

No. 647,902.

Patented Apr. 17, 1900.

J. N. McINTIRE.  
BOWLING ALLEY.

(Application filed Oct. 25, 1899.)

(No Model.)

Fig. 1,

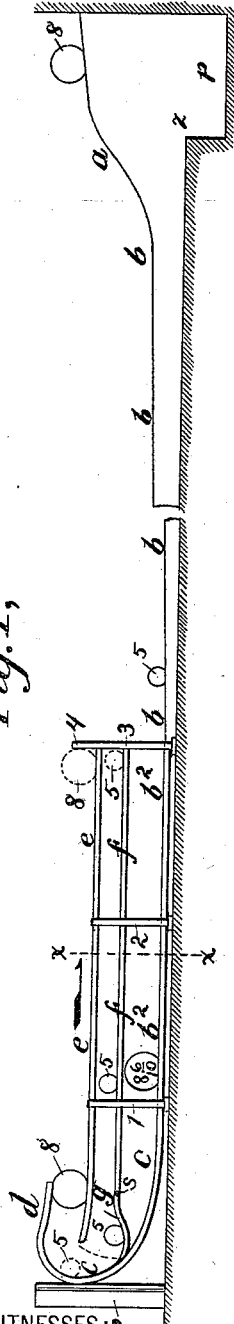


Fig. 2

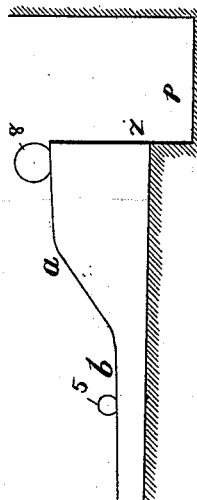


Fig. 3,

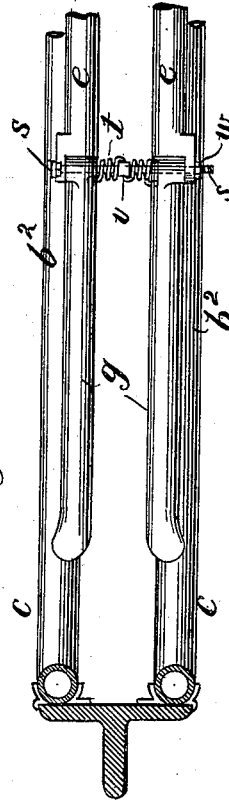


Fig. 4,

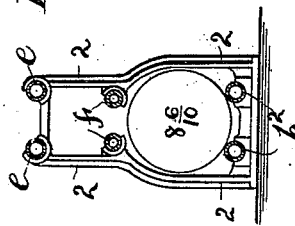


Fig. 6,

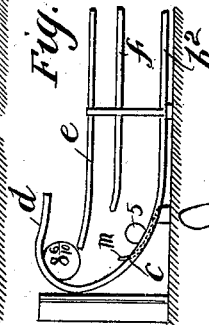
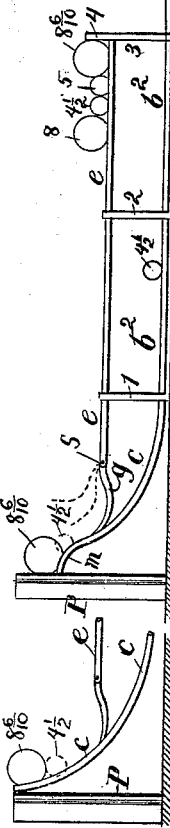


Fig. 5



WITNESSES:

E. J. Bunker  
S. C. Olsen

INVENTOR

J. N. McIntire

# UNITED STATES PATENT OFFICE.

JACOB N. MCINTIRE, OF NEW YORK, N. Y.

## BOWLING-ALLEY.

SPECIFICATION forming part of Letters Patent No. 647,902, dated April 17, 1900.

Application filed October 25, 1899. Serial No. 734,714. (No model.)

*To all whom it may concern:*

Be it known that I, JACOB N. MCINTIRE, of the borough of Manhattan, city, county, and State of New York, have invented a new and useful Improvement in Bowling-Alleys; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to that genus of ball return-ways for bowling-alleys in which the balls which roll home on a track from the pit end to the players' end of the alley are discharged or delivered initially onto the rear end (instead of onto the forward end) of what is called the "terminal" or "rack" on which the returned balls assemble for reuse by the players. In this type or genus of ball return-ways as heretofore made there has been no provision for automatically returning the series of small balls or the "pony" balls onto the lower or supplemental rack on which these small balls are generally kept, these balls in the use of this kind of return-way being returned by way of the ball-gutters of the alleys and placed by hand, on arrival at the players' end of the alley, on the said supplemental ball-rack; and one object of my invention is to provide means for returning these small balls from the pit end of the alley and automatically delivering or placing them on said supplemental rack.

As in different parts of the country bowling-alleys are used mostly for different kinds of games—such, for instance, as tenpins, candle-pins, cocked hat, &c.—and these several games requiring or rendering most convenient somewhat different constructions of ball-racks or terminals, another object of my invention is to provide for use a construction of ball return-way in which, where it may be desirable or necessary, all the balls (from the largest to the smallest) may be sent home from the pit end on the usual track of that type of return-way above referred to and delivered or discharged automatically onto the rear end of a single terminal or ball-receptacle.

In various species of ball return-ways of the type alluded to it has been found that the larger balls will necessarily be delivered onto the terminal or ball rack at a somewhat

greater speed than that at which the smaller balls are; and it being desirable to have both the large and small balls discharged onto the rear end of the terminal or terminals at about the same and at the lowest possible rate of speed my invention has for a further object the construction of the type of return-way referred to with means for regulating the velocities of both the big and small balls, so as to have the different sizes delivered onto the terminal or terminals at as nearly as possible the same rate of speed.

To the ends and objects above mentioned my invention may be said to consist of the novel structural features (of that type of return-way alluded to) which will be found hereinafter fully described and which will be most particularly pointed out in the claims of this specification.

To enable those skilled in the art to make and use ball return-ways involving either in part or in whole the several novel features of my invention in either the precise forms herein shown and described (as to one or all of said features) or under some modification thereof, I will now proceed to describe my invention more particularly by reference to the accompanying drawings, which form part of this specification and in which I have shown the several features of my invention each carried out in that precise form in which I have so far successfully practiced it, although, of course, as to each of said features modifications may be made in the constructions shown without departing from my invention, providing the novel principles of construction and mode of operation of each of said features be retained.

In the drawings, Figure 1 is a side elevation of a ball return-way made according to my invention and illustrating particularly those features thereof which relate to means for automatically discharging or delivering the larger series of balls onto an upper and the smaller series of balls onto a lower terminal or ball-rack and for also regulating the speeds at which the two series of balls—that is, the larger series and the smaller series—are delivered onto their respective terminals or ball-racks, the middle portion, however, of the long and nearly-horizontal portion of the ball-track being broken out or removed

and the end portions of the return-way moved toward each other for the purpose of showing the novel construction of the whole device within the space permissible and at the same time on a sufficiently large scale to plainly illustrate the details of construction. Fig. 2 is a similar view of one of my improved return-ways made in like manner with the middle portion of the ball-track removed and the end portions of the return-way moved toward each other and illustrating a form or feature of my invention in which all the balls (both large and small) are automatically returned onto the rear end of a single terminal or ball-rack in the same manner as the smaller balls only are returned onto the lower rack at Fig. 1. Fig. 3 is a detailed partial top view made on a somewhat enlarged scale and illustrating particularly a switch device which is employed in the forms of return-way shown at Figs. 1 and 2, and which also operates as a brake device for controlling or regulating in a measure the speeds of the balls of different sizes. Fig. 4 is a detail vertical section at the line  $x x$  of Fig. 1 looking in the direction indicated by the arrow in said Fig. 1. Fig. 5 is a partial side view showing a modification of the ball-delivering devices seen at Fig. 2. Fig. 6 is a partial side view illustrating another modification of my invention.

In the several figures the same parts will be found always designated by the same letters of reference.

Referring now more particularly to Figs. 1, 3, and 4 of the drawings, it will be seen that the ball-track of the return-way starts at a point vertically over the rear of the pit and at a proper elevation and descending thence to the proper extent and with the requisite obliquity, as seen at  $a$ , approaches to within a few inches—say about six—of the floor, from which point it runs toward the player's end of the alley with a slight descent, as seen at  $b$ , whence it runs level at  $b^2$  beneath the terminal until at the vicinity of the rearmost half of the ball-rack or terminal it begins to run upwardly in a curved direction, as seen at  $c$ , and extending thence upwardly and forwardly, as at  $d$ , constitutes the curved lifting and discharging end portion of the track peculiar to that genus or type of return-way to which my present invention relates and from which the balls pass onto the ball-racks or terminals. Of these there are two, the upper terminal  $e$ , on which the series of larger balls—say from eight and six-tenths inches diameter down to six inches diameter, inclusive—are to be assembled, and the lower terminal  $f$ , onto which are delivered the series of smaller balls running from five and a half down to four inches diameter, inclusive. The series of larger balls, however, it will be understood, roll continuously rearwardly and then upwardly and finally in a forward direction in contact always with the curved portion of the ball-track  $b c d$ , (as peculiar to

the type of return-way to which my improvements relate,) while the series of smaller balls travel only partially up in contact with the curved portion  $c d$  of said track, they having an insufficient amount of inertia or impetus to travel clear up and get onto the terminal  $e$ , and after having ascended to a point substantially such as illustrated, for instance, by the small dotted in five-inch ball seen at Fig. 1 fall back or descend by gravity, and traveling on the curved portion of the track on which they made their ascent come onto the curved switch device or hinged continuation  $g$  of the lower ball-rack  $f$ , and roll thence onto and forwardly along on said ball-rack, as I have illustrated at Fig. 1, in which a five-inch ball having ascended to the position shown in dotted lines at the left-hand side of the figure has descended onto the hinged switch  $g$ , as illustrated by the five-inch ball or circle thereon shown in full lines, and rolling thence forwardly into the position indicated by another full-line circle drawn on the rack  $f$  passes finally forward on said rack (which, as usual, is slightly inclined for the purpose) until it arrives at the position indicated by the dotted circle of a five-inch ball at the extreme right-hand end of the said rack.

The switch device  $i$ , which is hinged at the point  $s$  to the rearmost ends of the bars or tubes constituting the rack  $f$ , is made, preferably, of about the shape shown and with its rearmost end resting upon a suitable stop in the curved portion of the main track of the return-way is free to rise and fall, moving about its point of articulation, and, as illustrated at Fig. 1, (in which said switch is shown in its lowermost or normal position in full lines and in its uppermost position in dotted lines,) when any one of the balls of the larger series—as, for instance, the eight-and-six-tenths-inch ball shown in full-line circle immediately beneath the rack  $f$ —comes rolling home in ascending the curved portion  $c d$  of the return-way it simply lifts or pushes upwardly said switch  $g$  into the dotted-line position and passes, as usual, from the curved upper end of the return-way onto the upper ball-rack  $e$  in the manner illustrated by the eight-inch ball, full circle, shown in position on said ball-rack, and thence rolls forwardly into the position illustrated by the eight-inch ball, dotted circle, seen at the extreme right-hand end of said ball-rack, and it will also be understood that when any one of the series of smaller balls comes rolling home—as, for instance, a five-inch ball, such as shown by the full-line circle to the right of the terminal device in Fig. 1—said ball in like manner in ascending the curved portion of the return-way  $c d$ , without sufficient impetus, however, to follow completely in the wake of the larger ball, which may have previously ascended, also lifts up (to a less extent) the hinged switch device  $i$ , and passing sufficiently far above the movable end of said switch to allow the latter to drop back to its

normal position will then gravitate or roll downward on the said return-way and passing thence onto the said switch device will roll thence, as heretofore explained and as illustrated, onto the lower ball-track *f*. It is desirable, of course, to have this switch device made so that the balls, especially the smaller ones, will not have to exert much force, (and hence be retarded in their upward course of travel,) while at the same time it is desirable to have this switch operate as a retarding device or brake on the balls of the larger series, which by reason of their greater size and inertia may tend to travel too fast at the time of their deliverance from the portion *d* of the return-way onto the upper ball-track. Therefore I propose to make the hinged joint of this switch and brake device *g* after the fashion of some one of the well-known forms of spring-hinges used on doors to automatically close or open them and to have it arranged so that very little torsional action of the spring will come into play until one of the smaller balls of the larger series lifts the free end of the said device to a given height or point and so that the successively-larger balls of said series in lifting the free end of said switch device still higher will respectively have still greater degrees of braking or retarding force applied to them. By this means and in this way I am enabled to automatically regulate the final speed of the balls of different sizes, especially of the larger series, so that they will not travel too fast in passing onto the upper terminal *e*.

The precise detailed construction or form of the torsional-spring articulation is not important to this feature of my invention so long as some form be employed which will be simple, durable, and effective for the purpose explained, and at Fig. 3 I have illustrated one form of such spring articulation in which twin helical springs *t* are mounted on the pivotal stud *s*, with one end of each connected with the root end of one of the arms of switch *g* and the other end of each connected with a central integral lug or collar *u* of said stud, all in such manner that loosening the securing-nut *w* of said stud, giving the latter a turn in one or the other direction, and then resecuring it in position the springs may be adjusted to act differently, as circumstances may require.

Referring now particularly to Fig. 2 of the drawings, it will be seen that in the same manner as explained just now with reference to Fig. 1 the balls of the different series when placed on the highermost pit end of the return-way track will suddenly travel obliquely downward on the part *a*, then for a long distance on the slightly-descending portion *b* until they arrive at the vicinity of the terminal device, when they will ascend rearwardly and upwardly the curved portion *c* of the return-way, and after having lifted the brake and switch device *g* to different degrees, as illustrated by dotted lines at said figure, they will

continue their ascent, but on an upwardly and rearwardly curved continuation *m* of the said return-way, to a point sufficiently high to permit the automatic closing or fall of the switch device into its normal position, (shown in full lines,) when the balls will then descend or roll back downwardly on said portion *m* of the return-way, and coming onto the fallen switch *g* will roll forwardly thereon, and from thence onto the single terminal *e* illustrated in this case, on which terminal they will automatically assemble, as illustrated by a series of circles illustrating, respectively, an eight-and-six-tenths-inch ball, a four-and-a-half-inch ball, a five-inch ball, and an eight-inch ball, which said balls are also shown, respectively, by the full-line circles at the uppermost rear portion of the figure, by the dotted circle immediately below said full-line circle, by the full-line circle of a four-and-a-half-inch ball drawn on the return-way about the middle of the terminal part of the device, the full-line circle of a five-inch ball resting on the rearmost portion of the slightly-inclined part of the return-way, and the full-line circle of an eight-inch ball shown placed on the highermost pit end portion of the ball-track.

I have shown the return-way illustrated at Fig. 2 as having its pit end at the same elevation as that of the return-way, seen at Fig. 1, but set farther forward, so that it is vertically over the front (instead of the rear) edge of the pit. Both arrangements of the pit end of the return-way are adopted by different alley-builders and either one is practicable; but I prefer the arrangement shown at Fig. 2 as the better one of the two.

It will be seen by a comparison of Figs. 1 and 2 that the single ball-track *e* of the last-mentioned figure is located considerably lower than the upper terminal *e* at Fig. 1, and it will be understood that in that form of my improved return-way shown at said Fig. 2, which is adapted for the returning onto and assemblage on a single terminal of the balls of all sizes, it is necessary to have this terminal placed very much lower in order that the smallest ball of the whole series will come completely home on the return-way or will travel far enough upon the sort of ogee portion *c m* of the track to lift and pass far enough beyond the movable end of the switch device *g* to properly get onto said switch and thence onto the said terminal *e*, and it will also be understood that in this form of return-way adapted to the purpose mentioned the balls of the larger series are likely to travel so far upon the portions *c m* of the return-way as to retrace their course or descend again onto the switch *g* and thence onto the terminal *e* at too great a rate of speed if their home-coming velocity be not in some manner checked before their descent onto the said switch device, and hence in this form of my improved return-way it is all important to provide some means for retarding the course

of travel of the series of larger balls, which in the case shown is effectuated by the use in combination with the hinged switch device *g* of the torsional-spring articulation operating to cause said switch to act as a brake on the balls of the larger series as they pass under and lift up the movable end of said switch device.

Of course the sizes and proportions of all the parts and their precise relative arrangement together must conform in one manner to the regulation requirements of the bowling-alley—for instance, as to the height of the pit end of the return-way, its entire length, and the length of the terminal device, &c., while with reference to the degree or precise configuration of the curved portions of the return-way, the precise shape and detail arrangement of the switch device, and the elevations of the ball-racks respectively shown in the different figures the skilled constructor must use a wise discretion and proper mechanical judgment to make the contrivance as a whole (made in either of the forms shown) to adapt it perfectly to the circumstances or conditions under which it is to be used.

At Fig. 5 the modification shown embodies the extension upwardly of the concave form *c* of the track seen at Fig. 2 instead of having the direction of curvature reversed, as seen at *m*, Fig. 2; since in some cases or under some conditions the form shown in this modification may be found to be preferable in practice as one more effective or desirable, especially in a case in which it may be desired to place the single terminal *e* (on which to rack or assemble the balls of all sizes) at a comparatively high elevation.

In the modification seen at Fig. 6 I have shown as a substitute for the switch device *g* of Fig. 1 another specific means for effectuating that generic feature of my invention which consists in means for directing onto a lower rack such balls coming home on the track of the return-way as may not come with sufficient impetus to roll from the upwardly-curved rear end of said track onto the upper terminal or rack. As seen, this other specific means consists of a spring or pair of spring-bars having their fixed ends fastened to the inner or adjacent surfaces of the rails of the track *c*, while their yielding bent-up ends, which are depressed by (and do not appreciably effect) the balls of the larger series as they roll home, operate to direct the course of the smaller balls, which on striking said projecting ends are caused to ascend abruptly and bounce back sufficiently at the same time to get onto the lower rack *f*. These defectors, being arranged closer together than the rails of the track at *c*, will naturally affect differently the smaller balls than the larger ones. I, however, consider the switch device shown in the other figures the better specific device for the purpose of directing onto the lower rack all the balls which will not automatically go onto the top rack.

As every one skilled in the art knows, just which balls or how small balls will go up onto the top rack depends greatly (in a given form or construction of return-way) on just how the pit-boy puts the ball onto the pit end of the return-way or into the usual cage thereof, a given ball that will not ascend onto the top rack (or onto a terminal of given elevation) when simply laid in the cage being made to easily go up onto said rack when thrown in by the boy or given an impetus by him in the right direction.

By making the long nearly-horizontal portion *b* of the return-way track with a slight downgrade in about a right line from the point where the suddenly-inclined pit-end portion (or "sweep" *a*) merges into it to the point where it (the portion *b*) merges into the preferably level portion *b'*, that lies immediately beneath the terminal rails, (be the terminal single, as at Fig. 2, or double, as at Fig. 1,) I avail myself of the law that a body rolling down an inclined track necessarily has a continually-accelerated motion, and no matter how slight the degree of inclination of this long portion of the return-way ball-track a better result is attained than if this portion be made on a dead level, which necessarily involves the principle that a ball rolled therein must travel with a continually-retarded velocity. In practice, however, I have found a descent or downgrade of about three inches (which is scarcely perceptible and may be increased, if found desirable) to produce good effects.

Having now so fully explained my invention that those skilled in the art can make and use bowling-alleys provided with return-ways embodying either one or all of the (separable) novel structural features set forth in either the forms shown or under some modification thereof, what I claim as new, and desire to secure by Letters Patent, is—

1. In a ball-return-way of the type, or genus, shown, the combination, with the main, or upper, terminal; the ball-track, extending rearwardly of the said terminal and operating to deliver balls onto its rearmost portion, as specified; and a lower terminal, or ball-rack, located, as usual, beneath the said upper rack; of means operating to direct onto the rearmost end of said lower terminal, or rack, all home-coming balls which travel with a velocity insufficient to carry them onto the said upper terminal, or rack.

2. In a ball return-way of the type, or genus shown, the combination, with the ball-track, on which the balls roll home; an upper terminal, onto which certain of the larger balls are delivered, as specified, by said ball-track; and a lower terminal, or ball-rack, for the reception of certain smaller balls; of a switch device, which operates to direct onto the rearmost end of said lower terminal those balls which will not run up onto the upper terminal; all substantially as hereinbefore set forth.

3. The combination, with a ball-track, hav-

ing an upwardly-curved portion in rear of a terminal, or ball-rack, of a terminal adapted to hold balls delivered onto it; and a switch device, hinged to the rearmost end of said terminal; the whole arranged and operating so that a ball rolling on the said ball-track will pass beneath said hinged switch as specified, and after the latter shall have resumed its normal position will gravitate onto it and be delivered by it onto the rearmost end of said terminal, substantially as set forth.

4. In combination with a ball-track on which the balls travel homeward and which has its rearmost end curved upwardly; a terminal, or rack, adapted to the reception and reten-

tion thereon of balls; and a switch device for effectuating the delivery onto said terminal of balls which travel up on the rear curved portion of said ball-track and then gravitate backward, as specified, means for causing said switch device to operate as a brake to retard the velocity of the larger balls and cause them to pass onto the terminal at the desired low rates of speed, respectively, as set forth.

In witness whereof I have hereunto set my hand this 19th day of October, 1899.

J. N. MCINTIRE.

In presence of—

R. W. DRUMMOND,  
O. B. ACKERLY.