

[54] **PATTERN-MATCHING PUZZLE**

[72] Inventor: **William Keister**, 66 Baltusrol Way, Short Hills, N.J. 07078

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[51] Int. Cl. ....A63f 9/08

[58] Field of Search .....273/153 R, 156, 153 S; 70/289, 70/290

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*Primary Examiner*—Anton O. Oechsle  
*Attorney*—James Warren Falk

[57] **ABSTRACT**

A pattern matching game is disclosed in which a slide-carrying teeter bars has to be removed from a frame by selectively pivoting individual ones of the teeter bars through a gate element in one rail of the frame. A series of pattern bars carried by a support or rack adjacent the frame member prevent opening of the gate element unless the position of the teeter bar adjacent each pattern bar matches the pattern bars. The pattern bars may be removed and rearranged in different patterns creating a number of different puzzles, each requiring a different series of moves for its solution.

**14 Claims, 5 Drawing Figures**

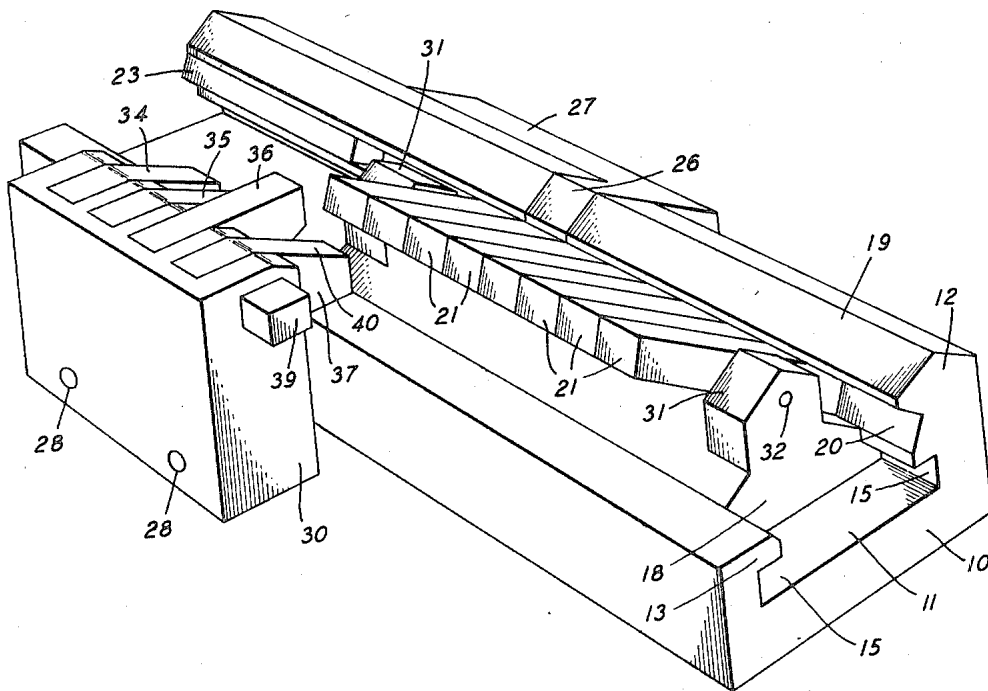


FIG. 1

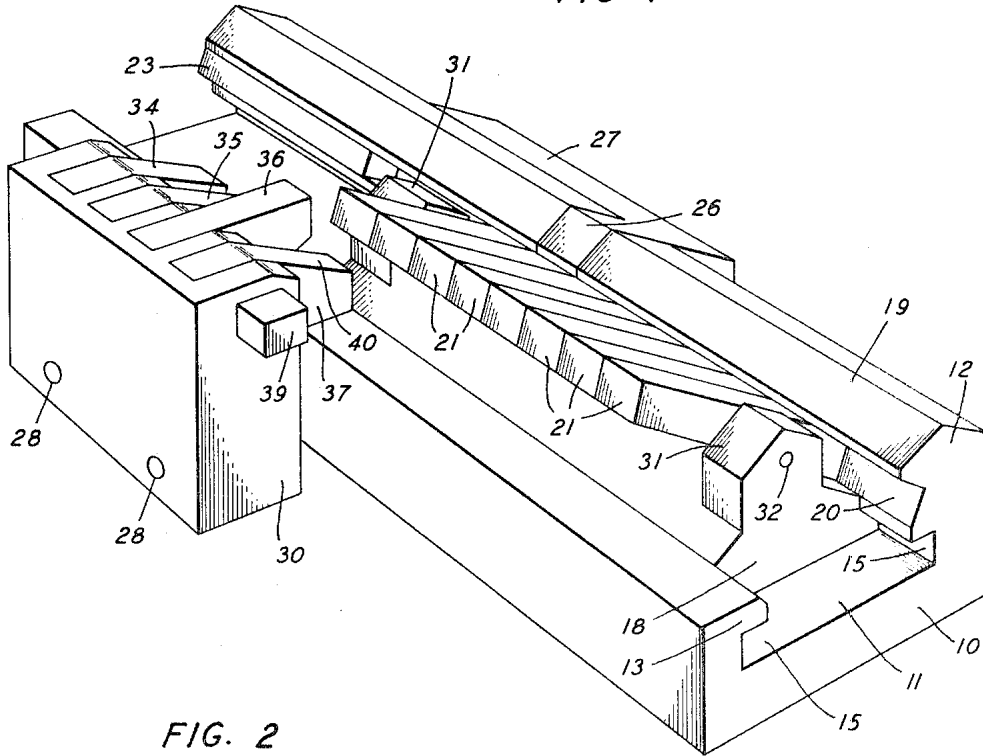


FIG. 2

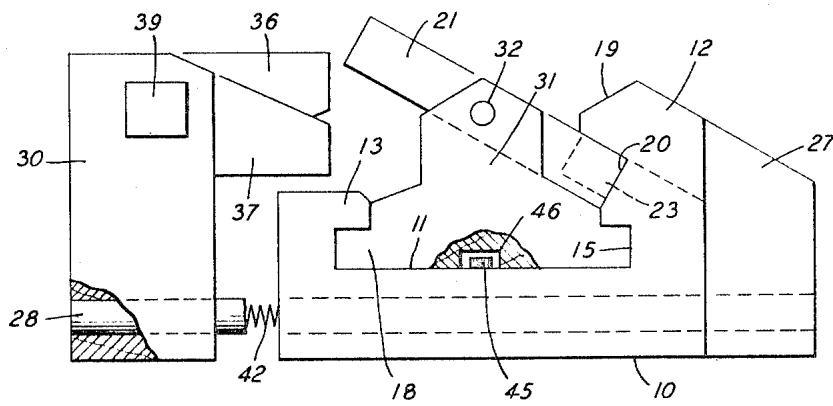
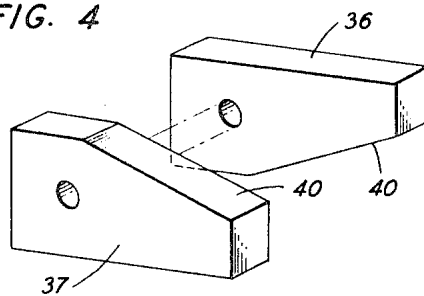
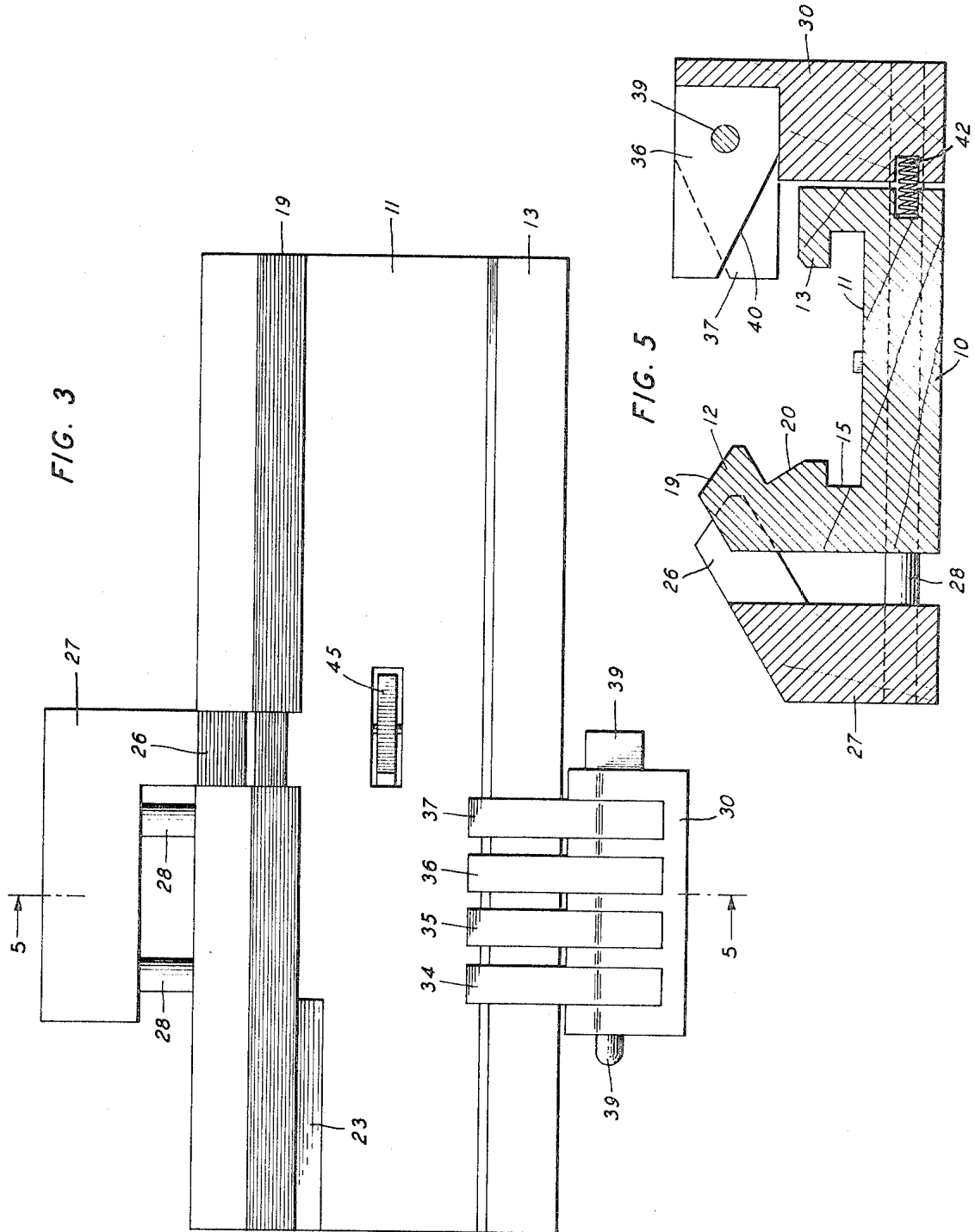


FIG. 4



INVENTOR  
WILLIAM KEISTER  
BY *James Stalk*  
ATTORNEY



INVENTOR  
WILLIAM KEISTER  
BY *James S. Felt*  
ATTORNEY

## PATTERN-MATCHING PUZZLE

## BACKGROUND OF THE INVENTION

This invention relates to a puzzle game and more particularly to a pattern-matching puzzle.

For centuries people have amused, and sometimes frustrated, themselves by devising puzzles. Many of these required only imagination or at best paper, pencil, and a logical or mathematical turn of mind. Cannibals and missionaries have been crossing rivers for generations; engines of trains have been reversing their directions on a siding for decades. Whole books of such puzzles are available.

Other puzzles require manipulation of physical objects, sometimes with a certain amount of dexterity but usually only with an appreciation of the underlying mathematical principles. Triple rings that can be assembled, in a unique way, into a single ring are of this type. So are wooden objects, such as balls or squares, made up of interlocking parts that must be assembled in a certain order.

One drawback of these puzzles is that they represent only a single puzzle each and thus only a single solution. Once the puzzle is made, its interrelations are set and cannot be changed. Having once accomplished the puzzle, the owner gets little satisfaction out of repeating the solution himself, though he may get considerable satisfaction out of observing others being unable to find the solution.

It is accordingly an object of this invention to provide a puzzle whose key interrelationships can be varied, thereby affording the user a variety of different solutions.

It is another object of this invention to provide a pattern-matching puzzle in which various elements must conform to set patterns as the puzzle is solved. More specifically it is an object of certain embodiments of this invention to provide such a puzzle in which the patterns can be varied between solutions.

## SUMMARY OF THE INVENTION

These and other objects of this invention are attained in one specific illustrative embodiment in which a plurality of teeter bars are provided together with a lesser plurality of pattern bars. The teeter bars are mounted on a slide positioned in a bed or frame between two side rails. The higher side rail has two characteristics. First, there is a groove extending along the length of the bed so that one end of the teeter bars can be positioned in it; the groove does not extend to the end of the bed, however, so that the slide cannot move off the bed unless all of the teeter bars are positioned so that their one ends rest on top of that higher side rail. The second characteristic of the side rail is that it has an opening substantially midway in the side rail, the opening being as wide as a teeter bar so as to provide a path through which the teeter bar may be pivotally moved to shift the position of its one end between the groove and the top of the side rail or between the top of the side rail and the groove.

A gate element, however, is positioned in this opening. In its normal position it appears merely as a part of the side rail and thus forming a part of the frame. Accordingly a teeter bar end can pass along its top or along the rail groove at the gate element. The gate element is physically connected to a spring loaded support or rack positioned adjacent the lower side rail. The player of the game by pressing the support member against this slight spring bias can move the support member up to the lower side rail. This simultaneously pushes the gate element out of the opening in the other rail, to allow a change in the position of a teeter bar.

There is, of course, a catch to this simple operation. The support member carries a number of pattern bars. These are advantageously removably supported, as by a pin, so that their pattern can be altered at will, thereby varying the solution to the puzzle. The pattern bars are shaped so that each presents one of two patterns to the teeter bars. Either a pattern bar requires that the teeter bar directly adjacent it be resting on the higher side rail, in which case the pattern bar will pass over

its other end, or the pattern bar requires that the teeter bar adjacent it be in the groove, in which case the pattern bar will pass under the other end of the teeter bar. If a teeter bar adjacent a pattern bar does not conform to the pattern of that pattern bar, the support member is blocked and cannot move adjacent the lower side rail. More importantly, when this happens the gate element cannot move out of the opening to allow a change in position of the teeter bar which is adjacent the gate element at that moment.

Advantageously there are more teeter bars than pattern bars. In the embodiment described herein there are eight teeter bars and four pattern bars. Since each pattern bar may present one of two patterns, these four pattern bars represent 16 different game solutions. The four pattern bars therefore appear at test locations for up to four teeter bars that may be located between the gate and the stop in the groove.

In the initial position of the puzzle, the slide is at the end of the base away from the stop or closed end of the groove. All of the teeter bars have their one ends below the upper surface of the higher side rail and in the groove. The object of the puzzle is to manipulate the slide and the gate element to allow the slide to be removed from the other end of the base. Since the groove at that end is blocked by the stop, this requires that all of the teeter bars be moved so that their one ends rest on top of the higher side rail.

As noted above, a teeter bar can only be pivoted when it is at the gate and the gate element may be moved. This in turn can only occur if the teeter bars adjacent the pattern bars, which may mean up to four teeter bars, match their positions against the patterns of the pattern bars. If one or more of the pattern bars in the test spaces do not match the teeter bars, the pattern bars strike the teeter bars and the gate cannot be opened. What is required therefore is a series of moves of the slide backwards and forwards, with teeter bars being pivoted at the gate position so that those teeter bars (from zero to four) at the test positions adjacent pattern bars match the patterns of the pattern bars.

As noted above, each of the possible combinations of patterns represents a different puzzle requiring a different sequence of movements of the teeter bars for its solutions and, with four pattern bars, there are sixteen different puzzles. The simplest pattern (all pattern bars up) is trivial and requires only the eight moves needed to pivot the eight teeter bars individually through the gate position. The longest of the 16 puzzles however takes 170 moves. Some patterns requiring an intermediate number of moves are actually more difficult, however, since the sequence of moves is more complex.

## DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of one specific illustrative embodiment of my invention;

FIG. 2 is an end view of the embodiment of FIG. 1;

FIG. 3 is a plan view of the frame member, gate element, and pattern bars of the embodiment of FIG. 1, the slide and teeter bars not being in position;

FIG. 4 is a perspective view of two of the pattern bars, and

FIG. 5 is a sectional view of the frame member, gate element, and pattern bars taken along the line 5—5 of FIG. 3.

## DETAILED DESCRIPTION

Turning now to the drawing, there is depicted one specific illustrative embodiment of my invention of a pattern matching puzzle. As seen in FIG. 1, the puzzle comprises a frame or base member defining a bed portion 11, a higher side rail 12, and a lower side rail 13. The two side rails extend slightly over the bed portion 11 so as to define tracks 15 in which a slide 18 can be positioned.

The higher side rail 12 has a sloping upper surface 19 on which teeter bars 21 can rest their one end and also a groove 20 extending almost its entire length. The ends of the teeter bars 21 can also rest in the groove 20. However a stop element 23 is positioned at one end of the groove 20. This stop element

may be physically a portion of the rail 19, as depicted, or may be merely a pin extending in the groove 20. Its purpose, as will be apparent from the subsequent description, is to prevent the slide 18 from being removed from the frame 10 at that end of the frame whenever any one teeter bar 21 has its end positioned in the groove 20.

The higher rail 19 also has an opening 25 in its upper surface, as best seen in FIG. 3. Normally however this opening is closed by a gate element 26 is formed so as to appear merely as a portion of the rail 19, as seen in FIG. 1. The gate element 26 is carried by a gate support 27 which is connected as by rods 28 to a pivot bar support member 30, discussed further below.

The slide 18 has two end mounts 31 between which the teeter bars 21 are pivotally mounted, as on a pin or rod 32. By removing the gate element 26 from the opening 25 any one of the teeter bars 21 may be pivoted between a position wherein its one end is in the groove 20, as shown in FIG. 1, and a position wherein the one end rests on top of the higher side rail 19.

As noted above, however, the gate element 26 is supported by a gate support 27 physically connected, as by the rods 28, to a pattern bar support member 30. Member 30 supports a plurality of pattern bars 34, 35, 36, and 37. In accordance with my invention these bars may be readily removed and their positions changed; to that end they are supported by a removable pin 39 extending through the support 30. Further they are shaped so as to have a sloping surface 40.

When a pattern bar is mounted by pin 39 on the support 30 so that the sloping surface 40 is up, then that pattern bar will extend under a teeter bar 21 whose one end rests in the groove 20, when the pattern bar support 30 and the pattern bars are pressed towards the lower side rail 13. Thus, as seen in FIG. 1, a teeter bar 21 will allow pattern bar 37 to slide underneath it. On the other hand if a pattern bar has its sloped surface 40 down, as pattern bar 36, then that pattern bar will hit against the end of a teeter bar 21 having its one end in the groove 20 thereby preventing the motion of the support 30 to abut against the lower side rail 13. Thus when the teeter bars are positioned as depicted in FIG. 1, the support 30 will be blocked from moving whenever any teeter bar 21 is positioned opposite the pattern bar 36. In order to allow the support 30 to move, the teeter bar at the pattern bar 36 must have been pivoted so that its one end rests on the upper surface 19 of the side rail 12, in which case the other end of the teeter bar will pass under the sloping surface 40 of the pattern bar 36.

The reason that movement of the support 30 is of such importance is because, as noted above, the gate element 26 is physically connected to the support. Thus when it is desired to open the gate element 26 to allow a teeter bar 21 to pivot either from the rail surface 19 to the groove 20 or vice versa through the opening 25, the support 30 must be moved against the side rail 13. A spring 42, best seen in FIGS. 2 and 5, normally biases the support 30 away from the side rail 13.

The slide 18 is held from removal out the open end of the frame 10 by a spring loaded pawl 45 located in the bed 11 and cooperating with a slot 46 in the bottom of the slide 11 so that the slide 18 can only be removed from the closed end of the frame, that is, the end where the groove 20 is blocked by the stop member 23.

When it is desired to play the game, that is to solve one of the possible matching puzzles, the pattern bars are first set into one of the sixteen possible test patterns, depending on the number of pattern bars having their sloping surfaces 40 up or down. One possible combination of the pattern bars is depicted in FIG. 1, though this is only one of the sixteen possible puzzles for this embodiment.

The slide 18 is slid onto the bed 11 with all the teeter bars 21 having their one ends in the groove 20, as depicted in FIG. 1. This is the initial position of the puzzle. The object of the puzzle is to manipulate the slide and the gate 26 so that all of the teeter bars 21 are placed above the rail 12 with their one ends on the surface 19, in which position the slide 18 may then be removed from the other end of the frame or base 10.

As noted above, the gate is connected by the cross members or rods 28 through holes in the bottom of the base 10 to the support or rack 30 carrying the four pattern bars 34-37. The pattern bars may be considered as appearing in four test locations at each of which locations it is possible to test the position of a teeter bar. The first pattern bar 37 defines a test position directly adjacent to the gate position, that is, when a teeter bar 21 is at the gate 26, the immediately preceding teeter bar is being tested by the pattern bar 37. The last pattern bar 34 is positioned directly next to the stop element 23 so that four teeter bar test positions are defined between the stop element 23 and the gate element 26. Accordingly, if a teeter bar 21 is pivoted so as to have its one end in the groove 20, then it will bear against the stop element 23 and be tested by the pattern bar 34. At the same time the fourth succeeding teeter bar will be at the gate element 26 and can be pivoted through the opening 25.

The gate element 26 is normally held closed by the spring 42, which also normally holds the pattern bars clear of the teeter bars so that the slide may move to and fro on the base 10, being limited in its motion by the stop member 23 and the pawl 45. A player would normally hold the base in his left hand with his thumb against the support or rack 30 while with his right hand he moves the slide 18. If the teeter bars in the four test locations match the setting of the corresponding pattern bars, the motion of the support under this thumb pressure can continue, thereby allowing the gate to open.

One solution for the puzzle presented by the position of the pattern bars indicated in the drawing is listed below. In this solution the binary "0" is taken as meaning that the teeter bar 21 has its end resting in the groove 20, that is, is down, while a binary "1" is taken as meaning that the teeter bar 21 has its end up or resting on the upper surface 19 of the higher side rail 12. While the teeter bars are not identified separately, their positions are listed in order as the slide is moved back and forth:

TABLE I

Move	Pattern Bars				Gate Position 25	Teeter Bars 21						
	34	35	36	37								
0					0	0	0	0	0	0	0	0
1				0	1	0	9	0	0	0	0	0
2			0	1	0	1	0	0	0	0	0	0
3					0	0	0	1	0	0	0	0
4					1	0	0	1	0	0	0	0
5	1	0	0	1	0	1	0	0	1	0	1	0
6					0	0	0	1	0	1	0	0
7				0	1	0	1	0	1	0	0	0
8			0	1	0	0	0	1	0	0	1	0
9					0	0	0	0	1	0	0	0
10					1	0	0	0	0	1	0	0
11				1	0	1	0	0	1	0	0	0
12					0	0	1	0	0	1	0	0
13					0	1	1	0	0	1	0	0
14					1	1	1	0	0	1	0	0
15	1	1	1	0	0	1	0	0	1	0	1	0
16					0	1	1	0	0	1	0	1
17					0	0	1	0	0	1	0	1
18					1	0	1	0	0	1	0	1
19				1	0	0	0	0	1	0	1	0
20					0	0	0	0	0	1	0	1
21					0	1	0	0	0	1	0	1
22			0	1	0	1	0	1	0	1	0	1
23					0	0	1	0	1	0	1	0
24					1	0	0	1	0	1	0	1
25	1	0	0	1	0	0	0	1	0	0	0	1
26					0	0	0	1	0	0	0	1
27				0	1	0	1	0	0	0	1	1
28			0	1	0	1	0	0	0	1	0	1
29					0	0	0	0	0	0	0	1
30					1	0	0	0	0	0	0	1
31				1	0	1	0	0	0	0	1	1
32					0	0	1	0	0	0	0	1
33			0	0	1	0	1	0	0	1	0	1
34					1	0	1	0	1	0	0	1
35				1	0	0	0	1	0	0	1	1
36					0	0	0	0	0	0	0	1
37				0	1	0	0	1	0	0	0	1
38					1	1	0	0	1	0	0	1
39					1	1	0	0	1	0	0	1
40					0	1	0	0	1	0	1	1
41					0	0	0	0	1	0	1	1
42					1	0	0	0	1	0	1	1
43				1	0	1	0	1	0	1	1	1
44					0	0	1	0	1	0	1	1
45			0	0	1	0	0	1	1	0	0	1
46					1	0	1	0	0	0	1	1
47				1	0	0	0	0	1	1	0	1
48					0	0	0	0	0	0	1	1
49					0	1	0	0	0	0	1	1

TABLE I—Continued

Move	Pattern Bars				Gate Position 25	Teeter Bars 21				
	34	35	36	37		1	1	1	1	
50-----		0	1	0	1	0	0	1	1	
51-----				0	0	0	1	0	0	1
52-----					1	0	0	1	0	1
53-----	1	0	0	1	0	1	1	1		
54-----					0	0	0	1	0	1
55-----				0	1	0	1	0	1	1
56-----		0	1	0	0	0	1	1	1	
57-----				0	0	0	0	0	1	1
58-----					1	0	0	0	0	1
59-----			1	0	1	0	0	1	1	1
60-----					0	0	1	0	0	1
61-----	0	0	1	0	1	1	1	1		
62-----					1	0	1	0	1	1
63-----			1	0	0	0	1	1	1	1
64-----					0	0	0	0	1	1
65-----				0	1	0	0	1	1	1
66-----		0	1	0	1	1	1	1	1	
67-----				0	0	0	1	1	1	1
68-----					1	0	0	1	1	1
69-----			1	0	1	1	1	1	1	1
70-----					0	0	1	1	1	1
71-----				0	1	1	1	1	1	1
72-----					1	1	1	1	1	1

Needless to say when all of the teeter bars 21 are up and have their ends resting on the upper surface 19 of the higher side rail 12, as indicated by the binary notation 11111111 in move 72, then the slide 18 can be removed from the base member 10 without interference by the stop element 23 in the groove 20.

It is to be noted, of course, in table I above that a move is only possible when a teeter bar 21 is down (0) at pattern bar 34, down (0) at pattern bar 35, up (1) at pattern bar 36 and down (0) at pattern bar 37 and, in fact, all of the teeter bars indicated for those test positions have precisely those positions or values. Similarly, the slide can only be moved past the first pattern bar 34, i.e., past the stop member 23, when the teeter bar required to be past that first pattern bar is up (1); a look at table I indicates that for those moves e.g., 15) where a teeter bar is positioned to the left of the first pattern bar 34 it is in fact up (1).

A further characteristic of the puzzle in accordance with my invention can be noted in table I. A move of position in a teeter bar is only possible at the gate element position 25. Accordingly the teeter bar positions indicated for each move differ from the preceding and succeeding moves by only one teeter bar and in each case by the position of the teeter bar at the gate position 25. It is also apparent from the table how the slide must be moved both forward and backward to position the desired teeter bar at that gate position.

It is left to the reader and to the player of the game to figure out possible solutions for the 15 other puzzles that may be defined by the four pattern bars employed in this specific embodiment, as well as solutions that may be utilized with other embodiments having less or more teeter bars or pattern bars.

Accordingly, it is to be understood that the above-described arrangements are merely illustrative of the application of the principles of my invention. Numerous other arrangements may be devised by those skilled in the art without departing from the spirit and scope of my invention. Thus various other physical shapes may be utilized for the teeter bars and the pattern bars, provided that the teeter bars and pattern bars are blocked in one test position and allowed to mesh towards each other in another test position. Similarly different shapes and mechanisms for the gate element will be obvious to those designing different physical implementations of my invention.

Further while the specific embodiment disclosed utilizes removable pattern bars, whereby a plurality of different puzzles can be formed, it is to be understood that a puzzle in accordance with my invention could utilize a set grouping of pattern bars, as is embodiments wherein the pattern bars and their support rack are molded as a single piece.

What I claim is:

1. A pattern-matching puzzle comprising

a bed member having a first and second side rail, said first side rail having a groove therein along the length of said bed member and an opening in its upper surface and communicating with said groove,

stop means in said groove adjacent one end of said bed member,

a slide member slidable along said bed member between said side rails and supporting a plurality of teeter bars capable of pivoting so that one end of a teeter bar rests on said first side rail in one position and in the other position said one end extends into said groove,

and gate means for permitting one of said teeter bars to be pivotally moved between said first side rail and said groove, said gate means comprising a support member adjacent said second rail and including a plurality of pattern bars and a gate element connected thereto and fitting into said opening in said first side rail, said support member being movable to position said pattern bars over said second side rail and simultaneously to remove said gate element from said opening in said first side rail, each of said pattern bars being so shaped and selectively disposed on said support member to pass above the other end of a teeter bar whose one end is in said groove, to pass the other end of a teeter bar whose one end rests on said first side rail, or be blocked by the other end of a teeter bar.

2. A pattern-matching puzzle in accordance with claim 1 wherein said plurality of pattern bars comprises a lesser number than said plurality of teeter bars.

3. A pattern-matching puzzle in accordance with claim 1 further comprising rod means extending through said bed member connecting said support member and said gate element and spring means normally positioning said support member away from said second side rail and said gate element in said first side rail.

4. A pattern-matching puzzle in accordance with claim 1 wherein said pattern bars are removable whereby their pattern can be altered.

5. A pattern-matching puzzle in accordance with claim 1 wherein the width of said opening in said first side rail accommodates only one of said teeter bars at a time.

6. A pattern-matching puzzle in accordance with claim 5 wherein said support member is positioned adjacent said second side rail so that the teeter bar directly adjacent the teeter bar at said gate element is matched in position against the first end one of said pattern bars.

7. A pattern-matching puzzle in accordance with claim 6 wherein said pattern bars are positioned along said second rail to match against successive ones of said teeter bars.

8. A pattern-matching puzzle in accordance with claim 7 wherein said support member is positioned adjacent said bed member so that a teeter bar in said groove and against said stop means is matched in position with the other end one of said pattern bars.

9. A pattern-matching puzzle comprising a plurality of teeter bars movable between two positions, a plurality of pattern bars movably positioned so as to come into complimentary association with said teeter bars, said pattern bars being prevented from moving into said complimentary association if any individual one of said teeter bars is not in the one of said two positions to match it then corresponding said pattern bar, and

a gate element physically connected to said pattern bars for allowing an individual one of said teeter bars to change between said two positions when said pattern bars may be moved into the path of said teeter bars.

10. A pattern-matching puzzle in accordance with claim 9 wherein the number of said plurality of teeter bars exceeds the number of said pattern bars and each of said pattern bars is matched against only one of said teeter bars at a time.

11. A pattern-matching puzzle in accordance with claim 10 wherein the teeter bar positioned at said gate element is not in the path of said pattern bars when the latter are moveable into complimentary association with the teeter bars.

12. A pattern-matching puzzle comprising a frame member, a slide member slidable along said frame member and supporting a plurality of teeter bars capable of pivoting between two positions,

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stop means on said frame member and preventing said slide member from moving past it if any one of said teeter bars is in one of said positions, and

gate means for permitting said teeter bars to be pivoted between said two positions, said gate means including a support member movably supporting pattern defining means so as to come into association with at least certain ones of said teeter bars when said pattern defining means is complementary to the shape defined by the tilted condition of said certain ones of said teeter bars, and a gate element forming a portion of said frame member and physically connected to said support member, whereby said

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gate element may be removed from said frame member when said pattern bars may be moved into association with said teeter bars.

13. A pattern-matching puzzle in accordance with claim 12 wherein said pattern bars are movable into association with said teeter bars between said stop means and said gate element.

14. A pattern-matching puzzle in accordance with claim 13 wherein said gate element accommodates only one of said teeter bars at a time.

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