNESSES

INVENTOR

John I. D. Bristol

BY Munn & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE.

JOHN I. D. BRISTOL, OF CHAPPAQUA, NEW YORK.

AUTOMATIC HAND-LEVEL.

1,205,705. Specification of Letters Patent. Patented Nov. 21, 1916.

Application filed May 13, 1916. Serial No. 97,295.

To all whom it may concern:

Be it known that I, JOHN I. D. BRISTOL, a citizen of the United States, and a resident of Chappaqua, in the county of Westchester and State of New York, have invented a new and Improved Automatic Hand-Level, of which the following is a full, clear, and exact description.

This invention relates to instruments of precision and has particular reference to leveling devices.

Among the objects of the invention is to provide an instrument of the character indicated that is adapted especially for hand operation, the same being easily manipulated and possessed of sufficient accuracy for ordinary purposes, such as laying out lawns, gardens, landscapes, tennis courts, or in approximating the altitude of distant objects or locations.

Another object of the invention is to provide a simple, cheap, and reliable device as stated which may be held in the operator's hand while making the observation, either without or in connection with a wind shield to increase the accuracy or reliability of the observation.

With the foregoing and other objects in view the invention consists in the arrangement and combination of parts hereinafter described and claimed, and while the invention is not restricted to the exact details of construction disclosed or suggested herein, still for the purpose of illustrating a practical embodiment thereof reference is had to the accompanying drawings, in which like reference characters designate the same parts in the several views, and in which—

Figure 1 is a perspective view indicating the instrument standing erect upon a horizontal support; and Fig. 2 is a vertical longitudinal section of the same.

Referring now more particularly to the drawings, at 10 I show a horizontal beam or rod having a central vertical pintle 11 swiveled in the upper end of the pendulum rod 12 and cross head 13. While the beam may turn around the vertical axis of the pintle 11, it is held from inclination with respect to the axis of the pintle and rod 12. At the ends of the cross head are formed trunnions 14, whereby the pendulum and cross head are adapted to be supported upon a horizontal axis which is arranged practically transverse or perpendicular to the vertical plane of the axis of the beam. While I show the pintle 11 projecting downwardly into the open upper end of the pendulum rod, it is obvious that these parts might be reversed without departing from the spirit of the invention, although I prefer the usage as indicated in the drawings because of the longer bearing provided between the pintle and the pendulum rod with a corresponding increase of accuracy of the instrument.

At the opposite ends of the beam 10 and preferably substantially equally distant from the center of the pintle, are arranged a pair of sighting devices 15 and 16, each provided with a long and narrow horizontal slit 15′ and 16′ respectively. These slits are disposed at equal distances above the horizontal axis of the beam. In other words, they are so arranged as to lie precisely in the same horizontal plane perpendicular to the axis of the pendulum. The sighting devices 15 and 16 are rigidly connected to the ends of the beam, and hence the device is not likely to become distorted or out of order.

The pendulum bob 12′ being of considerable mass and at the lower end of a comparatively long rod 12, the beam 10 will always be held substantially level, irrespective of the particular means for supporting the cross head. For ordinary use, therefore, I may support the cross head with the ends or points of the trunnions held between the thumb and finger of one hand, the hand being either below the beam with the thumb and finger held upwardly, or the hand may be inverted and held above the beam out of range of the sighting devices. When held as stated, the pendulum will always gravitate so as to depend in a vertical line, and thereby the beam 10 will be held horizontally, and likewise since the beam will ordinarily be set to extend in a direction perpendicular to the axis of the cross head, the slits 15′ and 16′ will lie practically in a horizontal plane. The operator then with his eye close to the member 15 looks through the slit 15′ and then through the slit 16′, bringing the wire 17 in range with some definite distant object, whose elevation will thus be determined to be the same as the height of the eye of the observer.

When the level is to be supported upon a stationary support, as upon a stone, stump, post, or the like, a holder 18, such as indicated, is employed. This holder is in the nature of an open sided tube having a wide

or flared base to increase the stability thereof, and to provide oscillating space for the pendulum rod protected from the wind. The upper end of the holder is notched at 19 on opposite sides to constitute bearings for the trunnions 14. It is also notched at 20 at the rear to provide free tilting movement of the beam with respect to the holder. The holder may serve also as a means for supporting the device in the hand of the operator taking the observation in windy weather.

The device is very simple of construction, and yet is of a very accurate nature when used as set forth herein and for the purposes stated. It is to be noted also that the instrument is so constructed that in taking it apart, it packs neatly within the wind shield. The sighting devices are designed to take in a much wider range than the ordinary level with cross wires, and this range of vision can also be greatly extended by a slight lateral movement of the horizontal beam 10 in either direction. As another field of usefulness for the instrument it may be noted that it is well adapted for ascertaining the increase or decrease of elevation in road building or the like. For this or similar purposes, it is expedient to use a supporting rod of wood or the like which will elevate the horizontal beam or rod 10 to any desired known extent, depending upon the height of the operator from the ground to the sighting slits. From this point then a wire or cord may be run from the bottom of the supporting rod along the line of operation to say fifty feet or any other suitable known distance, and then by a simple calculation the rise or fall of the roadway may be easily determined.

I claim:

1. The herein described hand level comprising a cross head, means to pivotally support the cross head for rotation around a horizontal axis, a beam pivoted upon the cross head for movement with respect thereto around a vertical axis, a pendulum rigidly connected to the cross head, the connecting means between the cross head and the beam serving to maintain the beam in a plane perpendicular to the pendulum, and sighting devices connected to the ends of the beam, substantially as set forth.

2. In an automatic hand level, the combination of a cross head, means to pivotally support the same for movement around a horizontal axis, a pendulum rigidly connected to the cross head, a beam connected to the cross head and held thereby and by the pendulum in a horizontal plane perpendicular to the pendulum, and a pair of sighting members connected to the ends of the beam, each sighting member being provided with a horizontal transverse slit, both slits being at the same elevation above the axis of the beam, and a wire extending from one end to the other of one of said slits.

3. In an automatic hand level, the combination of an open sided tubular upright holder having at its upper end a pair of notches arranged on opposite sides and forming seats, a cross head having trunnions seated in said seats, a pendulum connected rigidly to the cross head and swinging freely within the holder, a beam provided with a pintle projecting downwardly through the cross head and into the pendulum whereby the beam is held from tilting movement with respect to the pendulum but is free to rotate around the axis thereof, and sighting devices at the ends of the beam, substantially as set forth.

JNO. I. D. BRISTOL.

Witnesses:
J. W. HERING,
M. I. WHITNEY.