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(54) IMPROVEMENTS IN OR RELATING TO CAMERAS

(71) We, BALDA-WERKE PHOTOGRAPHISCHE GERÄTE UND KUNSTSTOFF G.M.B.H., & Co. KG., a company of the Federal Republic of Germany, of 498 Bünde 1, Postfach 1229, Steinmeisterstrasse 16—20, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to the connection of camera components so that they may be adjusted relative to one another by the overcoming of a positive force, and wherein one of the components is made of metal.

In order to adjust the lens of a camera it is already known to fit a rotatable disc to the lens housing, the disc being provided with arcuate slots which have metal rivets extending therethrough. The metal rivets clamp the adjustment plate positively against the lens housing. Adjustment of the camera lens is then effected by a rotation of the adjustment plate with the aid of external teeth provided thereon. The rivets are made of metal and depending upon the accuracy of the rivetting operation the contact pressure between the rivets and the adjustment plate may be great or small.

Such an arrangement is extremely expensive. Rivetting operations on a camera lens housing are difficult to perform and expensive. Moreover, the necessary contact pressure may not be established in certain small regions.

It is an object of the present invention to provide a connection between two relatively adjustable camera components, one of which is made of metal, which connection is extremely easy to produce and provides a sufficiently secure positive connection between the two relatively adjustable parts for small degrees of adjustment to be possible.

In accordance with the present invention there is provided a connection between two camera components which are adjustable relative to one another only by overcoming a positive clamping force therebetween, wherein one of said components is made of metal and the other component is made of

shrinkable plastics material, wherein the components engage with one another or have regions which at least partially enclose one another, and wherein after cooling of the plastics material component the two components clampingly engage each another but permit forcible limited movement of one relative to the other.

Also in accordance with the invention there is provided a method of connecting a metallic camera component and a camera component of plastics material, which comprises assembling the metallic component and a moulded plastics component before the latter has cooled whereby upon cooling of the latter shrinkage thereof will cause the components clampingly to engage each another but permit forcible limited movement of one relative to the other.

The invention thus makes use of a known property of plastics material and makes expensive additional devices completely unnecessary.

Thus, for example, one camera component may be a lens housing of plastics material and the other component a metal element which is rotatable relative to the lens housing by overcoming the clamping force. A metal ring, metal pin or the like may be moulded in in the manufacture of the plastics component and is clampingly gripped automatically upon cooling. The connection which is thereby achieved is sufficiently strong in order to make possible only the adjustments necessary upon assembly of the camera.

According to a preferred feature of the invention the metal component encircles a plastics peg which is moulded on one camera component and which at its free end has an enlarged head.

According to another preferred embodiment of the invention, the two components are rotatable relative to one another about a common axis of rotation and the metal component has two parallel surfaces extending perpendicular to the axis of rotation and which are held clamped upon shrinkage of the plastics material.

The metal element may be a ring which

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encircles the camera lens housing and in this case may be provided with inclined surfaces which upon rotation of the lens housing vary its distance from the film plane.

5 The metallic camera component may include keying means for engagement by an assembly tool.

Such keying means preferably includes teeth. It can however alternatively com-
10 prise a recess, for example a hexagonal hole or a slot.

In order that the invention may be more fully understood, a number of embodiments in accordance therewith will now be de-
15 scribed by way of example and with reference to the accompanying drawings, in which:—

Fig. 1 is a plan view of a metal collar which encircles a peg of plastics material;

20 Fig. 2 is a sectional view taken along the line II—II of Fig. 1;

Fig. 3 is a plan view of a metal pin moulded into a plastics component;

Fig. 4 is a sectional view taken along the line IV—IV of Fig. 3;

25 Fig. 5 is a plan view of an adjustable segment;

Fig. 6 is a sectional view taken along the line VI—VI of Fig. 5;

30 Fig. 7 is a plan view of an adjustable plate;

Fig. 8 is a side view of part of a camera lens housing; and,

Fig. 9 is a sectional view taken along the line IX—IX of Fig. 8.

35 In Figs. 1, 3, 5 and 7 of the drawings the associated camera parts which lie beneath the adjustable collar, pin, segment, or plate are made of plastics material, although they are not shown. These plastics camera parts
40 are visible however as the cross-hatched areas in the corresponding sectional views.

Referring first to Figs. 1 and 2, there is shown a camera part 1 of plastics material which includes a moulded peg 2 which is en-
45 circled by a metal collar 3. The plastics peg 2 has a reduced thickness region 2a over the greater part of its height and a larger diameter head 2b. Over the height of this reduced thickness region 2a of the
50 peg 2 the internal diameter of the metal collar 3 is slightly larger than the outer diameter of the reduced thickness region 2a. A toothed region 4 is formed over a portion of the periphery of the metal collar 3. The
55 metal collar 3 is mounted eccentrically relative to the central axis 5 of the peg 2. Rotation of the metal collar 3 is effected by the action of a rack element or key which operates in the manner of a drill chuck key and has a central pin which can be fitted into
60 a hole 6 in the plastics component 1.

By rotation of the collar 3 with the aid of the key in the position of the peripheral surface of the metal collar 3, and conse-
65 quently the position of the working surface

of an element coupled to or connected with the metal collar, is changed. Thus, for ex-
70 ample, a range-finder setting lever of a camera may be connected to the metal collar 3 and by way of the metal collar 3 can be arranged to displace the lens housing 1. This adjustment of the lens housing takes place in the assembly of the camera in the described manner by a rotation of the
75 metal collar 3 by means of the teeth 4.

The clamping action between the metal collar 3 and the plastics peg 2, created by shrinkage of the plastics material upon cool-
80 ing and overcome when rotation is effected by using the key, is exerted on the surfaces 1a and 2c of the plastics component. These surfaces clampingly engage the corresponding surfaces 3b and 3c of the metal collar.

In Figs. 3 and 4, instead of a metal collar, there is shown a metal pin 7 moulded into the plastics component 1. The pin 7 is pro-
85 vided with a slot 8 for its rotational adjustment.

In the embodiment shown in Figs. 5 and 6 there is shown an adjustable metal segment 9 which is pivotable about a pin 2¹. A
90 finger 10 projects up through an arcuate slot in the metal segment and has an enlarged head 10b at its upper end. By shrinkage of the plastics material when cooling the clamp-
95 ing effect between the underside of the head 10b and the plastics component 1 is created. The adjustment of the segment 9 takes place in a manner similar to that already described by means of a key which engages with teeth
100 4¹ on the segment 9 and which is seated in a hole 6.

Fig. 7 shows a rotationally adjustable metal plate 11 which is clampingly held by the shrinkage of three plastics fingers 10¹
105 between their respective heads 10¹b and the plastics component lying underneath the plate.

The metal ring 12 shown in Figs. 8 and 9 encircles a lens housing 13 which is of
110 plastics material. In known manner the metal ring 12 is provided with inclined surfaces 12a in order to permit alteration of the distance of the lens from the film plane. Upon shrinkage of the plastics material the
115 metal ring 12 is clampingly held between flanges 13a and 13b of the lens housing 13.

WHAT WE CLAIM IS:—

1. A connection between two camera components which are adjustable relative to one another only by overcoming a positive
120 clamping force therebetween, wherein one of said components is made of metal and the other component is made of shrinkable plastics material, wherein the components en-
125 gage with one another or have regions which at least partially enclose one another, and wherein after cooling of the plastics material component the two components clampingly
130 engage each another but permit forcible



encircles the camera lens housing and in this case may be provided with inclined surfaces which upon rotation of the lens housing vary its distance from the film plane.

5 The metallic camera component may include keying means for engagement by an assembly tool.

Such keying means preferably includes teeth. It can however alternatively comprise a recess, for example a hexagonal hole or a slot.

10 In order that the invention may be more fully understood, a number of embodiments in accordance therewith will now be described by way of example and with reference to the accompanying drawings, in which:—

Fig. 1 is a plan view of a metal collar which encircles a peg of plastics material;

20 Fig. 2 is a sectional view taken along the line II—II of Fig. 1;

Fig. 3 is a plan view of a metal pin moulded into a plastics component;

Fig. 4 is a sectional view taken along the line IV—IV of Fig. 3;

25 Fig. 5 is a plan view of an adjustable segment;

Fig. 6 is a sectional view taken along the line VI—VI of Fig. 5;

30 Fig. 7 is a plan view of an adjustable plate;

Fig. 8 is a side view of part of a camera lens housing; and,

Fig. 9 is a sectional view taken along the line IX—IX of Fig. 8.

35 In Figs. 1, 3, 5 and 7 of the drawings the associated camera parts which lie beneath the adjustable collar, pin, segment, or plate are made of plastics material, although they are not shown. These plastics camera parts are visible however as the cross-hatched areas in the corresponding sectional views.

40 Referring first to Figs. 1 and 2, there is shown a camera part 1 of plastics material which includes a moulded peg 2 which is encircled by a metal collar 3. The plastics peg 2 has a reduced thickness region 2a over the greater part of its height and a larger diameter head 2b. Over the height of this reduced thickness region 2a of the peg 2 the internal diameter of the metal collar 3 is slightly larger than the outer diameter of the reduced thickness region 2a. A toothed region 4 is formed over a portion of the periphery of the metal collar 3. The metal collar 3 is mounted eccentrically relative to the central axis 5 of the peg 2. Rotation of the metal collar 3 is effected by the action of a rack element or key which operates in the manner of a drill chuck key and has a central pin which can be fitted into a hole 6 in the plastics component 1.

65 By rotation of the collar 3 with the aid of the key in the position of the peripheral surface of the metal collar 3, and consequently the position of the working surface

of an element coupled to or connected with the metal collar, is changed. Thus, for example, a range-finder setting lever of a camera may be connected to the metal collar 3 and by way of the metal collar 3 can be arranged to displace the lens housing 1. This adjustment of the lens housing takes place in the assembly of the camera in the described manner by a rotation of the metal collar 3 by means of the teeth 4.

70 The clamping action between the metal collar 3 and the plastics peg 2, created by shrinkage of the plastics material upon cooling and overcome when rotation is effected by using the key, is exerted on the surfaces 1a and 2c of the plastics component. These surfaces clampingly engage the corresponding surfaces 3b and 3c of the metal collar.

75 In Figs. 3 and 4, instead of a metal collar, there is shown a metal pin 7 moulded into the plastics component 1. The pin 7 is provided with a slot 8 for its rotational adjustment.

80 In the embodiment shown in Figs. 5 and 6 there is shown an adjustable metal segment 9 which is pivotable about a pin 2¹. A finger 10 projects up through an arcuate slot in the metal segment and has an enlarged head 10b at its upper end. By shrinkage of the plastics material when cooling the clamping effect between the underside of the head 10b and the plastics component 1 is created. The adjustment of the segment 9 takes place in a manner similar to that already described by means of a key which engages with teeth 4¹ on the segment 9 and which is seated in a hole 6.

85 Fig. 7 shows a rotationally adjustable metal plate 11 which is clampingly held by the shrinkage of three plastics fingers 10¹ between their respective heads 10¹b and the plastics component lying underneath the plate.

90 The metal ring 12 shown in Figs. 8 and 9 encircles a lens housing 13 which is of plastics material. In known manner the metal ring 12 is provided with inclined surfaces 12a in order to permit alteration of the distance of the lens from the film plane. Upon shrinkage of the plastics material the metal ring 12 is clampingly held between flanges 13a and 13b of the lens housing 13.

WHAT WE CLAIM IS:—

1. A connection between two camera components which are adjustable relative to one another only by overcoming a positive clamping force therebetween, wherein one of said components is made of metal and the other component is made of shrinkable plastics material, wherein the components engage with one another or have regions which at least partially enclose one another, and wherein after cooling of the plastics material component the two components clampingly engage each another but permit forcible 130

limited movement of one relative to the other.

2. A connection as claimed in claim 1, in which one component is a lens housing of plastics material and the other component is a metal element which is rotatable relative to the lens housing by overcoming the clamping force.

3. A connection as claimed in claim 1 or 2, in which the metal component encircles a plastics peg which is moulded on one camera component and at its free end has an enlarged head.

4. A connection as claimed in any preceding claim, in which the two components are rotatable relative to one another about a common axis of rotation and the metal component has two parallel surfaces extending perpendicular to the axis of rotation and which are held clamped upon shrinkage of the plastics material.

5. A connection as claimed in claim 2, in which the metal element is a ring which encircles the lens housing and has inclined surfaces which upon rotation of the lens housing alter the distance of the housing from the film plane.

6. A connection as claimed in any preceding claim, in which the metal component is provided with keying means for engagement by a tool for effecting the relative movement of the components.

7. A connection as claimed in claim 6, in which the keying means comprises teeth on the metal component.

8. A connection as claimed in claim 6, in which the keying means comprises a recess in the metal component.

9. A connection between two camera components, substantially as hereinbefore described with reference to Figs. 1 and 2, Figs. 3 and 4, Figs. 5 and 6, Fig. 7, or Figs. 8 and 9 of the accompanying drawings.

10. A method of connecting a metallic camera component and a camera component of plastics material, which comprises assembling the metallic component and a moulded plastics component before the latter has cooled whereby upon cooling of the latter shrinkage thereof will cause the components clampingly to engage each another but permit forcible limited movement of one relative to the other.

11. A method as claimed in claim 10, wherein the plastics component is moulded to the metallic component.

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