E. G. STRONG.

BOWLING ALLEY.

APPLICATION FILED FEB. 23, 1912.

1,044,593.

Patented Nov. 19, 1912.

3 SHEETS—SHEET 1.

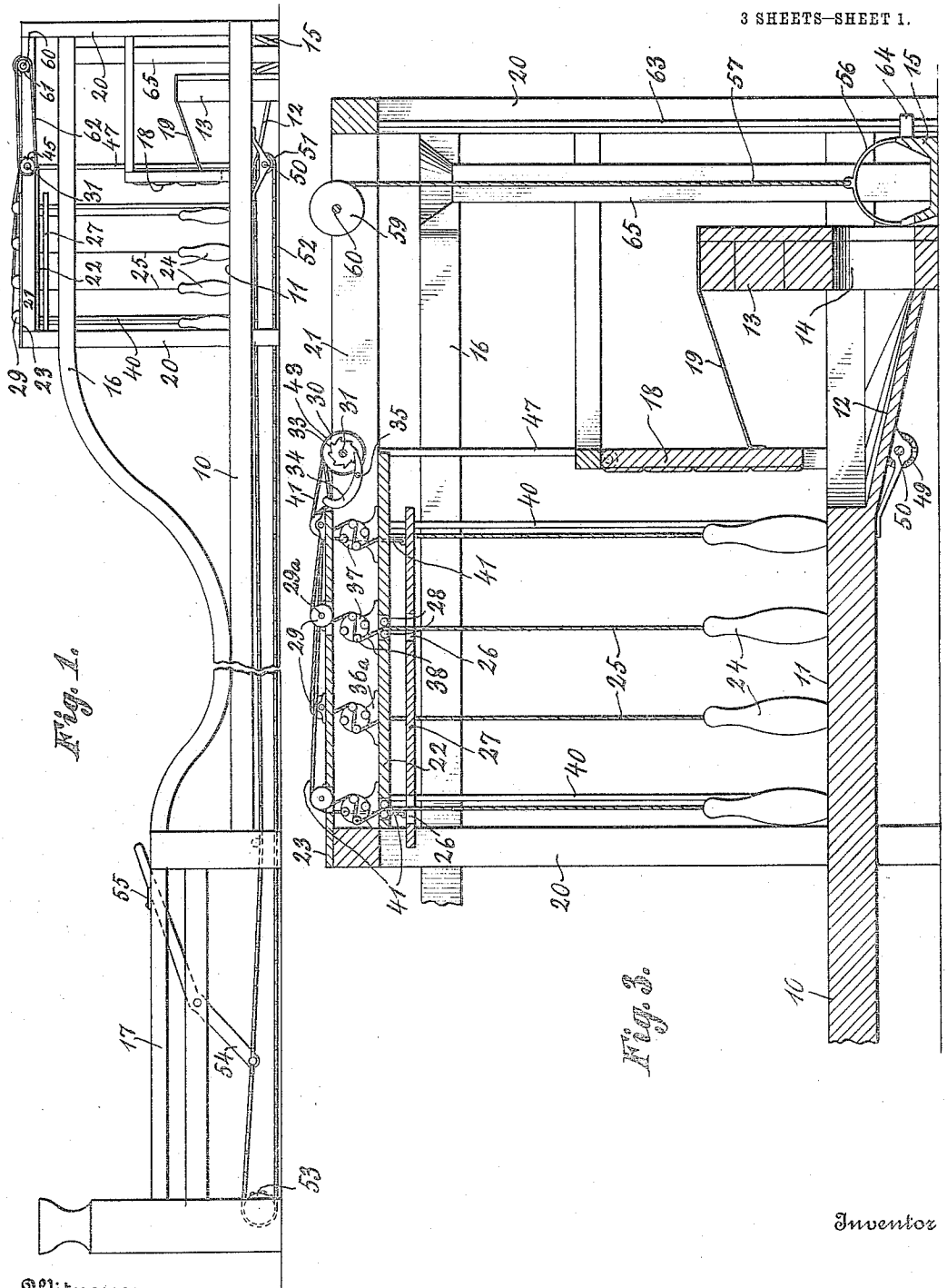

Fig. 1.

Fig. 3.

Witnesses

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3 SHEETS—SHEET 2.

Fig. 2.

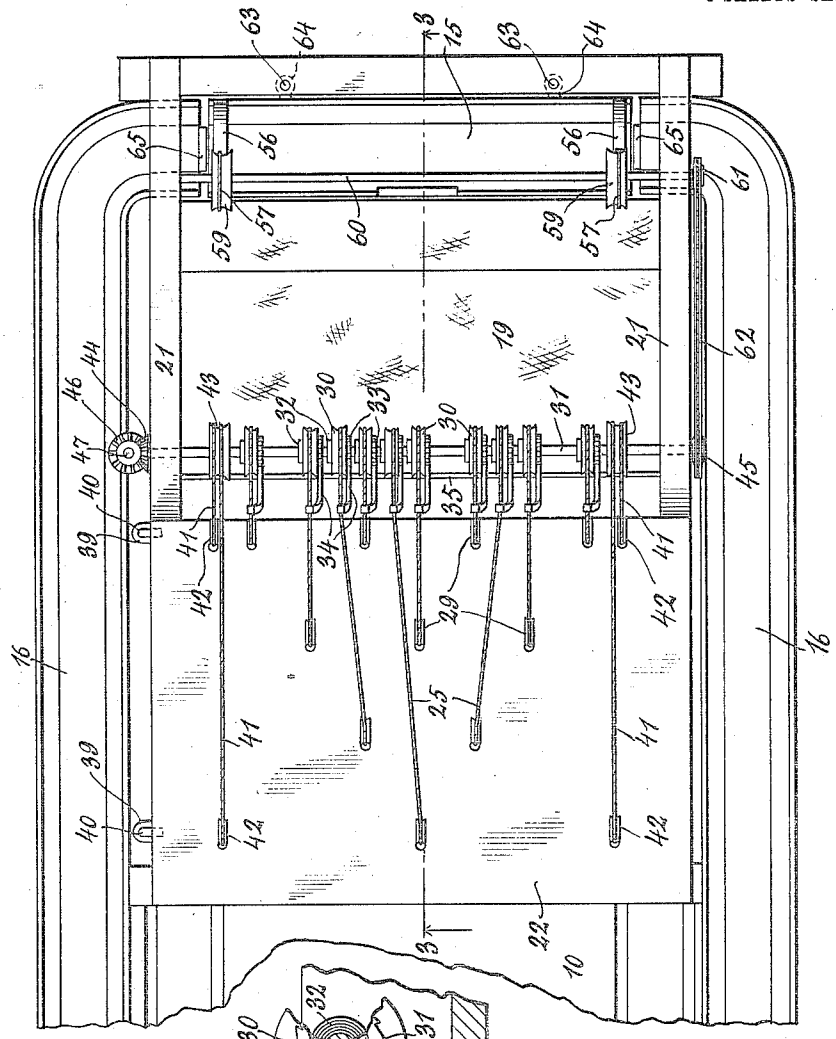
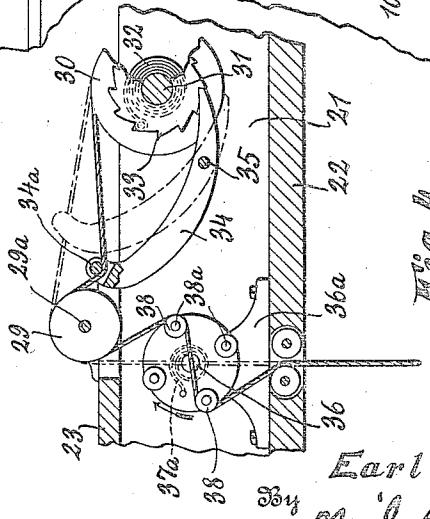


Fig. 4.



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3 SHEETS—SHEET 3.

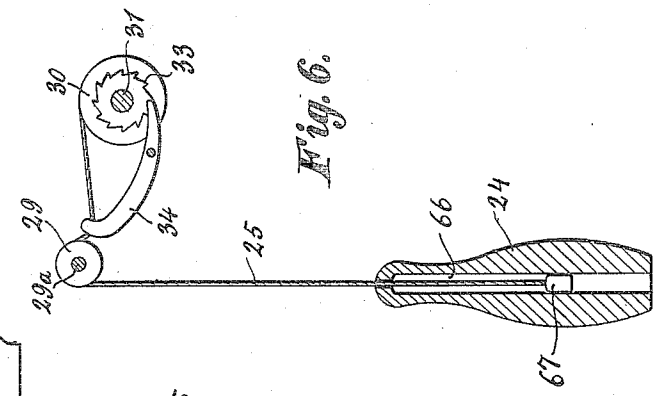

Fig. 6.

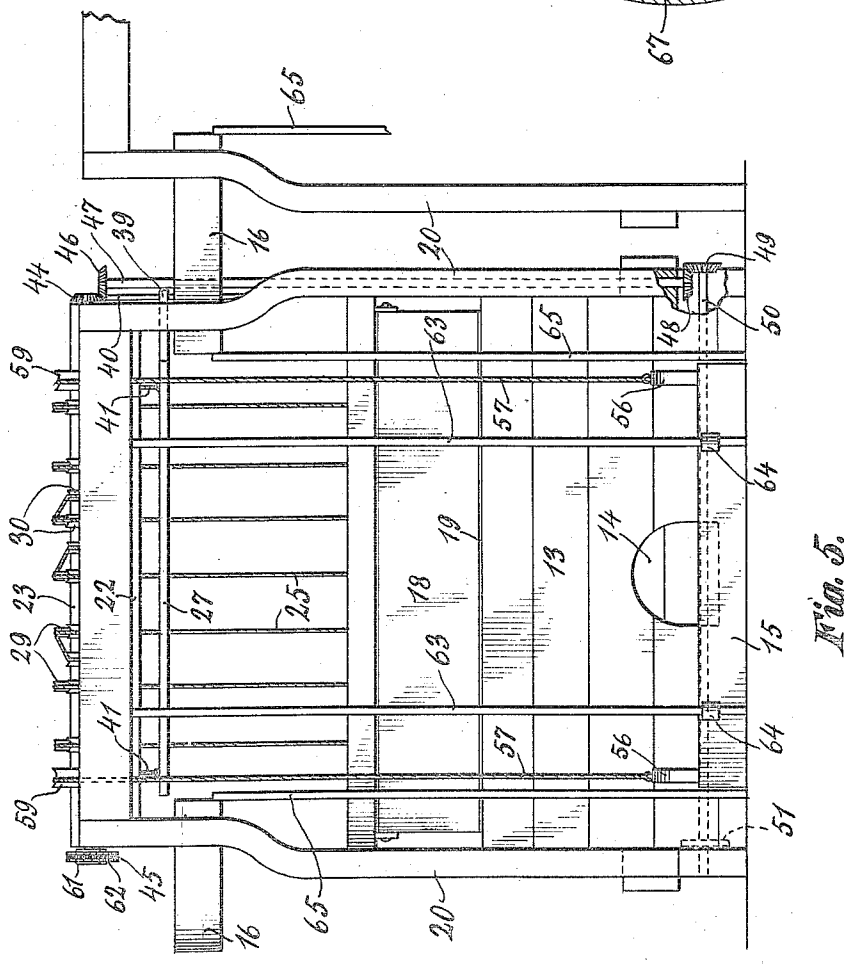

Fig. 5.

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UNITED STATES PATENT OFFICE.

EARL G. STRONG, OF MILAN, OHIO.

BOWLING-ALLEY.

1,044,593. Specification of Letters Patent. Patented Nov. 19, 1912.

Application filed February 23, 1912. Serial No. 679,405.

To all whom it may concern:

Be it known that I, EARL G. STRONG, a citizen of the United States, residing at Milan, in the county of Erie and State of Ohio, have invented certain new and useful Improvements in Bowling-Alleys, of which the following is a specification.

This invention relates more particularly to apparatus for mechanically resetting the pins of a bowling alley after they have been knocked down, said apparatus being so constructed that it may be actuated from the front end of the alley or the player's stand, thereby making it possible for the players to reset the pins, and thus dispense with an attendant at the rear end of the alley.

It is the object of the invention to provide an apparatus of the kind stated which is devoid of complicated parts to get out of order, and which, furthermore, is efficient and reliable in operation, and easily actuated.

With this object in view, the invention consists in a novel combination and arrangement of parts to be hereinafter described and claimed, reference being had to the accompanying drawings forming a part of this specification, in which drawings,

Figure 1 is an elevation of the alley. Fig. 2 is a plan view of the rear end thereof. Fig. 3 is a longitudinal section on the line 3—3 of Fig. 2. Fig. 4 is an enlarged elevation, partly in section, of a part of the mechanism hereinafter referred to. Fig. 5 is a rear elevation of the alley. Fig. 6 is a sectional view showing a modification.

Referring specifically to the drawings, 10 denotes a bowling alley which may be constructed in any ordinary or preferred manner. Behind the pin field 11, the alley, as indicated at 12, slopes downward and toward the center of a buffer wall 13 extending across the rear end of the alley, said wall having a bottom opening 14 at the center to which the balls are guided by the slope 12 of the alley, so that they may pass through said opening. Behind the buffer is located a trough 15, extending across the rear end of the alley and adapted to receive the balls as they pass through the opening 14. The trough is adapted to be elevated, as will be presently described, for the purpose of depositing the balls in a runway 16 which returns the balls to the front end of the alley. The rear end of the runway is elevated so that the balls will return by gravity after they are elevated thereinto. The front end of the runway terminates in a gallery 17, as usual, for holding the balls in convenient position for use. Immediately behind the pin field 11, and in advance of the buffer wall 13, is a swinging curtain 18 which is lifted when struck by the balls to permit them to pass to the slope 12 of the alley. The curtain prevents the balls from rebounding back to the alley, and it is connected at the back by a flexible sheet 19 to the buffer wall 13.

At the pin field 11 is mounted a frame which carries the resetting device. The frame comprises corner posts 20 connected at the top by longitudinal bars 21, carrying vertically spaced platforms 22 and 23 respectively.

The resetting device comprises the following parts: To each pin 24 is connected a hoisting line 25 which passes upward through an opening 26 in a vertically movable spotting board 27, and thence through openings in the platforms 22 and 23. In the opening of the lower platform are two opposite guide pulleys 28 between which the line passes, and in the opening of the top platform is located a guide pulley 29 over which the line passes rearward and is connected to a spring-actuated winding drum 30 mounted on a shaft 31 extending transversely between and supported by the longitudinal bars 21. The pulley 29 is mounted on a shaft 29^a suitably supported on the platform 23. The spring 32 for actuating the drum is secured at one end to the shaft 31 and has its other end made fast to the drum, and the latter also carries a ratchet wheel 33 engageable by a pawl 34 which is pivoted on a rod 35 to swing in a vertical plane, said rod extending between and being supported by the longitudinal bars 21. The tail of the dog is located between the pulley 29 and the drum 30 and has an eye through which the line 25 passes. In the eye is mounted an anti-friction roller 34^a. This end of the dog is weighted so as to normally hold the other end in engagement with the ratchet 33, and in this position of the dog,

the latter takes up the slack in that portion of the line which is between the pulley 29 and the drum 30. The slack in that portion of the line which is between the pin 24 and the pulley 29 is taken up by the following device: On a shaft 36, supported in a suitable bearing 36ª mounted on the platform 22, is mounted, so as to be free to turn thereon, a disk-shaped member 37 to which is secured one end of a spring 37ª the other end of which is made fast to the shaft 36. This spring tends to swing the member in the direction of the arrow shown in Fig. 4. The member carries two or more rollers 38 journaled on pins 38ª. The line 25 passes over two diametrically-opposite ones of these rollers, which are held normally opposite to each other in a substantially horizontal plane, thereby taking up the slack in the line.

When the pin 24 is held suspended by the line, the latter assumes the dotted line position, shown in Fig. 4, the member 37 being forced back against the tension of the spring 37ª so that the rollers come diametrically-opposite each other in a vertical plane, but as soon as the line is relieved of the weight of the pin, such as when the pin 24 is lowered to the pin-field and rests there, further delivery or paying out of the line will be taken up by the device assuming the first described position, or an intermediate or further position. By paying out enough line beyond what is needed to lower the pins to the floor, they are free to move in any direction and the required distance to make any play that is possible on a regular alley. The take-up devices take care of this extra amount of line so that it will not become entangled with the pins, or present an unsightly appearance by hanging slack about the pins. It will be of course understood that a hoisting and take-up device is provided for each pin.

In operation, when one or more of the pins are knocked down, the hoisting lines 25 are given a sudden jerk, which causes the dog 34 to slip off the ratchet 33, thus releasing the spring winding drum 30, which latter thereupon winds up the lines so that the pins are elevated to the spotting board 27, their heads entering the openings 26 through which their hauling lines pass. The openings 26 correspond to the position of the pins when they are properly spotted on the pin-field 11, in view of which, the pins, after they have been elevated, may be accurately reset upon lowering the board as will be presently described.

The spotting board 27 has outstanding brackets 39 on one of its edges, through which pass vertical guide-rods 40 located on one side of the alley. To the corners of the spotting board are made fast hoisting lines 41 which extend upward through openings in the platforms 22 and 23 to pulleys 42 mounted in the openings of the latter over which pulleys they pass and then extend rearward to hoisting drums 43 carried by the shaft 31.

On one end of the shaft 31 is a bevel gear 44 and on the other end is a sprocket wheel 45. The bevel gear is in mesh with a similar gear 46 on the upper end of a vertical shaft 47 mounted in suitable bearings on one side of the alley. On the lower end of the shaft 47 is a bevel gear 48 which is in mesh with a similar gear 49 on one end of a horizontal shaft 50 extending across the rear end of the alley and supported in suitable bearings carried thereby. On the other end of the shaft 50 is a sprocket wheel 51 over which runs a chain 52 which extends to the front end of the alley, and passes thereat over a sprocket wheel 53. To the gallery 17 is pivoted a lever 54 which is connected at one of its ends to the chain 52. Through this lever the chain 52 is made to travel over its sprocket wheels, thereby rotating the shaft 50, and through the gears 49, 48, 46 and 44 transmitting motion to the shaft 31 to wind or unwind the lines 41 and thus elevate or lower the spotting board 27. A suitable catch 55 is provided for locking the lever 54.

To the ends of the trough 15 are connected, by means of bails 56, hoisting lines 57 which are connected to drums 59 on a shaft 60 extending between and carried by the bars 21. On one end of the shaft 60 is a sprocket wheel 61 which is connected by a chain 62 with the sprocket wheel 45.

It will be evident from the foregoing that when the shaft 31 is set in motion to unwind the lines 41 and thus lower the spotting board 27, the motion is transmitted to the shaft 60, thereby winding the lines 58 on the drums 59 and elevating the trough 15, so that the balls may be discharged into the runway 16. When the spotting board is elevated, the trough is lowered to receiving position behind the wall 13.

A runway may be built on both sides of the alley so that when several alleys are built alongside each other the balls may be discharged to the runway on either side by shortening the hoisting line 58 on the opposite side. Also, two alleys may use a common return.

The trough 15 is guided by vertical rods 63 on which work slides 64 carried by the trough. As the trough is open at both ends, guard-boards 65 are located on each side of the alley between which the trough moves, said boards serving to prevent the balls from rolling out of the trough, and they terminate at the rear end of the runway 16 so that the balls may roll thereonto when the trough is elevated. The rear ends of the runways extend in a curve around to the ends of the trough, as shown in Fig. 2.

It is thought that the operation of the apparatus will be evident from the foregoing, but it may be summarized as follows: After the pins are set, the balls are rolled down the alley and upon leaving the pin field they collect in the trough 15. Each pin as it is knocked down is pulled up to the spotting board 27. When it is desired to reset the pins, the lever 54 is operated to lower the spotting board which, at the same time, elevates the trough and the balls are discharged into the runway 16 and carried back to the gallery 17. The lever 54 is now operated to elevate the spotting board and to return the trough to receiving position. When the pins are lowered to the pin field, any slack in the hoisting lines 25 will be taken up by the member 37 and the parts associated therewith, which are just strong enough to do this, the pull on the lines not being enough to prevent the dogs 34 from engaging the ratchets 33 as soon as the pins reach the pin field. When the pins are knocked down the slack in the hoisting lines must be taken up before the dogs can get a strong enough pull to be tripped. When the shaft 31 is turned to elevate the spotting board, the springs 32 are wound up. The spotting board having a greater distance to travel than the pins, since it must reach the body of the latter by the time they reach the pin field, the diameter of the drums 43 is slightly greater than the diameter of the drums 30.

Fig. 6 shows a slight modification of the resetting mechanism. The members 37 and the parts associated therewith are left off, and the pins 24 are formed with a longitudinal bore 66 in which is slidably mounted a small weight 67. The bore opens through the head of the pin, and is contracted at this end to prevent the weight from passing out. The hoisting line 25 is connected to the weight. The pin can move in a horizontal plane from its spot, or tip over until the slack is taken up, whereupon the jerk on the line that will result from the weight reaching the upper end of the bore will trip the dog 34.

I claim:

1. In a bowling alley, the combination of the pins, hoisting lines connected to the pins, spring drums to which the hoisting lines are connected, ratchets on the drums, dogs engageable with the ratchets for locking the drums, and a connection between the dogs and the hoisting lines for tripping the dogs.

2. In a bowling alley, the combination of the pins, hoisting lines connected to the pins, spring drums to which hoisting lines are connected, ratchets on the drums, dogs engageable with the ratchets for locking the drums, a connection between the dogs and the hoisting lines for tripping the dogs, a spotting board receiving the pins when elevated, and means for raising and lowering the spotting board.

3. In a bowling alley, the combination of the pins, hoisting lines connected to the pins, means for taking up the slack in the hoisting lines, spring drums to which hoisting lines are connected, ratchets on the drums, dogs engageable with the ratchets for locking the drums, and a connection between the dogs and the hoisting lines for tripping the dogs.

4. In a bowling alley, the combination of the pins, hoisting lines connected to the pins, means for taking up the slack in the hoisting lines, spring drums to which hoisting lines are connected, ratchets on the drums, dogs engageable with the ratchets for locking the drums, a connection between the dogs and the hoisting lines for tripping the dogs, a spotting board receiving the pins when elevated, and means for raising and lowering the spotting board.

5. In a bowling alley, the combination of the pins, hoisting lines connected to the pins, winding drums to which the hoisting lines are connected, a shaft supporting the drums, springs for operating the winding drums, said springs being connected to the shaft and wound by rotating said shaft in one direction, ratchets on the drums, dogs engageable with the ratchets for locking the drums, a connection between the dogs and the hoisting lines for tripping the dogs, a spotting board receiving the pins when elevated, hoisting lines connected to the spotting board, winding drums for said hoisting lines, said winding drums being carried by the aforesaid shaft, and means for operating the shaft.

6. In a bowling alley, the combination of the pins, hoisting lines connected to the pins, means for taking up the slack in the hoisting lines, winding drums to which the hoisting lines are connected, a shaft supporting the drums, springs for operating the winding drums, said springs being connected to the shaft and wound by rotating said shaft in one direction, ratchets on the drums, dogs engageable with the ratchets for locking the drums, a connection between the dogs and the hoisting lines for tripping the dogs, a spotting board receiving the pins when elevated, hoisting lines connected to the spotting board, winding drums for said hoisting lines, said winding drums being carried by the aforesaid shaft, and means for operating the shaft.

7. In a bowling alley, the combination of the pins, hoisting lines connected to the pins, resilient means for operating the hoisting lines, a lock for said operating means, a connection between the lock and the hoisting lines for releasing the operating means, a spotting board receiving the pins when

elevated, and means for raising and lowering the spotting board.

8. In a bowling alley, the combination of the pins, hoisting lines connected to the pins, means for taking up the slack in the hoisting lines, resilient means for operating the hoisting lines, a lock for said operating means, a connection between the lock and the hoisting lines for releasing the operating means, a spotting board receiving the pins when elevated, and means for raising and lowering the spotting board.

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

EARL G. STRONG.

Witnesses:

OTIS E. HARMON,

HOWARD C. STRONG.