No. 886,436. PATENTED MAY 5, 1908.

R. STRAUBEL & J. HECKEL.

DOUBLE TELESCOPE.

APPLICATION FILED JAN. 25, 1907.

2 SHEETS—SHEET 1.

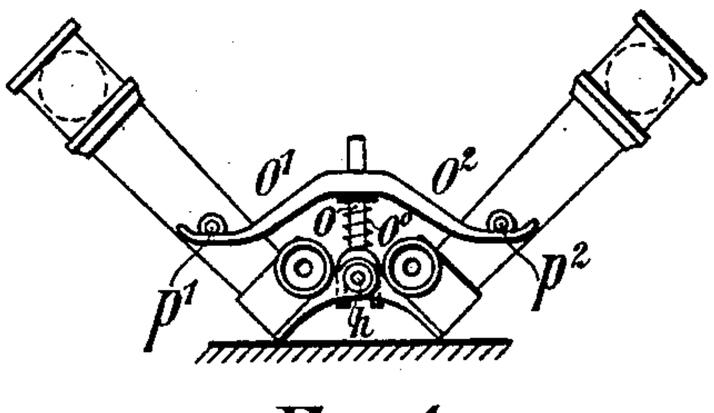

Fig. 1

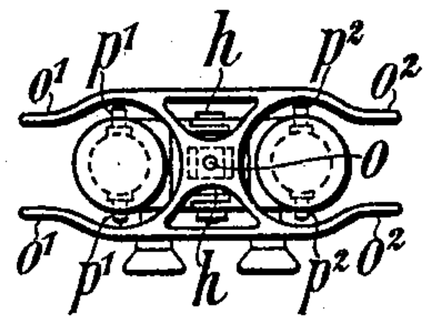

Fig. 2

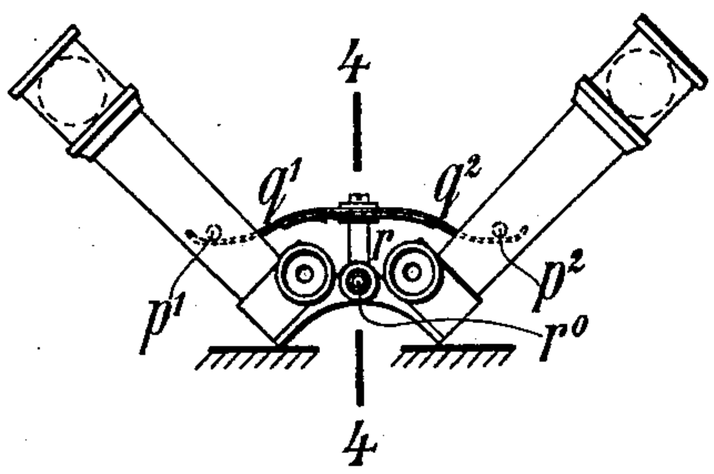

Fig. 3

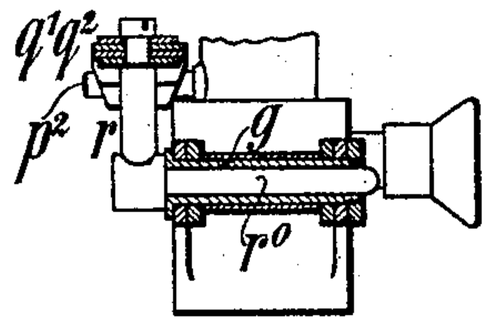

Fig. 4

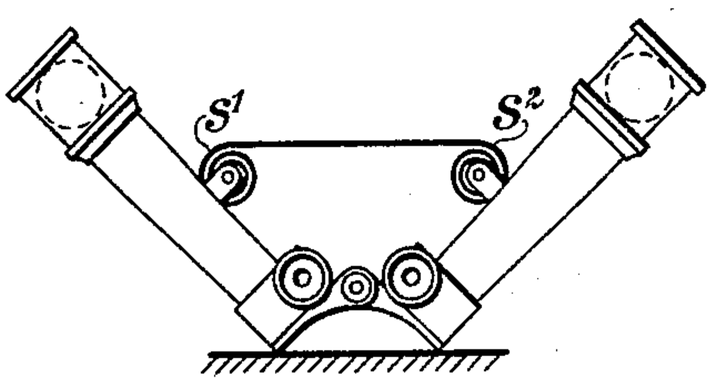

Fig. 5

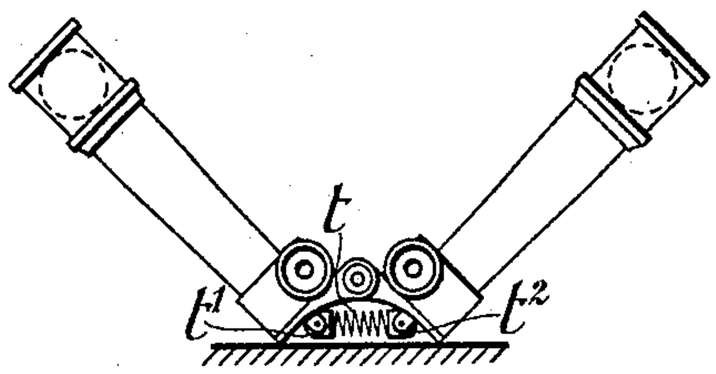

Fig. 6

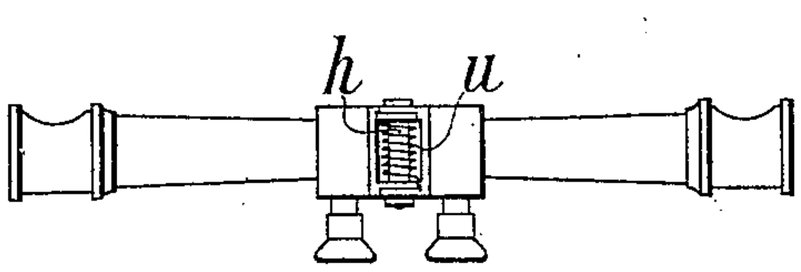

Fig. 7

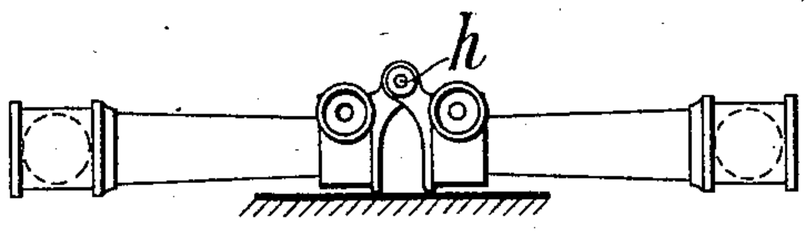

Fig. 8

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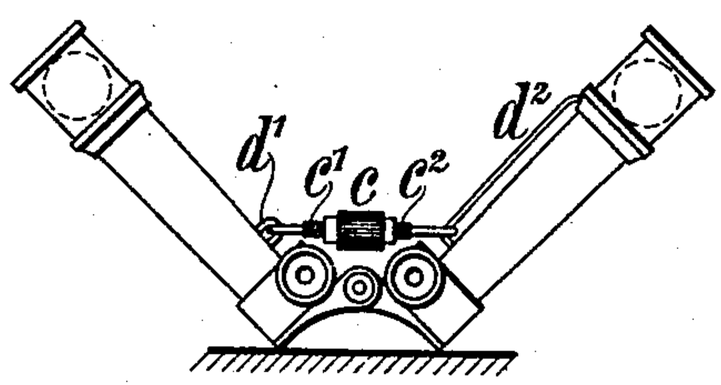

Fig. 9

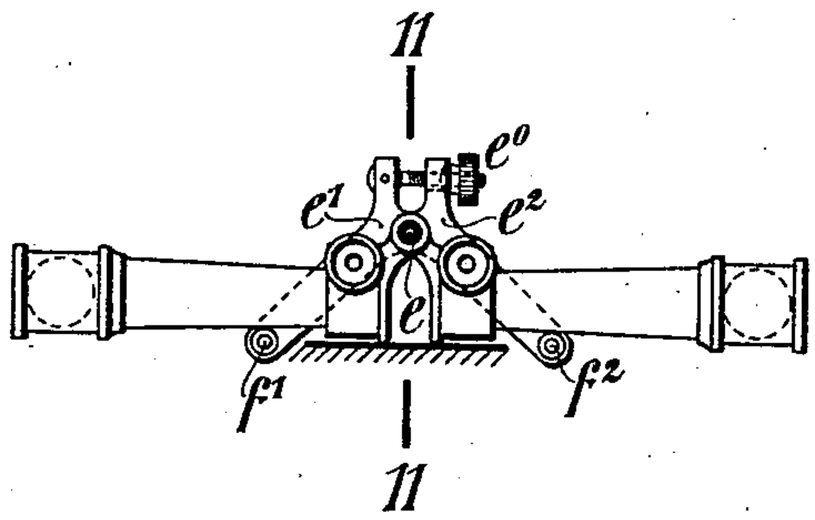

Fig. 10

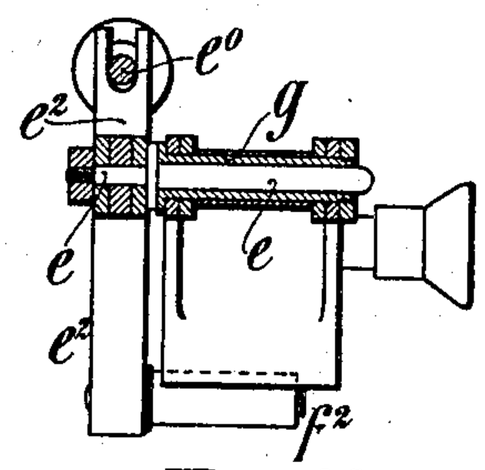

Fig. 11

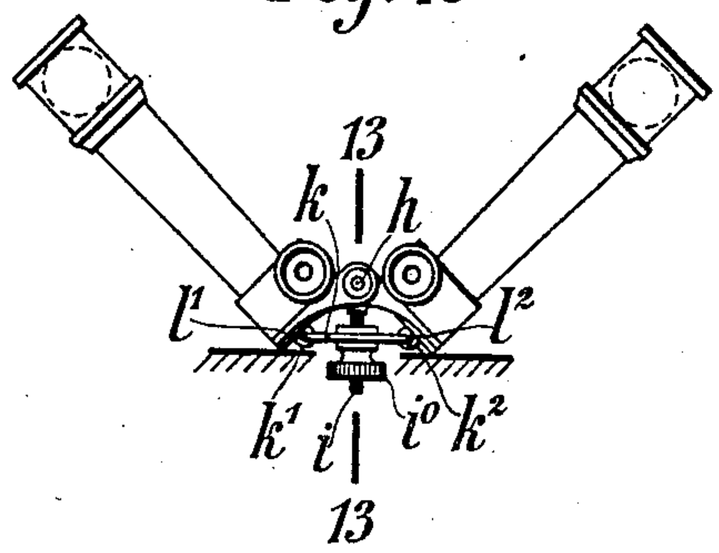

Fig. 12

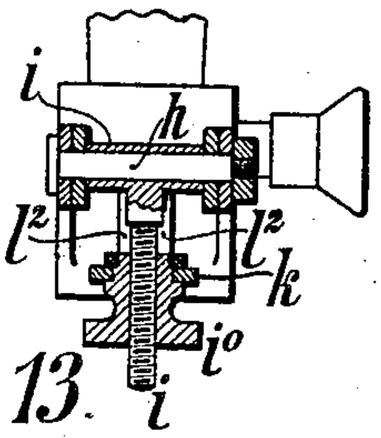

Fig. 13.

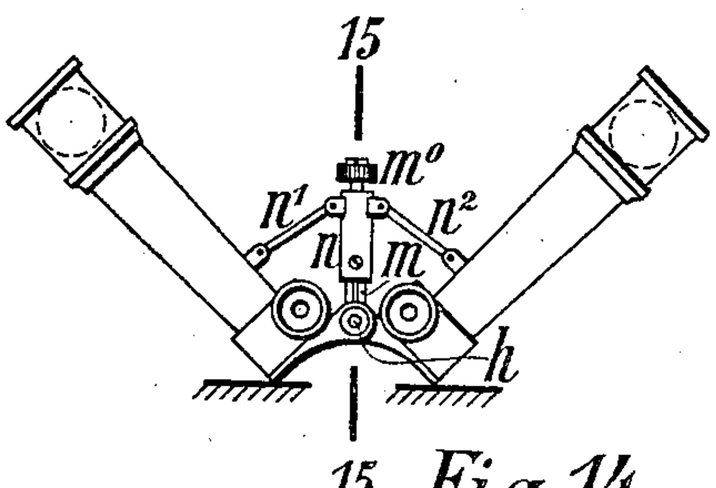

Fig. 14

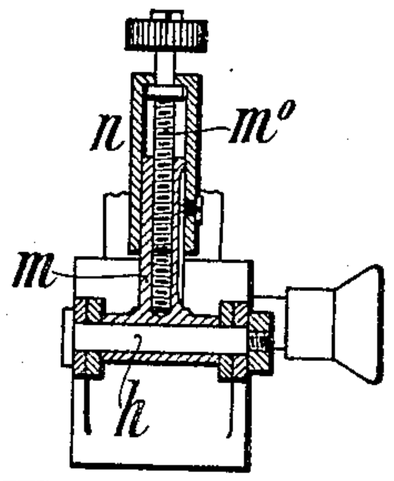

Fig. 15

Witnesses:
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Inventors:
Rudolf Straubel
Jakob Heckel

UNITED STATES PATENT OFFICE.

RUDOLF STRAUBEL AND JACOB HECKEL, OF JENA, GERMANY, ASSIGNORS TO THE FIRM OF CARL ZEISS, OF JENA, GERMANY.

DOUBLE TELESCOPE.

No. 886,436. Specification of Letters Patent. Patented May 5, 1908.

Application filed January 25, 1907. Serial No. 353,980.

To all whom it may concern:

Be it known that we, RUDOLF STRAUBEL, doctor of philosophy, and JACOB HECKEL, mechanician, citizens of the German Empire, and residing at Carl Zeiss strasse, Jena, in the Grand Duchy of Saxe-Weimar, Germany, have invented a new and useful Double Telescope, of which the following is a specification.

The invention consists in an improvement in those hinged double telescopes, the two main members of which are supported during observation by any supporting appliance, and particularly to those supported between the centers of gravity of the single telescopes, as is the case, for instance, when the instrument is engaged at the hinge or at both sides of it by a handle or the head of a stand.

The supporting appliance may or may not be permanently united to the double telescope. Since hinged double telescopes have no other contrivance for adjusting the distance between the oculars to the inter-pupilary distance of the observer than the hinge joint of the two single telescopes, the friction of the hinge should only be slight, lest it offer too great a resistance in varying the angle between the two single telescopes. On the other hand in supporting the instrument between the centers of gravity of the single telescopes the tendency of these tubes, to sink down about their common hinge, is even in the most favorable cases only incompletely counteracted. For the latter reason up to the present time in larger instruments, after having performed the adjustment to a correct distance between the oculars, additional friction of the hinge was produced by tightening up a friction coupling in order to secure the single telescopes relatively to each other. This coupling has the drawback, that it must be loosened and afterwards retightened, when the distance between the oculars is altered for the use of another observer. Moreover, with vibrations, or when the coupling is not sufficiently tightened, the distance between the oculars as adjusted becomes gradually lost.

According to the present invention, an automatic device is arranged between the single telescopes for securing them, not by additional friction, but positively, in the position as adjusted. This device is independent of the supporting appliance and acts within the range required for existing individual inter-pupilary distances. A device of this kind may be detachable from the double telescope or constructed to be permanently united with it.

Since, in general, the strain to which the securing device is subject varies with the angle between the single telescopes, springs are suitable as such devices or as parts of them, not only pull-springs and thrust-springs, but also torsion-springs. Springs adjust their length or shape automatically, according to the different strain exerted by the single telescopes in their different relative positions, so that, having adjusted the distance between the oculars to any inter-pupilary distance, through rotation of the single telescopes relatively to one another, the distance as adjusted is automatically secured. The spring device is so constructed, that rotation of the single telescopes varies their tendency of sinking down in the same sense as the spring power. Complete balancing of that tendency through the spring power, for any inter-pupilary distance, is not necessary, as the hinge-friction will act as a substitute for little insufficiencies in the spring power.

In a more developed form of the invention the automatic securing device is realized by a device for adjusting the single telescopes to any inter-pupilary distance. In this case each adjustment is accompanied by an automatic adaptation of the securing device incorporated in the adjusting device.

In the annexed drawings: Figure 1 is the front view of a hinged double telescope fitted with an automatic securing device according to the invention. Fig. 2 is the plan view of the same instrument, but the single telescopes being folded together so as to stand vertical. Fig. 3 is the front view of another instrument of this kind. Fig. 4 is a section along line 4—4 in Fig. 3, shown on an enlarged scale. Fig. 5 is the front view of a third instrument of this kind. Fig. 6 is the front view of a fourth instrument of this kind. Fig. 7 is the plan view of a fifth instrument of this kind. Fig. 8 is the front view of the same instrument. Fig. 9 is the front view of a hinged double telescope fitted with an adjusting and automatic securing device ac-

cording to the invention. Fig. 10 is the front view of another instrument of this kind. Fig. 11 is a section along line 11—11 in Fig. 10, shown on an enlarged scale. Fig. 12 is the front view of a third instrument of this kind. Fig. 13 is a section along line 13—13 in Fig. 12, shown on an enlarged scale. Fig. 14 is the front view of a fourth instrument of this kind. Fig. 15 is a section along line 15—15 in Fig. 14, shown on an enlarged scale.

The supporting appliance, whose form and connection with the instrument can be of various kinds, could be considered as irrelevant to the invention. It is therefore only indicated as a horizontal supporting plane, whose points of contact with the double telescope lie between the centers of gravity of the single telescopes. Each example is shown in the position in which the instrument is used by an observer of average inter-pupilary distance. Such position necessitates in most examples (Figs. 1 to 6, 9 and 12 to 15) the single telescopes being inclined upwards, in the others laying horizontally, according to the arrangement of the hinge joint.

Figs. 1 and 2 represent an arrangement, in which the automatic securing device is detachably supported upon the hinge-bolt h, while upon the device itself the single telescopes rest. On the hinge-bolt h the forked lower end of a pillar o is set, upon which a cross-piece o^1, o^2 is itself guided. Upon this cross-piece the single telescopes lie supported by the studs p^1, p^1 and p^2, p^2, while a spring o^0 balances this load on the cross-piece.

The following arrangement, represented in Figs. 3 and 4, differs from the former arrangement principally in that the cross-piece and spring are substituted by a spring cross-piece q^1, q^2 permanently fixed upon the supporting pillar r, its horizontal pivot r^0 being inserted into the hollow bolt g of the hinge of the telescope. The spring cross-piece being arranged only on the back of the instrument, only two studs p^1 and p^2 are placed on the single telescopes to correspond.

Fig. 5 shows a spring formed into a spiral at each end s^1, s^2 as securing device.

In the arrangement according to Fig. 6 the helical spring t, subjected to pressure, serves the same purpose, its ends being situated in blocks t^1 and t^2, which are pivotally fitted to the bottom pieces of the single telescopes.

In the fifth constructional example, Figs. 7 and 8, the securing device consists in a helical torsion-spring u surrounding the hinge-bolt h and with one end fixed to the hinge limb of the left telescope and with the other end to the hinge limb of the right telescope.

In the following examples the automatic securing device serves also for adjusting the single telescopes to the inter-pupilary distance. In Fig. 9 it is composed of the two hook-shaped screw-bolts c^1 and c^2 of opposite thread and the nut c common to both. Both points of application, the one on the eye d^1 and the other on the rail d^2, are fixed, the hook of the bolt c^2 only sliding along the rail d^2 when the instrument is being folded together.

The next example, represented by Figs. 10 and 11, shows a lever system detachable from the instrument as the adjusting and securing device. This system consists of two double levers e^1 and e^2 revoluble about the bolt e, a swing-out screw e^0 and two supporting rollers f^1 and f^2. The bolt e is inserted into the hollow hinge-bolt g of the double telescope.

The arrangement according to Figs. 12 and 13 shows the device likewise in combination with the hinge-bolt h, but in one not easily to be undone. This bolt is surrounded by the head of the screw i, the nut i^0 of which, fitted with a small hand wheel, loosely carries the stay k fitted with rollers k^1 and k^2. For these rollers guiding grooves l^1, l^1 and l^2, l^2 are arranged on the single telescopes.

Figs. 14 and 15 show a last constructional example. The device is again carried undetachable from the hinge-bolt h. In this case the hinge-bolt is surrounded by the foot of the nut m, the screw m^0 of which being provided with a small hand wheel. A sleeve n, which is connected with the single telescopes by means of the links n^1 and n^2, is loose on the screw m^0 and guided on its nut m.

We claim:

1. The combination, with a hinged double telescope adapted to be used on a supporting appliance, of a device which connects, independently of the said appliance and in addition to the hinge, both individual telescopes and secures them automatically in their relative position as adjusted to any interpupilary distance.

2. The combination, with a hinged double telescope adapted to be used on a supporting appliance, of a device for adjusting, independently of the said appliance and with the aid of the hinge, both individual telescopes to any inter-pupilary distance, this device securing the individual telescopes automatically in the position as adjusted.

3. The combination, with a double telescope adapted to be used on a supporting appliance, of a hinge-bolt connecting both individual telescopes and a device for adjusting them to any inter-pupilary distance mounted on the hinge-bolt and securing the individual telescopes automatically in the position as adjusted.

4. The combination, with a hinged double telescope adapted to be used on a supporting appliance, of a device which connects, independently of this appliance and in addition to the hinge, both individual telescopes and a spring adapted to act on this device so as to secure, together with the friction of the

hinge, the individual telescopes automatically in the position as adjusted to any inter-pupilary distance.

5. The combination, with a hinged double telescope adapted to be used on a supporting appliance, of a spring which connects, independently of the said appliance and in addition to the hinge, both individual telescopes so as to secure them, with the aid of the hinge friction, in the position as adjusted to any inter-pupilary distance.

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Witnesses:
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FRITZ SANDER.