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PATENTED AUG. 22, 1905.

J. F. WATSON.

APPARATUS FOR SIGNALING BY REFLECTING THE RAYS OF THE SUN OR
OTHER LIGHT.

APPLICATION FILED NOV. 10, 1904.

2 SHEETS—SHEET 1.

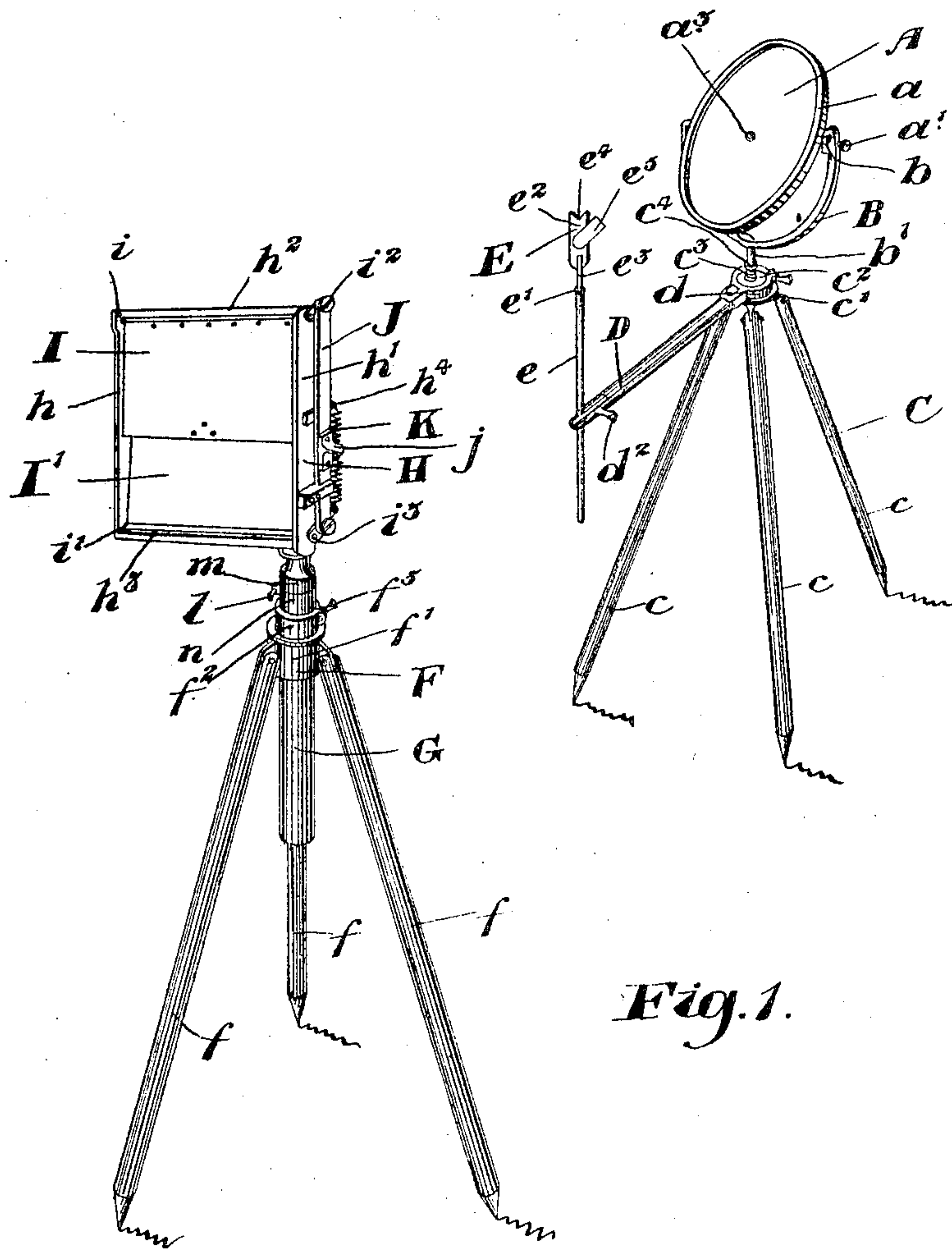


Fig. 1.

Witnesses

R. S. Smart
J. H. Glen.

Inventor

John Frederick Watson
by
J. B. Fetherstonhaugh
Atty.

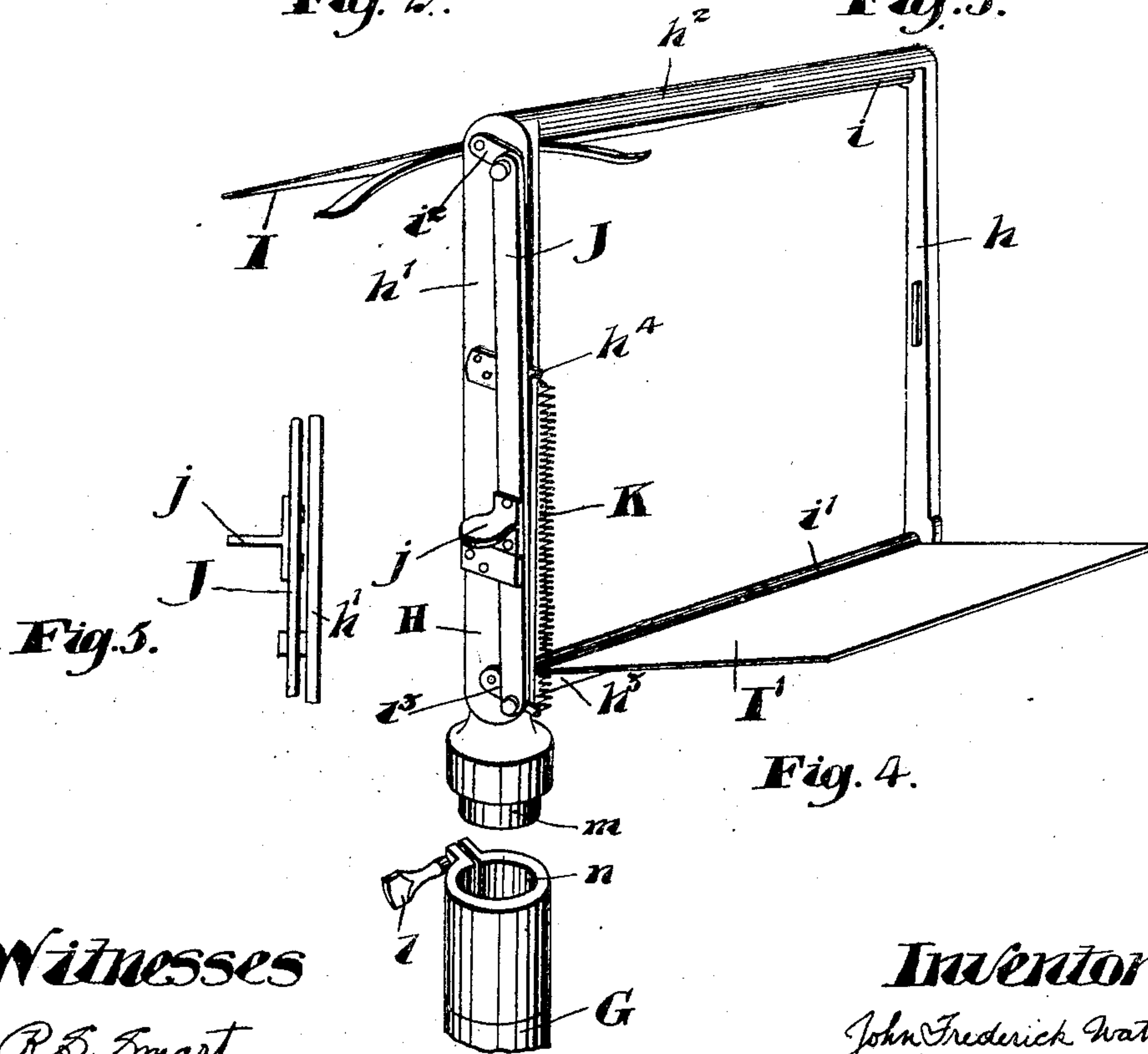
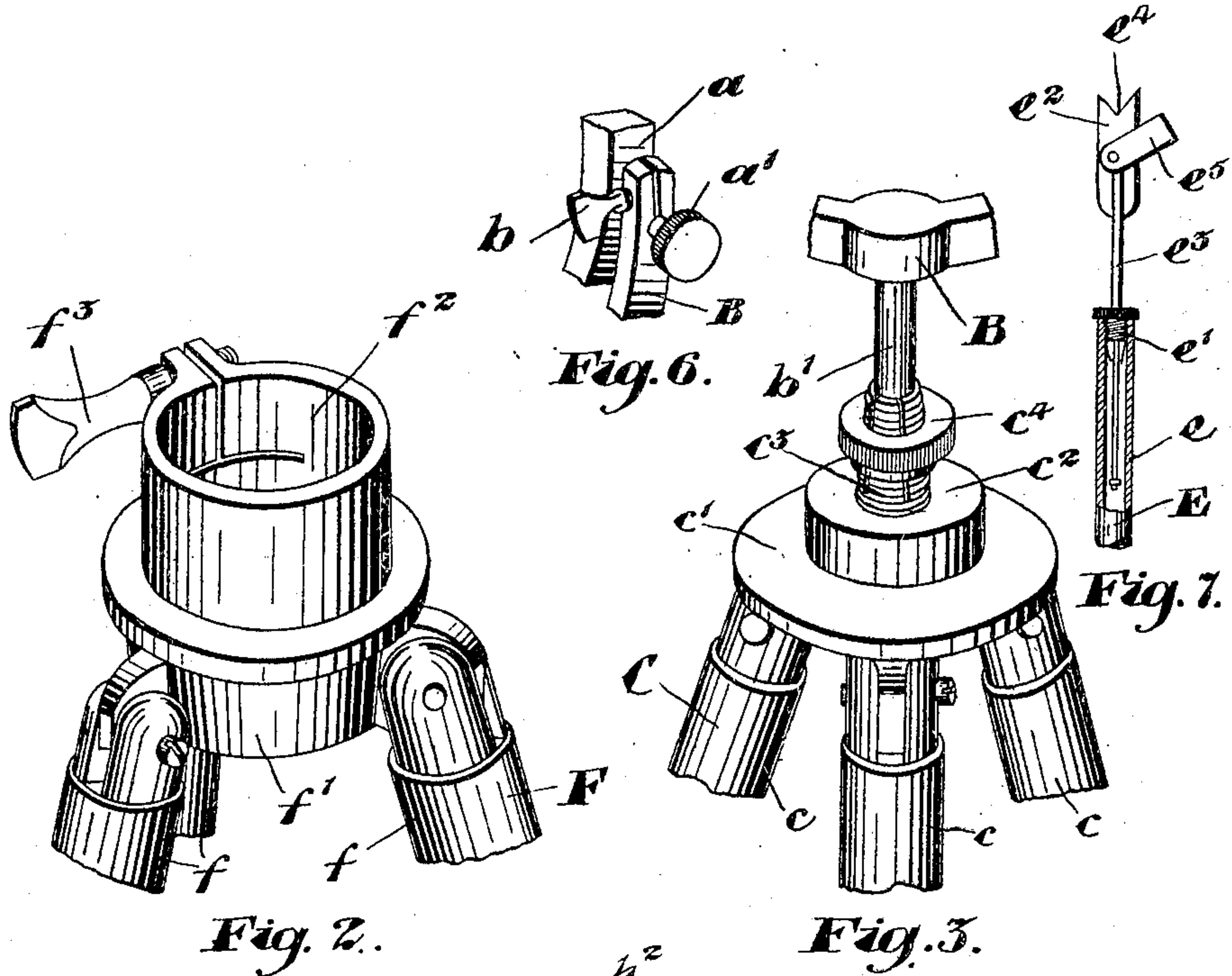
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att'y.

UNITED STATES PATENT OFFICE.

JOHN FREDERICK WATSON, OF OTTAWA, CANADA.

APPARATUS FOR SIGNALING BY REFLECTING THE RAYS OF THE SUN OR OTHER LIGHT.

No. 797,996.

Specification of Letters Patent.

Patented Aug. 22, 1905.

Application filed November 10, 1904. Serial No. 232,179.

To all whom it may concern:

Be it known that I, JOHN FREDERICK WATSON, of the city of Ottawa, in the county of Carleton, Province of Ontario, Dominion of Canada, civil servant, have invented certain new and useful Improvements in Apparatus for Signaling by Reflecting the Rays of the Sun or other Light, of which the following is a specification.

My invention relates to improvements in apparatus for signaling by reflecting the rays of the sun or other light; and the objects of my invention are to devise certain improvements in the apparatus for this purpose, generally known as "heliographs" or "heliostats," by means of which without reducing the efficiency of the apparatus it will be made lighter and more portable and such that it may be worked by the operator sitting or lying on the ground, which will be less tiring and will further make it possible to operate with a comparative degree of safety in exposed positions or from behind scant cover. Further objects are to simplify the construction, thereby reducing the chance of errors due to the tangent-screws and other weak parts of the present standard apparatus, to provide a quick means of directing the reflected rays on a given point, and, lastly, to provide an intercepting-shutter which shall when open allow the full beam of light to pass there-through and in which the pressure from the finger of the operator will come substantially in line with the axis of the supporting-tripod; and it consists, essentially, of the parts and combinations of parts hereinafter set forth, and illustrated in the drawings, in which—

Figure 1 is a perspective view of the reflecting apparatus and the intercepting apparatus or shutter. Fig. 2 is a perspective detail of the top of the tripod holding the shutter. Fig. 3 is a perspective detail of the top of the tripod holding the mirror. Fig. 4 is a perspective detail of the shutter. Fig. 5 is a side elevation showing in detail a portion of the shutter. Fig. 6 shows a detail of the trunnion in which the mirror is held. Fig. 7 is a detail, partly in section, of the V-sight.

In the drawings like letters of reference indicate corresponding parts in each figure.

The apparatus shown in Fig. 1 is that designed to be used in cases where it is possible to reflect the light upon the spot where the signal is to be sent with a single mirror. In

other cases a duplex mirror is used precisely similar in construction to the ones shown and arranged in a manner well known to those familiar with the heliostat.

A is the mirror, which is supported in a suitable circular frame *a*, the construction of which is according to the usual practice and need not be here described.

B is a substantially U-shaped frame in which the frame *a* of the mirror is pivotally suspended by means of suitable pivotal supports, such as the trunnions *a'*, extending through the arms of the U-shaped frame, one side of the U-shaped frame being split above the bearing for the trunnions and provided with a set-screw *b*, whereby the mirror may be securely fastened in any position to which it may have been adjusted by the friction on the trunnion when the set-screw *b* is tightened up.

In one point, however, my mirror differs materially from that ordinarily used. For the purpose of sighting I provide an unsilvered portion *a''* directly in the center of the mirror. The shape of this unsilvered portion is that of an annulus of very small diameter, the center of the annulus being part of the original silvering of the mirror. This greatly aids in the quick alinement of the instrument.

C is the tripod for the support of the frame and mirror and consists of the legs *c* and the plate *c'*, to which the legs are suitably hinged, the said plate being provided with an upwardly-extending central portion *c''* of smaller diameter than the main portion of the plate. A tapered externally-threaded socket *c'''* extends upwardly from the center of the portion *c''* and is formed with a plurality of longitudinal slots extending from the upper edge thereof toward the top of the portion *c''*. The tripod C is a very low one, being preferably less than twenty-eight inches from the ground.

A standard *b'* is provided on the U-shaped frame and extends downwardly from the lower portion thereof and is adapted to fit in the central hole in the socket *c'''*. A nut *c''''*, having a tapered and threaded interior, is adapted to screw on the outside of the socket *c'''*, thereby gripping the standard *b'* and securing the mirror and frame in any position to which they may be adjusted in a vertical sense.

D is a supporting-bar which extends outwardly from the upper portion of the tripod C and is adjustably secured thereto by a split collar *d*, which surrounds the upwardly-ex-

tending portion c^2 on the plate c' and is designed to be clamped in any position to which it may be adjusted by means of a set-screw d' , which extends through two lugs formed at the extremities of the split collar. At the outer extremity of the supporting-bar D a sighter E is adjustably secured by suitable means. This sighter consists of a light rod or tube e , having a cap e' threaded into its upper end, a sighting-V e^2 , supported by a light rod e^3 , which extends through the cap e' with a tight fit, so that the V may be adjusted vertically by simply pulling the rod e^3 out or forcing it in.

A coarser adjustment of the sight in the vertical direction may be made by means of the split end of the supporting-arm D, through which the rod e passes, a set-screw d^2 being provided for drawing together the bifurcated ends of the arm, and thereby clamping the vertical rod e . The V-sight consists of the plate e^2 , having a V-shaped notch e^4 in its upper end, and a plate e^5 , which is pivotally secured to the plate e^2 and is adapted to swing into position behind the V-shaped notch for reasons to be hereinafter explained.

Referring now to the light-intercepting apparatus, F is a supporting-tripod having the legs f hinged to the central socket f' , the said socket being provided with an upper split portion f^2 , provided with a tightening set-screw f^3 .

G is a standard which supports the frame H of the shutter. This standard is made in two portions in order that it may be conveniently packed away in a small case. These are secured together by means of a plug and socket m and n , a set-screw l being provided to secure rigidity of connection between the two portions. The frame H consists of uprights h h' and cross-pieces h^2 h^3 , the upright h' being practically vertical above the standard G and the remaining portion of the frame extending to one side thereof.

The means for intercepting the beam of light consists of a pair of shutters I I'. These shutters are pivotally supported in the frame H by pintles i i' , which extend through and have their bearings in the side pieces or uprights h h' of the frame. To the ends of the pintles which extend beyond the side pieces h' of the frame cranks i^2 i^3 are secured rigidly, and a vertically-disposed connecting-rod J is pivotally secured by suitable means to the free ends of these cranks.

K is a tension-spring, the upper end of which is secured to a projection k^4 , rigidly secured to the upright h' , and the lower end of which is secured to the outer end of the crank i^3 . It will thus be seen that the tension of the spring will tend to hold the shutters I I' in the closed position. A projection j is formed on the connecting-bar J, and by means of this projection the operator may

press downwardly with his thumb or finger, thereby opening the two shutters I I' in opposite directions. A suitable felt-tipped spring-cushion is provided on one of the shutters to prevent too great a jar and to reduce the noise when they come together when they are being worked at a high rate of speed. A stop is also provided for insuring their stopping at the proper position when they are closed, and a stop is provided to be engaged by a projection from the connecting-bar to insure its stopping when the shutters have been opened to their full extent.

It may here be mentioned that the vertical adjustment of the shutter is secured by moving the standard G up or down in the socket F and clamping it in the desired position by the set-screw f^3 .

Having now described the construction of the device, I will proceed to indicate the mode of operation of the same. The first step is to set the reflecting apparatus on the spot to which the signal is to be transmitted. For this purpose a small piece of the silvering is removed from the back of the mirror in the center thereof. This silvering is removed in the form of an annulus of very small diameter, the center portion consisting of a piece of the original silvering. It will thus be seen that in sighting with the apparatus the exact center of the apparatus may be more easily found. By looking through the transparent portion and getting the central silvered spot and the lower angle of the V-sight directly in line with the object the first part of the sighting is accomplished. The sighter is then securely clamped and the plate e^5 is brought up behind the V-sight. The mirror is then adjusted till the shadow of the central non-transparent portion comes directly in the base of the V, and it will then be sighted and may be clamped rigidly in position. The shutter is then placed in such a position as to intercept the beam of light from the mirror, and by opening and closing the same the signals may be transmitted.

The construction and operation of the invention having now been described, I will point out the advantages which my apparatus possesses over devices of the kind now in use. The principal advantage of the construction which I have shown is its great simplicity, as a large number of complicated parts, which I find to be quite unnecessary in this type of apparatus, have been dispensed with. I have further improved the sighter by providing the more simple means of securing the same to the supporting-tripod and by forming it with a V-shaped slot and the plate to be brought behind the slot, so that the shadow of the central silvered spot of the mirror may be more clearly seen when adjusting the machine.

Another important feature of my invention

is the improved arrangement of the light-intercepting shutter, by which the pressure comes directly over the center of support instead of considerably to one side thereof, as has previously been the custom. By this means the shutter is made very much more steady and is less liable to be thrown out of position during operation.

Another feature which may be pointed out is the arrangement of the shutter in two parts which when opened leave a clear space for the entire beam of light from the mirror, and this naturally makes the signal more clear to the receiver.

I would also call attention to the means for clamping the mirror-trunnions in position. When adjusted, this clamping arrangement has the advantage of gripping the trunnions firmly and holding them in position without throwing them out of adjustment, which was the case with the previous devices used for this purpose.

It is to be understood that in my invention a number of changes may be made in the details of construction in order to carry out my ideas in the most convenient manner.

What I claim as my invention is—

1. In apparatus of the class described the combination of a standard to rest on the ground, a shutter, a frame carrying the said shutter and supported at the upper part of the standard and means for operating the shutter arranged to move substantially in line with the axis of the standard, substantially as described.

2. In combination in apparatus of the class described, a standard to rest on the ground, a shutter, a frame supporting the shutter and supported at the upper part of the standard and extending wholly to one side of the axial line of the standard and means having movement along the axial line of the standard for operating the said shutter, substantially as described.

3. In apparatus of the class described the combination with a suitable tripod of a two-part shutter, pintles integrally connected with each part thereof, a frame journaling the pintles, levers integrally connected to the pintles, a connecting-rod joining the said levers and a spring connecting a suitable point on the frame to an extension of the lever, a standard downwardly extending from one side of the frame, a split collar and screws adapted to fit around and secure the standard in position, substantially as described.

4. In apparatus of the class described the combination with a suitable tripod of a two-part shutter, pintles integrally connected with each part thereof, a frame journaling the pintles, levers integrally connected to the pintles, a connecting-rod joining the levers, a spring connecting a suitable point of the frame to an extension of the lever, a two-part standard

downwardly extending from one side of the frame and a split collar and screws adapted to fit around and secure the standard in position substantially as described.

5. In apparatus of the class described the combination with the mirror-trunnions of the same, of bearings a split above the said trunnions and set-screws above the trunnions passing through the split bearing whereby rotation may be prevented after the mirror is set in position as and for the purpose specified.

6. In apparatus of the class described the combination with the downwardly-extending mirror-supporting standard, of a tapered external-threaded socket adapted thereto and provided with a plurality of longitudinal slots and a nut provided with a tapered threaded interior and adapted to fit on the said socket substantially as described.

7. In apparatus of the class described the combination with the reflecting-mirror and stand, of a sight provided with a substantially V-shaped slot and a plate adapted to be brought directly upon the slot as and for the purpose specified.

8. In apparatus of the class described the combination with the sight of a downwardly-extending standard therefrom of a tube and a cap into which the standard fits tightly as and for the purpose specified.

9. In apparatus of the class described in combination a two-part light-intercepting shutter, pintles integrally connected to each part thereof, a frame journaling the pintles levers integrally connected to the pintles and a connecting-rod joining the levers, a spring connecting a suitable point on the frame to an extension on the lever, a two-part standard extending downwardly from one side of the frame, a split collar, a screw adapted to fit around and secure the standard in position, a substantially V-shaped sight, a plate adapted to be brought immediately behind the sight, a standard extending downwardly from the sight, a tube and cap into which the standard fits tightly, split bearings and screws for securing the trunnions of the mirror, a downwardly-extending mirror-supporting standard, a tapered externally-threaded socket adapted thereto and provided with a plurality of longitudinal slots and a nut provided with a tapered threaded interior adapted to fit on the said socket all substantially as described.

10. In apparatus of the class described a reflecting-mirror provided with a central sighting-spot substantially in the form of an annulus and a sight adapted to receive the shadow from said spot substantially as described.

11. In apparatus of the class described the combination of a reflecting-mirror, a standard supporting the same, said mirror having a sighting-spot, and a sight adjustably support-

ed from the standard of the mirror, substantially as described.

12. In apparatus of the class described, a reflecting-mirror having a sighting-spot and a sight to coöperate with the sight-spot, and an adjustable plate associated with the said sight, substantially as described.

Signed at the city of Ottawa, in the Province of Ontario, this 5th day of November, 1904.

JOHN FREDERICK WATSON.

Witnesses:

RUSSEL S. SMART,
MAY LYON.