

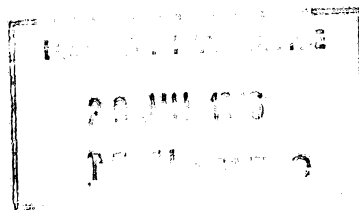
Application for a Patent.

We, ROBERT BOSCH (AUSTRALIA) PTY. LTD.,

of Cnr. Centre & McNaughton Roads, Clayton, 3168, Victoria,
Australia

hereby apply for the grant of a Patent
for an invention entitled "SWITCHING ARRANGEMENT"

which is described in the accompanying ~~complete~~ ^{provisional} specification.



Our address for service is: CALLINAN AND ASSOCIATES, Patent Attorneys, of
48-50 Bridge Road, Richmond, in the State of Victoria, Australia.

Dated this 29th day of July, 19 86.

ROBERT BOSCH (AUSTRALIA) PTY. LTD.

By its Patent Attorneys:

CALLINAN AND ASSOCIATES.

APPLICATION ACCEPTED AND AMENDMENTS

ALLOWED 31.1.91

Colin McNaughton

To The Commissioner of Patents.

COMMONWEALTH OF AUSTRALIA

The Patents Act 1952

DECLARATION IN SUPPORT

of the (Convention) Application made by: ROBERT BOSCH (AUSTRALIA) PTY. LTD.

(hereinafter termed "the applicant") for a patent (of addition) for an invention entitled
SWITCHING ARRANGEMENT

I/We: PETER PANG
of ROBERT BOSCH (AUSTRALIA) PTY. LTD., Cor. Centre and McNaughton Roads, Clayton, Victoria 3168, Australia
do solemnly and sincerely declare as follows:

~~I am / We are the applicant,~~

~~-or-~~

I am / We are authorised by the applicant to make this declaration on its / their behalf.

~~The basic application as defined by sections 141 and 142 of the Act was / were made~~

~~in~~

~~on~~

~~in~~

~~on~~

~~in~~

~~on~~

~~by~~

~~The basic application referred to in this paragraph is / are the first application made in a Convention country
in respect of the invention the subject of the application.~~

~~I / We am / are~~

Hans Gut
10 Wentworth Avenue
Mundingburri
Queensland, Australia

~~Is / are the actual inventor of the invention and the facts upon which the applicant is / are entitled to make
the application are as follows: The applicant is a person who would, if a patent
were granted upon an application made by the said actual inventor, be
entitled to have the patent assigned to it.~~

Declared at Robert Bosch P/L, Clayton this 4th day of August 1987.

Signed: Peter Pang

(12) PATENT ABRIDGMENT (11) Document No. AU-B-76259/87
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 609409

(54) Title
LOCKING SWITCHING ARRANGEMENT

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(56) Prior Art Documents
AU 21583/83 H01H 9/54
AU 471256 52910/73 04.22; 04.212
AU 402143 55645/65 04.2

(57) Claim

1. A locking switching arrangement for electric circuits, said arrangement including a pivotally movable switch assembly and a solenoid, said switch assembly being a momentary closure switch movable between a neutral position and at least one contact closing position and having a manually operable switch actuator, a plunger of said solenoid co-operating with a cam coupled to said switch actuator to lock said switch actuator into said at least one contact closing position when said switch actuator has been moved beyond a predetermined position whereby said contact closing position is maintained whilst said solenoid is energized and a current sensing switch to de-activate said solenoid when required.

Australia

609409

Form 10

PATENTS ACT 1952

COMPLETE SPECIFICATION

(ORIGINAL)

FOR OFFICE USE

Short Title:

Int. Cl:

Application Number:

Lodged:

Complete Specification—Lodged:

Accepted:

Lapsed:

Published:

Priority:

Related Art:

This document contains the
amendments made under
Section 17 and 18 of the
Patents Act 1952.

TO BE COMPLETED BY APPLICANT

Name of Applicant: ROBERT BOSCH (AUSTRALIA) PTY. LTD.

Address of Applicant: Cnr. Centre & McNaughton Roads, Clayton, 3168,
Victoria, Australia

Actual Inventor: HANS GUT

Address for Service: CALLINAN AND ASSOCIATES, Patent Attorneys, of
48-50 Bridge Road, Richmond, State of Victoria, Australia.

Complete Specification for the invention entitled: "SWITCHING ARRANGEMENT"

The following statement is a full description of this invention, including the best method of performing it known to me:—

* Note: The description is to be typed in double spacing, pica type face, in an area not exceeding 250 mm in depth and 160 mm in width, on tough white paper of good quality and it is to be inserted inside this form.

The present invention relates to a locking switching arrangement for controlling electric circuits and relates particularly, although not exclusively, to locking switching arrangements for controlling electric motors.

5 Switches are extensively used in automobiles for actuating electric motors which control, for example, the positioning of an antenna or window. To actuate a window a two-way rocker switch is provided to allow directional selection for opening or closing the window. The switch is
10 held down until the window is fully open or fully closed. As the movement of the window is relatively slow a driver must control his car for this period with one hand. One handed driving is not a recommended road safety procedure and should be avoided where possible. On reaching the end
15 of its travel the switch is de-activated by releasing the switch or overruled by, for example, limit switches or current sensor switches which detect stalling of the electric motor. The disadvantage of these types of switches are that the driver cannot lock the switch into the "window
20 open" position and have the switch automatically released at the end of travel of the window.

It is an object of the present invention to provide switching arrangement for electric circuits which can be locked into a particular position without holding the
25 switch but will be automatically released when required.

With this object in view the present invention ~~in~~
~~one aspect~~ provides a locking switching arrangement for



electric circuits, said arrangement including a switch assembly and a solenoid, said switch assembly being a momentary closure switch movable between a neutral position and at least one contact closing position and having a manually operable pivotally movable switch actuator, a plunger of said solenoid co-operating with a cam coupled to said switch actuator to lock said switch actuator into said at least one contact closing position when said switch actuator has been moved beyond a predetermined position whereby said contact closing position is maintained whilst said solenoid is energized and a current sensing switch to de-activate said solenoid when required.

In order that the invention may be clearly understood and readily put into practical effect, preferred non-limitative embodiments of a locking switching arrangement constructed in accordance with the invention



will now be described with reference to the accompanying drawings, in which:-

Fig. 1 is a cross-sectional view of several switches incorporating the locking switching arrangement of the present invention;

Fig. 2A is a cross-sectional view along and in the direction of arrows 2A-2A of one of the switches shown in Fig. 1 with the switch in open circuit;

Fig. 2B is a cross-sectional view along and in the direction of arrows 2B-2B of one of the switches shown in Fig. 1 with the switch in open circuit;

Fig. 3A is a similar view to Fig. 2A with the switch in a first actuated position;

Fig. 3B is a similar view to Fig. 2B with the switch in a first actuated position;

Fig. 4A is a similar view to Fig. 2A with the switch in a second actuated position;

Fig. 4B is a similar view to Fig. 2B with the switch in a second actuated position; and

Fig. 5 is a similar view to Fig. 2A showing an alternative form of the switch.

Turning to Figs. 2A and 2B there is shown a circuit which illustrates how the present invention may be used to control an electric motor M for power actuation of an antenna or window. For ease of understanding a two-way momentary closure rocker switch 10 is shown with the contacts separated from the actuator. Rocker switch 10 has

two switch contacts 12, 14 which control the directional movement of motor M. A spring-loaded plunger 16 moves along switchblade 18 to control switching with contacts 12, 14. Figs. 1, 2A and 2B show plunger 16 in its neutral position with contacts 12, 14 both being open. A manually operable rocker switch actuator 20 is pivotally movable to either side to cause plunger 16 to move along switchblade 18 to close contacts 12, 14. Fig. 3B shows switchblade 18 engaging contact 14 to activate motor M. Depending from actuator 20 is a cam 22 in the form of an off-set arm member with cam lobes 24, 26 on either side thereof. Between lobes 24, 26 is a cam track 28 on which rides a plunger 30 from solenoid 32. Solenoid 32 includes a return spring 34 which keeps the armature in close contact with cam track 28 or cam lobes 24, 26 even when the solenoid is not actuated. A current sensor switch 36 maintains contacts 38 closed and opens them, when the current increases due to a stalling of motor M.

In operation, the neutral position (Figs. 1, 2A and 2B) is shown where no current is drawn. If rocker switch actuator 20 is manually depressed to move actuator 20 through an angle α_1 (Figs. 3A and 3B), plunger 16 will cause switchblade 18 to engage with contact 14. This engagement activates both solenoid 32 and motor M causing the window or antenna to be raised or lowered. Removing a finger from actuator 20 will cause motor M and solenoid 32 to be de-activated, in view of the restoring force applied

by plunger 16, to return it to its neutral position (shown in Figs. 1, 2A and 2B). Accordingly the window or antenna will remain in the partially up or down position.

By depressing actuator 20 beyond angle α_1 , to angle α_2 (Figs. 4A and 4B) cam lobe 24 will depress plunger 30. At angle α_2 the plunger is trapped behind lobe 24, and therefore once freed, actuator 20 is locked in position α_2 , as long as solenoid 32 is activated, allowing activation of motor M without maintaining force on actuator 20. The depression of plunger 30 will provide a detent feeling to the operator to indicate that the locked position has been set. This detent feeling is a result of supplying sufficient force on actuator 20 to overcome the force applied by solenoid 32. Motor M will continue to be activated until current sensor switch detects that the current increased markedly, because motor M has stalled. Solenoid 32 will then be de-activated. Therefore the return force of plunger 16 depresses plunger 30 and causes actuator 20 to return to its neutral position which in turn causes motor M to stop. Return spring 34 is a soft spring to ensure plunger 30 does not lose contact with cam track 28 or lobes 24, 26.

Fig. 1 shows rocker switch 10 having two sets of contacts 12, 14 and switchblades 18 but again any number can be used depending on circuitry requirements. Although two sets are shown the preferred embodiment has assumed that only one set is required.

In both embodiments a two-way momentary closure rocker switch 10 is used but this may be replaced by a one-way momentary closure rocker switch when two actuation positions are not required.

5 In Fig. 5 a second embodiment of the invention is illustrated. In this embodiment cam 22 has recesses 38, 40 instead of lobes 24, 26. Spring 34 is arranged in the opposite direction to that of Figs. 1 to 3B. This switching arrangement omits the α_1 angle position and can only be shifted to the α_2 angle position where the switch is locked into its closed position. Plunger 30 will engage in either of steps 38 or 40 to prevent actuator 20 returning to its neutral position whilst solenoid 32 is activated. On de-activation of solenoid 32 the spring biasing of actuator 20 will return the actuator to its neutral position. This embodiment only allows a full automatic raising or lowering of the window or antenna unless actuator 20 is forced back to neutral position manually.

From the above it is clear that the shape of cam 20 22 can be varied to suit particular requirements. Although the preferred embodiments refer to the use of the invention with respect to the automobile industry it is evident that the use of the invention is unlimited. The invention is applicable whenever it is required to lock a switch in a particular position from which it automatically returns to neutral as soon as the electric motor stalls.

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It is believed that the invention and many of its

attendant advantages will be understood from the foregoing description and it will be apparent that various changes may be made in the form, construction and arrangement of the parts and that changes may be made in the form, construction and arrangement of the switching arrangement described

5 without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely preferred embodiments thereof.

The claims defining the invention are as follows:-

1. A locking switching arrangement for electric circuits, said arrangement including a pivotally movable switch assembly and a solenoid, said switch assembly being a momentary closure switch movable between a neutral position and at least one contact closing position and having a manually operable switch actuator, a plunger of said solenoid co-operating with a cam coupled to said switch actuator to lock said switch actuator into said at least one contact closing position when said switch actuator has been moved beyond a predetermined position whereby said contact closing position is maintained whilst said solenoid is energized and a current sensing switch to de-activate said solenoid when required.
2. The locking switching arrangement as claimed in claim 1, wherein said switch assembly is a two-way momentary closure rocker switch.
3. The locking switching arrangement as claimed in claim 1 or 2, wherein said cam is an off-set arm member depending from said switch actuator.
4. The locking switching arrangement as claimed in claim 3, wherein said cam has opposing cam lobes at the free end thereof, whereby said plunger is normally constrained to move along a cam track bordered by said cam lobes but in said predetermined position said plunger rides over a respective cam lobe to escape from said cam track to abut said cam lobe preventing said switch actuator from returning to its neutral position until said solenoid is de-activated.
5. The locking switching arrangement as claimed in claim 4, wherein said switch actuator will return to its neutral position, when released, if said plunger is following said cam track.
6. The locking switching arrangement as claimed in claim 3, wherein said cam has opposing recesses at the free end thereof, whereby said plunger can move along a cam track bordered by said recesses but in said predetermined



position said plunger enters a respective recess to escape from said cam track to prevent said switch actuator from returning to its neutral position until said solenoid is de-activated.

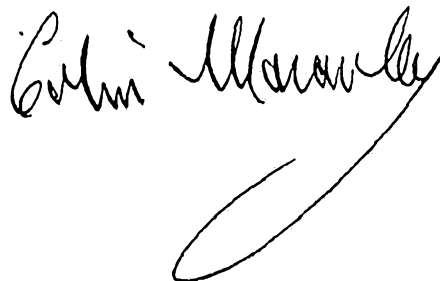
7. A locking switching arrangement substantially as hereinbefore described with reference to the accompanying drawings.

D A T E D this 29th day of January 1991.

ROBERT BOSCH (AUSTRALIA) PTY. LTD.

By their Patent Attorneys:

CALLINAN LAWRIE



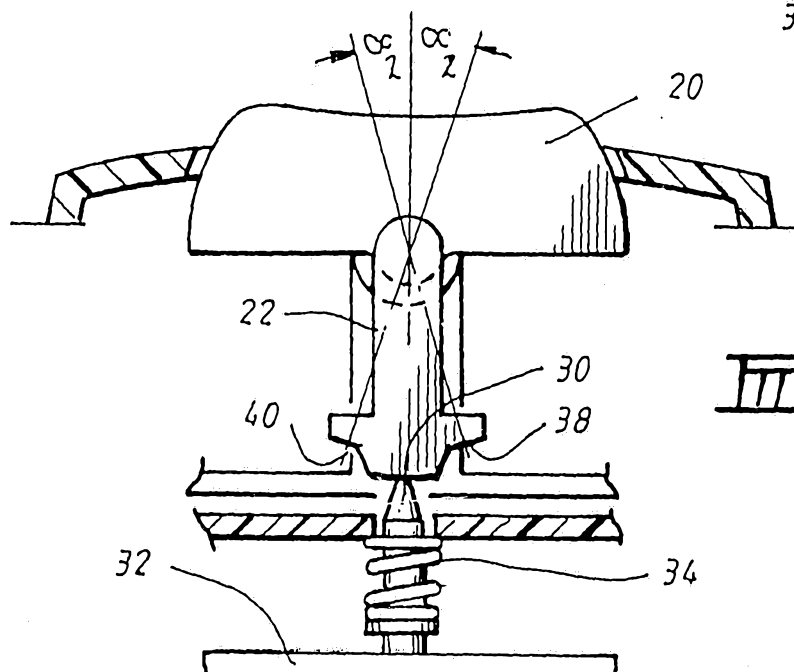
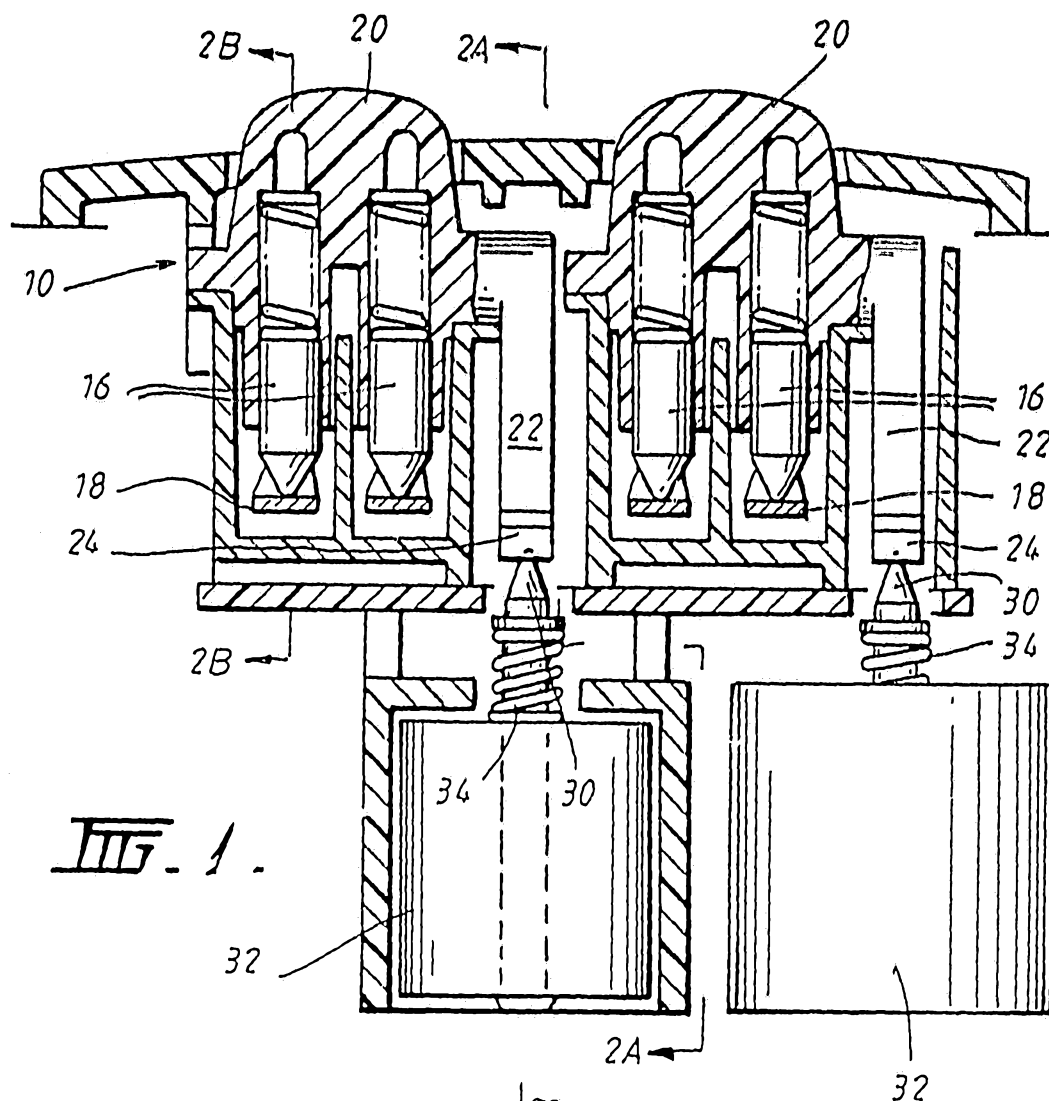


FIG. 2A.

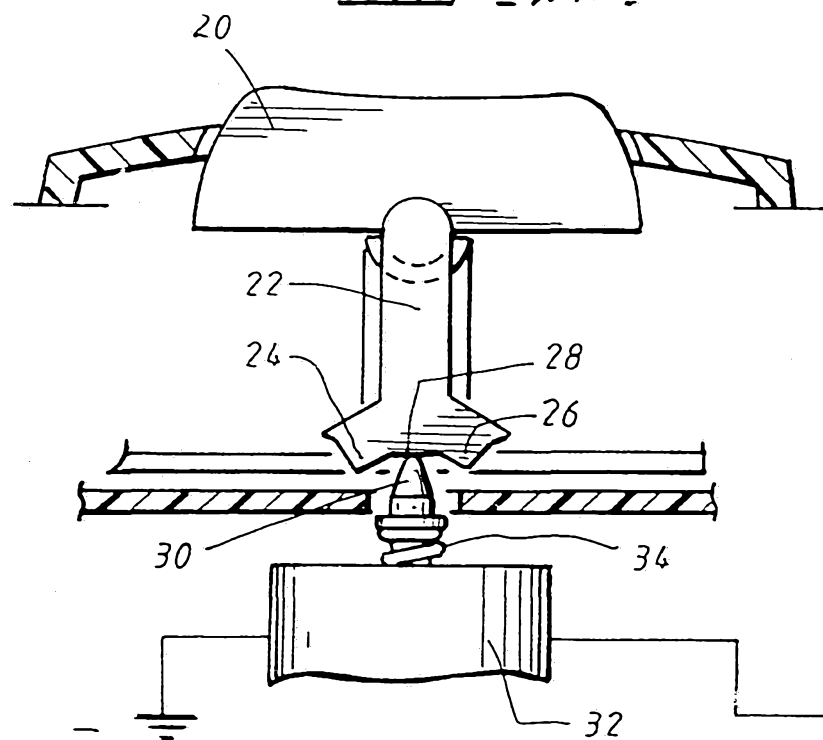
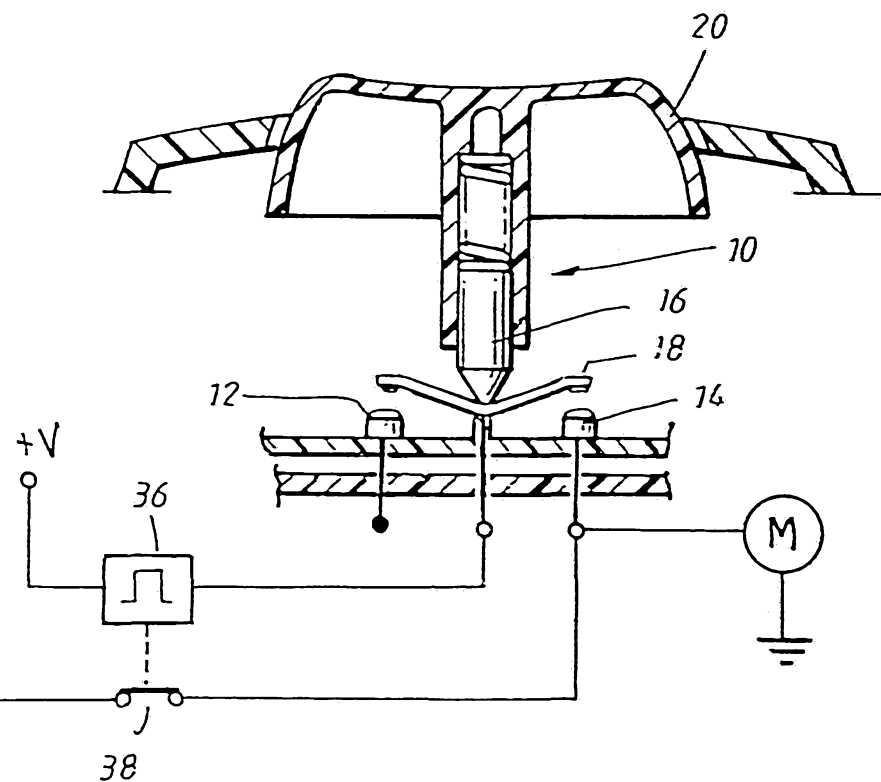


FIG. 2B.



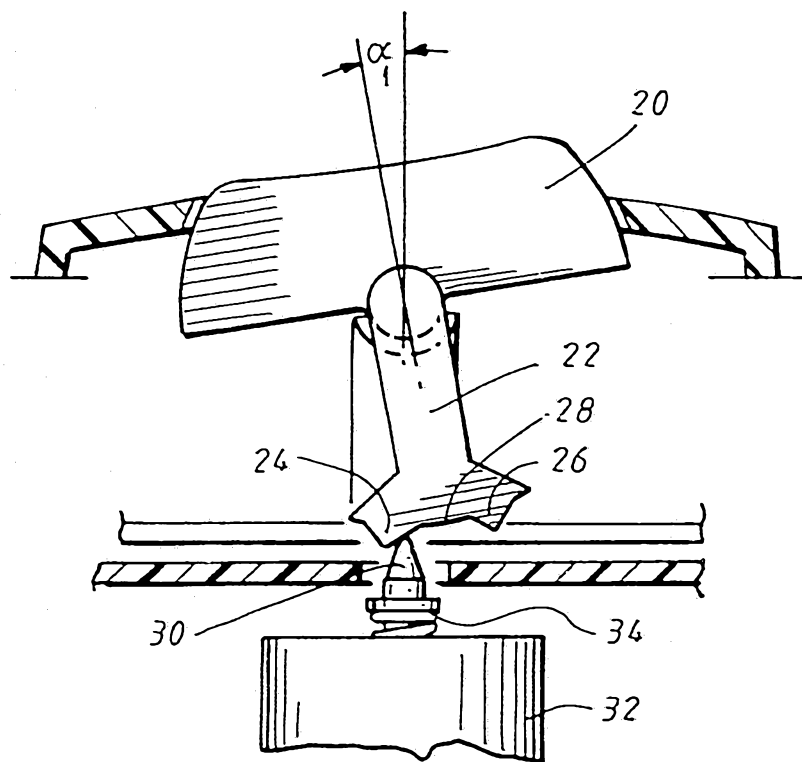


FIG. 3A.

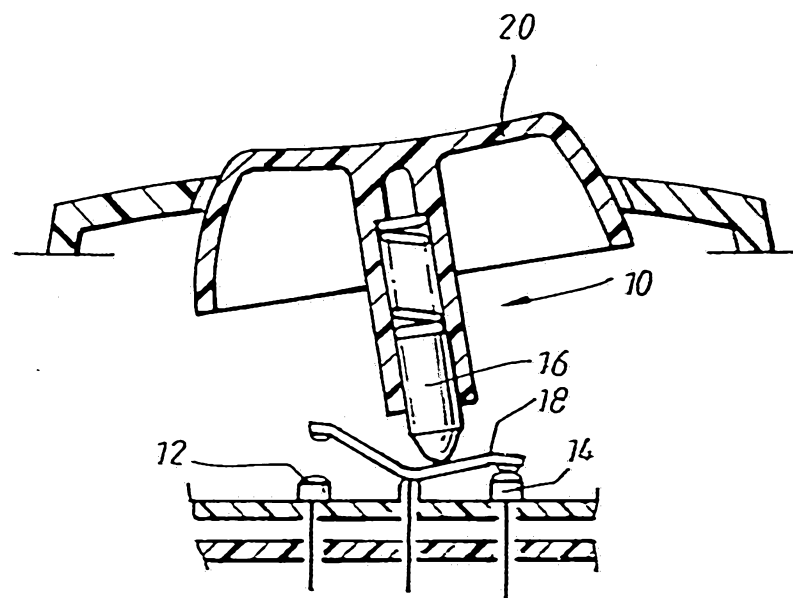


FIG. 3B.

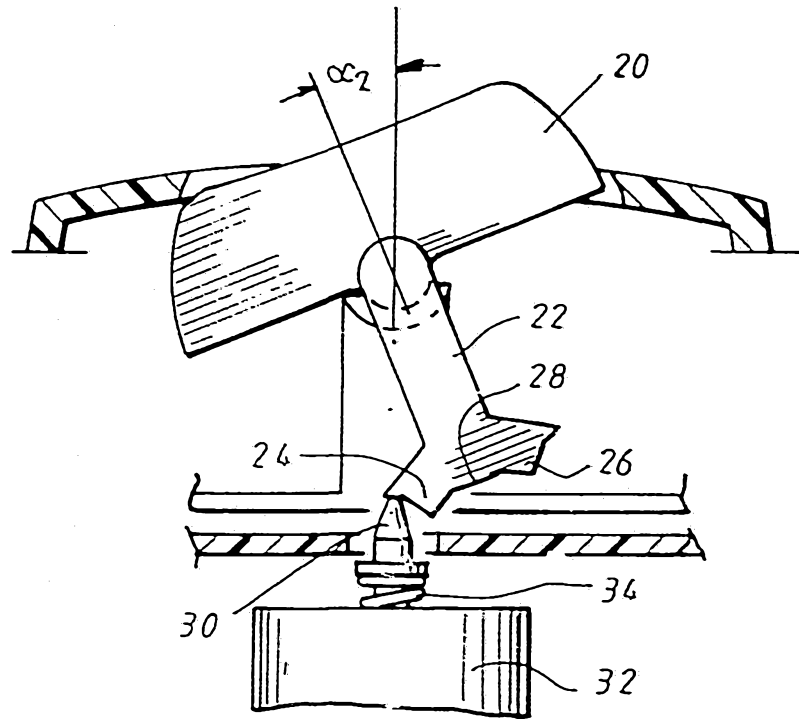


FIG. 4A.

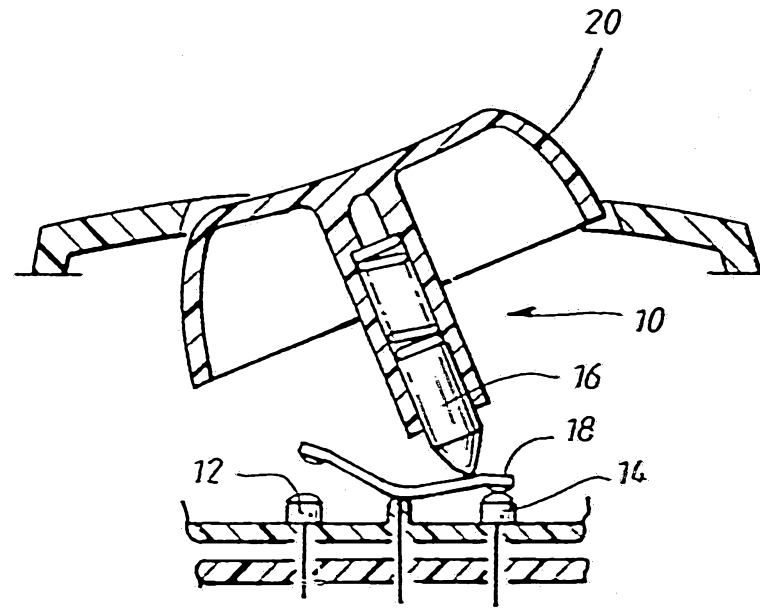


FIG. 4B.