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Cobb et al.

[11] **3,849,612**

[45] **Nov. 19, 1974**

[54] **VEHICULAR ROTARY ELECTRICAL SWITCH ASSEMBLY WITH REMOVABLE, INTERPOSED NON-CONDUCTIVE PLUG KILL SWITCH MEANS**

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[73] Assignee: **Indak Manufacturing Corp.,** Northbrook, Ill.

[22] Filed: **Aug. 1, 1973**

[21] Appl. No.: **384,603**

[52] **U.S. Cl.** ..... **200/11 J,** 200/11 C, 200/42 R, 200/291, 200/61.19, 200/153 M, 200/161

[51] **Int. Cl.** **H01h 21/50,** H01h 27/04

[58] **Field of Search** ..... 200/11 C, 11 E, 11 EA, 200/11 J, 11 K, 61.19, 42 R, 153 M, 153 F, 291, 52 R, 61.58 R, 161, 51.09, 51.1; 180/82 R; 339/45

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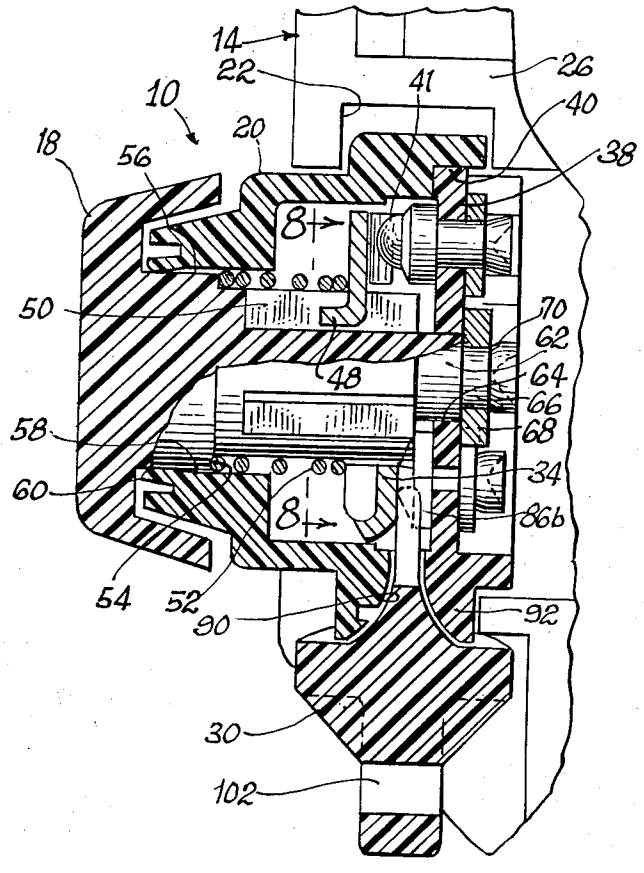
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Primary Examiner—James R. Scott
Attorney, Agent, or Firm—Burmeister, Palmatier & Hamby

[57] **ABSTRACT**

Each of the illustrated electrical switches comprises a contactor plate which is rotatable with a carriage in a casing. The contactor plate is biased by resilient means toward a plurality of contact points mounted in one end of the casing opposite the contactor plate. One of the contact points is engageable with a plurality of recesses or undulations in the contactor plate to provide a detaining action whereby the contactor plate is detained in a plurality of angularly spaced positions. Such contact point is in electrical contact with the contactor plate in each of such positions. The contactor plate also has contact segments which are engageable with other contact points as the contactor is rotated. In one embodiment, a pull pin or other stop member is removably mounted in the casing to hold the contactor plate away from one or more contact points in at least one position of the switch. The contactor may have recessed members or undulations which are opposite such contact points. The removal of the stop member releases the contactor plate for movement by the resilient means so as to bring the recessed members into engagement with the contact points. The removable pull pin or stop member may be employed as as a safety feature on a snowmobile or other vehicle whereby the pull pin may be connected by means of a cord or the like to the body or clothing of the rider so that the pull pin will be pulled out of the switch if the rider falls off the vehicle. The resulting closure of the switch may be employed to stop the engine of the vehicle.

15 Claims, 21 Drawing Figures



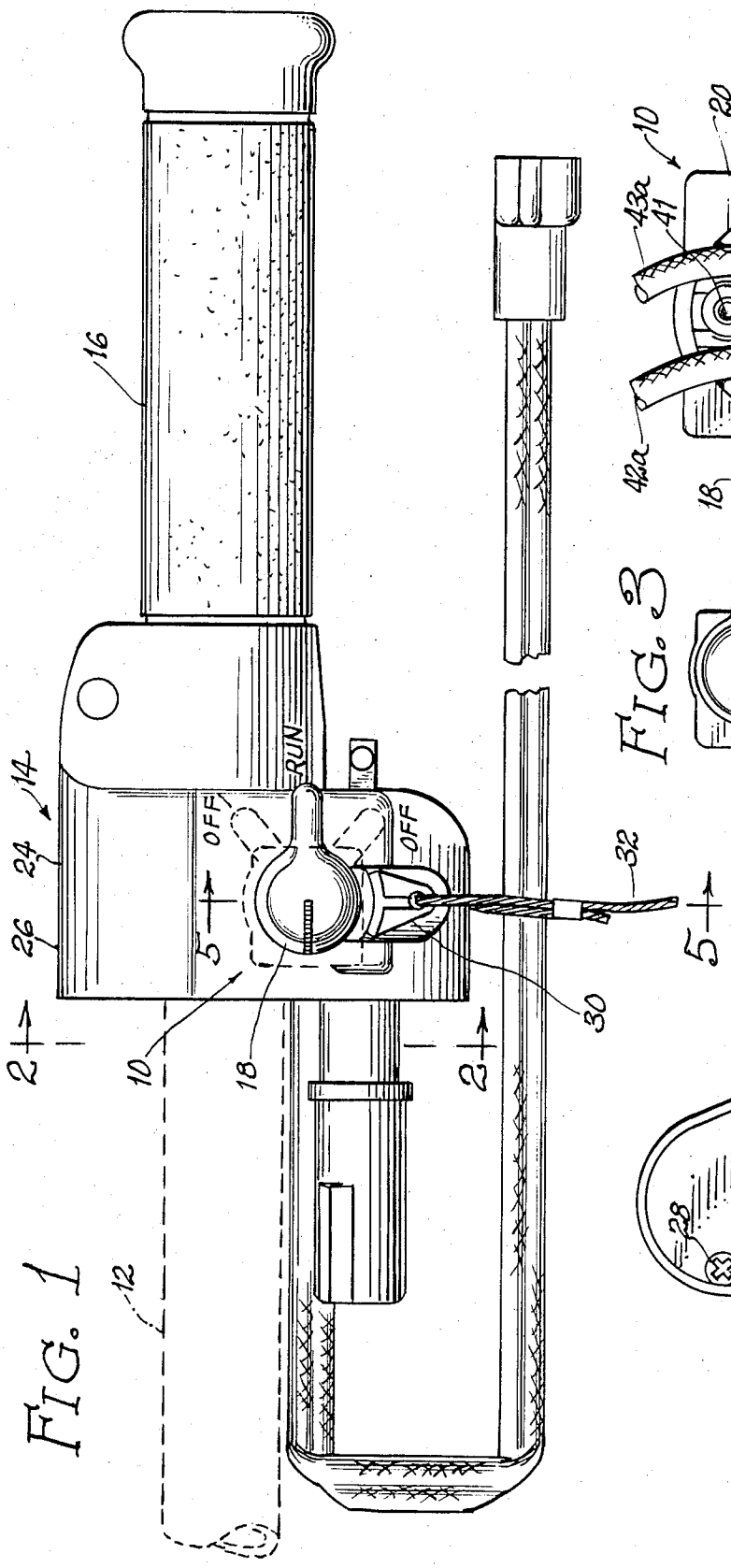


FIG. 1

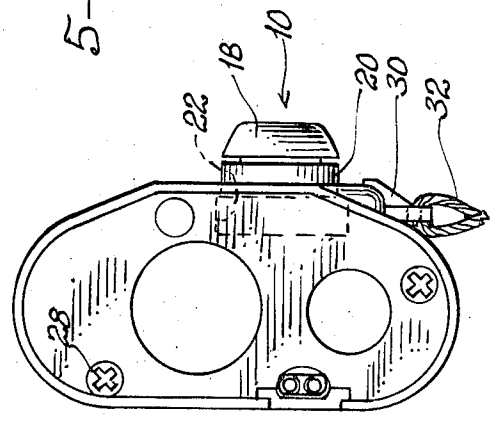


FIG. 2

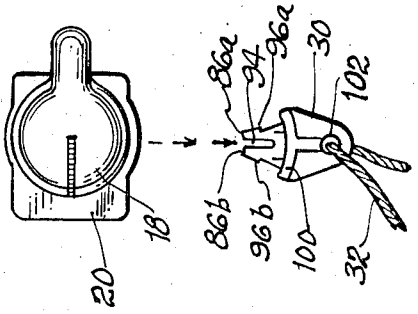


FIG. 3

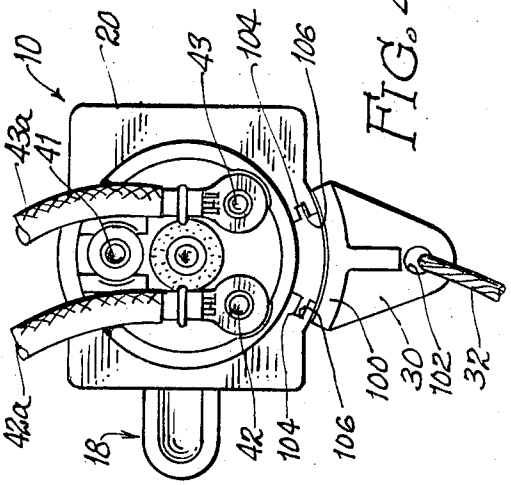


FIG. 4

FIG. 5

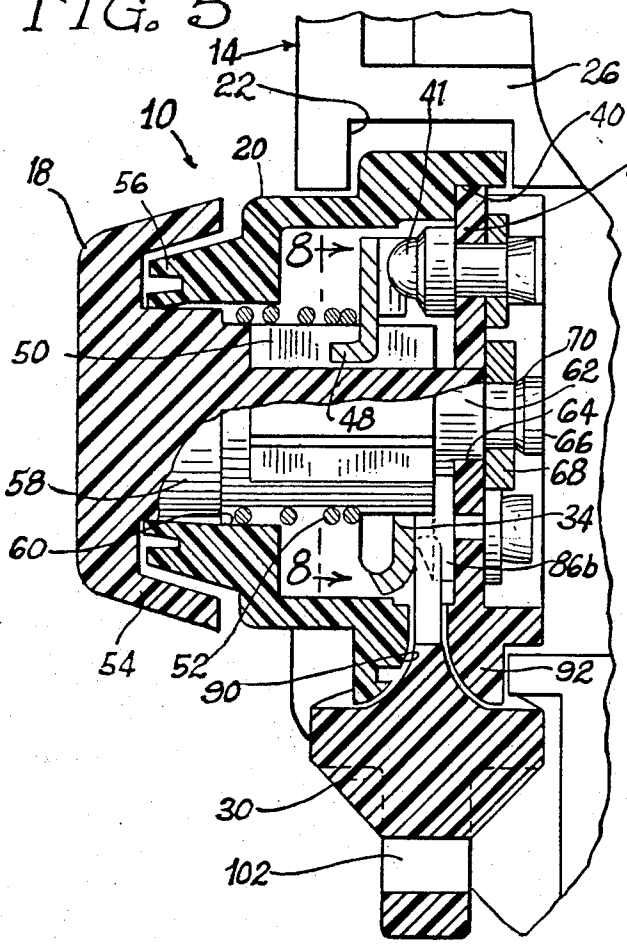


FIG. 6

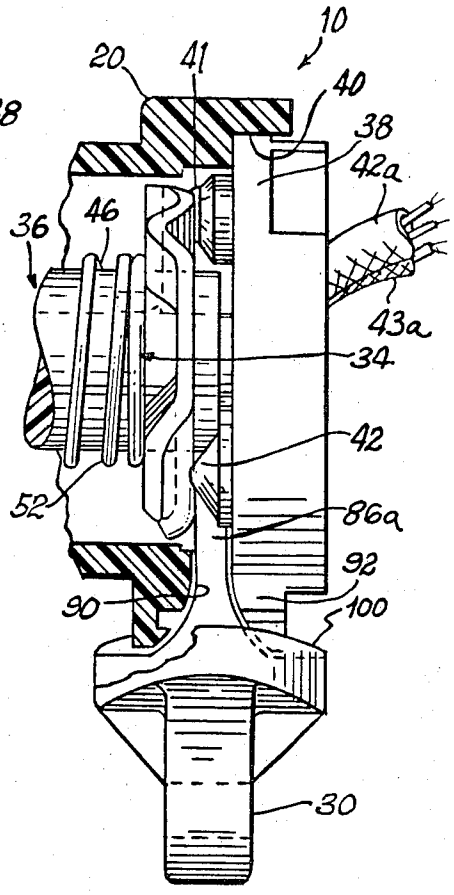


FIG. 7

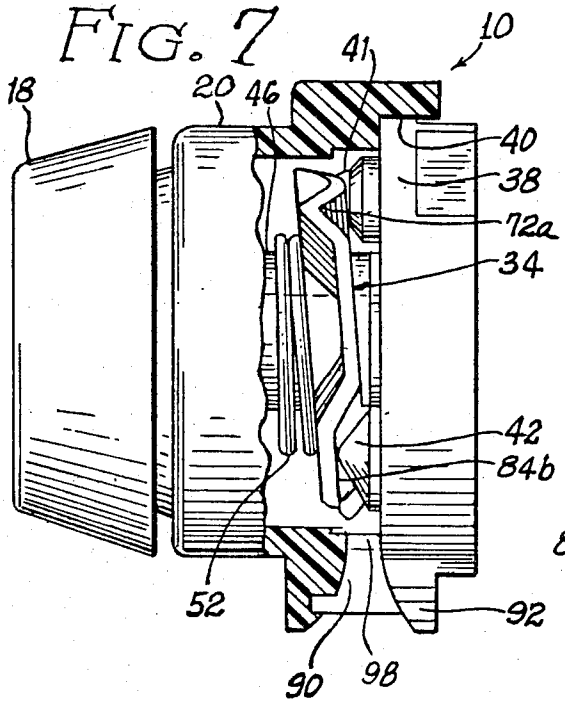


FIG. 8

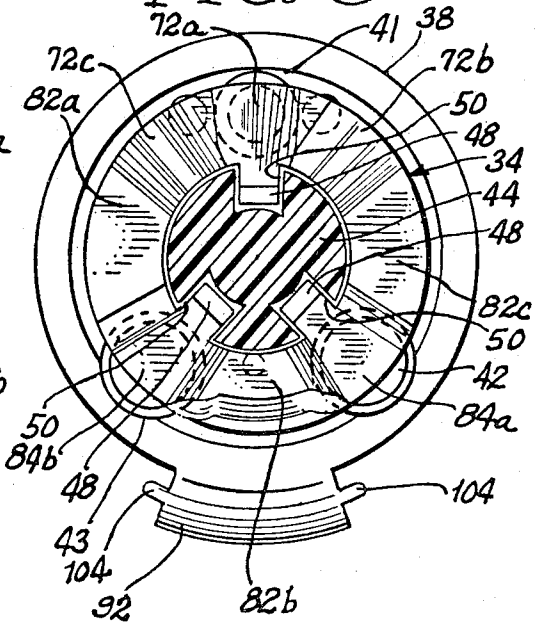


FIG. 9

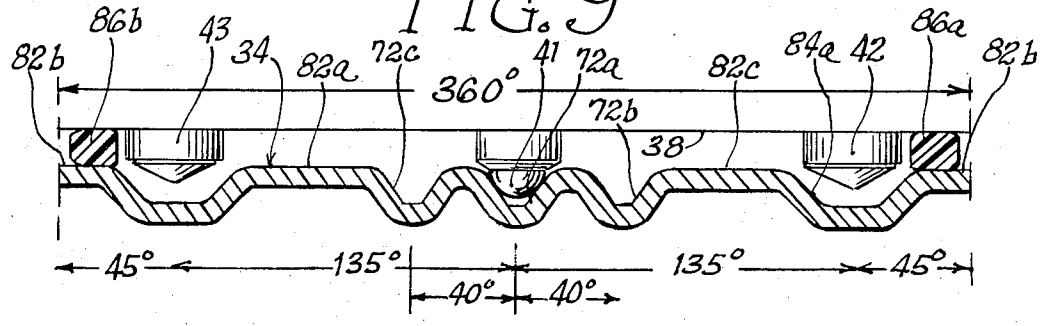


FIG. 10

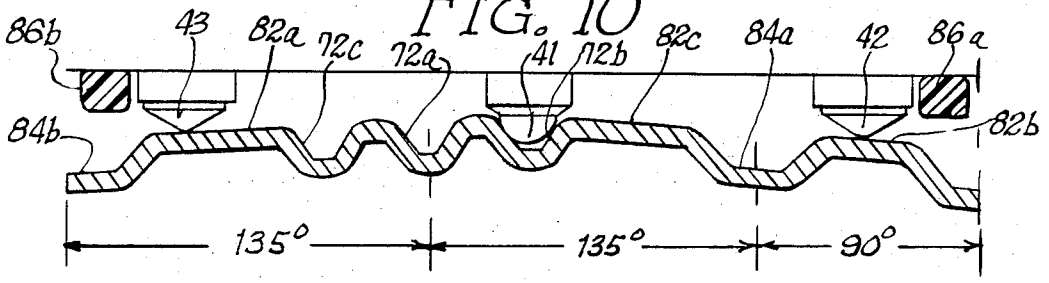


FIG. 11

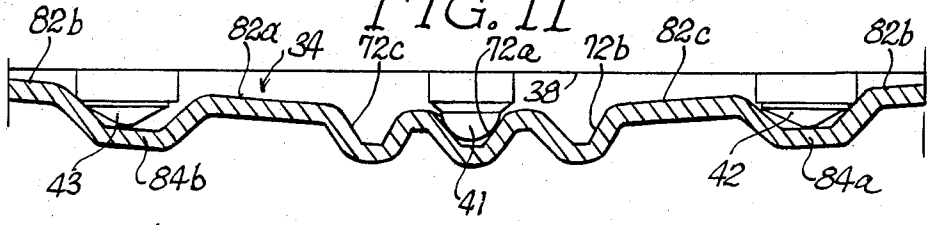


FIG. 12

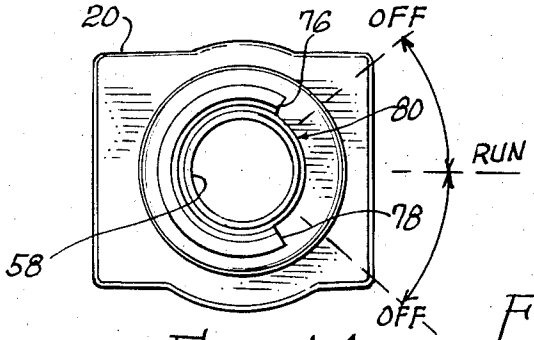


FIG. 13

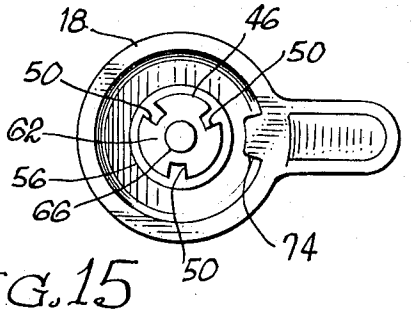


FIG. 14

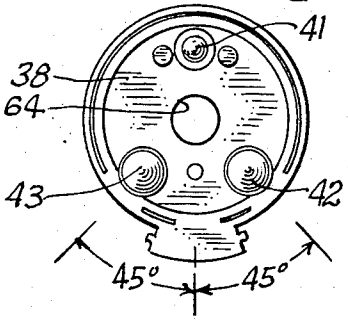


FIG. 15

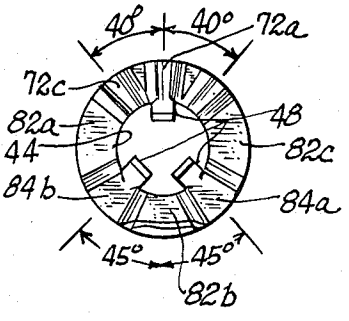


FIG. 16

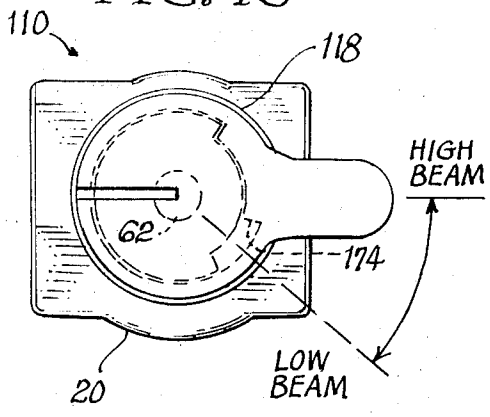


FIG. 17

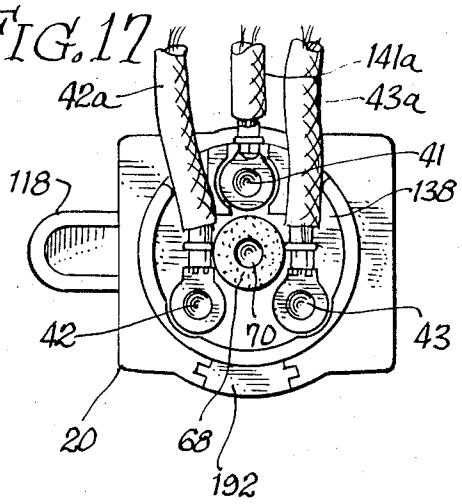


FIG. 18

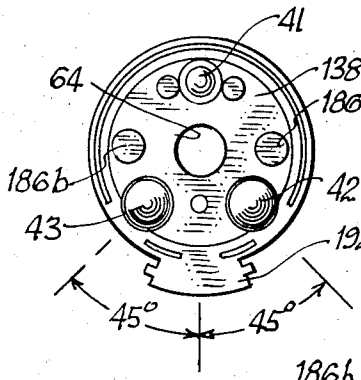


FIG. 19

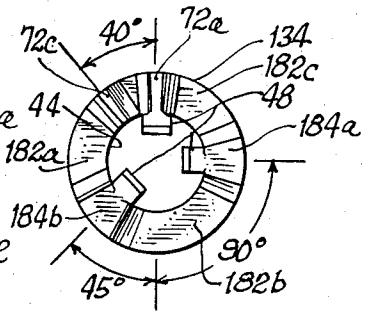


FIG. 20

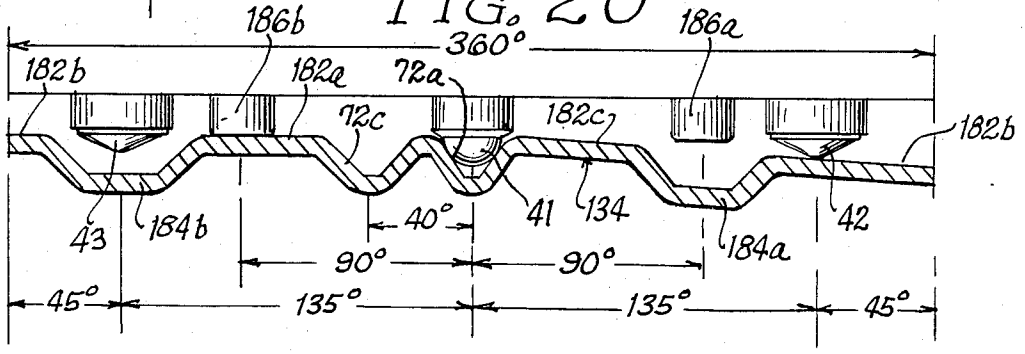
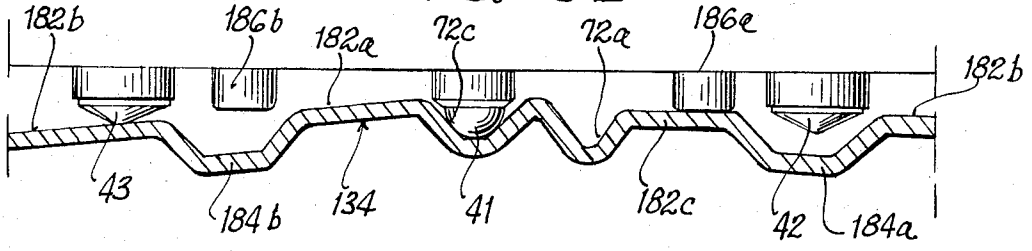


FIG. 21



VEHICULAR ROTARY ELECTRICAL SWITCH ASSEMBLY WITH REMOVABLE, INTERPOSED NON-CONDUCTIVE PLUG KILL SWITCH MEANS

This invention relates to electrical switches preferably of the rotary type.

One object of the present invention is to provide rotary electrical switches which will find various applications, but are particularly well adapted for use on snowmobiles or other vehicles.

A further object is to provide new and improved rotary electrical switches which may be employed very advantageously on snowmobiles or other vehicles to provide a kill switch which disables the ignition system of the vehicle engine, a headlight dimmer switch or the like.

Another object is to provide a new and improved rotary switch having a safety feature comprising a removable pull pin or other member which may be connected by means of a cord or the like to the body or clothing of the vehicle operator so that the pin will be pulled from the switch if the operator falls off the vehicle. The removal of the pin causes the switch to operate so as to stop the vehicle.

It is a further object to provide a new and improved rotary switch of the foregoing character in which the safety feature provided by the pull pin is incorporated into a rotary kill switch which may be operated manually to stop the vehicle.

Further objects, advantages and features of the present invention will appear from the following description, taken with the accompanying drawings, in which:

FIG. **1** is a plan view showing a rotary kill switch to be described as an illustrative embodiment of the present invention, the switch being mounted on the handlebar of a snowmobile or other vehicle.

FIG. **2** is an end view of the handlebar grip taken generally as indicated by the line **2—2** in FIG. **1.**

FIG. **3** is a front view showing the safety pull pin removed from the switch.

FIG. **4** is an enlarged rear view of the switch.

FIG. **5** is a sectional view taken generally along the line **5—5** in FIG. **1.**

FIG. **6** is a fragmentary view similar to FIG. **5,** but showing various components in elevation.

FIG. **7** is a view similar to FIG. **6** with the safety pull pin removed.

FIG. **8** is a section taken generally along the line **8—8** in FIG. **5.**

FIG. **9** is a diagrammatic developed view showing the switch contactor in its RUN position.

FIG. **10** is a view similar to FIG. **9,** but showing the contactor in one of its OFF or KILL positions.

FIG. **11** is a view similar to FIG. **9,** but showing the effect of removing the pull pin.

FIG. **12** is a front view of the casing of the switch.

FIG. **13** is a rear view of the combined carriage and knob.

FIG. **14** is a front view showing the member which supports the contact points.

FIG. **15** is a front view of the contactor.

FIG. **16** is a front view of a headlight dimmer switch constituting a modified embodiment of the present invention.

FIG. **17** is a rear view of the headlight dimmer switch.

FIG. **18** is a front view of the contact points and their supporting member employed in the switch of FIG. **16.**

FIG. **19** is a front view of the contactor for the switch of FIG. **16.**

FIGS. **20** and **21** are diagrammatic developed views showing the two operating positions of the contactor for the switch of FIG. **16.**

As just indicated, FIG. **1** illustrates a preferred embodiment of the present invention in the form of a rotary switch **10** which will find many applications, but is particularly well adapted to serve as a kill switch for a snowmobile or some other vehicle. The kill switch **10** is operative to turn off the engine by inactivating the ignition system. In ths usual arrangement, the kill switch **10** may be operated to short circuit the primary circuit of the magneto employed in the ignition system.

As shown in FIG. **1,** the kill switch **10** is adapted to be mounted on the handlebar **12** of the snowmobile or other vehicle. In this case, the switch **10** is incorporated into a grip member **14** adapted to be mounted on the handlebar **12.** The grip member **14** also includes a handgrip **16** adapted to be grasped by the operator. Thus, the switch **10** is conveniently positioned for quick and easy operation.

As shown, the kill switch **10** has a rotary knob or handle **18** which can be operated to three positions: a central RUN position, shown in full lines in FIG. **1**; and two OFF positions, shown in broken lines. The OFF positions are angularly spaced in opposite directions from the RUN position. With this arrangement, the engine can be stopped by turning the knob **18** in either direction from the RUN position. In this way, no time will be lost in attempting to turn the knob **18** in the wrong direction. This mode of operation is an important safety feature.

The illustrated kill switch **10** has a casing **20,** which is adapted to be received in a recess **22** formed between two portions **24** and **26** of the grip member **14.** Screws or other fasteners **28** may be employed to fasten the portions **24** and **26** together.

As an added safety feature, the kill switch **10** is provided with a pull pin or other removable member **30** which normally extends into the casing **20** of the switch **10,** but may be pulled out of the casing, as shown in FIG. **3.** The removal of the pin **30** effectively operates the switch **10** to another OFF position in which the ignition is inactivated.

The pin **30** is provided with a pull cord or other tension element **32** which may be connected to the body or the clothing of the operator. In this way, the pin **30** will be pulled out of the switch **10** if the operator falls off the vehicle, or if the vehicle travels away from the operator while he is temporarily dismounted. The removal of the pin **30** causes the engine to stop so that the vehicle will come to a halt. The provision of the pull pin **30** thus makes it possible to prevent accidents which otherwise might occur due to movement of the vehicle without the rider.

The kill switch **10** preferably comprises a contactor **34** (FIGS. **5–8**) which is rotatable within the casing **20.** Various means may be provided to rotate the contactor **34.** In this case, the contactor **34** is mounted on and rotatable with a carriage **36** which is combined with the knob **18.**

The contactor **34** is engageable with a plurality of fixed contacts which are mounted in the casing **20,** preferably on an end plate or member **38,** which may be made of an electrically insulating material, such as suitable plastic. The contact supporting member **38** may be mounted within an opening **40** formed in the rear end of the casing **20.** In this case, the casing **20** is also preferably made of a suitable plastic resinous material. The contact supporting member **38** is suitably secured within the opening **40.** It is preferred to fasten the member **38** to the casing **20** by ultrasonic welding or heat sealing. However, cement or other fastening means may be employed.

The electrical contacts on the member **38** preferably take the form of a plurality of contact points. In this case, there are three such contact points **41, 42** and **43.** However, it will be understood that the arrangement and number of the contact points may be varied. The contact points **41, 42** and **43** project forwardly from the member **38** and into the casing **20.**

In this case, electrical leads **42a** and **43a** are connected to the contact points **42** and **43.** A lead may also be connected to the contact point **41,** but in this case, no such lead is required.

The contactor **34** may assume various forms, but is illustrated as being generally in the form of a circular plate made of conductive material, such as copper or some other metal. The illustrated contactor **34** is formed with a central, generally circular opening **44** adapted to receive a generally cylindrical shaft portion **46** of the carriage **36.** The contactor **34** may have key elements or prongs **48** received in keyways or grooves **50** formed in the shaft portion **46.** In this way, the contactor **34** is caused to rotate with the carriage **36.**

Various resilient means may be provided to bias the contactor **34** rearwardly toward the contact points **41, 42** and **43.** Such resilient means may take the form of at least one spring, illustrated as a single coil spring **52** acting between the carriage **36** and the contactor **34.** The illustrated spring **52** is mounted around the shaft member **46** between the contactor **34** and a shoulder **54** on the carriage **36.**

The illustrated rotary carriage **36** has an enlarged cylindrical portion **56** extending between the knob **18** and the shaft portion **46.** The cylindrical member **56** is rotatably guided within a cylindrical opening **58** in the casing **20.** In this case, the casing **20** is provided with a flexible resilient sealing lip or flange **60** angling inwardly around the outer end of the opening **58.** The lip **60** is biased by its own resilience into sealing engagement with the cylindrical member **58.** The lip **60** also provides frictional resistance to movement of the cylindrical member **56** and keeps it from rattling. The sealing lip **60** is preferably molded integrally with the casing **20.**

The illustrated carriage **36** is formed with a cylindrical pilot portion **62** projecting rearwardly from the shaft portion **46** along the axis thereof. The pilot portion **62** may be rotatably guided within an opening **64** formed in the contact supporting member **38.**

Suitable means may be provided to retain the carriage **36** within the casing **20.** In this case, the carriage **36** has a reduced end portion **66** projecting rearwardly from the pilot portion **62.** A washer or disc **68** is mounted on the reduced portion **66,** which is then upset or riveted by the application of pressure and heat, as shown at **70.** The washer **68** and the riveted portion **70** retain the pilot portion **62** within the opening **66.**

The contactor **34** is preferably provided with detent elements adapted to cooperate with one or more of the contact points **41–43.** By virtue of this detent action, the contactor **34,** the carriage **36** and the knob **18** are detained in a plurality of angularly spaced positions. In this case, such detent elements take the form of recesses **72***a*, **72***b* and **72***c* formed in the contactor **34.**

As shown to best advantage in the developed views of FIGS. **9, 10** and **11,** the contactor **34** is preferably made of sheet metal so that it is advantageous to form the recesses **72***a*, **72***b* and **72***c* as undulations in the contactor. The detent recesses are spaced apart by angular intervals corresponding to the desired spacing between the operating positions of the switch. In this case, for example, the detent recesses **72***b* and **72***c* are spaced by about 40° from the recess **72***a* on opposite sides thereof.

It will be seen that the contact point **41** acts as a detent projection to cooperate with the detent recesses **72***a*, **72***b* and **72***c*. The contact point **41** is received in the recess **72***a* when the knob **18** of the switch is in its RUN position, as shown in FIG. **1.** The contact point **41** is received within the recesses **72***b* and **72***c* when the switch knob **18** is in its two OFF positions. It will be understood that the contact point **41** is in electrical engagement with the contactor **34** in all three positions of the switch. The spring **52** biases the contactor **34** against the contact point **41** to produce resilient resistance to movement of the contactor between its various positions.

The angular extent to which the knob **18** can be rotated is limited by stop elements which may be provided on the knob and the casing **20.** As shown in FIG. **13,** the rear portion of the knob **18** may be formed with an inwardly directed stop projection **74** adapted to be engaged with stop shoulders **76** and **78** at the opposite ends of a segmental recess **80** formed in the casing **20.**

To produce the desired switching functions, the contactor **34** is provided with one or more contact segments or other members which are engageable with the other contact points. In this case, the contactor **34** has three such contact segments **82***a*, **82***b* and **82***c*, which are engageable with the contact points **42** and **43.** Recessed members **84***a* and **84***b* are formed in the contactor **34** between the contact segments **82***a*, **82***b* and **82***c*. As shown, the recessed members **84***a* and **84***b* take the form of undulations in the sheet metal contactor **34.**

In the RUN position of FIGS. **8** and **9,** the recessed members **84***a* and **84***b* are opposite the contact points **42** and **43** so that the contactor **34** is out of engagement with the contact points **42** and **43.** The contactor **34** is held away from the contact points **42** and **43** by stop members **86***a* and **86***b*, which might be fixed on the contact supporting member **38,** but in this case are elements of the removable pin or member **30.** The stop elements **86***a* and **86***b* are preferably made of an electrically insulating material, such as a suitable resinous plastic. As shown, the stop members **86***a* and **86***b* are located in the angular interval between the contact points **42** and **43.**

In the RUN position of the contactor **34,** as shown in FIGS. **8** and **9,** the stop elements **86***a* and **86***b* are engaged by the contact segment **82***b* of the contactor **34.** The thickness of the stop elements **86***a* and **86***b* is such

that the recessed members **84***a* and **84***b* are held away from the contact points **42** and **43.**

If the contactor **34** is rotated to one of its OFF positions, as shown in FIG. **10,** the contact segments **82***b* and **82***a* are moved into engagement with the contact points **42** and **43,** respectively, so that the contactor **34** is electrically engaged with both contact points. Thus, the contactor **34** forms a closed electrical circuit between the contact points **42** and **43.** The contact point **41** now engages the detent recess **72***b* in the contactor **34.**

It will be recognized that the contactor **34** can be rotated in the opposite direction so that the contact point **41** will engage the detent recess **72***c*. In that case, the contact segments **82***c* and **82***b* on the contactor **34** engage the contact points **42** and **43,** respectively. Thus, the contactor **34** forms a closed electrical circuit between the contact points **42** and **43.**

It will be understood that the contact points **42** and **43** may be connected to the primary circuit of the ignition magneto so that the closure of the electrical circuit between the contact points **42** and **43** will short circuit the primary circuit. In this way, the magneto will be inactivated so that no spark will be produced by the magneto. Accordingly, the engine will be stopped.

As previously indicated, the electrical leads or wires **42***a* and **43***a* may be connected to the contact points **42** and **43.** The leads **42***a* and **43***a* may extend to the primary circuit of the magneto, or any other circuit which is to be controlled by the switch.

In this case, it is not necessary to connect an electrical lead to the contact point **41,** which is in contact with the contactor **34** in all three positions of the contactor. However, in some cases, it may be desired to produce a three-way make in the OFF positions, in which case another electrical lead may be connected to the contact point **41.** Such a three-way make is desirable, for example, when there are two magnetos or other devices which need to be inactivated.

As shown in FIG. **3,** the stop members **86***a* and **86***b* may take the form of tip elements or portions on the removable pin **30.** FIG. **11** shows the effect of removing the pin **30** when the contactor **34** is in its RUN position. The stop elements **86***a* and **86***b* are no longer present to hold the contactor away from the contact points **42** and **43.** Consequently, the force exerted by the resilient means or spring **52** causes the contactor **34** to move toward the contact points **42** and **43** until the recessed members **84***a* and **84***b* come into electrical engagement with the contact points **42** and **43.** Thus, the contactor **34** completes an electrical circuit between the contact points **42** and **43** so that the engine of the vehicle will be stopped.

In moving against the contact points **42** and **43,** the contactor rocks about the pivotal support afforded by the contact point **41** so that the contactor extends at a slight angle to its normal orientation, as will be evident from FIGS. **7** and **11.**

It is preferred to provide means for detaining the removable pin **30** against accidental withdrawal from the switch **10.** As shown to best advantage in FIGS. **5–7,** the pin **30** is adapted to be inserted into the switch through a lateral opening **90** formed between the casing **20** and a segmental member **92** projecting from the contact supporting plate or member **38.** It will be seen from FIG. **3** that the stop elements **86***a* and **86***b* take the form of prongs on the pin **30.** A slot or notch **94** is formed between the prong elements **86***a* and **86***b*.

In this case, detent elements or barbs **96***a* and **96***b* project laterally from the edges of the prong elements **86***a* and **86***b*. These detent elements **96***a* and **96***b* are adapted to be detained by ribs **98** on the casing **20** projecting into the opening **90** (FIG. **7**). There is sufficient interference between the detent elements **96***a* and **96***b* and the ribs **98** to retain the prong elements **86***a* and **86***b* in the opening **90** unless considerable force is exerted on the pin **30** to pull it out of the opening. Because of the provision of the slot **94,** the prongs **86***a* and **86***b* are sufficiently flexible to permit the removal of the pin **30** from the opening **90.**

The exterior portion of the pin **30** preferably has a curved flange portion **100** to form a snug closure for the opening **90.** A hole **102** may be formed in the exterior portion of the pin **30** to receive the pull cord **32.**

It will be seen from FIG. **4** that the segmental member **92** on the contact supporting member **38** is preferably formed with a pair of tongue elements **104** adapted to interlock with grooves **106** on the casing **20.** In this way, the casing is reinforced in the neighborhood of the opening **90** into which the pin **30** is inserted.

It will be understood that if the safety pull pin feature is not needed, the stop elements **86***a* and **86***b* of FIGS. **9** and **10** may be formed integrally with the contact supporting member **38,** as bosses thereon, or may be otherwise secured to the contact supporting member. The opening **90** for the pin **30** may then be omitted. The switch will then operate in the manner described in connection with FIGS. **9** and **10** to provide a RUN position, in which the contactor **34** does not engage the contact points **42** and **43,** and two OFF positions, in which the contactor engages the contact points **42** and **43.**

It will be understood that various mounting brackets or other devices may be provided to support the switch **10,** rather than mounting it between the two parts **24** and **26** of the grip member **14,** as shown in FIGS. **1, 2** and **5.**

As already indicated, various versions of the switch may be produced with a variety of details as to detent arrangements and contact and contactor constructions.

By way of illustration, a modified switch **110** is shown in FIGS. **16–21.** Many of the components of the switch **110** are the same as already described. To avoid needless repetition of the description, those components of the switch **110,** which are the same as previously described, have been given the same reference characters as previously employed so that the previous description can readily be applied to such components. Thus, only the differences between the switch **110** and the previously-described switch **10** will need to be described in detail.

The switch **110** has a knob or handle **118** which is the same as the previously-described knob **18,** except that the knob **118** is movable between two positions, designated HIGH BEAM and LOW BEAM in FIG. **16.** These legends refer to the fact that the switch **110** is particularly well adapted for use as a headlight dimmer switch on a snowmobile or other vehicle. The switch **110** may employ the same casing **120** as previously described. The switch **110** has a contactor **134** which dif-

fers in detail from the previously-described contactor **34.** These differences will be described presently.

Likewise, the switch **110** has a contact supporting member or plate **138** which differs in detail from the previously-described member **38.** The contact points **41, 42** and **43** may be the same as previously described.

The detent arrangement may be very similar to that previously described. As shown in FIGS. **20** and **21,** the contactor **134** has the detent recesses or undulations **72***a* and **72***c* as previously described. However, the detent recess **72***b* is omitted because the contactor **134** has only two operating positions.

To engage the contact points **42** and **43,** the contactor **134** preferably has three contact segments **182***a*, **182***b* and **182***c*, which are differently located but otherwise are the same as the previously-described contact segments **82***a*, **82***b* and **82***c*. Similarly, the contactor **134** has two recessed members or undulations **184***a* and **184***b*, which are differently located but otherwise are the same as the recessed members **84***a* and **84***b*, previously described.

Instead of the stop elements **86***a* and **86***b*, the switch **110** has stop elements **186***a* and **186***b* which are fixed to the contact supporting member **138.** Preferably, the elements **186***a* and **186***b* are formed as integral bosses on the contact supporting member **138.**

Instead of the member **92,** the contact supporting member **138** is formed with a laterally projecting member **192** which is somewhat larger so as to close the opening **90** in the casing **20.** Such opening is not needed because the pull pin **30** is not used.

In this case, the contact point **41** is provided with an electrical lead or wire **141***a*. The leads **42***a* and **43***a* for the contact points **42** and **43** are the same as previously described.

Instead of the inwardly projecting stop **74,** the knob **118** is provided with a larger stop **174** (FIG. **16**) so as to restrict the rotary movement of the knob **118.**

FIGS. **20** and **21** illustrate the operation of the switch **110.** In FIG. **20,** the contact point **41** is received in the detent recess **72***a*, and the contact point is in electrical engagement with the contactor **134.** The contact segment **182***b* engages the contact point **42** so that the contactor **134** establishes an electrical circuit between the contact points **41** and **42.** On the other hand, the recessed member **184***b* is opposite the contact point **43.** The contact segment **182***a* engages the insulating boss or stop **186***b*, which holds the contactor away from the contact points **43.** FIG. **20** represents the HIGH BEAM position of the knob **118.**

When the knob is rotated to the LOW BEAM position, as shown in FIG. **21,** the contact point **41** is received in the detent recess **72***c*. The contact segment **182***b* engages the contact point **43** so that the contactor **134** establishes a closed circuit between the contact points **41** and **43.** The recessed member **184***a* is now opposite the contact point **42.** The contact segment **182***c* engages the insulating boss or stop **186***a*, which holds the contactor **134** away from the contact point **42.**

In both positions of the switch, the contactor **134** has three points of engagement with elements on the stationary supporting member **138** so that the contactor is completely stable, without any tendency to rock. In the position of FIG. **20,** the contactor engages the contact points **41** and **42** and the insulating boss or stop **186**b. It will be understood that the force exerted by the biasing spring **52** is divided or distributed among the three points of contact so that positive contact pressure is maintained between the contactor **134** and the contact points **41** and **42.**

In the position of FIG. **21,** the contactor **134** engages the contact points **41** and **43** and the stop member **186***a*. The spring pressure is distributed among these three elements so that positive contact pressure is maintained between the contactor **134** and the contact points **41** and **43.**

It will be evident that many versions of the switch may be produced by varying the arrangement of the contact points, the contactor, the detent elements on the contactor, and the stop elements on the contact supporting member. If desired, the stop elements can be replaced with dummy contact points which do not have external electrical connections.

In the switch **10** of FIGS. **1–15,** the contactor **34** has three points of engagement with the fixed elements on the contact supporting member **38,** in all operating positions of the switch, as will be evident from FIGS. **9, 10** and **11.**

We claim:

1. An electrical switch,
comprising a casing,
a carriage rotatably mounted in said casing,
a contactor plate mounted on one end of said carriage and rotatable therewith,
a plurality of contact points mounted in one end of said casing opposite said contactor plate for engagement by said plate, and
resilient means biasing said contactor plate toward said contact points,
said plate having a first portion conductively engaging a first one of said contact points throughout the range of movement of said contactor plate,
said first portion having a plurality of angularly spaced recesses for receiving said one contact point with a detent action whereby said contactor and said carriage are detained in positions corresponding to the locations of said recesses,
said one contact point and said recesses being smoothly rounded and being of corresponding size such that said one contact point is snugly receivable in each of said recesses with a precise positioning action,
said contactor plate having a contact segment for engaging a second of said contact points in at least one of said positions,
said contactor plate forming a closed electrical circuit between said first and second contact points in at least one of said positions.

2. A switch according to claim **1,**
in which said recesses are formed by undulations in said contactor plate.

3. A switch according to claim **1,**
in which said one contact point is in electrical engagement with said contactor plate in each of said positions,
said contactor plate forming a closed circuit between said first and second contact points in one of said positions,
said contactor plate forming a closed circuit between said first contact point and a third of said contact points in another of said positions.

4. A switch according to claim **1,**

in which said contact points include said first contact point and second and third contact points,
said positions including first and second positions,
said first contact point being in electrical engagement with said contactor plate in both said first and second positions,
said contact segment engaging said second contact point in said first position while engaging said third contact point in said second position.

5. A switch according to claim **1,**
in which said contact points include said first contact point and second and third contact points,
said recesses in said contactor plate including first, second and third recesses for receiving said first contact point in first, second and third positions with a detent action,
said first contact point being in electrical engagement with said contactor plate in said first, second and third positions,
said contactor plate having contact segments for engaging said second and third contact points in said second and third positions,
said contactor plate being out of engagement with said second and third contact points in said first position.

6. An electrical switch,
comprising a casing,
a contactor in said casing,
means for rotating said contactor,
a plurality of contact points mounted in said casing opposite said contactor for engagement by said contactor,
resilient means biasing said contactor toward said contact points,
said contactor being rotatable to at least first and second positions,
said contactor having a contacting member for engaging at least one of said contact points in said second position,
said contactor having a recessed member opposite said one contact point in said first position,
and a stop member removably mounted in said casing and engageable with said contactor to hold said recessed member away from said one contact point in said first position,
said stop member being removable from said casing to cause movement of said contactor by said resilient means to bring said recessed member into engagement with said one contact point, whereby removal of said stop member causes closure of an electrical circuit between said contactor and said one contact point.

7. A switch according to claim **6,**
in which said stop member takes the form of a removable pull pin,
said casing having an opening for receiving said pull pin.

8. A switch according to claim **7,**
including a tension member connected to said pull pin for use in removing said pin from said casing.

9. A switch according to claim **6,**
in which said contactor includes a plurality of recessed members,
said contact points including at least two contact points opposite said recessed members when said contactor is in said first position,
said stop member having means engageable by said contactor to hold said recessed members away from said contact points in said first position,
said contactor having contacting means for engaging said contact points when said contactor is in said second position.

10. A switch according to claim **9,**
in which said recessed members take the form of undulations in said contactor,
said contacting means taking the form of contact segments on said contactor.

11. A switch according to claim **6,**
in which said recessed member takes the form of an undulation in said contactor.

12. A switch according to claim **6,**
in which said removable stop member is made of electrically insulating material.

13. A switch according to claim **6,**
in which said means for rotating said contactor includes a rotatable carriage in said casing,
said contactor being mounted on said carriage and being rotatable therewith,
said resilient means comprising at least one spring acting between said carriage and said contactor.

14. A switch according to claim **13,**
in which said contactor is plate-like in form,
said recessed member taking the form of an undulation in said contactor.

15. A switch according to claim **13,**
in which said contactor includes at least two such recessed members in the form of undulations in said contactor,
said contact points including at least two contact points opposite said recessed members when said contactor is in said first position,
said contact member having contact segments for engaging said contact points in said second position,
said removable stop member comprising means engageable by said contactor for holding said recessed members away from said contact points in said first position,
said stop member being removable to cause movement of said contactor by said resilient means to bring said recessed members into engagement with said contact points.

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