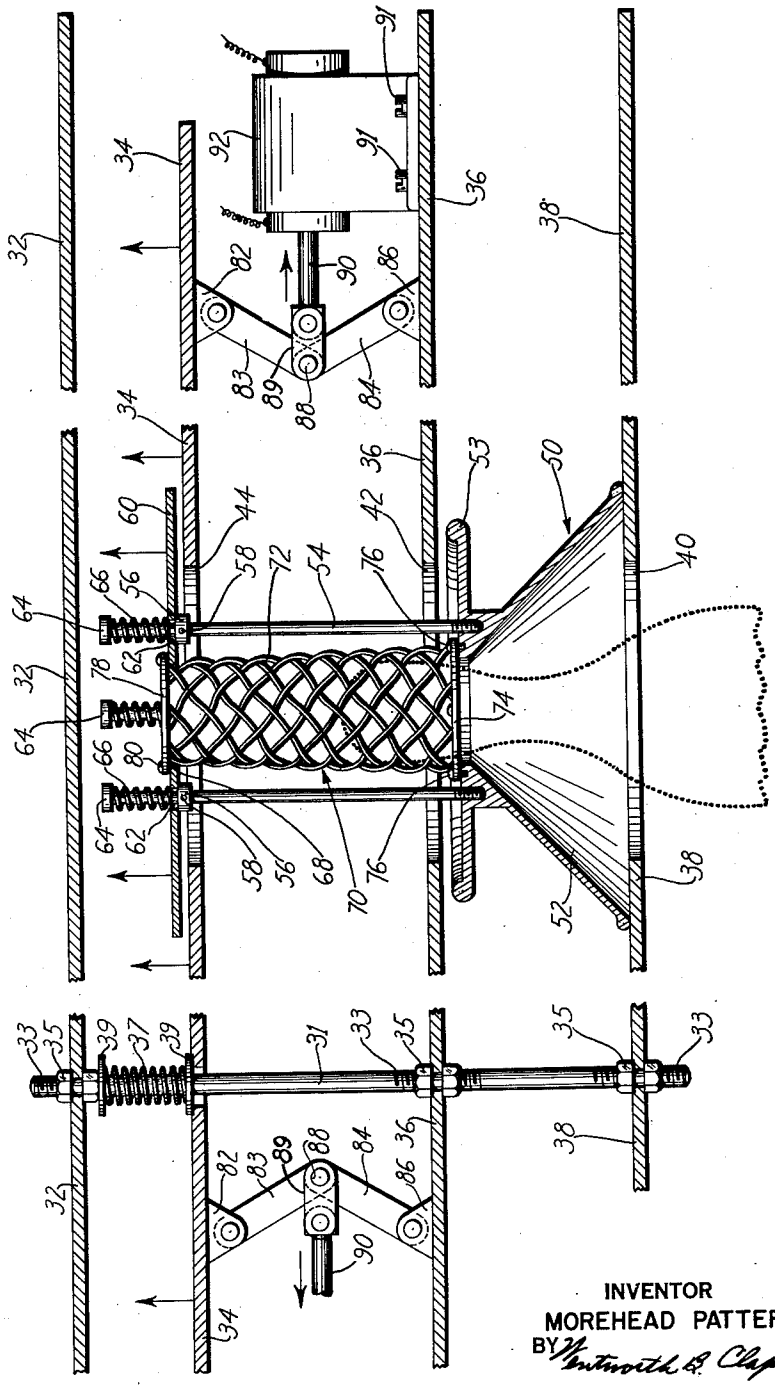
Feb. 19, 1952 M. PATTERSON 2,586,707

BOWLING PIN SPOTTING AND RESPOTTING APPARATUS

Filed April 3, 1946 2 SHEETS—SHEET 1

FIG. 1



INVENTOR
MOREHEAD PATTERSON
BY Wentworth & Clapham
ATTORNEY

Feb. 19, 1952 M. PATTERSON 2,586,707

BOWLING PIN SPOTTING AND RESPOTTING APPARATUS

Filed April 3, 1946 2 SHEETS—SHEET 2

FIG. 2

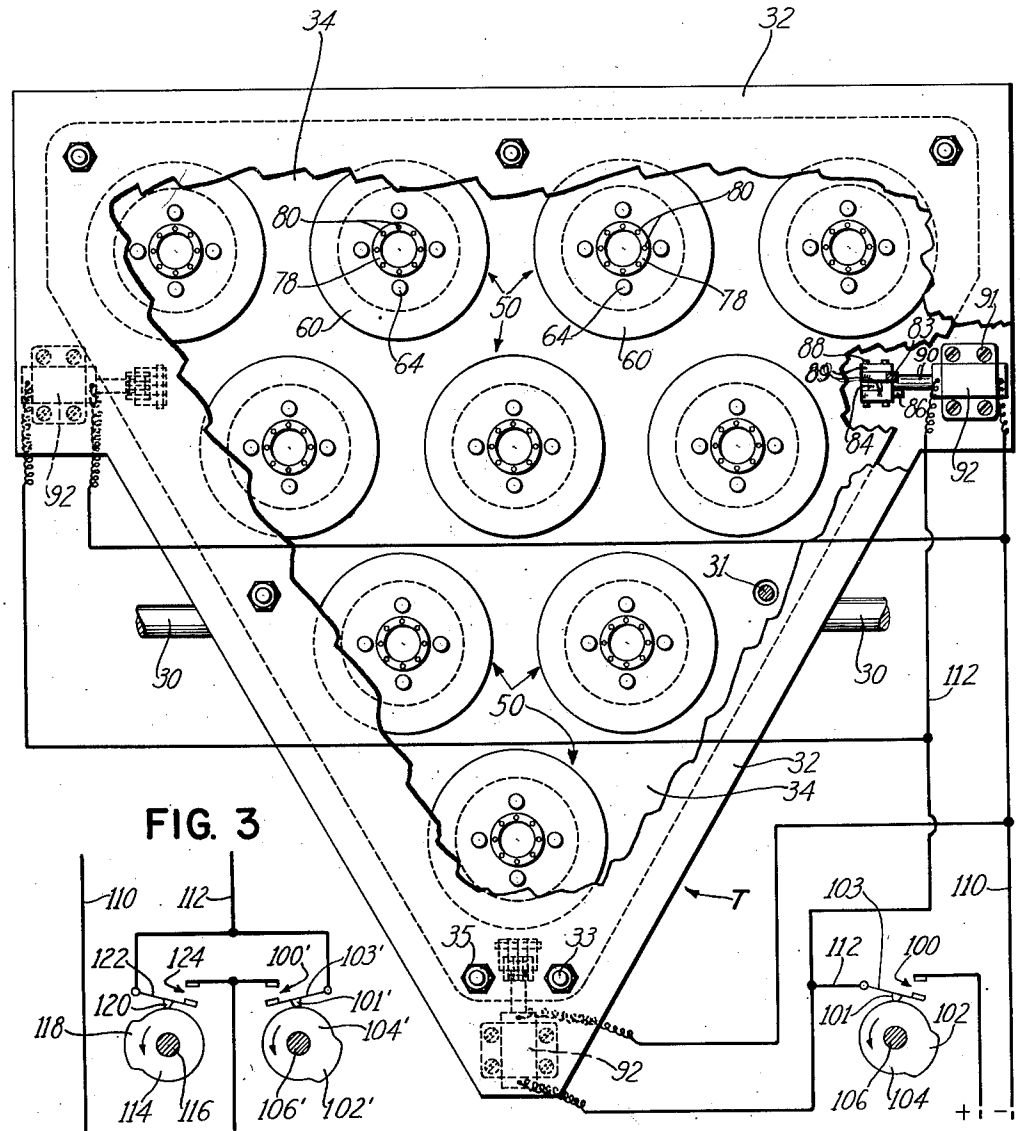


FIG. 3

INVENTOR
MOREHEAD PATTERSON
BY Wentworth & Clapham
ATTORNEY

Patented Feb. 19, 1952

2,586,707

UNITED STATES PATENT OFFICE

2,586,707

BOWLING PIN SPOTTING AND RESPOTTING APPARATUS

Morehead Patterson, New York, N. Y., assignor to American Machine and Foundry Company, a corporation of New Jersey

Application April 3, 1946, Serial No. 659,366

8 Claims. (Cl. 273—42)

1

This invention relates to bowling pin spotting mechanism, and more particularly to pin spotting and respotting devices which can be used for spotting and respotting pins on the playing bed of a bowling alley.

The invention includes the provision of improved pin handling devices forming a part of a pin spotting machine which are operative to properly grip and hold pins for spotting on an alley bed regardless of slight variations in the height or diameter of the heads of pins which are being handled. Some of the advantages occurring from this invention are, longer use of worn pins which can be shaved or repaired for further use; pins which may vary slightly in height because their bases have been trimmed can be lifted and respotted properly. It is evident, therefore, that this invention results in a direct saving to bowling alley operators because it permits longer use of pins.

Another feature of my improved pin handling mechanism is that it can readily adapt itself to the on or off-spot position of a pin to be lifted for respotting. Also, due to the nature and construction of the open bias weave grip forming an important part of each of the pin holding units, either an on or off-spot pin having an uneven bottom standing in a tilted or inclined position or a vertical pin can be gripped and held for replacement on the alley bed, plumb bob action or swinging of the pin is eliminated, and the pin is always respotted in desired on or off-spot position.

It is an object of the invention to provide an improved pin spotting mechanism having pin handling units provided with extensible pin gripping and holding means operative to firmly grip and hold pins to be spotted in on-spot or respotted in on or off-spot playing positions on the playing bed of a bowling alley.

It is a further object of the invention to provide an improved pin handling mechanism for a bowling pin setting machine capable of handling pins which may vary somewhat in height and also in diameter, and wherein the type of extensible grip employed is always operative to provide firm and positive gripping for holding a pin for spotting or respotting in proper on or off-spot position on a bowling alley.

It is a further object of my invention to provide an improved pin spotting mechanism having individually and laterally movable pin gripping units, each of which is provided with a grip composed of a plurality of strands interwoven about a common axis to form an open mesh structure into which a desired part of a bowling pin can be inserted, and means for operating each of the units to cause the respective grips thereof to contract about and firmly hold a bowling pin for spotting or respotting on the bed of an alley.

2

The invention also consists in an improved pin spotting device consisting of a plurality of pin spotter units each provided with a cable grip mechanism, and means for actuating each of the grip mechanisms regardless of whether the pins so gripped are on or off-spot or slightly inclined.

The invention also consists in the provision of improved pin gripping and spotting units in which a basket weave grip forms a part of each unit and makes possible an extremely firm gripping action due to the action of the multiple strands which encircle and grip that portion of a pin located in their range of action. In the case of respotting pins which may be standing in tilted position on an alley, any plumb bob action is eliminated and such pins are respotted in the same on or off-spot position each occupied prior to being lifted. In the case of pins being set initially, it is obvious that this mechanism contributes to positive on-spot spotting of a full set of pins.

Other objects of my invention will be set forth in the following description and drawings which illustrate a preferred embodiment thereof, it being understood that the above statements of the objects of my invention are intended generally to explain the same without limiting it in any manner.

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

Figure 1 is a partial side sectional view of the pin handling mechanism forming the invention, and shows in detail one of the pin gripping units and operating means therefor; and

Figure 2 shows a plan view, with parts broken away of the pin spotter table, and the plurality of individually, laterally movable pin spotter units mounted thereon, and a suitable mechanism for operating the units; and

Figure 3 is a diagram of a modified form of control unit.

The mechanism which forms the present invention may constitute a part of a bowling pin spotting machine of the general type shown in Rundell patent, No. 2,383,017, issued August 21, 1945. It may also be used in connection with any other bowling pin spotting device which is capable of spotting and respotting pins in on or off-spot positions.

Referring to the drawings which show a preferred embodiment of the invention, table T which is constructed and operated in the same general manner as disclosed in the above noted Rundell patent, is mounted on shaft **30** for movement to and from pin spotting and respotting position relative to a bowling alley (not shown). Shaft **30** which supports the table T for turning movement may be mounted in slides (not shown) supported in vertical guideways (not shown) forming a part of the machine with which this mechanism is used. The mechanism for supporting table T and moving the same forms no part of this invention and is, therefore, in the interest of brevity neither shown nor described.

Table T preferably is generally triangular in shape, and is provided with a plurality of spaced generally triangular members such as plates or boards **32**, **34**, **36** and **38** made of metal, wood or other suitable material. Plates **34**, **36** and **38** are provided with circular openings **40**, **42** and **44**, arranged in triangular formation and corresponding to spotted positions of pins on a bowling alley.

Mounted above each of the openings **40** in plate **38** is an individually laterally movable pin gripping and holding unit designated generally **50**. Since these units are identical in construction, but one will be described in detail. As shown in Figure 2 there are ten such units arranged in conventional triangular pin supporting arrangement corresponding to the positions of bowling pins on a bowling alley. Each unit **50** is mounted on plate **38** for individual lateral and vertical movement.

As shown in Figure 1, each unit **50** consists of a truncated cone or funnel portion **52** having a base which rests on plate **38** greater in diameter than the diameter of opening **40** in plate **38**. In this manner the relatively lightweight unit **50** can be shifted by the engagement of the tapered sides of funnel **52** with the head end of the heavier standing pin to positions on plate **38** relative to an opening **40** corresponding to an on or off-spot standing pin position on the alley. In this manner a pin can "walk" a considerable distance off-spot and still be gripped, lifted and respotted properly on the alley by a unit **50**.

As shown in Figure 1 the top of the funnel portion **52** is provided with a flange **53**, the diameter of which is greater than that of opening **42**. Flange **53** limits upward movement of funnel **52**. Screwed into flange **53** are elongated rods **54** each provided with a collar **56** fixed thereto by a pin **58**. The top faces of collars **56** bear against the underside of a plate **60** located above plate **34**. Rods **54** extend through openings **62** in plate **60** and are provided with heads **64**. Springs **66** on each of rods **54** normally act to maintain plate **60** in engagement with the top faces of collars **56**.

Plate **60** is provided with an opening **68** through which extends a cylindrical grip designated generally **70**, made up of a plurality of crossing strands or wires woven about a common axis to form an open meshed structure. The strands or wires can be made of round or flat wire, such as steel, bronze, or other similar materials, or from textiles such as cotton, or other flexible fibrous material which will have sufficient strength to stand constant pull and release.

Strands **72** are loosely interwoven angularly (Figure 1) in such manner that when a grip is stretched axially the strands move relatively to each other to constrict about and firmly hold

an article, such as a bowling pin, located within their range of action.

Each grip is of a diameter such that when maintained open (as shown in Figure 1), a portion of a pin, such as the handle end can readily enter into the bore of the grip so that the strands **72** encircle it. The ends of strands **72** adjacent funnel **52** are secured to a ring **74** by means of screws **76** which also attach ring **74** to the top of funnel **52**. The strands **72** at the other or upper end of grip **70** are attached to a ring **78** by screws **80** which also secure ring **78** to actuating plate **60**.

Toggle levers **83**, **84** are pivotally connected to brackets **82**, **86**, respectively, mounted on plates **34** and **36**, respectively. Levers **83**, **84** are also pivotally connected at **88** to a pair of parallel links **89**, the other ends of which are connected to the armature **90** of solenoid **92** mounted on and secured to plate **36** of table T by screws **91**. As shown in Figure 2, there are preferably three solenoids **92**, each connected to plates **34** and **36** in the manner described. Obviously more or fewer solenoids **92** and operating connections can be used as desired.

Plates **32**, **34**, **36** and **38** which form table T are secured together in assembled arrangement by means of rods **31** having threaded portions **33** and lock nuts **35** which hold plates **32**, **36** and **38** in predetermined spaced relationship. Plate **34** is attached to levers **83** (as shown in Figure 1) and is, therefore, mounted for vertical movement relative to fixed plate **36**. Springs **37** encircling rods **31** and located between washers **39** tend normally to hold plate **34** in the position shown in Figure 1 in which grip **70** is open and in pin receiving position.

In operation, as table T moves downwardly towards the playing bed of an alley and standing pins which are to be lifted and respotted for playing the next ball of the frame, openings **40** in plate **38** allow the head ends of any standing on or off-spot pins to enter the funnel portions **52** of their respective units **50**.

When pins and units **50** are in on-spot relationship with the longitudinal axis of each unit **50** aligned with the longitudinal axis of an on-spot pin there is no relative movement between such pins and units, when the handle ends of such pins become located within the bores of grips **70**. If, however, a pin occupies an off-spot position on the alley bed, or a unit **50** is not axially aligned relative to an on-spot standing pin, engagement by the head end of each standing pin with the tapered interior face of funnel **52** of its respective unit **50** will cause this unit to move into centered position or axial alignment with respect to such standing on or off-spot pin. In this manner the respotting units are located for gripping, lifting and respotting pins in the desired on or off-spot position with the head end of each such on or off-spot pin located (as shown in Figure 1), within the bore of its respective grip **70**.

When each individually and laterally movable unit **50** has been located to correspond with the on or off-spot position of a standing pin to be lifted and respotted, as above noted, solenoids **92** are energized simultaneously to open toggles **83**, **84**, and move plate **34** upwardly away from plate **36**. Actuating plate **60** is engaged by and moved with plate **34** thereby compressing springs **66** and stretching grips **70**, causing strands **72** thereof to constrict tightly about the head ends of any pins to be lifted.

With the pin heads held in this manner, table T is raised above the alley, a sweep (not shown) sweeps any deadwood from the alley or gutter of the alley into the pit and returns to inoperative position. The table is then lowered to reposition the pins which were lifted in on or off-spot position on the playing bed of the alley, solenoids 92 are deenergized, whereupon toggles 83, 84 are closed as springs 37 force plate 34 towards plate 36, and springs 66 which were compressed by the upward movement of plates 60 and 34 force plate 60 downwardly to release strands 72 of grips 70 from holding engagement with the head ends of pins which were lifted and respotted, the table is raised to a dwell position above the alley (not shown), and play can be resumed.

A suitable control for energizing and deenergizing solenoids 92 is shown diagrammatically in Figure 2. The three solenoids are connected in a multiple circuit by leads 110, 112 to a suitable source of electric power. When pins are to be gripped and held by units 50 during the respotting operation, solenoids 92 are energized as the result of the closing of switch 100 through engagement of follower 101 with a high portion 102 on cam 104 secured to shaft 106 which is suitably driven in timed relationship with the operation of the carrier T. When follower 101 on switch arm 103 rides off the high portion 102 at the time the respotted pins are to be released and left in playing arrangement on the alley, the circuit is broken by the opening of switch 100.

The structure illustrated in Figures 1 and 2 may be employed for spotting and respotting pins. In such case, table T can be used as shown in Rundell patent, No. 2,388,709, issued November 13, 1945. In this case, units 50 perform the dual functions of spotting and respotting pins. Mechanism for controlling the operation of table T when so employed can be the same as shown in Rundell Patent No. 2,388,709. Since the mechanism for moving table T to and from an alley, and operating means therefor form no part of the present invention, further description and showing is omitted.

The operation of the units 50 is substantially the same as described above except that the grips 70 are actuated both for the purpose of spotting and respotting the pins. That is, solenoids 92 are operated to cause grips 70 to firmly hold pins delivered in spotted arrangement for placing a frame of pins on the alley prior to the throwing of the first ball of a frame. Solenoids 92 are also energized and deenergized for operating grips 70 in order to grip, lift and respot on or off-spot pins on the bed of the alley prior to throwing the second ball of a frame.

A suitable control mechanism for energizing and deenergizing solenoids 92 for operating units 50 for both spotting and respotting pins is shown diagrammatically in Figure 3. When pins are to be gripped, lifted and respotted, solenoids 92, which are connected by leads 110, 112 to an electric control circuit, are energized as the result of closing of switch 100' through engagement of follower 101' with a high portion 102' on cam 104' secured to shaft 106' suitably driven in timed relationship with the operation of the carrier T. Pins which have been lifted and respotted by carrier T are released from gripping units 50 when switch 100' is opened when follower 101' rides off the high portion 102' and onto the low portion of cam 104'. When a new set of pins is to be spotted on the alley, a set of pins is delivered in triangular formation by suitable

mechanism (not shown), similar to that shown in the above mentioned Rundell Patent 2,388,709, whereupon a cam 114 on shaft 116 suitably driven in timed relationship with the operation of the machine and carrier T causes high portion 118 to engage a follower 120 on switch arm 122 which closes switch 124 and completes the circuit through leads 110, 112 to energize solenods 92 and cause the ten grips 70 to grip and firmly hold the pins delivered thereto. The solenoids 92 remain energized until the carrier T places the new set of pins on the alley whereupon high portion 118 moves out of engagement with cam follower 120, switch 124 is opened thereby breaking the circuit, and the pins are released in spotted arrangement on the alley.

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. It is not, therefore, to be restricted to the precise details of the structure shown and described.

What I claim is:

1. In a bowling pin setter for use with a bowling alley, the combination with a table adapted to be moved to and from said alley, and a support on said table, of a pin guide funnel loosely mounted on said support and arranged for lateral movement thereon relative to an on or off-spot pin standing on the bed of a bowling alley, a grip composed of a plurality of strands interwoven diagonally about a common axis to form an elongated open mesh gripping cage wherein said strands are constructed and arranged for relative gripping movement, means mounting one end of said cage on said funnel in position to receive and encircle the handle end of a standing pin, an actuating device attached to the other end of said cage, means on said table adapted to engage said device, means on said table adapted to engage said funnel, mechanism for effecting relative separating movement between said device engaging means and said funnel engaging means for stretching and constricting said strands into gripping engagement with the handle end of a pin encircled by said cage, and means for subsequently effecting relative movement of said device engaging means and funnel engaging means towards each other for compressing said cage and releasing said strands to free said pin from said grip.

2. A bowling pin spotting unit comprising a funnel having an upper rim portion provided with an opening greater than the maximum diameter of the handle end of a bowling pin, a resilient cylindrical grip having one end attached to said funnel adjacent said upper rim portion and in axial alignment with said opening for encircling and gripping the handle portion of a bowling pin and upon engagement with the handle end of a standing bowling pin move said grip into axial alignment with said pin, an operating member attached to the other end of said grip, resilient means coacting with said operating member and said funnel for maintaining the diameter of said grip greater than the diameter of said handle end of said pin to allow the entry thereof into said grip, and means engaging said operating member and said funnel for decreasing the diameter of said grip to cause said grip to firmly hold said pin in said unit.

3. A bowling pin spotting unit mounted for movement to and from the playing bed of a bowl-

ing alley, comprising a funnel having a top rim portion and a bottom rim portion connected by tapered pin guiding sides, a resilient elongated cylindrical grip having one end attached to said funnel adjacent said top rim portion and substantially in axial alignment with the longitudinal axis of said funnel, said funnel and grip being mounted for free movement in response to the movement of said unit toward said bed and the engagement of said funnel with the handle end of a bowling pin to move said grip into axial alignment with said pin, said grip being composed of a plurality of strands interwoven about a common axis to form an open meshed structure, resilient means normally maintaining the diameter of said grip greater than the diameter of said portion of said pin to allow the entry of said handle end portion of said pin into said grip, and actuating means attached to the other end of said grip, and means for moving said top rim portion of said funnel and said actuating means away from each other for decreasing the diameter of said grip to cause said strands to firmly grip and hold said pin in said setter.

4. A bowling pin spotter unit comprising a guide member having tapered sides and spaced openings through which an end portion of a bowling pin may project, a substantially cylindrical elongated cable grip having one end attached to said guide member adjacent one of said openings with the longitudinal axis of said grip passing through the center of said opening, an actuating member attached to the other end of said grip, a movable operating device positioned to engage said actuating member, means normally maintaining said actuating member disengaged from said device, means normally maintaining said grip in open pin receiving condition, means operative whenever a pin is to be spotted or respotted in on or off-spot position on a bowling alley for causing said actuating member to engage and move said device away from said guide member to contract said grip about said end portion of a bowling pin to firmly hold said pin in said unit and means for holding said guide member against substantial axial movement during the operation of said actuating member.

5. Pin spotting mechanism for a bowling pin spotting machine comprising a pin spotting table provided with spaced relatively vertically movable members, a plurality of pin spotting devices carried by said table, each of said devices including a substantially cylindrical elongatable cable grip, said table including a bottom member having a plurality of openings providing access of pins into said grips, an actuator carried by one end of each of said grips adapted to be engaged by one of said members, an actuator carried by the other end of each of said grips adapted to engage another of said members, and means carried by said table for effecting relative separating movement between said members to engage said actuators and elongate said grip to grip and hold pins in said devices.

6. Pin spotting mechanism for a bowling pin spotting machine comprising a pin spotting table provided with spaced relatively verticaly separable members, a plurality of pin spotting devices mounted on said table for independent lateral movement relative to said members, each of said devices including a substantially cylindrical elongatable cable grip, said table also including a bottom member supporting said devices and having a plurality of openings providing access of pins to said grips, actuating means for each of said grips, a guide engageable by the handle end of a pin for shifting said grip into substantially axial alignment with the longitudinal axis of said pin, means carried by said table for effecting relative separating movement between said members to engage said members with said actuating means and elongate said grips to grip and hold pins in said devices, means for effecting relative movement between said members toward each other to disengage said members from said actuating means, and means for compressing said grips to effect the release of pins from said devices.

7. Pin setting mechanism for a bowling pin spotting machine comprising a pin setter table adapted to move to and from a bowling alley for setting pins thereon, spaced relatively movable members carried by said table, a plurality of pin gripping units carried by said table, each of said units including a cable grip composed of a plurality of strands interwoven about a common axis mounted in pin receiving position on each of said units, grip elongating devices mounted adjacent each end of each of said grips, one of said devices of each of said units being positioned above one of said members, the other of said devices of each of said units being located below one of said members, and means for effecting relative separating movement betweent said members to engage said grip elongating device and effect a relative movement of said devices in opposite directions to cause said strands of said cable grips to firmly grip and hold pins located in said grips.

8. Pin spotting mechanism for a bowling pin spotting machine comprising a pin spotter table adapted to move to and from a bowling alley, vertically spaced members carried by said table, said members including a movable member and two fixed members, a plurality of individually and laterally movable pin guiding and gripping units loosely mounted on one of said fixed members and above openings in said fixed member, each of said units including a guiding and locating device located between said fixed members and having openings constructed and arranged to receive and encircle the handle end of a bowling pin, an elongated extensible cable grip attached to said device adjacent to and in substantial alignment with the longitudinal axis of said device, actuating means carried by said grip, means normally maintaining said grips open whereby the handle ends of standing pins may extend through said openings in said first-named fixed member and engage said guiding and locating devices and shift said units on said first-named fixed member and locate said grips substantially in coaxial alignment with the longitudinal axes of said standing pins, and means for moving said movable member upwardly into engagement with said actuating means and away from said fixed members, one of said fixed members being operative in response to said movement to restrict the upward movement of said devices, whereby said cable grips are stretched to grip and hold said pin.

MOREHEAD PATTERSON.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,584,030	Gray	May 11, 1926
2,268,598	Kellems	Jan. 6, 1942
2,353,189	Rundell	July 11, 1944