

Nov. 18, 1952

L. A. DURANT ET AL  
STEP-UP SWITCH MECHANISM

2,618,719

Filed June 3, 1947

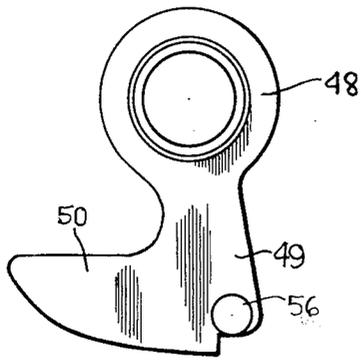
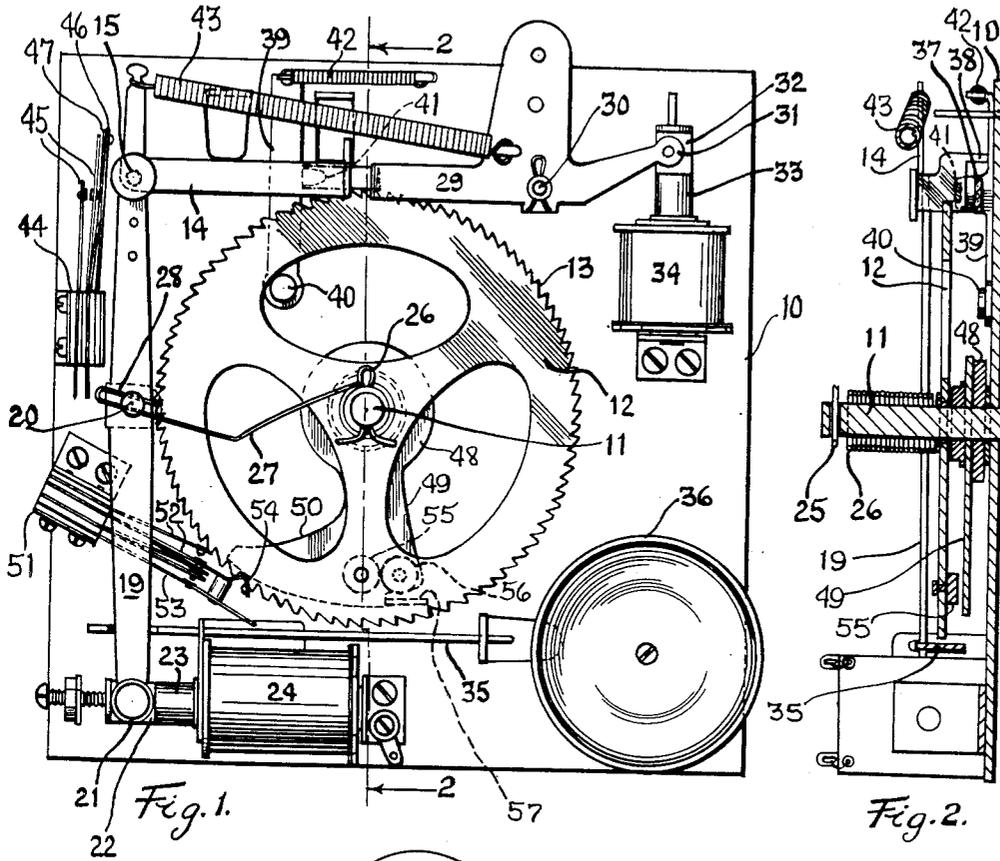


Fig. 3.

INVENTORS  
Lyndon A. Durant and  
Gordon Horlick  
BY *Clarence E. Shedy*  
Their Attorney.

## UNITED STATES PATENT OFFICE

2,618,719

## STEP-UP SWITCH MECHANISM

Lyndon A. Durant and Gordon Herlick, Chicago, Ill., assignors, by direct and mesne assignments, to Royal Patent Corporation

Application June 3, 1947, Serial No. 752,234

1 Claim. (Cl. 200—105)

1

This invention relates to certain new and useful improvements in a step-up switch mechanism useful in many arts such for example as in an amusement apparatus where a score is indicated by a score indicating device controlled by a step-up mechanism.

The main and principal object of the invention is to provide an improved step-up switch mechanism having an arrangement for closing an electric switch each time a toothed wheel is rotated step by step under the action of an electrically operated ratchet mechanism, and another arrangement for closing an electric switch only upon a complete cycle of step by step rotation of the toothed wheel.

It is common practice to incorporate in amusement game apparatuses in the nature of a ball rolling or bagatelle game wherein a ball or balls are projected upon a playing field for gravitation thereover into closing engagement with target switches, a scoring circuit, such for example as that illustrated in the Durant et al. Patent No. 2,266,932, dated December 23, 1941. In such a scoring circuit is usually employed a free game device such as disclosed in the Durant et al. Patent No. 2,298,605 which is conditioned for a free game or play upon the attainment of a certain score. The score registering mechanism of such games usually employ a step-up switch which comprises a tooth-bearing wheel rotatable step by step each time a score is to be recorded. At the present time the capacity of the step-up wheel is a score of 100,000 or less, the attainment of a score higher than 100,000 being unattainable by reason of the fact that the capacity of a step-up score switch is covered by the number of teeth on the step-up wheel and to increase the score capacity would necessitate a wheel of a diameter not favorably adaptable for the intended purpose or the space assigned in the game apparatus for its occupancy.

It is an object of this invention, therefore, to incorporate in a score circuit of such a game apparatus an arrangement for the attainment of high scores such for example, over 100,000, without increasing the size of the step-up wheel or the number of teeth thereon and without material change in the present day bagatelle game having included therein a score circuit including the step-up wheel. Broadly, this object is accomplished by operatively associating with the standard step-up wheel a high score of over 100,000 score switch effective for its operation by a wiper member engageable with the high score switch at the end of a complete cycle of rotation of the step-up wheel. It will be apparent from the description to follow that one or more of such high score switches and wiper arms may be independently employed for attaining high scores and super high scores.

Ancillary to the accomplishment of these objects, is the object of providing such a mechanism which will comprise relatively few parts with the

2

result that the device may be manufactured at an economical cost.

Other objects will appear hereinafter.

The invention consists in the novel combination and arrangement of parts to be hereinafter described and claimed.

The invention will be best understood by reference to the accompanying drawings showing the preferred form of construction, and in which:

Fig. 1 is an elevational view of the invention;

Fig. 2 is a sectional detail view of the same taken substantially on lines 2—2 of Fig. 1; and

Fig. 3 is an elevational view of a switch actuating member embodied in the invention.

While we have indicated that the invention to be presently described is useful in a score registering device of an amusement game apparatus, wherein balls are employed to close scoring switches, it will become apparent from the description to follow that our invention is adaptable to many uses and therefore, we do not want to limit our invention to the specific use referred to or to the score value herein referred to.

We will first describe what is known as a well known step-up mechanism. This unit comprises a vertical plate or support 10 carrying a rotatable horizontally disposed shaft 11 having fixed thereto for rotation therewith a ratchet wheel 12. This ratchet wheel 12 has teeth 13 on its periphery equally spaced with respect to each other. The shaft 11 and wheel 12 thereon are rotated in a clockwise direction, step by step by means of a pawl 14 pivotally connected as at 15 to a lever 19. The lever 19 is pivotally connected to the plate 10 as at 20. The lower end portion of the lever 19 carries a roller 21 operable in a slot 22 of a plunger 23 of an electro-magnetic coil 24.

Secured to the shaft 11 by means of a cotter pin 25 is one end of a spring 26. This spring 26 embraces the shaft 11 and has its opposite end portion 27 secured as at 28 to the pintle pin 20 of the lever 19. As the wheel 12 is rotated in a clockwise direction step by step under propulsion of the lever 19 and pawl 14, the spring 26 is tensioned upon the shaft 11 and in order to latch the wheel 12 against rotation in an anticlockwise direction, as viewed in Fig. 1, a latch arm 29 is provided. This latch arm 29 is pivoted to the plate 10 as at 30 and has an end portion 31 engaging in a slot 32 of a plunger 33 of an electric magnetic coil 34.

There may be associated with the lever 19 a sounding bar 35 which is adapted to engage a gong 36 each time the lever 19 is pivoted. The latch arm 29 has an end portion 37 disposed beneath a finger 38 of the pawl 14 whereby when the coil 34 is energized and the plunger 33 retracted from the position shown in Fig. 1, the latch when pivoted from engagement with adjacent tooth of the wheel 12 will also pivot the pawl 14 upwardly to permit the wheel 12 to ro-

3

tate in an anticlockwise direction under the action of the spring 26.

The latch arm 29 and pawl 14 are releasably latched in disengaged position with respect to the wheel 12 by a latch bar 39 pivoted as at 46 to the plate 10 and providing a lateral finger 41 which is adapted to engage beneath the end 37 of the pawl 29 when in disengaged position with respect to the wheel 12, the latch bar 39 being held with the finger 41 in latched position with respect to the latch pawl 29 by a spring 42. A spring 43 connects the pawl 14 and the latch arm 29 together for simultaneous pivotal movement into engagement with the wheel 12.

A device constructed in accordance with the foregoing description is well known in the art and it is with such a device that we associate our arrangement for the purposes hereinbefore set forth.

In this connection we mount upon the plate 10 a primary control switch structure 44 comprising spring contacts 45 and a spring leaf 46 for bringing the contacts into closed position, the leaf 45 being separated and insulated from an adjacent contact leaf 45 by an insulating strip 47. This strip 47 is disposed in the path of movement of the upper end portion of the lever 19 and each time the pawl 14 is moved to the left as viewed in Fig. 1, the switch contacts 45 will be closed. This switch may control the conditioning of a free-play unit shown in the patent, aforesaid.

Mounted upon the shaft 11 for independent rotation with respect thereto is a hub 48 and depending from this hub 48 is a wiper arm 49 having an arcuate wiper foot 50 rotatable concentrically with respect to the periphery of the wheel 12.

Mounted on the plate 10 is a high switch structure 51, for the purpose hereinbefore referred to, comprising independent pairs of spring contacts 52 and 53 with one of the spring leaves of the spring contacts 52 provided with a V-shaped head 54 disposed in the path of movement and adapted to be engaged by the foot 50. One of these switches may be in circuit with the score circuit while the other one may be in circuit with the free-play unit or other scoring mechanism of the game.

Each time the magnetic coil 24 is energized in a manner well known in the art, as by the closing by a rolling of a score switch, the pawl 14 will rotate the wheel 12 and the shaft 11 one step commensurate with the distance between the teeth 13 of the wheel 12.

Each time that the pawl 14 is moved to the left, as viewed in Fig. 1, the upper end of the lever 19 will engage the strip 47 and move the spring contacts 45 into closing engagement with respect to each other for the purpose hereinbefore stated. As soon as the wheel 12 nears the completion of a cycle of rotation, a pin 55 carried thereby will be brought into engagement with a pin 56 carried by the arm 49, and as the wheel 12 continues to rotate step by step in a clockwise direction, as viewed in Fig. 1, the arm 49 will be rotated therewith, bringing the wiper foot 50 into contact with the V-shaped head 54 on one of the spring contacts 52; thereby to close the spring contacts 52 and 53 for the purposes hereinbefore stated. After closing these contacts 52 and 53, the arm 49 will continue to rotate through another complete cycle with the wheel 12 until the foot 50 engages a stop bar 57 provided by the plate 10 at which time the arm will be held against retrograde rotation.

4

Upon release of the wheel 12 for anticlockwise action by the spring 26, the pin 55 at the end of one cycle of rotation of the wheel 12, will engage the pin 56 and thereupon both wheel 12 and arm 49 will be rotated through another cycle to their original normal position as shown in Fig. 1.

While we have shown one switch structure 51 and one wiper arm 49 for closing the same, it is apparent that more than one of such arms and switch structures may be associated with the shaft 11 for successively or independently closing a plurality of switch structures similar to the switch structure 51.

While we have illustrated and described the preferred form of construction for carrying our invention into effect, this is capable of variation and modification without departing from the spirit of the invention. We, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail ourselves of such variations and modifications as come within the scope of the appended claim.

We claim:

A device of the class described including a mounting plate, a switch structure mounted on said plate, intermittently movable means on said mounting plate and having means engaging said switch structure for intermittently closing the same, means for intermittently moving said movable means, a second switch structure mounted on said plate, a shaft carried by said plate for supporting a second intermittently movable means, said second-mentioned movable means having means engageable by said first intermittently movable means so as to be intermittently moved by said first-mentioned movable means, an arm on said shaft between said second intermittently movable means and said plate and providing a wiper foot adapted to engage and close said second switch structure, and means providing a coupling between said arm and said second-mentioned movable means at the completion of one cycle of rotation of said second-mentioned movable means whereby said second intermittently movable means has movement independent of said arm prior to the completion of one cycle of rotation, said last-named means including a pin member carried by said second-mentioned movable means, and a pin member carried by said arm and disposed in the path of movement with respect to said first-mentioned pin member, and means on said plate in the path of movement of said arm for preventing retrograde rotation of said arm.

LYNDON A. DURANT.  
GORDON HORLICK.

#### REFERENCES CITED

The following references are of record in the file of this patent:

#### UNITED STATES PATENTS

Number	Name	Date
263,939	Monnier	Sept. 5, 1882
830,247	McBerty	Sept. 4, 1906
1,491,223	Casner	Apr. 22, 1924
1,919,969	Traver	July 25, 1933
2,126,695	Wright	Aug. 9, 1938
2,235,038	Pearce	Mar. 18, 1941

#### FOREIGN PATENTS

Number	Country	Date
208,339	Germany	Mar. 25, 1909