

PATENT SPECIFICATION

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(54) DEVICES FOR FIRING FLASH APPARATUS

(71) We, AGFA-GEVAERT AKTIENGESELLSCHAFT, a body corporate organised according to the Laws of Federal Republic of Germany, of Leverkusen, Federal Republic of 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:—

The invention relates to devices for firing flash apparatus.

The invention provides a device for firing an electronic flash apparatus in response to the action of a striker member of a camera for firing a percussively-operated flash lamp, which device comprises a drive member to be acted upon by the striker member, and a mass so coupled by resilient means to the drive member that the movement executed by the drive member when struck by the striker member is transmitted via the resilient means to the mass, the movement of the mass causing flash contact means for the electronic flash apparatus to be actuated to fire the flash apparatus after a delay from the striking of the drive member.

Such a device enables a camera provided with a striker member for firing percussively-operated flash lamps to be adapted for firing electronic flash apparatus; the necessary delay in firing the electronic flash apparatus from the actuation of the striker member (necessary, because *inter alia*, the delay time of percussively-operated flash bulbs is greater than that of electronic flash apparatus) is provided by mechanical means. The device is of simple construction and provides reliable operation of the flash apparatus.

The resilient means can be of low mass, so that a part of it will begin moving at the same time as the drive member moves, while the mass itself will initially remain in its original position. Depending on the magnitude of the deflection of the resilient means, on the elasticity constant, and on the magnitude of the mass, the mass is then

50 moved at a certain speed. The inertia of the mass causes the mass to carry on moving after the flash contact means has been actuated to fire the flash, so that the flash contact means remains actuated for a 55 certain period. The delay time may be appropriately selected by the choice of the elasticity constant and of the magnitude of the mass.

Advantageously, the mass can be moved to different positions on the resilient means to vary the separation of the drive member and the mass, and hence vary the delay; for example, if the resilient means is an elongate resilient member, the mass can be moved along the resilient member. By the displacement of the mass, the length between the mass and the drive member can be altered, and thus the force of the resilient means can simultaneously be altered.

In an advantageous manner, the resilient means may be a leaf spring, of steel or of a resilient plastics material, which is firmly joined to the drive member.

The resilient member may be formed in one piece with the drive member, which is preferably rotatably mounted.

The flash contact means may comprise a pair of contacts arranged to be closed on being struck by the mass; or the flash contact means may include a pair of contacts, one of which is formed by the mass, and the other of which is arranged in the path of movement of the mass.

The invention also provides the combination of a camera having a striker member for firing a percussively-operated flash lamp and a device for firing an electronic flash apparatus according to the invention described above.

The cameras with which the device is used have striker members for firing percussively-operated flash lamps. The flash lamps may be of the kind where an impact-sensitive composition is ignited when struck to fire a flash bulb, or of the piezo-electric kind (either of the piezo-primable kind or the piezo-electrically operated (electronic) kind). The striker

members strike the relevant part of the flash-lamp directly, but more usually (at least with the "ignition" type of flash-bulb) will release a tensioned member which performs the striking operation.

The devices according to the invention may be adapted to be secured to such a camera (for example, the devices may be adapted to fit into the socket where percussively-operated flash bulbs are fitted), or if desired the devices may be incorporated in the camera, or incorporated in the electronic flash apparatus.

Three adaptor devices for firing an electronic flash apparatus in response to the action of a striker member of a camera for firing a percussively-operated flash lamp, will now be described, by way of example, with reference to the accompanying drawings, in which:

Figures 1a to 1c show the first adaptor device;

Figure 2 shows the second adaptor device; and

Figures 3 and 4 show the third adaptor device.

The striker members of cameras with which the adaptors are used are also illustrated in the drawings.

Referring to Figures 1a to 1c, 1 indicates an adaptor device in which a drive member 3 is rotatable about an axis 2. A hairpin spring acting against the direction of rotation A is indicated by 4. A pin 5, secured to a housing of the adaptor, acts as a stop for a projection 3a on the drive member 3. A leaf spring 6 is secured to the drive member 3 at one end portion and, at the other end portion, is disposed a mass 7. Flash contacts are indicated by 8, and a striker member, arranged in a camera, by 9. The device is so arranged on the camera that the striker member 9 interacts with an edge 3b of the drive member 3. The leaf spring may be formed of steel. The flash contacts 8 are connected to a terminal to which the electronic flash can be connected.

Figure 1a shows all parts in the striking position. If, in accordance with Figure 1b, the striker member 9 is urged in the direction of arrow B, then the drive member 3 is struck and turned in the direction of arrow A. This causes the leaf spring 6 to be tensioned. Initially, the mass 7 remains in its starting position as shown in Figure 1b. Then the mass 7 moves, under the effect of the force of the tensioned leaf spring 6, in the direction of the flash contacts 8. After a pre-determined delay the mass 7 reaches the flash contacts 8 and closes the same, as may be seen from Figure 1c. As a result of the kinetic energy of the mass 7, the contact springs of the flash contacts 8, which are closed, are moved a certain distance in the direction of movement of the mass.

Consequently the flash contacts 8 are closed for a predetermined time, which is for all cases sufficient for firing the electronic flash apparatus.

In the adaptor device shown in Figure 2 drive member 11 is rotatably mounted in housing of the adaptor about an axis 12. A hairpin spring engaging with the drive member is indicated by 13, and a stop by 14. Secured to the drive member 11 is a leaf spring 15 on the free end of which is arranged a mass 16, which, for adjustment, can be displaced in one or the other direction along the leaf spring 15. A striker member in a camera is indicated by 17, and a contact spring by 18, this contact spring forming together with the mass 16, which is electrically conductive, flash contacts. The leaf spring 15, the drive member 11 and the hairpin spring 13 are also electrically conductive. A stop 19, secured in the housing, forms a contact 20 with one arm of the spring 13. The connecting points 21 and 22 are connected, in a manner not illustrated, to a socket provided on the adaptor device.

Referring to Figures 3 and 4, 23 is a drive member, 24 is a first leaf spring and 25 is a second leaf spring. The members 23, 24 and 25 are constructed in one piece and are made of resilient plastics material. Disposed on the free end of the leaf spring 24 is a mass 26. A first stop is indicated by 27 and a second stop by 28. The drive member 23 is pivotable about an axis 29. A striker member 30 arranged in a camera acts on a projection 23a of the drive member 23. Flash contacts, which can be closed by means of the mass 26, are indicated by 31. All members, with the exception of the striker member 30 of the camera to which the adaptor is secured, are arranged in a housing 32.

The method of operation of the third adaptor device of Figure 3 corresponds to that of the first two adaptor devices of Figures 1 and 2 respectively. The leaf spring 25 of the drive member 23 in Figures 3 and 4 replaces the hairpin spring 4 and 13 of Figures 1 and 2, respectively.

WHAT WE CLAIM IS:—

1. A device for firing an electronic flash apparatus in response to the action of a striker member of a camera for firing a percussively-operated flash lamp, which device comprises a drive member to be acted upon by the striker member, and a mass so coupled by resilient means to the drive member that the movement executed by the drive member when struck by the striker member is transmitted via the resilient means to the mass, the movement of the mass causing flash contact means for the electronic flash apparatus to be actuated

members strike the relevant part of the flash-lamp directly, but more usually (at least with the "ignition" type of flash-bulb) will release a tensioned member which performs the striking operation.

The devices according to the invention may be adapted to be secured to such a camera (for example, the devices may be adapted to fit into the socket where percussively-operated flash bulbs are fitted), or if desired the devices may be incorporated in the camera, or incorporated in the electronic flash apparatus.

Three adaptor devices for firing an electronic flash apparatus in response to the action of a striker member of a camera for firing a percussively-operated flash lamp, will now be described, by way of example, with reference to the accompanying drawings, in which:

Figures 1a to 1c show the first adaptor device;

Figure 2 shows the second adaptor device; and

Figures 3 and 4 show the third adaptor device.

The striker members of cameras with which the adaptors are used are also illustrated in the drawings.

Referring to Figures 1a to 1c, 1 indicates an adaptor device in which a drive member 3 is rotatable about an axis 2. A hairpin spring acting against the direction of rotation A is indicated by 4. A pin 5, secured to a housing of the adaptor, acts as a stop for a projection 3a on the drive member 3. A leaf spring 6 is secured to the drive member 3 at one end portion and, at the other end portion, is disposed a mass 7. Flash contacts are indicated by 8, and a striker member, arranged in a camera, by 9. The device is so arranged on the camera that the striker member 9 interacts with an edge 3b of the drive member 3. The leaf spring may be formed of steel. The flash contacts 8 are connected to a terminal to which the electronic flash can be connected.

Figure 1a shows all parts in the striking position. If, in accordance with Figure 1b, the striker member 9 is urged in the direction of arrow B, then the drive member 3 is struck and turned in the direction of arrow A. This causes the leaf spring 6 to be tensioned. Initially, the mass 7 remains in its starting position as shown in Figure 1b. Then the mass 7 moves, under the effect of the force of the tensioned leaf spring 6, in the direction of the flash contacts 8. After a pre-determined delay the mass 7 reaches the flash contacts 8 and closes the same, as may be seen from Figure 1c. As a result of the kinetic energy of the mass 7, the contact springs of the flash contacts 8, which are closed, are moved a certain distance in the direction of movement of the mass.

Consequently the flash contacts 8 are closed for a predetermined time, which is for all cases sufficient for firing the electronic flash apparatus.

In the adaptor device shown in Figure 1, drive member 11 is rotatably mounted in housing of the adaptor about an axis 12. A hairpin spring engaging with the drive member is indicated by 13, and a stop by 14. Secured to the drive member 11 is a leaf spring 15 on the free end of which is arranged a mass 16, which, for adjustment, can be displaced in one or the other direction along the leaf spring 15. A striker member in a camera is indicated by 17, and a contact spring by 18, this contact spring forming together with the mass 16, which is electrically conductive, flash contacts. The leaf spring 15, the drive member 11 and the hairpin spring 13 are also electrically conductive. A stop 19, secured in the housing, forms a contact 20 with one arm of the spring 13. The connecting points 21 and 22 are connected, in a manner not illustrated, to a socket provided on the adaptor device.

Referring to Figures 3 and 4, 23 is a drive member, 24 is a first leaf spring and 25 is a second leaf spring. The members 23, 24 and 25 are constructed in one piece and are made of resilient plastics material. Disposed on the free end of the leaf spring 24 is a mass 26. A first stop is indicated by 27 and a second stop by 28. The drive member 23 is pivotable about an axis 29. A striker member 30 arranged in a camera acts on a projection 23a of the drive member 23. Flash contacts, which can be closed by means of the mass 26, are indicated by 31. All members, with the exception of the striker member 30 of the camera to which the adaptor is secured, are arranged in a housing 32.

The method of operation of the third adaptor device of Figure 3 corresponds to that of the first two adaptor devices of Figures 1 and 2 respectively. The leaf spring 25 of the drive member 23 in Figures 3 and 4 replaces the hairpin spring 4 and 13 of Figures 1 and 2, respectively.

WHAT WE CLAIM IS:—

1. A device for firing an electronic flash apparatus in response to the action of a striker member of a camera for firing a percussively-operated flash lamp, which device comprises a drive member to be acted upon by the striker member, and a mass so coupled by resilient means to the drive member that the movement executed by the drive member when struck by the striker member is transmitted via the resilient means to the mass, the movement of the mass causing flash contact means for the electronic flash apparatus to be actuated



to fire the flash apparatus after a delay from the striking of the device member.

2. A device as claimed in claim 1, wherein the mass can be moved to different positions in the resilient means to vary the separation of the drive member and the mass, and hence vary the delay.

3. A device as claimed in claim 1 or claim 2, wherein the resilient means is a leaf spring.

4. A device as claimed in claim 3, wherein the leaf spring is of steel.

5. A device as claimed in claim 3, wherein the leaf spring is of a resilient plastics material.

6. A device as claimed in any one of claims 1 to 5, wherein the resilient means is an elongate member, one end portion of which is secured to the drive member and the other end portion of which is secured to the mass.

7. A device as claimed in any one of claims 1 to 6, wherein the resilient means is formed in one piece with the drive member.

8. A device as claimed in any one of claims 1 to 7, wherein the drive member is rotatably mounted.

9. A device as claimed in any one of claims 1 to 8, wherein the flash contact

means comprises a pair of contacts arranged to be closed on being struck by the mass in the path of movement of the mass.

10. A device as claimed in any one of claims 1 to 8, wherein the flash contact means comprises a pair of contacts, one of which is formed by the mass, and the other of which is arranged in the path of movement of the mass.

11. A device for firing an electronic flash apparatus in response to the action of a striker member of a camera for firing a percussively-operated flash lamp, constructed substantially as hereinbefore described with reference to, and as shown in, Figures 1a to 1c, or Figure 2 or Figures 3 and 4.

12. The combination of a camera having a striker member for firing a percussively-operated flash lamp and a device for firing an electronic flash apparatus as claimed in any one of claims 1 to 10.

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