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WORD FORMING PUZZLE APPARATUS

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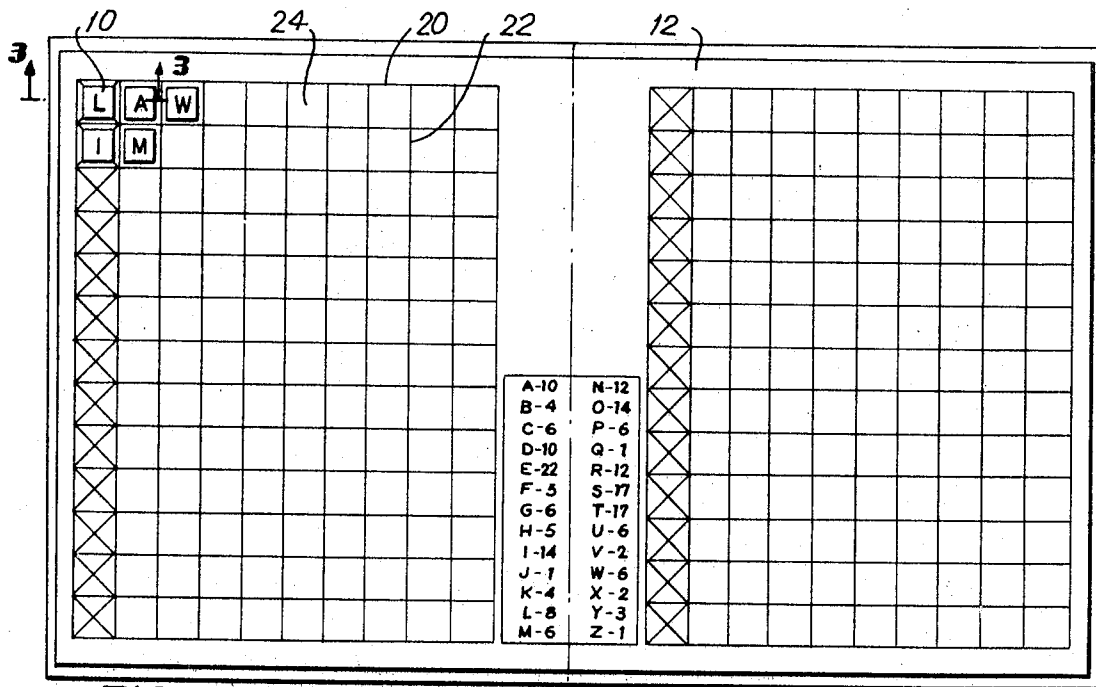


FIG. 1

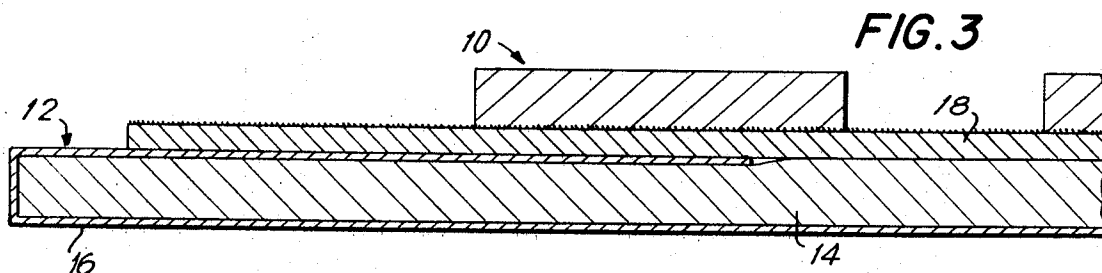


FIG. 3

L	A	W	A	B	I	D	I	N	G
I	M	M	O	E					
T									
T									
L									
E									
S									
T									
R									
O									
K									
E									
S									

F	U	D	G	E					
E	A	S	T	E	R				
L									
L									
G									
R									
E									
A									
T									
O									
A									
K									
S									

FIG. 2

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WORD FORMING PUZZLE APPARATUS

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8 Claims

ABSTRACT OF THE DISCLOSURE

Game apparatus comprising a predetermined number of playing pieces, each playing piece being provided with a letter of the alphabet, and adapted for association to define both a preselected key phrase and a plurality of player selected words, each letter of the preselected key phrase being utilized as a key letter of one of the player selected words, whereby the number of player selected words corresponds to the number of letters in the preselected key phrase. A game board is provided having locations for the playing pieces arranged in columns and rows, the number of locations being related to the number of pieces in a ratio substantially less than 2:1.

This invention relates generally to games and more particularly to games requiring a player to combine symbols chosen from a predetermined symbol set, such as letters of an alphabet, numbers, or the like, to form symbol subsets defined by predetermined usages, such as dictionary-defined words or mathematical relationships.

It is a primary object of the present invention to provide a game comprising a plurality of symbols defined by a symbol set of specific symbol distribution, said symbols being capable of relative positioning to form symbol subsets and means defining criteria determinative of playing procedure and play objectives to enable player positioning of said symbols according to said criteria.

It is another primary object of the present invention, in addition to the foregoing object, to provide a game comprising a predetermined number of playing pieces, each playing piece being provided with symbols selected from a symbol set, such as letters of an alphabet, and adapted for association to define both a preselected symbol subset and a group of player selected symbol subsets, the preselected symbol subset, comprising, for example, a key phrase, the number of symbols thereof having a predetermined relationship to the total number of playing pieces and the player selected symbol subsets being defined by predetermined usage, such as dictionary definable words, and wherein each symbol of the preselected symbol subset is utilized as a symbol of one of the player selected symbol subsets, whereby the number of player selected symbol subsets corresponds to the number of symbols in the preselected symbol subset.

Another primary object of this invention, in addition to the foregoing objects, is to provide such a game further comprising a gameboard provided with a plurality of locations adapted to receive the playing pieces with the number of locations being at least as great as the number of playing pieces.

It is a further primary object of this invention, in addition to each of the foregoing objects, to provide such a game wherein at least one vertically aligned group of locations is provided with indicia for indicating a preferred orientation of the playing pieces defined in the preselected symbol subset.

Yet another primary object of this invention, in addi-

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tion to each of the foregoing objects, is to provide such a game wherein the playing pieces and the gameboard are constructed and arranged for enabling retention of the playing pieces in position relative to the board.

It is also a primary object of this invention, in addition to each of the foregoing objects, to provide such a game which is economical to manufacture while yet being durable during use.

An important feature of the present invention is that the degree of difficulty, or the degree of skill and average playing time, may be readily controlled by design considerations and be determinable according to a mathematical relationship defining an index of solution facility.

The invention resides in the combination, construction, arrangement and disposition of the various component parts and elements incorporated in an improved game in accordance with the principles of this invention. The present invention will be better understood and objects and important features other than those specifically enumerated above will become apparent when consideration is given to the following details and description, which when taken in conjunction with the annexed drawing describes, discloses, illustrates and shows a preferred embodiment or modification of the present invention and what is presently considered and believed to be the best mode of practicing the principles thereof. Other embodiments or modifications may be suggested to those having the benefit of the teachings herein, and such other embodiments or modifications are intended to be reserved especially as they fall within the scope and spirit of the subjoined claims.

In the drawing:

FIG. 1 is a top plan view of a gameboard adapted for use with the present invention;

FIG. 2 is a top plan view of the gameboard of the preceding figure showing the manner in which the playing pieces may be associated therewith; and

FIG. 3 is a partial cross-sectional elevational view taken along line 3-3 of FIG. 1.

Referring now to the drawing, there is shown and illustrated a group of playing pieces, plaques or tiles 10 characterized by the provision of symbols, in this case letters of the alphabet, thereon to enable association thereof to form lexical units of symbol subsets, in this case words, and groups of lexical units or symbol subsets defined by a predetermined usage, in this case dictionary defined words. There is also shown and illustrated a gameboard 12 adapted to aid and assist in associating the playing pieces 10 to form such subsets or words and groups of subsets or words. The tiles, plaques or playing pieces 10 and the gameboard 12 may be fabricated of any conventional material, such as metal, plastic, woods, cardboard, Bristol board, or the like, with the symbols, letters and other indicia being provided thereon by means of printing, embossing or the like.

The playing pieces 10 may, for example, be fabricated of cardboard squares, imprinted on the top surface thereof with the symbols selected from a fixed symbol set, in the illustrated embodiment letters of the alphabet. While any desired number of playing pieces 10 may be utilized, with the symbols or letters being provided in any desired frequency of distribution, for the exemplary form of the game shown and hereinafter more fully described it has been found preferable to provide a total of 200 playing pieces 10, with 69 of the playing pieces 10 being imprinted with vowels and 131 of the playing pieces 10 being imprinted with consonants. Furthermore, it has been found that the following frequency distribu-

tion of the symbols or letters selected for the fixed symbol set or alphabet is preferable:

A-10	F-5	K-4	P-6	U-6
B-4	G-6	L-8	Q-1	V-2
C-6	H-5	M-6	R-12	W-6
D-10	I-14	N-12	S-17	X-2
E-22	J-1	O-14	T-17	Y-3 and Z-1

In utilizing the playing pieces **10** to play the game, initially a key phrase is formed from the playing pieces **10**, the number of letters in the key phrase being related to the total number of playing pieces provided. Using the 200 playing pieces distributed as above, it has been found advantageous to use a key phrase having 25 or 26 letters, the key phrases utilizing 25 letters being more difficult than the key phrases utilizing 26 letters. Associated with the apparatus may be means, such as an instruction sheet, defining or setting forth exemplary key phrases which may be used, such as the following:

	No. letters
LITTLE STROKES FELL GREAT OAKS	26
DOUBLE DOUBLE TOIL AND TROUBLE	26
WHAT IS THIS THAT THOU HAST DONE	26
KEEP COOL ANGER IS NOT ARGUMENT	26
GIVE ME LIBERTY OR GIVE ME DEATH	26
GIVE US THIS DAY OUR DAILY BREAD	26
ONE GOOD TURN DESERVES ANOTHER	26
THAN NEVER TO HAVE FOUGHT AT ALL	26
ONE NIGHT ON THE WAY TO THE FORUM	26
A PENNY SAVED IS A PENNY EARNED	25
TOUCH NOT TASTE NOT HANDLE NOT	25
HUMPTY DUMPTY HAD A GREAT FALL	25
LONDON BRIDGE IS FALLING DOWN	25
NEVER GO BROKE TAKING A PROFIT	25
AND NEVER THE TWAIN SHALL MEET	25
THE KINDLY FRUITS OF THE EARTH	25

With the key phrase selected being formed, preferably generally vertically as shown in FIG. 2, the object of the game is to then utilize the remaining playing pieces **10** to build words outwardly from the key phrase, using each letter of the key phrase as one of the letters of the respective words. For example, and as shown in FIG. 2, each letter of the key phrase may be utilized to provide the first letter of a word. The game would be completed by utilizing all of the 200 letters to form words corresponding to all of the letters of the key phrase.

Certain rules or conditions are preferably followed in building the words from the key phrase. For example, it has been found that it is preferable to build the words based upon the following four conditions:

- There must be one word completed for each letter of the KEY PHRASE.
- Words used cannot be less than five (5) letters in length (plurals or any tense ending may be used to meet this requirement) or more than ten (10) letters. Composite or hyphenated words may be used.
- Proper names, foreign words, contractions or abbreviations may not be used.
- A word any form of it) may not be used more than once in any one puzzle.

It has been found advisable that the playing pieces be separated into three groups prior to a player's building of the words, namely: vowels, easy-to-use consonants (D, G, L, N, R, S and T) and hard-to-use consonants (B, C, F, H, J, M, P, Q, V, W, X and Z) and, accordingly, the playing pieces **10** may be colored, or otherwise provided with identifying means, for aiding in separating the playing pieces **10** into these groups or a group of bins, compartments, or the like may be provided for separating the playing pieces into sets of individual letters, or such groups of letters. In this way, a player will be aided in forming the appropriate words, since he should make an effort to use at least one or more of the hard-to-use consonants in every word formed.

For example, using the key phrase "Little Strokes Fell Great Oaks," the following group of words may be formed to fulfill all of the above criteria, utilizing all 200 playing pieces identified above:

5	LAWABIDING	FUDGE
	IMMOBILIZE	EASTERN
	TANGLED	LACQUERS
	TOXICITY	LIVERY
	LENDS	GRADED
10	EFFECTIVE	RICKSHAW
	STICKS	EXPOUNDS
	TROUBLED	ARMORED
	ROWBOATS	TOWNSHIPS
	OFFSPRING	OPPORTUNE
15	KOWTOWS	ADJUSTMENT
	ENMESH	KETTLE
	SYMPHONICS	STRENGTH

While the playing pieces may be assembled on any flat surface, the gameboard **12** is particularly constructed and arranged for cooperation with the playing pieces **10** as an aid in playing the game.

Although, as pointed out above, the gameboard **12** may be fabricated of any desired material, in the exemplary form of gameboard **12** shown in the drawing, the gameboard **12** comprises a cardboard sheet **14** covered on the lower surface thereof with a cover sheet **16** and on the upper surface thereof with an imprinted sheet **18** for providing the playing surface. The playing surface **18** is imprinted with generally horizontally and vertically disposed lines **20** and **22**, respectively, to divide the playing surface **18** into a plurality of generally square locations **24**. The locations **24** should be at least as numerous as the number of playing pieces **10**. In the exemplary form shown, the horizontal and vertical lines **20** and **22** are configured to provide 26 generally horizontally disposed groups of locations, each generally horizontally disposed group of locations providing 10 locations. The leftmost location in each group is marked, as by means of an X, to indicate the preferred orientation of the key phrase for positioning playing pieces. Accordingly, the playing pieces **10** which define the key phrase may be positioned on each of the squares or locations **24** containing an X and the words may be built outwardly therefrom by positioning the appropriate playing pieces over the adjacent locations **24**.

As an aid in positioning the playing pieces **10** relative to the board **12**, means may be provided to enable frictional engagement between the playing pieces **10** and the playing surface **18**. For example, the undersurface of each of the playing pieces **10** may be provided with a flocked or otherwise roughened surface and the upper surface of the playing surface **18** may be likewise provided with a flocked or otherwise roughened surface to enable frictional interengagement therebetween. Alternatively, magnets or other temporary adhering means may be provided to aid in positioning the playing pieces **10** relative to the gameboard **12** and retaining the playing pieces **10** in such position.

The basic game described above may be modified for additional player interest and/or difficulty by initially positioning the key phrase on the gameboard in other than the leftmost column, so that the letters of the key phrase form, say, the third or fourth letter of the words, rather than the first word, as hereinbefore shown, illustrated, described and disclosed. Additionally, the game may be made more difficult by modifying the rules to preclude the use of plural or past tense forms of the words. Appropriate markings may also be provided on the gameboard to indicate to a player the ideal and minimum word lengths allowable under the rules or which will enable proper completion of the game.

The subject game may be played as a solitaire game, or may be made competitive by providing each player with a gameboard and a set of playing pieces or tiles and

initially starting with the same key phrase on the respective boards. The player first completing the game, or the player having the fewest unused letters at the end of a specified time limit would then be the winner.

"Wild" letter playing pieces or tiles may also be provided, either in addition to the 200 basic playing pieces or as substitutes for selected ones thereof. Such "wild" playing pieces would be either blank or provided with some indicia other than a letter and could be used for any letter required. For example, the playing pieces provided may comprise 200 playing pieces, including 6 "wild" playing pieces, 69 vowels, and 125 consonants, with the frequencies of the letters being, for example, as follows:

A-10	F-4	K-3	P-6	U-6
B-3	G-6	L-8	Q-1	V-2
C-6	H-5	M-5	R-12	W-5
D-10	I-14	N-12	S-17	X-2
E-22	J-1	Q-14	T-17	Y-2 and Z-1

The above distribution of letters results in a game which is exceedingly difficult to complete. A less difficult game results from the following letter distribution:

A-10	F-3	K-3	P-4	U-6
B-2	G-4	L-8	Q-1	V-1
C-7	H-4	M-5	R-12	W-3
D-12	I-14	N-13	S-17	X-1
E-24	J-1	O-14	T-17	Y-3 and Z-1

together with 8 "wild" playing pieces. Extra letters may be supplied to be used as replacements for any which may become lost.

In the embodiment hereinabove described, the symbols utilized correspond to letters of an alphabet, particularly the English alphabet, with the permissible symbol subsets corresponding to English language dictionary defined legitimate words. It is possible that the symbols and symbol set utilized may comprise other symbol sets, with well-defined elements, such as numbers, other alphabets, or the like, or with arbitrarily defined elements, such as ideographs (in a rebus-type game), or the like. Moreover, the symbol subsets need not be defined by formal lexicography, but may, for example, be defined by occupational, slang, foreign language, technical, or any predetermined or arbitrarily determined usage.

For example, the symbols may comprise numerical characters, in which instance the predetermined subset may be defined by a specific mathematical quantity or physical constant, such as pi, e , $\log_{10} e$, $\log e/10$, Planck's constant, etc., or the predetermined subset may be an arbitrarily defined quantity. The player selected subsets would correspond to mathematical series, such as arithmetic series, geometric series, or the like, or may correspond to mathematical or physical constants.

The playing pieces, rather than being non-valued or equivalued, as in the above embodiments, may also be valued or multivalued, especially for competitive play. In other words, in the above embodiments, completion of the game, or winning in the case of a competitive game, depends only upon the number of playing pieces utilized, rather than depending upon which playing pieces were utilized. Differing values may be related to differing ones of the playing pieces so that the specific play pieces utilized may affect the outcome.

Additionally, the key phrase or predetermined symbol subset may be eliminated, enabling the player or players to form the symbol subsets without being limited by the criteria imposed by any predetermined symbol subset or key phrase, the player selected symbol subsets being relatively random or being limited to forming an inter-related symbol subset corresponding to the predetermined symbol subset or key phrase but being player selected.

In competitive embodiments, the element of competition may involve time of completion, as heretofore described, or may be determined by total symbol value or formation of particular symbol subsets (e.g., "8-ball").

Competitive embodiments may also vary in mode; that is, in the number of playing surfaces, the cycle of play (such as alternate placement of playing pieces by two or more players), or in the procedures for symbol acquisition, deposition, removal, manipulation, or initial distribution to each player, that is, whether a player receives his symbols by chance or by design.

The placement of the symbols may also be controlled by chance, say the roll of a die, or the like, or chance may be a factor in the placement, rather than skill alone.

Accordingly, while there are four steps involved in defining the play procedure of the preferred embodiment, namely: (1) acquiring symbols, (2) depositing symbols on the playing surface, (3) removing symbols from the surface, and (4) manipulating symbols on the surface, these steps may each be modified, or even eliminated in certain cases, or constraints may be imposed on any of these steps without departing from the principle of this invention.

The degree of difficulty, which may be defined as an Index of Solution Facility, G , may be calculated. Suppose a version of the game is specified as follows:

- (1) The key phrase contains m characters;
- (2) The initial distribution of characters is D_0 ; and
- (3) There is a rule by which we can test whether or not a given ordered combination of characters is a legal play in the game.

At any stage in the solution, words will have been formed for $f-1$ of the m letters in the key phrase and we will have remaining a distribution D_f of letters out of which to form the next $m-f+1$ words; moreover, there will be exactly $S(D_f)$ ways of arriving at this situation; i.e., $S(D_f)$ distinct ways of forming words for the same $f-1$ of the m letters such that the distribution of letters which remain is D_f .

Consider the problem of forming the f th word: the f th letter of the key phrase may be selected and the dictionary consulted in order to determine how many legal (more than four and fewer than eleven letters) words can be formed with the f th letter as its initial letter and its initial letter and the remainder of the letters drawn from D_f . Designating this number S_f , each of these S_f possible f th words leads to a stage in the solution at which words will have been formed for f of the m letters in the key phrase and there will remain of the former distribution D_f a new distribution out of which the next $m-f$ words may be formed. Clearly, certain of the S_f possible f th words may contain the identical set of letters but in different order and use of either word would lead to the same new distribution. (For example: if the f th letter of the key phrase were B, and A, E, S, and T were available from D_f , then BEAST, BEATS, and BASTE would all be legal and would all lead to the same new distribution.) Identifying, then, the N_f unique sets of letters among the S_f words and creating N_f new distributions $D_{f+1}(i) = D_f - 1_i$ $i=1, 2, \dots, N_f$, where 1_i is the i th of the N_f sets of letters, and in fact:

$$S(D_{f+1}(i)) = n_i S(D_1)$$

where n_i is the number of legal words which can be formed from 1_i using the f th letter of the key phrase as the initial letter.

But for each i this is just like the initial situation: at this stage in the solution, words will have been formed for f of the m letters in the key phrase and there will remain a distribution $D_{f+1}(i)$ of letters out of which to form the next $m-f$ words; moreover, there will be exactly $S(D_{f+1}(i))$ ways of arriving at this situation. Thus, the process just described can be repeated until a stage is arrived at where either (1) a legal word cannot be formed beginning with the k th (final) letter of the key phrase the letters in D_k or (2) a legal word cannot be formed beginning with the k th (final) letter of the key phrase and using all of D_m , or (3) a solution is reached; i.e.,

all of D_m can be utilized to form a legal word beginning with the m th (final) letter of the key phrase. Now, there are exactly $S(D_m)$ ways of reaching this situation and $S(o)=nS(D_m)$ ways of reaching a solution based on D_mk where n is the number of legal words which can be formed having initially the m th letter of the key phrase and containing all of D_m .

The total number of solutions available for the given key phrase is clearly then the sum of all the $S(o)$ which exist, that is, which do not drop out because of (1) or (2) above. Call this total T_k for the K th key phrase.

From knowledge of the distribution of letters in connected discourse, the probability can be calculated for any given combination of letters in a key phrase. Clearly a vast majority of all possible 25 and 26 letter combinations chosen from the initial distribution will have such a low probability that they can be completely ignored, to wit: a key phrase containing all consonants is highly unlikely at best. For each combination C_j of letters chosen from the initial distribution, whose probability of occurrence P_{c_j} in a key phrase is greater than, say 0.001, T_{c_j} can be computed.

The index of facility of solution of a game with given initial letter distribution is therefore:

$$G = \sum_j a_j P_{c_j} \text{ where } a_j = 0 \text{ if } P_{c_j} < 0.001 \\ a_j = 1 \text{ if } P_{c_j} \geq 0.001$$

The existence of this G enables the simple comparison to be made of the difficulty of any two games in this general form. In fact, if G_1 is the facility index of one game and G_2 is the facility index of a second game, and $G_1 > G_2$ then clearly the second game is more difficult than the first. Notice that the two games may not even use the same characters or have the same definition of legal words. In fact, the foregoing enables the comparison of any two games employing (1) a key phrase of any length, (2) any initial distribution of characters, and (3) any rule for checking the legality of a given ordered combination of the characters.

What is claimed is:

1. Apparatus for playing a solitaire game comprising, in combination, a gameboard having lines thereon defining an array of areas constituting playing piece locations, said array comprising 26 rows each having 10 areas; a plurality of playing pieces, at least some of which are provided with a letter of the alphabet, the lettered pieces being distributed generally in accordance with the following letter frequency table;

A-10	F-5	K-4	P-6	U-6
B-4	G-6	L-8	Q-1	V-2
C-6	H-5	M-6	R-12	W-5
D-10	I-14	N-12	S-17	X-2
E-22	J-1	O-14	T-17	Y-3 and Z-1

and means defining exemplary key phrases to be constructed by positioning on said gameboard some of said lettered playing pieces with each playing piece being positioned on a single one of the areas in a single row so that words may be formed on the rows of the gameboard utilizing the remaining playing pieces, each key phrase being such that there is at least one solution wherein all of the playing pieces are utilized to form words on the gameboard.

2. Apparatus defined in claim 1 wherein said means defines exemplary key phrases of at least 25 and not more than 26 letters each.

3. Apparatus defined in claim 1 wherein there is provided at least one visually distinguished playing piece having no letter thereon and which may be arbitrarily utilized as a substitute for any desired letter.

4. Apparatus defined in claim 1 wherein one area of each of said rows is visually distinguished from the other areas to define preferred locations for constructing the key phrases from said playing pieces.

5. Apparatus for playing a solitaire game comprising, in combination, a gameboard having lines thereon defining an array of areas constituting playing piece locations, said array comprising 26 rows each having 10 areas; a plurality of playing pieces each of which is provided with a letter of the alphabet, the pieces being distributed generally in accordance with the following letter frequency table:

A-10	F-4	K-3	P-6	U-6
B-3	G-6	L-8	Q-1	V-2
C-6	H-5	M-5	R-12	W-5
D-10	I-14	N-12	S-17	X-2
E-22	J-1	O-14	T-17	Y-2 and Z-1

and six visually distinguished playing pieces void of any letter for arbitrary use as any desired letter; together with means defining exemplary key phrases to be constructed by positioning some of said lettered playing pieces on said gameboard with each playing piece being positioned on a single one of the areas in a single row so that words may be formed on the rows of the gameboard utilizing the remaining playing pieces, each key phrase being such that there is at least one solution wherein all of the lettered playing pieces are utilized to form words on the gameboard.

6. Apparatus for playing a solitaire game comprising, in combination, a gameboard having lines thereon defining an array of areas constituting playing piece locations, said array comprising 26 rows each having 10 areas; a plurality of playing pieces each of which is provided with a letter of the alphabet, the pieces being distributed generally in accordance with the following letter frequency table:

A-10	F-3	K-3	P-4	U-6
B-2	G-4	L-8	Q-1	V-1
C-7	H-4	M-5	R-12	W-3
D-12	I-14	N-13	S-17	X-1
E-24	J-1	O-14	T-17	Y-3 and Z-1

and eight visually distinguished playing pieces void of any letter for arbitrary use as any desired letter; together with means defining exemplary key phrases to be constructed by positioning some of said lettered playing pieces on said gameboard with each playing piece being positioned on a single one of the areas in a single row so that words may be formed on the rows of the gameboard utilizing the remaining playing pieces, each key phrase being such that there is at least one solution wherein all of the lettered playing pieces are utilized to form words on the gameboard.

7. Apparatus for playing a solitaire game comprising, in combination, a gameboard having lines thereon defining an array of areas constituting playing piece locations, said array comprising 26 rows each having 10 areas; a plurality of playing pieces each of which is provided with a letter of the alphabet, the pieces being distributed generally in accordance with the following letter frequency table:

A-13	F-3	K-3	P-4	U-6
B-2	G-5	L-8	Q-1	V-1
C-7	H-5	M-5	R-13	W-3
D-14	I-14	N-15	S-19	X-1
E-24	J-1	O-12	Y-17	Y-3 and Z-1

and ten visually distinguished playing pieces void of any letter for arbitrary use as any desired letter; together with means defining exemplary key phrases to be constructed by positioning some of said lettered playing pieces on said gameboard with each playing piece being positioned on a single one of the areas in a single row so that words may be formed on the rows of the gameboard utilizing the remaining playing pieces, each key phrase being such that there is at least one solution wherein all of the lettered playing pieces are utilized to form words on the gameboard.

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8. Appartus for playing a game comprising, in combination, a gameboard having lines thereon defining an array of areas constituting playing piece locations, said array consisting of a plurality of rows each having a plurality of areas; a plurality of playing pieces each of which is provided with a letter of the alphabet, said playing pieces being fewer in number than the number of said areas with the letters thereof having a frequency distribution such that it is possible to form an array of words on the gameboard utilizing all of the playing pieces with one word in each row and at least one aligned series of letters transverse said rows forming a key phrase; together with means defining exemplary key phrases to be constructed by positioning some of said playing pieces on said gameboard so that words may be formed on said rows of the gameboard utilizing the remaining playing pieces, one for each area.

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