The system for counting scores in a racket sports match, such as a badminton, table tennis or tennis game, comprises at least one counting device (1) including a transmitter, activation means (13) and a shell (2) in which the transmitter is accommodated, and at least one display unit (100) including a receiver and a screen (101). The transmitter of the counting device (1) is configured to transmit a signal indicating a point, following activation of the activation means (13), to the receiver of the display unit (100) to display a score based on the received signal. The shell (2) the counting device (1) is adapted to be releasably mounted on a racket and is tube-shaped and extends between a first end (5) and a second end (6) and has an exterior surface (3) and an interior surface (4) presenting an internal diameter dimensioned to allow mounting of the counting device (1) on a shaft of a racket.

Fortsættes ...
The present invention relates to a system for counting scores in a racket sports match, such as a badminton, table tennis or tennis game, comprising at least one counting device including a transmitter, activation means and a shell in which the transmitter is accommodated, and at least one display unit including a receiver and a screen, the transmitter of the counting device being configured to transmit a signal indicating a point, following activation of the activation means, to the receiver of the display unit to display a score based on the received signal.

In sports matches on a sub-elite level a majority of the matches are governed by the players themselves, and the players continuously need to keep track on the score. To that end, displays are known in which numbers are flipped to indicate the score. It is, however, inconvenient to the players to flip the numbers on a centrally positioned display at each point, and hence the score is normally committed to memory.

From badminton it is known to attach score indicators to the shaft which score indicators are scratched like a lottery ticket during the game. One disadvantage is that only the player himself or herself can see his or her own score. Another disadvantage is that the score indicator is for single use only.

DE 4006503 A1 describes an arrangement for counting and displaying the scores in a tennis match played on a court comprising two play areas separated by a net. An electronic counter and display are arranged in the field of vision of both players. A pulse generator placed on or in the racket of at least one player sends information on the score of each player to the counter and display via radio, ultrasound or laser.

US 2007/105666 A1 describes an electronic device to be used in rackets or paddles, comprising of an acoustic or vibration sensor, a microcontroller, a microtransmitterreceiver, a microspeaker and a display. The device is adapted to count, calculate and show in the display the game time, game speed, the score and the quantity of hits that the player gave to the ball.

GB 2355203 A describes a player operated scorekeeping apparatus worn or carried by one player and connected by a radiocommunications link with a remote display. For example, a wrist band supports unit provided with
pushbuttons for inputting points as they are won by either side and associated with respective signal encoders containing stored address data for modulating the radio transmission to the display unit which incorporates data decoding within the radio receiver to allow address storage matching before displaying the appropriate alteration to the previously displayed score. If an erroneous entry signal is received, e.g. by operating both buttons simultaneously, the display reverts to the previous score.

DE 195 46 410 A1 describes a display consisting of flap or LED elements controlled by microcomputer and varying to suit the sport and other parameters indicating the results and receiving information by radio, infrared or ultrasonic signals. The elements are operated by transmitters clipped on the sportswear or a wrist watch of the participants. They may also operated by a compact hand transmitter on a judge or referee outside the playing area.

With this background it is an object of the invention to provide an alternative which is simple, practical and less costly for players to keep track on the score in a game.

This and further objects are met by a system of the kind mentioned in the introduction which is furthermore characterized in that the shell of each at least one counting device is adapted to be releasably mounted on a racket and that a single activation means is provided.

In this manner, the counting device is easily mounted on an existing racket such that the counting device may be used and reused in games, in which the players come with their own equipment, or borrows it. Another advantage is that such a system incorporating such a counting device is simple in its configuration and hence cost-effective to manufacture and non-expensive for instance sports clubs to purchase.

In a preferred embodiment, the shell of the counting device is substantially tube-shaped and extends between a first end and a second end and has an exterior surface and an interior surface presenting an internal diameter dimensioned to allow mounting of the counting device on a shaft of a racket. The tube-shape may be formed by two or more parts which are assembled around a shaft, or one or more parts comprising a snaplock arrangement. In
this manner, a counting device which is simple and fast to mount or after-
mount on a racket is provided, just as the balance of the racket is not affected
to any noticeable extent.

In an embodiment, the shell of the counting device comprises an
open section extending from the first end of the shell to the second end of the
shell such that the shell may be snapped onto a shaft of a racket. This is par-
ticularly advantageous in that a particularly fast after-mounting of the counting
device on a racket not provided with such device is achieved. Preferably, the
distance from a first edge of the open section to a second edge of the open
section is smaller than the internal diameter of the shell, which provides for a
safe retention of the counting device on the racket, even under vigorous
movements such as smashing with the racket. Furthermore, the flexural
properties of the racket are not changed as the shell is held in a relatively
loose fit on the racket.

In a preferred embodiment, the single activation means is provided in
the form of a pushbutton. By pushing the pushbutton when a point is won, a
signal is sent from the transmitter in the counting device to the receiver of the
display unit, thereby incrementing the score. This is particularly advantageous
as the counting device is fast and simple to apply as the player does not need
to identify the correct activation means prior to activation. This embodiment is
particularly well-suited for racket sports such as badminton, in which the
score is incremental in each set, and not dependent on serving, advantages
and other special rules.

In a preferred embodiment, the interior surface of the shell is sub-
stantially conical to allow mounting of the shell at the transition between a
handle and a shaft of a badminton racket. The structure of a badminton racket
is very well known and has dimensions, shape and weight regulated by interna-
tionally acknowledged rules. Hence, the body or frame of a badminton
racket comprises a head with a stringed area, a shaft and a handle. A throat
forms the transition between the head and the shaft, and at the opposite end
of the shaft, another transitional area to the handle is formed. Traditionally,
badminton frames have been made out of wood, but wood rackets have
largely been abandoned due to the availability of lighter, more durable synthetic materials such as carbon fiber, lightweight metal alloys and ceramics. For instance, the length of the frame should be no longer than 680 millimeters or wider than 230 millimeters. The weight of a fully strung frame should be within 80 and 100 grams. Frames can come in different shapes, with larger or smaller sweet spots, and can be more or less flexible, depending on the materials used and their construction. The handle connects to the shaft and is used to hold the racket. The handle is covered with a material forming the grip. There are two types of grips: towel grips are good for absorbing moisture, but may need to be changed frequently; synthetic grips are less absor- bent but more durable. Within the grip there is a core most often made of wood. One end of the handle is closed by an end cap, most often made of plastic, and at the transition to the shaft; a front cap is connected to the shaft and to the handle. The shaft is inserted into the core of the handle and fast- ened to the core for instance by means of a screw. The front cap also most often comprises reception means for the grip and is typically conical, but also asymmetrical and hexagonal shapes are known.

In order to enhance the retention of the counting device on the racket, the interior surface of the shell at the first end may be provided with at least one barb adapted to engage a soft material of the handle of a badminton racket, and the interior surface of the shell at the second end is preferably provided with a contact surface adapted to embrace the shaft of a badminton racket.

Particular ease of handling and operation of the system is provided in a presently preferred embodiment of the system in which the shell of the counting device comprises a space for accommodating the transmitter, a battery and further electronic equipment and delimited by a bottom facing the interior surface of the shell and an openable lid covering in a closed position the space, the lid being preferably connected to the shell by means of a first snaplock part and a second snaplock part engaging with a first abutment face and a second abutment face, respectively. Alternatively, all elements may be included in a one-piece moulded unit including the transmitter, battery and
other electronic equipment. This means that the battery may not be exchanged, and is thus less preferred from an environmental point of view.

In a further development of this preferred embodiment, the space is provided in a slightly raised portion of the exterior surface of the shell, the lid being preferably flush with the exterior surface in the closed position. Thereby, optimum conditions for accommodating the transmitter, battery and other electronic equipment is achieved, without compromising the balance and comfort of the racket in use of the system.

In a further embodiment each at least one display unit comprises a first on/off button and a second reset/link button adapted to enable pairing with one of said at least one counting device.

In a yet another embodiment, said at least one display unit is mounted on a fitting adapted to be connected to a post of a net. This fitting is advantageously formed to fit standardized posts and may furthermore be shaped in a manner so that it may be adapted to various kinds of posts.

The system according to the invention may advantageously be provided as a set including two display units and two counting devices to allow each of two players to activate a respective display unit. Alternatively, three or four or more counting devices may be provided as spare counting devices.

Further embodiments and advantages are set forth in the dependent claims, and will be apparent from the accompanying description of preferred embodiments.

In the following the invention will be described in further detail by means of examples of embodiments with reference to the schematic drawings, in which

Fig 1 shows a perspective view seen from below of a counting device of a system in an embodiment of the invention;

Fig. 2 shows a perspective view of the counting device of Fig. 1;

Fig. 3 shows a sectional perspective view of the counting device of Fig. 1;

Fig. 4 shows a schematic view of a net with two display units of a system in another embodiment of the invention, mounted on a fitting on a
post;
Fig. 5 shows a partial perspective view, on a larger scale, of details of the system of Fig. 4;
Fig. 6 shows a perspective view of the front side of a display unit of a system in an embodiment of the invention;
Fig. 7 shows a photograph of the front side of a display unit of a system in an embodiment of the invention;
Fig. 8a shows a perspective view of a badminton racket for illustration purposes;
Fig. 8b shows a partial perspective view of a detail of the badminton racket of Fig. 8a, on a larger scale, with a counting device of an embodiment of the system according to the invention;
Figs 9 to 11 show perspective views of a counting device of a system in another embodiment, some details removed for clarity reasons;
Fig. 12 shows a perspective view of the counting device of Figs 9 to 11, with some details in place; and
Fig. 13 shows a sectional perspective view of the counting device of Fig. 12.
In a first embodiment shown in Figs 1 and 2, a counting device 1 comprising a shell 2 is shown. The shell 2 has an exterior surface 3 and an interior surface 4, of which the exterior surface 3 is mainly conical to provide an aerodynamic shape.
The counting device 1 of the embodiment shown is adapted to fit a badminton racket. Alternatively, the counting device according to the invention could be made to fit a sport equipment of a similar kind, such as a tennis racket, a squash racket or the like.
The interior surface 4 has a substantially conical shape to fit a transition from the shaft to the handle of a badminton racket, i.e. in the position in which the front cap is located. The shell 2 has a first end 5 at which a number of barbs 18 are provided. The barbs 18 may dig into a soft material and hence reduce or even eliminate the risk that the counting device 1 falls off after mounting. The shell 2 furthermore has a second end 6, at which a contact
surface 19 is provided. The contact surface 19 is provided on the interior surface 4 and is adapted to embrace the shaft of a badminton racket. The contact surface 19 may furthermore comprise a ductile material such that a range of shaft diameters may be embraced. Furthermore, it is possible optionally to provide the contact surface 19 and/or other parts of the interior surface 4 of the shell 2 with a friction-increasing means, such as an adhesive, to increase the retention of the counting device 1 to a racket. In case the contact surface 19 is provided by a ductile material, this area also has a sound-dampening effect.

In the embodiment shown, the shell 2 furthermore comprises an open section 7 extending from the first end 5 to the second end 6. The open section 7 comprises a first edge 8 and a second edge 9 of the shell 2, of which the first edge 8 and the second edge 9 are located at a distance from each other that is smaller than the internal diameter of the interior surface 4 of the shell 2.

Referring to Fig. 3, the shell 2 of the counting device 1 furthermore comprises a space 10 for accommodating the transmitter, a battery and further electronic equipment. The space 10 is delimited by a bottom 12 facing the interior surface 4 of the shell 2 and an openable lid 11 covering in a closed position the space 10. The lid 11 is, in the embodiment shown, connected to the shell 2 by means of a first snaplock part 14 and a second snaplock part 15 engaging with a first abutment face 16 and a second abutment face 17, respectively. In an alternative embodiment, not shown, the lid 11 may be mounted to the shell 2 with only one snaplock part engaging an abutment face of the shell. Moreover, other ways of connecting or mounting the lid on the shell are conceivable, for instance a friction lock mechanism, a click lock mechanism or fastening means such as a screw or the like.

In the embodiment shown, the pushbutton 13 is provided on the lid 11, the pushbutton 13 acting as the activation means to activate the transmitter to transmit a signal to a receiver. The space 10 is provided in a slightly raised portion of the exterior surface 3 of the shell, the lid 11 being flush with the exterior surface 3 in the closed position. In order to provide a smooth
transition between the space 10 and the first end 5, the exterior surface 3 of the shell 3 is provided with an inclined portion 20 having a steeper inclination than the remaining parts of the exterior surface 3. It is conceivable that the space is made of a more flat configuration such that the exterior surface of the shell is substantially completely conical, all parts being flush.

In the shown embodiment, the counting device 1 comprises only one activation means, viz. the pushbutton 13. In other embodiments, not shown, it is possible to provide two or more buttons to allow for more functionalities of the counting device.

In the embodiment of Fig. 4, two display units 100 are shown, mounted on a fitting 200 which in turn is mounted on the top of a post 400 holding a net 300 of a badminton court. Hereby it is possible for two players to control the two display units 100 to keep track of the scores of the respective half of the court.

The display unit 100 comprises, referring now to Fig. 5, a screen 101, a housing 102, a first on/off button 104 and a second reset/link button 103. The first on/off button 104 is used for switching the display unit on and off. The second reset/link button 103 resets the displayed score by pushing for a short time period (for instance 0.5 s), and by pushing the button 103 longer (for instance 2 s) a scan or search for a transmitter to pair with is carried out.

In order to allow the pairing, the pushbutton 13 of a counting device 1 is held down, while at the same time the display unit 100 scans for a transmitter. In other embodiments, the display unit may comprise another number of buttons than two. The screen 101 is able to display numbers from 00 to 99 and the display unit 100 may be set to battery-saving or automatic switching off mode if not active for predetermined periods of time. It is conceivable to incorporate a magnet in the lower side of each display unit 100 which holds the display unit 100 in place temporarily and thus allows the display unit to be moved from one half of the court to the other when switching sides in a game.

The display unit 100 furthermore has a number of mounting elements 105 assembling the screen 101 with the housing 102. These mounting elements 105 may be in the form of screw holes and threading in which a screw
is introduced or other configurations. The mounting of the display unit or units 100 is carried out substantially as described in the above. Alternatively, it is possible to mount the display unit or units with the fitting at another position in the surroundings of the court or the place where the game takes place.

Figs 7 and 9 to 13 show further design aspects of the system according to the invention.

Fig. 8a shows the parts of a badminton racket for information purposes, and Fig. 8b shows a detail of the badminton racket of Fig. 8a intended for cooperation with the counting device 1.

The dimensions and weight of the counting device are chosen to fit the requirements of being releasably mounted and retained on a racket without compromising the feel and handling of the racket. Hence, the shell 2 of the counting device 1 is for instance moulded by a lightweight durable material, such as ABS or PC. The length of the shell 2 from the first end 5 to the second end 6 lies in the range 35-70 mm, the outer diameter at the first end 5 is typically 25-35 mm and the outer diameter at the second end 6 is typically 12-20 mm. The internal diameter of the of the interior surface 4 is as mentioned dimensioned to allow mounting of the counting device 1 on a shaft on a racket and typically ranges from 10-25 mm for a badminton racket. This gives an approximate material thickness of 1-4 mm and an overall weight of the counting device 1 of approximately 4-7 g without the transmitter, battery and other electronic equipment and approximately 7-11 g including these elements. The dimensions of the open section 7 are also chosen to allow that the counting device 1 is able to be inserted over the shaft of a racket, and as mentioned the distance from the first edge 8 to the second edge 9 of the open section 7 is smaller than the internal diameter of the shell 2. For a badminton racket, this distance is approximately 8 mm thus being substantially the same as the diameter of the racket shaft. The configuration and material of the counting device are chosen such that it is possible to squeeze the shaft through the open section 7 during mounting and dismounting of the counting device without damage in order to allow for the releasable mounting provided for.
The invention should not be regarded as being limited to the embodiments shown in the drawings and described in the above. Several modifications and combinations may be carried out within the scope of the appended claims.

The different features of the embodiments may be combined.

Reference numerals

1    counting device
2    shell
3    exterior surface
4    interior surface
5    first end
6    second end
7    open section
8    first edge
9    second edge
10   space
11   lid
12   bottom
13   pushbutton
14   first snaplock part
15   second snaplock part
16   first abutment face
17   second abutment face
18   barbs
19   contact surface
20   inclined portion
100  display unit
101  screen
102  housing
103  second button ("RESET"/"LINK")
104  first button ("ON"/"OFF")
105  mounting element
200  fitting
300  net
400  post
PATENT KRAV

1. System til optælling af point i en ketsjersportskamp, såsom en badminton-, bordtennis- eller tenniskamp, omfattende
   mindst én tælleindretning (1), der omfatter en sender, et aktiveringsmiddel (13) og en skal (2) hvor senderen er anbragt, og
   mindst én displayenhed (100), der omfatter en modtager og en skærm (101), hvor senderen af tælleindretningen (1) er konfigureret til at sende et signal, der indikerer et point ved aktivering af aktiveringsmidlet (13), til modtageren af displayenheden (100) for at fremvise en stilling baseret på det modtagne signal.
   Kenden ved, at skallen (2) af hver mindst én tælleindretning (1) er tilpasset til at være udløseligt monteret på en ketsjer og at et enkelt aktiveringsmiddel er tilvejebragt.

2. System ifølge krav 1, hvor skallen (2) af tælleindretningen (1) er i alt væsentlig rør-formet og strækker sig mellem en første ende (5) og en anden ende (6) og har en ydre overflade (3) og en indre overflade (4) som udgør en indvendig diameter dimensioneret til at tillade montering af tælleindretningen (1) på et skaf af en ketsjer.

3. System ifølge krav 2, hvor skallen (2) af tælleindretningen (1) omfatter et åbent afsnit (7), der strækker sig fra den første ende (5) af skallen (2) til den anden ende (6) af skallen (2) således skallen (2) kan snappes på et skaf af en ketsjer, hvor afstanden fra en første kant (8) af det åbne afsnit (7) til en anden kant (9) af det åbne afsnit (7) er fortrinsvis mindre end den interne diameter af skallen (2).

4. System ifølge et hvilket som helst af de foregående krav, hvor det enkelte aktiveringsmiddel er tilvejebragt i form af en trykknap (13).

5. System ifølge et hvilket som helst af krav 2 til 4, hvor den indre overflade (4) af skallen (2) er i alt væsentlig konisk for at tillade montering af skallen (3) ved overgangen mellem et håndtag og et skaf af en badmintonketsjer.

6. System ifølge krav 5, hvor den indre overflade (4) af skallen (2) ved den første ende (5) er tilvejebragt med mindst én modhage (18) tilpasset til gå i indgreb med et blødt materiale af håndtaget af en badmintonketsjer, og den indre overflade (4) af skallen (2) ved den anden ende (6) fortrinsvis er tilvejebragt med en kontaktoverflade (19) tilpasset til at omslutte skafet af en badmintonketsjer.

7. System ifølge et hvilket som helst af de foregående krav, hvor skallen (2) af tælleindretningen (1) omfatter et rum (10) til at anbringe senderen, et batteri og yderligere elektronik udstyr og afgrænset ved en bund (12), der vender mod den indre
overflade (4) af skallen (2) og et oplukkeligt låg (11), der dækker hullet i en lukket position (10), hvor låget (11) er fortrinsvis forbundet til skallen (2) ved hjælp af en første snaplåsdel (14) og en anden snaplåsdel (15) som henholdsvis går i indgreb med en første tilstødende flade (16) og en anden tilstødende flade (17).

8. System ifølge krav 7, hvor hullet (10) er tilvejebragt i en lidt hævet del af den ydre overflade (3) af skallen (2), hvor låget (11) er fortrinsvis i flugt med den ydre overflade (3) i den lukkede position.

9. System ifølge et hvilket som helst af de foregående krav, hvor hver mindst ene displayenhed (100) omfatter en første tænd/sluk knap (104) og en anden reset/link knap (103) tilpasset til at muliggøre parringen med én af den mindst ene tælleindretning (1).

10. System ifølge et hvilket som helst af de foregående krav, hvor den mindst ene displayenhed (100) er monteret på et forbindelsesstykke (200) tilpasset til at kunne monteres på en stolpe (400) til et net (300).

11. System ifølge et hvilket som helst af de foregående krav, hvor et system omfattende to displayenheder (100) og to tælleindretninger (1) er tilvejebragt som et sæt.
SEARCH REPORT - PATENT

1. Certain claims were found unsearchable (See Box No. I).

2. Unity of invention is lacking prior to search (See Box No. II).

A. CLASSIFICATION OF SUBJECT MATTER
A 63 B 71/06 (2006.01)
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)
IPC AND CPC: A63B, G09G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
DK, NO, SE, FI: IPC-classes as above.

Electronic database consulted during the search (name of database and, where practicable, search terms used)

EPDOC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<th>Relevant for claim No.</th>
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<td>WO2009033298 A1 (ZUEGER) 19.03.2009. See abstract and figures.</td>
<td>1-3, 5</td>
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<td>Y</td>
<td>GB2409624 A1 (BIRCH) 06.07.2005. See column 5, lines 30-40; column 6, lines 26-30 and figure 2.</td>
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<td>Y</td>
<td>EP0098519 A2 (BRUNNER) 18.01.1984</td>
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<td>Y</td>
<td>US6409616 B1 (LIN) 25.06.2002</td>
<td>1-3, 5</td>
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Further documents are listed in the continuation of Box C.

Search Report

Danish Patent and Trademark Office
Helgeshøj Allé 81
DK-2630 Taastrup
Denmark

Telephone No. +45 4350 8000
Facsimile No. +45 4350 8001

Date of completion of the search report
20 July 2015

Authorized officer
Mehran Maleki
Telephone No. +45 4350 8043

Application No.
PA 2015 70199
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<td>A</td>
<td>US4801880 A (KOIKE) 31.01.1989</td>
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**Box No. I  Observations where certain claims were found unsearchable**

This search report has not been established in respect of certain claims for the following reasons:

1. ☐ Claims Nos.:
   because they relate to subject matter not required to be searched, namely:

2. ☐ Claims Nos.:
   because they relate to parts of the patent application that do not comply with the prescribed requirements to such an extent that no meaningful search can be carried out, specifically:

3. ☐ Claims Nos.:
   because of other matters.

**Box No. II  Observations where unity of invention is lacking prior to the search**

The Danish Patent and Trademark Office found multiple inventions in this patent application, as follows:
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Continuation of Box [.]