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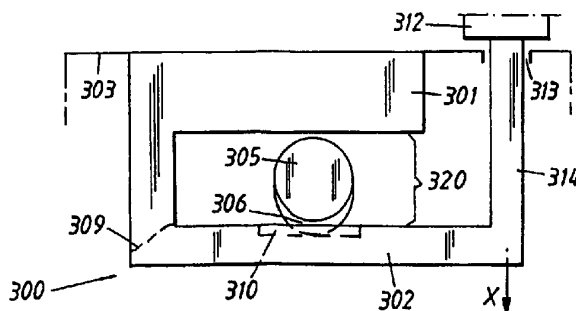


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(54) Title: ARRANGEMENT RELATING TO MECHANICALLY INTERLOCKING DEVICES



(57) Abstract

It is shown a locking arrangement at a portable device such as a telephone terminal. The device comprises a main body (303) and a movable protruding member such as a flip-lid. The protruding member is switchable between at least a first position and a second position with respect to the main body. The locking arrangement comprises a plunger unit (305) and a lock and release unit (300) with a fixed part (301) and a resilient part (302). The resilient part (302) is resilient along at least one direction of resilience (X) away from the fixed part (301). The plunger unit (305) is switchable, along a direction of insertion and retraction, between a disengaged position and an engaged position between the fixed part (301) and the resilient part (302).

**TITLE OF THE INVENTION**

ARRANGEMENT RELATING TO MECHANICALLY INTERLOCKING DEVICES

**TECHNICAL FIELD OF THE INVENTION**

The present invention relates to mechanical locking  
5 arrangements for enabling mechanical interlocking between  
two devices, in particular to locking arrangements that  
comprise a plunger unit and a lock and release unit.

**DESCRIPTION OF RELATED ART**

The technical evolution, in terms of features such as weight  
10 and size, in the field of portable mobile telephone terminals  
has reached a point where physiognomic considerations  
must be made. Limitations in terms of size of previous  
generations of mobile terminals were dictated by the size of  
the components of the terminal, not least the size of the  
15 battery pack. Present day terminals, on the other hand,  
comprise a small number of highly integrated low-power  
circuits that easily fit inside a palm-sized unit. In fact  
the dimensions of the smaller among the recently developed  
terminals are such that the distance between the loudspeaker  
20 and the microphone has become an important design factor. In  
order to further miniaturize the terminals, while still  
enabling a proper alignment between the loudspeaker/micro-  
phone and the ear/mouth of the user, mechanical solutions  
such as foldable lids and arms comprising a microphone or a  
25 speaker have become commonplace.

A problem relating to foldable and flip-lid equipped  
portable terminals, and in fact to any portable device that  
comprises protruding members that are attached by e.g. a

hinge unit and are capable of being folded between different positions in relation to a main housing of the device, is how to enable single action lock and single action release of the protruding member.

An example of the state of the art in this respect is disclosed in US-  
 5 5327584 where it is shown a portable radio with a cover release mechanism. Several separate parts act together to form the cover release mechanism: an engaging portion with a hole, a locking plate operated upon by an operating portion, a wire spring mounted on a stopper. Needless to say, by the mere fact that it comprises a multitude of sub-parts, this mechanism is relatively  
 10 complicated in terms of both assembly and manufacture.

Another example of locking arrangements is to be found in UK patent application GB-2106977. A vanity case comprising a receptacle and a cover member has an arrangement for enabling snap engagement between the receptacle and the cover member. The snap engagement and disengagement  
 15 are accomplished by applying force between two resilient latch tongues, one comprised in the cover member and one being part of the receptacle. The force is applied via a separate slider element.

Any discussion of documents, devices, acts or knowledge in this specification is included to explain the context of the invention. It should not be  
 20 taken as an admission that any of the material formed part of the prior art base or the common general knowledge in the relevant art in Australia on or before the priority date of the claims herein.

#### **SUMMARY OF THE INVENTION**

A problem the present invention seeks to alleviate is how to enable one-  
 25 hand single action lock and one-hand single action release of a protruding member such as e.g. a flip-lid of a portable communication device.

Another problem the present invention seeks to alleviate is how to enable single action lock and release of the protruding member, while utilizing a minimum number of components.

30 An object of the present invention is to alleviate the problems as stated above.

In accordance with a first aspect of the invention there is provided a locking arrangement for a portable device, said device including a main body and



a movable protruding member, said protruding member being moveable between at least a first position and a second position with respect to the main body, said locking arrangement including a plunger unit, a lock and a release unit;

the lock and release unit includes a fixed part and a resilient part;

5 the resilient part having at least one direction of resilience away from the fixed part;

the plunger unit is moveable, along a direction of insertion and retraction, between a disengaged position and an engaged position between the fixed part and the resilient part of the lock and release unit;

10 characterized in that the lock and release unit also includes an actuating part for enabling actuation of the resilient part along the direction of resilience which direction is mainly perpendicular to the direction of insertion and retraction.

In accordance with a second aspect of the invention there is provided a portable communication device including a main body and a flip-lid attached to  
15 the main body with a hinge unit said flip-lid being moveable between at least a first position and a second position with respect to the main body, said device also including a locking arrangement including a plunger unit and a lock and release unit, characterized in that

the lock and release unit, includes a fixed part and a resilient part;

20 the resilient part having at least one direction of resilience away from the fixed part;

the plunger unit is moveable, along a direction of insertion and retraction, between a disengaged position and an engaged position between the fixed part , and the resilient part, of the lock and release unit, characterized in that the lock  
25 and release unit also includes an actuating part, for enabling actuation of the resilient part along the direction of resilience, which direction is mainly perpendicular to the direction of insertion and retraction.

An advantage of the present invention is that only a small motion, e.g. a hand action, is required by a user of the invention in order to engage and  
30 disengage the plunger unit to and from the lock and release unit and thus releasing the protruding member from the main body of the device.

Another advantage of the present invention is that, by the fact that the lock release unit can be produced in one



single unit, the complexity, and hence also the cost, relating to manufacture and assembly onto the device is low.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Figures 1a-c show two schematic side views and a cross-sectional view of a first embodiment of a locking arrangement.

Figures 2a-c show one schematic side view and two cross-sectional views of a second embodiment of a locking arrangement.

Figure 3 shows a schematic side view of a third embodiment of a locking arrangement.

Figure 4 shows a schematic side view of a fourth embodiment of a locking arrangement.

Figure 5 shows a schematic perspective view of a portable telephone with a flip-lid.

Figures 6a-c show three schematic side views of a plunger unit.

Figures 7a-b show two schematic perspective views of a lock and release unit attached to a housing of a device.

#### DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

A first preferred embodiment of a locking arrangement according to the invention, showing the general function of locking a member 104 to a main body 103, is illustrated in figures 1a, 1b and 1c. The arrangement comprises a lock and release unit 100 and a plunger 105.

A first side view is shown in figure 1a where the lock and release unit 100 is attached to the main body 103. The particular properties of the main body 103 are outside the scope of the invention, although a typical main body 103 may be a portable device such as a telephone as will be further exemplified below. Furthermore, the attachment of the lock and release device 100 to the main body 103 is also outside the scope of the invention and is hence not explained in further detail in connection with figures 1a-c.

10 The lock and release device 100 comprises an elongated fixed part 101, which is attached to the main body 103, and an elongated resilient part 102. The resilient part 102 is resilient along a direction X away from the fixed part 101 creating a gap 120 having varying extent between the fixed  
15 and resilient parts 101,102.

A delimiting line 109 has been indicated in the figure in order to illustrate roughly where the resilient part 102 and the fixed part 101 of the lock and release unit 100 transit into each other. The delimiting line 109 is not an  
20 illustration of where the two parts 101,102 attach to each other, thus implicating a necessity of two seaparate parts. Rather, the delimiting line 109 is simply an indication of the fact that the lock and release unit 100 may be in the form of one single unit as well as being formed of two  
25 separate parts joined together.

The actual resilience of the resilient part 102 is obtained according to characteristics such as physical properties of the material of the part. It is known in the art how to obtain suitable resilient properties and it will hence not  
30 be discussed in detail. However, it is obvious that a

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plastic material manufactured by e.g. a process of injection molding is a reasonable choice. Nevertheless, other materials such as metals or even wood may be suitable depending on the application.

5

With reference to figures 1b and 1c, an elongated plunger unit 105 having a notch 106 and a tapered end 107 is attached to the member 104. The member 104 is to be locked to the main body 103 by means of the locking  
10 arrangement comprising the plunger unit 105 and the lock and release unit 100. Examples of members 104 having specific characteristics will be discussed below in connection with other embodiments of the invention.

15 The plunger unit 105 is in figures 1a-c located within the gap 120 between the resilient part 102 and the fixed part 101 locking the member 104 to the main body 103. The locking is effectuated by moving the plunger 105 with its tapered end 107 along a direction Y, forcing the  
20 resilient part 102 along direction X, forcing the resilient part 102 along direction X widening the gap 120 until the notch 106 catches the resilient part 102 which retracts backwards against the direction X. The notch 106 comprises a slanted edge 108 along which the resilient  
25 part 102 slides when retracting. The direction X is mainly perpendicular to the direction y. This is also the case in the other following embodiments of the invention.

By forcing the member 104 with the attached plunger 105  
30 backwards along the direction Y the member 104 may be unlocked from the main body 103. Such a backwards motion will entail the resilient part 102 sliding against the slanted edge 108 of the notch 106 and hence bring about a motion of the resilient part 102 towards the direction X,  
35 widening the gap 120 towards the direction X, widening the gap 120. Further backward motion of the member



104 and plunger 105 will result in an unlocking of the plunger from the lock and release unit 100.

A second embodiment according to the invention is disclosed in figures 2a-c. As in the previous example, a lock and  
5 release unit 200 comprising a fixed part 201 and a resilient part 202 is attached to a main body 203 of e.g. a portable device. In a typical example of an implementation, the main body 203 may be a mobile telephone terminal. In such a case the main body 203 would correspond to a housing of such a  
10 telephone terminal.

Both the fixed part 201 and the resilient part 202 are elongated and are forming a single unit. A dashed line 209 indicates roughly where a transition between the two parts 201,202 is located. The resilient part 202 is resilient  
15 along a direction X away from the fixed part 201 creating a gap 220 having varying extent. Attached to, or rather forming an integrated part of, the resilient part 202 is an actuating part 212. The actuating part 212 extends through a hole 213 in the main body 203 making it accessible from  
20 without.

Also, as in the previous example, an elongated plunger unit 205 having a notch 206 and a tapered end 207 is attached to a member 204. The member 204 is to be locked to the main body 203 by means of the locking arrangement comprising the  
25 plunger unit 205 and the lock and release unit 200. A typical example of a member 204 may be a flip-lid at a mobile telephone terminal.

The plunger unit 205 is located within the gap 220 between the resilient part 202 and the fixed part 201 locking the member 204 to the main body 203.

As in the example shown in connection with figures 1a-c, the locking and unlocking is effectuated by moving the plunger 205 along a direction Y, forcing the resilient part 202 along direction X widening the gap 220 until the notch 206 catches a slanted edge 211 of a notch 210 in the resilient part 201. The notch 206 in the plunger also comprises a slanted edge 208 along which the resilient part 202 slides when retracting.

The member 204 with the attached plunger 205 is unlocked from the main body by a pulling force applied backwards along the direction Y. A backwards motion resulting from such a force will entail the slanted edge 211 of the notch 210 in the resilient part 202 sliding against the slanted edge 208 of the notch 206 and hence bring about a motion of the resilient part 202 towards the direction X, widening the gap 220. Further backward motion of the member 204 and plunger 205 will result in an unlocking of the plunger 205 from the lock and release unit 200. The pulling force needed to release the plunger 205 from the locked position depends of course on the sizes and physical characteristics of the parts involved. By also applying a force upon the resilient part 202 along the direction X the unlocking action may be facilitated. Such a force may be applied via the actuating part 212. In fact both the locking action and the unlocking action may be facilitated by way of applying a force upon the actuating part 212 along the direction X.

A further embodiment of a locking arrangement 300 is schematically disclosed in figure 3. As in previous examples, a fixed part 301 is attached to a main body 303 such as a housing of a telephone terminal. The fixed part 5 301 transfer to a resilient part 302 at a location indicated by a dashed line 309. The resilient part 302 is resilient along a direction X and is capable of being dislocated forwards and backwards along the direction X via an actuating part 312. The actuating part 312 forms part of an 10 end of an actuating arm 314 which is elongated along the direction X and attached to the resilient part 302. The actuating arm 314 extends through a hole 313 in the main body 303 in more or less the same manner as in the previous example.

15 Figure 3 also shows a plunger 305 having a notch 306 which is capable of being engaged into a locked position and disengaged from the locked position as shown in the examples above.

Yet another example of a locking arrangement 400 is 20 schematically disclosed in figure 4. A fixed part 401 is attached to a main body 403. The fixed part 401 transfer to a resilient part 402 which is resilient along a direction X. In a gap 420 between the fixed part 401 and the resilient part 402 is a plunger 405 with a notch 406 located. This 25 example is merely to illustrate yet a different shape of the parts, as e.g. the rectangular cross-section of the plunger 405 seen in the figure.

Figures 5, 6a-c and 7a-b show yet another illustration of a preferred embodiment of the present invention. A mobile 30 telephone terminal 500 comprises a main body in the form of

a housing 503 to which is attached a flip-lid 520. As is known in the art the terminal comprises means for communicating in a telecommunication network. In the housing 503 is located a display 524, keys 525 and a loudspeaker 523 and in the flip-lid 520 a microphone.

The flip-lid 520 is capable of being rotated from an open position to a closed position covering the keys 525 around an axis R by means of a hinge mechanism 521. Although not shown in figure 5, the hinge mechanism 521 may comprise means for spring-loading the lid 520 when in the closed position against the housing 503. The flip-lid 520 is in figure 5 shown in the open position.

In order to enable the lid to be engaged and disengaged to and from the closed and open positions respectively, the terminal 500 comprises a locking arrangement according to the present invention. A plunger unit 505 is attached to the flip-lid 520 and a lock and release unit (700 in figure 7a) is attached inside the housing 503. A hole 513 in the housing 503 allows access for the plunger 505 to the lock and release unit (700 in figure 7a).

Figures 6a-c show three side views of a plunger 605 such as the plunger 505 shown attached to the flip-lid 520 in figure 5. The plunger has a tapered end 607 and a notch 606 with a slanted edge 608, generally of the same shape as the plungers 105,205 shown in previous examples. Although the plunger 605 is shown to be a separate part detached from any flip-lid etc, it is understood that the plunger 605 may be an integral part of the flip-lid (520 in figure 5).

Figures 7a and 7b show in some detail a lock and release unit 700 which is attached to the inside of a housing 703, corresponding to the housing 503 in figure 5. A fixed part 701, a resilient part 702 and an actuating arm 714 with an actuating part 712. Similar to previous examples, the resilient part 702 has a direction of resilience X away from the fixed part 701 which enables a gap 720 between the two parts to become wider when a force is applied along the direction X on the actuating part 712. The fixed part 701 is attached to the inside of the housing 703 by means of knobs 717 protruding from the housing 703 and engaging the fixed part 701 via an opening 716.

A tip 707 of a plunger (505 in figure 5, 605 in figure 6a-c) having a tapered end 707 is engaged in a notch 708 in the resilient part 702 in the same manner as disclosed in previous examples above. By applying a force along the direction X on the actuating part 712 protruding out from the housing 703 through a hole 713, the gap 720 widens and the plunger is detached from the engaged position.

The above examples above show implementations of the invention where a plunger is attached to a protruding member and a lock and release unit is attached to a main body of a device. However, other embodiments where a plunger is attached to a main body and a lock and release unit is attached to a protruding member are, needless to say, also feasible.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. Locking arrangement for a portable device, said device including a main body and a movable protruding member, said protruding member being moveable between at least a first position and a second position with respect to the main body, said locking arrangement including a plunger unit, a lock and a release unit;  
the lock and release unit includes a fixed part and a resilient part;  
the resilient part having at least one direction of resilience away from the fixed part;  
the plunger unit is moveable, along a direction of insertion and retraction, between a disengaged position and an engaged position between the fixed part and the resilient part of the lock and release unit;  
characterized in that the lock and release unit also includes an actuating part for enabling actuation of the resilient part along the direction of resilience which direction is mainly perpendicular to the direction of insertion and retraction.
2. Locking arrangement according to claim 1, characterized in that the plunger unit is attached to the protruding member and the lock and release unit is by the fixed part attached to the main body of the device.
3. Locking arrangement according to claim 1, characterized in that the plunger unit is attached to the main body of the device and the lock and release unit is attached by the fixed part to the protruding member.
4. Locking arrangement according to any one of claim 1-3, characterized in an actuating arm is elongated along said direction of resilience and attached to the resilient part for facilitating a locking action or an unlocking action by way of applying a force upon the actuating arm along said direction of resilience.
5. Locking arrangement according to claim 4, characterized in that the actuating part forms an extension of the resilient part of the lock and release unit.
6. Locking arrangement according to any one of claims 1-5, characterized in that the lock and release unit is in the form of a single unit.



7. Locking arrangement according to any one of claims 1-5, characterized in that the lock and release unit is in the form of at least two separate parts that are joined together.

8. Locking arrangement according to any one of claims 1-7, characterized in that the resilient part and the fixed part of the lock and release unit are both on the whole elongated in shape and are joined together at one of their respective ends.

9. Locking arrangement according to any one of claims 1-8, characterized in that the plunger unit has a tapered end for enabling easy separation of the resilient part, of the lock and release unit, from the fixed part, when the plunger unit, is inserted along the direction of insertion and retraction into the engaged position.

10. Locking arrangement according to any one of claims 1-9, characterized in that the plunger unit has a notch for locking the plunger unit in the engaged position.

11. Locking arrangement according to claim 10, characterized in that the notch includes a slanted edge where the direction of slant is in respect of the direction of insertion and retraction.

12. Locking arrangement according to any one of claims 10-11, characterized in that the lock and release unit has a notch for engaging the plunger notch in the engaged position.

13. Locking arrangement according to claim 12, characterized in that the notch of the lock and release unit includes a slanted edge where the direction of slant is in respect of the direction of insertion and retraction.

14. Locking arrangement according to any one of claims 12-13, characterized in that the notch of the lock and release unit is in the resilient part.



15. Portable communication device including a main body and a flip-lid attached to the main body with a hinge unit, said flip-lid being moveable between at least a first position and a second position with respect to the main body, said device also including a locking arrangement including a plunger unit and a lock and release unit, characterized in that

the lock and release unit, includes a fixed part and a resilient part;

the resilient part having at least one direction of resilience away from the fixed part;

the plunger unit is moveable, along a direction of insertion and retraction, between a disengaged position and an engaged position between the fixed part, and the resilient part, of the lock and release unit, characterized in that the lock and release unit also includes an actuating part, for enabling actuation of the resilient part along the direction of resilience, which direction is mainly perpendicular to the direction of insertion and retraction.

16. Portable communication device according to claim 15, characterized in that the plunger unit is attached to the flip-lid and the lock and release unit is by the fixed part attached to the main body of the device.

17. Portable communication device according to claim 15, characterized in that the plunger unit is attached to the main body of the device and the lock and release unit is attached by the fixed part to the flip-lid.

18. Portable communication device according to any one of claims 15-17, characterized in that an actuating arm is elongated along said direction of resilience and attached to the resilient part for facilitating a locking action or an unlocking action by way of applying a force upon the actuating arm along said direction of resilience.

19. Portable communication device according to claim 18, characterized in that the actuating part forms an extension of the resilient part of the lock and release unit.

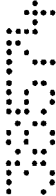




20. Portable communication device according to any one of claims 15-19, characterized in that the lock and release unit is in the form of a single unit.

21. Portable communication device according to any one of claims 15-19, characterized in that the lock and release unit is in the form of at least two separate parts that are joined together.

22. Portable communication device according to any one of claims 15-20, characterized in that the resilient part and the fixed part of the lock and release unit are both on the whole elongated in shape and are joined together at one of their respective ends.



23. Portable communication device according to any one of claims 15-22, characterized in that the plunger unit has a tapered end for enabling easy separation of the resilient part of the lock and release unit from the fixed part when the plunger unit is inserted along the direction of insertion and retraction into the engaged position.



24. Portable communication device according to any one of claims 15-23, characterized in that the plunger unit has a notch for locking the plunger unit in the engaged position.

25. Portable communication device according to claim 24, characterized in that the notch includes a slanted edge where the direction of slant is in respect of the direction of insertion and retraction.

26. Portable communication device according to any one of claims 24-25, characterized in that the lock and release unit has a notch for engaging the plunger notch in the engaged position.

27. Portable communication device according to claim 26, characterized in that the notch or the lock release unit includes a slanted edge where the direction of slant is in respect of the direction of insertion and retraction.



28. Portable communication device according to any one of claims 26-27, characterized in that the notch of the lock and release unit is in the resilient part.

29. Portable communication device according to any one of claims 15-28, characterized in that the lock and release unit is attached to an inside surface of the main body and is located near a hole in the mainbody which allows entry of the plunger when switching from the disengaged position to the engaged position.

30. A locking arrangement as claimed in claim 1 substantially as hereinbefore described with reference to the accompanying drawings.



31. A portable communication device as claimed in claim 15 substantially as hereinbefore described with reference to the accompanying drawings.

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



33. A portable communication device substantially as hereinbefore described with reference to the accompanying drawings.

**DATED** this 20th day of November 2002  
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Fig. 1a

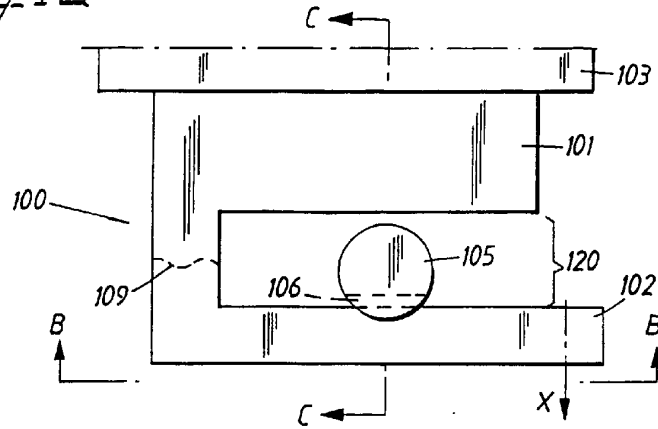
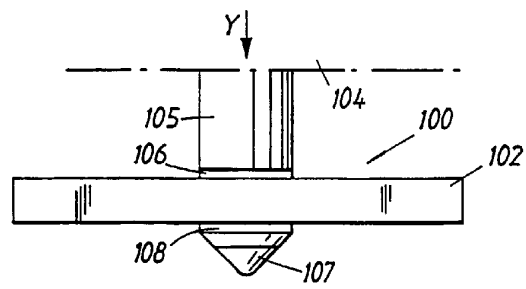
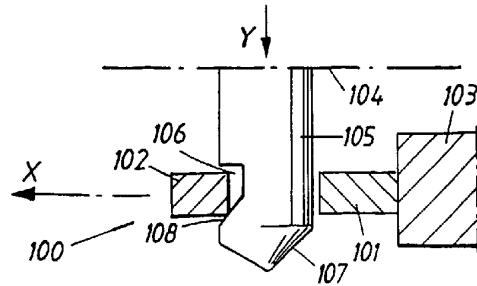
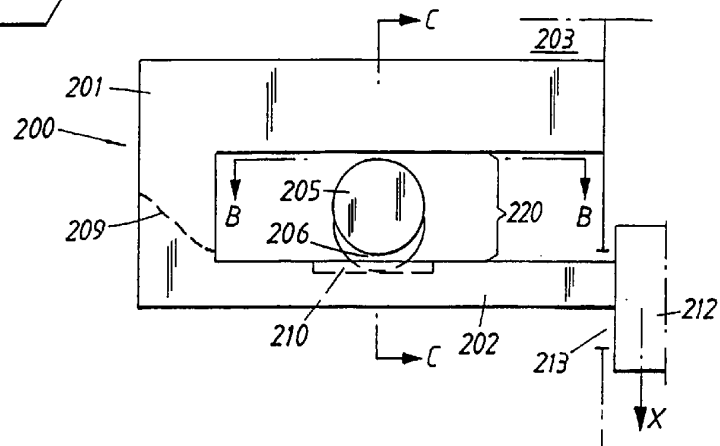
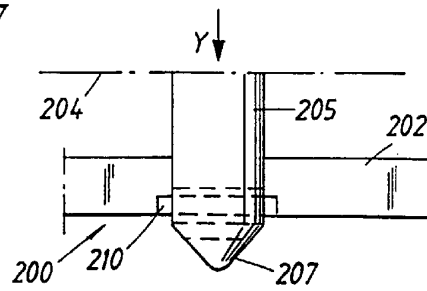
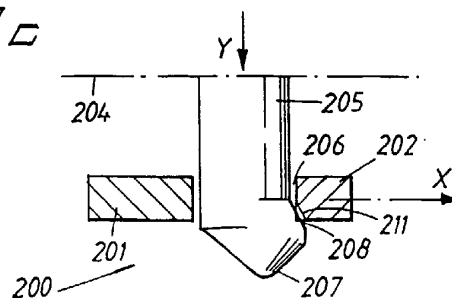
Fig. 1b  
B-BFig. 1c  
C-C

Fig. 2a

Fig. 2b  
B-BFig. 2c  
C-C

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Fig. 3

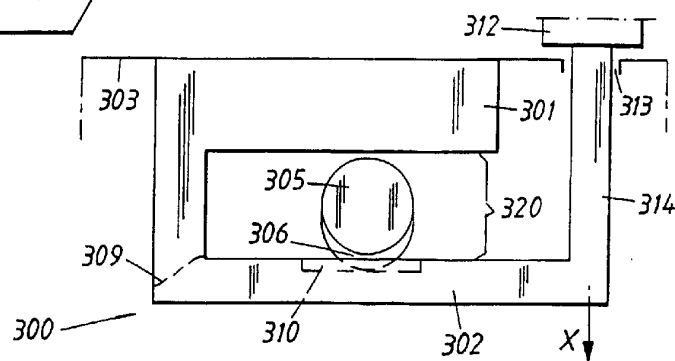


Fig. 4

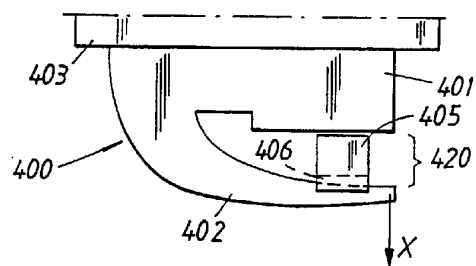
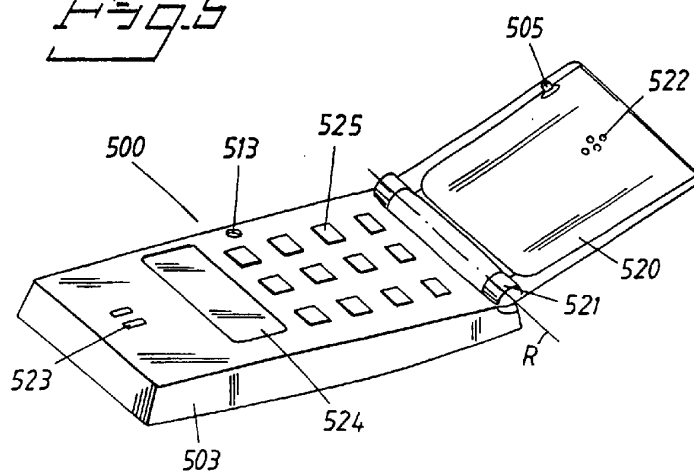
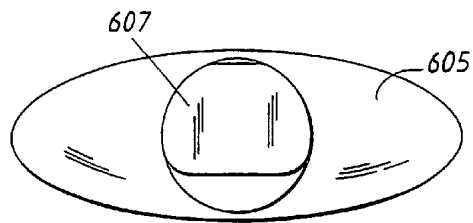


Fig. 5



*Fig. 6a*



*Fig. 6b*

*Fig. 6c*

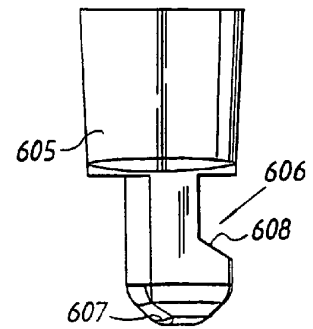
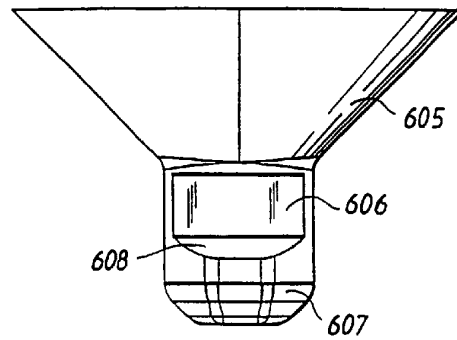


Fig. 7a

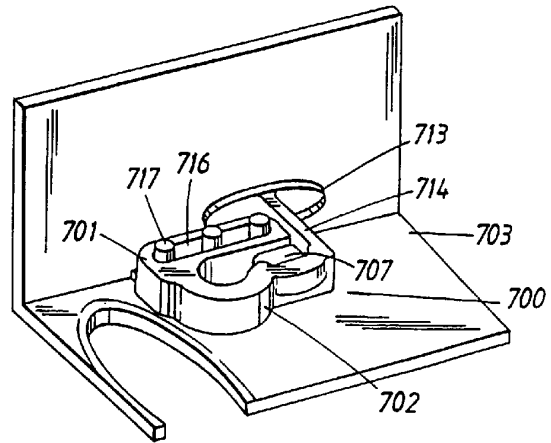


Fig. 7b

