

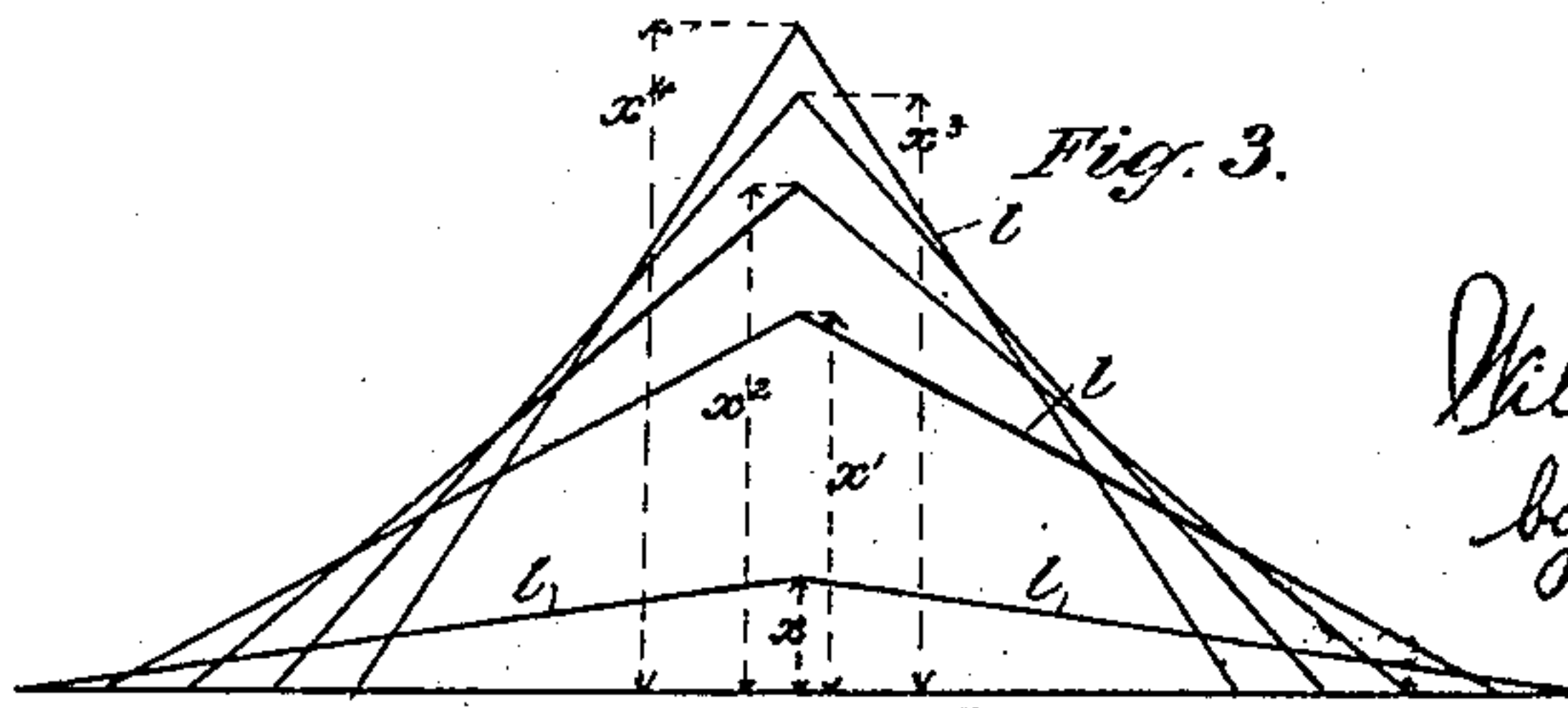
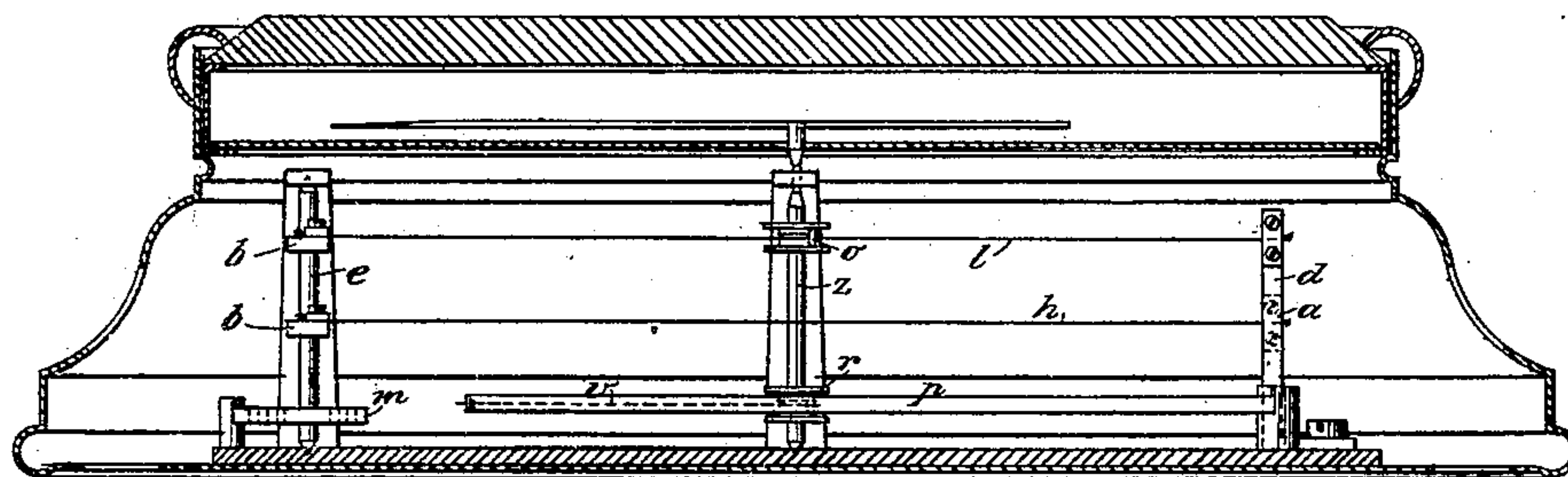
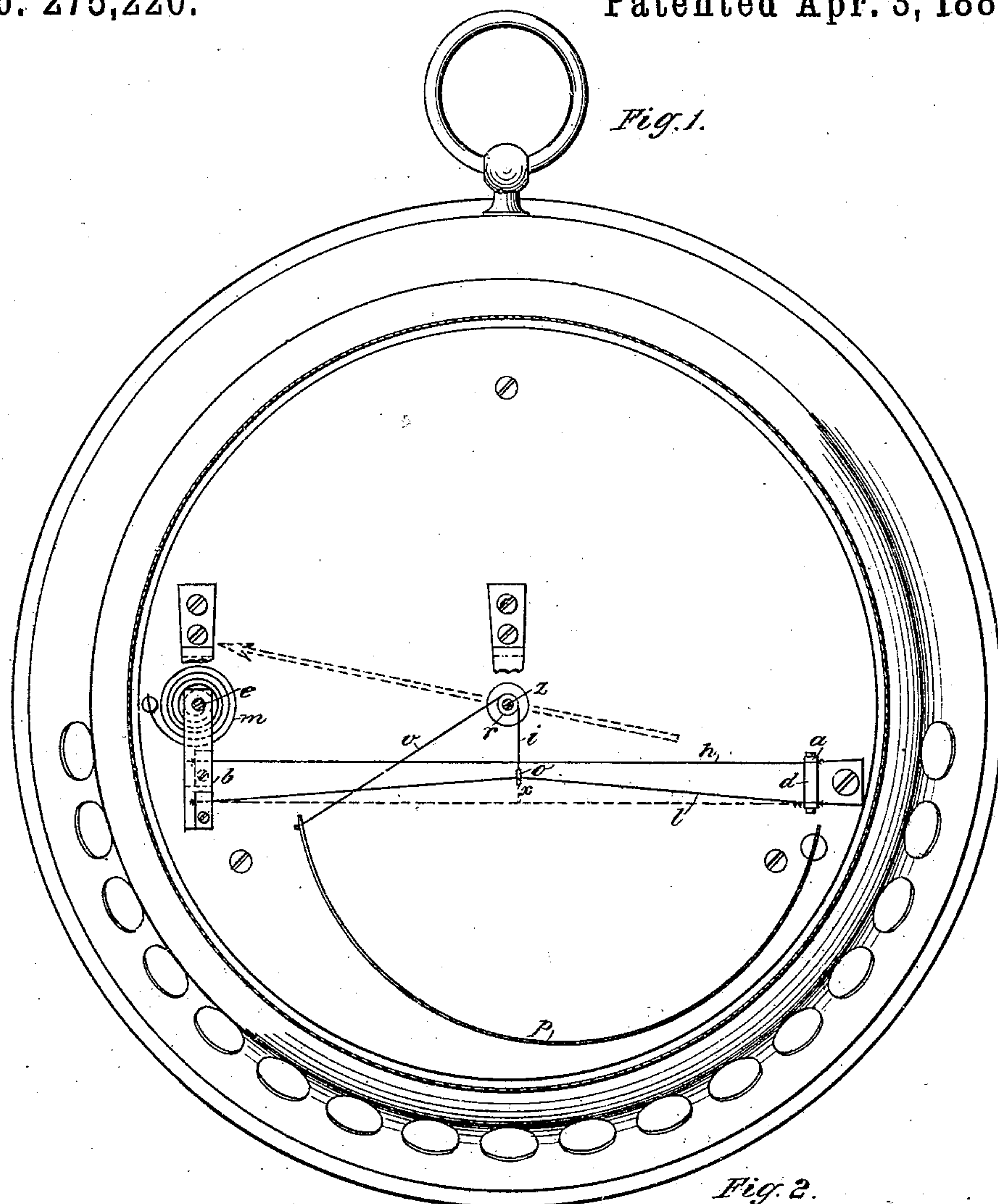
(No Model.)

W. KLINKERFUES.

HYGROSCOPE.

No. 275,220.

Patented Apr. 3, 1883.



Witnesses:
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UNITED STATES PATENT OFFICE.

WILHELM KLINKERFUES, OF GÖTTINGEN, GERMANY.

HYGROSCOPE.

SPECIFICATION forming part of Letters Patent No. 275,220, dated April 3, 1883.

Application filed January 16, 1883. (No model.)

To all whom it may concern:

Be it known that I, WILHELM KLINKERFUES, a subject of the Emperor of Germany, and residing in the city of Göttingen, Germany, have invented certain new and useful Improvements in Meteorological Indicating-Instruments, of which the following is a specification.

This invention relates to hair hygrometers, and is also applicable to other instruments in which the hygroscopic qualities of the human hair are employed for indicating the relative moisture of the atmospheric air, in combination with air-pressure and temperature of air. As a hair or a hair string of quality and preparation as used for hygrometers or weather-instruments generally changes its length not in geometrical proportion to the changes of relative moisture of the air, and as, for instance, a hair string of one hundred units of length is, by an increase of relative moisture from 0 per cent. to ten per cent., lengthened 0.517 units, while by an increase of relative moisture from ninety per cent. to one hundred per cent. the length is increased only 0.117 units, a practical difficulty arises in construction and adjustment of such hygrometers and other meteorological instruments connected therewith, for the reason that they cannot have their corresponding scales divided into equal parts or divisions without the use of more or less complicated mechanical arrangements of adjustment. By the present invention this difficulty can be overcome with an exactness that fully suffices for most practical purposes.

Figure 1 is a front view of an apparatus illustrating my invention. Fig. 2 is an axial section of the same, and Fig. 3 is a diagram illustrative of the action of the non-hygroscopic string on the hygroscopic hair string.

Suppose a hair or hair string, h , be with its one end secured at a fixed point, d , and to its other end secured to an arm, b , fastened to the axle e , which is influenced by a spring, m , in such a manner that the hair string h is continually kept extended in a straight line. This arm b will, by an increase of relative moisture of the air and corresponding lengthening of the hair string h , be caused to turn to the left, together with the axle e . If to this arm b a non-hygroscopic string, l , be attached with its

one end, while its other end is fastened to a fixed part or standard, d , of the instrument, and if this string l is of such length that it will remain bent during all changes in length of the hair string h , this bend (designated by x in the drawings) will be of different widths, according to the changes in length of the hair string h . With an increase of the length of the hair string h —that is, during an increase of percentage of relative moisture—this bend x will be reduced, while it will be increased with a decrease of relative moisture of the air. By connecting the bend x of the string l by means of an eye, o , and another non-hygroscopic string, i , to a roller or lever on the index-axle z , which latter, by another string, v , and roller r and a small spring, p , keeps the string l taut, the indicating-hand of the shaft z will, according to the changes of relative moisture, either turn to the right or left, and indicate either a rise or fall of percentage of relative moisture of the air.

As the size of the bend x of string l during equal changes in length of string h or distance between the points at which l is fastened does not grow or decrease in geometrical proportion with the hair string h or the aforesaid distance, but as, on the contrary, x increases in decreasing proportion with equal reductions in length of the hair-string h , as will be understood with reference to Fig. 3 of the drawings, while it grows in increasing proportion with equal increases in length of h , this geometrical attribute of the bend x , in combination with the aforesaid attribute of a hair string, according to which the dimensions in length increase in decreasing geometrical proportions with the percentage of relative moisture of the air, allows the use or application of a scale with equal divisions for all percentages of relative moisture.

If the bracket d , to which the hair string h and string l are attached, instead of being a fixture to the ground-plate of the instrument, is connected to the free end of a thermometrical ring, after Bourdon's system, or to the free end of an aneroid-ring, after Bourdon's system, or to the diaphragm of an aneroid-box, after Vidi's system, this bracket d will, according to the changes of temperature or to the barometric alterations of air-pressure, come nearer

to or be moved farther apart from the axle *e*, and will consequently influence the movements of axle *z* and the indicating-hand, in combination with the hygroscopic alterations of hair string *h*. In such combination the invention
5 can usefully be applied to instruments indicating the dew-point of the air or to instruments for foretelling the coming weather.

What I claim as my invention, and desire to
10 secure by Letters Patent, is—

The combination of a straight hygroscopic hair string, *h*, and a non-hygroscopic bent

string, *l*, connected by means of a string, *i*, to the axle *z* of the index, in such a manner that the shortening of the hair string *h* deep- 15
ens the bend of the string *l*, while the lengthening of the hair string *h* flattens this bend, all substantially as described, and for the purpose set forth.

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