

A POINTING DEVICE FOR A COMPUTER

The present invention relates to a pointing device for input of screen cursor positioning commands or the like to a computer and of the type mentioned in the introductory part of claim 1. Such a unit is generally and in the following named a "trackball". It is used for the same purpose as - and as an alternative to - a so-called "mouse" which is moved on a pad to give pointing signals for the computer.

The anatomic designations used in the following correspond to the Danish designations in "Bevægeapparaters Anatomi" (in English: *The Anatomy of the Locomotive Apparatus*) by Erik Andreasen, Gyldendal, Copenhagen 1966.

It is generally known that the use of in particular a mouse but also of trackballs may cause serious inconveniences to the user and, to exposed users, even actual industrial injury, such as a tennis elbow, the rotator cuff syndrome and carpal tunnel syndrome. These injuries are together called RSI (Repetitive Strain Injury). These diseases and the aspects of the use of pointing devices causing the diseases are among other briefly described in the publication by Lone Winther: "Pas på musefælder" (in English: *Watch out for mouse traps*), Finanssektorens Arbejdsgiverforening og Finansforbundet, Copenhagen 1995.

It is thus among other stated that the hand in its natural position of rest with the forearm resting on a table is turned such that the ulnar margin (little finger edge) rests downwards against the table and the palm is lifted 45° from the horizontal plane. In this position the two forearm bones - spoke bone (radius) and elbow bone (ulna) - lie parallel and thus not twisted at all. Furthermore, the hand is partially

closed (cup-shaped) and the thumb points towards the other fingers and is aligned with the wrist (*carpus*). This position should allegedly be taken during work with the pointing device.

5 It is further stated that provisions should be made for variations in the working posture, as much and as often as possible during work with the pointing device. The wrist must not be bent backward when using the pointing device as this can cause the carpal tunnel
10 syndrome. The wrist being bent backwards should not be prevented by using a wrist supporting device as this entails an unfortunate pressure against the underside of the wrist. The hand should not be constantly bent inwards with a horizontal palm as when working with
15 many known mouses, or constantly bent outwards with vertical palm as when working with a joystick. Occupation-related diseases of the same kind as mouse injuries (RSI) are known from pilots who control aircrafts by means of joysticks.

20 Finally, it is stated that the carpometacarpal joint of the thumb (*articulatio carpometacarpea prima*) - which is a saddle joint with a large mobility - will not stand loads in its extreme positions, i.e. with the thumb drawn away from or bent inwards towards the other
25 fingers.

A pointing device of the initially stated kind is known and marketed by the firm Logitech under the name "TrackMan Marble", see e.g. the brochure from said firm "Enter Cyberspace" (Nordic Version), Logitech S.A.,
30 1122 Romanel, CH, n.d.

By this device, the hand lies stretched and only slightly bent over the pointing device. The wrist is forced backwards which as stated is injurious. During the abutment of the hand on the pointing device, the
35 first phalanx (*phalanx proximalis*) of the index finger

will be placed quite close to the ball whereby the pulp (pulpa) of the thumb will have its working area correspondingly close to the metacarpophalangeal joint of the index finger when using the ball. This requires
5 that the carpometacarpal joint of the thumb (*articulatio carpometacarpea prima*) is constantly deflected until close to its inner limit which as stated also is injurious.

At the Internet address <http://www.globalsl.com/star1.html>, a description of a wireless trackball "Startrack" from the firm Zen Technology is published. In this trackball, the ball is on the top side of an elongated apparatus of the form and size as a remote control for a television set or the like. This appar-
15 atus must be encompassed or carried by the four fingers of the hand whereby the palm will face sideways or even upwards or obliquely upwards. However, the forearm is thus twisted so that the spoke bone and the elbow bone are crossed, this position is fatiguing and as
20 stated injurious by constant use.

In the article "Styrebind i F16-fly forbillede for ny type mus" (in English: *Joystick in F16 airplanes serves as model for a new type of mouse*) in the magazine "ComputerWorld" no. 14/97 page 48, Copenhagen 18
25 April 1997, a mouse with the name ANIR for a computer is described where the abutment faces for the user hand are designed as a generally known "joystick", whereby the hand takes up a closed position when using the mouse, with the thumb edge (radial margin) of the palm
30 facing upwards and the pulp of the thumb resting on a mouse knob on the upper end face of the joystick. As on known joysticks, an abutment face is provided below on which the little finger edge (ulnar margin) rests and on the underside of this face a conventional mouse ball
35 is journalled. The entire hand and the forearm are thus

moved across the working face when commands are to be given to the computer.

The inconvenience of this mouse is that there are no possibilities for using the fine movement
5 coordination skills of the hand and the fingers; all fine coordination movements must be carried out with the entire forearm which is both difficult and may cause tensions, especially in the shoulder joint (*articulatio humeri*). Besides, it is unfortunate when
10 the forearm is twisted about 45° away from its neutral position.

The object of the invention is to provide a pointing device of the initially stated kind where the said inconveniences are avoided and where the user's
15 hand in a main position of use occupies a natural, partly closed neutral position with straight wrist (*carpus*) and with abutment for the entire hand against the pointing device. A further object of the invention is to provide a pointing device which can be operated
20 without being supported and which provides the user with the possibility of working standing up and/or moving around when working with the device.

This is obtained by the features in the characterizing part of claim 1. .

25 By letting the hand occupy a partly closed position, it is achieved that the fingers take up a natural grasping position when they are to activate the controls of the pointing device and thus not being forced to work in extreme positions - the fingers need in particular not be bent backwards from the mouse knobs when
30 these are not used - and the hand is enabled to "grasp itself on to" the pointing device. The fact that the entire hand is in abutment against the pointing device results partly in a high friction between the pointing
35 device and the hand and in that the hand finds a

natural rest on the pointing device as no part of the hand must fixed "in free air". The hand being able to stick to the pointing device and there being, as stated, a high friction between the pointing device and
5 the hand, assures that the wrist does not tend to lower against the working surface and thus bend backwards which as said initially is extremely injurious.

The fact that the handle means at the little finger side (ulnar side) of the hand protrudes from an
10 essentially plane surface (the second abutment faces) permits that the pointing device used without rest on a supporting face (i.e. held freely in air) is by itself kept in place in the hand as the fingers - and in particular the little finger - in a relaxed and par-
15 tially closed position can retain the pointing device in a safe way.

By the features in claim 2, it is obtained that the elbow bone (ulna) and spoke bone (radius) of the forearm do not occupy a more or less entwined position
20 but the very neutral position described above. Furthermore, an increased security against backward bending of the wrist is obtained as under these circumstances, gravity acts in a more oblique angle in relation to the main rotational axis (flexion axis).

25 By the features in claim 3, it is obtained that the hand is supported against the tendency caused by gravity to slide down from the oblique angle stated in claim 2. Furthermore, the area of the hand surface abutting against faces on the pointing device is
30 increased, and thus the relaxation of the hand is furthered. Besides, the user is permitted to let the pointing device hang in his hand, while the forearm hangs downwards, relaxed. Experiments have shown that the pointing device so to speak "hangs by itself" in
35 the hand, when the little finger is merely kept arched,

for which thanks to the design described in claim 3 a quite small force is required, which of course is in accordance with the natural grasping movement of the little finger.

5 By the features in claim 4, it is obtained that the pointing device can be erected such that the handle means occupies an alternative oblique position pointing forward whereas the weight of the hand rests on the second abutment surfaces. The working position of the
10 hand is thus changed which implies a desirable variation in the user's working conditions.

By the features in claim 5, it is obtained that the pointing device can be tilted further forwards whereby the handle means occupies yet another alternative, oblique position pointing forwards, said position
15 being even continuously variable in all directions and variable during use.

By the features in claims 6 and 7, it is obtained that the hand and fingers are bent at an optimum during
20 the use which assures said neutral position of rest.

By the features in claim 8, it is obtained that the basic joint of the thumb (*articulatio carpometacarpea prima*) is in its neutral position during use of the pointing device whereby the very injurious loading of
25 the basic joint near its extreme positions is avoided. The hand position obtained by the measures in claim 8 corresponds nearly completely to the writing position of the hand when using traditional writing utensils. This position is ideal to avoid the initially stated
30 occupation-related diseases (RSI).

By the features in claim 9, it is obtained that the sideways movement of the thumb when operating the ball follows the working direction of the basic joint whereby simultaneous activation of the basic joint in
35 two directions is to a great extent avoided.

By the features in claim 10, it is obtained that the bending movements of the thumb in basic joint and interphalangeal joints can be kept at a non-straining level.

5 By the features in claim 11, a possibility of further alternative conditions of use is obtained as the pointing device can also be used as a traditional mouse. This can partly be convenient for the user by certain particular applications, and will partly result
10 in arm movements deviating from those made when using the pointing device only as described in claims 1-10, which can be desirable as a variation for a shorter while.

By the features in claim 12, it is obtained that
15 the push-buttons are activated in the bent position of the fingers whereby the strong grasping muscles of the fingers perform the work. It is thus avoided that the fingers have to make a pressure with the distal phalanx (*phalanx distalis*) in an extended or almost extended
20 condition which is strenuous and straining.

The invention will in the following be explained more in detail by means of an embodiment with reference to the drawings, where

Fig. 1 shows a side view of a right-hand version
25 of a pointing device according to the invention in a main position of use, seen from the thumb side,

Fig. 2 shows the pointing device in Fig. 1, seen from the end facing away from the user's arm,

Fig. 3 shows the pointing device in Fig. 1, seen
30 from the little finger side,

Fig. 4 shows the pointing device in Fig. 1, seen from the end facing the user's arm,

Fig. 5 shows the pointing device in Fig. 1, seen from below,

Fig. 6 shows the pointing device from Fig. 1, seen from above,

Fig. 7 corresponds to Fig. 1 and shows the user's hand resting on the pointing device,

5 Fig. 8 corresponds to Fig. 3 and show the user's hand resting on the pointing device,

Fig. 9 shows the pointing device resting in the user's hand hanging downwards, and

Fig. 10 shows the pointing device during use, 10 tilted up for abutment of the second bottom face against the working face in a first alternative position of use.

In all figures, the same referential designations are used for the same elements.

15 The pointing device has a handle means 6 (Figs. 1, 3-4, 6) which extends in an oblique angle in relation to a working surface 9 (the base on which the pointing device rests). The top ridge 7 of the handle means thus extends under an angle A (Figs. 3-4) of 20 about 45° with the working surface 9. As it is seen in Fig. 8, this ridge serves as abutment for the foremost edge of the palm from which the four fingers protrude. This foremost edge of the palm corresponds to the row of the four knuckles of the hand, and a line through 25 the index finger knuckle and the little finger knuckle of the hand will thus extend under a corresponding angle B with the working surface 9, cf. Fig. 8. The palm and the forearm will thus be arranged in the above described desirable neutral positions.

30 In the main position of use shown in Figs. 1-4 and 7-8, the pointing device 1 rests against a working surface 9 such as a table, with a first bottom face 3 (Figs. 5, 10) which is provided on the underside of a crest 23 (Figs. 1, 3, 5, 10) protruding from the 35 handle means 6.

The middle, ring, and little finger grasp around the handle means 6 and rest with the pulp on their distal phalanx (*phalanx distalis*) against a face 8 (Figs. 3 and 5; cf. Fig. 8) forming a finger tip 5 portion of the abutment faces against which the hand and fingers abut. The face 8 forms an angle C with the working face 9 of about 22° , see Fig. 2. Thus, the distal phalanxes of these three fingers will have a distance D of preferably 30-40 mm to the ball of the 10 thumb (thenar) 10, see Fig. 10.

The index finger grasps around along an edge 11 on a collar 12 which forms a termination of the handle means 6 at the finger side of the pointing device 1 and in the thumb end of the handle means 6, 15 see Figs. 2, 3, 6, and 8. The index finger is thus somewhat less bent than the other three fingers.

A freely rotatable ball 5 is embedded in a surface portion 13 in the pointing device 1 at the end of the handle means 6, see Figs. 1-2, 4-7 and 10, 20 and preferably near a centre axis 20 (Figs. 1, 4-6) in the handle means 6. Around the ball 5, the surface portion 13 is preferably concavely limited by edges 17 as shown in Figs. 1-2. Thus is obtained that the thumb can be put to rest on the edges 17 when the 25 ball 5 is not to be operated, e.g. in breaks or in the moment the user clicks with the push-buttons of the pointing device.

As shown in Fig. 4, the surface portion 13 has in general an angle F of about 58° with the working 30 surface 9. This angle corresponds to the angle which the purely sideways working direction (the adduction-abduction direction) for the metacarpophalangeal joint 26 of the thumb (fig. 7) has when the hand is positioned on the pointing device as described above. It is 35 thus obtained that when operating the ball 5 for

giving "sideways" commands to the computer, the metacarpophalangeal joint of the thumb must make a purely sideways movement (adduction-abduction), essentially without any contents of bending movement (flexion-extension). If the surface portion 13 had another angle, relatively many movements of the thumb should have been combined movements (with contents of both adduction/abduction and flexion/extension) which would be unnecessarily tiring for the thumb.

10 Besides, during use, the thumb is extended forwards, slightly bent and in straight extension of the wrist, see Figs. 7, 9 and 10. The ball of the thumb 10 abuts against a portion 14 of the handle means 6 which portion extends from the ball 5 against the
15 little finger end of the handle means 6, see Figs. 1, 4 and 6. As the portion 14 adjoins the edge 11 of the collar 12 along an acute-angled edge 15 (Figs. 1-2, 5-6), the thumb is being directed in a direction towards the distal phalanx (*phalanx distalis*) 16 of
20 the index finger, see Figs. 7 and 10.

The hand is thus almost closed and takes up a position which to a very high extent corresponds to the ordinary writing position when using traditional writing utensils. Maximum security against RSI (Repetitive Strain Injury) is thus obtained.
25

The handle means 6 with the back 7 and the faces 8, 11, 14 constitute together first abutment faces which form abutment for the entire palm except for the heel of the hand (*carpus*) itself and for the
30 grasping faces of the index, middle, ring and little finger in their entire extensions. The entire hand thus being supported by the pointing device 1, the best conditions for the relaxation of the hand during use of the pointing device are obtained which further improves
35 the security against RSI.

From the little finger end 18 of the handle means 6 a disc or wall 19 (Figs. 1, 3, 4, 6, 9) protrudes in an oblique angle relative to the centre axis 20 of the handle means 6. The wall 19 is approximately parallel to the collar 12 in the thumb end of the handle means. The wall 19 forms an angle α of about 130° with the working surface 9, see Fig. 4. The faces 21 facing the handle means 6 (Figs. 1-2, 4, 6) of the wall 19 form second abutment faces for the little finger edge of the intermediate portion of the hand (*metacarpus*) together with the side of the first phalanx (*phalanx proximalis*) and preferably also the middle phalanx (*phalanx media*) of the little finger facing away from the other fingers.

The wall 19 thus acts as a support for the hand against the tendency caused by gravity to slide down the sloping ridge 7 of the handle means 6. Furthermore, the area of the surface of the hand abutting against faces on the pointing device is increased and thus the relaxation of the hand is furthered. Moreover, the possibility is obtained that the pointing device 1 can hang in the user's hand while the forearm hangs down, relaxed, as shown in Fig. 9. If only the little finger is kept arched, for which thanks to the design of the handle means 6 and the wall 19 merely a quite small force is required, the pointing device hangs by itself in the hand. The user's hand is in Fig. 9 shown in an almost completely relaxed condition corresponding to the user taking a break from the work in front of the screen to relax or think; when the user resumes the data-entry from the pointing device, the grasp of the four fingers around the pointing device is tightened before the pointing device is ready for control of the ball 5 and the push-buttons.

Fig. 9 thus illustrates both that breaks for relaxation during work are possible without the user having to put aside the pointing device according to the invention, and that when working, the user can let his arm hang down relaxed in a standing as well as in a sitting posture and at the same time operate the pointing device.

On the side of the wall 19 facing away from the handle means 6, according to the invention, a second bottom face 22 (Figs. 3-4, 10) is provided approximately parallel to the second abutment faces 21. The second bottom face 22 forms an abutment against the working surface 9 when the pointing device 1 is raised to the position shown in Fig. 10. Thanks to the weight of the hand resting on the second abutment faces 21 on the inside of the wall 19, the pointing device 1 rests stably against the working surface 9 in this position and supports and retains therefore the hand in its neutral position. The forearm bones are thus twisted $\frac{1}{4}$ turn, relative to the main position of use in Figs. 7-8, and the position in Fig. 10 should thus be used only as a variation which, however, as stated initially, is very important.

On a portion 24 (Figs. 3, 5-6, 8, 10) of the edge of the wall 19 positioned opposite the middle phalanx 25 of the little finger, the edge is provided with a curved surface form, such as a ball, ellipsoid, or egg shape. The pointing device 1 can thus in a way not shown be tilted forwards from the position shown in Fig. 10, the pointing device rolling over the surface 9. In this position, the pointing device can roll freely through a considerable solid angle with the vertex approximately on the working surface 9 at the same time as the weight of the pointing device and the hand is resting on the working surface. This provides

extraordinarily good possibilities for variations of the user's hand position while working, which counteracts locking in the wrist. Experiments have shown that the user's hand is approximately in balance in very
5 large parts of the said solid angle with the shown location of the curved surface 24. The hand is thus at rest also in these alternative positions of working.

The pointing device according to the invention thus at least provides one possible main position of
10 use with an optimum position of the arm and hand, and three alternative positions of use to be used in particular cases or as variations. In a first alternative position of use, the pointing device 1 is tilted upwards such that the second bottom face 22 rests
15 against the working surface 9 (Fig. 10); in a second alternative position of use, the pointing device 1 is further tilted forwards so that the curved surface 24 rests against the working surface 9; in a third alternative position of use the user's arm hangs down,
20 relaxed (Fig. 9). In addition, the pointing device according to the invention can in a fifth way simply be held in the hand in any desired position of the device, e.g. while the hand rests in the lap or is held behind the neck. Using these many possibilities of variation
25 when working will to a very high degree counteract RSI.

The pointing device 1 according to the invention is as generally known pointing devices provided with one, two, or preferably three push-buttons, preferably operated by the index, middle and ring finger. Accord-
30 ing to the invention, the third push-button can, however, preferably be adapted for operation by both the ring and little finger (optional, or by both fingers simultaneously), as many users find it difficult to distinguish between the ring and little finger
35 when activating only one finger.

A push-button 27 for the index finger is in the shown embodiment embedded in the edge 11 of the collar 12 on which the index finger rests, see Figs. 3 and 8. Push-buttons for the remaining three said 5 fingers are not shown, but the person skilled in the art will on the basis of the here stated information be able to position these push-buttons in or at the fingertip portion 8.

According to the invention, the pointing device 10 may be manufactured with a soft, rugged, or slightly sticky surface thus assuring that the hand is supported and retained at optimum on the pointing device.

According to the invention, the ball 5 can in a way not shown be embedded in a detachable part mainly 15 comprising the surface 13, with e.g. a round or polygonal contour. This part is inserted into a corresponding recess in the pointing device whereby the device corresponds to the one shown in the figures. The ball 5 can then according to the invention be eccentrically 20 embedded in the detachable part whereby when inserting the detachable part in different orientations, there is obtained correspondingly different placements of the ball 5. It is thus obtained that the placement of the ball 5 can be adapted to users with 25 different thumb lengths relative to the hand size.

In a particular embodiment of the invention, the pointing device 1 is adapted for use not only as a stationary trackball but also as a movable mouse. This provides the user with yet a possibility for variation 30 in the position and conditions of use, beside the five positions of use which have been described previously.

This embodiment is illustrated in Fig. 5, where a mouse ball 2 known per se is built into the first bottom face 3. The pointing device can according to 35 the invention be provided with a sliding switch for

switching between the mouse function and the trackball function, or the pointing device can be adapted for automatic response to the one of the balls 2, 5 which may be moved.

5 The pointing device needs in a manner known *per se* to be connected to the computer by a signal path which can be a cable or a wireless connection. The cable is not shown in the drawings, but will preferably extend from the point L in Figs. 2, 3, and 5. A transmitter
10 device for a wireless connection is not shown, either, but may preferably be placed at the point T in Figs. 2 and 3.

According to the invention, the pointing device can be produced in several sizes for users with differ-
15 ent sizes of hands. The optimum rest which the hand is to find on the pointing device is thus further improved.

The pointing device according to the embodiment here described can easily be designed in a laterally
20 reversed version to be used by left-handed users.

C L A I M S

1. A pointing device for input of screen cursor positioning commands or the like for a computer and of the type
- 5 - where the pointing device is adapted to lie mainly stationary on an essentially horizontal working surface such as a table, a first bottom face of the pointing device abutting against the working surface in the position of use of the pointing device,
- 10 - where the casing of the pointing device is contacted or partially encompassed by a user's hand,
- the outer shape of the pointing device besides the first bottom face comprising curved or rounded first abutment faces forming abutment for the inwards facing
- 15 surfaces of the hand, and
- where the user acts by his thumb on a freely rotatable ball (a so-called "trackball") on the pointing device,
- c h a r a c t e r i z e d i n
- 20 - that the first abutment faces comprise abutment faces for the entire palm, except for the heel of the hand (carpus) itself, and for the grasping faces of the index, middle, ring, and little finger in their entire extension, and
- 25 - that the pointing devices has second abutment faces for the little finger edge (ulnar margin) of the intermediate portion of the hand (metacarpus) and for the side facing away from the other fingers of the first phalanx (phalanx proximalis) and preferably also
- 30 the middle phalanx (phalanx media) of the little finger,
- whereby the first abutment faces form a handle means at the end of which the ball is journaled, which handle means preferably has an elongated, essentially
- 35 rounded wedge-shape around which the hand grasps with



the middle, ring, and little finger and which at the little finger side (ulnar side) of the hand protrudes from an essentially plane surface constituted by the second abutment faces and preferably has an oblique collar at the thumb side of the hand, an edge of said collar forming an abutment for the index finger.

2. A pointing device according to claim 1, characterized in that the handle means in general extends at an oblique angle with the first bottom face as a curve extending in the longitudinal direction of the handle means and along the surface of the handle means opposite the first bottom face essentially extends at an angle with the first bottom face of 30-60°, preferably 40-50° and in particular preferred about 45°, whereby a line through the index finger knuckle and the little finger knuckle on the user's hand during its abutment against the first abutment faces extends at a corresponding angle with the first bottom face.

3. A pointing device according to claim 1 or 2, characterized in that the second abutment faces are situated on a wall protruding from the first bottom face at an angle of 110-150°, preferably 120-140° and in particular preferred about 130° with said face.

4. A pointing device according to claim 3, characterized in that the wall on its side opposite the second abutment faces has a second, essentially plane bottom face extending essentially parallel to the main extension of the second abutment faces and being adapted for abutment against the working surface in a first alternative position of use of the pointing device.

5. A pointing device according to claim 3 or 4, characterized in that the wall has an edge



which adjoins the second abutment faces at their abutment for the first phalanx of the little finger, and which is designed with a face of double curvature such as an approximately ball-, ellipsoid-, or egg-shaped face adapted for abutment against the working surface in a variable second alternative position of use of the pointing device.

6. A pointing device according to any of the preceding claims, characterized in that a fingertip portion of the first abutment faces, which portion forms an abutment for the distal phalanx (*phalanx distalis*) of at least the ring and little finger and preferably also for the distal phalanx of the middle finger, extends at an angle, or has a tangent plane extending at an angle, with the first bottom face of no more than 35° , preferably $10-30^\circ$ and in particular preferred about 22° , whereby the dorsal side of the distal phalanx of the fingers in question during abutment of the first bottom face against the working surface will face the working surface.

7. A pointing device according to claim 6, characterized in that an edge of the fingertip portion adjoining the first bottom face is situated in a distance of 20-50 mm, preferably 30-40 mm from a portion of the first abutment faces forming an abutment for the ball of the thumb (*thenar*), whereby the user's hand when grasping the pointing device will be closed to such an extent that the finger pulps (*pulpae*) on the distal phalanx of at least the middle, ring, and little finger have corresponding distances from the ball of the thumb.

8. A pointing device according to any of the preceding claims, characterized in that the ball is journalled in a recess in an operating surface which at an edge with acute angles adjoins the



portion of the first abutment faces forming an abutment for the distal phalanx (*phalanx distalis*), middle phalanx (*phalanx media*), and preferably also the first phalanx (*phalanx proximalis*) of the index finger, 5 whereby the distal phalanx (*phalanx distalis*) of the thumb at abutment against the centre of the exposed part of the ball is directed essentially in a direction towards the distal phalanx of the index finger.

9. A pointing device according to claim 8, c h a -
10 r a c t e r i z e d in that the operating surface extends from the first bottom face and in an area around the ball essentially extends at an angle of 40-80°, preferably 50-70°, and in particular preferred about 58° with the first bottom face.

15 10. A pointing device according to any of the preceding claims, c h a r a c t e r i z e d in that the ball has a diameter of 20-30 mm, preferably about 25 mm.

11. A pointing device according to any of the
20 preceding claims, c h a r a c t e r i z e d in also comprising a ball journaled freely rotatable in the first bottom face, said ball having means for submitting screen cursor positioning commands or the like when the pointing device is moved across the working
25 surface as a so-called "mouse", the ball rolling on the working surface.

12. A pointing device according to any of the preceding claims, c h a r a c t e r i z e d in that in the abutment places for the finger pulp of the distal
30 phalanx of the index finger, preferably also of the middle finger, and in particular preferred of the ring finger as well, push-buttons are situated or embedded in the first abutment faces.

