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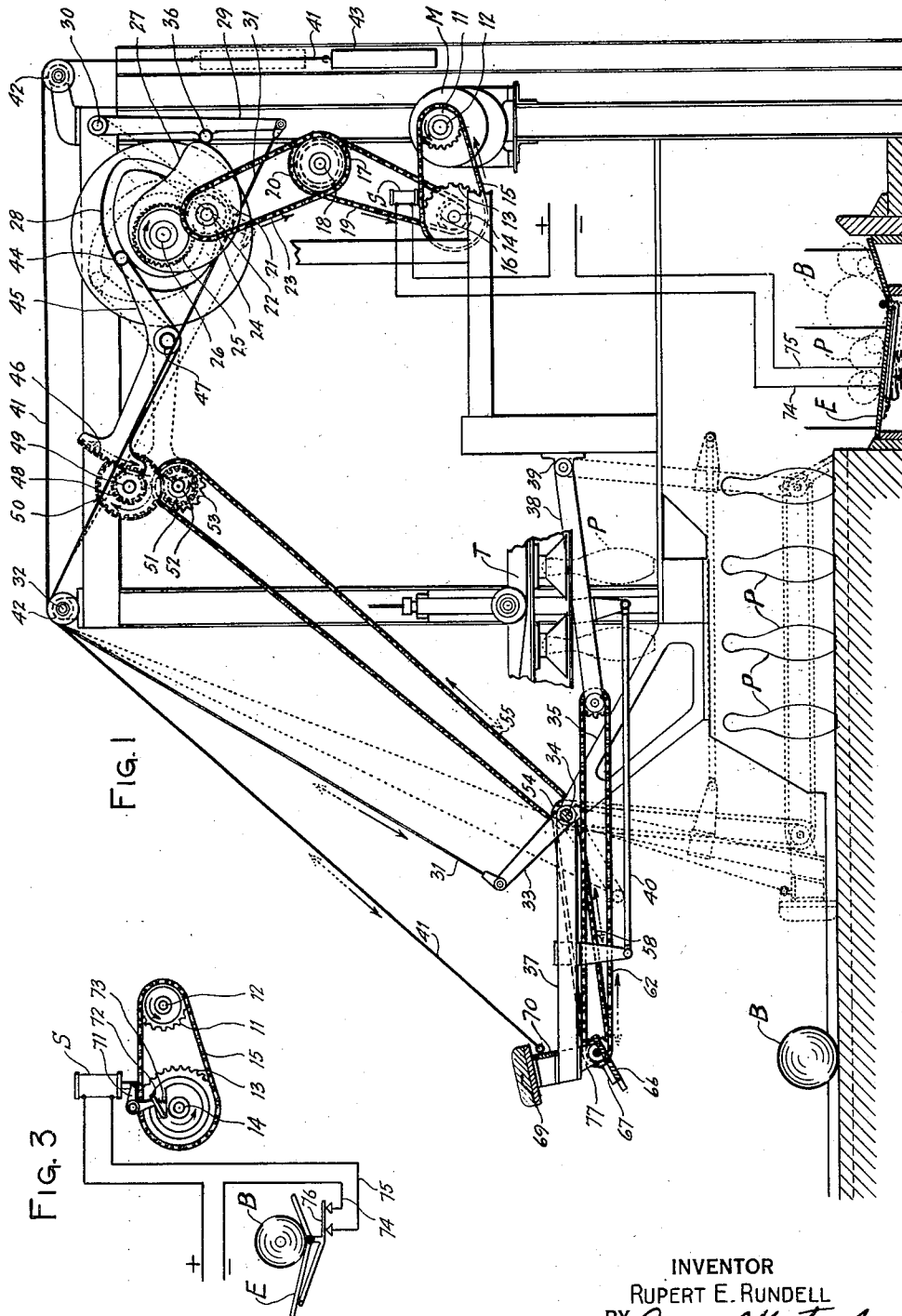
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PIN REMOVING AND GUARD MECHANISM FOR BOWLING ALLEYS

Filed Dec. 29, 1938

2 Sheets-Sheet 1



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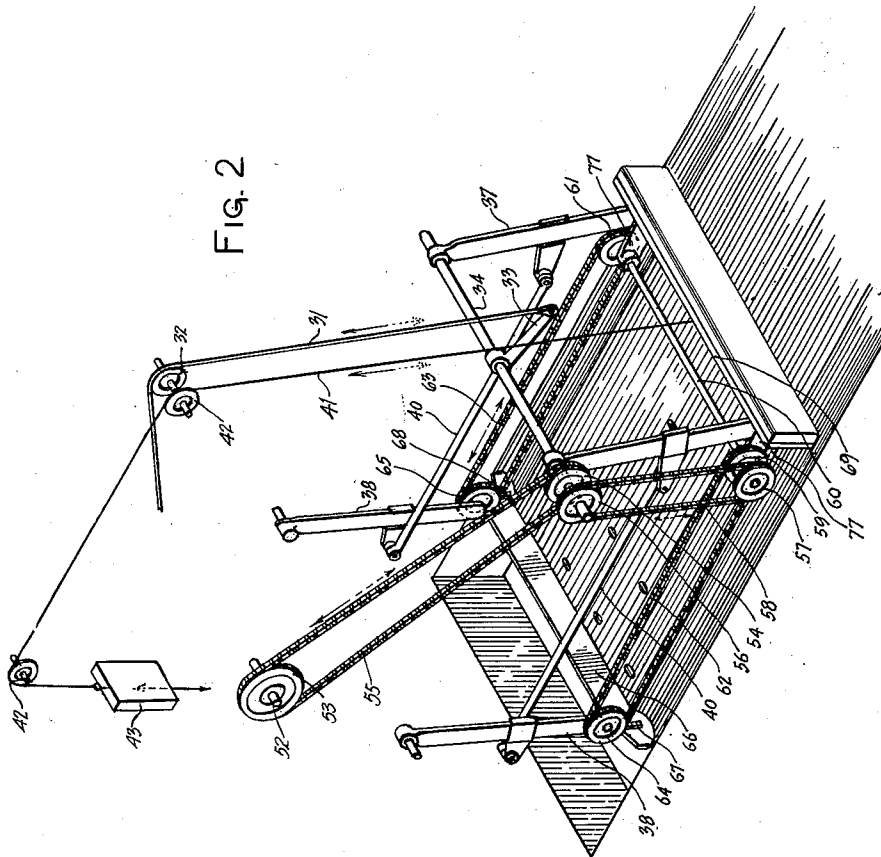
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UNITED STATES PATENT OFFICE

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PIN REMOVING AND GUARD MECHANISM
FOR BOWLING ALLEYSRupert E. Rundell, Rockville Centre, N. Y., as-
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pany, a corporation of New Jersey

Application December 29, 1938, Serial No. 248,215

19 Claims. (Cl. 273-42)

This invention relates to bowling pin setting apparatus and more particularly to mechanism for removing fallen pins or dead wood, and unwanted pins from a bowling alley following the throwing of a ball, and for cleaning the alley of all pins after the throwing of the last ball; and to a guard for preventing injury to a pin setter or to pin setting apparatus whenever the pin removal mechanism is functioning.

This invention finds particular use in a machine such as that described in my co-pending application, Serial No. 221,680 filed July 28, 1938.

In the normal bowling game, it is customary to throw either one or more balls for each frame or set-up of a desired number of pins, usually ten to a game. In most cases, however, two balls are used. If all the pins are knocked down on the first ball, and a so-called "strike" results, and if there are any fallen pins or dead wood lying upon the alley or in the gutters, it is necessary to remove them before a new set of pins can be located in desired arrangement upon the spots on the alley. If, on the other hand, it is necessary to throw two balls, dead wood and/or standing pins must also be removed systematically from the alley in order to continue play. Consequently, it is an object of my invention to provide improved mechanism for removing the pins from the alley after the throwing of each ball in order to properly prepare the alley for repositioning pins thereon after the throwing of a ball and following the removal of any dead wood therefrom, or to make the alley ready for receiving a new set of pins.

It has been found in the operation of bowling alleys, that very often there is a tendency on the part of players, due either to lack of care or inadvertency, to throw balls down the alley during the time when a new set of pins is being placed on the alley or dead wood and/or standing pins are being removed therefrom after the throwing of a ball. It can be seen, therefore, that great injury can result to the pin setter and also the equipment may be damaged due to this action on the part of a player and hence, it is a further object of my invention to provide safety mechanism for preventing a ball from being thrown or rolled over the pin supporting portion of the alley or into the pit whenever dead wood or standing pins are being removed or reset upon the alley. In this manner I am able to guard against injury to the pin setter or to the equipment caused by balls and pins striking together in the pit, and thereby make it possible

for the proprietor to obtain insurance at less cost.

It is a further object of the invention to provide a combined safety guard and pin removing device which move into position adjacent the alley so that while the guard acts as a stop against inadvertent or carelessly thrown balls, the pin remover can be actuated to move over the pin supporting area of the alley to eject any dead wood or unwanted standing pins therefrom into the pit and return to its inoperative position.

It is a further object of the invention to provide mechanism for setting a predetermined number of pins in desired arrangement upon the bed of a bowling alley and to furnish a guard cooperating therewith which moves into a position adjacent the alley prior to the operation of the setting mechanism in order to protect the setting mechanism against damage from balls or other objects traveling over the alley prior to the removal of the pin setting mechanism therefrom.

The invention also consists in the provision of a combined guard and pin remover or rake which move into an operative position adjacent the pin supporting section of a bowling alley and remain there in order that the guard may act as a protecting medium against inadvertently thrown balls or other objects rolled over the alley while the pin remover travels over the alley to remove dead wood or unwanted standing pins.

It is a further object of the invention to provide guard mechanism which moves to a position adjacent the pin supporting portion of an alley and prevents balls or other unwanted articles from moving to the alley while pins are being set upon the alley.

It is a further object of the invention to provide an improved pin removing mechanism for removing fallen pins, balls which may have become lodged on the alley or in the gutter, and unwanted standing pins from the alley. This improved mechanism takes the form of a member which moves vertically to and from the alley and moves in a horizontal plane during its entire travel along the alley to eject pins or balls or both into the pit located at one end of the alley.

It is a further object of the invention to provide mechanism which is set into operation whenever a ball is thrown for moving a guard and a pin removing device into a position adjacent the pin supporting portion of the alley and for effecting the movement of the device over

the alley to remove dead wood and unwanted standing pins therefrom while the guard remains stationary during the operation of the pin remover.

With these and other objects not specifically mentioned in view, the invention consists in certain combinations and constructions which will be hereinafter fully described, and then specifically set forth in the claims hereunto appended.

In the accompanying drawings which form a part of this specification, and in which like characters of reference indicate the same or like parts:

Fig. 1 is a side elevation of my machine, partly in section, showing the guard and rake in their "up" position, and a set of pins in place prior to rolling a ball down the alley;

Fig. 2 is a perspective view showing the construction of the rake frame and its operating mechanism, with the guard and rake located in operative position adjacent an alley, with the rake located in the ends of its pin removal travel; and

Fig. 3 is a detail view showing the clutch mechanism and ball actuated control for operating the guard and the rake

In the illustrated embodiment of my invention, as shown in the several figures, the rake and guard mechanism is operated from a motor M (Fig. 1). Mounted upon motor shaft 12 is a sprocket 11, which is connected to driving sprocket 13 and loosely mounted on shaft 14 by means of chain 15. Fixed to shaft 14 is a sprocket 16, which is driven at suitable intervals by sprocket 13, and a clutch mechanism which will be described more fully hereinafter. Sprocket 16, through the medium of chain 19, drives a shaft 18 and sprocket 20, also mounted on shaft 18, through chain 23 and sprocket 21, drives shaft 22. A spur pinion 24 mounted on shaft 22 meshes with a spur gear 25 on cam shaft 26, to which are fixed two cams 27 and 28, which through the drive of the spur gears control the movements of the pin and ball remover and guard. A lever 29, pivotally mounted upon a pin 30, suitably supported in the frame of the machine, has attached to one end a cable 31 which is trained over a pulley 32 mounted on the machine frame, and at its other end the cable is attached to a lever 23 pivotally mounted on a shaft 34 supported in brackets 35 suitably fixed to the frame of the machine, as shown in Fig. 1.

When a ball is thrown down the alley, and lands in the pit adjacent the end of the alley, it engages and depresses a control bar 10, which in the illustrated embodiment extends across the full width of the pit. This control member is preferably hinged to the ends of the platform of elevator E. The weight of the ball causes bar 10 to recede into a slot formed in the platform E, in order that the hinged ends of the bar can operate a "micro-switch" of any suitable conventional type, which closes a switch 76, thereby making a series circuit consisting of conductors 74, 75, including solenoid S. Electrical energy is obtained from any suitable source. Solenoid S (Figs. 1 and 3), which is energized when the circuit 74, 75 is closed, rocks bell crank lever 71 from engagement with control arm 72 of the driving portion of a clutch, which may be of the well-known Bliss type whereby spring 73 turns arm 71 and effects a driving engagement between sprocket 13 and shaft 14, which through the several driving connections heretofore de-

scribed sets cam shaft 26 into rotation to operate the guard and pin remover mechanism.

Upon initiation of the movement of cam 27, cam follower 36 carried by lever 29, bears against the cam surface 27 thereby causing lever 29 to swing about pin 30 and feed a quantity of cable 31 over the pulley 32 sufficient to allow lever 33 and shaft 34 to rock and locate the ejector frame on the alley. Referring to Fig. 1, it will be seen that in the form disclosed, this frame is composed of substantially parallel front and rear arms 37 and 38, respectively. Front arms 37, which are fixed to shaft 34, are connected by means of a link 40 to rear arms 38, which are pivotally mounted in brackets 39 supported on the frame of the machine. In this manner, provision is made for giving the frame a parallel horizontal motion as it descends upon the alley. The frame is lowered under the control of cam 27 by gravity, and in order to check its descending speed, one end of a cable 41 is attached approximately midway to a cross-bar 70 connecting the front arms 37, which cable is trained over pulleys 42 mounted on the frame of the machine and secured to a weight 43 of suitable proportions to act as a counterbalance for the frame. Also supported on the free ends of the front arms 37 is a guard or safety stop 69 which consists of a padded, stout board, and which, as a part of the pin and ball removing mechanism moves down into a position adjacent the alley and remains stationary during the operation of the rake or ejector 66. In this manner, the ejector mechanism 67, and the pin transfer device "T" are protected against carelessly or inadvertently thrown balls, and thereby damage to the machine is prevented inasmuch as a ball cannot pass beyond the stop until all pin removal and positioning operations have been effected and the frame has returned to its position of rest above the alley.

When the guard has been located in operative position, in the manner described above, the rake is moved in a substantially horizontal plane rearwardly thereof to the end of the alley where it projects all fallen and/or unwanted standing pins therefrom into the pit and onto elevator E. The rake is so constructed that it will, at all times, travel during its entire ejecting operation in substantially a horizontal plane over the alley both on its active ejecting movement and on its return to an inoperative position adjacent the guard. In order to operate the rake, a cam follower 44 on cam lever 45 pivotally mounted on shaft 47, suitably supported in the frame of the machine, engages a cam 28 fixed to the shaft 26. Lever 45 is also provided with a gear segment 46, which meshes with a pinion 48 on shaft 49 and spur gear 51 mounted on shaft 52. A sprocket 53 also mounted upon shaft 52 is rigidly connected to gear 51 and a chain 55 transfers the drive from the sprocket 53 to a sprocket 54 loosely mounted on shaft 34, supported in brackets 35. A sprocket 56 loosely mounted on shaft 34, is rigidly connected to sprocket 54. Extending rearwardly of cross-bar 70, are arms 77 in which is journaled a shaft 60 having fixed at one end a double sprocket 57, 59. Trained over sprocket 57 is a chain which transfers rotary movement from sprocket 56 to the shaft 60. On the other end of shaft 60 is attached a single sprocket 61. Idler sprockets 64 and 65 are mounted on studs fixed in the free ends of arms 38 (Fig. 2). Chains 62 and 63 connect sprockets 59 and 64, and 61 and 65, respectively. A pin

remover 66 is attached by brackets 67 and 68 to chains 62 and 63, respectively, and travels with them during the rotation of shaft 60, and sprockets 61, 65. It will be seen that the pin remover 66 is so mounted that during its operative travel over the alley, it always moves in a horizontal plane and does not engage the alley during this operation. In this manner, it is possible to more satisfactorily remove fallen pins, unwanted standing pins or balls which may have become lodged on the alley, than has been possible in the past. At the same time, because of its horizontal travel, wear and tear to the alley, resulting from contact with the rake and the alley, is necessarily held at a minimum.

While cam 27 is rotating to control the movement of the guard and pin remover frame to the alley floor, cam 28 has also rotated the same amount, but since cam follower 44, which controls the travel of the rake 66 over the alley, has during this period occupied a "dwell" portion of the cam 28, no motion is imparted to the cam lever 45, and hence, rake 66 remains stationary and at the rear of guard 69. However, when the guard and pin remover or rake frame has been positioned upon the alley floor, cam follower 44 moves from the "dwell" portion of cam 28 and hence the lever is rocked away from the center of the cam, thus causing a rotation to be imparted to shafts 49 and 52 with the net result that the chains 62 and 63 are caused to travel and translate the rake 66 along the alley from the point of rest adjacent the guard 69 to the point of ejection at the end of the alley where it precipitates fallen and unwanted standing pins into the pit upon the elevator E. As indicated in Fig. 1, the lever 45, having a gear segment portion 46, is shown in its down swing from full line to dotted line position, indicated by arrows. When the cam follower 44 is engaged by the high peak on cam 28, as shown in dotted lines in Fig. 1, the forward movement of the rake 66 ceases and on further rotation of the cam 28, the movement of the rake is reversed and it returns to its inoperative position adjacent the guard 66. When the cam follower 44 engages the "dwell" portion of cam 28, cam follower 36 on lever 29 is engaged by the rising portions of cam 27, thereby causing the lever to swing outwardly to draw in the cable 31, which was given out with the pin and ball ejecting frame also lowered upon the alley floor. Acting in conjunction with the lever 29 is weight 43 which assists in returning the frame to its original or full line position (shown in Fig. 1).

In the operation of my pin removing mechanism, whenever a ball B is thrown and lands in the pit at the end of an alley, it contacts a switch control or bar which through suitable connections closes the circuit, energizes solenoid S, which causes the lever 71 to be moved from engagement with arm 72 whereby spring 73 rocks arm 72 to clutch sprocket 13 to sprocket 16 to drive shaft 26 through chains 19, 23 and sprockets 20 and 21, whereupon by means of cams 27 and 28 engaging cam followers 36 and 44 on levers 29 and 45, the guard 69 and rake 67 are lowered into a position adjacent the alley as shown in dotted lines in Fig. 1. While the pin remover and guard are being lowered, pin setter T, partially shown in Fig. 1, moves downwardly and engages any pins P which may have been standing, holds them firmly, and raises them from the alley floor, whereupon rake 67 moves from a point at the rear of guard 69 longitudinally along that portion of the

alley which supports the pins and ejects all fallen pins or dead wood that are positioned upon the alley or in the gutter adjacent thereto into the pit. In this manner, all pins which have been knocked over but have not been carried into the pit with a ball, are removed from the alley. Upon the completion of this operation, the rake 67 returns to its position of rest adjacent the guard, whereupon the pin setter T descends, deposits the pins which it has lifted, on the same spots or in the exact positions from which they were raised, and then moves upward above the alley where it dwells. After the second ball has been thrown, and has landed on the pit platform of the elevator E, control 10 again sets into rotation shaft 26 and the guard and rake are again lowered into operative position as shown in Fig. 1. If any pins are left standing, however, the pin setter T will contact them but will not lift them from the alley floor as it did after the throwing of the first ball. The mechanism for controlling the operations of the pin setter with respect to lifting pins from the alley, is fully described in the co-pending application, Serial No. 101,332, filed September 17, 1936, by Gottfried J. Schmidt for Bowling pin setting apparatus, and since it does not form a part of this invention, no further description thereof is given. A detail description of the pin and ball elevator E, which at the conclusion of each raking operation effects the distribution of pins and return of balls, is given in my copending application previously referred to.

The invention above described may be varied in construction within the scope of the claims, for the particular device, selected to illustrate the invention, is but one of many possible concrete embodiments of the same. The invention is not, therefore, to be restricted to the precise details of the structure shown and described.

What is claimed is:

1. In a pin setting machine for bowling alleys, the combination with an alley bed, of a transporting device adapted to position a predetermined number of pins upon said alley, an alley guard, a rake located adjacent said guard and extending across said alley for travel thereover and therealong, means for moving said guard and rake into a position adjacent said alley whereby said guard prevents unwanted objects from rolling across the pin supporting portion of said alley, and means for moving said rake away from said guard and along the pin supporting portion of said alley after a ball has been thrown in order to remove therefrom a ball, fallen pins and/or unwanted standing pins.

2. In a pin setting machine for bowling alleys, the combination with an alley for supporting bowling pins in desired arrangement, of a pit at the end of said alley, a guard for preventing unwanted objects from entering said pit, a device for ejecting fallen pins, and balls, or unwanted standing pins from said alley into said pit while said guard occupies said position, and mechanism for moving said guard and device as a unit to locate them in operative position adjacent said alley.

3. In a pin setting mechanism for bowling alleys, comprising in combination, a guard, a rake, mechanism for moving said guard and rake substantially simultaneously into a position adjacent the upper surface of said alley, and means for moving said rake relative to said guard with a straight line motion over said alley and in a horizontal plane only to remove unwanted pins from said alley.

4. In a pin setting mechanism for bowling alleys, a guard, a pin and ball remover associated with said guard, means for lowering said guard and said remover into a position adjacent said alley, and means for moving said remover in said lowered position relative to said guard while said guard remains in its lowered position for removing unwanted pins from said alley.

5. In a pin setting machine for bowling alleys, in combination, an alley for supporting a plurality of pins in desired formation, brackets mounted on said machine, arms movably mounted upon said brackets, sprockets rotatably supported at the free ends of said arms, chains trained over said sprockets, a pin remover secured to said chains, means for lowering said arms to position said remover adjacent said alley, and means for driving said chains to cause said remover to move over said alley and discharge unwanted pins therefrom.

6. In a pin setting machine for bowling alleys, in combination, an alley for supporting a plurality of pins in desired formation, brackets mounted on said machine, front and rear arms movably mounted upon said brackets, a guard fixed to the free ends of said front pair of arms, sprockets carried by said arms, chains trained over said sprockets, a pin remover fixed to said chains, means for lowering said guard and remover into a position closely adjacent the upper surface of said alley, and means for driving said chains to cause said remover to move relative to said guard over the alley to discharge therefrom any unwanted pins.

7. In a pin setting machine for bowling alleys, the combination with an alley having positioned thereon adjacent one end a plurality of pins arranged in desired formation, of a pit at said end of said alley, a guard, a rake mounted on said guard, means for moving said guard and rake to a position of rest adjacent said alley to prevent unwanted articles from rolling into said pit, and means for translating said rake to and from the rear of said guard to a point adjacent the end of said alley for ejecting dead wood and unwanted standing pins from said alley into said pit.

8. In a pin setting machine for bowling alleys, the combination with an alley provided with a pin supporting section adjacent one end of a pit at said end of said alley, a guard, a rake, mechanism energized by the throwing of a ball for moving said guard and rake into close proximity with said pin supporting portion of said alley, means for holding said guard stationary in said position, and means for moving said rake relative to said guard while said guard maintains said position and over said pin supporting portion of said alley to eject pins from said alley into said pit.

9. In a pin setting machine for bowling alleys, the combination with an alley provided with a pin supporting section adjacent one end of a pit at said end of said alley, a guard, a rake, mechanism energized by the throwing of a ball for moving said guard and rake into close proximity with said pin supporting portion of said alley, means for holding said guard stationary in said position, and means for moving said rake relative to said guard and over said pin supporting portion of said alley to remove pins therefrom to transport pins from said alley into said pit, said mechanism comprising a plurality of interconnected driving and driven members, a driving shaft, a driven shaft, a clutch, a solenoid for operating said clutch to transfer the

drive from said driving to said driven member, and a switch actuated by a thrown ball.

10. In a pin setting machine for bowling alleys, the combination with an alley provided with a portion for supporting a plurality of pins in desired arrangement, of a pit adjacent the end of said alley, a guard, a rake, means for moving said guard and rake into close proximity with said alley, means for moving said rake relative to said guard and over said pin supporting portion of said alley for raking pins from said alley into said pit, and means for maintaining said guard adjacent said alley during the operation of said rake.

11. In a pin setting machine for bowling alleys, the combination with an alley for supporting a plurality of pins in desired formation, and a transfer member for moving a plurality of pins to and positioning them upon said alley, of an ejector for removing fallen pins and unwanted standing pins from said alley, said ejector comprising a plurality of spaced arms adjacent each side of said alley, ejector operating mechanism carried by the free ends of said arms, means mounting said ejector on said mechanism, means for moving said arms to transport said ejector to and from operative position with respect to said alley, and means for operating said mechanism to travel said ejector in a horizontal plane at all times over said alley and out of engagement therewith when it is operating to remove fallen pins and unwanted standing pins therefrom.

12. A pin setting mechanism for bowling alleys comprising an alley supporting a plurality of pins in desired arrangement at one end thereof, a transfer member for setting said pins on said alley, a guard arranged to be positioned adjacent said alley whenever pins are being handled by said member, means set into motion by the thrown ball for moving said guard adjacent said alley and mechanism operative independent of said transfer member for moving said guard away from said alley upon completion of the pin positioning operation.

13. In a pin setting machine for a bowling alley comprising an alley arranged to support a plurality of pins in desired formation at one end thereof, a guard, a rake located behind said guard, mechanism for moving said rake along said alley to remove pins therefrom, and means actuated by the throwing of each ball for moving said guard and rake into close proximity with said alley and for setting said mechanism into operation to move said rake rearwardly of said guard while said guard remains positioned adjacent said alley to eject fallen or unwanted standing pins from said alley.

14. In a pin setting machine for bowling alleys, the combination with an alley arranged to support a plurality of pins at one end thereof, of a transfer mechanism for locating said pins on said alley, a guard, a rake, mechanism for lowering and raising said guard and rake after the throwing of each ball, including means for moving said rake over the pin supporting portion of the alley every time said guard and rake are positioned adjacent said alley, and means for holding said guard against upward movement from said alley until said rake has completed its sweeping operations.

15. In a pin setting machine for a bowling alley, the combination with an alley arranged to support a plurality of pins in desired formation, of a guard, an ejector located behind said guard, means for positioning said guard adjacent said

alley, mechanism for moving said ejector along said alley to remove pins and balls therefrom while said guard remains adjacent said alley, and means actuated by the throwing of a ball for setting said mechanism into operation to move said ejector rearwardly to discharge said pins and balls from said alley.

16. In a pin setting machine for bowling alleys, the combination with an alley, of pin handling mechanism for locating thereon a plurality of pins in desired formation, a pit adjacent the pin supporting end of said alley, a guard, a rake, means for lowering said guard and rake into a position of close proximity with said alley whenever pins are to be handled and located thereon by said mechanism, means for moving said rake relative to said guard over said pin supporting end of said alley to eject fallen and unwanted standing pins therefrom into said pit, and means for raising said guard and rake from said alley after each pin locating operation of said mechanism.

17. In a pin setting machine for a bowling alley, the combination with an alley arranged to support a plurality of pins in desired formation, of a guard movable into and out of operative position adjacent said alley, a rake positioned behind said guard, a rake support, means for positioning said support and rake above said alley, and means for moving said rake along said support longitudinally above said alley and to the rear of said guard, connections between said rake and said guard for positioning the guard adjacent the alley to guard the rake

during its operation to remove fallen pins or unwanted standing pins therefrom.

18. In a pin setting machine for a bowling alley, in combination, an alley for supporting a plurality of pins in desired formation, a rake for removing balls, deadwood, and unwanted standing pins from said alley, spaced substantially horizontal rake supporting members located on each side of said alley and extending longitudinally of and in substantial parallelism with said alley, mechanism for raising and lowering said members and rake from and to said alley, and means operative when said members and rake have been lowered to move said rake on said members along a substantially horizontal path above said alley.

19. A pin setting machine for a bowling alley comprising, an alley supporting a plurality of pins in desired arrangement at one end thereof, a transfer member for placing a set of pins on said alley, a pin ejector, spaced substantially horizontal ejector supports mounted at each side of said alley, and mechanism for moving said ejector in a substantially horizontal path on said supports during its entire ejecting operation to remove fallen and unwanted pins from said alley, said mechanism including a plurality of spaced parallel arms movably mounted at each side of said alley and connected to said supports, and means for raising and lowering said arms to locate said ejector supports and ejector in operative positions adjacent said alley.

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