June 14, 1949. F. J. MALONEY 2,473,287

MULTIPLE SWITCH

Filed June 12, 1946

Fig. 1

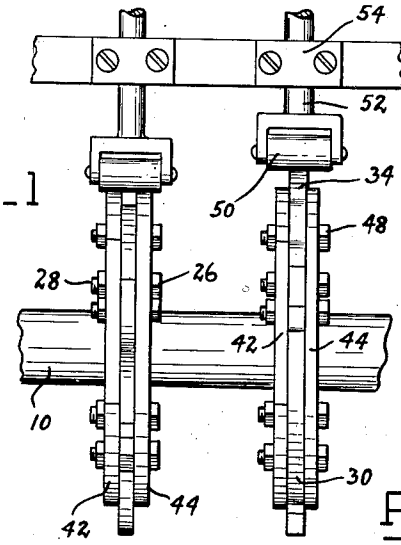


Fig. 4

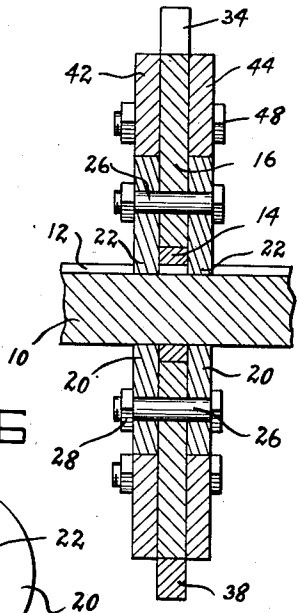


Fig. 6

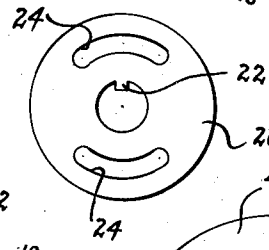
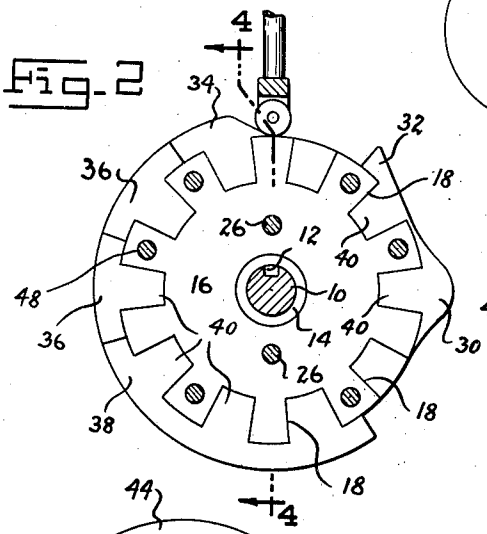


Fig. 2



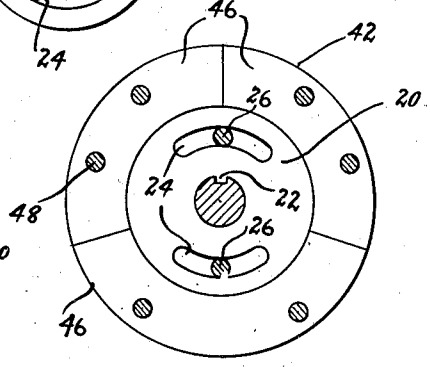
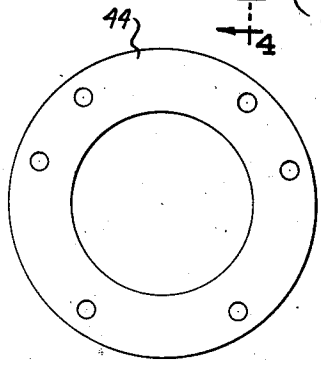


Fig. 3

Fig. 5



Inventor

Francis J. Maloney

By Clarence A. O'Brien and Harvey B. Jackson

Attorneys

Patented June 14, 1949

2,473,287

UNITED STATES PATENT OFFICE

2,473,287

MULTIPLE SWITCH

Francis J. Maloney, Warren, Ohio

Application June 12, 1946, Serial No. 676,162

5 Claims. (Cl. 200—16)

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This invention pertains to a multiple switch and more particularly relates to a cam for imparting a selective and variable actuation to a follower for controlling the time and duration of electrical circuits thereby, although the principles of the invention are broadly applicable to any cam for providing a variable contour thereon.

The primary objects of the invention are to provide a cam with means to selectively vary its actuating surface as to extent and time; and to provide such a construction of adjustable cam as will be suitable for electrical switch means.

Other ancillary objects of the invention are the development of a device in conformity with the foregoing objects, which shall be compact, readily adjusted, durable and dependable in operation and with all inexpensive to manufacture.

These, together with numerous other objects of my invention, to become more fully apparent hereinafter, are attained by my device, one embodiment of which has been illustrated by way of example only in the accompanying drawings, wherein:

Figure 1 is an end elevation showing a preferred embodiment of the invention;

Figure 2 is a side elevation of certain elements of my invention;

Figure 3 is a side elevation of a part of the invention, taken from the left side of Figure 4;

Figure 4 is a vertical sectional view through the embodiment of the device shown in Figure 1 and taken substantially upon the line 4—4 of Figure 2;

Figure 5 is an elevational view of an element forming a part of my invention, and

Figure 6 is an elevational view of another element of the invention.

Referring more specifically to the drawings, 10 indicates a shaft having a key-way 12, upon which is keyed a spacer sleeve or bushing 14 constituting a journal for an annular carrier 16 which is radially notched about its circumference as at 18. A pair of identical discs 20 are keyed as at 22 to the groove 12 for rotation with the shaft 10 and embrace therebetween the spacer 14 and the carrier 16. The discs are each arcuately slotted as at 24 to slidably receive bolts 26 which extend through the carrier, nuts 28 being provided for locking the carrier and bolts in circumferentially adjusted position relative to discs 20.

As shown more clearly in Figure 2, I provide a series of cam inserts which may take any desired form of cam actuating surface such as those indicated at 30, 32, 34, 36 and 38 in Figure 2. Each insert is provided with a depending lug or projection indicated at 40 adapted to engage and snugly seat in the radial notches 18, and to be retained therein both by the frictional or seating engagement of the lugs 40 in the sockets 18 and also by a clamping means to be later set forth. It will be readily understood that the cam inserts will be provided with any suitable desired cam profile to form a cam actuating surface or surfaces of predetermined contour and having predetermined operating characteristics. Thus, I may form inserts engaging in single sockets 18 as at 30 or 32, which inserts may be placed at any suitable point upon the periphery of the carrier 16. Alternatively, or in conjunction with any of the inserts, 30, 32, I may employ a series of inserts such as 34, 36 and/or 38 which in their entirety provide a cam surface of predetermined contour.

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As shown more clearly in Figures 3, 4 and 5, a pair of annular rings 42 and 44 are provided to embrace the marginal edge of the carrier 16 and to be journalled for rotation upon the discs 20. One ring, indicated at 44 is intended to be formed of integral construction while the other ring indicated generally at 42 is composed of a plurality of segments 46 which when assembled together constitute a ring. Suitable apertures are provided in the ring 44, carrier 16 and the ring segments 46 of ring 42 for the reception of fastening means such as bolts 48 whereby the carrier and the rings may be rigidly secured in predetermined clamped position for tightly embracing the insert portions in a manner which will be readily understood.

The assembly consisting of ring 42, carrier 16 and the other retaining ring 44 when assembled together as by bolts 48, presents a circular surface which forms the base circle of a cam whose operating surface of cam lobe is formed by the use of the selective inserts 30, 32, 34, 36 and 38 as previously mentioned. When it is desired to change the cam profile, the appropriate fastening bolts 48 may be loosened on one or more of the cam ring sections 46 or said sections may be detached if desired whereby appropriate inserts may be removed or positioned in the desired notches 18 in order to effect the desired change. The removable cam ring sections 46 provide a convenient means for releasing the pressure which locks the inserts in the carrier plate and in the cam assembly, without the necessity for removing the entire cam or the entire ring thereby releas-

ing all of the inserts. When it is desired to change not the profile but the angular position of the cam operating surface, the bolts and nuts **26** and **28** may be loosened whereby the assembly consisting of the carrier plate to which the rings **42**, **44** and the cam inserts are rigidly attached is released, whereby said assembly may be rotated or shifted by means of the arcuate slot **24** into a predetermined and selected position and the fastening bolt **26** and nut **28** may be again tightened to lock the parts in the selected position.

As indicated better in Figure 1, the cams engage and actuate anti-friction rollers **50** carried by reciprocating cam followers **52** slidably received in guide members **54**. By means of the cam constructed in accordance with the foregoing explanation a motion of predetermined duration and characteristics is imparted to the reciprocating follower **52**.

Although it is the primary object of this invention to employ said motion of the follower **52** to operate in accordance with a predetermined pattern an electrical circuit, it will be evident that it may also be employed for the actuation of other instrumentalities. It is also to be understood that roller **50** and follower **52** may operate any suitable type of electric switch or electrical controller or alternatively they may be fitted to form part of an electrical switch by being made of electrically conductive material, while the cam inserts will then be made of an insulating material. When used in such a manner, the circuit will be completed by the contact of the roller **50** with the metallic rings **42**, **44** and the surface of the carrier plate **16** in a manner known in the art, while the circuit will be broken by the interposition of the cam inserts between the cam base circle and the roller **50**.

I desire to here call attention to the fact that this arcuate adjusting means is not essential to the principles of this invention, and may be omitted in certain instances where adjustment is regarded as unnecessary and a more inexpensive construction is desirable.

Moreover, if the follower mechanism **50**, **52** is intended to actuate a switch, the cam mechanism will form no part of the electrical circuit and hence may be conveniently formed of any suitable material, whether of metals, or non-metals including plastics.

It is to be distinctly understood that I do not limit myself to the exact construction shown and described in the foregoing application, but that I may avail myself of any modifications falling within the scope of the appended claims.

I claim as my invention:

1. In a controller for electric circuits, a shaft, a pair of discs secured to said shaft, an annular carrier journalled on said shaft intermediate said discs, a plurality of circumferentially spaced, radial notches upon the periphery of said carrier, a plurality of cam inserts selectively engageable with said notches, said inserts defining cam surfaces of predetermined contour extending radially outward from the circumference of said carrier, a pair of rings journalled upon said discs, said rings being secured to opposite sides of said carrier.

2. In a controller for electric circuits, a shaft, a pair of discs secured to said shaft, an annular carrier journalled on said shaft intermediate said discs, a plurality of circumferentially spaced, radial notches upon the periphery of said carrier, a plurality of cam inserts selectively engageable with said notches, said inserts defining cam surfaces of predetermined contour extending radially outward from the circumference of said carrier, and arcuate slotted means carried by one of said discs and apertures carried by said carrier and operatively associated with said guide means.

3. In a controller for electric circuits, a shaft, a pair of discs secured to said shaft, an annular carrier journalled on said shaft intermediate said discs, a plurality of circumferentially spaced, radial notches upon the periphery of said carrier, a plurality of cam inserts selectively engageable with said notches, said inserts defining cam surfaces of predetermined contour extending radially outward from the circumference of said carrier, a pair of rings journaled to said discs, said rings being secured to opposite sides of the carrier, and one of said pair of rings being of integral construction, and the other ring being formed of detachable segments.

4. In a controller for electric circuits, a shaft, a pair of discs secured to said shaft, an annular carrier journalled on said shaft intermediate said discs, a plurality of circumferentially spaced, radial notches upon the periphery of said carrier, a plurality of cam inserts selectively engageable with said notches, said inserts defining cam surfaces of predetermined contour extending radially outward from the circumference of said carrier, a pair of rings journalled upon said discs, said rings being secured to opposite sides of said carrier, the radially protruding portions of said inserts defining operating cam surfaces and the periphery of said rings defining cam base circles.

5. In a controller for electric circuits, a shaft, a pair of discs secured to said shaft, an annular carrier journalled on said shaft intermediate said discs, a plurality of circumferentially spaced, radial notches upon the periphery of said carrier, a plurality of cam inserts selectively engageable with said notches, said inserts defining cam surfaces of predetermined contour extending radially outward from the circumference of said carrier, a pair of rings journalled upon said discs, said rings being secured to opposite sides of said carrier, the radially protruding portions of said inserts defining operating cam surfaces and the periphery of said rings defining cam base circles, said rings being of electrically conductive material and said inserts being of electrically non-conductive material.

FRANCIS J. MALONEY.

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