United States Patent [19]

Hanssen et al.

[11] **3,883,710**

[45] **May 13, 1975**

[54] **HEADLIGHT DIMMER SWITCH**

[75] Inventors: **Tore B. Hanssen; Albert F. Ditzig,** both of Roselle, Ill.

[73] Assignee: **Controls Company of America,** Schiller Park, Ill.

[22] Filed: **Nov. 14, 1973**

[21] Appl. No.: **415,837**

[52] **U.S. Cl.** **200/156;** 315/83

[51] **Int. Cl.** **H01h 1/56;** H01h 13/58

[58] **Field of Search** ..... 315/83.1, 83; 200/156, 200/64, 65, 11 C

[56] **References Cited**

UNITED STATES PATENTS

2,154,796	4/1939	Whittington	200/156 X
2,231,387	2/1941	Jones	200/156 X
2,810,794	10/1957	Brown et al.	200/156 X

FOREIGN PATENTS OR APPLICATIONS

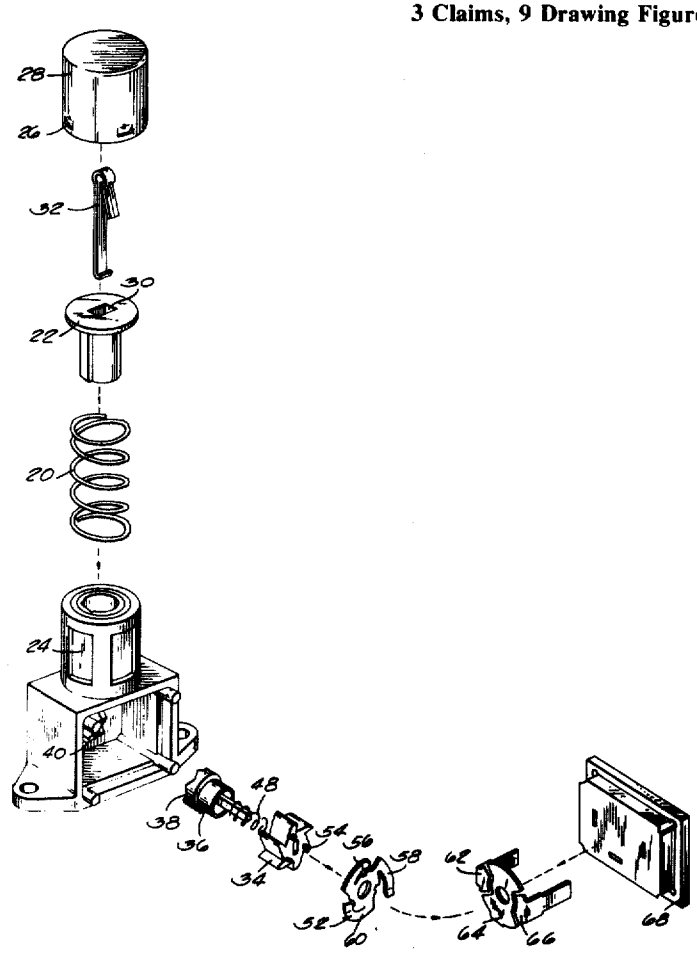
1,011,751	7/1957	Germany	200/156

Primary Examiner—Robert K. Schaefer
Assistant Examiner—William J. Smith
Attorney, Agent, or Firm—Michael, Best & Friedrich

[57] **ABSTRACT**

When the plunger is depressed, the actuating blade acts on the cam to rotate the cam detent and wiper assembly 60°. The rotating detent cooperates with the fixed detent to give the "feel" and indexing action. The fixed contacts are arranged so one of the three wipers will always contact a "hot" contact while one of the wipers will contact either the low beam or high beam contacts in the static (detented) position. During the switching action, which occurs after the detent action starts and, therefore, at high speed, there is always an interval when both the high and low beam contacts are engaged by the wipers to make the new circuit before breaking the old circuit. The "hot" circuit is never broken and arcing is minimized. The use of three blades instead of two increases switch life. And safety is improved since there is no time during which no headlamp circuit is made.

3 Claims, 9 Drawing Figures



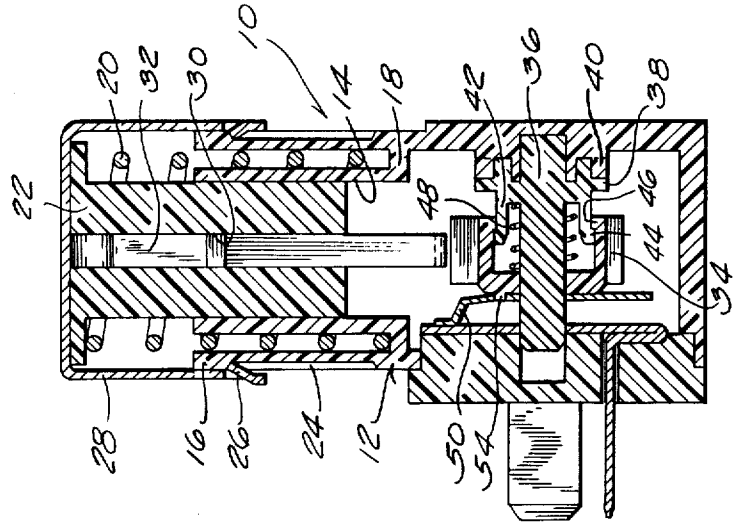

10
20
32
30
14
18
42
36
40
38
22
48
46
44
34
28
16
26
24
12
50
54

Fig. 2.

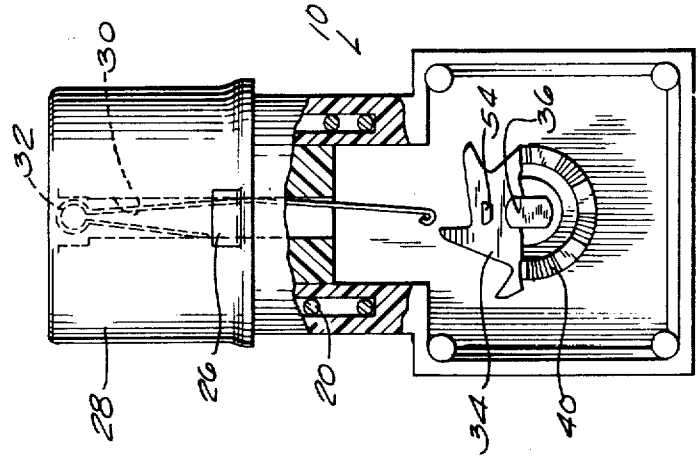

10
30
32
54
36
28
26
20
34
40

Fig. 1

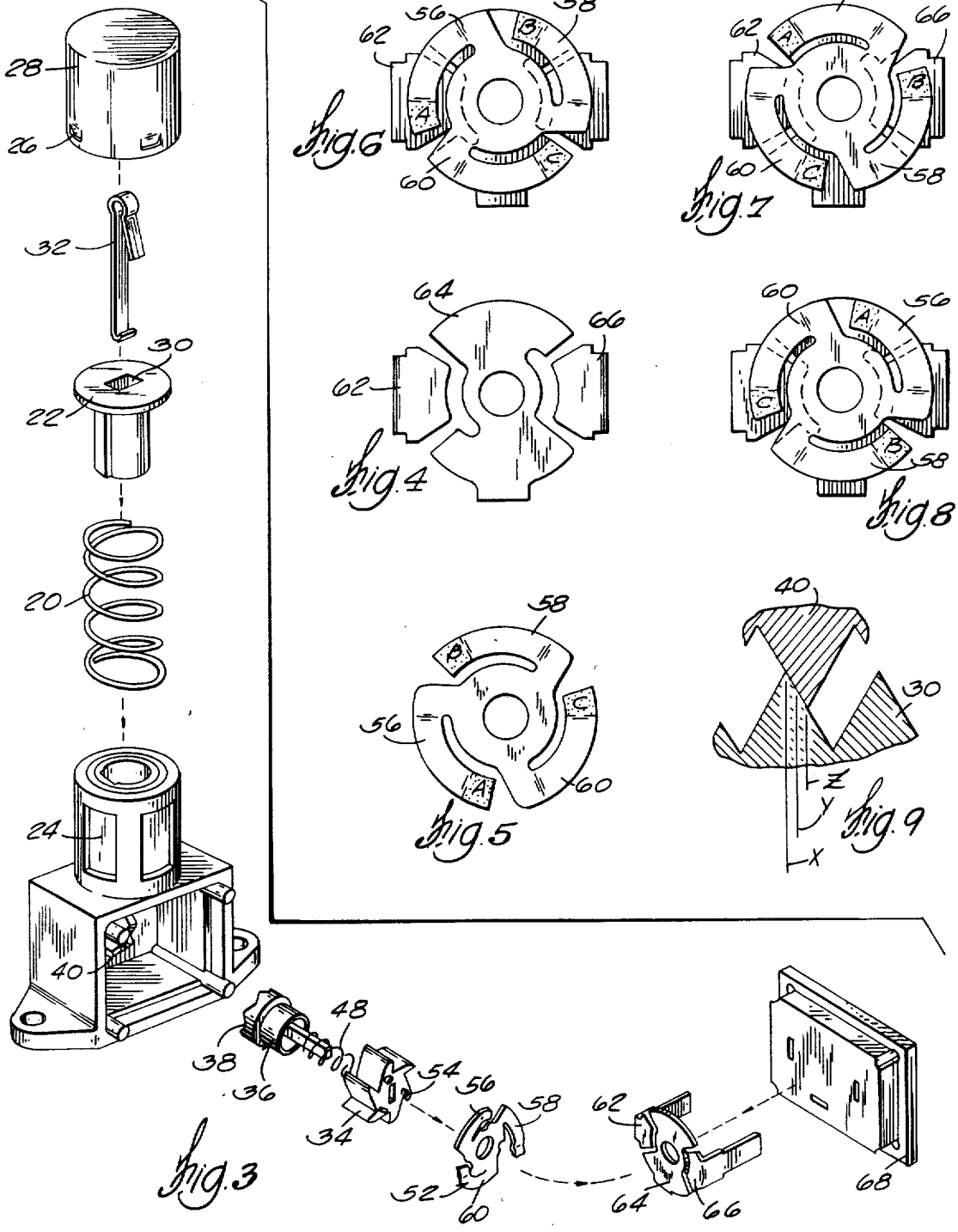


Fig. 3

Fig. 6

Fig. 7

Fig. 4

Fig. 8

Fig. 5

Fig. 9

HEADLIGHT DIMMER SWITCH

BACKGROUND OF THE INVENTION

1. Prior Art

The foot dimmer switches of the prior art have an expected life which is marginal and there is a need for greater life. Many switched at a speed related to speed of actuation and appreciable arcing results. Most break before making the next circuit, giving a brief but undesired interval of no light. Unbalanced contact pressures are common in the prior art.

2. SUMMARY OF THE INVENTION

By providing three equally spaced wiper-contacts, uniform contact pressures are achieved in the present design. The blades "work" electrically half as much as in the art resulting in 50% increase in life. Since connection to the "hot" contact is never broken, arcing is eliminated. Since all switching occurs after the detent trip point, all switching is done at high speed independent of speed of actuation and this results in improved switching and reduced arcing. And the make-before-break action provides a safety feature lacking in the prior art. Finally, this design can be produced for less cost than the prior art.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a vertical section through the dimmer switch with part of the cam broken away to show the detent assembly lying behind the cam.

FIG. 2 is a vertical section taken at right angles to the view in FIG. 1.

FIG. 3 is an exploded assembly view giving the orientation of the parts.

FIG. 4 is a view of the fixed contacts from the inside of the housing.

FIG. 5 is a view of the wiper assembly taken from the same direction as FIG. 4 so that FIG. 5 can be superimposed on FIG. 4 to create the views shown in FIGS. 6 through 8.

FIG. 6 is a view showing the wiper assembly overlying the fixed contacts so as to show the manner in which the switching is achieved. This is the low beam position.

FIG. 7 shows the wiper rotated 60° and is the high beam position.

FIG. 8 shows the wiper rotated a further 60° and is now the low beam position.

FIG. 9 is a spread view of the detent arrangement showing the manner in which the detenting action is made to precede the switching action and the making of a new circuit is made to precede the breaking of the circuit being broken.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The dimmer switch assembly includes a molded housing **10** having a generally cylindrical upper portion **12.** The upper portion has concentric tubular walls **14,16** joined by web **18** which serves as a seat for compressed spring **20** acting against the underside of plunger **22** guided in inner tube **14.** The outer wall **16** has vertical grooves **24** molded therein to receive, capture and guide tabs **26** sheared upwardly from cap **28** which fits over the plunger. Downward movement of the plunger and cap is limited by the plunger flange engaging the top of the walls **14,16** and outward movement is limited by engagement of tabs **26** with the top of the grooves **24.**

A rectangular bore **30** extends through the plunger and the formed actuating pin **32** is mounted therein. The pin has a generally "hairpin" shape so its upper rounded end is received in the enlarged pocket at the top of the bore while the short leg and the resiliency of the pin urge it to the position shown in FIG. **1.** In this position the slight bend of the long leg of the pin extends across the centerline of the plunger to act on cam **34** off center. The lower end of the pin is bent back on itself to provide a rounded end and avoid digging into the cam **34.**

The cam has a generally rectangular center opening fitting over the shaft **36** to key the cam to the shaft. The shaft is part of a molded piece including detent teeth **38** engaging detent **40** molded in the housing. The piece also includes a hub **42** having the bead **44** which is forced into the hub of the cam until it is captured inside shoulder **46** with spring **48** captured therein to force the cam and detent apart to the maximum determined by engagement of the bead with the shoulder. The wiper **50** hub fits loosely on the shaft but is provided with notches **52** engaged by lugs **54** so the cam can drive (rotate) the wiper. The wiper includes three resilient arms **56,58,60** bent to firmly bear against contacts **62,64,66** mounted in the cover **68.** Each arm is formed at the free end to provide a contact area A, B, C on blades **56,58,60,** respectively. Three blades act to urge the cam to the right with a force less than the force of spring **48.**

As the cam is forced to rotate by depressing the plunger, detent **38** is forced to the left (FIG. **2**) until the teeth go over the top of the housing detent **40** as indicated at point X in FIG. **9.** At this moment spring **48** drives the detent **38** and rapid switching is assured, as will be clear hereinafter.

The three arms are equally spaced but the fixed contacts **62,64,66** are not. Thus in FIG. **6** both contacts B and C rest on fixed contact **64** which is designed to be connected to the "hot" side of the battery while A is connected to contact **62** . . . . the low beam contact. As the wiper is detented, the action starts at point X in FIG. **9.** First the next circuit is made at point Y and then at Z the prior circuit is broken. At no time is the circuit to **64** broken. So going from FIG. **6** to FIG. **7** contact area B engages high beam contact **66** before area A leaves low beam contact **62** while C maintains contact with the hot contact **64.** Both high and low are made at this instant. Then the low contact is broken as A leaves **62** and engages **64.** Going from FIG. **7** to FIG. **8** C engages low **62** before B leaves high **66.**

As a result of this switching action the circuits are broken only one-third to one-half of prior designs with a consequent increase in life cycle of 50% or more. The B+ (**64**) circuit is never broken.

We claim:

1. A switch including

a housing,

a plunger mounted in the housing for reciprocal motion and biased outwardly,

an electrically conductive wiper mounted in the housing for rotation in discreet steps and having three equally spaced resilient wiper arms,

three contacts fixed in the housing about the axis of rotation of the wiper for engagement by the wiper arms,

the first and third of said contacts being diametrically opposed with each being in the general shape of a segment of an annulus,

the second of said contacts including two connected diametrically opposed contact portions each having the general shape of a segment of an annulus,

the contact portions of said second contact lying between the first and third contacts and having greater angular embrace than the first and third contacts so the second contact is always engaged by a wiper arm and the next to be engaged contact of the first and third contacts will be engaged before engagement with the other of the first and third contacts is broken,

two of the three wiper arms always contacting the second contact in any at-rest position.

2. A switch according to claim 1 including a detent mechanism operative in response to depression of said plunger to positively drive the wiper to its next step position at a rotational position prior to switching so the speed of switching is determined by the detent mechanism.

3. A switch according to claim 2 in which the detent mechanism includes

a detent fixed in the housing and having alternate hills and valleys disposed about the axis of rotation of the wiper,

a detent rotatable with the wiper and having alternate hills and valleys engageable with the housing detent,

a cam fixed relative to the rotatable detent and engaged by the plunger when the plunger is depressed,

spring means urging the detents into engagement and yieldable during initial depression of the plunger until the rotatable hills pass over the fixed hills and operative to thereafter drive the rotatable detent to completion of the step.

* * * * *