

(No Model.)

3 Sheets—Sheet 1.

H. J. HAIGHT.
ELECTRIC INDICATING INSTRUMENT.

No. 467,505.

Patented Jan. 26, 1892.

Fig. 2.

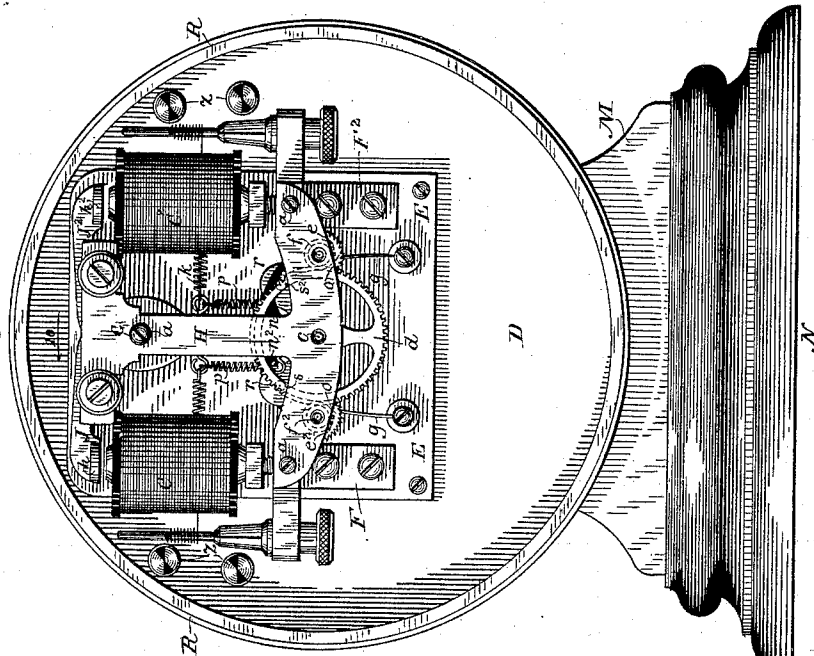
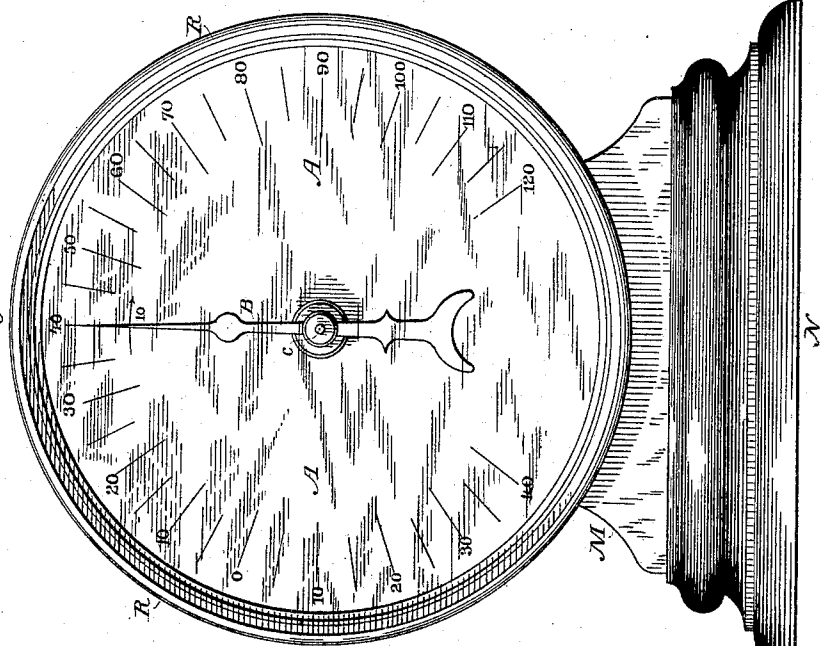


Fig. 1.



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Fig. 4.

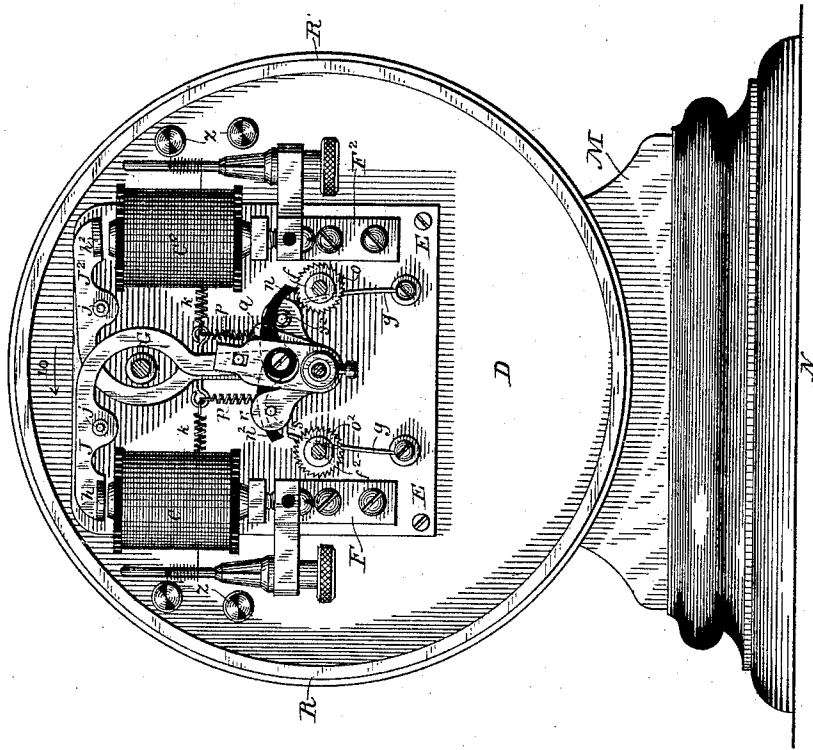
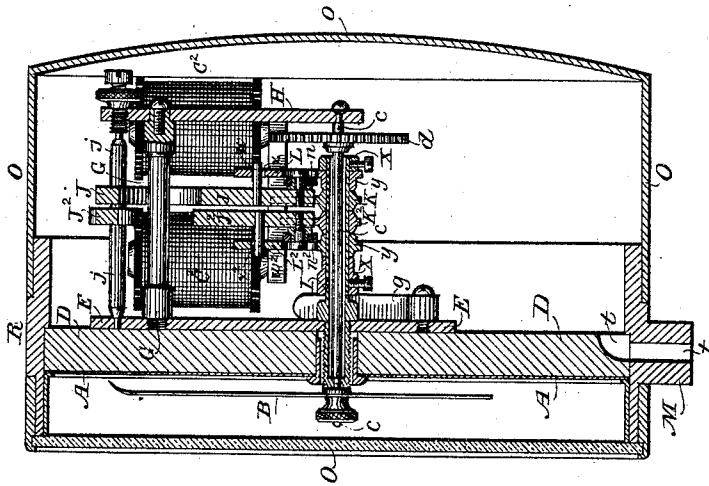


Fig. 3.



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Fig. 5.

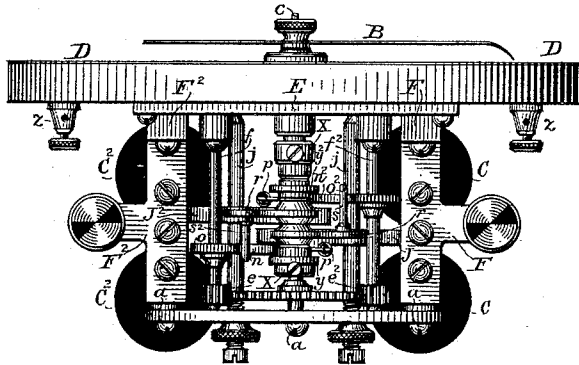


Fig. 6.

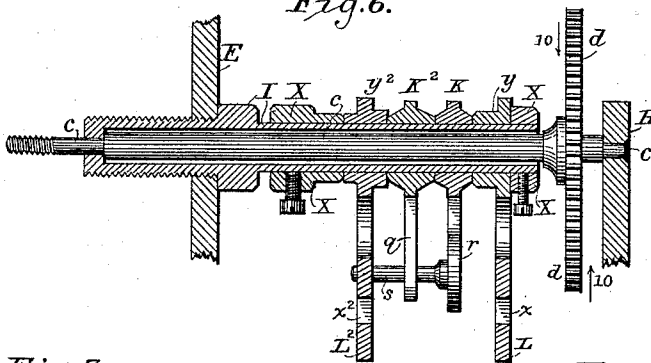


Fig. 7.

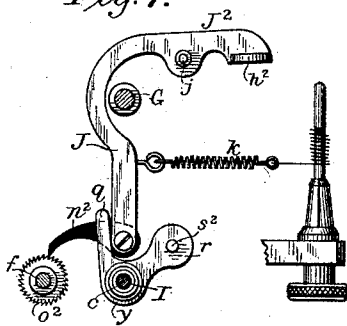
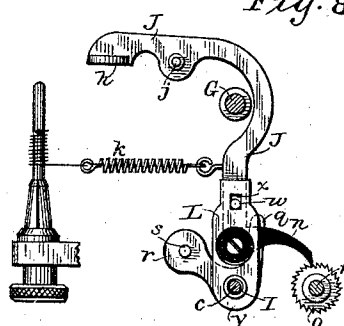


Fig. 8.



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UNITED STATES PATENT OFFICE.

HENRY JANSEN HAIGHT, OF NEW YORK, N. Y.

ELECTRIC INDICATING-INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 467,505, dated January 26, 1892.

Application filed February 7, 1891. Serial No. 380,612. (No model.)

To all whom it may concern:

Be it known that I, HENRY JANSEN HAIGHT, of the city, county, and State of New York, have invented certain new and useful Improvements in Electric Indicating-Instruments, of which the following is a specification.

This invention relates to that class of electric indicating-instruments which comprises a fixed dial or reading-scale, an index co-operating therewith capable of a step-by-step movement in either direction, two electro-receptive devices, such as electro-magnets, and mechanism intermediate between said electro-receptive devices and said index which moves said index in opposite directions, depending upon which of said electro-receptive devices is actuated by an electric current. Such electric instruments are used for various indicating purposes, such as in dial-telegraphy and for indicating and exhibiting meteorological data, stock-quotations, weights, or any other information which is capable of interpretation through the movements of an index. The only special features in the instrument to make it capable of transmitting any desired information are that it shall have a properly-graduated dial and that the index shall have a range of movement to adapt it to the particular dial.

More specifically, the present invention consists in certain specific improvements in the construction of the indicating-instruments which are set forth in Letters Patent of the United States No. 376,149, granted to me January 10, 1888, and Letters Patent of Great Britain No. 20,522, granted to me December 16, 1890.

In indicating-instruments of this character it is essential that the index should be moved each time an exactly uniform distance, and in order that this may be accomplished it should be mounted to turn in rigid bearings, which will not be jarred or worked loose, and a limiting device should be employed which will insure the accuracy and uniformity of the movements of the index. The present improvements consist in the features in the construction of the instrument which secure these objects.

The improved instrument is illustrated in the accompanying drawings, wherein—

Figure 1 is a front view of the instrument. Fig. 2 is a rear view of the same with the protecting-cover removed. Fig. 3 is a central vertical cross-section. Fig. 4 is a view similar to Fig. 2, looking at the rear of the instrument, but with part of the mechanism removed. Fig. 5 is a plan view of the index-actuating mechanism. Figs. 6, 7, and 8 are detail views of parts of the instrument.

The instrument comprises as its primary features a properly-graduated dial or reading-scale A, an index B, capable of a step-by-step movement in either direction, two actuating electro-magnets C C², and mechanism intermediate between said magnets and said index. The excitation of magnet C causes the movement of the index in one direction, while the excitation of the other magnet C² causes its movement in the opposite direction. The scale, index, magnets, and actuating mechanism are all supported on a suitable supporting-plate D of insulating material—such as wood—and to the rear of this plate D is rigidly secured a metallic plate E. On opposite sides of this plate E are rigidly mounted two metallic brackets F F², which support the magnets C C², respectively. Also rigidly mounted on the plate E is a perpendicular metallic post G. A T-shaped bridge H is rigidly secured to the outer ends of the post G and brackets F F² by screws *a a*, so that said bridge is held parallel with the plate E and in rigid and immovable connection therewith. On this rigidly mounted and secured bridge H and the plate E are mounted all the actuating mechanisms intermediate between the magnets C C² and the index B. Consequently the rigid support of the bridge H is of the highest importance, and it is secured by the brackets F F² and the post G. There is also rigidly secured to the plate E a hollow sleeve I, (shown most clearly in Fig. 7,) the front end of which extends through the plates D and E, as shown in Fig. 3, and the rear end of which terminates a short distance behind the bridge H. The index B is secured to a shaft *c*, (so as to rotate therewith,) which extends longitudinally through said sleeve I and is journaled in bearings formed by the front end of the sleeve and the bridge H, as shown most clearly in Fig. 7. This shaft *c* carries at its rear end, between the open end

of the sleeve I and the bridge H, a pinion d , which meshes on diametrically-opposite sides with two pinions $e e^2$. The pinion e is carried by a shaft f , journaled at opposite ends on the metal plate E and bridge H, and the pinion e^2 is carried by a similar shaft f^2 , journaled in a similar manner. The pinions $e e^2$ are held in any position in which they may be left by springs g , which bear frictionally against the shafts $f f^2$, as shown in Fig. 4. By rotating these pinions $e e^2$ alternately in opposite directions the pinion d (and with it the shaft c and index B) will be rotated alternately in opposite directions.

To enable the pinion e to be rotated, the magnet C is provided. The armature h of this magnet is carried by a vibrating armature-lever J, which is carried by a rock-shaft j , which is journaled at opposite ends by suitable provisions in the bridge H and metal plate E. (See Fig. 3.) This armature-lever is vibrated in one direction when the armature h is attracted to the magnet C on the excitation of the same by the passage of an electric current and in the opposite direction by a spring k . (See Fig. 4.) The lower arm of the armature-lever J carries a pawl n , pivotally mounted thereon. This pawl engages with a ratchet-wheel o , which is fixed to the same shaft f that carries the pinion e . The pawl is normally held in engagement with the ratchet o by a spring p . (Shown most clearly in Fig. 4.) When an electric current passes through magnet C, its armature will be attracted, thus swinging the lever J and rotating the ratchet-wheel o , and with it the shaft f , pinions $e d$, and index B in the directions indicated by the arrows 10 in Figs. 1, 2, and 4. In an exactly similar manner the magnet C^2 controls the movement of an armature-lever J^2 , carrying its armature h^2 . Lever J^2 has a pawl n^2 , which normally engages a ratchet-wheel o^2 , thus rotating the index B in the opposite direction. The extent of movement of the armatures of the magnets in connection with the relative lengths of the two arms of the armature-levers, the diameter of the ratchet-wheels, and the proportionate sizes of the pinions determines the distance or step which the index B moves. The dial or scale A is graduated in accordance with the length of the step and each graduation is determined by the particular unit of measurement which may be desired for the instrument. If it is a temperature-indicating instrument, this unit would be appropriately a degree of temperature. By successively magnetizing and demagnetizing one of the magnets, as C, the index may be moved any desired number of steps or degrees in one direction, and by successively magnetizing and demagnetizing the other magnet C^2 the index may be moved any desired number of steps or degrees in the opposite direction. Since both pinions $e e^2$ are constantly in gear with the pinion d , it follows that all three pinions and both ratchets $o o^2$ must move to-

gether; but since under ordinary circumstances the pawls $n n^2$ would prevent the backward rotation of their respective ratchets $o o^2$ provision is made to throw one pawl entirely out of action when the other is in operation.

On the fixed sleeve I are hung so as to turn thereon two collars or hubs K K². The hub K has two rigid arms $q r$, (see Fig. 6,) which straddle the lower free end of the vertical arm of the armature-lever J, the arm q lying between the vertical arm of the armature-lever J and the shaft f and the arm r lying between said vertical arm and the shaft f^2 . The arm r of the hub K has a perpendicularly and rearwardly projecting horizontal pin s , which in the normal stationary position of all the parts rests just below the pawl n^2 of the other lever J^2 , as shown in Figs. 4 and 5. When now the vertical arm of the lever J is moved under the influence of its actuating-magnet C in the direction of arrow 20, it strikes the arm q of the hub K, thus causing the latter to turn on the sleeve I, and thereby raising the pin s . The pin s on being raised encounters the pawl n^2 and swings it upward, so as to cause it to be entirely freed from its ratchet o^2 . The pinions $d e e^2$ are then free to be rotated by the action of the pawl n on the ratchet o . In an exactly similar manner the hub or collar K² has arms which straddle the other armature-lever J^2 . The pin s^2 on the arm of this hub extends forwardly, (see Fig. 5,) so as to rest below the pawl n and throw it out of engagement with the ratchet-wheel o , when the armature-lever J^2 and its pawl n^2 act upon the ratchet-wheel o^2 . It is thus clear that it is only necessary to excite one or the other of the magnets C or C² in order to move the index B in either direction and that the index will remain in any given place until one of the magnets is excited. The springs $g g$, by reason of their frictional contact with the shafts $f f^2$, prevent any movement of the pinions $e e^2$, except by the action of the armature-levers. It is evident that the extent of each step-by-step movement of the index B is determined by the extent of movement of the armature-levers J J². Accordingly, it is necessary that limiting means should be employed for limiting and determining the extent of the movement of these levers, which shall be certain, accurate, and uniform. Each of the levers J J² has a separate limiting device. The lever J has near its lower end an outwardly-projecting pin w , which swings, with the lever, in an arc having the shaft j as a center. This pin enters and engages an aperture x , extending through the upper part of a link L, which at its lower end is provided with a collar y , which embraces the sleeve I. The link is thus suspended from and is capable of swinging on the sleeve I, and consequently its aperture x swings in an arc of which the sleeve I is the center. The aperture x is of a size somewhat larger than the pin w and is preferably rect-

angular in shape. The relative sizes of the pin w and aperture x determine the extent of movement of the armature-lever J. Since the pin w and aperture x swing in different arcs, it follows that when the pin swings in one direction it will encounter the margin of the aperture x on one side, and when the pin swings in the opposite direction it will encounter the margin of the aperture on the opposite side. The relative sizes of the pin w and aperture x are such that the index B is moved the proper distance, the armature h never strikes the magnet C, and the lever J never strikes the post G. A principal object in having the aperture x located in a swinging link L is that thereby noise is reduced to a minimum, so that the movements of the instrument are only faintly audible. The pin w when it swings does not encounter and strike a fixed stop; but, on the contrary, when it first encounters a margin of the aperture x it causes the link L to swing, and then the movements of both cease simultaneously, and while the pin w is in contact with the margin of the aperture x . In an exactly similar manner the armature-lever J² is provided with an inwardly-projecting pin w^2 , which enters a slightly larger aperture x^2 in a link L², having a collar y^2 , whereby it is suspended from and swings on the sleeve I.

The collars $y y^2$ and hubs K K² are held on the sleeve I and maintained in proper position thereon by collars X, which are held fast to the sleeve by set-screws Y. It will thus be observed that all of the moving parts of the instrument are mounted either on the rigid sleeve I or between the fixed metal plate E and the rigidly-mounted bridge H.

There are shown on the wooden base-plate D binding-posts $z z$ for the attachment of cir-

cuit-wires and for connecting them to the magnets C C².

The base-plate D, which supports the mechanism of the instrument, may be mounted in any convenient case. It is shown in the drawings of a circular shape and mounted in a ring or cylinder R, which in turn is carried by a bracket M, secured to a base N. Covers O O are provided for the front and back of the case, the front cover having a glass plate for enabling the position of the index B to be seen. The ring R and its bracket M are formed with a passage-way t for the circuit-wires.

I claim as my invention—

1. A swinging armature-lever, a ratchet-wheel, and a pawl carried by said lever, which engages said ratchet-wheel, in combination with a limiting device therefor, said limiting device consisting of a link swinging on a different center from that on which said lever swings and reciprocally engaging parts carried by said lever and said link, respectively, substantially as set forth.

2. A swinging armature-lever having a projecting pin, a ratchet-wheel, and a pawl carried by said lever, which engages said ratchet-wheel, in combination with a limiting device for said lever, said device consisting of a link swinging on a different center from that on which said lever swings, and said link having an aperture in which said pin enters, said aperture being larger than said pin, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

HENRY JANSEN HAIGHT.

Witnesses:

JOSEPH A. STOCKEN,
SPENCER D. NEWKIRK.