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The invention concerns a monocular telescope of constant length according to the classifying clause of the claim 1.

A telescope with a focussing device, in which a rotatable focussing drive acts on a focussing member which is axially displaceable in the tube of the telescope, is known from the DE-OS 20 05 396. An eccentric with an endless slide surface is provided as geared connection between the focussing drive and the focussing member. In this manner, the entire focussing range is covered by half to a full revolution of the focussing drive for constant direction of rotation of the focussing drive. For step-up or step-down of the amount of the displacement achieved by the eccentric, a transmission gear is arranged between this and the focussing member. This known telescope displays a constant magnification and a stationary eyepiece.

A telescope with variable magnification, the eyepiece tube of which is drawn out to different lengths according to the chosen magnification, is known from the DE-PS 1 109 398. The eyepiece tube is guided and longitudinally displaceable in a cam sleeve with a cam slot for the constrained rotation during the variation of the pulled-out portion, however coupled to be relatively non-rotatable with the carrier of a reversing system, which carrier in its turn is guided in a second cam slot for the constrained displacement during rotation in the cam sleeve. Thereby, great variations in the telescope magnification are also achievable. The focussing takes place by means of a fine adjusting nut, wherein the focus once set for a certain distance remains maintained continuously over the entire magnification range.

A telescope with continuously variable magnification, which displays two co-axial rotary knobs arranged in a housing depression and separated by a web, is furthermore known from the US-PS 3 028 792. The rotary knob at the objective side displaces a focussing lens by way of a threaded spindle for the purpose of the focussing, whilst the rotary knob at the eyepiece side serves for the variation of the



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magnification by means of two axially displaceable reversing lenses, the course of movement of which is controlled by spirally shaped dogs.

Finally, a telescope according to the classifying clause of the claim 1 is known. This telescope, on the one hand, a variation of the magnification in steps, for example 20, 30 and 40 times, is achievable by an exchangeable eyepiece or, on the other hand, also a stepless setting of magnification, for example 20 to 60 times, is achievable with the use of a zoom eyepiece. The focussing takes place manually by means of an operating knob, the rotary movement of which causes an axial displacement of a focussing element. By reason of the low depth of focus present in the case of high magnifications, it is difficult in this case to focus the telescope, since the plane of focus is passed through too rapidly on the setting by means of an invariable connection between the operating knob and the focussing element. Similar applies also in converse degree for low magnifications, for which reason the adjusting speed is designed for a mean value.

The invention is based on the object of so developing a monocular telescope of the initially named kind that optimum setting conditions are created for different magnifications.

This problem is solved according to the invention by the characterising features of the claim 1. Advantageous developments of the invention are evident from the subclaims.

Further details of the invention are evident from the following description of examples of embodiment illustrated schematically in the drawing. In that case, all components not required for an understanding of the invention have been omitted.

There show:

Fig. 1 a longitudinal section through the telescope according to the invention in a first embodiment,

Fig. 2 a cross-section with details of the gear according to Fig. 1 and

Fig. 3 a longitudinal section through a gear in a second embodiment.

The monocular telescope illustrated in Fig. 1 displays a tube 10, which carries an objective 11 and is here drawn shortened. An eyepiece lying opposite this objective is constructed as exchangeable



eyepiece 12, by which the magnification is selectable. The exchangeable eyepiece 12 can be formed as variable eyepiece with steplessly changeable magnification, for example of 20 to 60 times, or individual eyepieces of different magnification, for example of 20, 40 and 60 times, can be used. For focussing, a focussing unit 13 of a lens system is provided, which is displaceable by means of a setting member 14 along the optical axis 15 of the telescope. The setting member 14 carries knurled knobs 16 at both ends. Furthermore, a prism set 17 is fastened in the tube 10 for deflection of the ray path between the focussing unit 13 and the exchangeable eyepiece 12. The setting member 14 is constructed as transmission gear 18, which is drawn only schematically in Fig. 1.

In Fig. 2, the construction of the transmission gear 18 is illustrated in a first embodiment. Gear wheels 22, 22' and 22'' of different diameters are mounted on the setting member 14 formed as rotational axle with a detent barrier of detent notches 19, spring 20 and ball 21. Above the setting member 14, the sliding carriage 23 is displaceable in guide tracks 24 along the optical axis 15 and carries the focussing unit 13. At its underside, the sliding carriage 23 displays toothed racks 25, 25' and 25'', which are bringable into engagement with the corresponding gear wheels 22, 22' and 22'' by pulling-out or pressing-in of the setting member 14. The setting speed for the focussing by means of the transmission gear is adapted in three stages according to the magnification of the exchangeable eyepiece 12 used.

The embodiment shown in Fig. 3 differs from that according to Fig. 2 in that a transmission gear 26 is used here, which is in geared connection with the respective eyepiece 12. Thereby, it is achieved that, on a change of the eyepiece 12, the setting speed corresponding to its magnification is automatically adapted for the focussing. The exchangeable eyepiece 12 is fastenable at the telescope by means of a bayonet fastener 27, which here displays a collar 28, the axial depth of which varies according to magnification. Lying against the collar 28 is one end of a control pin 29, the other end of which is connected with an angle lever 30. This is pivotable about an axis 31 and engages at the setting member 14. Under the pressure of a spring 32,



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the control pin 29 is displaced axially according to the position of the collar 28 at the bayonet fastener 27, whilst the angle lever 30 translates this movement into a displacement of the setting member 14 perpendicular thereto. The transmission gear 26 besides the sliding carriage 23 arranged on the same corresponds substantially to that of Fig. 2, for which the same reference symbols are used.

It is self-evident that numerous variations of what has been described are possible. Thus, in the case of an exchangeable eyepiece of variable magnification, a control cam, against which the control pin lies, can be shaped on in place of a collar.

In the case of an arrangement designed for only two different magnifications, a co-axial coarse-fine drive can find use, as is indeed known for focussing particularly for microscopes. Furthermore, the manual adjustment can be replaced by a motor-driven one, wherein an operating knob is provided in place of the knurled knobs. Finally, the focussing element can also be constructed differently, for example as prism set. This can mounted on a toothed rack which is moved axially by means of a gear wheel fastened on the setting member.





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Claims

1. Monocular telescope of constant length with an objective arranged in a tube, exchange eyepieces for varying the magnification and a focussing unit which is displaceable in the tube by means of a setting member, characterised in that the setting speed for the focussing is adaptable to the chosen magnification by means of a transmission gear (18, 26).
2. Monocular telescope according to claim 1, characterised in that the transmission gear (18, 26) is arranged on the setting member (14).
3. Monocular telescope according to claim 1, characterised in that the setting member (14) is connected in geared manner with the exchange eyepiece (12).
4. Monocular telescope according to claim 3, characterised in that a control pin (29), which is axially displaceable at the exchange eyepiece (12) by means of a collar (28), is connected with an angle lever (30), which engages at the setting member (14).
5. Monocular telescope according to claim 1, characterised in that a lens system is provided as focussing unit (13).
6. Monocular telescope according to claim 1, characterised in that a prism system is provided as focussing unit (13).

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5. Monocular telescope according to claim 1, characterised thereby, that a lens system is provided as focussing unit (13).

6. Monocular telescope according to claim 1, characterised thereby, that a prism system is provided as focussing unit (13).

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ABSTRACT

The monocular telescope of constant length comprises an objective mounted in a tube as well as exchange eyepieces for varying the magnification. The focussing is effected by means of a focussing unit displaceable in the tube by way of a setting member. For adaptation of the setting speed for the focussing a transmission gear is provided, which is arranged on the setting member and can be drivingly connected with the exchange eyepiece.

(Fig. 1)

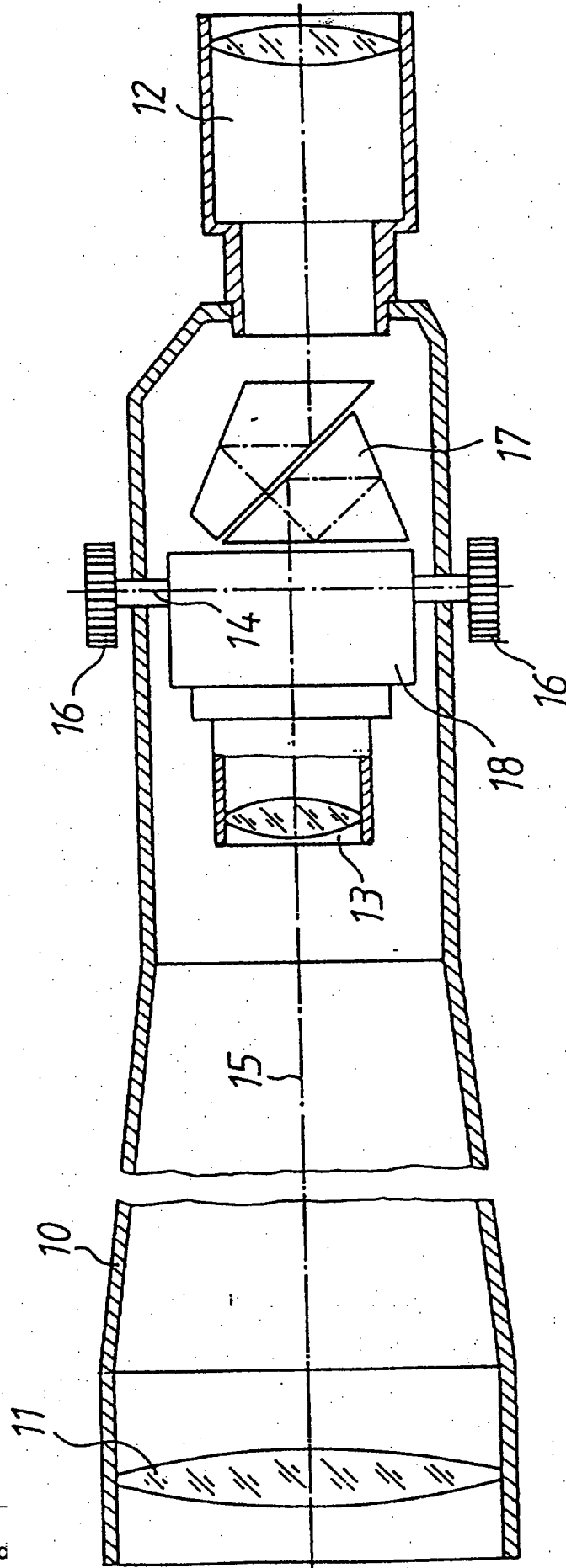
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Fig. 1

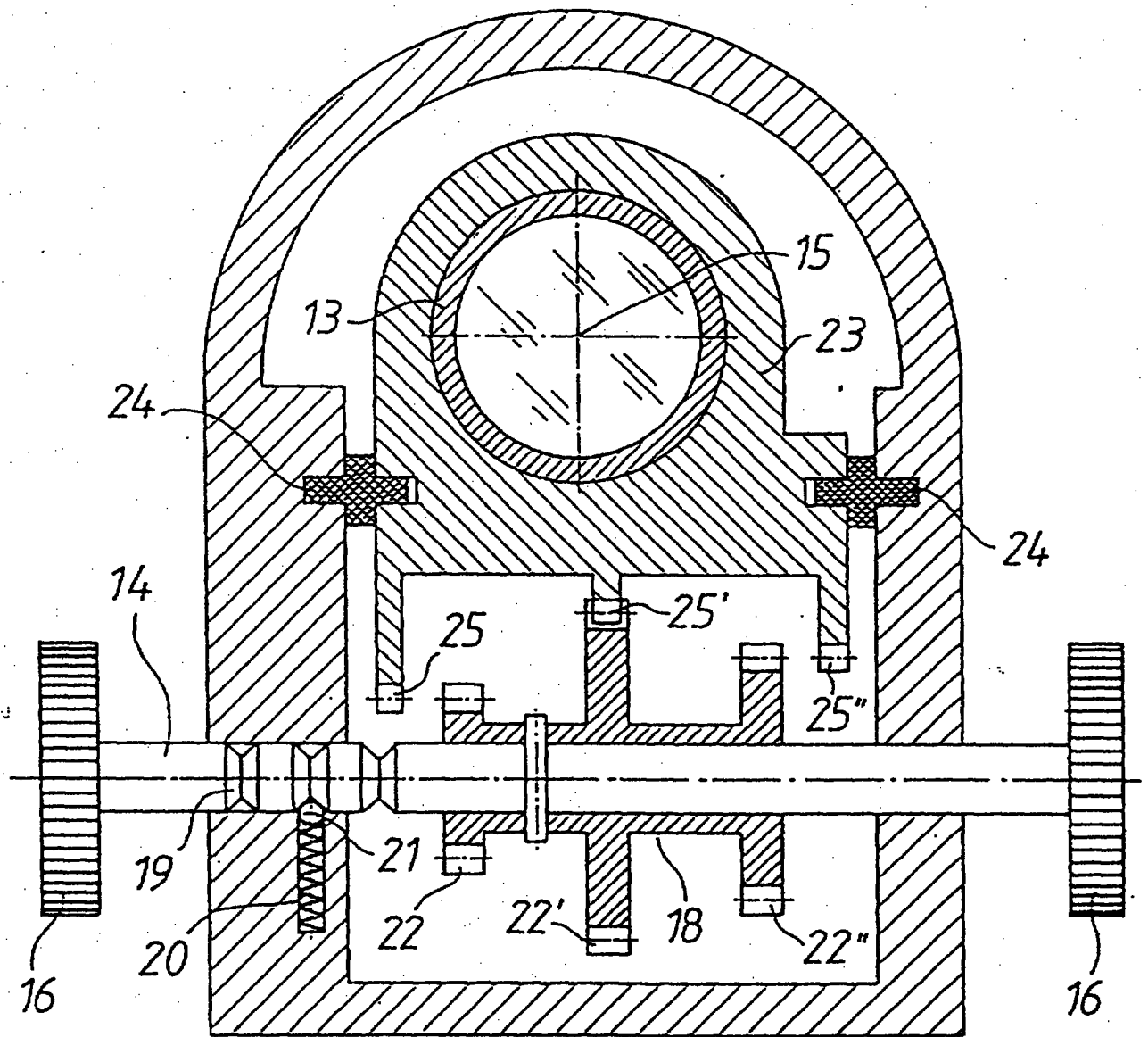


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Fig. 2

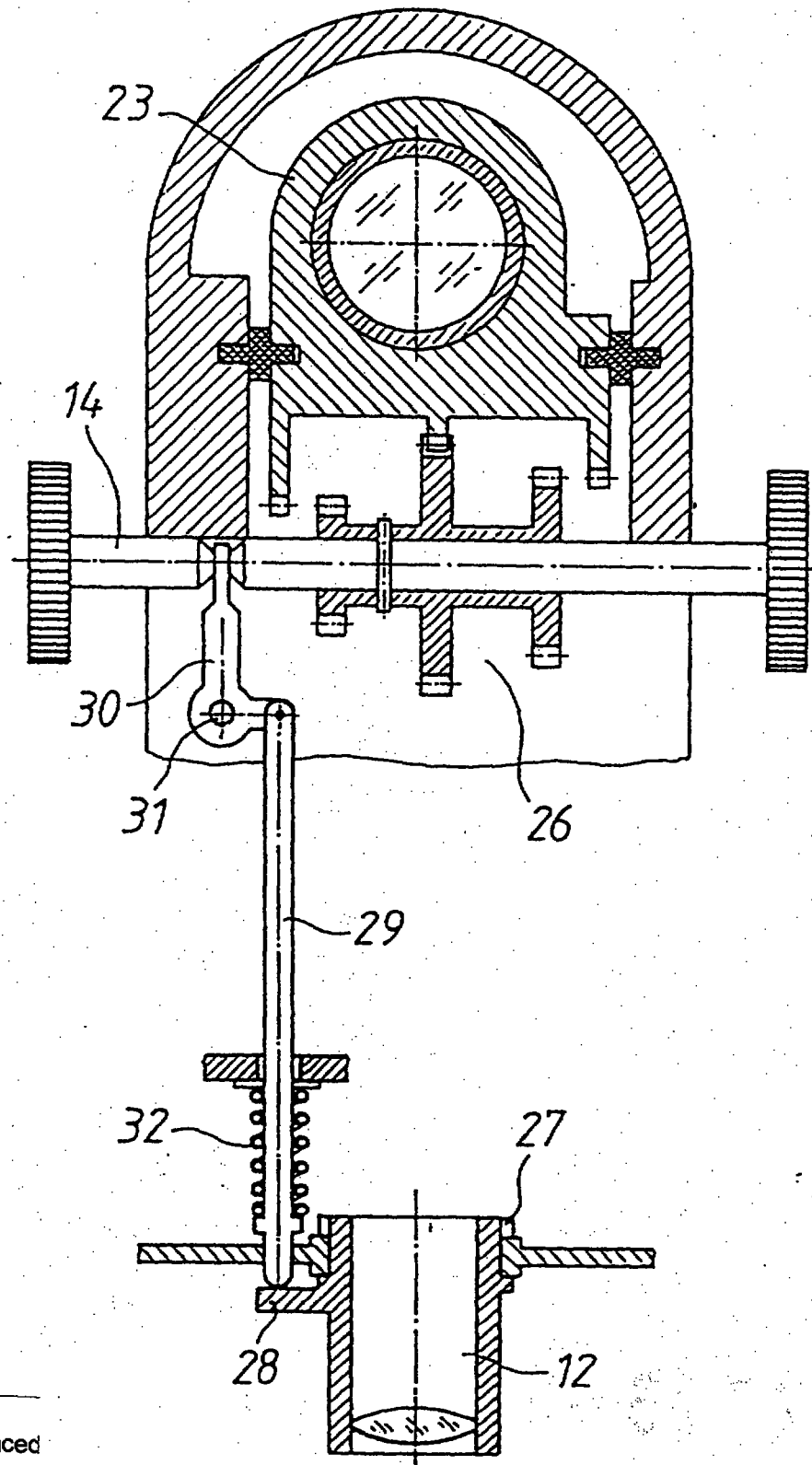


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Fig. 3



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MONOCULAR TELESCOPE OF CONSTANT LENGTH

The invention concerns a monocular telescope of constant length according to the classifying clause of the claim 1.

A telescope with a focussing device, in which a rotatable focussing drive acts on a focussing member which is axially displaceable in the tube of the telescope, is known from the DE-OS 20 05 396. An eccentric with an endless slide surface is provided as geared connection between the focussing drive and the focussing member. In this manner, the entire focussing range is covered by half to a full revolution of the focussing drive for constant direction of rotation of the focussing drive. For step-up or step-down of the amount of the displacement achieved by the eccentric, a transmission gear is arranged between this and the focussing member. This known telescope displays a constant magnification and a stationary eyepiece.

A telescope with variable magnification, the eyepiece tube of which is drawn out to different lengths according to the chosen magnification, is known from the DE-PS 1 109 398. The eyepiece tube is guided and longitudinally displaceable in a cam sleeve with a cam slot for the constrained rotation during the variation of the pulled-out portion, however coupled to be relatively non-rotatable with the carrier of a reversing system, which carrier in its turn is guided in a second cam slot for the constrained displacement during rotation in the cam sleeve. Thereby, great variations in the telescope magnification are also achievable. The focussing takes place by means of a fine adjusting nut, wherein the focus once set for a certain distance remains maintained continuously over the entire magnification range.

A telescope with continuously variable magnification, which displays two co-axial rotary knobs arranged in a housing depression and separated by a web, is furthermore known from the US-PS 3 028 792. The rotary knob at the objective side displaces a focussing lens by way of a threaded spindle for the purpose of the focussing, whilst the rotary knob at the eyepiece side serves for the variation of the

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magnification by means of two axially displaceable reversing lenses, the course of movement of which is controlled by spirally shaped dogs.

Finally, a telescope according to the classifying clause of the claim 1 is known. This telescope, on the one hand, a variation of the magnification in steps, for example 20, 30 and 40 times, is achievable by an exchangeable eyepiece or, on the other hand, also a stepless setting of magnification, for example 20 to 60 times, is achievable with the use of a zoom eyepiece. The focussing takes place manually by means of an operating knob, the rotary movement of which causes an axial displacement of a focussing element. By reason of the low depth of focus present in the case of high magnifications, it is difficult in this case to focus the telescope, since the plane of focus is passed through too rapidly on the setting by means of an invariable connection between the operating knob and the focussing element. Similar applies also in converse degree for low magnifications, for which reason the adjusting speed is designed for a mean value.

The invention is based on the object of so developing a monocular telescope of the initially named kind that optimum setting conditions are created for different magnifications.

This problem is solved according to the invention by the characterising features of the claim 1. Advantageous developments of the invention are evident from the subclaims.

Further details of the invention are evident from the following description of examples of embodiment illustrated schematically in the drawing. In that case, all components not required for an understanding of the invention have been omitted.

There show:

Fig. 1 a longitudinal section through the telescope according to the invention in a first embodiment,

Fig. 2 a cross-section with details of the gear according to Fig. 1 and

Fig. 3 a longitudinal section through a gear in a second embodiment.

The monocular telescope illustrated in Fig. 1 displays a tube 10, which carries an objective 11 and is here drawn shortened. An eyepiece lying opposite this objective is constructed as exchangeable

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eyepiece 12, by which the magnification is selectable. The exchangeable eyepiece 12 can be formed as variable eyepiece with steplessly changeable magnification, for example of 20 to 60 times, or individual eyepieces of different magnification, for example of 20, 40 and 60 times, can be used. For focussing, a focussing unit 13 of a lens system is provided, which is displaceable by means of a setting member 14 along the optical axis 15 of the telescope. The setting member 14 carries knurled knobs 16 at both ends. Furthermore, a prism set 17 is fastened in the tube 10 for deflection of the ray path between the focussing unit 13 and the exchangeable eyepiece 12. The setting member 14 is constructed as transmission gear 18, which is drawn only schematically in Fig. 1.

In Fig. 2, the construction of the transmission gear 18 is illustrated in a first embodiment. Gear wheels 22, 22' and 22'' of different diameters are mounted on the setting member 14 formed as rotational axle with a detent barrier of detent notches 19, spring 20 and ball 21. Above the setting member 14, the sliding carriage 23 is displaceable in guide tracks 24 along the optical axis 15 and carries the focussing unit 13. At its underside, the sliding carriage 23 displays toothed racks 25, 25' and 25'', which are bringable into engagement with the corresponding gear wheels 22, 22' and 22'' by pulling-out or pressing-in of the setting member 14. The setting speed for the focussing by means of the transmission gear is adapted in three stages according to the magnification of the exchangeable eyepiece 12 used.

The embodiment shown in Fig. 3 differs from that according to Fig. 2 in that a transmission gear 26 is used here, which is in geared connection with the respective eyepiece 12. Thereby, it is achieved that, on a change of the eyepiece 12, the setting speed corresponding to its magnification is automatically adapted for the focussing. The exchangeable eyepiece 12 is fastenable at the telescope by means of a bayonet fastener 27, which here displays a collar 28, the axial depth of which varies according to magnification. Lying against the collar 28 is one end of a control pin 29, the other end of which is connected with an angle lever 30. This is pivotable about an axis 31 and engages at the setting member 14. Under the pressure of a spring 32,

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the control pin 29 is displaced axially according to the position of the collar 28 at the bayonet fastener 27, whilst the angle lever 30 translates this movement into a displacement of the setting member 14 perpendicular thereto. The transmission gear 26 besides the sliding carriage 23 arranged on the same corresponds substantially to that of Fig. 2, for which the same reference symbols are used.

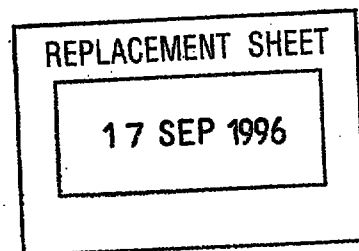
It is self-evident that numerous variations of what has been described are possible. Thus, in the case of an exchangeable eyepiece of variable magnification, a control cam, against which the control pin lies, can be shaped on in place of a collar.

In the case of an arrangement designed for only two different magnifications, a co-axial coarse-fine drive can find use, as is indeed known for focussing particularly for microscopes. Furthermore, the manual adjustment can be replaced by a motor-driven one, wherein an operating knob is provided in place of the knurled knobs. Finally, the focussing element can also be constructed differently, for example as prism set. This can be mounted on a toothed rack which is moved axially by means of a gear wheel fastened on the setting member.



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Claims

1. Monocular telescope of constant length with an objective arranged in a tube, exchange eyepieces for varying the magnification and a focussing unit which is displaceable in the tube by means of a setting member, characterised in that the setting speed for the focussing is adaptable to the chosen magnification by means of a transmission gear (18, 26).
2. Monocular telescope according to claim 1, characterised in that the transmission gear (18, 26) is arranged on the setting member (14).
3. Monocular telescope according to claim 1, characterised in that the setting member (14) is connected in geared manner with the exchange eyepiece (12).
4. Monocular telescope according to claim 3, characterised in that a control pin (29), which is axially displaceable at the exchange eyepiece (12) by means of a collar (28), is connected with an angle lever (30), which engages at the setting member (14).
5. Monocular telescope according to claim 1, characterised in that a lens system is provided as focussing unit (13).
6. Monocular telescope according to claim 1, characterised in that a prism system is provided as focussing unit (13).

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5. Monocular telescope according to claim 1, characterised thereby, that a lens system is provided as focussing unit (13).
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MONOCULAR TELESCOPE OF CONSTANT LENGTH**ABSTRACT**

The monocular telescope of constant length comprises an objective mounted in a tube as well as exchange eyepieces for varying the magnification. The focussing is effected by means of a focussing unit displaceable in the tube by way of a setting member. For adaptation of the setting speed for the focussing a transmission gear is provided, which is arranged on the setting member and can be drivingly connected with the exchange eyepiece.

(Fig. 1)

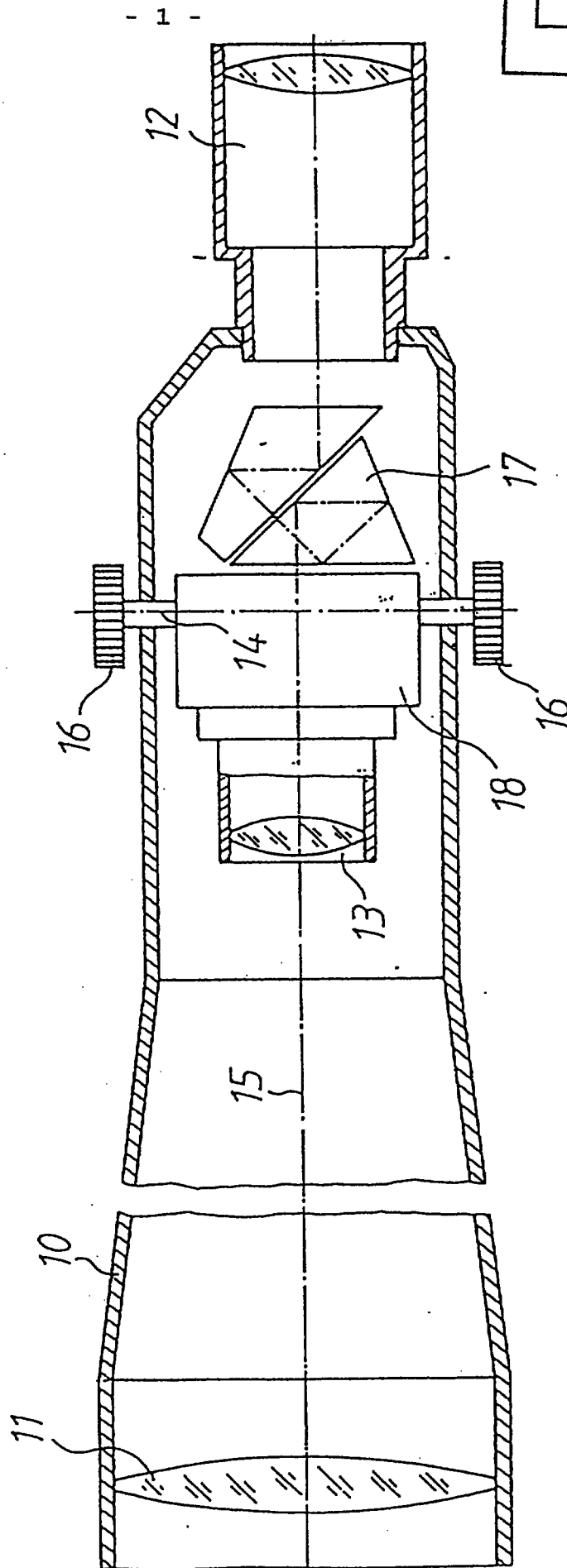


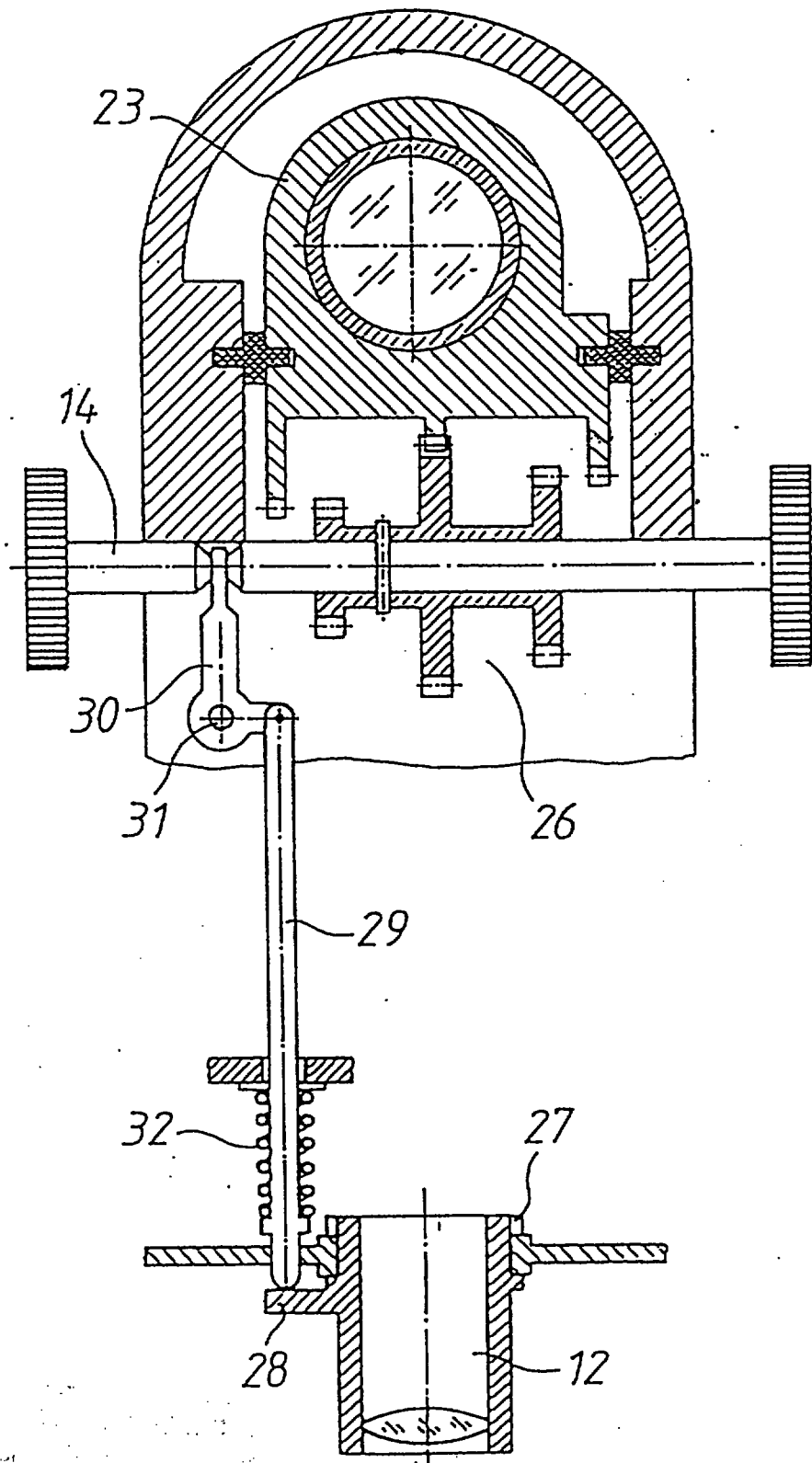
Fig. 1

This diagram illustrates a mechanical assembly in cross-section. The upper portion is a semi-circular housing (13) containing a central circular component (15) surrounded by a ring (23). Below this is a rectangular base (18) with internal components (25, 25', 25'', 22, 22'). A central horizontal shaft (14) is supported by bearings (16) and passes through the assembly. A vertical pin (22) is connected to the central rotating element (21). The assembly is secured by two large bolts (24) on the sides. The diagram uses various hatching patterns to indicate different materials and cross-sections.

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Fig. 3



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Claims

1. Monocular telescope of constant length with an objective (11) arranged in a tube (10), an exchangeable or a variable eyepiece (12) for varying the magnification and a focussing unit which is displaceable in the tube by means of a setting member (14), characterised in that for adaptation of the setting speed of the focussing unit (13) to the chosen magnification, the setting member (14) is constructed as transmission gear (18, 26) with several different transmission ratios which are selectable according to the magnification used, wherein a smaller transmission ratio is selected in conjunction with a high magnification and conversely.
2. Monocular telescope according to claim 1, characterised in that gearwheels (22, 22', 22'') of different diameters are mounted on the setting member (14) and bringable into engagement with toothed racks (25, 25', 25''), which are fastened to a sliding carriage (23) carrying the focussing unit (13), by displacement of the setting member (14) transversely to the optical axis (15).
3. Monocular telescope according to claim 1, characterised in that the setting member (14) is connected in geared manner with the eyepiece (12) in such a manner that an automatic switching-over of the transmission gear (18, 26) takes place by displacement of the setting member (14) on a change in magnification.
4. Monocular telescope according to claim 3, characterised in that the eyepiece (12) is provided with a collar (28), the axial depth of which varies in accordance with the magnification, one end of a control pin (29) lies against the collar (28) and the other end of the control pin (29) is connected with an angle lever (30), which is pivotable about an axis (31) and engages at the setting member (14), wherein the control pin (29) is displaced axially in

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accordance with the position of the collar (28) and the ~~angle lever (30)~~
translates this movement into a displacement of the setting member (14).

5. Monocular telescope according to claim 1, characterised in that a lens system is provided as focussing unit (13).
6. Monocular telescope according to claim 1, characterised in that a prism system is provided as focussing unit (13).

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MONOCULAR TELESCOPE OF CONSTANT LENGTH

The invention concerns a monocular telescope of constant length according to the classifying clause of the claim 1 (see Sov. J. Opt. Technol., Vol. 43, No. 6, page 360; June 1976).

A telescope with a focussing device, in which a rotatable focussing drive acts on a focussing member which is axially displaceable in the tube of the telescope, is known from the DE-OS 20 05 396. An eccentric with an endless slide surface is provided as geared connection between the focussing drive and the focussing member. In this manner, the entire focussing range is covered by half to a full revolution of the focussing drive for constant direction of rotation of the focussing drive. For step-up or step-down of the amount of the displacement achieved by the eccentric, a transmission gear is arranged between this and the focussing member. This known telescope displays a constant magnification and a stationary eyepiece.

A telescope with variable magnification, the eyepiece tube of which is drawn out to different lengths according to the chosen magnification, is known from the DE-PS 1 109 398. The eyepiece tube is guided and longitudinally displaceable in a cam sleeve with a cam slot for the constrained rotation during the variation of the pulled-out portion, however coupled to be relatively non-rotatable with the carrier of a reversing system, which carrier in its turn is guided in a second cam slot for the constrained displacement during rotation in the cam sleeve. Thereby, great variations in the telescope magnification are also achievable. The focussing takes place by means of a fine adjusting nut, wherein the focus once set for a certain distance remains maintained continuously over the entire magnification range.

A telescope with continuously variable magnification, which displays two co-axial rotary knobs arranged in a housing depression and separated by a web, is furthermore known from the US-PS 3 028 792. The rotary knob at the objective side displaces a focussing lens by way of a threaded spindle for the purpose of the focussing, whilst the rotary knob at the eyepiece side serves for the variation of the



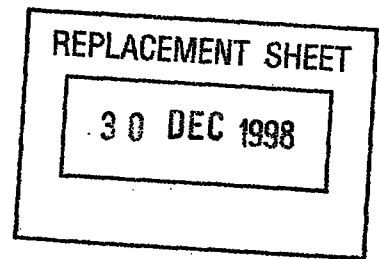
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Claims

1. Monocular telescope of constant length with an objective (11) arranged in a tube (10), an exchangeable or a variable eyepiece (12) for varying the magnification and a focussing unit which is displaceable in the tube by means of a setting member (14), characterised in that for adaptation of the setting speed of the focussing unit (13) to the chosen magnification, the setting member (14) is constructed as transmission gear (18, 26) with several different transmission ratios which are selectable according to the magnification used, wherein a smaller transmission ratio is selectable in conjunction with a high magnification and conversely.
2. Monocular telescope according to claim 1, characterised in that gearwheels (22, 22', 22'') of different diameters are mounted on the setting member (14) and bringable into engagement with toothed racks (25, 25', 25''), which are fastened to a sliding carriage (23) carrying the focussing unit (13), by displacement of the setting member (14) transversely to the optical axis (15).
3. Monocular telescope according to claim 1, characterised in that the setting member (14) is connected in geared manner with the eyepiece (12) in such a manner that an automatic switching-over of the transmission gear (18, 26) takes place by displacement of the setting member (14) on a change in magnification.
4. Monocular telescope according to claim 3, characterised in that the eyepiece (12) is provided with a collar (28), the axial depth of which varies in accordance with the magnification, one end of a control pin (29) lies against the collar (28) and the other end of the control pin (29) is connected with an angle lever (30), which is pivotable about an axis (31) and engages at the setting member (14), wherein the control pin (29) is displaced axially in accordance with the position of the collar (28) and the angle lever (30) translates this movement into a displacement of the setting member (14).



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5. Monocular telescope according to claim 1, characterised in that a lens system is provided as focussing unit (13).
6. Monocular telescope according to claim 1, characterised in that a prism system is provided as focussing unit (13).