A perpetual lottery system and method for use by a plurality of players is provided wherein each play participates in the game indefinitely. The perpetual lottery provides a lotto-type lottery wherein a play registered on the payment of a single price is eligible for an indefinite number of subsequent draws or for as long as the game lasts. Furthermore, a lottery system and method is provided having a plurality of plays in a draw period followed by a draw in which each play's chance of winning is dependent upon a wager corresponding to the play.
For two-letter codes and other abbreviations, refer to the “Guidance Notes on Codes and Abbreviations” appearing at the beginning of each regular issue of the PCT Gazette.
PERPETUAL LOTTERY SYSTEM

FIELD OF THE INVENTION

[0001] The invention relates to the field of gaming systems and, more particularly, to lotteries wherein each player in the lottery participates in the lottery indefinitely and to lotteries wherein a player's chance of winning is dependent upon a wager corresponding to the play.

BACKGROUND

[0002] Lotteries have long been operated advantageously by governments and charitable organizations for the raising of revenues. Today, governments and private organizations around the world operate lotteries for the raising of general revenues or, in the case of many governments, revenues directed to particular social programs such as education. The amounts collected from ticket sales are generally divided between prizes and revenues according to a predetermined formula, less the overhead costs of operating the lottery.

[0003] Plays in typical lotteries are made by the purchase of tickets bearing variable game indicia in a specific configuration - e.g. in the Lotto 6/49® game, the variable game indicia (apart from any bonus plays) consists of 6 numbers in the range of 1 to 49 with no number repeated. The tickets are ordinarily purchased during a fixed period immediately followed by a draw. This period may be considered to be a "draw period". In a typical draw, winning game indicia are randomly determined by either electronic means, such as a computerized random number generator, or mechanical means, such as the well-known lottery ball tumbler. If a ticket's variable game indicia match all or a given subset of the winning game indicia, the player wins a prize.
Lotteries are typically one of two types: numbers games or lotto games. In a numbers game (e.g. Pick 3® or Pick 4®), the game consists of correctly matching a multiple-digit number (e.g. 3- or 4-digit number). In such games, the prize is typically a multiple of the player's wager amount. In a lotto game (e.g. Lotto 6/49®), the game consists of correctly selecting a subset of numbers from a set of unique numbers drawn at random by the lottery organization at the end of the draw period. For example, in a Lotto 6/49® lotto game, the player selects 6 numbers out of 49 with odds of winning approximately 14 million to one. All players who match all 6 winning numbers share a large "jackpot" prize. Accordingly, the lotto game is a pari-mutuel game. Players who match less than 6 numbers typically win lesser, frequently fixed, prizes. The prize structure for a lotto game defines the percentage of revenue that is allocated to each prize level.

Numbers games and lotto games are characterized by a number of important differences. Numbers games typically have fixed payouts that are relatively smaller than the pari-mutuel jackpot prizes of lotto games. A further difference concerns the players' motivation to participate. In a numbers game, the chances of winning are relatively better and a player may wager more or less based on his hunch on how lucky he feels that day. Conversely, in a lotto game, the chances of winning the jackpot are relatively slight and players typically buy only one ticket merely to participate in the game in order to have a chance, however slight, of winning the jackpot, rather than having no chance at all. Since the chances of winning are already slight, merely participating in the game is generally considered to be more important than the improved chances afforded by multiple tickets. Furthermore, having multiple tickets in a lotto game does not alter the payout (considering only the jackpot and discounting lower prize levels).

In typical lotto games, a ticket is ordinarily eligible only for the next draw following the purchase of the ticket and for no further draws. A player wishing to participate in the game for multiple draws must purchase a new ticket for each
draw. In order to assist lotto players to play multiple draws, some lotteries sell multi-
draw tickets or use a mail or web subscription service to provide the players a way
to play the same numbers for more than one draw, with the cost of such tickets or
subscriptions being a multiple of that for one draw. Such methods are, however,
limited in time or require additional periodic payments. There is a need, therefore,
for a lotto-type lottery wherein a ticket obtained on the payment of a single price is
eligible for an indefinite number of subsequent draws or for as long as the game
lasts. Furthermore, there is a need for a lottery wherein a play’s chance of winning
is dependent upon the play’s wager amount.

SUMMARY

[0007] Described herein is a perpetual lottery system and method for use by
a plurality of players wherein each play participates in the game indefinitely. The
perpetual lottery provides a lotto-type lottery wherein a ticket obtained on the
payment of a single price is eligible for an indefinite number of subsequent draws
or for as long as the game lasts. Furthermore, described herein is a lottery having
a plurality of plays in a draw period followed by a draw in which each play’s chance
of winning is dependent upon a wager corresponding to the play.

[0008] According to one embodiment, there is provided herein a method of
determining winning plays in each draw of a lottery. The lottery has a plurality of
plays, a series of draw periods and a series of draws. Each draw follows a
corresponding draw period and has a prize. Each play is registered in a specific
draw period in the series of draw periods, and has variable game indicia and a
wager contributing to the prize. The method comprises: determining a winning draw
period for the draw, the winning draw period being any draw period in the series of
draw periods preceding the draw; determining winning game indicia for the draw;
and comparing the winning game indicia to the variable game indicia of each play
registered in the winning draw period. Plays registered in the winning draw period
and having variable game indicia matching the winning game indicia are winning plays in the draw. Every play registered prior to the draw is eligible to be a winning play. In this way, each play registered in the lottery is eligible for an indefinite number of future draws.

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[0009] According to another embodiment, there is provided herein a method of determining winning plays in a draw of a lottery. The lottery has a plurality of plays, a prize and a draw. Each play has variable game indicia and a wager contributing to the prize. The method comprises: apportioning, to each play, a weighted chance of winning the draw based upon the play's wager; determining winning game indicia for the draw based upon the weighted chances of the plays; and comparing the winning game indicia to the variable game indicia of each play. Plays having variable game indicia matching the winning game indicia are winning plays in the draw. In this way, each play's chance of winning the lottery is related to its wager.

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[0010] According to a further embodiment, there is provided herein a method of determining the prize for each draw in a lottery. The lottery has a plurality of plays, a series of draw periods and a series of draws. Each draw follows a corresponding draw period and has a prize. Each play is registered in a specific draw period in the series of draw periods and has a wager. The method comprises, following the draw period and prior to the corresponding draw: calculating a revenue of the draw period by summing the wagers of the plays registered in the draw period; apportioning a part of the revenue of the draw period to a prize money allocation of the draw period; calculating a current prize money for the draw by summing the prize money allocation for the draw period and a portion carried forward from the previous draw; and apportioning the current prize money for the draw between the prize for the draw and a portion carried forward to the next draw. In this way, the prize for the draw comprises portions of the wagers of all of the plays registered prior to the draw.
BRIEF DESCRIPTION OF THE DRAWINGS

[0011] An understanding of the invention will be obtained from the following description, with reference to the following drawings in which:

[0012] FIG. 1 shows a schematic view of play registration means in a lottery according to one aspect of the invention;

[0013] FIG. 2 shows a pictorial view of a perpetual lottery ticket according to another aspect of the invention;

[0014] FIG. 3 shows a flowchart illustrating a method for determining winning plays in a perpetual lottery according to a further aspect of the invention;

[0015] FIG. 4 shows a flowchart illustrating a method for determining a prize in a draw according to a further aspect of the invention;

[0016] FIG. 5 shows a flowchart illustrating a method for determining a winning draw period according to a further aspect of the invention;

[0017] FIG. 6 shows a pictorial view of a perpetual lottery ticket showing a wager amount according to a further aspect of the invention; and

[0018] FIG. 7 shows a flowchart illustrating a method for determining winning plays in a lottery having plays whose chances are proportional to the amount wagered with the play, according to a further aspect of the invention.
DETAILED DESCRIPTION

[0019] Described herein is a perpetual lottery system and method for use by a plurality of players wherein each play participates in the game indefinitely. The lottery may comprise any game of chance wherein each play corresponds to variable game indicia and to play registration means for registering the play. Play registration means 10 according to one embodiment of the invention are illustrated in FIG. 1. The play registration means 10 may include any means to provide for the purchase and registration of a play by a player wherein the player selects or is provided with variable game indicia. The purchase price paid by a player for a play may be considered to be a wager of the play. The play registration means may include a retail vendor of tickets which communicates ticket purchases through a point-of-sale (POS) terminal 20 to a central server 30 of the lottery organizer. Alternatively, the purchase and registration may be made directly by the player through a web client 40 using a web form provided by the lottery organizer and connected to the central server 30. The purchase may also be made through a short message service (SMS) client 50 such as a mobile telephone connected through communications links to the central server 30.

[0020] In each case, the player may select the variable game indicia of the play by any suitable means including verbal communication, using a betslip, or by an electronic variant including a web entry form or SMS message. Alternatively, the variable game indicia may be generated by the central server 30 and provided to the player. In any event, the central server 30 will confirm that the play is consistent with the rules of the lottery and register the play, including the variable game indicia and wager amount, in a play database 60. The player may either pay the ticket vendor or provide payment information which the central server may use to process the payment. Regardless of whether the variable game indicia for a play are selected by the player or provided to the player, they are fixed once the play is registered.
The lottery also preferably comprises play indication means which indicate the play including the variable game indicia and any other required information. The play indication means may comprise a ticket bearing the variable game indicia and the other required information such as are typically used in lotto games, or an electronic receipt receivable over the Internet, by SMS communication, or by any other suitable means. The variable game indicia may include any symbols including numbers such as are used in typical lotto games.

In one embodiment of a perpetual lottery, an indefinite series of draws are held to determine the winner or winners of prizes corresponding to each draw. A player who registers a play in the lottery by, for example, purchasing a ticket remains in the game indefinitely and is generally eligible for all draws subsequent to the purchase of the ticket. In other words, a play registered in the play database is eligible in all draws subsequent to the registration of the play; the play is neither expunged nor rendered inactive until the lottery is discontinued altogether. In contrast with lottery methods in the prior art, a player in the perpetual lottery pays a single amount for a play which is eligible for an indefinite number of future draws. Rather than paying a new amount for each draw on a subscription basis or paying a single amount for a fixed number of future draws that is a multiple of the amount for a single draw, only one amount is paid.

In the perpetual lottery, the registration of a play occurs in, and the play is associated with, a specific draw period in a series of draw periods. A draw period consists of a period of time during which plays are registered and is immediately followed by a corresponding draw. Each draw has a prize, wherein each play's wager contributes to the prize. Each play is characterized by both variable game indicia and a specific draw period. Each draw period will typically have numerous plays and the draw periods may be considered, therefore, to be distinct groups of plays. The lottery has, therefore, a plurality of plays.
A ticket 70 according to one embodiment of the invention is shown in FIG. 2. A player of the lottery purchases a ticket 70 from a vendor of tickets and, depending upon the rules of the game, the player may provide the variable game indicia 80 or may have randomly selected variable game indicia provided by a variable game indicia provider such as a central server of the lottery organizer. Once the variable game indicia 80 are provided, the player pays for the ticket and the vendor submits the transaction to the central server (i.e. registers the play). The vendor then issues the player a ticket (i.e. the play indication means) having printed thereupon the variable game indicia 80 and a draw period signification 90 which indicates the draw period during which the ticket was purchased. The draw period signification could include the date of purchase 100 of the ticket or a draw period number 110. If the purchase is made online (e.g. through the Internet) or through a telephone subscription service, the ticket (i.e. play indication means) may be issued in an electronic format.

As discussed above, a draw follows each draw period in the perpetual lottery, with a plurality of plays registered in each draw period. A method 120 of determining winning plays in each draw according to one embodiment of the invention is illustrated in the flowchart of FIG. 3. As each play is characterized by both variable game indicia and a specific draw period, determining a winning play requires determining the winning draw period (step 130) as well as determining the winning game indicia (step 140). The winning draw period will be one of the draw periods preceding the draw. The winning draw period and the winning game indicia may be determined by any suitable means including computerized random number generators (e.g. by the central server of the lottery organizer) or physical lottery systems such as ball tumbler machines known in the art.

The determination of the winning draw period may be performed either before or after the determination of the winning game indicia. Where the winning draw period is determined before the determination of the winning game indicia, the
determination of the winning draw period may be considered to be a preliminary draw (step 130), as shown in FIG. 3. Once the winning draw period is determined in the preliminary draw (step 130), the winning game indicia may be determined (step 140) by any suitable draw means as described above, and only plays from the winning draw period are eligible. The draw means may be configured so that the winning game indicia are selected from the collection of variable game indicia of eligible plays - i.e. there will always be at least one eligible play with winning game indicia. Alternatively, the winning game indicia may be determined without regard to the variable game indicia of eligible tickets with the potential result that no eligible ticket has the winning game indicia for a given draw.

[0027] Once the winning draw period and winning game indicia are determined, the winning game indicia are compared to the variable game indicia of all of the plays registered in the winning draw period (step 150) (e.g. by the central server) - those plays having matching variable game indicia are winning plays (output 160) and an indication of the same may be stored in the play database. Players may then be informed of the winning plays either by publication or by private notification (e.g. e-mail). The player may submit their play for verification (e.g. reading or scanning a ticket at a POS terminal and submitting the information to the central server) to receive their prize; where a winning player has provided financial information, the player's account may instead be credited automatically. In either case, the central server would decide a player's claim for a prize by reference to the play database. Players will preferably have a limited period in which to claim prizes, after which the prize may be forfeited to the lottery organization or carried forward to the next draw. The next draw period then begins, usually immediately following the completion of the prior draw, and the process repeats.

[0028] In a draw in an ordinary lotto game, every eligible ticket typically has an equal chance of winning the draw. The chances of each draw period in the perpetual lottery of being the winning draw period may likewise be equal, and the
winning draw period randomly selected from the draw periods preceding the draw. In a lottery in a further embodiment of the invention, however, the chances of each of the draw periods being determined to be the winning draw period in any particular draw are not necessarily equal. The chance of each draw period is preferably weighted so that the draw period has a progressively diminishing chance of being the winning draw period in each successive draw. The weighting may be determined either according to characteristics of the draw period or independently therefrom. For example, the weighting may simply provide that draw periods have exponentially decreasing chances of being the winning draw period in successive draws. Alternatively, and as will be further described below, each draw period's chance of being the winning draw period for any particular draw may be weighted according to the composition of the prize corresponding to the particular draw.

The weighting of each draw period's chance of being the winning draw period in a particular draw according to the composition of the prize corresponding to the particular draw may be better understood by first considering the general allocation of money in a typical lotto game. In a typical lotto game, the revenues, $R$, collected from ticket sales during each draw period are divided as follows:

$$ R = P + F $$

where $P$ is the prize money allocation and $F$ is the money allocated to taxes, contributions to good causes, the overhead costs of the lottery and the organizer's profit. In a typical lotto game, all of the prize money allocation, $P$, for a draw is available as prize money in that draw - i.e. winning plays may receive the entirety of the prize money allocation. If no play wins the draw, the prize money is typically carried forward and added to the prize money of the next draw (i.e. an accumulating, or so-called progressive, jackpot).
Similarly, in a lottery according to one embodiment of the present invention, each draw period may be apportioned a weighted chance of being the winning draw period according to the composition of the prize determined according to the method 170 illustrated by the flowchart in FIG. 4 and described as follows.

In this method 170, the revenues, \( R_d \), are calculated to be the sum of the wagers of all of the plays registered during draw period \( d \) (step 180), and are allocated as follows (step 190):

\[
(2) \quad R_d = P_d + F_d
\]

where, for the draw following draw period \( d \), \( P_d \) is the prize money allocation and \( F_d \) is the money applied to the overhead costs of the lottery and retained for the organizer's profit. The prize money allocation, \( P_d \), contributes to the current prize money, \( P_{c,d} \), for draw, \( d \), which also includes a portion carried forward, \( P_{f,d} \), from the previous draw, \( d-1 \) (step 200):

\[
(3) \quad P_{c,d} = P_d + P_{f,d-1}
\]

Likewise, a portion, \( P_{f,d} \), is carried forward from the current prize money, \( P_{c,d} \), of draw \( d \) to the next draw, \( c+1 \). Accordingly, the entirety of the current prize money, \( P_{c,d} \), for draw \( d \) is not available for the prize, \( Prize_d \), for draw \( d \) - an amount is carried forward to the next draw, \( c+1 \), leaving as a prize for draw \( d \) (step 210):

\[
(4) \quad Prize_d = P_{c,d} - P_{f,d}
\]

As in a typical lotto game, prize money that is not won in draw \( d \) may be carried forward to the next draw \( d+1 \) in a jackpot rollover fashion. As described above, and unlike in a typical lottery, a portion of the current prize money, \( P_{c,d} \), for the current draw is carried forward and added to the prize money of the next draw prior to the performance of the current draw. This prize money carried forward is independent
of any jackpot rollover and is added to the next draw's current prize money regardless of whether the current draw prize is won. Likewise, the current prize money, $P_{c_i}$, for any given draw includes the prize money allocation for that draw and the prize money carried forward from the previous draw. The prize money carried forward, $P_{f_{d+1}}$, from the previous draw is calculated as follows:

$$P_{f_{d-1}} = f \times P_{c_{d-1}}$$

where $f$ is a positive multiplier less than 1. Alternatively, $f$ could be a function of any of the quantities in the lottery including the current prize money. As may be shown by a recursive substitution of the expressions for $P_{f_{d+1}}$ and $P_{c_d}$ in the above expressions, the current prize money, $P_{c_d}$, for any particular draw of is given generally by:

$$P_{c_d} = \sum_{n=1}^{d} f^{d-n} \times P_n$$

For example:

$$d = 1; \quad P_{c_1} = \phi \times P_x \equiv P_x$$

Thus, in the first draw, $d = 1$, of the perpetual lottery, the current prize money, $P_{c_1}$, is merely the prize money allocation, $P_1$, as there is no previous draw period to provide a portion carried forward. Likewise, in the second draw, $d = 2$:

$$d = 2; \quad P_{c_2} = f^1 \times P_1 + f^0 \times P_2 \equiv f \times P_1 + P_2$$

being the current draw's prize money allocation, $P_2$, and a fraction, $f$, of the previous draw's prize money allocation, $P_1$. Similarly, for the third draw, $d = 3$:

$$d = 3; \quad P_{c_3} = \phi^2 \times P_1 + f^1 \times P_2 + f^0 \times P_3 \equiv \phi^2 \times P_1 + f \times P_2 + P_3$$
As may readily be seen, the current prize money, \( P_{C_d} \), for any particular draw \( d \) is a summation of the current draw's prize money allocation and exponentially diminishing fractions of the prize money allocations of the previous draws. As each draw period's prize money allocation derives from the wagers of the plays registered in that draw period, every draw period, and therefore every play's wager, prior to any given draw contributes to the draw's current prize money and therefore to the draw's prize.

As discussed earlier, each draw period's chance of being selected as the winning draw period for any particular draw may be weighted according to the composition of the prize corresponding to the particular draw. This weighting may be chosen having regard to the contribution by the plays registered in each draw period to the current prize money of the draw, as described above. Accordingly, the chance of the \( n \)'th draw period being selected as the winning draw period for draw \( d \) may be weighted by (having regard to equation (6)) the draw period's contribution, \( f_{d_1}^{d_n} p_n \), to the current prize money, \( P_{C_d} \). The \( n \)'th draw period's chance of winning, therefore, may be given by:

\[
\text{Chance}_{n'} = \frac{f_{d_1}^{d_n} p_n}{\sum_{r \in d} P_r}
\]

Based upon this calculation, the winning draw period for any particular draw may be determined by the method 220 illustrated in the flowchart of FIG. 5 and described as follows. According to the above calculations, the draw prize and the total contributions of all of the draw periods are determined (step 230). The chances of the draw periods of being the winning draw period are weighted and apportioned according to each draw period's contribution to the prize, according to the above-described calculations (step 240). A random draw is then performed according to these weighted chances (step 250) to determine the winning draw period (output 260).
For example, the winning draw period may be determined recursively in the following manner. It may be first determined whether the current draw period or one of the previous draw periods is the winning draw period. The chance of the current draw period being the winning draw period, according to equation (10), is given by:

\[
(11) \quad \text{Chance}_d = \frac{P_d}{P_{r_d}}
\]

A draw may be performed to determine, based upon this weighted chance, whether the current draw period, \(d\), is the winning draw period, or rather one of the previous draw periods is the winning draw period. If the current draw period is determined as not being the winning draw period, then the same procedure is performed for the \(d-1\) draw period. If the \(d-1\) draw period is determined as not being the winning draw period, then the same procedure is performed for the \(d-2\) draw period, as so on. Consider an example where \(\text{Chance}_d = 0.837\) and a random number generator which generates a random number between 0 and 1 is used to perform the preliminary draw. Alternatively, a 3-chamber physical draw machine, each loaded with 10 balls ranging from 0 to 9, may be used, with each ball denoting one decimal position. If the random number generator returns a number less than 0.837, then the current draw period \(d\) is the winning draw period; otherwise, one of the previous draw periods is the winning draw period. The same procedure would then be applied recursively for the \(d-1\) and further draw periods until a winning draw period is determined.

In another method of performing the preliminary draw, a range of numbers is apportioned to all of the draw periods according to the draw periods' chances of winning. The determination of the winning draw period is then performed by generating a random number within the range of numbers - the
winning draw period is the draw period whose portion of the range of numbers contains the random number.

Alternative methods of determining the prize money carried forward and the weighted chances of being the winning draw period are included in the invention. The prize money carried forward may be a fixed amount, may be a function of any of the quantities in the lottery, and may be dependent upon whether a prize was won in the current draw. As described above, calculation of the chances of being the winning draw period may be made with or without regard to any characteristic of a given draw period and may include a predetermined formula or behaviour including an exponential decrease. Additionally, any draw period's chance could be calculated to have a constant or increasing chance of being the winning draw period over a number of draws.

The amount available in one embodiment as a prize (apart from any jackpot rollover) for draw \( d \) is the current prize money, \( P_{Cd} \), less the prize money carried forward, \( Pf_d \), from draw \( d \), and is given by:

\[
Prize, = P_{Cd} - Pf_d = P_{Cd} \times (1 - \frac{1}{l})
\]

The prize for each draw may include a single prize level, such as a jackpot-only lotto game, or multiple prize levels won by partial matches to the winning prize indicia, or the like. In this case, the prize is divided into a number of pools. For example, prizes may be given for matching 6, 5, 4 or 3 numbers out of 6 winning numbers, and the prize may be divided as follows:

\[
Prize = P_{m6} + P_{m5} + P_{m4} + P_{m3}
\]

where a fraction of the total prize is apportioned to each prize level \( P_{mn} \) according to a predetermined rule. Each of the prize level pools not won in any particular draw
may be carried forward to the next draw in a jackpot-rollover fashion or rolled into one or more of the other prize level pools.

[0036] In a typical lotto game, jackpot prizes not won in a draw are lost to all of the current ticket holders - implicit in the game is that the lottery organizer is not obligated to pay out all of the prize money allocation within the same draw. Players wanting a chance to win the jackpot rollover must purchase tickets in the next draw. In contrast, plays in a perpetual lottery according to the invention are indefinitely eligible to win all jackpot rollovers, generally with progressively diminishing chances. Alternatively, the rules of the game may provide that amounts not won in the current draw may be lost from a particular prize pool and retained by the organizer in a reserve, or "seed", fund, as is typically the case with non-jackpot prize pools.

[0037] In the case of multiple prize levels, determining the winning draw periods for each level may proceed in any of the follow ways:
   a) a single preliminary draw applies to all of the prize levels;
   b) the preliminary draw applies to the jackpot prize only, in which case the other prize levels can only be won by plays from the current draw period; or
   c) multiple preliminary draws are conducted, one for each prize level.

While method a) is simple to describe to the public, method b) is preferred as it provides that all draw periods are eligible for the jackpot while current draw period plays are not shut out of the lower prize levels. Method c) is the most complex.

[0038] A ticket representing the play indication means for a play in a further embodiment of the invention is shown in FIG. 6. The ticket 270 (and corresponding play) has unique game indicia serving as a unique identifier 280, or "Ticket ID", of the ticket. In this case, the draw means determines the winning play by selecting a winning identifier. Each eligible play, such as the group of plays belonging to a winning draw period determined by a preliminary draw, as described above, may
have equal chances of winning the draw. Alternatively, each play may have a chance of winning that is proportional to the play's contribution to the prize corresponding to the draw. The determination of the winning play could then proceed in a similar fashion to the determination of the winning draw period described earlier; for example, weighted chances could be apportioned to all of the plays proportionally with each play's contribution to the prize, and the draw could be performed by randomly determining the winning identifier according to the weighted chances of the plays. The purchase price (i.e. wager) for plays, in this embodiment, could be variable thereby allowing the player to wager any desired amount, with the ticket showing the wager amount 290, as shown in FIG. 6. The play's chance of winning would then be dependent upon the wager amount. In this case, the wager amount could be submitted to a central computer upon the purchase of the ticket along with the ticket's identification number.

[0039] Shown in the flowchart in FIG. 7 is a method 300 of determining winning plays in a draw in a lottery according to the above-described embodiment. In the method 300, plays would be registered during a draw period and, following the end of the draw period, the draw prize and the total contribution thereto by all eligible plays would be determined prior to the draw. Chances would then be apportioned to each play weighted according to the play's wager (step 310). The winning game indicia for the draw would then be determined based upon the weighted chances of the plays (step 320). For example, a random draw could be performed according the weighted chances of the plays. Winning plays could be determined by comparing the winning game indicia to the variable game indicia of each play (step 330) and prizes awarded to winning plays (output 340) having variable game indicia matching the winning game indicia. This method of apportioning weighted chances of winning to plays is independent of any preliminary draw determining a winning draw period, as described earlier, and may also be employed in a lottery having a single draw or multiple independent draws.
The above-described embodiment of the invention generally consists of a lottery having a plurality of plays in a draw period followed by a draw in which each play's chance of winning is weighted by the play's wager. Each play has a variable game indicia, preferably comprising a unique identifier, and is registered by play registration means which may include means to provide for the purchase of a ticket by a player. The play registration means may include any of the play registration means described above, and may also provide for the provision of play indication means including the unique identifier, the wager amount and any other required information.

In a further embodiment, the wager amount associated with each play consists of the price of the play, wherein a fixed selection of prices is available to players to select from; alternatively, the price may be any arbitrary amount selected by the player. In either case, the price of the play represents the play's wager. Each play's chance of winning the draw is proportional to the contribution of the play's wager to the overall revenue of the draw period with the overall revenue being the sum of all of the play wagers. The overall revenue, \( R \), can be represented by:

\[
R = \sum_{i} w_i
\]

where \( i \) identifies the play and \( w_i \) represents the wager corresponding to play \( i \) contributing to the draw period revenue. In this case, each play's chance of winning, \( C_i \), the draw would be given by:

\[
C_i = \frac{w_i}{R} = \frac{w_i}{\sum_{i'} w_{i'}}
\]

Since the overall revenue is apportioned between the prize and the overhead of the lottery, the wager amounts may likewise be considered to contribute to the prize in the same proportion. Furthermore, the random draw could be performed by any...
suitable draw means as described earlier, including computerized random number generators or physical lottery systems such as ball tumbler machines as are known in the art.

[0042] In a further embodiment of the invention, the lottery has a single draw period or multiple independent draw periods and a draw following each draw period. As in the above-described embodiment, a variable wager may be made with each play giving the play a chance of winning the corresponding draw wherein the chance is proportional to the wager amount. The duration of each draw period in this embodiment is flexible and is determined by a target prize pool amount rather than being fixed in duration, as in the above-described embodiment. In this case, the draw period ends, and a draw is held, only when the prize pool reaches a predetermined target amount. In this way, a player will know what the prize will be and what his relative chance of winning will be at the time of registering a play and making a wager.

[0043] The same principle described above can be applied to the perpetual lottery in a previously-described embodiment having multiple draw periods and a preliminary draw to determine the winning draw period. In this case, the duration of each draw period would be the amount of time it takes for the prize money allocation, $P_\phi$, to grow to a predetermined target amount, rather than a fixed period in time. In a further embodiment, the target prize money allocation, $P'$, is selected to be a constant amount for all draws. Substituting $P'$ for $P_n$ in equation (6) gives:

\[
P_{C_d} = \sum_{n=1}^{d} f d^H x P' = P' x \sum_{n=1}^{d} l' - \\
\therefore \frac{P'}{P_{C_d}} = \frac{1}{\sum_{n=1}^{d} f d^{-n}}
\]
Accordingly, the chances of any given draw period, \( n \), of being the winning draw period in draw, \( d \), in this embodiment is given by substituting the above expression into equation (10):

\[
\text{Chance}_{n} = f^{d-n} \times \frac{P'}{PC_{d}} = \frac{I}{j^{n}} x \frac{f^{d}}{\sum_{n=1}^{\infty}} \frac{1}{f^{rd-n}}
\]

[0044] Thus, in the above-described embodiment, a given draw period's chances of being the winning draw period in each successive draw decreases at an exponential, but predictable, rate. As such, the lottery organizer and the players will know at the time of a play's registration the corresponding draw period's chances of winning in each successive draw.

[0045] With the foregoing exemplary embodiments of the invention having been disclosed, it will be apparent to those skilled in the art that various changes and modifications can be made to appropriately suit the needs and objectives of another application and still achieve the advantages of the invention; all such changes and modifications are intended to fall within the scope of the invention as defined by the claims that follow.
What is claimed is:

1. In a lottery having a plurality of plays, a series of draw periods and a series of draws, each draw following a corresponding draw period, each draw having a prize, each play being registered in a specific draw period in the series of draw periods, each play having variable game indicia and a wager contributing to the prize, a method of determining winning plays in each draw, the method comprising:
   determining a winning draw period for the draw, the winning draw period being any draw period in the series of draw periods preceding the draw;
   determining winning game indicia for the draw; and
   comparing the winning game indicia to the variable game indicia of each play registered in the winning draw period;
   wherein plays registered in the winning draw period and having variable game indicia matching the winning game indicia are winning plays in the draw; and
   whereby every play registered prior to the draw is eligible to be a winning play.

2. The method according to claim 1, wherein determining the winning draw period for the draw comprises randomly selecting a draw period preceding the draw to be the winning draw period;

3. The method according to claim 1 further comprising:
   apportioning, to each draw period preceding the draw, a weighted chance of the being the winning draw period;
   wherein determining the winning draw period for the draw comprises randomly selecting a draw period preceding the draw to be the winning draw period according to the draw periods' weighted chances.
4. The method according to claim 3, wherein each draw period's weighted chance is apportioned on the basis of the wagers by the plays registered in the draw period.

5. The method according to claim 3, wherein each draw period's weighted chance is apportioned proportionally to a sum of the wagers of the plays registered in the draw period.

6. The method according to claim 3, wherein the weighted chances of the draw periods in the series of draw periods prior to the draw are apportioned according to a predetermined function.

7. The method according to claim 6, wherein the predetermined function is a decreasing exponential function whereby each successively earlier draw period has an exponentially lower weighted chance.

8. The method according to claim 3, wherein determining the winning draw period for the draw comprises recursively determining whether each draw period successively preceding the draw is the winning draw period based upon the draw period's weighted chance until the winning draw period is determined.

9. The method according to claim 3, wherein the winning draw period for the draw is determined on the basis of the weighted chances of all of the draw periods preceding the draw.

10. The method according to claim 1, wherein determining the winning game indicia comprises randomly selecting game indicia to be the winning game indicia;
11. The method according to claim 3, wherein the winning draw period of the draw is determined before the winning game indicia for the draw are determined.

12. The method according to claim 11, wherein determining the winning game indicia comprises randomly selecting the variable game indicia of a play registered in the winning draw period to be the winning game indicia;

13. The method according to claim 11 further comprising:

   apportioning to each play registered in the winning draw period a weighted chance of winning the draw;

   wherein determining the winning game indicia for the draw comprises randomly selecting the variable game indicia of a play registered in the winning draw period to be the winning game indicia according to the plays’ weighted chances.

14. The method according to claim 13, wherein the each play’s weighted chance is apportioned on the basis of the play’s wager.

15. In a lottery having a plurality of plays, a prize and a draw, each play having variable game indicia and a wager contributing to the prize, a method of determining winning plays in the draw, the method comprising:

   apportioning, to each play, a weighted chance of winning the draw based upon the play’s wager;

   determining winning game indicia for the draw based upon the weighted chances of the plays; and

   comparing the winning game indicia to the variable game indicia of each play;

   wherein plays having variable game indicia matching the winning game indicia are winning plays in the draw.
16. The method according to claim 15, wherein the weighted chance of winning the draw apportioned to each play is proportional to the play's wager;

17. The method according to claim 15, wherein the winning game indicia for the draw are determined after a sum of the plays' wagers is at least a predetermined target amount.

18. In a lottery having a plurality of plays, a series of draw periods and a series of draws, each draw following a corresponding draw period, each draw having a prize, each play being registered in a specific draw period in the series of draw periods, each play having a wager, a method of determining the prize for each draw, the method comprising:
   calculating a revenue of the draw period by summing the wagers of the plays registered in the draw period;
   apportioning a part of the revenue of the draw period to a prize money allocation of the draw period;
   calculating a current prize money for the draw by summing the prize money allocation for the draw period and a portion carried forward from the previous draw; and
   apportioning the current prize money for the draw between the prize for the draw and a portion carried forward to the next draw;
wherein the prize for the draw comprises portions of the wagers of all of the plays registered prior to the draw.

19. The method according to claim 18, wherein the portion carried forward to the next draw is a fixed fraction of the current prize money for the draw.

20. The method according to claim 18 further comprising:
   apportioning the prize for the draw amongst the prizes of a plurality of prize levels according to a predetermined rule.
PERPETUAL LOTTERY TICKET

GAME NUMBERS
03 09 18 22 23 41 47

30 Jan 2005  Draw Period #19

FIG. 2
Preliminary draw is held to determine winning draw period - all draw periods preceding draw are eligible.

Draw is held to determine winning game indicia - only plays registered in winning draw period are eligible.

Winning game indicia are compared to the variable game indicia of plays registered in the winning draw period.

Winning plays

FIG. 3
170

180 Revenues are calculated by summing wagers of plays registered in draw period.

190 A part of revenue is apportioned to prize money allocation of draw period.

200 Current prize money for draw is calculated by summing the prize money allocation for the draw period and portion carried forward from previous draw.

210 Current prize money for draw is apportioned between prize for draw and portion carried forward to next draw

FIG. 4
Draw prize and total of draw period contributions to the draw prize are determined.

Chances are apportioned to all of the draw periods proportional to each draw period's contribution to the draw prize.

Random draw of draw periods is performed according to weighted draw period chances.

Winning draw period.

FIG. 5
FIG. 6

PERPETUAL LOTTERY TICKET

TICKET ID

966834124547

WAGER

$5.12

30 Jan 2005  Draw Period #19
Weighted chances of winning the draw are apportioned to each play based upon the play's wager.

A draw is held to determine the winning game indicia based upon the weighted chances of the plays.

Winning game indicia are compared to the variable game indicia of plays.

Winning plays

FIG. 7
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC: A63F3/06 (2006.01) , G07C 15/00 (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)
A63F3/06 (2006.01); G07C 15/00 (2006.01)
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)
Databases used: Canadian Patent Database; USPTO WEST (full-text patent database, pre-grant publication, EPO/JPO abstracts); and Internet.
Search words used: perpetual lottery system, multiple play or draw, draw period, wager, dependent, random numbers or symbols, winning numbers or symbols, weighted chance, lottery, game of chance, payout, and prize.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<tbody>
<tr>
<td>Y</td>
<td>US 5,979,894 (Alexoff) 9 November 1999 (9.11.1999) entire document</td>
<td>1, 10, and 15 to 17</td>
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<td>A</td>
<td>entire document</td>
<td>2 to 9, and 11 to 14</td>
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<td>Y</td>
<td>US 6,733,878 (Walker et al.) 11 May 2004 (11.05.2004) col. 1, lines 49-63; col. 2, lines 39-67</td>
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<td>Y</td>
<td>US 6,017,032 (Grippo et al.) 25 January 2000 (25.01.2000) col. 4, lines 15-29</td>
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</table>

[X] Further documents are listed in the continuation of Box C.  [X] See patent family annex.

* Special categories of cited documents
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search 19 March 2007 (19-03-2007)
Date of mailing of the international search report 30 April 2007 (30-04-2007)

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Form PCT/ISA/210 (second sheet) (April 2005)
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<p>| Y         | US 2005/0164767 (Wright) 28 July 2005 (28.07.2005) Claim 1; Figure 3           | 18 to 20             |</p>
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