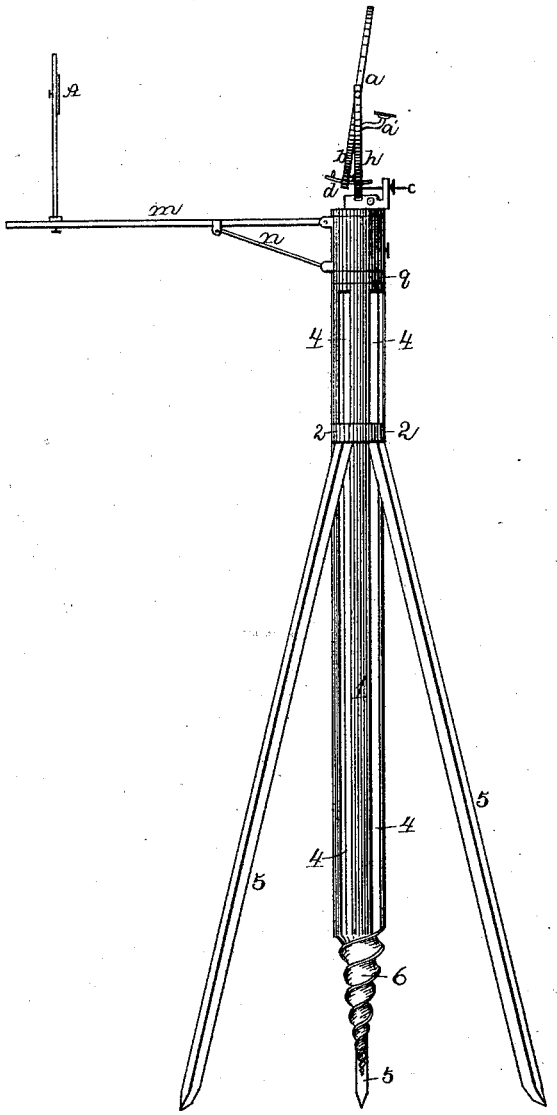
5 Sheets—Sheet 1.

J. W. GARNER.

Heliotrope.

No. 216,565. Patented June 17, 1879.

Fig. 1.



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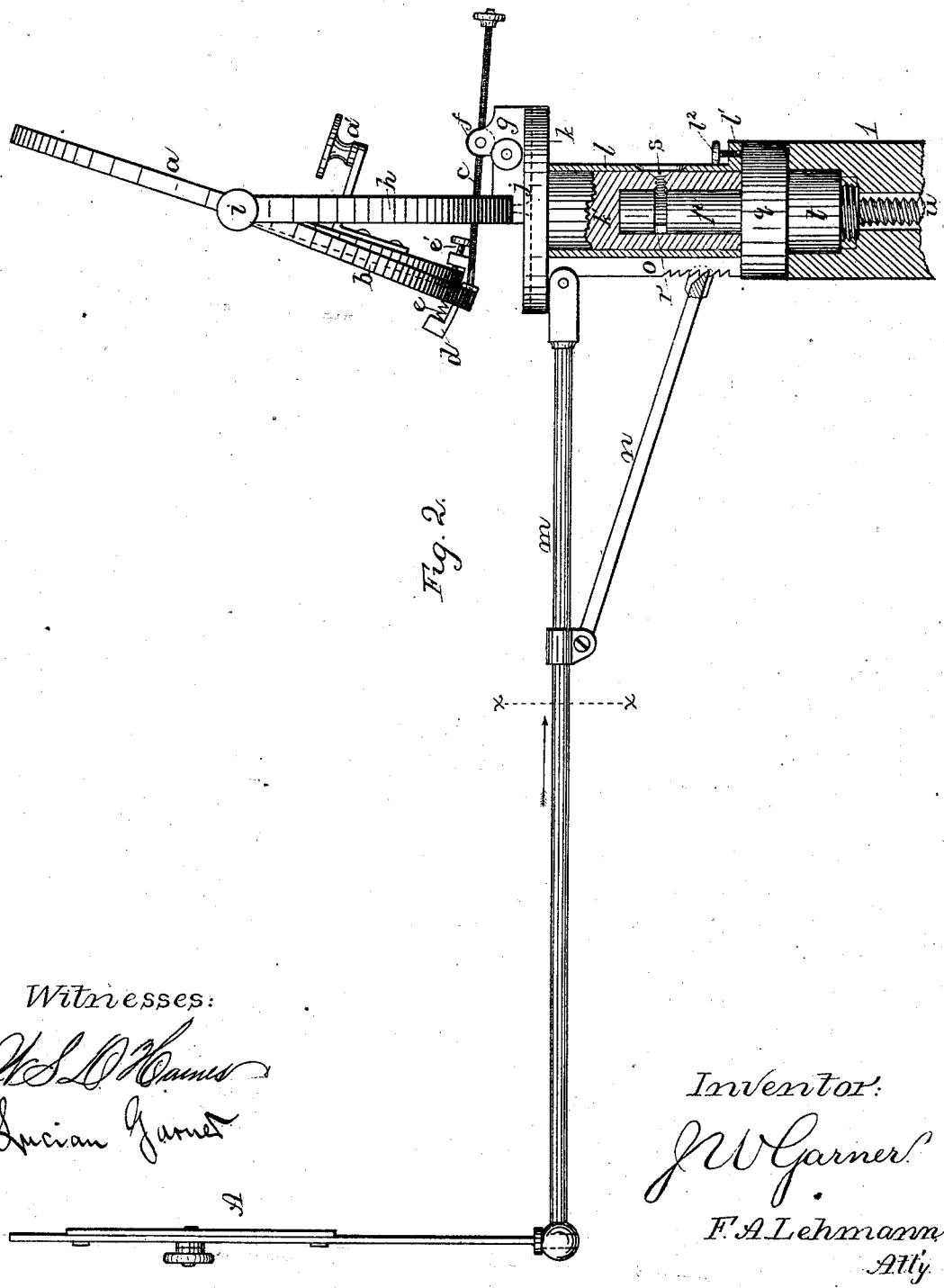

Fig. 2.

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Fig. 3.

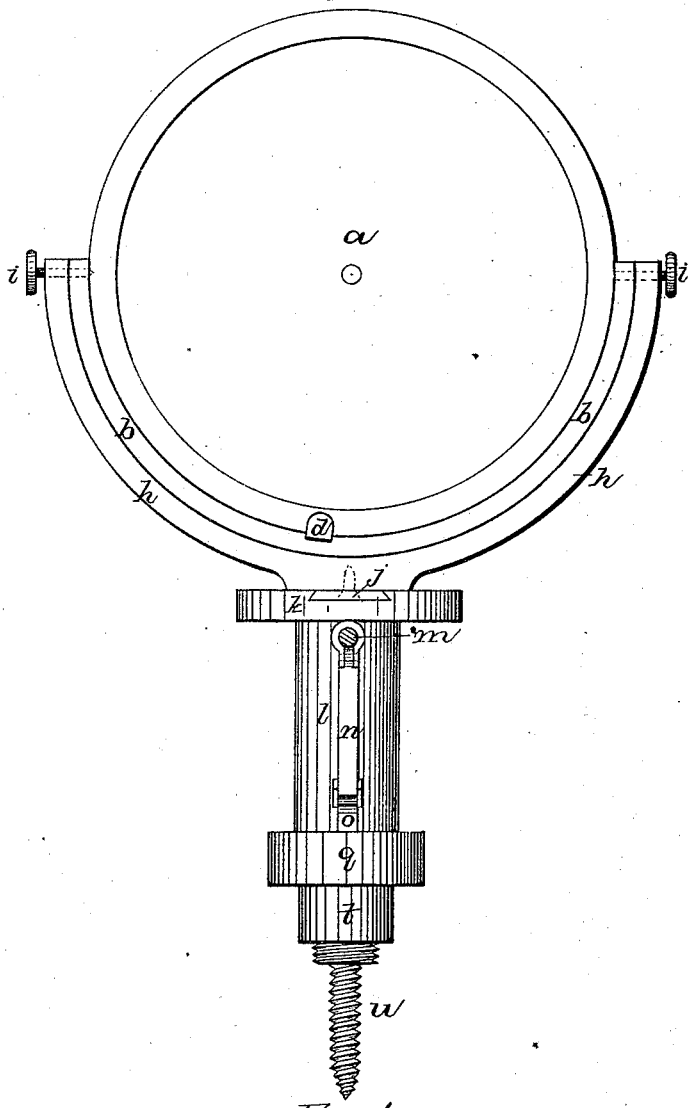

Fig. 4.

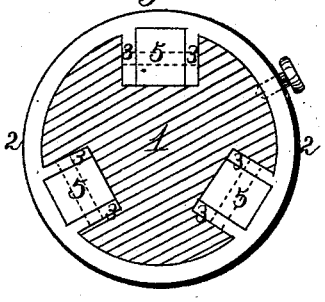

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Fig. 5.

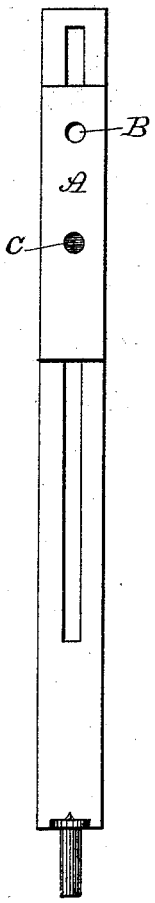


Fig. 6.

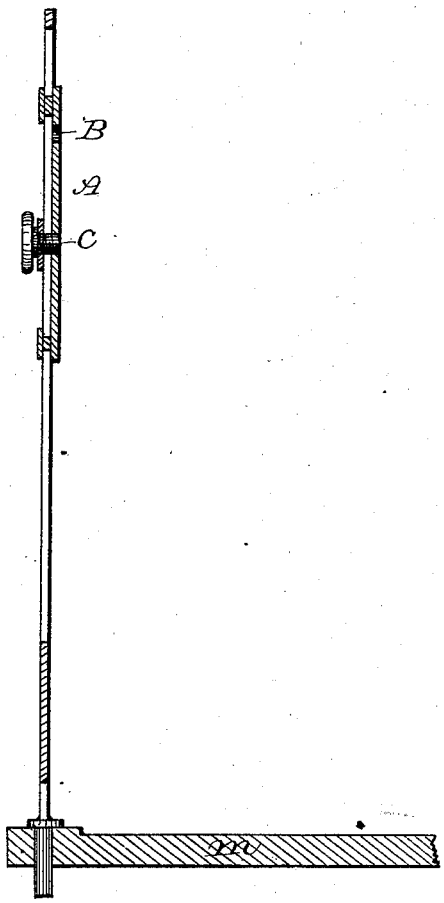
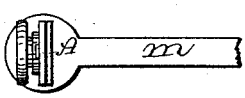


Fig. 7.



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Heliotrope.

No. 216,565. **Patented June 17, 1879.**

Fig. 8.

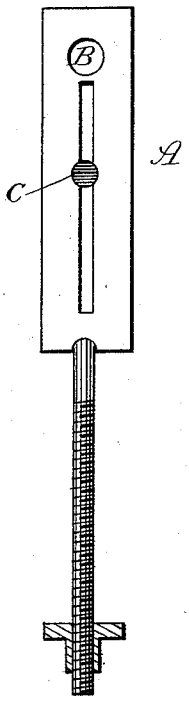
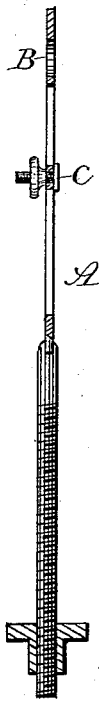


Fig. 9.



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UNITED STATES PATENT OFFICE.

JOHN W. GARNER, OF WASHINGTON, DISTRICT OF COLUMBIA.

IMPROVEMENT IN HELIOTROPES.

Specification forming part of Letters Patent No. **216,565**, dated June 17, 1879; application filed May 20, 1879.

To all whom it may concern:

Be it known that I, J. W. GARNER, of Washington, in the District of Columbia, have invented certain new and useful Improvements in Helio-Telegraphs; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in helio-telegraphs; and it consists in the peculiar construction and arrangement of parts, whereby a cheap, light, simple, and effective signaling-instrument is produced, as will be more fully described hereinafter.

In the accompanying drawings, Figure 1 is a side elevation of my invention. Fig. 2 is an enlarged view of the upper portion of my instrument, partly in section. Fig. 3 is a front elevation, showing the instrument detached from the standard. Fig. 4 is a cross-section of the standard. Figs. 5, 6, and 7 are detailed views of the sight.

a represents a circular plane mirror, which has a small circle in its center left without reflecting properties, so that it can be used in sighting the instrument. Secured to the back of the mirror, and removable at will, is the finger-key *a'*, which is used to operate it.

b is a metallic ring, in which the mirror swings, and is provided at its lower center with an arc, *d*, or its equivalent, extending at right angles to the ring, a suitable spring, *e*, and an adjusting-screw, *e'*, whereby the distance through which the mirror is to oscillate can be regulated at will. Secured to the lower center of the ring *b*, by means of a ball-and-socket joint, or in any other manner that may be preferred, is the adjusting-screw *c*, which passes through the nut *f*, which is secured between the ears *g*, which extend back from the bottom of the ring *h*. By means of this construction the mirror can be kept at a proper angle to the sun by turning the screw *c*, and without having to adjust the entire instrument.

The mirror *a* and ring *b* are held in position by means of the screws *i*, which extend through the upper ends of the semicircle *h*, which rises from the base *j*. This base *j* is beveled, and is secured to the platform *k* by means of a dovetail groove cut in the upper face of the platform, as shown in Fig. 3. By this construction the operating parts can be removed from the standard in transportation.

In order to adjust the mirror to keep pace with the lateral motion of the sun, I pivot the ring *h* on the base *j*, and provide it with any suitable mechanism for moving it from side to side.

Encircling the shank *k'*, which extends from the lower side of the platform, is the sleeve *l*, to which is pivoted the arm *m*, which extends outward between the instrument and the distant station, and has at its outer end the sight, or a second mirror, as circumstances may require.

Pivoted to the lower side of the arm *m* is the brace *n*, which extends backward and catches into the rack *o*, so as to prevent the arm from vibrating. By this arrangement the arm can be tightened to any desired extent. If necessary, cords or wires may be run from the screws *i* to the outer end of the arm, so as to still further strengthen it; but this, in practice, will seldom, if ever, be required.

Projecting from the lower side of the platform *k* is the shank *k'*, which is made hollow, so as to receive the projection *p*, which extends from the upper side of the cap *q*. This projection is provided with a groove, *r*, and extending through the shank *k'*, and fitting into the groove, is the screw *s*, thus securing the shank and the cap together, so as to allow them to be revolved at will. As the mirror is supported by the shank, and the arm *m* by the sleeve, it will readily be seen that by this construction each may be moved independently of the other, or they may both be moved together, without having to move the standard. When it is desired to signal different stations, this will be found of great utility, and will save the time required to readjust the standard.

In order to keep the arm *m* from swinging, and thus getting the sight out of position, I provide the sleeve *l* with an annular flange or a projection, l^1, and any number of thumb-screws, l^2, so as to clamp the sleeve *l* firmly to the cap *q*, as shown in Fig. 2.

Extending from the lower side of the cap is

the shank *t*, which fits into a corresponding recess made in the top of the standard 1, and projecting below this shank *t* is the screw *u*, which extends still farther into the standard. This cap *q* is thus made removable at will, so that the instrument may be taken from the standard, and, by means of the screw *u*, applied to a fence, house-top, tree, stump, or any other object desired.

Secured to the outer end of the arm *m* is the sight A, which is provided with any suitable means of adjustment. In the upper end of the sight is the hole B, and at a suitable distance below this hole is the adjusting-point C. Encircling the standard 1, and sliding up and down upon it, is the ring 2, which is provided with a thumb-screw, so that it can be secured at any point. From the inner side of the ring 2 project the ears 3, as shown in Fig. 4. These ears fit into grooves 4, made in the standard. Pivoted into these ears 3 are the upper ends of the legs 5, which have their lower ends pointed, so as to be secured in the ground.

By means of the grooves 4 the legs may be folded up into the standard, so as to be out of the way in transportation. The lower end of the standard 1 is provided with a screw, 6; or the standard may be pointed, if preferred, by which means it can be secured in the ground. By this construction of the standard the instrument can be so firmly secured in place that it will be almost impossible for the wind to shake or overturn it.

The operation of my invention is as follows: The instrument is fixed in position, and the mirror turned facing the station to which the message is to be transmitted. This can be determined by placing the eye to the back of the mirror and looking through the little hole in its center until the object-point is plainly in view. The arm *m* is then placed in such a position as to bring the hole in the sight directly between the hole in the center of the mirror and the station to which the message is to be sent. The mirror is then inclined until it receives the rays of the sun in such a manner as to cause it to illuminate the sight, throwing the shadow left by the hole in the mirror on the adjusting-point C. The finger-key is now depressed, causing the shadow on the sight to move upward until it covers the hole B, and the result is that a flash of light will be transmitted to the distant station.

It is apparent that the shadow-point and the hole C (or two shadow-points, which may be used, if preferred) should be adjustable relatively to each other, to adapt the sight for use at a greater or lesser distance from the mirror, or to correspond with the adjustment of the mirror to suit the operator when the sight is stationary. Such a construction I show in Figs. 8 and 9.

By arranging a code of signals to suit the requirements of the case, and by operating the mirror accordingly, intelligible messages can be readily transmitted a number of miles.

When the sun is to the rear of the operator, a second mirror is used instead of the sight, the mirror having a strip of white paper with the adjusting-point marked on it. This second mirror will reflect the light in the direction it should go.

In the instruments now commonly in use, the mirror and sight are placed on separate standards; and in order to signal first to one station and then to another, it is necessary to take up the standard on which the sight is supported and replant it—an operation which consumes from five to fifteen minutes, as, in addition to the replanting of the standard, the sight has to be readjusted.

In my instrument, in order to establish communication with different stations successively, all that is necessary is to swing the arm carrying the sight, and this also rotates the shank on which the mirror is supported, thus keeping the sight and the mirror in a line with one another.

By looking through the hole in the mirror the proper elevation of the sight can in an instant be determined, and the whole operation of thus transferring communication from one station to another should not consume more than a minute at the outside limit.

The sight which is used in connection with the instruments now in use is provided with but a single shadow-point, which is placed near the top. The instrument has to be adjusted so that the shadow from the center of the mirror falls on the point when the mirror is inclined, and as soon as the shadow reaches this point the flash is seen at the distant station.

In sending messages by codes, this flash, produced in adjusting the instrument, is liable to be confounded with the message, thus causing a great deal of delay and annoyance, as the instrument has to be almost continually adjusted in order to keep pace with the sun.

The sight which is provided for my instrument has two points marked on it—the hole near the top, which is used to get the correct vertical adjustment, and the adjusting-point below it.

By this contrivance the adjustment of the instrument will cause no flash to be transmitted to the distant station, and, consequently, no uncertainty in the mind of the receiving-operator as to whether the flash is a part of a letter or only an adjustment of the sending-operator.

In order to send messages it is necessary to fix the instrument so as to be almost immovable by the wind; and as in the instrument now in use there are two light tripods, it will be difficult, if not impossible, to secure them firmly in hard ground.

In my instrument the standard consists of a center post screwed into the ground, and braced by any suitable number of legs placed at an angle to it, thus securing it firmly in place.

Having thus described my invention, I claim—

1. In a helio-telegraph, the combination and

arrangement upon the same standard of the mirror and sight, these two parts being secured to different portions of the apparatus, as described, and thus adapted to rotate together or independently of each other, substantially as shown.

2. In a helio-telegraph, the standard 1, provided with a screw or equivalent device upon its lower end for fastening it in the ground, the upper end of the standard being swiveled to the apparatus, so that the standard can be turned freely around in either direction without turning the apparatus, substantially as set forth.

3. In a helio-telegraph, a standard having a screw or equivalent device upon its lower end to fasten it in the ground, in combination with sliding and folding braces that are attached to the standard, substantially as specified.

4. In combination with the standard having a screw upon its lower end and grooves in its side, the sliding adjustable legs, substantially as described.

5. A helio-telegraph provided with a screw upon its lower end, the said screw being swiveled in position, so as to revolve independently of the instrument and of the shank, and adapted to fit in the upper end of the standard, substantially as specified.

6. In a helio-telegraph, the combination of a mirror adapted to revolve upon the platform, a platform that is adapted to revolve upon the sleeve, and a sleeve that revolves upon the shank, all constructed substantially as described, whereby each part may be adjusted independently of the other, substantially as shown.

7. In a helio-telegraph, the arm *m*, carrying a sight and pivoted to the sleeve at its inner end, and provided with the brace and rack, whereby it may be supported, substantially as set forth.

8. The combination of the mirror *a*, semicircle *b*, swiveled in the outside semicircle or frame, stop *d*, spring *e*, and finger-key *a'*, substantially us described.

9. The mirror *a*, semicircle *b*, swiveled between the outside frame and the mirror, stop *d*, spring *e*, and adjusting-screw *e'*, substantially as set forth.

10. The combination of the mirror *a*, semicircle *b*, and adjusting-screw *c*, the screw being connected to the semicircle by a suitable joint, substantially as specified.

11. The combination of a mirror, its supporting-semicircle *h*, and a slide, *j*, that fits in a groove in the platform, whereby the mirror and all of its attachments can be readily removed, substantially as shown.

12. In combination with a helio-telegraph mirror, a sight provided with an adjusting-point, C, and hole B, substantially as described.

13. In a helio-telegraph, a sight, A, provided with the hole B and the shadow-point C, adjustable relatively thereto, substantially as and for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 19th day of May, 1879.

J. W. GARNER.

Witnesses:
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