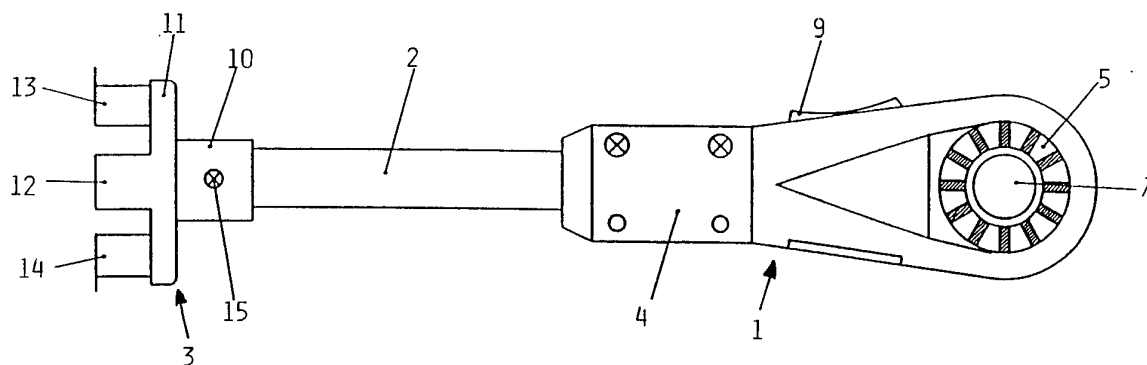




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(21) International Application Number: PCT/DK93/00269 (22) International Filing Date: 18 August 1993 (18.08.93) (30) Priority data: 1026/92 18 August 1992 (18.08.92) DK (71) Applicant (for all designated States except US): DANCALL RADIO A/S [DK/DK]; P.O. Box 105, DK-9490 Pandrup (DK). (72) Inventors; and (75) Inventors/Applicants (for US only): PETERSEN, Jens, Toftgaard [DK/DK]; Fuglsangsvej 6, 2.tv., DK-9400 Nørresundby (DK). HANSEN, Steen [DK/DK]; Jernbanegade 18A, 1., DK-9800 Hjørring (DK). CHRISTRUP, Søren [DK/DK]; Højbakkevej 3A, Biersted, DK-9440 Åbybro (DK).		(74) Agent: HOFMAN-BANG & BOUTARD A/S; Adelgade 15, DK-1304 Copenhagen K (DK). (81) Designated States: AT, AU, BB, BG, BR, BY, CA, CH, CZ, DE, DK, ES, FI, GB, HU, JP, KP, KR, KZ, LK, LU, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SK, UA, US, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>

(54) Title: AN OPERATING UNIT FOR A MOBILE TELEPHONE AND A CARRIER LEVER THEREFOR

**(57) Abstract**

An operating unit (1) for a mobile telephone mounted in an automobile and equipped with the means necessary for operating the mobile telephone as well as a loudspeaker. The operating unit (1) is adapted to be mounted in the vicinity of the steering wheel rim of the automobile by means of a carrier lever (2) such that a driver can reach the operating unit (1) without releasing the steering wheels, as well as means capable of generating acoustic signals characteristic of the functions concerned upon activation of one or more of the operating means (5, 6, 7, 8, 9) of the operating unit. A carrier lever (2) for an operating unit (1) for such a mobile telephone has a foot member (11) on its inner end (2), said foot member having two or more laterally projecting, deformable attachment flaps (12, 13, 14).

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- 1 -

AN OPERATING UNIT FOR A MOBILE TELEPHONE
AND A CARRIER LEVER THEREFOR

5 The invention concerns a mobile telephone mounted in an automobile and equipped with the means necessary to operate the mobile telephone and a loudspeaker, as well as a carrier lever for an operating unit for a mobile telephone. The carrier lever is adapted to be mounted on a steering column or its cover so as to extend substantially
10 radially outwardly from it and so that the operating unit is arranged in the vicinity of the steering wheel rim, enabling a driver to reach the operating unit without releasing the steering wheel.

15 It is a known problem that the use of mobile telephones when driving may be a danger to road safety. The problem has been remedied in part by the use of mobile telephones having a so-called hands free function, there being used an external microphone and loudspeaker so that conversations
20 can take place without the handset being lifted. However, in connection with a call or answering a call it is still necessary that the driver averts his attention from the traffic, e.g. to dial digits on a pushbutton dialing device in connection with a call.

25 US patent specification 4 698 838 teaches integrating an automobile telephone in the central portion of the steering wheel of an automobile. This entails that the telephone is arranged more closely to the driver of the automobile, so that the driver does not have to avert his
30 attention to the same extent from the essential thing, viz. the traffic; but this does not change the fact that e.g. in connection with a call the driver has to concentrate on dialing digits on a pushbutton dialing device on
35 the handset. Thus, this solution does not ensure full

- 2 -

attention to the traffic when operating the mobile telephone.

5 US patent specification 4 868 862 discloses an example of a mobile telephone having an outer operating unit which may e.g. be arranged on an operating lever mounted on the cover of the steering column. This makes it possible to reach the lever without releasing the steering wheel. According to this document digits may be selected by means
10 of the operating lever in connection with a call either by tilting the lever or by turning a button at its end. Where the lever is tilted, however, the driver still has to check on a display whether the correct digit has been selected. Where a button is turned at the end of the arm,
15 the driver has to look at the button to check that it has been set to the correct digits. Thus, in both cases it is still necessary that the driver averts his attention from the traffic, and this document thus provides no solution to the above-mentioned problem either.

20 In other connections it is known to have a device giving an acoustic confirmation of entered data. For example, the German Offenlegungsschrift DE 39 20 982 discloses an example of a telephone answering machine which, by means of
25 artificially generated speech, can e.g. confirm the digit recorded on the telephone answering machine. It can be checked in this manner that a recorded telephone number is correct.

30 Finally, European patent application EP 463 856 discloses a device for scanning menus on a mobile telephone. Here e.g. a finger wheel or a ball is used, moving through various menus, i.e. modes of function of the mobile telephone, which facilitates the operation. The menus selected
35 in this manner are shown on a display on the handset of the mobile telephone, and it is thus necessary in this so-

- 3 -

lution too that the driver averts his eyes and thus averts his attention from the traffic and to the display to see which menus have been selected. Since the finger wheel or the ball is mounted on the handset of the automobile telephone, the driver must hold it in his hand during operation, and one hand must thus be removed from the steering wheel.

The invention provides a mobile telephone where the driver, not only during a conversation but also when operating the mobile telephone in connection with e.g. a call, can keep his eyes on the road and the traffic and both hands on the steering wheel so that the operation of the mobile telephone will be as safe as possible traffic-wise.

This is achieved according to the invention in that the mobile telephone in combination comprises partly an operating unit adapted to be mounted by means of a carrier lever in the vicinity of the steering wheel of the automobile such that a driver can reach the operating unit without releasing the steering wheel, and partly means capable of generating acoustic signals characteristic of the operating functions concerned upon activation of one or more of the operating means of the operating unit.

In this manner it is achieved, the operating unit being close to the steering wheel, that the driver can keep both hands on the steering wheel while operating the various functions on the operating unit. Upon each operation the said means for generating acoustic signals give a direct acoustic feedback telling which function has just been operated. When this feedback is given acoustically, the driver does not have to avert his eyes and his attention from the traffic, because it is not necessary to perform any visual controls in connection with the operation. The combination of the possibility of keeping both hands on

- 4 -

the steering wheel with the fact that the driver can keep his eyes on the traffic, gives the greatest possible road safety in connection with the operation of the mobile telephone.

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An expedient embodiment of the operating unit is obtained by mounting the carrier lever of the operating unit on the steering column or its cover such that the carrier lever extends therefrom in a direction toward the steering wheel rim, as stated in claim 2.

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Claim 3 defines an expedient mounting of the carrier lever, where the inner end of said lever is provided with a foot member which has two or more laterally projecting, deformable attachment flaps. This makes it possible to mount the lever on the cover of the steering column independently of the shape of the cover since this may be shaped very differently on the various car makes.

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When moreover, as stated in claim 4, the foot member is divided into an inner portion and an outer portion, which are interconnected by deformable strips of material, the foot member will be sufficiently flexible for the operating unit, following mounting on e.g. the cover of the steering column, to be adjusted to the optimal distance from the steering wheel, but is simultaneously so stiff that after adaptation and mounting the user will regard the operating unit as a stable and fixedly mounted installation. A particularly expedient embodiment of this is stated in claim 5, the greatest possible flexibility being obtained when the connecting strips extend substantially peripherally between the two rings.

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When, as stated in claim 6, the acoustic signals are in the form of spoken words, which are stored digitally, and they are reproduced by the loudspeaker associated with the

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- 5 -

system and already used in connection with hands free conversation, a direct and clear feedback is obtained on the functions activated by means of the operating unit.

5 Claim 7 defines an embodiment of the invention which can additionally improve the road safety. When the mobile telephone comprises a data store for storing a data list with names and associated telephone numbers, it is not
10 necessary to dial the telephone number when calling, it being possible to find the desired name in the data list merely by a search controlled by the operating unit, following which the telephone can call the associated telephone number.

15 An expedient operation is achieved when the operating unit comprises at least one switch so adapted and connected to a search register adapted for searching a data list such that said register will be counted one value up or down upon operation of the switch, as stated in claim 8. This
20 results in a very simple search in the data list.

An expedient embodiment is obtained by using a rotary switch, the search register being counted one value up or down when the rotary switch is rotated a given angle, as
25 stated in claim 9. An additional improvement is obtained by giving the rotary switch a plurality of marked positions such that the search register is counted one value up or down when the rotary switch is rotated from one position to an adjacent position, as stated in claim 10.

30 Claim 11 defines an operationally reliable embodiment of such a rotary switch using alternately dark and light fields in connection with an infrared detector.

35 In connection with large data lists containing many telephone numbers the operation will be facilitated by using

- 6 -

two switches, one of which serves to search names, the other to search the alphabet, as stated in claim 12.

5 As mentioned, the invention also relates to a carrier lever for an operating unit for a mobile telephone. When this is constructed as stated in claim 13, the result will be a carrier lever which can be mounted on many different shapes of the steering wheel cover, entailing that the carrier lever can be utilized in practically all car
10 makes.

Claims 14 and 15 define expedient embodiments of the foot of the carrier lever, which means that after mounting on the steering column cover it can be adjusted such that the
15 operating unit arranged on the carrier lever is arranged optimally with respect to the steering wheel of the automobile.

The invention will be explained more fully below with reference to the drawing, in which
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figs. 1A and B show an operating unit mounted on a carrier lever,

25 figs. 2A and B show a foot member for the unit of fig. 1,

fig. 3 shows an example of the mounting of the unit of fig. 1,

30 fig. 4 and fig. 5 show possible positions of the operating unit, and

figs. 6A, B and C show the structure of a rotary switch.

35 Figs. 1A and B show an example of an operating unit 1 which is mounted on a carrier lever 2. A foot 3 is pro-

- 7 -

- vided at the opposite end of the carrier lever 2, serving to secure the carrier lever 2 and thus the operating unit 1. The actual operating unit 1 consists of a housing 4 in which the various operating elements are placed. The operating elements are formed by two finger wheels 5, 6, two pushbuttons 7, 8 and a tilt button 9. Each of the finger wheels 5, 6 is connected with a rotary switch, as will be described later.
- 10 As mentioned, the entire unit may be secured by means of the foot 3 to e.g. the cover around the steering column in an automobile. Since these covers may be shaped widely differently, the foot 3 must be constructed very flexibly. The foot consists of a bushing 10, a foot member 11 as well as three flaps 12, 13, 14. The bushing 10 is placed centrally on the foot member 11 and is constructed such that the carrier lever 2 may be inserted into the bushing 10 and be clamped by means of a screw 15.
- 20 Figs. 2A and B show an example of how a foot member 11 may be constructed. The foot member consists of an inner portion 16, whose center is formed with a hole 17, as well as an outer portion 18. A plurality of cutouts 19, 20, 21 are provided between the inner portion 16 and the outer portion 18, enabling the inner portion 16 to be connected with the outer portion 18 by means of the connecting strips 22, 23, 24. Since it is contemplated that the entire foot member 11 is made of metal, this structure will be very flexible, because the inner portion 16, on which the bushing 10 and the carrier lever 2 are mounted, can be rotated through a considerable angle in all directions with respect to the outer portion 18. The thickness is selected such that it is possible to rotate the inner portion with a reasonable force, but also such that following final adjustment the unit will still be stable and keep the position adjusted.

- 8 -

Figs. 2A and B moreover show the three attachment flaps 12, 13, 14, each of which is provided with a hole 25, 26, 27. These flaps may likewise be bent so as to conform to the surface on which the foot member is to be mounted.

5 Mounting takes place by means of screws through the holes 25, 26, 27.

Fig. 3 shows an example of how the unit may be mounted. A hole 29 is provided in the plastics cover 28 which surrounds a steering column (not shown). Holes are drilled around said hole to secure the flaps 12, 13, 14. The figure shows how the flaps 12, 14 are secured to the plastics cover 28 by means of the screws 30, 31. It will be seen clearly how the carrier lever 2, which is secured to the inner portion 16 of the foot member by means of the bushing 10, is rotated downwardly in the figure so that the inner portion 16 is rotated through an angle of about 45° with respect to the outer portion 18, whereby the connecting strips 22, 24 have assumed the shown position.

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It is possible to rotate the carrier lever 2 in this manner so that it will have an optimum position with respect to the steering wheel. The figure moreover shows a cable 32 which, via the carrier lever 2 and the hole 29 in the plastics cover 28, connects the operating unit electrically to the other part of the mobile telephone, which is mounted in the automobile in the normal manner.

It is possible in the described manner to place the carrier lever 2 and thereby the operating unit 1 at the optimum angle with respect to the steering wheel of the automobile. Then the carrier lever 2 may be cut to the length which gives the best position of the operating unit 1. When the final position is reached, the entire foot may be covered by a rubber sleeve 33.

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- 9 -

It is outlined in figs. 4 and 5 how the unit may be arranged with respect to the steering wheel. Since it is still to be possible to move the hands freely around the steering wheel to operate it in the normal manner, there must be a minimum distance of about 35 mm between the steering wheel rim and the operating unit 1. This ensures that the steering wheel can be moved freely and that the user can use the operating means, such as e.g. the finger wheel 5, of the operating unit with the fingers without removing the hand from the steering wheel. It is also important to ensure that the unit does not prevent operation of the other switches of the car, ignition key and the like. Likewise, there must be sufficient space for the driver to be able to operate clutch and brakes and to get into and out of the automobile without bumping the knees against the unit. In fig. 5 the hatched areas 35, 36, 37, 38 show possible positions of the operating unit 1.

Figs. 6A, B and C show an example of how the rotary switches in connection with the finger wheels 5, 6 may be constructed. Each wheel is equipped with two infrared reflector units 39, 40, each of which consists of an infrared light emitting diode and an infrared phototransistor. The infrared detectors 39, 40 are mounted on a printed board 41 which is arranged in the housing 4 of the operating unit. The underside 42 of the finger wheel 5, which is made of a dark material, is provided with four white sections 43, so that there will be four white and four dark sectors of 45° each. When the infrared reflector units 39, 40 are directed towards these sectors, it is possible to detect in which direction and how much the finger wheel is rotated. When an infrared detector unit is aligned with a white sector, the transmitted infrared light is reflected to the receiver, thereby making the phototransistor conductive. This gives a high output signal of e.g. 4-5 volts. Correspondingly, a low output signal of e.g. 0-1

- 10 -

volt is obtained when an infrared reflector unit is aligned with a dark sector. When four white and four dark sectors and two infrared detector units for each finger wheel are used, 16 positions can be obtained each time the finger wheel is rotated through 360°.

As will be seen in fig. 6B, the finger wheel 5 is moreover provided with 16 ball-shaped depressions 44. Coaction with a spring-loaded ball 45, which is provided together with the spring 46 in a casing 47 on the housing 4 adapted for the purpose, entails that the finger wheel has 16 clicks and thus also 16 rest positions for each 360° rotation. The digital output signals are synchronized with these clicks. A very user-friendly function is obtained in this manner.

The various operating elements on the operating unit may e.g. have the following functions: The finger wheels 5, 6 are used for leafing through a name list or telephone book which is stored in a known manner in the mobile telephone. One finger wheel is used for the search through the names, where rotation of the finger wheel to an adjacent position i.e. one click, depending upon the direction, makes the search proceed to the succeeding name or return to the preceding name. The other finger wheel is correspondingly used for the search through the alphabet, the search proceeding to the next letter or returning to the last one by moving the finger wheel one position. By combining the two finger wheels it will be possible, even if the list comprises many names, to find the desired name rapidly. The push bottom 7 has the function "pick up" or "hang up" depending upon the momentary position. If the button is operated one time, the function "pick up" is performed, and the next time the function "hang up", and so on. The push-button 8 may be used for repeating the number called last. The tilt button 9 is used for controlling the volume of

- 11 -

the associated loudspeaker.

5 The telephone is equipped with a store in a known manner,
from which a plurality of preentered feedbacks can be
given via the associated loudspeaker when a function is
performed. Each time the driver of the automobile operates
one of the functions of the operating unit, he will thus
immediately get an acoustic feedback telling which func-
tion was performed. The general feedbacks may be recorded
10 by the manufacturer, while the names of the telephone list
have to be recorded by the user. It should be noted that
the recorded names will then automatically be arranged
alphabetically by the telephone.

15 An example of operation and associated acoustic feedback
in a typical call situation might be as follows:

Lower finger wheel:	Feedback:
"click-click-click	
20 click-click-click"	"A"- "B"- "C"- "D"- "E"- "F"

Upper finger wheel:	
"click-click-click"	"Father" - "Flemming
	Nielsen" - "Frederikke"

25 Upper pushbutton (pick up)	
"click"	"calls Frederikke"

Upper pushbutton (hang up)	"hangs up"
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30 Entry of new names/numbers to the data list takes place by
first keying in the name and associated telephone number
by a keyboard in a normal and known manner, following
which the name is recorded through a microphone and is
35 stored in digitized form together with the data already
keyed in.

- 12 -

Since in certain situations it may be necessary to call numbers which have not been duly programmed by name in text and speech beforehand, there may be a special list of e.g. 3 or 5 numbers which, instead of names, may be reproduced as e.g. "extra 1", "extra 2", etc. If numbers are added to this list, they may e.g. be arranged after the last letter of the alphabet.

The foregoing is an example of how a system according to the invention can be designed, and it will be appreciated that details may be modified in many ways within the scope of the invention. Thus, e.g. other switch types may be used, or the operating elements may be arranged differently on the operating unit.

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- 13 -

P a t e n t C l a i m s :

1. A mobile telephone mounted in an automobile and equipped with the means necessary for operating the mobile telephone as well as a loudspeaker, c h a r a c t e r - i z e d in that in combination it comprises an operating unit (1) adapted to be mounted in the vicinity of the steering wheel rim of the automobile by means of a carrier lever (2) such that a driver can reach the operating unit (1) without releasing the steering wheel, as well as means capable of generating acoustic signals characteristic of the operating functions concerned upon activation of one or more of the operating means (5, 6, 7, 8, 9) of the operating unit (1).
2. A mobile telephone according to claim 1, c h a r a c - t e r i z e d in that the carrier lever (2) is adapted to be mounted on the steering column or its cover (28) so as to extend therefrom in a direction toward the steering wheel rim.
3. A mobile telephone according to claim 2, c h a r a c - t e r i z e d in that a foot member (11) is provided on the inner end of the carrier lever (2), said foot member having two or more laterally projecting, deformable attachment flaps (12, 13, 14).
4. A mobile telephone according to claim 2 or 3, c h a - r a c t e r i z e d in that the foot member (11) is divided into inner (16) and outer (18) portions which are interconnected through deformable strips of material (22, 23, 24).
5. A mobile telephone according to claim 4, wherein the inner (16) and outer (18) portions of the foot member are

- 14 -

ring-shaped, characterized in that the connecting strips (22, 23, 24) extend substantially peripherally between the two rings.

5 6. A mobile telephone according to claims 1-5, characterized in that the acoustic signals are in the form of spoken words which are stored digitally, and are reproduced by the loudspeaker associated with the system.

10 7. A mobile telephone according to claims 1-6, characterized in that it comprises a data store for storing a data list of names and associated telephone numbers.

15 8. A mobile telephone according to claims 1-7, characterized in that said operating unit comprises at least one switch (5, 6) which is so adapted and connected with a search register provided for searching a
20 data list that said register will be counted one value up or down upon operation of the switch.

25 9. A mobile telephone according to claim 8, characterized in that said switch is a rotary switch (5, 6), and that the search register is counted one value up or down when the rotary switch (5, 6) is rotated through a given angle.

30 10. A mobile telephone according to claim 9, characterized in that the rotary switch (5, 6) has a plurality of marked positions where the distance between two adjacent positions corresponds to the given angle, so that the search register is counted one value up or down when the rotary switch (5, 6) is rotated from one position to
35 an adjacent position.

- 15 -

11. A mobile telephone according to claim 9 or 10, c h a -
r a c t e r i z e d in that the rotary switch (5, 6) has
a means provided with alternately dark and light (43) sec-
tions and at least one infrared detector (39, 40) consist-
5 ing of a transmitting unit and a receiving unit for scan-
ning the angle and the direction of rotation of the
switch.
12. A mobile telephone according to claims 8-10, c h a -
10 r a c t e r i z e d in that the operating unit has two
switches (5, 6), one of which serves to search through
names and the other to search through the alphabet.
13. A carrier lever (2) for an operating unit (1) for a
15 mobile telephone, said carrier lever being adapted to be
mounted on a steering column or its cover (28) so as to
extend therefrom in a direction toward the steering wheel
rim, and so as to place the operating unit (1) in the vi-
cinity of the steering wheel rim such that a driver can
20 reach the operating unit (1) without releasing the steer-
ing wheel, c h a r a c t e r i z e d in that a foot mem-
ber (11) is provided on the inner end of the carrier lever
(2), said foot member having two or more laterally pro-
jecting, deformable attachment flaps (12, 13, 14).
25
14. A carrier lever according to claim 13, c h a r a c -
t e r i z e d in that the foot member (11) is divided
into inner (16) and outer (18) portions which are inter-
connected through deformable strips of material (22, 23,
30 24).
15. A carrier lever according to claim 14, wherein the
inner (16) and outer (18) portions of the foot member are
ring-shaped, c h a r a c t e r i z e d in that the con-
35 necting strips (22, 23, 24) extend substantially periphe-
rally between the two rings.

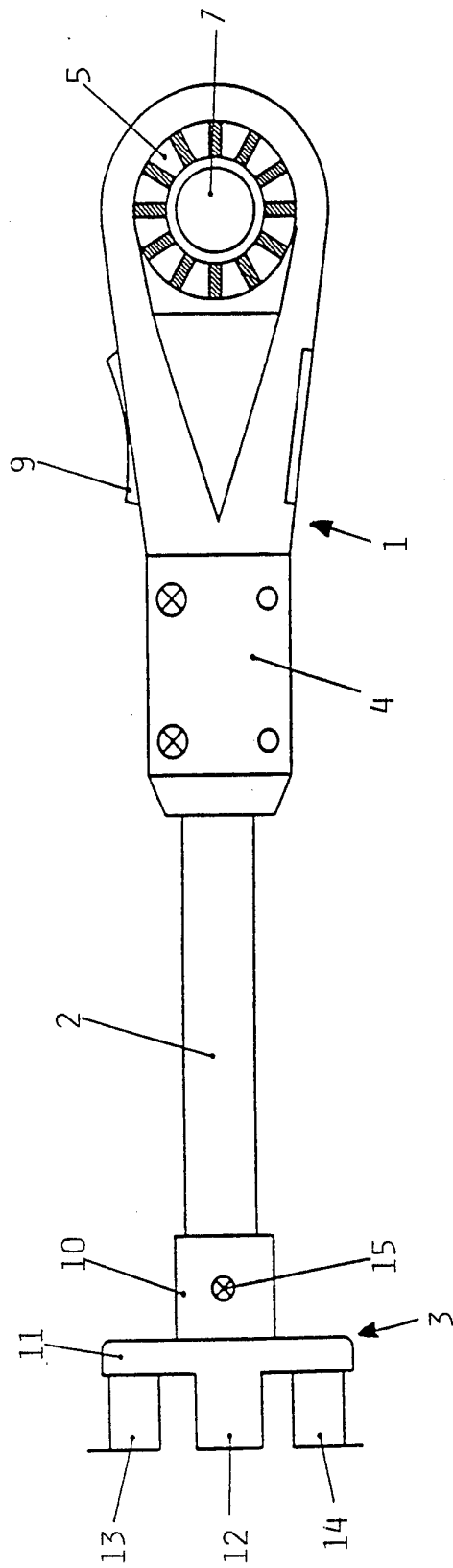


Fig. 1A

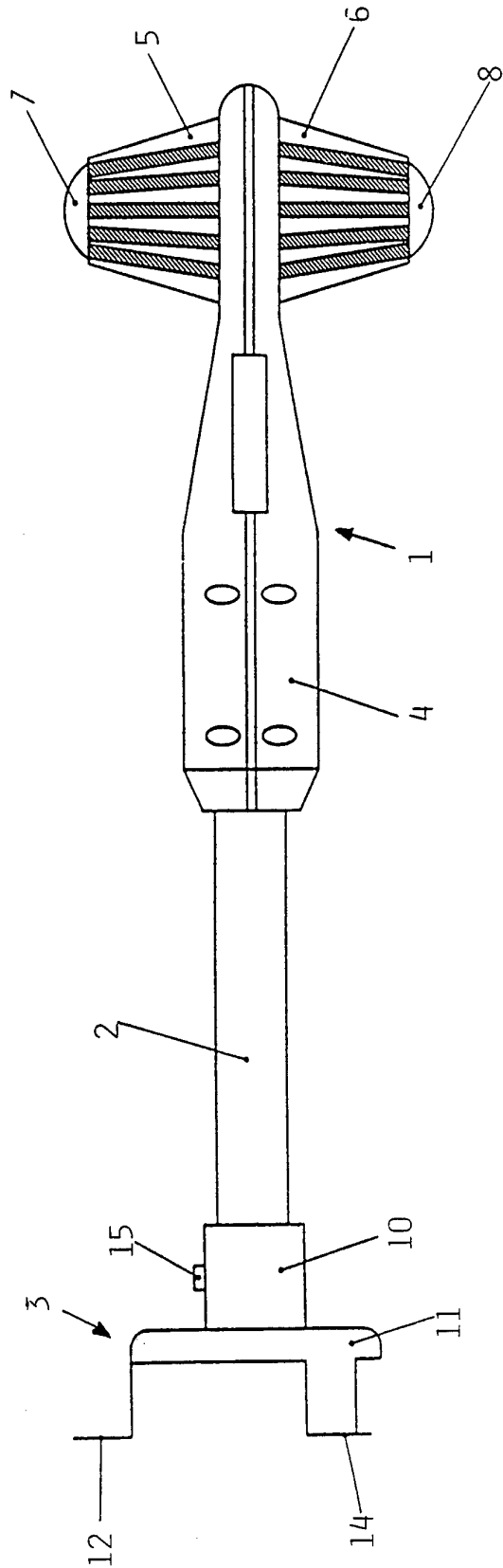


Fig. 1B

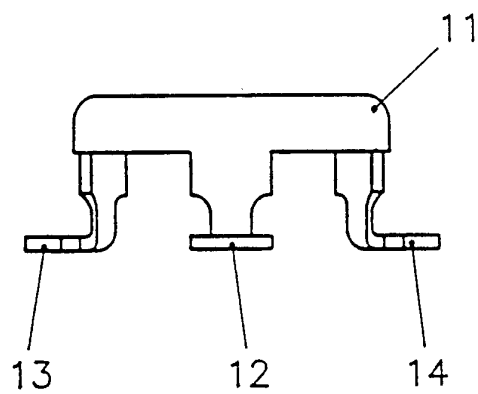


Fig. 2A

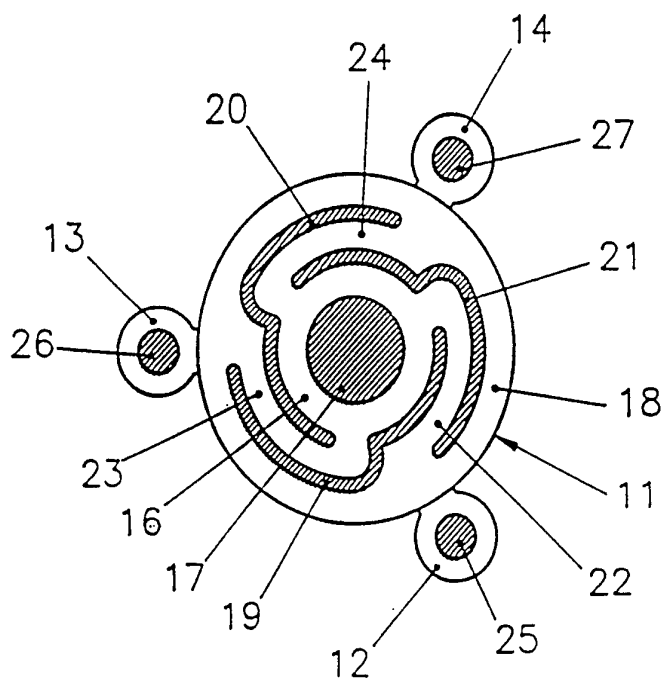
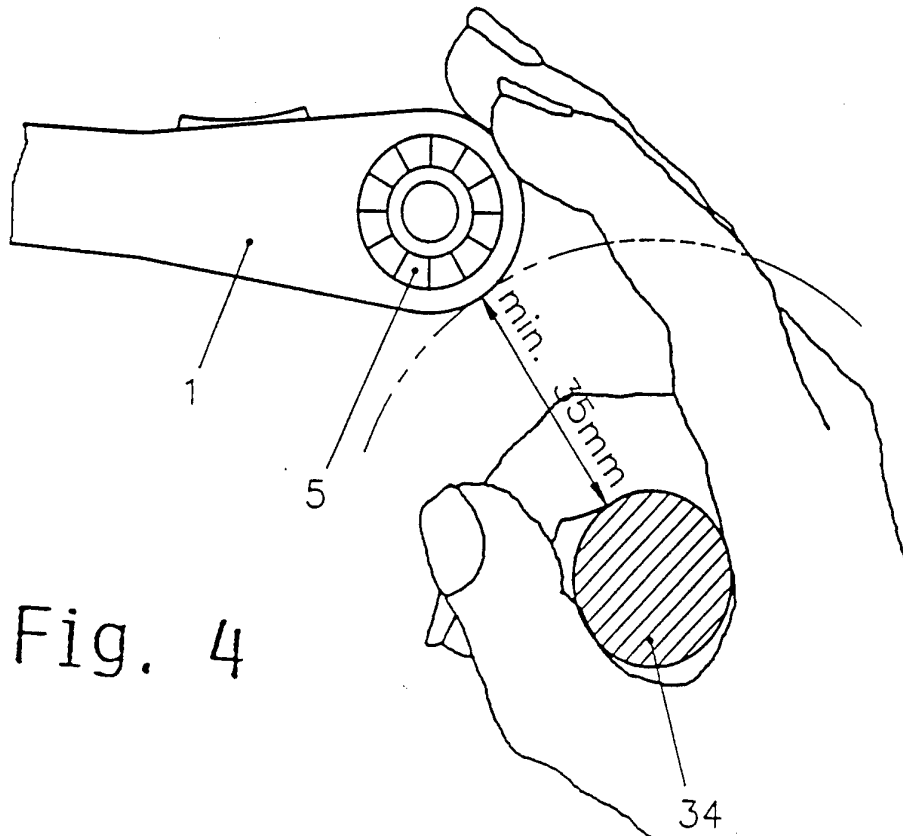
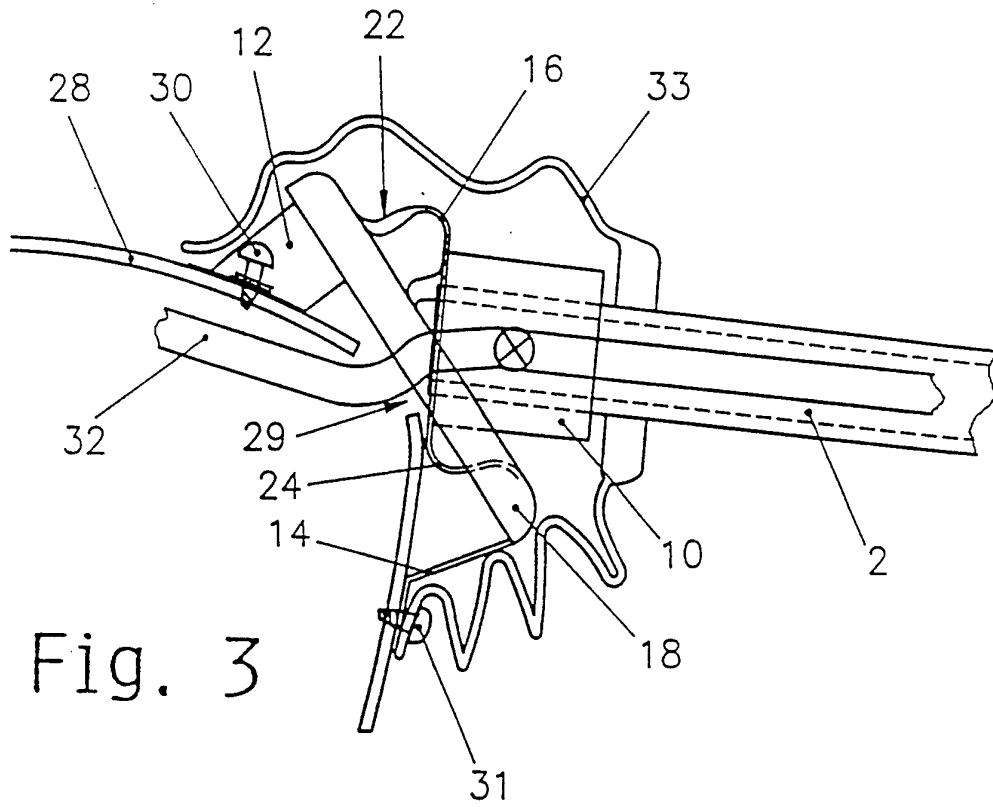


Fig. 2B

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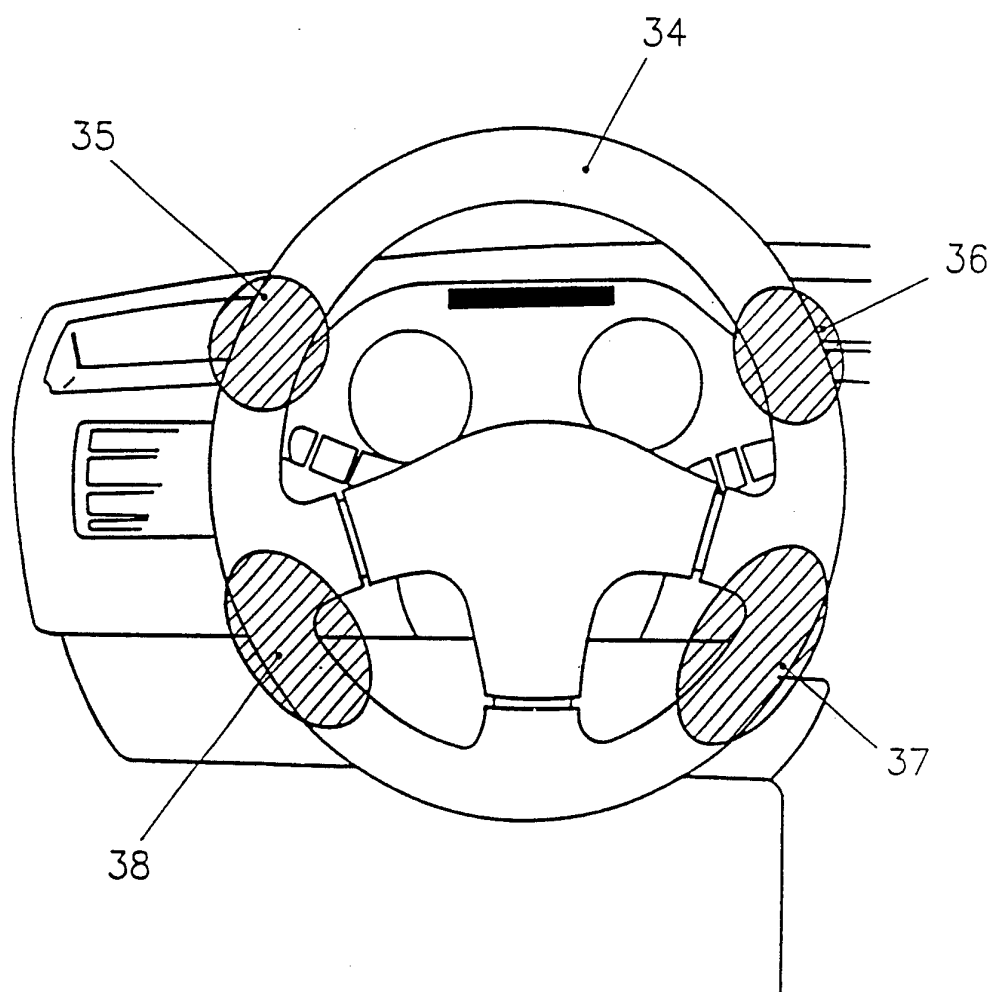


Fig. 5

5/5

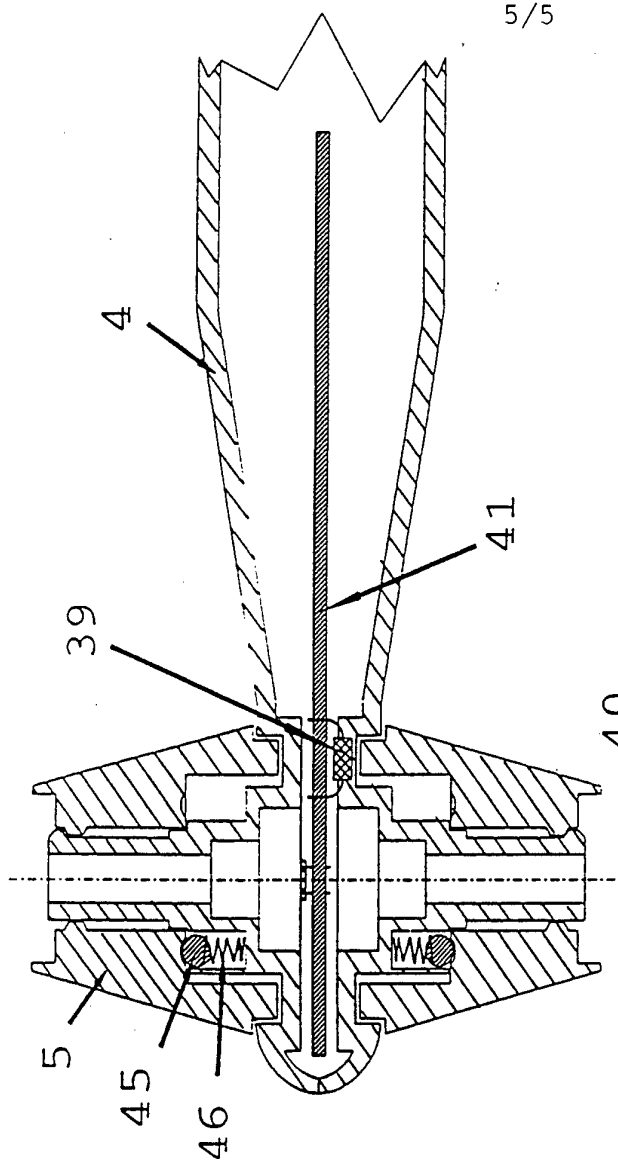


Fig. 6A

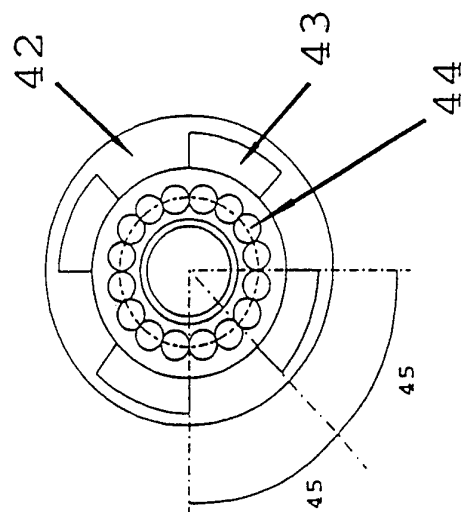


Fig. 6B

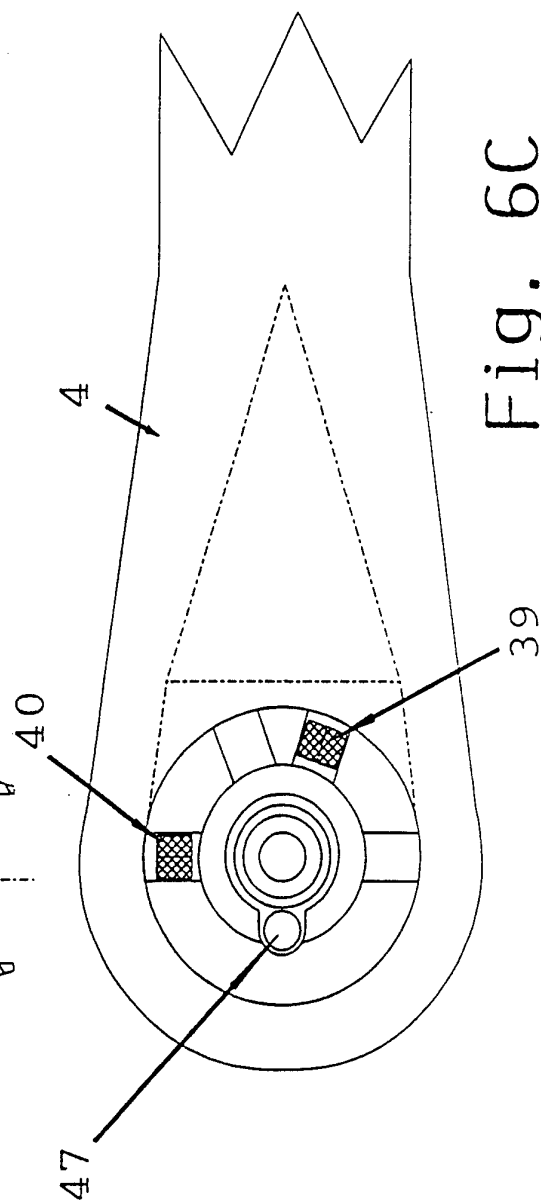


Fig. 6C

INTERNATIONAL SEARCH REPORT

International application No.

PCT/DK 93/00269

A. CLASSIFICATION OF SUBJECT MATTER		
IPC5: H04M 1/02, H04M 1/23 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
IPC5: H04M, B60R		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
SE,DK,FI,NO classes as above		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 5086510 (C. GUENTHER ET AL), 4 February 1992 (04.02.92), column 4, line 47 - column 5, line 47; column 11, line 61 - column 12, line 16; column 16, line 27 - line 39, figures 1,4-7,10 --	1,6-10
Y	US, A, 4868862 (K.RYOICHI ET AL), 19 Sept 1989 (19.09.89), column 2, line 23 - line 45; column 9, line 16 - line 33, figures 11-15 --	1,6-10
A	US, A, 4723265 (A.KAMEI ET AL), 2 February 1988 (02.02.88), column 1, line 29 - column 2, line 31, figures 1-3 --	1-15
☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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A	US, A, 4455454 (K.UMEBAYASHI), 19 June 1984 (19.06.84), figures 1a-1b,2b, abstract --	1-15
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Information on patent family members

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