

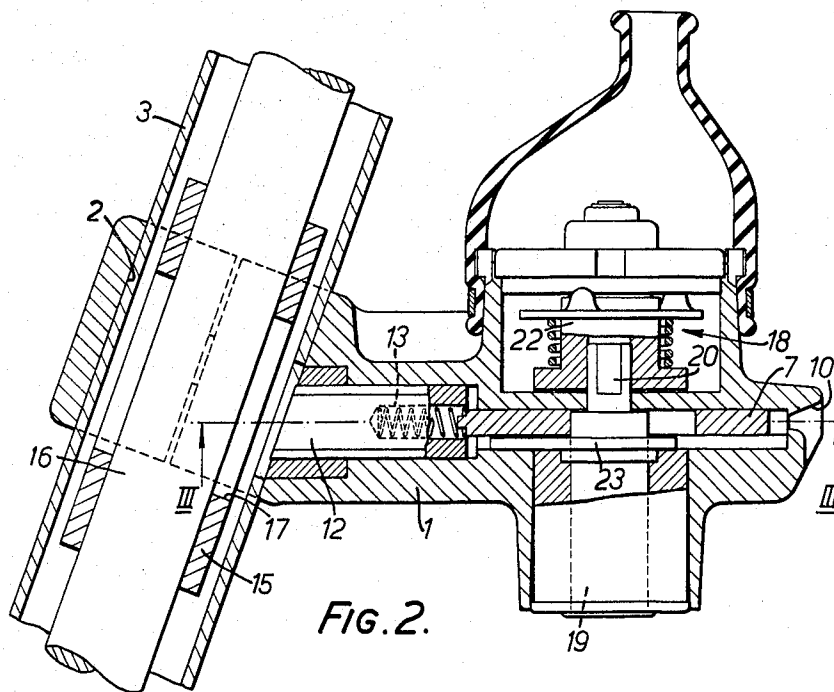
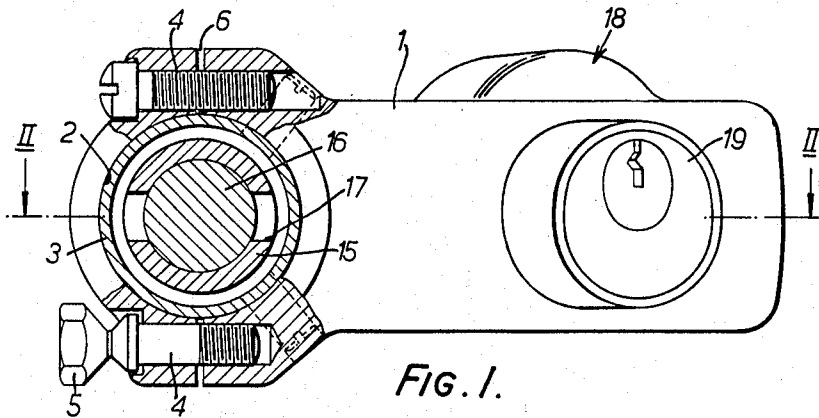
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P. S. JEA VONS ET AL
THEFT PREVENTION DEVICES

3,250,101

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2 Sheets-Sheet 1



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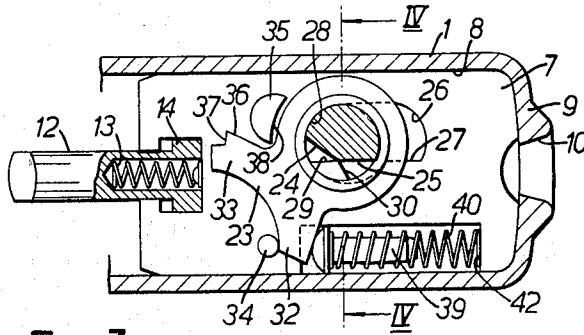


FIG. 3.

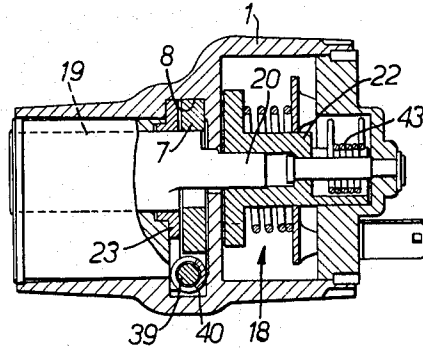


FIG. 4.

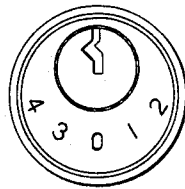


FIG. 5.

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THEFT PREVENTION DEVICES

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9 Claims. (Cl. 70—252)

This invention relates to theft prevention devices for use in motor vehicles, and is an improvement in or relating to the invention disclosed in our co-pending application No. 178,492, now Patent No. 187,527.

In said co-pending application we have described a theft prevention device having a key-operated switch mechanism and a manually and separately operable locking mechanism, in use the switch controlling a vital electrical circuit of the vehicle and the locking mechanism acting to render inoperable a vital mechanical part of the vehicle; the mechanisms are interlocked so that one cannot be operated unless the other is in the inoperative position and so that when the locking mechanism is in the locked position it automatically returns to the inoperative or unlocked position when the key is turned in the direction opposite to that required to operate the switch mechanism. In the embodiment described specifically in that application the locking mechanism comprises a manually operable locking bolt, and the present invention relates to devices using such a bolt.

According to the present invention the switch and locking mechanisms are so interrelated that turning the key for the switch mechanism in said opposite direction is, if necessary, capable of producing positive retracting movement of the locking bolt. As in the earlier arrangements a return spring may be provided also to provide retraction of the bolt, but the aforesaid interrelation of the mechanisms provides a valuable safety feature in that it ensures positive retraction of the bolt in the event of spring failure.

If desired the return spring may be omitted, positive retraction of the bolt by means of the key always being relied on to provide the bolt return movement. Even when the spring is fitted and operative, binding of the bolt which might render the spring force insufficient will not prevent bolt return. Such binding may occur, for example, if the bolt is in locking engagement with the vehicle steering system and the steering is "hard over."

Preferably the locking mechanism comprises a slideable control member which serves to urge the locking bolt towards the steering column of the vehicle when fitted. The control member may be recessed within a housing of the device to avoid inadvertent operation and arranged to be accessible through an aperture in the housing for direct manual operation. The interlocking feature may be at least in part obtained by engagement of a switch operating shaft, interconnecting the switch itself and a key-operated lock, and the control member.

The control member may have a suitably profiled aperture through which the shaft passes, and a pawl-like retaining member mounted on the switch shaft for engagement with the control member may act to retain the control member in the locking position and also to produce positive retraction of the control member. The retaining member may act through a return spring for the control member, movement of the pawl member on turning the key in said opposite direction compressing the spring to a "solid" condition, i.e. with immediately adjacent turns in abutment, should positive retraction be necessary.

An embodiment of the invention in the form of a theft

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prevention device embodying an ignition and starter switch and adapted to lock a vehicle steering column is illustrated in the accompanying drawings and will now be described by way of example. In the drawings:

FIGURE 1 is a front perspective view of the device as fitted with a portion adjacent the steering column and the column itself shown in section,

FIGURE 2 is a sectional view on the line II—II in FIGURE 1,

FIGURE 3 is a sectional view on the line III—III in FIGURE 2,

FIGURE 4 is a sectional view on the line IV—IV in FIGURE 3, and

FIGURE 5 is a view of the lock showing the various operative positions thereof.

A die-cast housing 1 is formed with a mounting bore 2 through which the steering column passes when the device is fitted. When fitted, as shown in FIGURES 1 and 2, the housing surrounds the usual tubular outer casing 3 of the column and is clamped thereto by bolts such as 4, some of which have shear-off heads 5 to prevent unauthorised removal. The housing being suitably split at 6 for mounting purposes. A control element or slide 7 of plate-like form is slidably mounted within the housing 1 in a slide way 8 disposed transversely of the column and closed by an outer end wall 9 with a central aperture 10 through which the slide 7 is accessible for direct manual operation.

A sliding bolt 12 is arranged in the slide 7 with a maximum projection from the inner end of the latter from which it is spring loaded by means of a spring 13; projection of the bolt 12 is limited by a head 14 thereof. When the slide 7 is moved inwardly to an operative or locking position, in which position it is retained in a manner described hereinafter, the bolt 12 is resiliently urged by the bolt spring 13 into engagement with a sleeve 15 fixed to and surrounding the normal central shaft 16 of the steering column. The sleeve 15 has a plurality of locking recesses 17 spaced around the sleeve periphery for engagement by the bolt 12.

The switch mechanism 18 comprises a pin-tumbler type key-operated lock 19 which is connected through an operating shaft 20 to the combined ignition and starter switch 22. The shaft 20 has a normal circular cross-section, and over a portion of its length coextensive with the thickness of the slide 7 and a plate-like pawl forming a retaining member 23 mounted alongside the slide 7 has a segment bounded by part-chords 24 and 25 (see FIGURE 3) cut away to provide a reduced section. An aperture 26 in the slide 7 and through which the shaft 20 passes is elongated in the direction of the slide axis, having a generally circular inner end portion and a generally part-circular outer end portion bounded by a chord 27 to provide a flat chordal step with which the cut-away shaft portion engages in a manner to be described.

The pawl 23 is mounted on the shaft 20 with a degree of angular lost motion, having a circular aperture 28 which fits the normal shaft section apart from an inward projection defined by two part-chordal surfaces 29 and 30 which respectively engage the base of the reduced section of the shaft at 24 and 25 at the limits of lost motion. The pawl 23 has two generally radial projecting arms the lower 32 of which is directed downwardly and the upper 33 of which is directed inwardly more or less in alignment with the slide axis between two projections 34 and 35 from the adjacent side face of the slide.

Considering the device in the completely inoperative position, the upper arm 33 engages at the end adjacent the shaft 20 the rear convex surface of the upper slide projection 35 at approximately the level of the switch shaft axis. For engagement with that projection as the

slide 7 moves to the locked position the upper level pawl arm 33 has a upper edge 36 which is inclined upwardly to a cut-out step 37 arranged at the free end of the arm 33 for engagement with the outwardly facing undercut surface 38 of the slide projection 35.

In the inoperative position the lower pawl arm 32 on its inner side engages the lower slide projection 34, which is in the form of a circular pin, and on its outer side engages the head of a slidably mounted retraction pin 39. The stem of the pin 39 is received within the inner end of a slide return spring 40 which engages the outer end of a rectangular cut-out 42 at the bottom edge of the slide 7 and within which the retraction pin 39 moves. A torsion spring 43 centres the switch shaft 20 so that with the key removed in the "off" position marked "0" in FIGURE 5 the shaft 20 takes up the position shown at the inner end of the slide aperture 26 with the part-chord 25 of the reduced section aligned with said chordal step 27. The device can now be considered as fully inoperative.

If the slide 7 is moved inwardly to the locking position to lock the steering column shaft 16, by means of a suitable member such as a pencil or even the ignition key itself inserted through the housing aperture 10, the shaft 20 enters into the outer portion of the slide aperture 26; as it does so the upper slide projection 35 slides along the upper pawl arm 33, turning the pawl 23 slightly against the return spring 40 until it reaches the cut-out step 37, whereupon the pawl 33 clicks into position engaging the projection surface 38 to retain the slide 7 in the locked position. In order to free the locking mechanism it is first necessary to turn the key in the opposite direction to the switch-operating direction to the unlocking position marked "2" in FIGURE 5; this brings the shaft 20 into engagement with the projection in the pawl aperture 28 and turns the pawl 23 in the direction which frees the upper slide projection 35 and allows the slide to return to the inoperative or unlocked position illustrated under the force of the return spring 40.

Return movement of the slide 7 is normally produced solely by the return spring 40, the spring force being increased by movement of the retraction pin 39 which is displaced by the lower pawl arm 32 as the pawl 23 is turned by the key. The pawl movement necessary to free the slide 7 would bring the turns of the spring up "solid" if for any reason the slide 7 remained in the locked position. This might occur if the slide 7 jammed, in which case further pawl movement would provide positive retraction of the bolt 12 should the spring force itself be insufficient to produce return movement of the slide 7. Thus slide return to the inoperative position does not depend upon spring tension and in the event of spring breakage or binding of the bolt 12 the slide 7 will be returned in a positive manner by means of the pawl 23.

When the slide has returned to the inoperative position the key can be turned in the normal forward direction to operate the switch 22, the shaft 20 turning freely in the inner portion of the slide aperture 26. When the key is turned to the position marked "3" in FIGURE 5 the vertical ignition is switched on and the switch mechanism will remain in this position, although the key cannot be withdrawn. Further key movement to the position "4" energizes the starter, from which position to the position "3" the mechanism is returned by the spring 43 when the key is released. When the slide 7 is in the locked position the shaft 20 passes through the outer end portion of the slide aperture 28 and hence cannot be turned in the forward switch operating direction, i.e. from the position "0" to position "3," because of engagement of the base of the reduced shaft section at 25 with the chordal step 27.

An auxiliary switch position is shown at "1," and this position the mechanism can remain but the key cannot be removed; the vehicle auxiliary electrical circuit is ener-

gized but not the ignition circuit, and further movement to position "2" is necessary for unlocking.

It will be clear that the switch and locking mechanisms of the described arrangement are completely interlocked so that the hazardous circumstance of an attempt to drive the vehicle with the steering column locked cannot arise. If the steering column shaft 16 is locked the ignition circuit must be open and cannot be closed until the locking mechanism has first been released by turning the ignition key in the opposite direction (to position "2") to that required for switch operation. The action of the pawl 23 through the retraction pin 39 and the return spring 40 ensures that if the key is turned to the position "2" the slide 7 must be retracted and the steering column free.

We claim:

1. A theft prevention device for a motor vehicle, comprising a switch mechanism, a key-operated lock, a switch-operating shaft interconnecting the switch mechanism and the lock so that turning the latter by the appropriate key operates the switch mechanism, a manually and separately operable locking mechanism including a locking bolt for engagement with a mechanical part of the vehicle, and a slidable control member in which the locking bolt is mounted, the switch-operating shaft and the control member interengaging to interlock the switch and locking mechanisms so that one cannot be operated unless the other is in the inoperative position, a rotary member through which the switch-operating shaft passes and which is rotationally coupled thereto with a limited degree of angular lost motion, and spring means through which said rotary member acts to urge the locking bolt in the unlocking direction when the switch-operating shaft is turned from the inoperative position in a direction opposite to that required to operate the switch mechanism.

2. A device according to claim 1, wherein the control member is recessed within a housing of the device to avoid inadvertent operation and is arranged to be accessible through an aperture in the housing for direct manual operation.

3. A device according to claim 1, wherein the control member has a suitably profiled aperture through which the shaft passes, and said rotary member is mounted on the switch shaft and acts as a pawl for engagement with the control member to retain the latter in the locking position and also to produce positive retraction of the control member when necessary.

4. A theft prevention device for a motor vehicle, comprising a switch mechanism, a key-operated lock, a switch-operating shaft interconnecting the switch mechanism and the lock so that turning the latter by the appropriate key operates the switch mechanism, a manually and separately operable locking mechanism including a locking bolt for engagement with a mechanical part of the vehicle, and a slidable control member in which the locking bolt is mounted, the switch-operating shaft passing through an aperture in the control member, which aperture and the shaft are so profiled that they interengage to interlock the switch and locking mechanisms so that one cannot be operated unless the other is in the inoperative position, a rotary member through which the switch-operating shaft passes and which is rotationally coupled thereto with a limited degree of angular lost motion, and spring means through which said rotary member acts on said control member to urge the locking bolt in the unlocking direction when the switch-operating shaft is turned from the inoperative position in a direction opposite to that required to operate the switch mechanism.

5. A device according to claim 4, wherein a return spring for the control member forms said spring means and movement of said rotary member in said opposite direction compresses the spring to a solid condition, whereby to provide positive retraction of the locking mechanism in the event the latter tends to jam.

6. A theft prevention device for a motor vehicle, comprising a switch mechanism, a key-operated lock, a switch-

operating shaft interconnecting the switch mechanism and the lock so that turning the latter by the appropriate key operates the switch mechanism, a manually and separately operable locking mechanism including a locking bolt for engagement with a mechanical part of the vehicle, and a slidable control member for the locking bolt, the switch-operating shaft and the control member interengaging to interlock the switch and locking mechanisms so that one cannot be operated unless the other is in the inoperative position, a pawl member which is mounted on the switch-operating shaft and which is rotationally coupled thereto with a limited degree of angular lost motion, the control member having a projection which is engaged by the pawl member to retain the locking mechanism in the operative locking position, and spring means through which said pawl member acts to urge the locking bolt in the unlocking direction when the switch-operating shaft is turned to free the pawl from engagement with said projection, from the inoperative position in a direction opposite to that required to operate the switch mechanism, the spring means being positioned between the pawl member and the control member and acting not only as a return spring for the latter but also urging the pawl member to the pawl-engaged position with respect to said projection.

7. A theft prevention device for a motor vehicle, comprising an ignition switch mechanism, a key-operated lock, a switch-operating shaft interconnecting the switch mechanism and the lock so that turning the latter by the appropriate key operates the switch mechanism, a manually and separately operable locking mechanism including a locking bolt for engagement with a steering column of the vehicle, and a slidable control member in which the locking bolt is mounted, the switch-operating shaft and the control member interengaging to interlock the switch and locking mechanisms so that one cannot be operated unless the other is in the inoperative position, a pawl member which is mounted on the switch-operating shaft and which is rotationally coupled thereto with a limited degree of angular lost motion, the pawl member having an

upper projecting arm for engagement with a projection of the control member to retain the latter in the operative locking position, and spring means which act between the control member and a lower projecting arm of the pawl member to urge the latter into engagement with said projection, so that the pawl member acts through the spring means to urge the locking mechanism in the unlocking direction when the switch-operating shaft is turned, to free the projection, from the inoperative position in a direction opposite to that required to operate the switch mechanism.

8. A device according to claim 7, wherein said upper projecting arm has an inclined upper edge which in the operative position engages the rear surface of said projection to retain the control member in the inoperative position, from which it can be displaced manually against the spring loading of the pawl member by said spring means, and a step which then engages the front surface of said projection to retain the control member in the operative position.

9. A device according to claim 7, wherein turning the pawl member in said opposite direction brings the turns of a spring providing said spring means to a solid spring condition if the control member tends to jam, whereby to produce positive retraction of the locking mechanism on continued turning of the pawl member by means of the switch-operating shaft.

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