Aug. 30, 1966 R. G. GODETTE 3,270,151

TAIL GATE SWITCH

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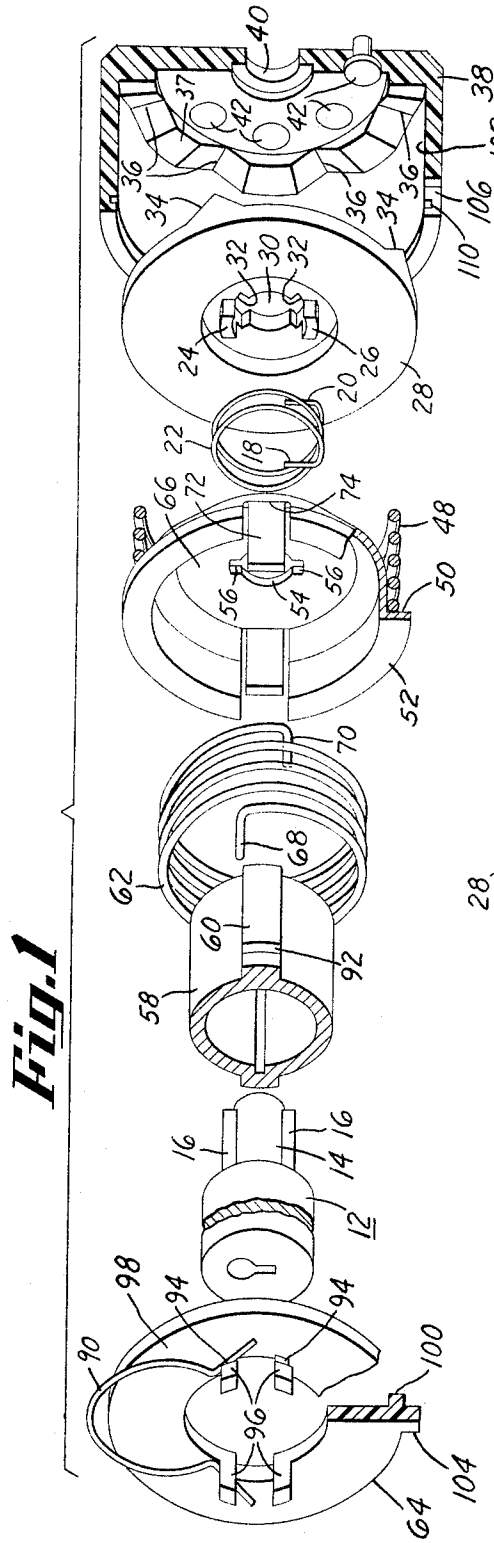


Fig. 1

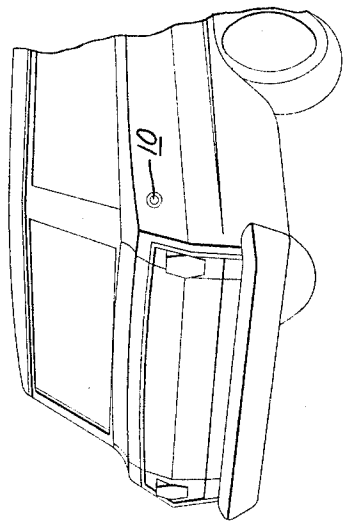


Fig. 3

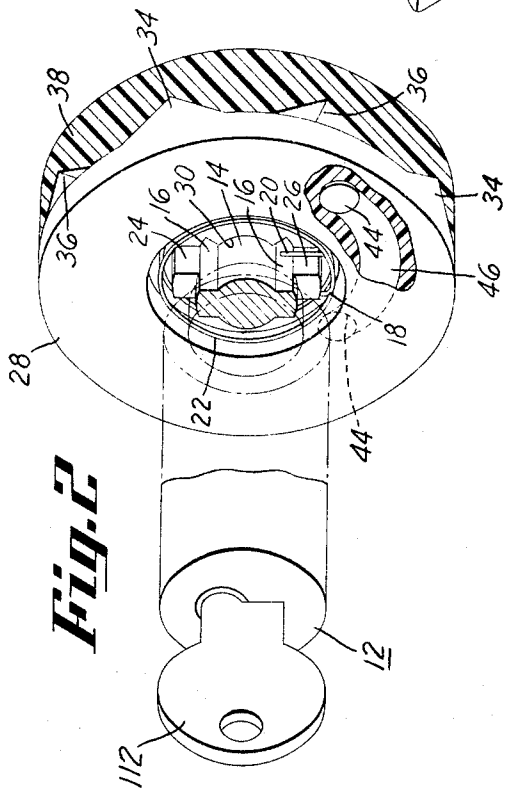


Fig. 2

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Fig. 5

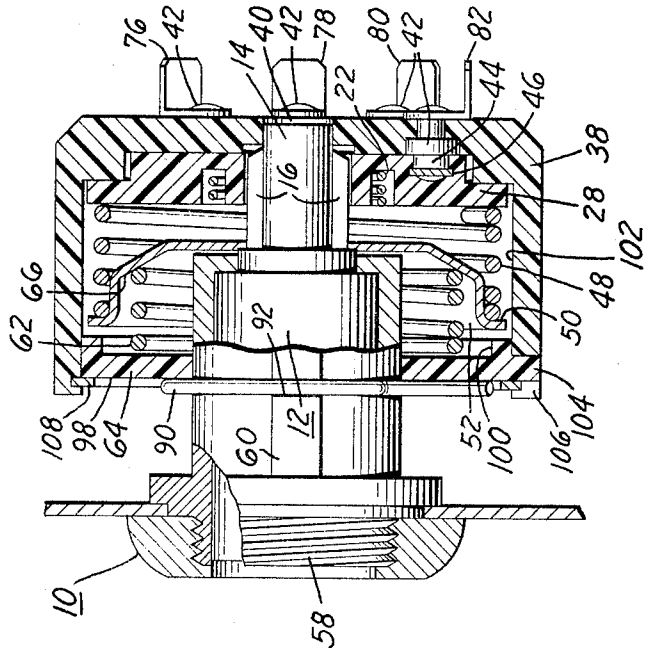
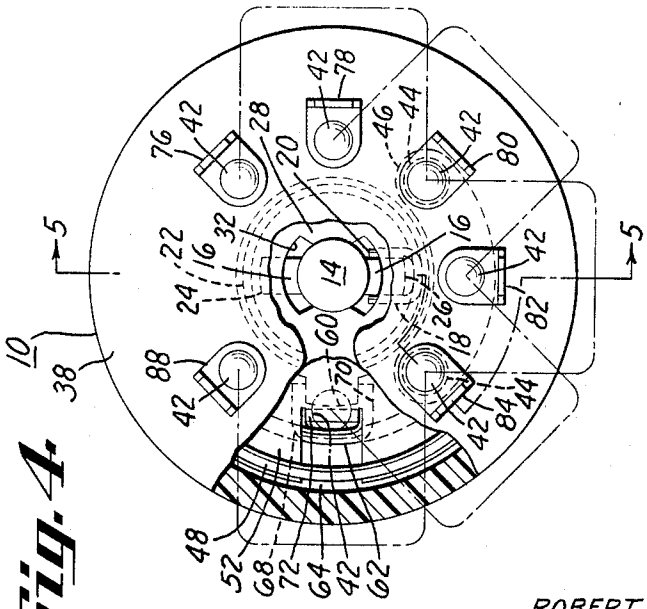


Fig. 4



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TAIL GATE SWITCH

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This invention relates to electric switches and more particularly to a type of electrical switch that operates a plurality of circuits carrying high amperage.

It is an object of the present invention to provide a single switch operable by a key that will control a plurality of high amperage circuits.

It is a further object of this invention to provide a switch that will be very quickly energized or deenergized.

It is still a further object of this invention to provide a switch that will operate in a snap acting manner and positively engage electrical contacts.

It is yet a further object of the present invention to provide a control for a plurality of circuits in conjunction with a lock that is operated by a key, the whole control system being contained in a single unit.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of the present invention is clearly shown.

In the drawings:

FIGURE 1 is an exploded perspective view of a switch made in accordance with this invention;

FIGURE 2 is a perspective view of an assembled switch of the type shown in FIGURE 1, with parts broken away, illustrating the operative parts of the torsion mechanism;

FIGURE 3 illustrates the invention in a typical application controlling the tail gate and rear window of a station wagon;

FIGURE 4 is an end view of the switch of this invention, with parts broken away, illustrating the mounting of the torsion spring with the switch in the neutral position;

FIGURE 5 is a sectional view taken along line 5—5 of FIGURE 4 illustrating the internal structural details of the subject device.

Referring now to FIGURE 3, the tail gate switch, generally designated by numeral 10, is shown in its operative environment.

Referring now to FIGURE 1, a lock cylinder, designated by numeral 12, has a shaft 14 carrying a pair of laterally extending lugs 16. The lugs 16 engage portions 18 and 20 of a torsion spring 22 and projecting portions 24 and 26 of a contact plate 28 formed of insulating material, depending on the direction of rotation of the lock. In this manner, a lost motion connection is established between the shaft 14 with the laterally extending lugs 16, hereinafter referred to as the driver, and the contact plate 28. Disposed in the center of the contact plate 28 is an aperture 30. The aperture 30 has key slots 32 extending from two sides of the aperture. The contact plate 28 has a series of projecting nodes 34 on one face which are slidably engageable with inwardly projecting grooves 36 on one face of a switch base 38 formed of insulating material. On an interior face of the switch base 38, concentrically mounted around a center hole 40, are contacts 42 spaced in a manner corresponding to the radial position of contacts 44 mounted on one face of the contact plate 28. The contacts 44 are more clearly shown in FIGURE 2 in the section with parts broken away. A bus bar 46, connecting two of the contacts 44 on one face of the contact plate 28, is disposed in an arcuate manner so as to be capable of electrically connecting two of the contacts 42 on the face of the switch base 38 while the contact plate 28 and the switch base 38 are engaged during normal operation of the switch.

Referring now to FIGURE 1, the contact plate 28 and the switch base 38 are kept engaged by the pressure of a compression spring 48 on one face of the contact plate 28, the spring 48 being compressibly interposed between an outer surface 50 of an escutcheon 52 and the contact plate 28. The relationship of the spring 48 to the escutcheon 52 and the contact plate 28 is more clearly seen in FIGURE 5. The escutcheon 52 has an aperture 54 with extending key portions 56 corresponding in size and shape to the driver.

Disposed circumferentially around the lock cylinder 12 is a sleeve 58 having outwardly projecting lugs 60. A centering torsion spring 62 is positioned between a lock cylinder mounting plate 64 and a surface 66 of the escutcheon 52. When the lock cylinder 12 is rotated, a lug 60 of the sleeve 58 engages either an inwardly projecting portion 68 or an inwardly projecting portion 70 depending on the direction of rotation. During such rotation, the lug 68 or 70 that is not engaged by the lug 60 will engage a flange 72 extending from an inside edge 74 of the surface 66 of the escutcheon 52, thus causing the lock cylinder 12 to be constantly biased towards the neutral position. This arrangement is more clearly illustrated in FIGURE 4 in the area with parts broken away.

Referring now to FIGURES 4 and 5, it is seen that the contacts 42 pass through the switch base 38 and secure a plurality of terminals 76, 78, 80, 82, 84, 86 (not shown), and 88 to the switch base 38.

As best seen in FIGURE 1, the lock cylinder 12 is held in firm engagement with the lock cylinder mounting plate 64 by the cooperation of a snap ring 90 with grooves 92, one not shown, in the outwardly projecting lugs 60 on the periphery of the sleeve 58 and grooves 94 in lugs 96 projecting from the lock cylinder mounting plate 64 bearing against a surface 98 of the lock cylinder mounting plate 64. A flange 100 cooperates with a surface 102 of the switch base 38 to hold the lock cylinder and the attached mechanism in longitudinal alignment with the hole 40 in the switch base 38 as best seen in FIGURE 5.

Referring now to FIGURE 5, the lock cylinder mounting plate 64 has an outwardly projecting lug 104 cooperating with a peripheral slot 106 to act as a radial locater. The lock cylinder mounting plate 64 is kept in biased engagement with the switch base 38 by the cooperation of an "O" ring 108 with a peripheral groove 110 of the switch base 38 and the surface 98 of the mounting plate 64.

In operation, the tail gate switch 10 is mounted in any appropriate location, such as a point near the rear deck of a station wagon, as illustrated in FIGURE 3. A key 112 is inserted in the lock cylinder 12 and turned in either direction. The escutcheon 52, being in firm engagement with the lock cylinder 12, rotates with the lock cylinder thereby engaging either the inwardly projecting portion 68 or the inwardly projecting portion 70 which the unengaged projecting portion engages the lug 60, tending to bias the lock cylinder 12 toward neutral position during this rotation. At the same time, lug 16 carried by the shaft 14 engages either portion 18 or portion 20 of the torsion spring 22 while the unengaged portion engages the projecting portion 26. The lugs 16 are caused to move in the key slots 32 but, during this rotation, the torsion spring 22 is wound tighter and, due to its engagement with the projecting portion 26, causes the contact plate 28 to be rotated in the direction of the key movement. Normally, this movement of the contact plate 28 will occur prior to the time that the lugs 16 make contact with the lateral edges of the key slots 32. This will result in a rapid movement of the nodes 34 from engagement with the grooves 36 across surface 37. The energy stored in

the spring **22** will be sufficient to overcome the static friction between the nodes **34** and the sides of the grooves **36**. All things being equal, static friction is approximately 1.33 times sliding friction and, once the nodes **34** of the contact plate **28** start to move, they will continue very rapidly up the side of the grooves **36** across surface **37** and into adjacent groove **36** as the torsion spring energy is expended. The nodes **34** act as radial locators for the cooperation of the bus bar **46** and the contacts **42** of the switch base **38**. If the lugs **16** make contact with the lateral edges of the key slots **32**, the rapid separation of the bus bar and the contacts will occur directly.

As better seen in FIGURE 4, the bus bar **46** is normally in engagement with the lead strips **80** and **84** through several of the contacts **42** while the key is in the neutral position. As the contact plate **28** is caused to rotate, the bus bar **46** will continue in engagement with one of the lead strips **80**, **82** or **84**, constituting the hot lead, at all times but a portion of the bus bar **46** will selectively engage lead strips **76** or **78** through the contacts **42** during clockwise rotation, or lead strips **86** (not shown) or **88** during counterclockwise rotation. Thus, it is seen that rotation of the key in a clockwise or counterclockwise direction can be made to cause a change in the selection of circuits attached to four leads on the base **38** of the switch in a rapid manner.

Due to the nature of the electrical equipment normally attached to a switch of this kind, high amperage is caused to flow through the bus bar **46** to one of the selected leads, so it is imperative that arcing or teasing of the contacts is prevented by the rapid separation of the bus bar and the contact connected lead strip. Travel of the nodes **34** very rapidly up the sides of the grooves **36** due to the accumulated force of the torsion spring and on into an adjacent groove effects this rapid contact separation.

As hereinbefore described, the rotation of the escutcheon **52** with its lugs **72** engaging portions of the centering torsion spring **62** has caused the lock cylinder to be biased towards the neutral position. When finger pressure is removed from the key **112** during rotation of the lock cylinder, the stored up energy of the centering spring **62** is sufficient to return the lock cylinder **12** to its neutral position.

While the embodiment of the present invention, as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. An electrical switch in combination with a lock cylinder having a shaft extending therefrom carrying a driver lug, said lock cylinder being rotatably mounted within a sleeve member having extending lugs and fixed to a support member, a first torsion spring means engageable with said extending lugs and a member rotatable with said driver lug to urge said lock cylinder to return to a predetermined neutral position, said electrical switch comprising a switch base carrying fixed contacts disposed in opposition to contacts carried by a rotatable contact plate, said contact plate having lobes thereon in face opposing biased

engagement with a series of cam grooves on said switch base, and a second torsion spring means engaging the contact plate and said driver lugs whereby any rotation of said lock cylinder is transmited in a delayed manner to the contact plate as the second torsion spring stores sufficient energy during said rotation to overcome the biased engagement of said rotatable contact plate to said switch base and effecting a rapid separation of said opposed contacts and repositioning said contact plate carried cam lobes in a different series of grooves on said switch base thereby bringing about a switching of the position of the opposed contacts.

2. The combination of an electrical switch and a lock cylinder having a shaft extending therefrom arranged to turn in response to key rotation, said lock cylinder being rotatably mounted within a sleeve member fixed to a support member, a first biasing means engageable with said sleeve member and a member rotatable with said driver lug to urge said lock cylinder toward a predetermined neutral position and a driver lug carried by said shaft, said electrical switch comprising a rotatable control plate in face opposing biased engagement with a switch base, said rotatable control plate having a conductive portion disposed in opposition to contacts carried on the switch base, said rotatable control plate including a series of cam lobes carried on one surface disposed in opposed relationship to a series of cam grooves carried on said switch base, and second biasing means for urging said conductive portion toward said contacts and providing a torsional connection between said lug and said control plate, said control plate having a portion in the center thereof which provides an oversized opening to restrict the rotational movement of said driver lug, said driver lug being in torsional connection with said control plate through said second biasing means thereby effecting a delayed but sudden separation of said opposed conductive area and contacts as the key is rotated in said lock cylinder.

3. The electrical switch of claim **1** wherein said member rotatable with said driver lug includes an escutcheon member having an aperture therein receiving the driver lug and a projecting flange to engage said first torsion spring.

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