No. 809,890. PATENTED JAN. 9, 1906.

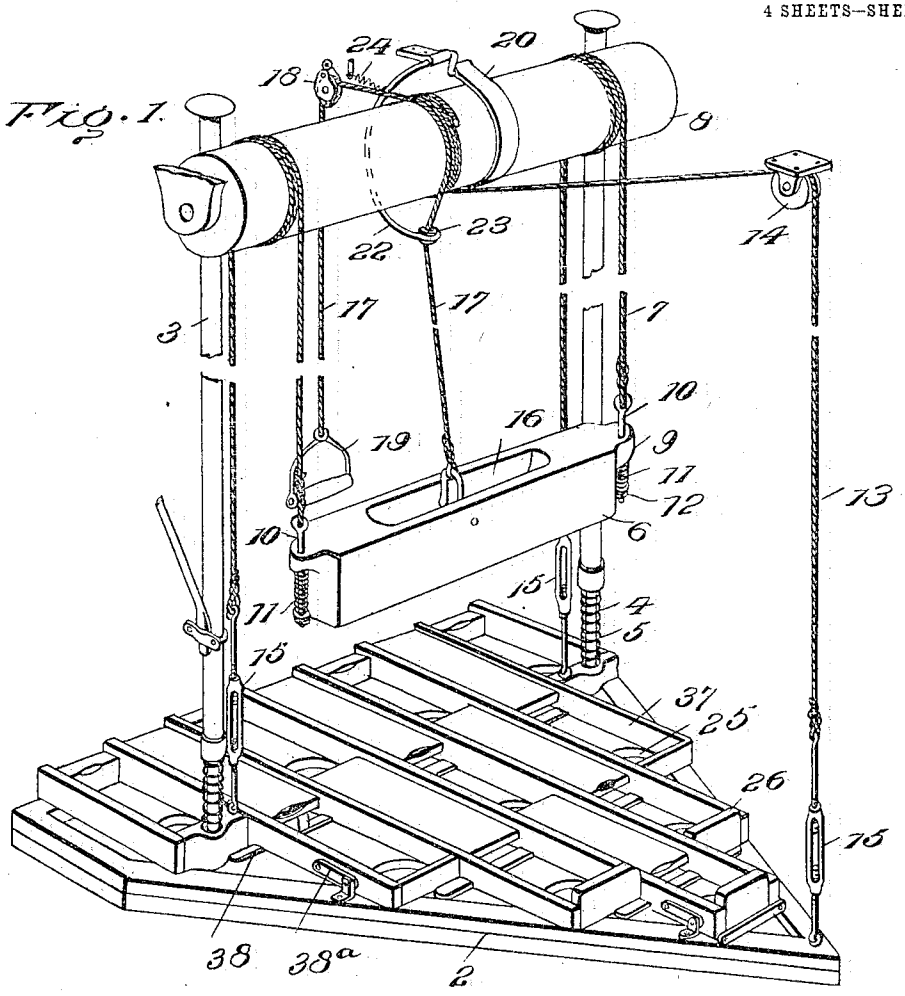
J. C. BACKUS.

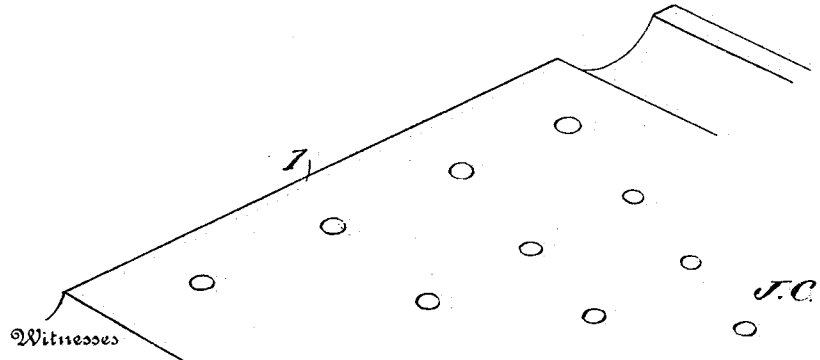
MEANS FOR SETTING AND SPOTTING TENPINS.

APPLICATION FILED APR. 6, 1905.

4 SHEETS—SHEET 1.

FIG. 1.





Witnesses

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4 SHEETS—SHEET 2.

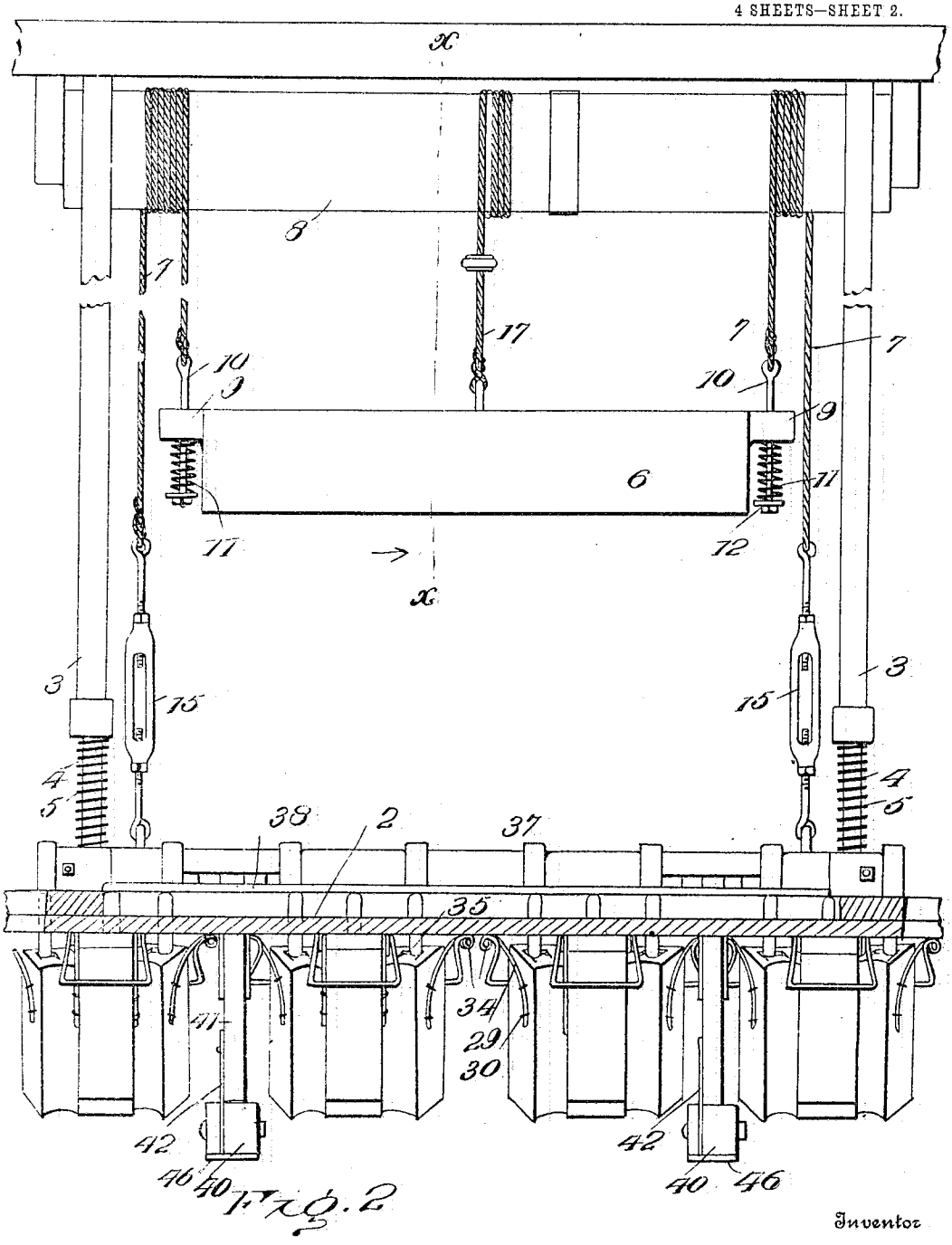


FIG. 2.

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4 SHEETS—SHEET 3.

FIG. 3

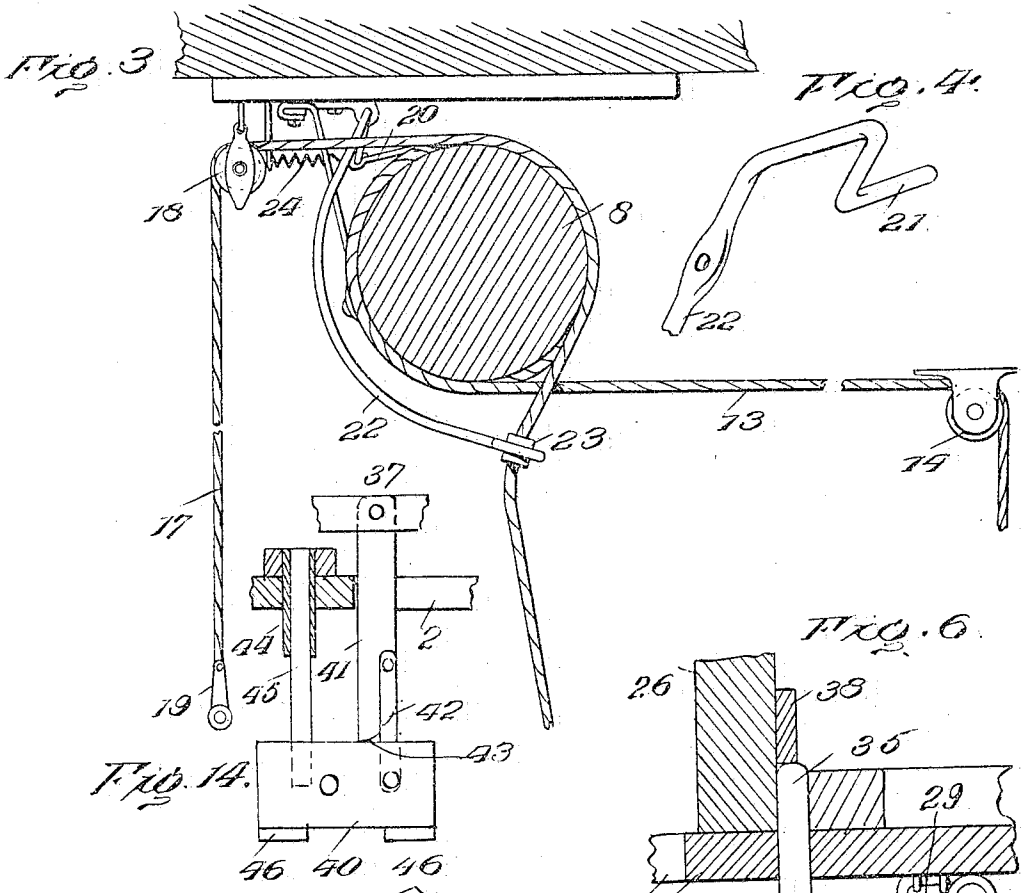
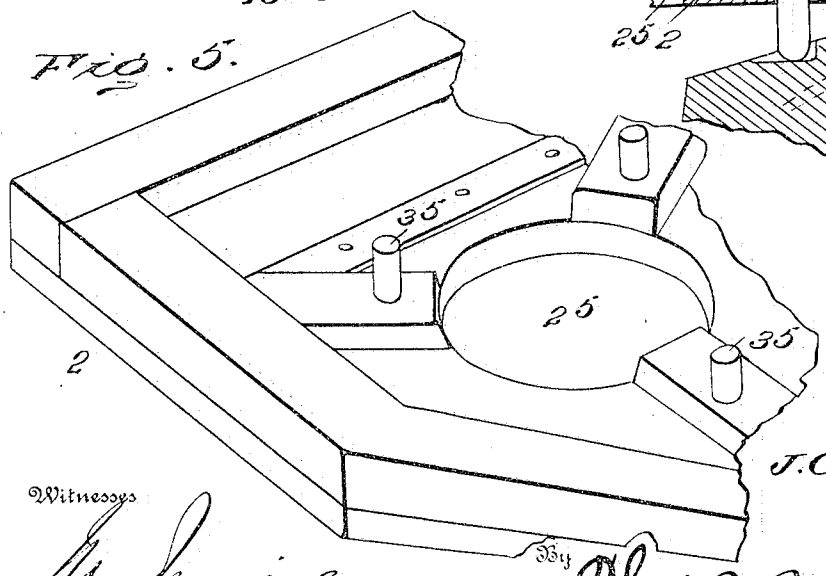


FIG. 4.

FIG. 14.

FIG. 6.

FIG. 5.



Inventor

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Witnesses

W. N. Woodson

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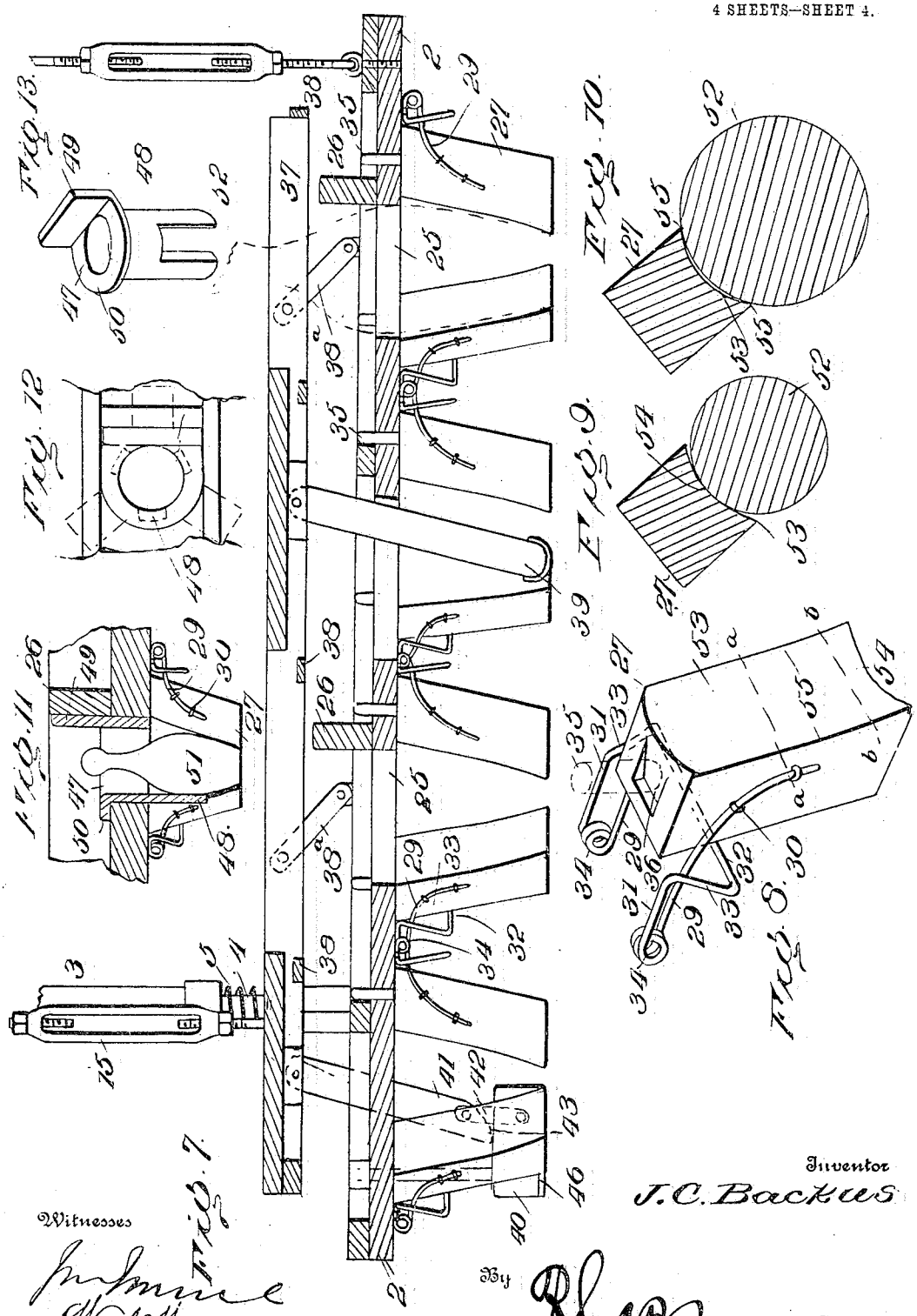
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4 SHEETS—SHEET 4.



Witnesses

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Inventor

J. C. Backus

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UNITED STATES PATENT OFFICE.

JOHN C. BACKUS, OF SMETHPORT, PENNSYLVANIA.

MEANS FOR SETTING AND SPOTTING TENPINS.

No. 809,890. Specification of Letters Patent. Patented Jan. 9, 1906.

Application filed April 6, 1905. Serial No. 254,202.

To all whom it may concern:

Be it known that I, JOHN C. BACKUS, a citizen of the United States, residing at Smethport, in the county of McKean and State of Pennsylvania, have invented certain new and useful Improvements in Means for Setting and Spotting Tenpins, of which the following is a specification.

This invention appertains to apparatus for properly positioning tenpins upon bowling-alleys, and embodies peculiar structural devices, which hereinafter will be more particularly set forth, and defined in the subjoined claims.

The invention consists, preferably, of a counterbalanced pin-carrier and a controlling-brake, the latter being automatically actuated upon application of force to overcome a part of the carrier-counterbalance to permit movement of said carrier to advance the pins to the bed of the alley.

The invention also consists in combination, with the carrier and pin-shifter, of coöperating means for holding the carrier steady when settling upon the bed of the alley in its final movement to effect movement of the shifter for arighting and discharging the pins from the carrier upon the alley.

The invention also consists of pressure-pins arranged between the pin-shifter and the pin-guides for spreading the latter when the pin-shifter falls back upon or occupies a normal position upon the carrier, also in novel means for connecting the pin-guides to the carrier, so as to obviate the formation of a defined pivot-joint, and provide spring means for pressing coöperating pin-guides inward to insure correct positioning and steadying of the pins.

The invention further consists of means for adapting the machine to the different sizes of pins generally used upon bowling-alleys, said means consisting of a reducer for the pin-openings of the carrier and coöperating auxiliary pin-guides and abutments to assure proper positioning of the pins both upon the carrier when placed thereon and upon the alley when discharged thereupon from the carrier.

For a full description of the invention and the merits thereof and also to acquire a knowledge of the details of construction of the means for effecting the result reference is to be had to the following description and accompanying drawings.

While the invention may be adapted to different forms and conditions by changes in the structure and minor details without departing from the spirit or essential features thereof, still the preferred embodiment thereof is shown in the accompanying drawings, in which—

Figure 1 is a perspective view of a mechanism embodying the essential features of the invention and specially designed for placing pins upon a bowling-alley. Fig. 2 is a front view of the machine. Fig. 3 is a longitudinal section on the line $x\ x$ of Fig. 2 looking in the direction of the arrows, showing the parts on a larger scale. Fig. 4 is a detail perspective view of the upper portion of the brake-operating lever. Fig. 5 is a detail perspective view of a rear corner portion of the carrier. Fig. 6 is a sectional detail view of a portion of the carrier and a pin-guide, showing the relation of the parts when the pin-guide is moved to a position to clear the pins. Fig. 7 is a central longitudinal section of the carrier and conjunctive parts on a larger scale. Fig. 8 is a detail perspective view of a pin-guide and the connecting means for attaching it to the carrier. Fig. 9 is a horizontal section of the pin-guide on the line $a\ a$ of Fig. 8, showing the pin in operative position. Fig. 10 is a view similar to Fig. 9 on the line $b\ b$ of Fig. 8. Fig. 11 is a sectional detail showing the means for adapting the machine for small-sized pins. Fig. 12 is a top plan view of the parts shown in Fig. 11. Fig. 13 is a detail perspective view of the reducer. Fig. 14 is a detail view of the means for steadying the carrier during the operation of the pin-shifting means.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

The pit end of the bowling-alley is indicated by the reference-numeral 1 in Fig. 1, and the carrier 2 is movable toward and from the bed of the alley, so as to properly place the pins thereon and then move away to admit of unobstructed use of the alley in the accustomed manner. Within the purview of the invention the carrier 2 may be mounted in any manner and is preferably of triangular shape to conform to the outline of the pins when set, and thereby occupy the smallest amount of space. As shown, the carrier 2 is mounted for vertical movements and is directed in its ascent and descent by guides 3 and 4, the former being attached to

a framework or overhead support and the latter firmly and rigidly attached to the carrier and telescoping with the elements 3. Springs 5 are mounted upon the guide members 4 and serve as buffers to prevent shock or jar when the carrier reaches the limit of its upward travel. A weight 6 acts as a counterbalance for the carrier, adjunctive parts, and the pins placed thereon. This weight is supported at opposite ends by means of cords 7 or analogous flexible connections, the same passing once or twice around opposite end portions of a roller 8, journaled overhead and arranged transversely of the alley. Ears or lugs 9 project outward from opposite ends of the weight 6 and are vertically apertured to receive eyebolts 10. A spring 11 is mounted upon the lower portion of each eyebolt and is confined between the lug 9 and a washer and nut 12. The cord or like connection 7 is attached to the upper end of the eyebolt and after passing around the roller 8 is attached to the carrier to hold the same in suspension. The springs 11 act as buffers to neutralize shock and jolt and prevent injurious strain of this nature from affecting the workings of the machine. A cord or like connection 13 is attached to the front end of the carrier and passes over a direction-pulley 14, thence around roller 8, to which it is secured. Each of the suspending-cords 7 and 13 is provided with a turnbuckle 15 or analogous contrivance to admit of leveling the carrier, so that it may occupy a position parallel with the bed of the alley, so as to set the pins squarely thereon. The weight 6 is formed in its top side with a depression 16, which constitutes a receptacle in which additional weight may be placed, if desired. An operating cord or rope 17 is connected to the weight at a central point and after passing over the roller 8 extends through a sheave-pulley 18, thence hangs loosely, and is provided with a handle 19 for convenience of operation. Upon pulling downward upon the loose end of the operating-cord 17 the carrier is relieved wholly or in part of the influence of the weight 6 and descends more or less rapidly, according to the force expended upon the operating-rope 17 and the controlling influence of the brake, as will be explained more fully hereinafter. The weight 6 may be equal to the combined weight of the carrier, adjunctive parts, and the pins placed thereon, or it may fall short of or exceed said combined weight, as may be determined upon in the installation of the apparatus.

A brake mechanism is provided and coöperates with the roller 8 for governing its speed and the descent of the carrier, as well as to hold the same when elevated and receiving the pins to be placed upon the alley at the proper time. The brake may be of any construction so long as the objects sought are attained. The type of brake illustrated is preferred, as it admits of embracing the roller without exerting any undue stress in any particular direction. The brake consists of a band or strap 20, made fast at one end to a convenient part of the framework or overhead structure and having its opposite end attached to the crank portion 21 of an operating-lever 22. The lever 22 is fulcrumed between its ends, and its lower arm curves around and beneath the roller 8 and terminates in an eye 23, through which the operating cord or rope 17 passes. A spring 24 coöperates with the lever 22 to draw the band or strap 20 about the roller 8 with sufficient force to hold the carrier elevated and prevent free rotation of the roller. Under normal conditions the brake is set and the part of the operating-cord 17 between the roller 8 and weight 6 is deflected from the perpendicular, as shown most clearly in Figs. 1 and 3. When it is required to lower the carrier upon the alley, a pull upon the loose end of the operating-cord 17 tends to straighten the portion between the weight and roller, thereby drawing the lower end of the lever 22 forward and releasing the brake and permitting the carrier to descend whether loaded to place the pins upon the alley or empty to insure correct position of the pins should a player demand lowering of the carrier to satisfy himself that the pins have not been displaced and occupy correct position. A pull upon the loose end of the operating cord or rope 17 performs the dual function of releasing the brake, at the same time overcoming wholly or in part the counterbalance, thereby permitting the carrier to move toward the plane of the alley, whether loaded or empty.

It is preferred in the practical operation of the apparatus to have the combined weight of the carrier and pins slightly in excess of the counterbalance, so that upon release of the brake by a slight pull upon the cord 17 the loaded carrier will descend by the preponderance of weight. Obviously by pulling upon the cord 17 with more or less force the speed of the carrier's descent may be regulated. After the pins have been deposited upon the alley the carrier is prevented from instant return by pulling upon the cord 17 with a force to relieve the lightened carrier of the preponderant force of the counterbalance. The pins are thus steadied and their correct position assured before the carrier clears them upon its ascent. Upon releasing the cord 17 the carrier ascends or returns to normal position by the superior force of the counterbalance represented by the diminished weight of the carrier after the pins have been deposited upon the alley. The brake is so adjusted as not to prevent the return of the carrier when relieved of the weight of the pins. Moreover, when the carrier is loaded it tends to descend and to turn the roller 8 in an anticlockwise direction, with

the result that the strap-brake 20 is tightened. Upon the return of the carrier to normal position the roller 8 rotates in a clockwise direction, which tends to loosen the grip of the brake-strap, as will be readily understood.

The carrier is provided with pin-openings 25 to admit of discharge of the pins therefrom onto the bed of the alley, abutments or stops 26 being located in front of the respective pin-openings to engage with the foot of the pins and properly position the same to admit of their positive discharge upon actuation of the pin-shifter. A series of pin-guides 27 cooperate with the pin-openings and are movable, so as to embrace the pins and to clear them when the carrier begins its ascent or travel away from the bed of the alley. In the preferable construction the pin-guides 27 consist of short legs and are grouped around the respective pin-openings, the members of each group converging inward toward their lower ends, so as to exert a lateral pressure against the sides of the pins and insure correct position thereof. Each pin-guide is connected to the carrier by means of spring-arms 29, which are attaehed to opposite sides of the guide by means of staples 30 or other suitable fastenings, said arms curving upwardly and rearwardly with reference to the position of the pin-guide and the pin-opening with which it coöperates. Other arms 31 are connected with the arms 29 and are placed against the under side of the carrier and are stapled or otherwise fastened thereto. A cross-bar 32 is connected by members 33 to the arms 31. Coil-springs 34 are located at the juncture of the arms 29 and 31. The several elements 29, 34, 31, 33, and 32 are preferably formed of a single length of wire of suitable gage bent into the form substantially as shown, thereby obviating the formation of joints and providing the necessary spring to admit of the yielding movements of the pin-guides. The members 33 are arranged exterior to the arms 29 and serve to prevent lateral displacement or movement of the pin-guides. The cross-bar 32 is arranged a proper distance below the upper ends of the arms 29 and serves as a stop to limit the outward and downward movement of the pin-guides when clearing the pins, thereby preventing overstraining or other injury to the spring-arms 29, which would be liable to occur if the cross-bars 32 or their equivalent were not provided. Pressure-pins 35 are loosely mounted in the carrier 2 and are of a length to project a short distance above the carrier to be engaged by the pin-shifter when resting upon the carrier, so as to transmit pressure to the pin-guides and effect spreading thereof, as indicated most clearly in Figs. 2 and 6. A recess 36 is formed in the upper end of each pin-guide and forms a seat for the lower end of the coöperating pressure-pin.

The pin-shifter consists of a frame 37, preferably of open structure and comprising transversely-spaced longitudinal strips connected in series in a substantial manner, the strips being arranged upon opposite sides of respective pin-openings 25, so as to properly position the pins and prevent lateral displacement thereof when placed upon the carrier preliminary to operating the machine to place them upon the alley. Links 38[a] connect the pin-shifting frame to the carrier and insure a combined longitudinal upward and forward or downward and rearward movement of said frame. Cross-pieces 38 project from or connect the longitudinal strips of the pin-shifter frame and are adapted to come in contact with the pressure-pins 35 and move the same downward when said shifter-frame is resting upon the carrier. The total weight of the pin-shifter frame and adjunctive parts is in excess of the combined force of the spring-arms 29 and springs 34. Hence when said shifter-frame 37 settles upon the carrier the parts 38, coming in contact with the pressure-pins 35, depress the same and effect spreading of the pin-guides. Operating-bars 39 are pendent from the pin-shifter and are of a length to project below the pin-guides when said shifter is resting upon the carrier, so as to come into contact with the bed of the alley upon descent of the carrier. The operating-bars 39 are pivotally connected at their upper ends to the pin-shifter frame 37, so as to move therewith. The lower ends of the operating-bars 39 are covered with rubber, leather, or like material to prevent injurious contact with the bed of the alley in the operation of the machine.

A block 40 is arranged below the carrier and is connected to the pin-shifter 37 by means of an operating-bar 41 and link 42, the operating-bar 41 being pivoted at its upper end to the frame 37 and having its lower end made rounding, as shown at 43, so as to rock upon the block 40, to which it is connected by the link 42. A telescopic guide connection is interposed between the block 40 and the carrier 2 to insure vertical movement between the parts 40 and 42 in the operation of the machine. The guide connection consists of a tube 44 and a pin 45, the former being preferably attached to the carrier and the latter made fast to the block 40. The lower face of the block 40 is provided with rubber, leather, or other material 46, to insure frictional contact between the block and the bed of the alley, so as to obviate slipping. The block 40 projects below the pin-guides 27 a distance corresponding to the projecting ends of the operating-bars 39, so as to come in contact with the bed of the alley as the carrier approaches the same in its final descent. After the block 40 settles upon the bed of the alley and the carrier continues its descent the shifter-frame 37 is thrown up-

ward and forward, so as to aright the pins and effect their discharge through the pin-openings 25. During this operation the bar 41 rocks upon the block 40, and the latter being held to the carrier 2 by means of the telescopic guide connection steadies said carrier and relieves it in a great measure of the longitudinal strain incident to the forward and upward movement of the shifter when arighting the pins to effect their delivery upon the alley-bed.

It often happens that players desire to use pins smaller than those of the regulation size and known as "duck-pins," and in order to adapt the machine for setting such pins the means shown most clearly in Figs. 11, 12, and 13 have been devised, the same consisting of a reducer 47, provided with pendent guides 48 and an abutment 49, the latter projecting upward from the reducer and adapted to bear against the abutment or stop 26. An outer flange 50 supports the reducer in the pin-opening 25, although it is obvious that any means may be employed for retaining the part 47 in position. The pendent guides 48 are arranged to come between the pin-guides 27, so as not to interfere therewith. The abutment 49, bearing against the stop 26, prevents turning of the reducer when fitted into the pin-opening. The parts 47, 48, and 49 are preferably of integral formation, being a casting, although it is to be understood that they may be constructed in any manner. When it is required to adapt the apparatus for setting duck-pins 51, a reducer 47 is fitted into each pin-opening 25, and when it is required to set pins 52 of the regulation size the reducers 47 are removed. These reducers may be cheaply manufactured and are an essential part of the apparatus, since they admit of its application for setting different sizes of pins, as may be elected. Each of the pin-guides 27 is made concave upon its inner or gripping face, so as to conform approximately to the circular outline of the pin 52. The concavity 53 is such with reference to the pin that the variation in the circumference of the latter in its length due to its taper causes each of the pin-guides to touch the pin at three points 54 and 55, as shown most clearly in Figs. 9 and 10. The lowermost portion of the pin-guide touches the pin 52 at a central point, as shown at 54 in Fig. 9, whereas the upper part of the pin-guide in contact with the pin 52 touches the latter at two points, as shown at 55 in Fig. 10. As a result of this construction the pins 52 are centralized and the apparatus made sensitive in the placing of the pins. The pin-guides have their upper and lower ends in parallel planes and incline thereto when closed about the pins to properly position the latter.

In the installation of a pin-setting apparatus in accordance with this invention the component parts are assembled substantially as shown in Fig. 1, and when the carrier is elevated the pit end of the alley is unobstructed and the pins may be placed upon the carrier. After the carrier has been loaded a pull upon the loose end of the operating-cord 17 releases the brake and overcomes the counterbalance, thereby permitting the carrier to descend, and as it approaches the limit of its downward travel the lower ends of the operating-bars 39 and the block 40 come in contact with the bed of the alley, and in the continued downward movement of the carrier the pin-shifter is thrown upward and forward, thus lifting or arighting the pins, which slip through the pin-openings 25 and are received upon the alley. At this time the pin-guides 27 are relieved of the controlling influence of the pin-shifter and move inward and exert a lateral pressure upon the pins, so as to properly position them. The carrier being released of the load begins its ascent when the counterbalance is released, and the shifting frame 37 settling back upon the carrier starts the pin-guides by the parts 38 coming in contact with the pressure-pins 35. Should it be required to lower the carrier to properly position any misplaced pin or to satisfy the demand of a player, the pin-guides by reason of their separation or spreading at their lower ends pass readily over the pins, and when the pin-shifter is thrown upward and forward the set pin-guides contract at their lower ends and move inward, and thereby serve to bring the pins to proper position.

Having thus described the invention, what is claimed as new is—

1. In apparatus for placing pins upon a bowling-alley and in combination with a carrier for receiving the pins and movable toward the bed of the alley to deposit the pins thereon and movable away from the bed of the alley so as to obviate obstruction thereof, a brake mechanism coöperating with said carrier for controlling its movements.

2. In apparatus for placing pins upon a bowling-alley and in combination with a carrier for receiving the pins and movable toward the bed of the alley to deposit the pins thereon and movable away from the bed of the alley so as to obviate obstruction thereof, a counterbalance for the carrier, and a brake for controlling the movements of the counterbalanced carrier.

3. In apparatus for placing pins upon a bowling-alley and in combination with a carrier for receiving the pins and movable toward the bed of the alley to deposit the pins thereon and movable away from the bed of the alley so as to obviate obstruction thereof, a counterbalance for the carrier, a coöperating brake, and means for simultaneously controlling the counterbalance and brake.

4. In apparatus for placing pins upon a bowling-alley and in combination with a carrier for receiving the pins and movable to-

ward the bed of the alley to deposit the pins thereon and movable away from the bed of the alley so as to obviate obstruction thereof, a brake mechanism coöperating with the carrier, a counterbalance, and operating means for the counterbalance adapted to effect release of the brake mechanism when actuated to relieve the carrier wholly or in part of the influence of its counterbalance.

5. In apparatus for placing pins upon a bowling-alley and in combination with a carrier for receiving the pins and movable toward the bed of the alley to deposit the pins thereon and movable away from the bed of the alley so as to obviate obstruction thereof, a brake mechanism embodying an operating-lever, a counterbalance, and an operating-cord for said counterbalance adapted to positively actuate said operating-lever when drawn upon to overcome the force of the counterbalance wholly or in part so as to simultaneously effect release of the brake and permit free movement of the carrier.

6. In apparatus for placing pins upon a bowling-alley and in combination with a carrier for receiving the pins and movable toward the bed of the alley to deposit the pins thereon and movable away from the bed of the alley so as to obviate obstruction thereof, a brake mechanism comprising an operating-lever having a crank portion and a curved arm, a counterbalance for the carrier, and an operating-cord for the counterbalance having a portion deflected by the brake-operating lever and adapted to actuate the latter and effect release of the brake when said operating-cord is pulled upon.

7. In apparatus for placing pins upon a bowling-alley and in combination with a carrier for receiving the pins and movable toward the bed of the alley to deposit the pins thereon and movable away from the bed of the alley so as to obviate obstruction thereof, a brake mechanism coöperating with the carrier and comprising an operating-lever having a crank portion and a curved arm provided with an eye, a counterbalance, and an operating-cord connected with the counterbalance and passed through the eye of the brake-operating lever for actuating the latter simultaneously with the operation of the counterbalance.

8. In apparatus for placing pins upon a bowling-alley and in combination with a carrier for receiving the pins and movable toward the bed of the alley to deposit the pins thereon and movable away from the bed of the alley so as to obviate obstruction thereof, a roller, a counterbalance, connecting means between the counterbalance, roller and carrier, a brake coöperating with said roller, and an operating-cord for simultaneously actuating the counterbalance and brake.

9. In apparatus for placing pins upon a bowling-alley and in combination with a carrier for receiving the pins and movable toward the bed of the alley to deposit the pins thereon and movable away from the bed of the alley so as to obviate obstruction thereof, a roller, a counterbalance, connections between the counterbalance, roller and carrier, a brake coöperating with said roller, a brake-operating lever, and an operating-cord connected with said counterbalance and passed around said roller and normally deflected between the roller and counterbalance by the brake-operating lever, said operating-cord when actuated serving to simultaneously release the brake and relieve the carrier wholly or in part of the influence of the counterbalance.

10. In apparatus for placing pins upon a bowling-alley and in combination with a carrier for receiving the pins and movable toward the bed of the alley to deposit the pins thereon and movable away from the bed of the alley so as to obviate obstruction thereof, a roller, a counterbalance, connections between the roller, counterbalance and carrier, a brake-band encircling the roller, a brake-operating lever having a crank portion in connection with one end of said brake-band and having its opposite end portion curved to extend around the roller, and an operating-cord connected to the counterbalance and normally deflected by said brake-operating lever and adapted to simultaneously release the brake and relieve the carrier wholly of the influence of its counterbalance.

11. In apparatus for setting the pins of bowling-alleys, the combination of a carrier provided with pin-openings, pin-guides arranged about the pin-openings, a pin-shifter, and means for positively transmitting pressure from the pin-shifter to the pin-guides to effect separation or spreading of the latter.

12. In apparatus for setting pins of bowling-alleys, the combination of a carrier provided with pin-openings, pin-guides coöperating with the pin-openings for properly positioning the pins, a pin-shifter to effect delivery of the pins upon the alley, and means for transmitting pressure from the pin-shifter to the pin-guides loosely mounted in the carrier.

13. In apparatus for setting pins of bowling-alleys, the combination of a carrier provided with pin-openings, pin-guides coöperating with the pin-openings for properly positioning the pins, a pin-shifter to effect delivery of the pins upon the alley, and pressure-pins loosely mounted in the carrier and supported by the pin-guides and adapted to spread the latter when the pin-shifter is resting upon the carrier.

14. In apparatus for setting the pins of bowling-alleys, the combination of a carrier provided with pin-openings, pin-guides coöperating with the respective pin-openings, and spring connections forming the sole supporting means for the pin-guides and having posi-

tive attachment with the pin-guides and carrier and normally tending to yieldingly press coöperating pin-guides together for centralizing and properly positioning the pins.

15. In apparatus for setting the pins of bowling-alleys, the combination of a carrier provided with pin-openings, pin-guides coöperating with the respective pin-openings, spring-arms attached to and projected from the pin-guides, and other arms having connection with the first-mentioned spring-arms and rigidly attached to the carrier.

16. In apparatus for setting the pins of bowling-alleys, the combination of a carrier provided with pin-openings, pin-guides coöperating with the respective pin-openings, spring-arms attached to and projected from the pin-guides, and other arms having connection with the first-mentioned spring-arms and rigidly attached to the carrier, the arms attached to the carrier having pendent portions embracing outer sides of the first-mentioned arms to prevent lateral displacement of the pin-guides.

17. In apparatus for setting the pins of bowling-alleys, the combination of a carrier provided with pin-openings, pin-guides coöperating with the respective pin-openings, spring-arms attached to and projected from the pin-guides, and other arms having connection with the first-mentioned spring-arms and rigidly attached to the carrier, the arms attached to the carrier having pendent portions embracing outer sides of the first-mentioned arms to prevent lateral displacement of the pin-guides, said pendent members being connected at their lower ends by means of a cross-bar which serves to limit the movement of the pin-guides.

18. In apparatus for setting the pins of bowling-alleys, the combination of a carrier provided with pin-openings, pin-guides coöperating with the pin-openings to effect correct positioning of the pins, spring-arms 29 attached to the pin-guides, other arms 31 attached to the carrier, spring-coils connecting the arms 29 and 31, members 33 pendent from the arms 31 and embracing the arms 29, and a cross-bar 32 connecting the lower ends of the members 23, the several parts of the connections between the pin-guides and carrier being of integral formation.

19. In apparatus for setting the pins of bowling-alleys, the combination of a carrier provided with pin-openings, and coöperating pin-guides loosely connected with the carrier and movable into and out of contact with the pins, said pin-guides being concave upon their inner or engaging faces and having their ends inclined and in parallel planes, the concavity of each pin-guide being such with reference to the pins as to admit of the lower portion of a guide touching a side of the pin at a central point, and the upper portion touching a side of the pin at two points, the latter corresponding approximately to the intersection of the engaging face with opposite sides of the pin-guide.

20. In apparatus for setting pins of bowling-alleys, the combination of a carrier adapted to receive the pins and movable toward and from the plane of the alley to deposit the pins thereon and admit of its unobstructed use, a pin-shifter mounted upon the carrier and adapted to receive a combined vertical and longitudinal movement, operating means pendent from the pin-shifter for actuating the latter as the carrier reaches the limit of its movement toward the plane of the alley preliminary to discharging the pins thereon, said operating means consisting of a block, a telescopic guide connection between said block and carrier, and an operating-bar between the pin-shifter and block.

21. In apparatus for setting pins of bowling-alleys, the combination of a carrier adapted to receive the pins and movable toward and from the plane of the alley to deposit the pins thereon and admit of its unobstructed use, a pin-shifter mounted upon the carrier and adapted to receive a combined vertical and longitudinal movement, operating means pendent from the pin-shifter for actuating the latter as the carrier reaches the limit of its movement toward the plane of the alley preliminary to discharging the pins thereon, said operating means consisting of a block, a telescopic guide connection between said block and carrier, and an operating-bar between the pin-shifter and block, and jointed to each to admit of said bar having a swinging movement.

22. In apparatus for setting pins of bowling-alleys, the combination of a carrier adapted to receive the pins and movable toward and from the plane of the alley to deposit the pins thereon and admit of its unobstructed use, a pin-shifter mounted upon the carrier and adapted to receive a combined vertical and longitudinal movement, operating means pendent from the pin-shifter for actuating the latter as the carrier reaches the limit of its movement toward the plane of the alley preliminary to discharging the pins thereon, said operating means consisting of a block, a telescopic guide connection between said shifter and block, said operating-bar having pivotal connection with the pin-shifter and link connection with said block and adapted to rock upon the latter.

23. In apparatus for setting pins upon bowling-alleys, the combination of a carrier provided with pin-openings and movable toward and from the plane of the alley to deposit the pins thereon and admit of its unobstructed use, and reducers for each of said pin-openings to admit of adapting the apparatus for different sizes of pins.

24. In apparatus for setting pins upon bowling-alleys, the combination of a carrier

provided with pin-openings and movable toward and from the plane of the alley to deposit the pins thereon and admit of its unobstructed use, and reducers for each of said pin-openings to admit of adapting the apparatus for different sizes of pins, said reducer having pendent pin-guides.

25. In apparatus for setting pins upon bowling-alleys, the combination of a carrier provided with pin-openings and movable toward and from the plane of the alley to deposit the pins thereon and admit of its unobstructed use, and reducers for each of said pin-openings to admit of adapting the apparatus for different sizes of pins, said reducer having pendent guides and a vertical abutment or stop.

26. In apparatus for setting pins upon bowling-alleys, the combination of a carrier provided with pin-openings and movable toward and from the plane of the alley to deposit the pins thereon and admit of its unobstructed use, and reducers for each of said pin-openings to admit of adapting the apparatus for different sizes of pins, said reducer having pendent spaced pin-guides and a vertical abutment or stop.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN C. BACKUS. [L. S.]

Witnesses:
J. D. YOAKLEY,
V. B. HILLYARD.