

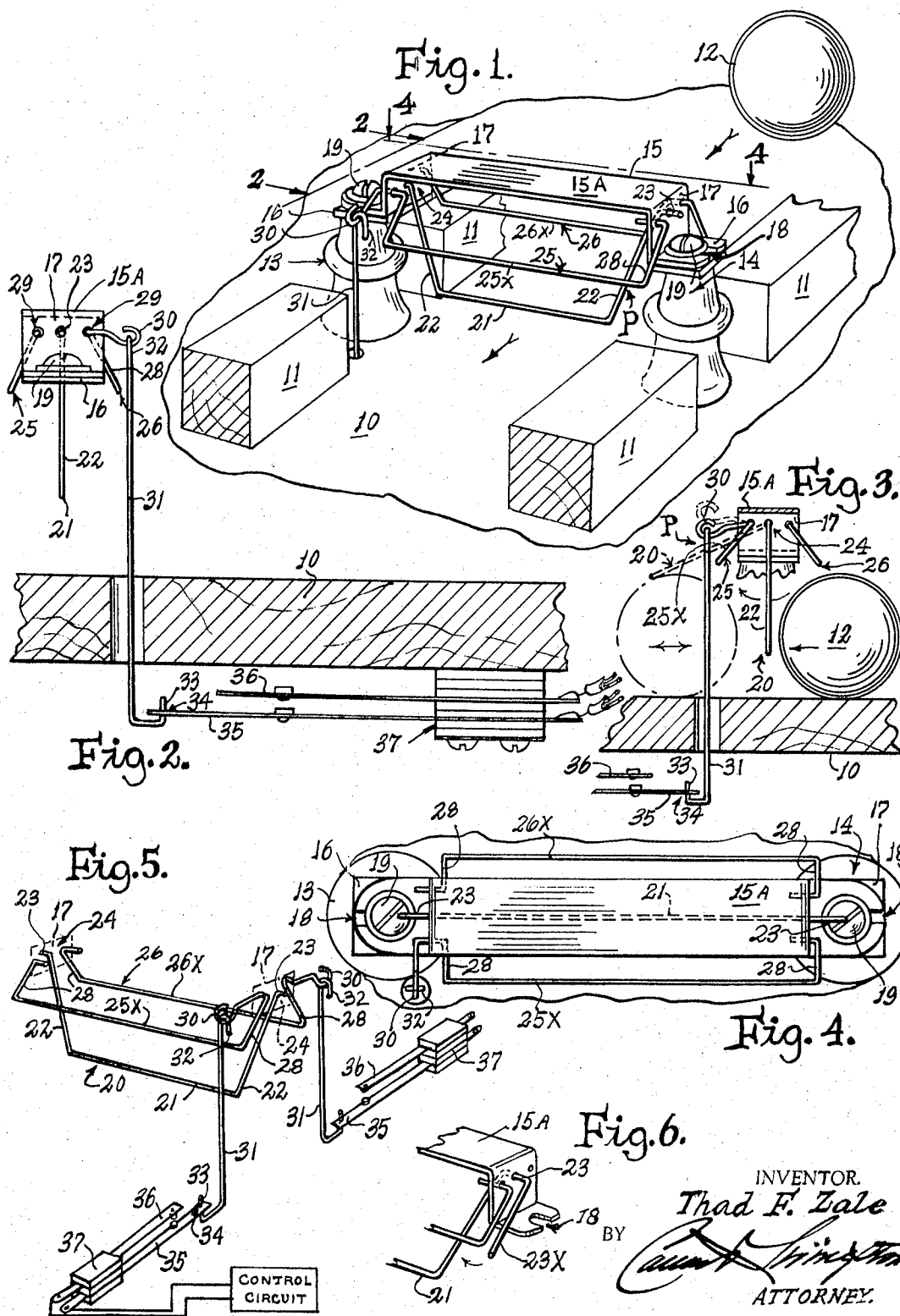
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BALL GATE

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BALL GATE

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ABSTRACT OF THE DISCLOSURE

The disclosure provides a control means cooperable with a wireform or similar ball-operated gate in ball-rolling games characterized in that a control appendage which may also be a wireform is pivoted in close proximity to the gate to be engaged by the latter in a sort of camming lever action which may have a wide range of lever ratios, whereby the control appendage may be made to load the gate more or less and provide selected leverage and sensitivity adapting it for connection to a desired controlled device, such as a switch, for example, through a further leverage or linkage means.

This invention provides an improved ball gate of the pendant or overhead type, in conjunction with cooperative switch-actuating means for use in ball-rolling games, and characterized particularly in that the actuating means for the switch provides a positive leverage which applies a minimal loading to the ball gate means itself and greatly reduces the tendency of the gate to stall or hang-up a low-energy ball.

A further advantage of the improvement resides in the fact that two-way action and corresponding positive switch-actuating operation is made possible by a very simple and inexpensive wire-form actuator lever coacting with a larger wire-form pendant gate.

Additional aspects of novelty and utility reside in details of the construction and operation of the device described hereinafter in view of the annexed drawing, in which:

FIGURE 1 is a fragmentary perspective view of a portion of a ball-rolling board equipped with the novel gate structure;

FIGURE 2 is an enlarged fragmentary side view of the gate and switch means as seen along lines 2-2 of FIGURE 1, parts being shown in elevation and in section;

FIGURE 3 is a fragmentary sectional operating detail similar to the view of FIGURE 2;

FIGURE 4 is a top plan view looking along lines 4-4 of FIGURE 1;

FIGURE 5 is a skeletonized perspective of the essential components of a dual-action type of the new gate;

FIGURE 6 is a perspective fragment of a modified form of the gate adapted to uni-directional operation.

As seen in FIGURE 1, the gate structure is mounted upon a ball-rolling surface 10 usually in association with some form of ball-guiding means such as represented by the rails 11, which are spaced to guide a ball 12 along a predetermined path whether the ball is rolling under the effect of gravity or propulsion or both, the directional

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arrows in FIGURE 1 indicating the advance of such a ball toward the guideway and gate.

Mounted upon a pair of elevated supports, which may take the form of the ball bumpers 13 and 14 situated at opposite sides of the guideway or the path of travel of the ball, is an overhead supporting bracket 15 comprising an elongated cross member 15A offset at opposite ends to provide mounting feet 16 each preferably provided with open-ended slots 18 interfitting with mounting screws 19 engaged in the tops of the supports or bumpers 13, 14, and also serving to secure the latter side on the ball-rolling board.

The aforesaid offsets at the ends of the bracket each include a vertical panel section 17 connecting the elongated span 15A with the feet and seen to advantage at the top of FIGURE 2, and also indicated functionally by dotted lines in FIGURE 5. These panels are perforated as at 24 to afford a means for journalling or pivotally seating the offset ends of certain wire forms which constitute the gate and associated switch-actuating bails.

The ball gate 20 consists of a simple wire form of approximately U-shape comprising a bottom cross bar or bight portion 21 joining a pair of opposite side arms 22, the ends 23 of which are offset to define pivot fingers each seating in aligned pivot perforations 24 in the bracket panels 17. Thus, the gate 20 is normally freely pivotable and by its own weight and configuration tends to hang pendently in the normal full-line positions seen in FIGURES 1 to 4.

The span of the cross bar or bight 21 of the gate is made somewhat shorter than the distance across the alleyway, and in some cases may desirably be made quite short, coming almost to a point; but in any case said bar will be disposed in spaced relation from the surface of the ball-rolling board at a distance thereabove to be positively engaged and elevated by an advancing ball, as in FIGURE 3, to be pivoted upwardly out of the path of the ball, as indicated in dotted lines, so that the ball may readily pass beneath the cross bar 21. Such gating of the ball is preferably bi-directional, as in the arrangement of FIGURE 3, or may be uni-directional, in accordance with the modified construction shown in FIGURE 6 wherein the gate is prevented from opening in one direction.

Means for actuating a control device, such as a gate switch, comprises one or two switch-operating bails 25, 26 (FIGURES 3 and 4 particularly) which are also simple wire forms of approximately U-shaped configuration similar to that of the gate but having the cross bar or bight members 25X, 26X thereof connecting with much shorter side arms 28 so that said cross bars will be disposed at a camming point —P— (FIGURES 1 and 3) which is at a level substantially above the cross bar 21 of the gate, with the result that when the gate is pivoted open by a passing ball, in the manner illustrated in FIGURE 3, the side arms 22 of the gate will bear against the cross bar 25X (or 26X) of the actuator bail at the points —P— and swing the actuator to the dotted-line position shown in FIGURE 3.

The opposite free ends of the actuating bails or forms are offset to serve as pivots respectively penetrating ap-

pertaining pivot holes 24 in the panel portions 17 of the bracket, as in the case of the gate; but one end of the actuator form is further formed into a hook 30, seen particularly in FIGURES 2 and 5, and adapted to engage the hooked end 32 of a switch-operating rod 31 passing through a hole in the ball-rolling board to the underside thereof for coupling engagement with the end of a switch blade 35 by means of another hook formation 33 in said rod and engaging a hole 34 in the end of the switch blade.

The illustrative gate switch shown is of the simple stack type comprising a pair of spring contact blades 35, 36 secured in insulated relation in the stack 37 attached to the underside of the board 10 with the movable blade 35 sprung normally into open-circuit relation to the companion blade 36.

When the gate is rocked upwardly by a passing ball, as in FIGURE 3, the corresponding switch-actuating bail or form 25 or 26 will likewise be rocked upwardly to pull the corresponding switch-operating rod 31 upwardly and close the contact 35 with its companion contact 36 and operate some desired signalling or control device or circuit (not shown) in a known manner for purposes related to scoring or other control or indicating function in the game.

Two of the switch-actuating bails or forms 25, 26 will generally be provided on each mounting bracket, as in FIGURES 1 to 5, where the gate action is intended to be bi-directional, as in FIGURE 5, it being optional to omit either switch unit where uni-directional signalling action is required.

In the case of a one-way gate, the construction of the gate bail will be modified as in FIGURE 6, wherein one offset pivot end 23 of the gate side arm 22 has a further offset 23X angled downwardly so that it will strike the edge of the mounting flange or foot 16 of the bracket when the gate is struck by a ball moving reversely to the intended direction of opening movement.

I claim:

1. A gate structure for ball-rolling games comprising, overhead bracket means adapted for mounting at an elevation above a ball-rolling surface a distance to permit a ball of predetermined diameter to pass freely thereunder; a first control member comprising a gate member pivotally suspended from said bracket means to pivot about an axis approximately parallel to the ball-rolling surface; said gate member having a pendant horizontally-extensive portion lying at a level above said surface at a distance to be engaged by such a ball in passing beneath the bracket means to be pivoted thereby upwardly to ball-passing condition out of the way of the ball, a second control member pivotally supported by the bracket means and depending therefrom in close proximity to the gate member and pivotable about an axis parallel to that of the gate member, said second control member having limited independent movement but disposed to be engaged and pivoted by the gate member in ball-passing movement of the latter in a predetermined leverage relationship therewith; and a controlled device and means drivingly interconnecting the same with said second control member for actuation by movement of the latter responsive to ball-passing movement of the gate member.

2. A gate structure according to claim 1 wherein the bracket means comprises a horizontal member supported in elevation above the ball-rolling surface by upright support means at opposite ends thereof, and said gate member and control member are respectively wire forms of approximately U-shaped configuration each having opposite end portions offset and respectively pivotally engaged with a correspondingly located one of said upright supports, the second control member having a shorter pivotal radius than the gate member such that a mechanical advantage in leverage exists in the pivoting of the control member by the gate member.

3. A gate construction as set forth in claim 2 wherein said interconnecting means includes the formation on one of said ends of the control member of an offset lever arm, and a pivotal connection therewith of a drive rod adapted for connection with said controlled device and moved in a direction back and forth approximately normal to said ball-rolling surface in actuating the controlled device responsive to ball-passing movements of the gate member.

4. Gate means for use on ball-rolling surfaces and comprising at least two approximately U-shaped wire-forms a first one of which constitutes a ball gate and a second one of which constitutes an actuator, and each having a pair of side arms joined by a cross member, the ends of said side arms being offset to provide in each said form pintles extending in a common pivotal axis; bracket means adapted for mounting on said surface and including an upwardly-projecting portion and an overhead portion spaced above said surface a distance to permit a ball of predetermined size to roll therebeneath; the first one of said wireforms having longer side arms than the other; means on said bracket pivotally seating the respective pintles of said wireforms such that their respective axes are parallel to each other and the ball-rolling surface with said cross bars pendant therebelow and spaced above said surface with the cross bar of the form having the longer side arms disposed above said surface a distance to be engaged by said ball in rolling beneath the overhead portion as aforesaid, whereby to pivot the gate upwardly out of its path; said actuator form being engaged by the gate at a point on the side arms of the actuator which is close to the cross member thereof to be pivoted upwardly by the gate member in ball-passing action, the length of the lever arm of the gate acting upon the actuator being of shorter radius than the length of the lever arm on the gate member effectively engaged by the ball in such action; a switch device to be actuated responsive to ball-passing movement of the gate; and means drivingly linking the actuator to said switch for actuation of the latter by ball-passing movement of the gate as aforesaid.

5. A ball gate comprising a bracket adapted for mounting at an elevation above a ball-rolling surface a distance to permit a ball to roll thereunder; at least two wire form members of approximately U-shape and each comprising opposite pendant arms joined by a horizontally extensive cross bar, the ends of said arms being offset to define respectively axially aligned pivot pintles for said members to extend along a common axis, said pintles being respectively pivotally supported in opposite end portions of said bracket with the cross bar portions of each of said members disposed below the bracket and above said surface, the cross bar of one of said wire forms constituting a gate being disposed at a level above said ball-rolling surface to be engaged by a ball passing beneath said bracket and being adapted to pivot out of the path of such ball sufficiently for the same to pass therebeneath, the other wire form member having its cross bar disposed at a greater distance above said surface such that the ball will pass freely therebeneath; said other member being engaged by the gate and moved upwardly in ball-passing movement as aforesaid; a controlled device to be actuated by movement of a ball past said gate; and means drivingly interconnecting the second form with said controlled device and operated by pivotal movement of the second form caused by ball-passing movement thereof by the gate.

6. A ball gate structure of the type including a swinging gate member disposed relative to a ball-rolling surface in a manner to lie in the path of a rolling ball for engagement and movement by the latter to be pushed aside to permit passage of the ball, improvements comprising: a control member appendage and means mounting the same to rock in predetermined close proximity and leverage relationship to the gate member on the ball-rolling side of said surface for limited independent move-

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ment relative to the latter and for rocking engagement by the gate member in ball-effected movement of the latter as aforesaid, a controlled device located at the side of said surface which is opposite said ball-rolling side, and means providing a driving linkage connecting with the control appendage and said device transmitting leverage motion therefrom to the controlled device.

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