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(72) Inventor: **van Barneveld, Raymond**
2497 AP 's-Gravenhage (NL)

(74) Representative: **Jilderda, Anne Ayolt**
Octrooibureau LIOC B.V.,
Postbus 13363
3507 LJ Utrecht (NL)

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(71) Applicant: **Raymond Van Barneveld Darts B.V.**
2497 AP 's-Gravenhage (NL)

(54) **Game aid and program code, in addition to knowledge base for use therein**

(57) A game aid for a game of skill, in particular a game of darts, wherein a determined points total has to be obtained in a number of playing turns, comprises in a palm-sized housing (1) input means (31-36) for entering an obtained play result and electronic memory

means for at least temporarily storing the obtained play result. The device is provided with processor means for determining at least one target result for at least one subsequent playing turn. Via interface means (21-23) the determined at least one target result is made known to a user.

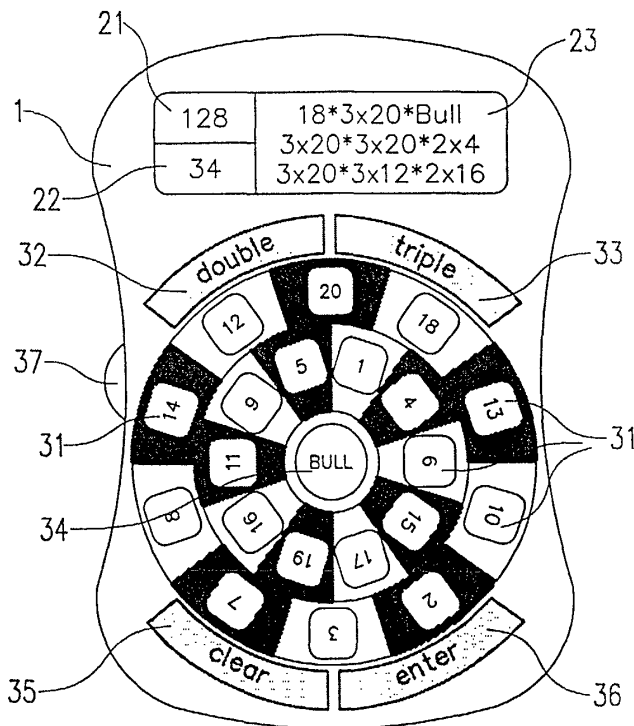


Fig.2

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Description

[0001] The present invention relates to a game aid for a game of skill wherein a determined points total has to be obtained in a number of playing turns.

[0002] The invention herein relates more specifically, although not exclusively, to a game aid for a game of darts. Darts is a game of skill which is played recreationally as well as competitively to a professional level. The object herein is to throw in each playing turn throwing means provided for the purpose, the so-called darts or arrows, from a prescribed minimum distance into a substantially circular game board. The game board is subdivided into segments each providing a different play result. A playing turn usually consists of three throws and the total of the thrown zones determines the play result of the playing turn.

[0003] Darts has a large number of game variants, of which the so-called 301, 501, 701 and 1001 games (abbreviated to x01-game) are the most popular in this country and in the countries around us. In these game variants the players begin with a starting total of 301, 501, 701 and 1001 points respectively. After each throw the play result scored is subtracted from the total score until one of the two players finishes at zero. The first player to achieve this wins the game. A dart in the outer ring of the game board counts double, while a dart in the inner ring even produces a treble score. The bull's-eye gives 50 points and the ring around it 25. One difficulty is that it is necessary to finish exactly on zero and that a final finishing throw, i.e. one finishing on zero, may only be made by means of a throw in one of the segments which count double, this also including the bull's-eye. The difference between a beginner, an advanced player and a professional is to be found not only in terms of skill but also in the game tactics associated with throwing to finish.

[0004] The present invention has for its object, among others, to provide a game aid which makes a game of skill, such as for instance darts, more accessible to the first category of players in particular.

[0005] In order to achieve the intended objective, a game aid of the type stated in the preamble comprises according to the invention electronic memory means for at least temporarily storing an obtained play result, input means for entering an obtained play result, processor means for determining at least one target result for at least one subsequent playing turn and interface means for at least temporarily generating the determined at least one target result to a user. The game aid thus provides a guide to the user, on the basis of which he/she can score an optimal play result without him/herself having to possess the necessary tactical insight or mental arithmetic ability. In the case of a game of darts the device will for instance indicate as target result the maximum obtainable number of points per playing turn, as long as the point score does not allow a finishing throw. However, as soon as the zero score becomes possible, the device will only indicate combinations of throws which will actually result in a zero score. When there are more possibilities the user can make his ideal choice therefrom. The user is thus spared difficult mental arithmetic work.

[0006] In a preferred embodiment the game aid according to the invention is characterized in that the processor means are at least temporarily coupled to a knowledge base and are able, on the basis of a program code loaded into the device for this purpose, to make a preferred selection from a number of possible target results and to make this known to the user via the interface means. In such cases not all target results are herein indicated but only the tactically most sound as found in the knowledge base. Because in a game of darts the finishing throw in the above indicated x01 variant must be a double, all mathematical combinations of throws having an odd final throw are for instance omitted. The user can thus make a well-considered choice more quickly.

[0007] In a particular embodiment the game aid according to the invention is characterized in that the knowledge base can make use of rules from a set of game rules, insight, tactics and experience. Not only the rules of the game, but also insight, experience and tactical considerations can be incorporated in the databank. The throw combinations from major or minor tournaments of professional players can for instance be stored as such in the database and can be followed by the game aid. Insight which takes into account a missed throw but nevertheless provides a favourable continuation can also be incorporated in the database.

[0008] The game aid according to the invention is more particularly characterized in that the processor means are coupled to selection means for selecting some of the knowledge rules in the database and performing the preferred selection on the basis thereof. The user is herein offered a certain control over the selection process of the device in respect of the available database. A professional player for instance can thus be taken as example in the sense that only combinations of play ever produced by this player in a tournament are taken into consideration by the device and presented as target result.

[0009] The components of the game aid can be coupled to each other per se in diverse ways in optionally distributed manner. In a further preferred embodiment the game aid according to the invention is however characterized in that at least substantially all parts thereof are accommodated in a palm-sized housing, which is also provided with electric power supply means. By thus bringing all components together in a palm-sized housing the device can be easily carried and held by the player on his person during the game. A pocket size or key-ring size can be envisaged here. In respect of the user interface, a further embodiment of the game aid according to the invention is herein characterized in that it comprises a display panel and one or more input keys.

[0010] In a particular embodiment the game aid according to the invention is characterized in that the processor means are coupled to memory means for storing therein of game results of historical playing turns and to perform calculations thereon on the basis of the program code and to make a result thereof known to the user via the user interface. When the game aid is used the obtained results are always inputted so that the game aid can determine one or more target results. By storing these historical results in the memory means statistical or other calculations can be performed thereon to give the user insight into a progression and/or regression of his play. A further embodiment of the game aid according to the invention is characterized as such in that the calculations produce a result from a group of an average scoring result per historical playing turn, a points total over the historical playing turns and a remaining points total after the historical playing turns.

[0011] The invention also relates to a program code and knowledge base for use in the above described game aid, and will now be further elucidated on the basis of a specific embodiment and an accompanying drawing. In the drawing:

figure 1 shows a view of a first embodiment of a game aid as according to the present invention;

figure 2 shows a view of a second embodiment of a game aid according to the present invention; and

figure 3 shows a view of a third embodiment of a game aid according to the invention.

The figures are otherwise purely schematic and not drawn to scale. Some dimensions in particular are (highly) exaggerated for the sake of clarity. Corresponding components are designated as far as possible in the figures with the same reference numeral.

[0012] The device of figure 1 is intended specifically as game aid in a game of darts and comprises a palm-sized housing 1 manufactured from a shockproof, impact-proof plastic in pocket size. In this embodiment the housing has a slightly curved design to enhance the ergonomics thereof, although numerous other designs and other sizes can be envisaged within the scope of the invention. The housing 1 accommodates a user interface in the form of a multiple display panel 2 and a number of keys 31-36 for input of game data by a user. Further arranged in the housing are an electric power supply (not further shown) in the form of a number of optionally rechargeable batteries which provide the correct electronic supply voltage and current to the processor and memory means also incorporated in the housing. The memory means comprise on the one hand a non-volatile portion, so-called EPROM memory (erasable program-mable read only memory), in which a program code is stored together with a knowledge base on which the processor means can draw during operation to determine a target result on the basis thereof. Depending on the possible further functionality of the device, a size of a few kBytes to some tens of mBytes can be applied for the non-volatile memory. This memory has the advantage that the information stored therein is retained even without supply voltage. In addition, the device contains a volatile memory portion, so-called RAM (random access memory), with a size of a few mBytes, in which information can be written and read quickly. In this memory are stored playing results and calculated values which are rapidly available for subsequent display for instance via a display window 2. In contrast to the non-volatile EPROM, the RAM memory depends on a continuous supply voltage to retain the information stored therein.

[0013] The image display panel 2 comprises three zones. A first zone 21, the points remaining window, shows the user's current remaining point score, while in a second zone, the level window, his/her average playing level is indicated in the form of the average number of points scored so far per throw during the game. The values in these zones are continuously adjusted after input of a new throw result. In addition, a target result is determined by the processor means of the device after each playing turn and displayed in a third zone 23, the target window, of the panel.

[0014] The keys of the device are combined into a keyboard and comprise on one side value keys 31, 32, 33, 34 with which a throw result can be entered and on the other side a clear key 35 to clear an input as desired, as well as an enter key 36 for confirming and processing an input. The device is intended specifically as assist means in the game of darts in one of the x01 variants, and the values of the value keys are therefore adapted hereto. At the start of the game the desired variant is chosen with a selection key 31 provided for this purpose in combination with entering the relevant value of x. For a 501 game for instance the key with value 5 is pressed while the user holds the bull's eye-key 34 pressed in. In the points remaining window 21 the value '501' now appears, while the game average is set to zero in level window 22. In this variant of darts the maximum throw amounts to treble twenty, or 60 points, and the ideal target result is therefore initially always three such throws per turn, designated as '3x20 * 3x20 * 3x20' in target window 23.

[0015] The player enters the obtained throw result each time by pressing the relevant value keys and confirming the input with confirm key 36. Double 20 is for instance entered by the double key 32 in combination with the 20-key 31. Treble 16 requires the combination of the treble key 33 in combination with the 16-key. Single values can be entered simply by pressing the relevant value key 31. A throw in the bull's eye of the dartboard scores 50 points and is entered by a key combination of the double key 32 and the bull's eye key 34, while a throw into the ring around the bull's eye is entered simply by pressing the bull's eye key and scores 25 points. As a check the input appears temporarily in the points remaining window until either the confirm key 36 or clear key 35 is pressed, or an input time limit of 15 seconds is exceeded. An input is confirmed each time with confirm key 36 and possibly corrected with clear key 35.

[0016] As long as the remaining points total remains above 220, the device shows the maximum score of three times treble 20 in the target window 23. Below 220 points, the device aims for the most favourable possible starting position in respect of the end game, wherein a finish exactly on zero is required, this with a final throw on a double. From 170 points it becomes possible to finish a game. In this phase of the game it is a matter of tactics, experience and above all the mental arithmetic skill of the player. In order to assist the player herein the device shows in each case one or more end games as target result which have been determined for this purpose by the processor means. The processor means can herein function per se purely on the basis of a mathematical algorithm, although in this embodiment a choice has been made for a knowledge base which is stored as such in the memory means of the device and which can be queried by the processor means. A part of the content of the knowledge base is shown in the following table and comprises per remaining points total one or more selections from the mathematically conceivable end games which are recommended from the viewpoint of experience, game rules or tactics. Sometimes no end game is possible at all and this is indicated as such. From 110 points it is possible to finish with two darts, and this is also shown as an option.

<i>remainin gpoints</i>	<i>end game</i>		
	<i>1st dart</i>	<i>2nd dart</i>	<i>3rd dart</i>
170	Treble 20	Treble 20	Bull's Eye
169			

168			
167	Treble 20	Treble 19	Bull's Eye
166			
165			
164	Treble 20	Treble 18	Bull's Eye

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5

10

15

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25

30

35

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55

	Treble 19	Treble 19	Bull's Eye
163			
162			
161	Treble 20	Treble 17	Bull's Eye
	Treble 19	Treble 18	Bull's Eye
160	Treble 20	Treble 20	Double 20
	Treble 20	Bull's Eye	Bull's Eye
159			
158	Treble 20	Treble 20	Double 19
	Treble 18	Treble 18	Bull's Eye
	Treble 20	Treble 16	Bull's Eye
157	Treble 20	Treble 19	Double 20
	Treble 19	Bull's Eye	Bull's Eye
156	Treble 20	Treble 20	Double 18
155	Treble 20	Treble 19	Double 19
	Treble 20	Treble 15	Bull's Eye
	Treble 19	Treble 16	Bull's Eye
154	Treble 20	Treble 18	Double 20
	Treble 18	Bull's Eye	Bull's Eye
	Treble 19	Treble 19	Double 20
153	Treble 20	Treble 19	Double 18
152	Treble 20	Treble 20	Double 16
	Treble 17	Treble 17	Bull's Eye
	Treble 20	Treble 14	Bull's Eye
	Treble 19	Treble 19	Double 19
	Treble 19	Treble 15	Bull's Eye
151	Treble 20	Treble 17	Double 20
	Treble 19	Treble 18	Double 18
	Treble 17	Bull's Eye	Bull's Eye
150	Treble 20	Treble 18	Double 18
	Treble 20	Treble 20	Double 15
	Bull's Eye	Bull's Eye	Bull's Eye
	Treble 19	Treble 19	Double 18
149	Treble 20	Treble 19	Double 16
	Treble 20	Treble 13	Bull's Eye
	Treble 18	Treble 15	Bull's Eye
148	Treble 20	Treble 16	Double 20
	Treble 20	Treble 20	Double 14
	Treble 19	Treble 17	Double 20
147	Treble 20	Treble 17	Double 18
	Treble 19	Treble 18	Double 18
	Treble 20	Treble 19	Double 15
146	Treble 20	Treble 18	Double 16
	Treble 20	Treble 20	Double 13
	Treble 20	Treble 12	Bull's Eye
145	Treble 20	Treble 15	Double 20
	Treble 19	Treble 16	Double 20
	Treble 18	Treble 17	Double 20
144	Treble 20	Treble 20	Double 12
	Treble 18	Treble 18	Double 18
	Treble 20	Treble 16	Double 18
143	Treble 20	Treble 17	Double 16
	Treble 19	Treble 18	Double 16
	Treble 19	Treble 12	Bull's Eye
142	Treble 20	Bull's Eye	Double 16

	Treble 20	Treble 20	Double 11
	Treble 20	Treble 14	Double 20
141	Treble 20	Treble 15	Double 18
	Treble 20	Treble 19	Double 12
	Treble 17	Treble 18	Double 18
140	Treble 20	Treble 20	Double 10
	Treble 20	Treble 16	Double 16
	Treble 20	Treble 10	Bull's Eye
139	Treble 20	Treble 13	Double 20
	Treble 20	Treble 19	Double 11
	Treble 19	Treble 14	Double 20
138	Treble 20	Treble 18	Double 12
	Treble 20	Treble 14	Double 18
	Treble 19	Treble 19	Double 12
137	Treble 20	Treble 19	Double 10
	Treble 20	Treble 15	Double 16
	Treble 19	Treble 16	Double 16
136	Treble 20	Treble 20	Double 8
	Treble 20	Treble 12	Double 20
	Treble 20	Treble 18	Double 11
135	Bull's Eye	Treble 15	Double 20
	Single Bull	Treble 20	Bull's Eye
	Treble 20	Treble 17	Double 12
134	Treble 20	Treble 14	Double 16
	Treble 20	Treble 18	Double 10
	Treble 19	Treble 15	Double 16
133	Treble 20	Treble 19	Double 8
	Treble 20	Treble 11	Double 20
	Treble 19	Treble 12	Double 20
132	Single Bull	Treble 19	Bull's Eye
	Bull's Eye	Bull's Eye	Double 16
	Treble 20	Treble 12	Double 18
131	Treble 20	Treble 13	Double 16
	Treble 20	Treble 17	Double 10
	Treble 19	Treble 14	Double 16
130	Treble 20	Single 20	Bull's Eye
	Treble 20	Treble 20	Double 5
	Treble 20	Treble 18	Double 8
129	Single 19	Treble 20	Bull's Eye
	Treble 20	Treble 15	Double 12
	Treble 20	Treble 11	Double 18
128	Single 18	Treble 20	Bull's Eye
	Treble 20	Treble 20	Double 4
	Treble 20	Treble 12	Double 16
127	Treble 20	Treble 17	Double 8
	Treble 20	Single 17	Bull's Eye
	Treble 19	Treble 19	Double 6
126	Treble 19	Single 19	Bull's Eye
	Treble 20	Treble 10	Double 18
	Treble 20	Treble 14	Double 12
125	Single Bull	Treble 20	Double 20
	Single 18	Treble 19	Bull's Eye
	Bull's Eye	Single Bull	Bull's Eye
124	Treble 20	Single 14	Bull's Eye
	Treble 20	Treble 16	Double 8

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		Treble 19	Treble 17	Double 8
	123	Single 19	Treble 18	Bull's Eye
		Treble 19	Single 16	Bull's Eye
5		Treble 19	Treble 10	Double 18
	122	Single 18	Treble 18	Bull's Eye
		Treble 20	Treble 10	Double 16
		Treble 20	Treble 18	Double 4
	121	Treble 20	Single Bull	Double 18
10		Treble 20	Single 11	Bull's Eye
		Bull's Eye	Treble 13	Double 16
	120	Treble 20	Single 20	Double 20
		Treble 20	Treble 12	Double 12
		Treble 20	Single 10	Bull's Eye
15	119	Single 19	Treble 20	Double 20
		Treble 19	Single 12	Bull's Eye
		Treble 18	Single 15	Bull's Eye
	118	Treble 20	Single 18	Double 20
		Treble 18	Single 14	Bull's Eye
20		Treble 18	Treble 16	Double 8
	117	Treble 20	Single 17	Double 20
		Treble 19	Single 20	Double 20
		Treble 20	Single Bull	Double 16
	116	Treble 20	Single 20	Double 18
25		Treble 20	Single 16	Double 20
		Treble 19	Single 19	Double 20
	115	Treble 19	Single 18	Double 20
		Treble 20	Single 15	Double 20
		Treble 18	Single 11	Bull's Eye
30	114	Treble 20	Single 14	Double 20
		Treble 18	Single 20	Double 20
		Treble 20	Single 18	Double 18
	113	Treble 20	Single 13	Double 20
		Treble 19	Single 16	Double 20
35		Treble 20	Single 17	Double 18
	112	Treble 20	Single 20	Double 16
		Treble 18	Single 18	Double 20
		Treble 19	Single 19	Double 18
	111	Treble 20	Single 11	Double 20
40		Treble 20	Single 19	Double 16
		Treble 20	Single 15	Double 18
	110	Treble 20	Single 10	Double 20
		Treble 20	Single 18	Double 16
		Treble 20	Bull's Eye	Double 16
45	109	Treble 20	Single 17	Double 16
		Treble 20	Single 9	Double 20
		Treble 19	Single 20	Double 16
	108	Treble 20	Single 16	Double 16
		Treble 18	Single 18	Double 18
50		Treble 19	Single 19	Double 16
	107	Treble 20	Single 15	Double 16
		Treble 20	Single 7	Double 20
		Treble 19	Bull's Eye	Double 20
	106	Treble 20	Single 14	Double 16
		Treble 20	Single 10	Double 18
55		Treble 20	Single 6	Double 20

105	Treble 20	Single 13	Double 16
	Treble 19	Single 16	Double 16
	Treble 20	Single 5	Double 20
104	Treble 20	Single 12	Double 16
	Treble 18	Single 18	Double 16
	Treble 18	Bull's Eye	Double 16
103	Treble 20	Single 11	Double 16
	Treble 20	Single 3	Double 20
	Treble 19	Single 16	Double 20
102	Treble 20	Single 10	Double 16
	Treble 20	Single 6	Double 18
	Treble 18	Single 16	Double 16
101	Treble 20	Single 9	Double 16
	Treble 20	Single 1	Double 20
	Treble 17	Bull's Eye	Double 20
100	Treble 20	Double 20	Double 20
	Bull's Eye	Bull's Eye	Double 20
	Single Bull	Single Bull	Bull's Eye
99	Treble 19	Single 10	Double 16
	Treble 17	Single 16	Double 16
	Treble 19	Single 6	Double 18
98	Treble 20	Double 19	Double 18
	Bull's Eye	Single 16	Double 16
	Bull's Eye	Single 8	Double 20
97	Treble 19	Double 20	Double 20
	Single 19	Treble 18	Double 12
	Treble 17	Single 6	Double 20
96	Treble 20	Double 18	Double 20
	Double 16	Double 16	Double 16
	Treble 18	Single 18	Double 12
95	Treble 19	Double 19	Double 12
	Single Bull	Single 20	Bull's Eye
	Treble 17	Single 12	Double 16
94	Treble 18	Double 20	Double 16
	Single bull	Single 19	Bull's Eye
	Bull's Eye	Single 12	Double 16
93	Treble 19	Double 18	Double 16
	Single Bull	Single 18	Bull's Eye
	Single 19	Treble 14	Double 16
92	Treble 20	Double 16	Double 16
	Single Bull	Single 17	Bull's Eye
	Treble 18	Single 18	Double 10
91	Treble 17	Double 20	Double 10
	Single Bull	Single 16	Bull's Eye
	Single 17	Treble 14	Double 16
90	Treble 18	Double 18	Double 16
	Treble 20	Double 15	Double 16
	Single 20	Single 20	Bull's Eye
89	Treble 19	Double 16	Double 16
	Treble 17	Double 19	Double 16
	Treble 13	Bull's Eye	Double 16
88	Treble 20	Double 14	Double 16
	Treble 16	Double 20	Double 16
	Treble 18	Double 17	Double 16
87	Treble 17	Double 18	Double 16

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		Treble 19	Double 15	
	86	Treble 18	Double 16	
		Treble 20	Double 13	
5		Treble 12	Bull's Eye	
	85	Treble 15	Double 20	
		Treble 19	Double 14	
		Treble 17	Double 17	
	84	Treble 20	Double 12	
10		Treble 16	Double 18	
		Treble 18	Double 15	
	83	Treble 17	Double 16	
		Treble 19	Double 13	
		Treble 15	Double 19	
15	82	Bull's Eye	Double 16	
		Treble 14	Double 20	
		Treble 18	Double 14	
	81	Treble 15	Double 18	
		Treble 19	Double 12	
20		Treble 17	Double 15	
	80	Treble 20	Double 10	
		Treble 16	Double 16	
		Treble 18	Double 13	
	79	Treble 19	Double 11	
25		Treble 13	Double 20	
		Treble 17	Double 14	
	78	Treble 18	Double 12	
		Treble 20	Double 9	
		Treble 16	Double 15	
30	77	Treble 19	Double 10	
		Treble 15	Double 16	
		Treble 17	Double 13	
	76	Treble 20	Double 8	
		Treble 18	Double 11	
35		Treble 16	Double 14	
	75	Treble 17	Double 12	
		Treble 15	Double 15	
		Single Bull	Bull's Eye	
	74	Treble 14	Double 16	
40		Treble 18	Double 10	
		Treble 16	Double 13	
	73	Treble 19	Double 8	
		Treble 17	Double 11	
		Treble 15	Double 14	
45	72	Treble 12	Double 18	
		Treble 20	Double 6	
		Treble 16	Double 12	
	71	Treble 13	Double 16	
		Treble 17	Double 10	
50		Treble 19	Double 7	
	70	Treble 18	Double 8	
		Treble 10	Double 20	
		Single 20	Bull's Eye	
	69	Treble 15	Double 12	
55		Treble 19	Double 6	
		Treble 17	Double 9	

68	Treble 20	Double 4	
	Treble 16	Double 10	
	Treble 12	Double 18	
67	Treble 17	Double 8	
	Treble 15	Double 11	
	Single 17	Bull's Eye	
66	Treble 10	Double 18	
	Bull's Eye	Double 8	
	Treble 14	Double 12	
65	Single Bull	Double 20	
	Treble 15	Double 10	
	Treble 19	Double 4	
64	Treble 16	Double 8	
	Treble 8	Double 20	
	Single 14	Bull's Eye	
63	Treble 13	Double 12	
	Treble 17	Double 6	
	Treble 15	Double 9	
62	Treble 10	Double 16	
	Treble 14	Double 10	
	Treble 18	Double 4	
61	Treble 15	Double 8	
	Single Bull	Double 18	
60	Single 20	Double 20	
	Single 10	Bull's Eye	
	Treble 12	Double 12	
59	Single 19	Double 20	
	Single 9	Bull's Eye	
	Treble 13	Double 10	
58	Single 18	Double 20	
	Single 20	Double 19	
	Single 8	Bull's Eye	
57	Single 17	Double 20	
	Single Bull	Double 16	
	Single 7	Bull's Eye	
56	Single 20	Double 18	
	Single 16	Double 20	
	Single 6	Bull's Eye	
55	Single 15	Double 20	
	Single 19	Double 18	
	Single 5	Bull's Eye	
54	Single 14	Double 20	
	Single 18	Double 18	
	Single 4	Bull's Eye	
53	Single 13	Double 20	
	Single 17	Double 18	
	Single 3	Bull's Eye	
52	Single 20	Double 16	
	Single 12	Double 20	
	Single 16	Double 18	
51	Single 19	Double 16	
	Single 11	Double 20	
	Single 15	Double 18	
50	Single 18	Double 16	
	Single 10	Double 20	

		Single 14	Double 18	
	49	Single 17	Double 16	
5		Single 9	Double 20	
		Single 13	Double 18	
	48	Single 16	Double 16	
		Single 8	Double 20	
		Single 12	Double 18	
10	47	Single 15	Double 16	
		Single 7	Double 20	
		Single 19	Double 14	
	46	Single 14	Double 16	
		Single 10	Double 18	
15		Single 6	Double 20	
	45	Single 13	Double 16	
		Single 5	Double 20	
		Single Bull	Double 10	
	44	Single 12	Double 16	
20		Single 4	Double 20	
		Single 8	Double 18	
	43	Single 11	Double 16	
		Single 3	Double 20	
		Single 7	Double 18	
25	42	Single 10	Double 16	
		Single 6	Double 18	
		Single 20	Double 20	
	41	Single 9	Double 16	
		Single 1	Double 20	
30		Single 5	Double 18	
	40	Double 20		
	39	Single 7	Double 16	
		Single 3	Double 18	
		Single 15	Double 12	
35	38	Double 19		
	37	Single 5	Double 16	
		Single 1	Double 18	
		Single 13	Double 12	
40	36	Double 18		
	35	Single 3	Double 16	
		Single 11	Double 12	
		Single 19	Double 8	
	34	Double 17		
	33	Single 1	Double 16	
45		Single 17	Double 8	
		Single 9	Double 12	
	32	Double 16		
	31	Single 15	Double 8	
		Single 7	Double 12	
50		Single 11	Double 10	
	30	Double 15		
	29	Single 13	Double 8	
		Single 9	Double 10	
		Single 17	Double 6	
55	28	Double 14		

27	Single 11	Double 8	
	Single 7	Double 10	
	Single 15	Double 6	
26	Double 13		
25	Single 9	Double 8	
	Single 17	Double 4	
	Single 1	Double 12	
24	Double 12		
23	Single 7	Double 8	
	Single 3	Double 10	
	Single 11	Double 6	
22	Double 11		
21	Single 5	Double 8	
	Single 1	Double 20	
	Single 9	Double 6	
20	Double 10		
19	Single 3	Double 8	
	Single 7	Double 6	
	Single 1	Double 9	
18	Double 9		
17	Single 1	Double 8	
	Single 5	Double 6	
	Single 9	Double 4	
16	Double 8		
15	Single 7	Double 4	
	Single 3	Double 6	
	Single 11	Double 2	
14	Double 7		
13	Single 5	Double 4	
	Single 1	Double 6	
	Single 9	Double 2	
12	Double 6		
11	Single 3	Double 4	
	Single 7	Double 2	
	Single 9	Double 1	
10	Double 5		
9	Single 1	Double 4	
	Single 5	Double 2	
	Single 7	Double 1	
8	Double 4		
7	Single 3	Double 4	
	Single 5	Double 1	
	Single 1	Double 3	
6	Double 3		
5	Single 1	Double 2	
	Single 3	Double 1	
4	Double 2		
3	Single 1	Double 1	
2	Double 1		
1			

[0017] The combinations of throws shown in the table are presented in the target window 23 of display panel 2, so that the player need only make a choice from the indicate end games instead of racking his brains over all possible

mathematical combinations. The invention thus provides not only the beginner but also the advanced darts player with a very welcome game aid.

[0018] An alternative second embodiment of the device of figure 1 is shown in figure 2. In terms of functionality this second embodiment largely corresponds with the first, although the placing of the different keys is adapted more to the layout of a dartboard. If in the first embodiment of the device the different value keys were already in the sequence in which the relevant values appear on the dartboard, in this case the position of the function keys is also largely in accordance with the position of the relevant sections on the dartboard. Further added is a rotating wheel 37, a so-called jog-dial, with which it is possible to browse through the different target results while rotating.

[0019] A third embodiment of a game aid according to the invention is shown in figure 3. In this embodiment a link has been made with the functionality of a calculator. The device therefore has a numeric keyboard 41 which can be used not only to enter play results, but also to enter variables of arithmetic operations. In addition, the device provides a number of function keys 42 which are specifically aimed at the function of calculator. By means of a mode key 39 especially arranged for this purpose, it is possible to switch between the different functions of the device and to select the desired game variant x01. Obtained play results are here also confirmed via a confirm key 36 or, if desired, corrected by means of clear keys 35. A browse key 38 provides the option of browsing through the target result indicated in target window 23 and thus provides the same functionality as the rotating wheel 37 of the second embodiment described in the previous paragraph.

[0020] Although the invention has been elucidated on the basis of these three examples, it will be apparent that the invention is by no means limited thereto. On the contrary, many more variations and embodiments are still possible within the scope of the invention. More functions can thus be integrated in the same device and combined to create a wider range of application. Instead of being a tailor-made device, the game aid can also be fully emulated by software on for instance a portable palm or pocket computer, a so-called personal digital assistant (PDA), wherein the user interface will consist of a touch screen on which the different keys are displayed and can be activated by touch. The invention therefore also relates to the program code and knowledge bank which enables a PDA or similar device to behave as a game aid according to the invention as well as to a device loaded with this program code and/or knowledge base. The user interface can be wholly realized by a combination of voice recognition and artificial speech, whereby the device can be considerably more compact and, apart from the internal electronics, only has to provide space for a loudspeaker or similar audio reproduction means in combination with a microphone or other such audio recording means.

[0021] The device can also be extended with more knowledge banks which are stored in optionally mutually integrated manner in memory means of the device and offer a greater variation of end games. In this case the functionality of the device can moreover be increased with a selection mechanism for specific selection of a determined knowledge base or set of knowledge bases. The game of for instance a favourite professional player can thus be imitated. Nor is the utility of the game aid according to the invention limited to games of darts, but it can be used in all games of skill wherein points are obtained via separate rounds for the ultimate purpose of accumulating a particular score. All in all the invention provides a game aid which herein always relieves the player of mental arithmetic work and supplements tactical knowledge and experience, this in combination with other functions if desired.

Claims

1. Game aid for a game of skill wherein a determined points total has to be obtained in a number of playing turns, comprising input means for entering an obtained play result, electronic memory means for at least temporarily storing the obtained play result, processor means for determining at least one target result for at least one subsequent playing turn and interface means for at least temporarily generating the determined at least one target result to a user.
2. Game aid as claimed in claim 1, **characterized in that** the processor means are at least temporarily coupled to a knowledge base and are able, on the basis of a program code loaded into the device for this purpose, to make a preferred selection from a number of possible target results and to make this known to the user via the interface means.
3. Game aid as claimed in claim 2, **characterized in that** the knowledge base makes use of rules from a set of game rules, insight, tactics and experience.
4. Game aid as claimed in claim 2 or 3, **characterized in that** the processor means are coupled to selection means for selecting some of the knowledge rules in the database and performing the preferred selection on the basis thereof.

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5. Game aid as claimed in one or more of the foregoing claims, **characterized in that** at least substantially all parts thereof are accommodated in a palm-sized housing, which is also provided with electric power supply means.

5 6. Game aid as claimed in one or more of the foregoing claims, **characterized in that** the user interface comprises a display panel and one or more input keys.

7. Game aid as claimed in one or more of the foregoing claims, **characterized in that** the processor means are coupled to memory means for storing therein of game results of historical playing turns and to perform calculations thereon on the basis of the program code and to make a result thereof known to the user via the user interface.

10 8. Game aid as claimed in claim 7, **characterized in that** the calculations produce a result from a group of an average scoring result per historical playing turn, a points total over the historical playing turns and a remaining points total after the historical playing turns.

15 9. Program code for use in the game aid as claimed in one or more of the foregoing claims.

10. Knowledge base for use in the game aid as claimed in one or more of the claims 1-8.

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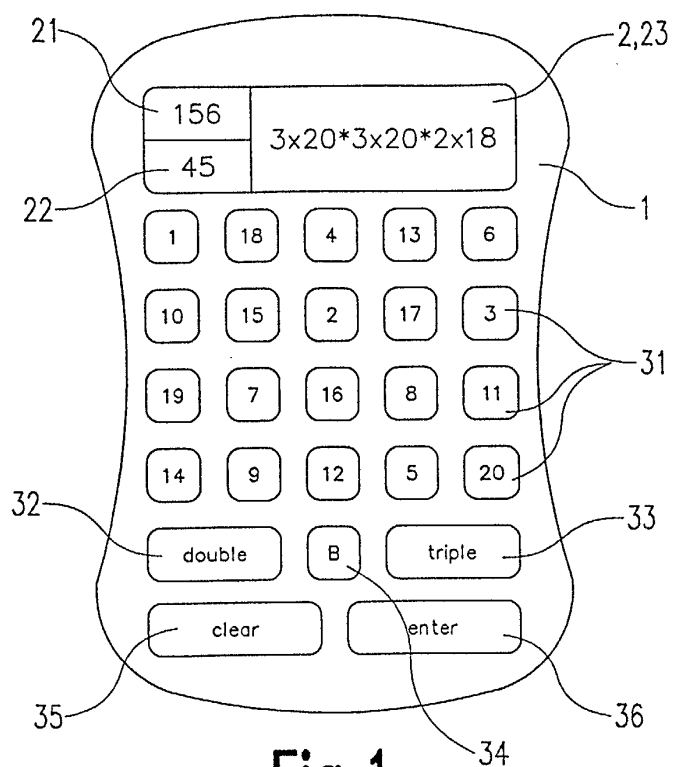


Fig.1

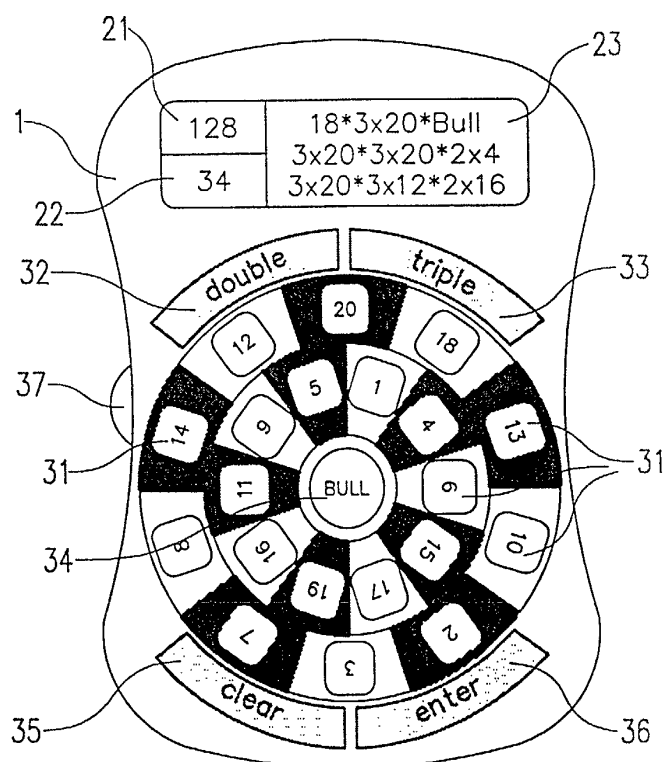


Fig.2

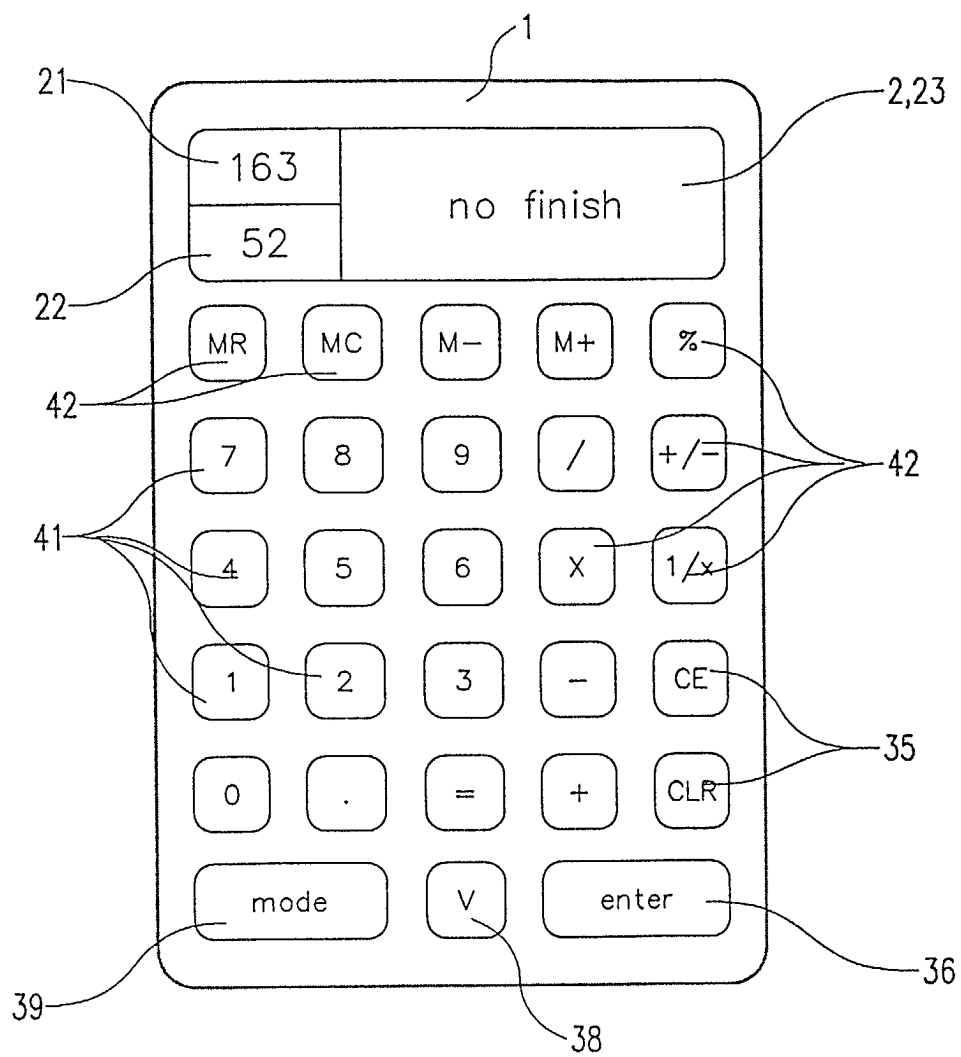


Fig.3