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FLASHLIGHT SYNCHRONIZATION DEVICE

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Fig. 1.

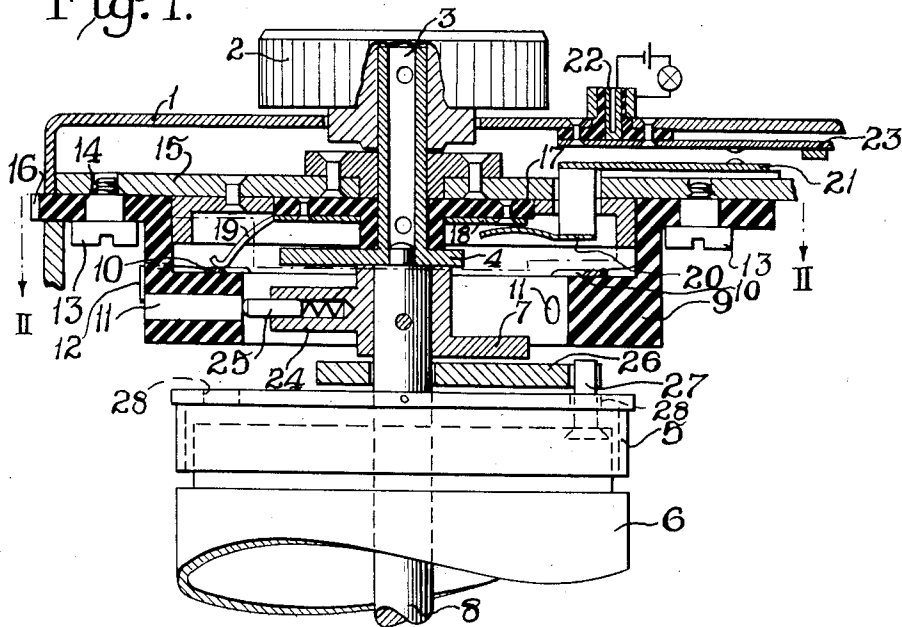
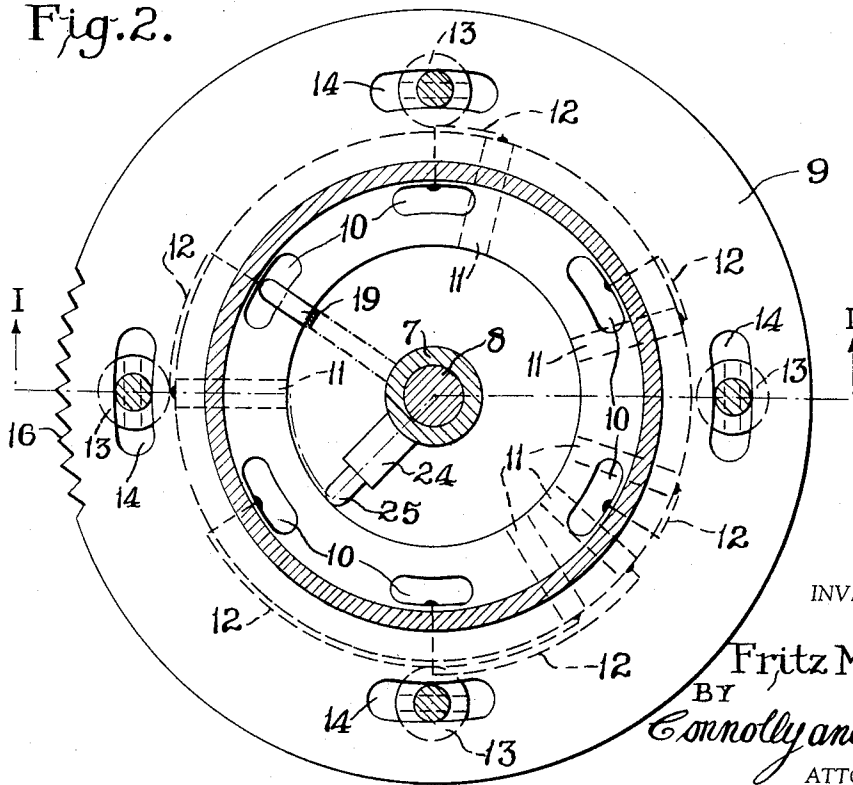


Fig. 2.



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FLASHLIGHT SYNCHRONIZATION DEVICE

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5 Claims. (Cl. 95—11.5)

The present invention relates to a flashlight synchronization device for photographic cameras with focal plane shutter, said device being preferably of the type having a first electrical contact controlled by the shutter release and a second or ignition contact controlled by a running down shutter part, the time of ignition being suited to the shutter speed selected.

Known devices of this type have a pair of electrical contacts both of which are mobile. While one contact is controlled by a running down shutter part by way of a control cam and after operation of the shutter release is moved into contact with the second contact, this second contact is controlled by means of a setting cam coupled with the shutter speed setting means and the time of ignition is established in accordance with the shutter speed selected, by varying its distance from the first contact. The distance separating these two contacts is relatively small so that for the contact provided for setting the time of ignition there is only a short setting travel available, more especially when, in setting the time of ignition, provision is to be made, in addition to the shutter speed setting, also for the varying ignition characteristics of the different types of flashbulbs. The exact establishment of the most advantageous time of ignition is, therefore, somewhat difficult with these devices and requires a very high degree of mechanical precision in manufacture and fitting of the contact elements and control cams.

The present invention provides a flash synchronization device of the type described for photographic cameras with focal plane shutter, i.e., comprising preferably a first electrical contact controlled by the shutter release and a second or ignition contact controlled by a running down shutter part, the time of ignition being suited to the shutter speed selected, which is characterized in that in the vicinity of the ignition contact controlled by a running down shutter part several alternative contacts are arranged for the individual shutter speeds which contacts can be selectively brought into the flashbulb circuit via a contact element controlled by the shutter speed setting knob.

According to the invention each alternative contact located in the vicinity of the mobile ignition contact is in electrical connection with a further contact element, these latter contact elements being located in the vicinity of a setting contact member controlled by the shutter speed setting knob. According to one embodiment of the invention the ignition contact member is arranged on a spindle coupled with the roller of the first shutter blind, whereas the alternative contacts for the different shutter speeds are arranged in a concentric circle about said spindle. The setting contact member, which brings into the flashbulb current circuit in turn the contact elements in electrical connection with the alternative contacts for the ignition contact member, is rigidly connected with the spindle of the shutter speed setting knob; the aforementioned contact elements being arranged in a concentric circle about said spindle, and being spaced in correspondence with the markings on the shutter speed dial.

The alternative contacts for the ignition contact mem-

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ber and the contact elements in electrical connection with them are arranged according to the invention on a carrier made of insulating material which may be adjustable about the axis of the rotatable ignition contact member.

In this case, the aforementioned contact elements are advantageously large enough in the tangential direction to insure that when the contact carrier is turned, the contact element concerned and the setting contact member remain electrically connected.

The invention offers the considerable advantage that during the travel of the shutter blinds the ignition contact member travels through a relatively long distance so that the time of ignition can be adjusted both in accordance with the shutter speed selected and with the ignition characteristics of the type of flashbulb used. The adjustment of the time of ignition and the actuation of the ignition contact member are performed with simple means practically free from wear, without the use of control cams.

The novel features and advantages of the present invention will become apparent to one skilled in the art from a reading of the following description described in conjunction with the accompanying drawings in which:

Fig. 1 is a view in elevation partially in cross section of an embodiment of this invention, and

Fig. 2 is a plan view of the synchronization device in cross section taken through Fig. 1 along the line II—II. The cross-sectional portion of Fig. 1 is taken through Fig. 2 along the line 1—1.

Referring to the drawings, 1 is a camera housing on which a shutter speed setting knob 2 is provided. When the knob is turned to select the desired shutter speed, its rotation is transmitted in known manner (not shown in the drawing) via a spindle 3 and a shutter speed setting cam 4 to a focal plane shutter. Of the latter, parts of the two blind rollers 5, 6 are shown, the roller 5 of the first shutter blind and a control cam 7 for the release of the second blind, on the roller 6, being fixed on a spindle 8. The spindles 3 and 8 are coaxial. For the release of the second blind, there is further provided a disc 26 arranged to rotate about the spindle 8 and connected to the roller 6 of the second blind by a pin 27 projecting through a circular slot 28 in the roller 5 of the first blind. The movement of disc 26 is regulated by a mechanism (not shown) controlled by said cam 7. A complete description of the manner in which the rotation of a shutter speed setting knob is transmitted to a shutter by means of a shutter speed setting cam of the type shown as cam 4, and a complete description of a mechanism illustrating the manner in which a control cam similar to the type shown in control cam 7 releases a second shutter blind by use of a disc similar to the type shown in disc 26 are described, for example, in United States Letters Patent No. 2,122,671.

There is also arranged coaxially with the spindle 8 an annular contact carrier 9, made of insulating material, on which contact elements 10 and alternative contacts 11 are provided. A cable 12 connects each contact element 10 electrically with a contact 11. The whole contact carrier 9 is coupled to a stationary housing member 15 by means of shoulder screws 13 passing through slots 14 in the contact carrier 9, and it can be turned about the spindle 8 through an angle determined by the length of the slots 14. For this purpose a part of the contact carrier 9 which projects beyond the camera housing is knurled at 16.

With an insulating bushing 17 rigidly attached to the spindle 3 there is rigidly connected a current-conducting ring 18 having a spring setting contact member 19 which, when the shutter speed setting knob 2 is turned, slides over the contact elements 10. The ring 18 is electrically connected through a contact spring 20 to a contact 21

which is paired with a blade-spring first contact 23 which is connected electrically with a flashbulb contact socket 22. A flashbulb is shown electrically connected to the contact socket and through a source of potential, for example a dry cell battery, to ground. The contact 23 follows the movement of the shutter release via transmission members not shown in the drawing. Movement of the shutter release (not shown) moves blade 23 downward to close the contacts.

Furthermore, a resilient ignition contact pin 25, under outward pressure by a compression spring, is arranged radially in a bushing 24, rigidly connected with the spindle 8. When the spindle 8 is turned, the pin 25 slides over the contacts 11. Pin 25 is connected to the ground side of the ignition circuit.

The device of the invention operates in the following manner:

By turning the shutter speed setting knob 2 a shutter speed is selected in accordance with an indication (not shown) on a dial of knob 2. For each shutter speed dial marking (not shown) a corresponding contact element 10 is provided on the contact carrier 9 and the geometrical arrangement of the contact elements 10 coincides with that of the markings on the dial of the shutter speed setting knob 2. The spring setting contact member 19 is therefore placed on the appropriate contact element 10 when the shutter speed is being selected; see in particular Fig. 2.

After the shutter has been set, the rotatable ignition contact 25 takes up the position shown in Fig. 2. When the shutter release (not shown) is operated, the first contact 23, 21 is closed and thus an electrical connection made between the aforementioned contact element 10 and a flash device connected to the contact socket 22. At the same time the first shutter blind is released so that via the blind roller 5, the spindle 8 and the bushing 24 the ignition contact 25 is caused to turn clockwise, see Fig. 2, and the contacts 11 may be successively touched for a brief moment. When that contact 11 is touched which is connected via contact element 10 and spring setting contact member 19 with the first contact 23, the current circuit of the flashbulb is closed and the flashbulb is ignited.

By suitably locating the contact 11 on the contact carrier 9 in accordance with the corresponding shutter speeds and corresponding to the characteristic running down movement of the focal plane shutter concerned, the result can be achieved that, when a flashbulb having particular ignition characteristic is used, the maximum amount of light is always emitted when the exposure slot formed between the shutter blinds is symmetrical with respect to the center line of the image opening.

The adjustment of the synchronization device to suit flashbulbs of different ignition characteristics is performed by turning the contact carrier 9 within the limits set by the slots 14, that is to say by adjusting the contact carrier 9 in relation to the initial position of the rotatable ignition contact number 25. To this end the contact elements 10 are given elongated or kidney shape to provide good contact between the spring setting contact 19 and the appropriate contact element 10, irrespective of the adjustment of the device to suit the particular flashbulb to be used. Moreover, the contact elements 10 can be elongated even further so as to insure good contact even when the shutter speed setting knob 2 is not accurately set for a shutter speed marking on the shutter speed dial.

Since the contact elements 10 are spatially separated from the contacts 11, the synchronization device can be adjusted in a simple manner for any distances between the consecutive markings on the shutter speed dial by suitable arrangement of the contacts 10, 11. During the setting movement of the shutter after its running down-movement the ignition contact member is brought back into its initial position by turning in an anticlockwise di-

rection whereby the contacts 11 may be successively touched again for a brief movement. When said contact 11 is touched, which is in connection with the contact element 10, no ignition of a flashbulb takes place because contact 23, 21 is open.

In another modification of the invention the ignition contact 25 reaches its initial position at the end of the running down movement of the shutter, that is, to say the ignition contact 25 makes exactly one revolution during the shutter movement. When the ignition contact 25 is capable to be disengaged from the spindle 8 during the setting movement of the shutter, the contact 23, 21 is not necessary and the contact spring 20 may be directly connected to the contact socket 22. In that case between the ignition contact 25 and the spindle 8 a coupling may be provided which is only operative in one direction of movement.

Instead of providing a rotatable ignition contact member 25 and arranging the contacts 11 on an annular contact carrier, there may be provided a longitudinally sliding ignition contact member 25, the contacts 11 being arranged in a straight line on a contact strip. In similar manner, adjustment of the spring setting contact member 19 can be performed, and the contact elements 10 arranged along a straight line.

What is claimed is:

1. A flashlight synchronization device for a photographic camera having a roller blind shutter means including a rotatable roller and a shutter speed-setting means comprising a first plurality of contact elements corresponding to the number of available shutter speed settings mounted in a first circular array upon a common carrier, a rotatable ignition contact member operatively coupled to said rotatable roller and concentrically mounted adjacent said common carrier for successively contacting said first plurality of contact elements, a second plurality of contact elements mounted in a second circular array upon said common carrier, each of said second plurality of contact elements being electrically connected to one of said first plurality of contact elements, a movable setting contact member operatively coupled to said shutter speed-setting means which includes a speed-setting knob rotatably mounted adjacent said shutter, said movable setting contact member being concentrically disposed adjacent said common carrier which causes it to selectively touch said second plurality of contact elements, electric circuit means connecting said setting contact member and said ignition contact member to a flashbulb to fire said flashbulb when said ignition contact member contacts that contact member of said first plurality of contact members which is connected to that contact member of said second plurality of contact members which is in contact with said setting contact member, and adjustable means rotatably mounted upon said common carrier upon said camera substantially between said shutter speed-setting knob and said rotatable roller to permit said carrier and said first plurality of contact elements to be rotated relative to said movable ignition contact member to vary the ignition time for said flashbulb in accordance with its ignition characteristic.

2. A flashlight synchronization device as set forth in claim 1 wherein said movable ignition contact member is operatively coupled to a rotating shaft connected to said rotatable roller.

3. A flashlight synchronization device as set forth in claim 1 wherein said carrier is rotatable within a limited angle, and said elements of said second plurality are of extended shape to provide contact between said setting contact member and said elements through said limited angle of rotation of said carrier.

4. A flashlight synchronization device as set forth in claim 2 wherein said speed-setting knob is concentrically mounted relative to said rotating shaft connected to said rotatable roller, said movable setting contact member being concentrically attached to said speed-setting knob, and

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said common carrier comprising a cylindrical housing which is concentrically and rotatably mounted upon the casing of said camera between said movable setting contact member and said roller.

5. A flashlight synchronization device as set forth in claim 4 wherein said cylindrical housing is annular in form, said second plurality of contact elements is mounted upon an annular surface of said cylindrical housing which is disposed adjacent said movable setting contact member, the portions of said first plurality of said contact elements which are successively contacted by said ignition contact member are disposed within the inner cylindrical surface of said cylindrical housing, and said

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ignition contact member is secured to said rotating shaft and disposed within said cylindrical housing.

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