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C. T. BREITENSTEIN  
ADJUSTABLE CAM MECHANISM

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2 Sheets-Sheet 1

FIG. 1

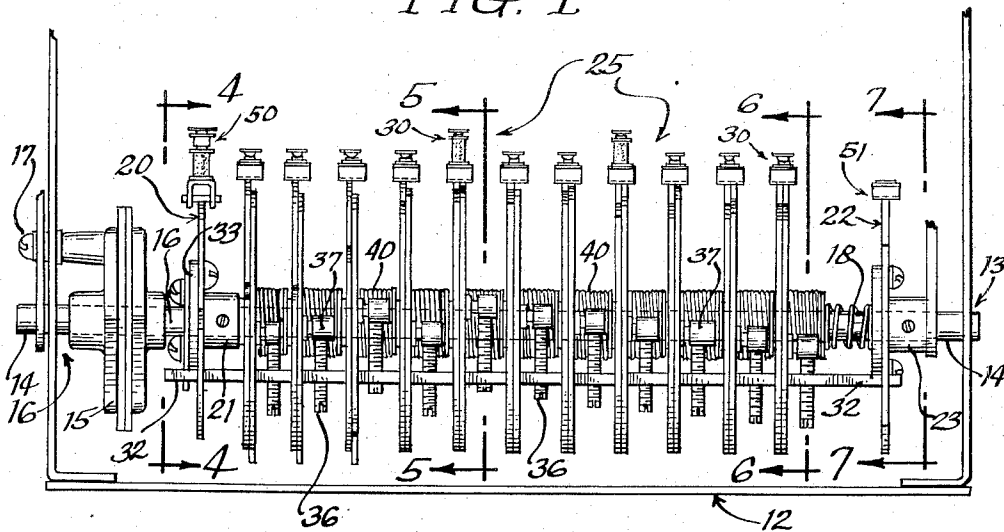


FIG. 2

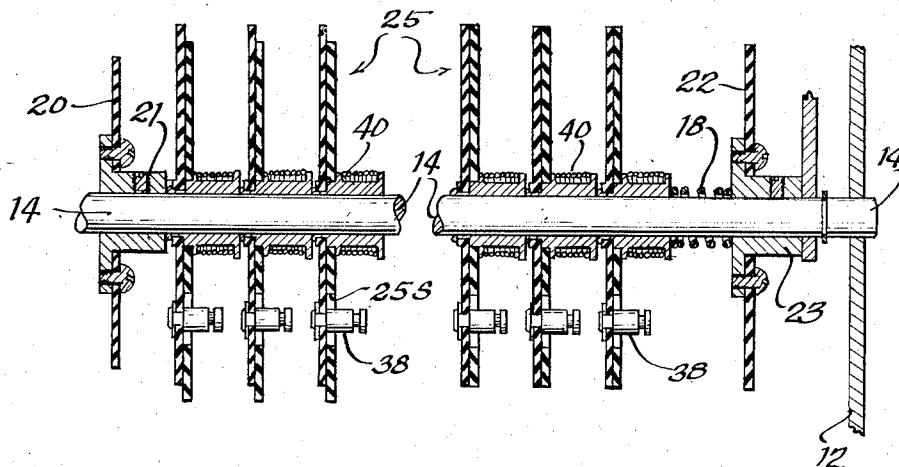
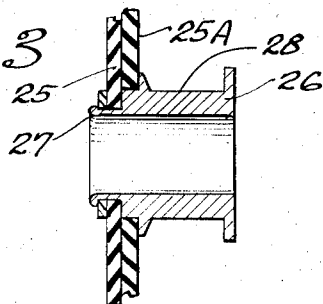


FIG. 3



INVENTOR.  
Charles T. Breitenstein

BY

*Charles T. Breitenstein*  
Attorney

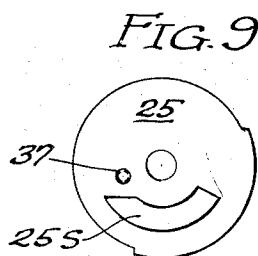
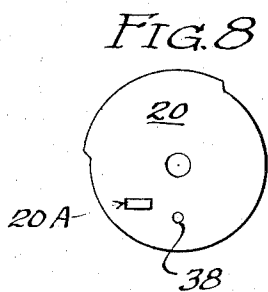
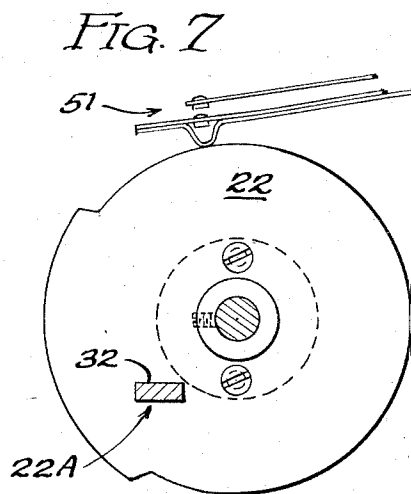
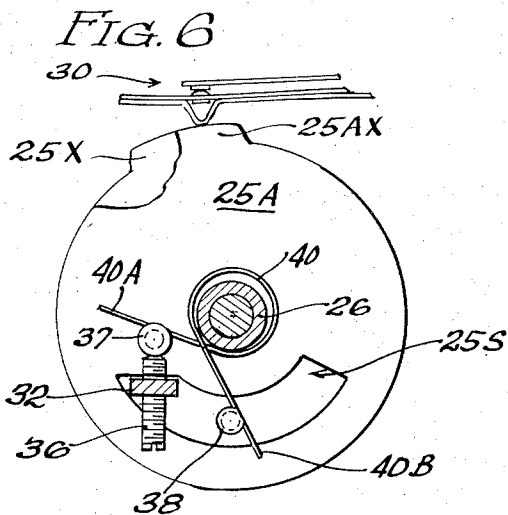
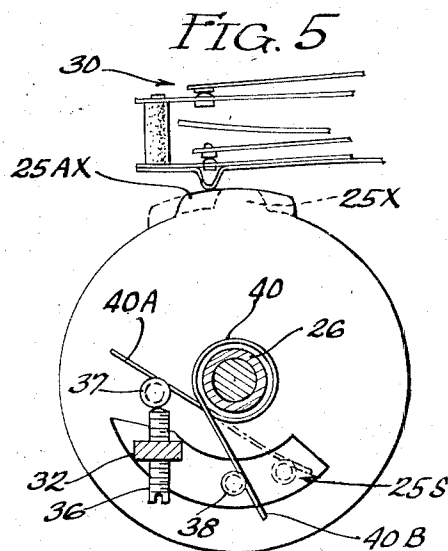
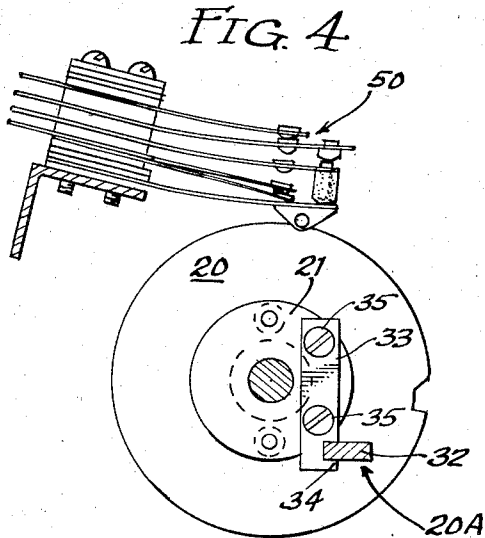
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INVENTOR.  
Charles T. Breitenstein  
BY *Charles T. Breitenstein*  
Attorney

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## ADJUSTABLE CAM MECHANISM

Charles T. Breitenstein, Chicago, Ill., assignor to American National Bank and Trust Company of Chicago, executor of the estate of Raymond T. Moloney, deceased

Application August 1, 1957, Serial No. 675,669

3 Claims. (Cl. 74-568)

This invention has as its principal object the provision of an adjustable cam mechanism useful in a variety of control and timing applications and characterized by a simplified and economical construction which affords easy access to individual cam means in a ganged assembly for purposes of selective adjustment.

A further object is the provision in a device of the class described of a ganged assembly of adjustable cams having adjustment means for each cam carried on a single tandem bar which is common to all cams and drives the entire gang in synchrony on a common shaft means.

Additional objects and aspects of novelty and utility relate to details of the construction and operation of the embodiment described hereinafter in view of the annexed drawings in which:

Fig. 1 is a top plan view of a timer unit with adjustable cams with parts broken away;

Fig. 2 is a fragmentary sectional view of some of the adjustable cams;

Fig. 3 is an enlarged sectional fragment through a cam hub;

Fig. 4 is a side view of one of the endwise driver or fixed cams, with parts shown in section, as seen in the direction of lines 4-4 of Fig. 1;

Fig. 5 is a side view of one of the adjustable cams as seen along lines 5-5 of Fig. 1;

Fig. 6 is a side view of another adjustable cam looking along lines 6-6 of Fig. 1;

Fig. 7 is a side view of another fixed or driver cam looking in the direction of lines 7-7 of Fig. 1;

Figs. 8 and 9 are side views to reduced scale respectively showing the configuration of the fixed and adjustable types of cam.

The adjustable cam means, as depicted in Fig. 1, is incorporated in a timer unit for use in a beverage dispensing machine, said unit comprising a main frame or chassis 12 affording a bearing at 13 for one end of a long cam shaft 14 engaged near its opposite end with the output gears (not seen) in a small reduction-gear type motor 15 with the end of the shaft 14 journaled as at 16 on the chassis, the motor being further mounted and secured against bodily rotation by screw means 17.

Near the opposite ends of the long cam shaft are so-called fixed or driver cams 20 and 22, the basic construction of which is exemplified in Fig. 8. Both cams 20 and 22 have hubs 21 and 23 pinned to the shaft 14 so that these cams are positively coupled to the shaft (see also Fig. 2) and are therefore rotated with the latter by the motor 15.

Floating on shaft 14 between the endwise "fixed" cams 20 and 22 are any number of adjustable cams generally indicated at 25, the basic construction of which is exemplified in Fig. 9.

Each of the adjustable cams has two sections 25 and 25A mounted on a hub means 26, such as depicted in Fig. 3, the sections 25 being fixed to move with the hub by peened ends 27, whereas the sections 25A are free to

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turn on the hubs relative to the corresponding fixed portions 25. The hub members also have formed thereon spring races 28, and, excepting as hereinafter noted, these hubs float on shaft 14, there being on the latter (Figs. 1 and 2) a spring means 18 acting to crowd all of the adjustable cams together toward one end to align the same with corresponding switches or like means 30 to be actuated thereby.

The two endwise or driver cams 20 and 22 (Figs. 4, 7, 8) each have a rectangular, radially offset slot 20A or 22A into which is keyed a long tandem bar 32 also of rectangular cross section, and this bar is removably locked in position by a short keeper bar 33 (Figs. 1 and 4) having a notch 34 to fit the tandem bar, and held by screws 35 to the hub 21 of one of the driver cams, which arrangement prevents the tandem bar from moving lengthwise out of its seating slots.

At intervals along the tandem bar corresponding to the desired positions of adjustable cams are tapped holes to receive adjustment screws 36 (Figs. 1 and 5), said screws respectively bearing against studs 37 carried by the relatively movable cam sections 25.

Means yieldingly coupling the two relatively movable sections 25 and 25A of the adjustable cams includes a coil spring 40 (Figs. 5 and 6) carried on the spring race of each hub 26 and having one end portion 40A bearing against the stud 37 of the appertaining shiftable cam section 25A, while the opposite end portion 40B thereof bears against a stud 38 carried by the companion cam section 25, it being observed especially in Figs. 5, 6, and 9, that the relatively adjustable cam sections 25A each have an arcuate slot 25S through which the stud 38 projects with a range of angular adjustment depending on the length of the arcuate slot in each case.

It should now be apparent from Figs. 5 and 6 that by turning in the adjustment screws 36 the cam sections 25A can be shifted angularly relative to their corresponding sections 25, and therefore the respective cam lobes, as at 25X, 25AX, Fig. 5, may be angularly shifted to lengthen or shorten the total effective length thereof, it being understood that the lobes 25X, 25AX may be of desired length and shape so long as they are complementary or cooperative and the relative shifting thereof alters the desired cam effect.

The endwise driver discs or cams 20, 22 may be optionally designed to serve as control cams in addition to their function in supporting and moving the tandem bar 32, it being observed in Figs. 4 and 7 that each of these two cams has associated therewith a switch 50 or 51 to be controlled thereby.

While adjustable cams including relatively shiftable lobe sections are known in the arts, the present disclosures provide a ganged assembly in which individual cams may be adjusted at will against a tandem driving member common to all cams in a simple and economical construction which is very accessible for accurate adjustment and easy servicing.

I claim:

1. Adjustable cam means comprising: a pair of complementary cam members carried on a hub and relatively angularly rotatable to change the cam action thereof; stud means on each said member; spring means acting against said stud means to shift one cam member relative to the other; registrable slot means in both cam members; a drive bar passing in parallelism with the rotative axis of said hub through said slot means; an adjustment member carried by said bar and selectively movable to act on the stud means of one of said cam members to shift the same relative to the other cam member; and means for rotatively driving said bar to rotate the cam members in operative function.

2. Adjustable cam mechanism comprising: cam members in sets, one of which is adjustably rotatable relative to another in the set and all of which members in any set are carried on a hub; shaft means mounting said hub for rotation; a drive bar extending parallel to said shaft through registering slot means in all of the cam members in each set, the slot means in that one of said members in each set which is to be adjustably moved relative to the other being concentrically elongated to permit a range of movement relative to said bar; spring means for each said set and acting rotatively on the cam members thereof to move one of the latter to a predetermined limit in said range of movement; means for limiting said range of movement for the cam members of individual sets; and means carried by said bar selectively adjustable to engage a part on the aforesaid adjustably movable cam member to displace the latter angularly against the action of said spring means and alter the joint cam action of the cam members of a set; and drive means for all said sets and including means rotatable on said shaft and supportably mounting said drive bar for rotation about the shaft in parallelism therewith as aforesaid.

3. Variable cam mechanism comprising: a shaft and mounting means therefor; spaced drive members rotatably mounted on said shaft, a tandem bar supported by and between said drive members for rotation therewith in radially-spaced parallelism to said shaft; a plurality of cam units floating on said shaft between said drive members, each unit including at least two jointly rotatable co-

operative cam elements concentric on said shaft and one of the same in each unit being angularly adjustable relative to the other; registering slot means in said cam elements and through which said tandem bar passes, the slot means in one element in each unit keying with said bar so as to be rotatably driven with the bar, the slot means in the companion element of each unit being formed to clear said bar in the angularly adjusted position thereof; spring means acting on the cam elements in each unit to move one of the same to a predetermined limit relative to the other in a certain direction; adjusting means carried by said tandem bar opposite each cam unit for selective movement to engage a part on the appertaining adjustable cam element to move the latter adjustably away from said limit; correlated cam formations on the cam elements of each said unit producing an effective cam action depending on the relative angular adjustment of said cam elements; means movable with each cam unit for limiting the adjusting movement thereof as aforesaid; and means for driving at least one of said spaced rotatable members whereby the totality of said cam units will be rotated in unison.

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