United States Patent

Dawson

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[54] POLE VAULT CROSSBAR APPARATUS

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[21] Appl. No.: **84,820**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 738,952, June 21, 1968, abandoned.

[52] **U.S. Cl.** ..... **272/59 C**
[51] **Int. Cl.** **A63b 5/02,** A63b 5/16
[58] **Field of Search** ..... 272/59 C

[56] **References Cited**

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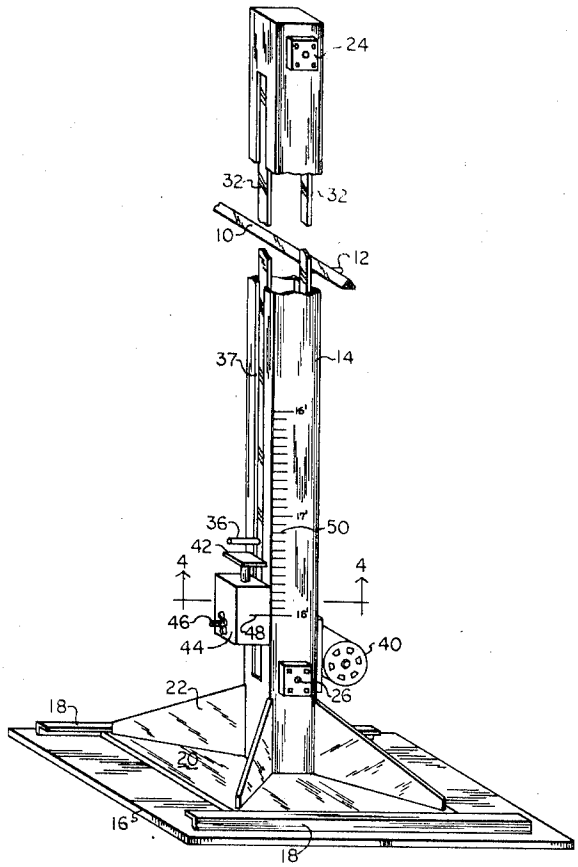
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[57] **ABSTRACT**

A crossbar for pole vaulting is placed on pegs mounted for vertical travel on two standards. The pegs are moved upward by halyards attached to the pegs and run over wheels at the top of the standards or downward by downhauls attached to the pegs. Therefore, the crossbar may be replaced when the pegs are at a height which is conveniently reached by attendants. The pegs and the crossbar are then raised to the desired height and stopped when protuberances on the halyards engage adjustable stops on the standards.

For automatic operation, an electrically conductive crossbar for pole vaulting is set upon pegs which are mounted for vertical travel on the two standards. If the bar is knocked off, the change in electrical resistance between the pegs is noted and the pegs run down the standards so the crossbar is manually replaced on the pegs at which time the change in electrical resistance between pegs cause the pegs to be run up the standards. The height the pegs reach on the standard is adjusted by a limit switch on the standard.

16 Claims, 9 Drawing Figures



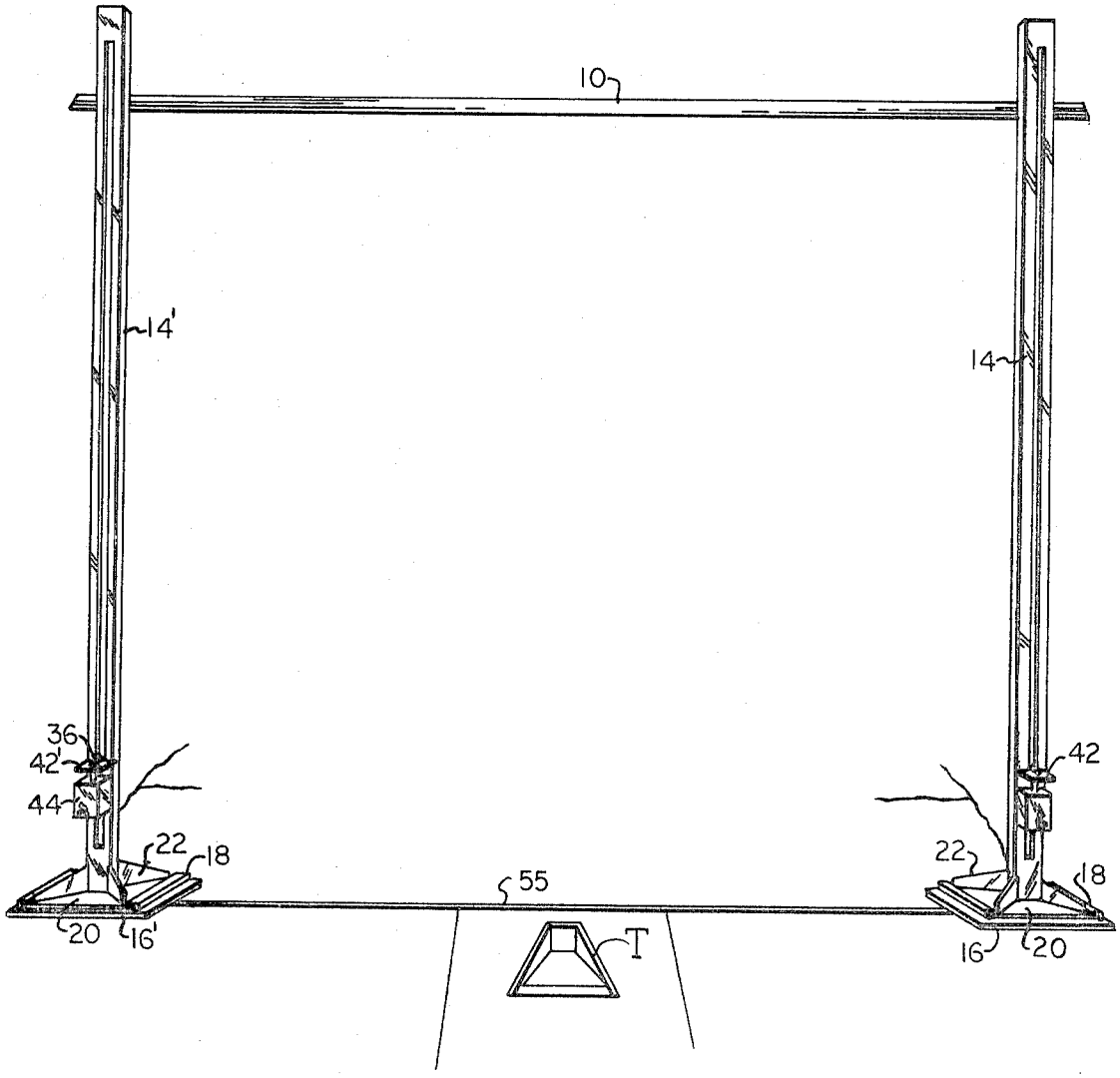


FIG. 1

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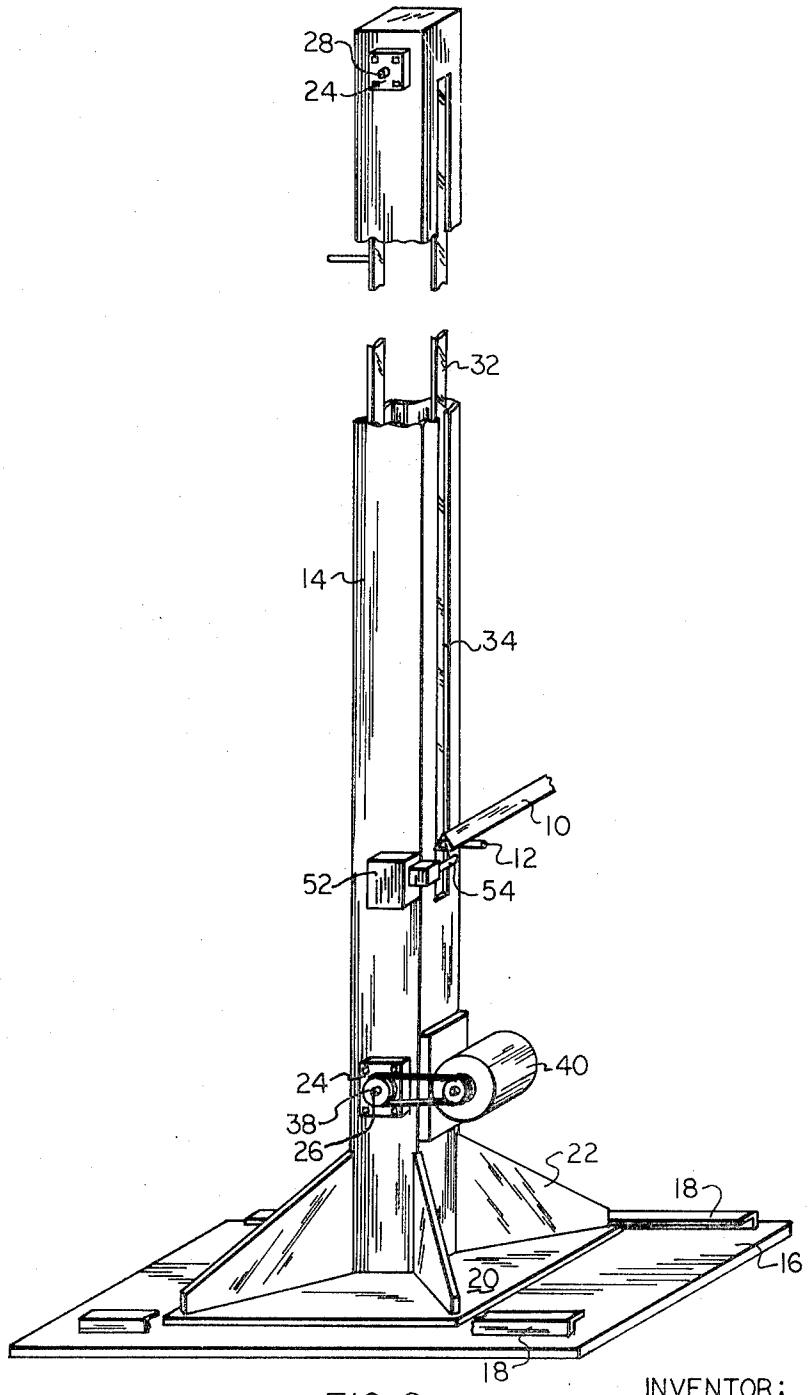


FIG. 2

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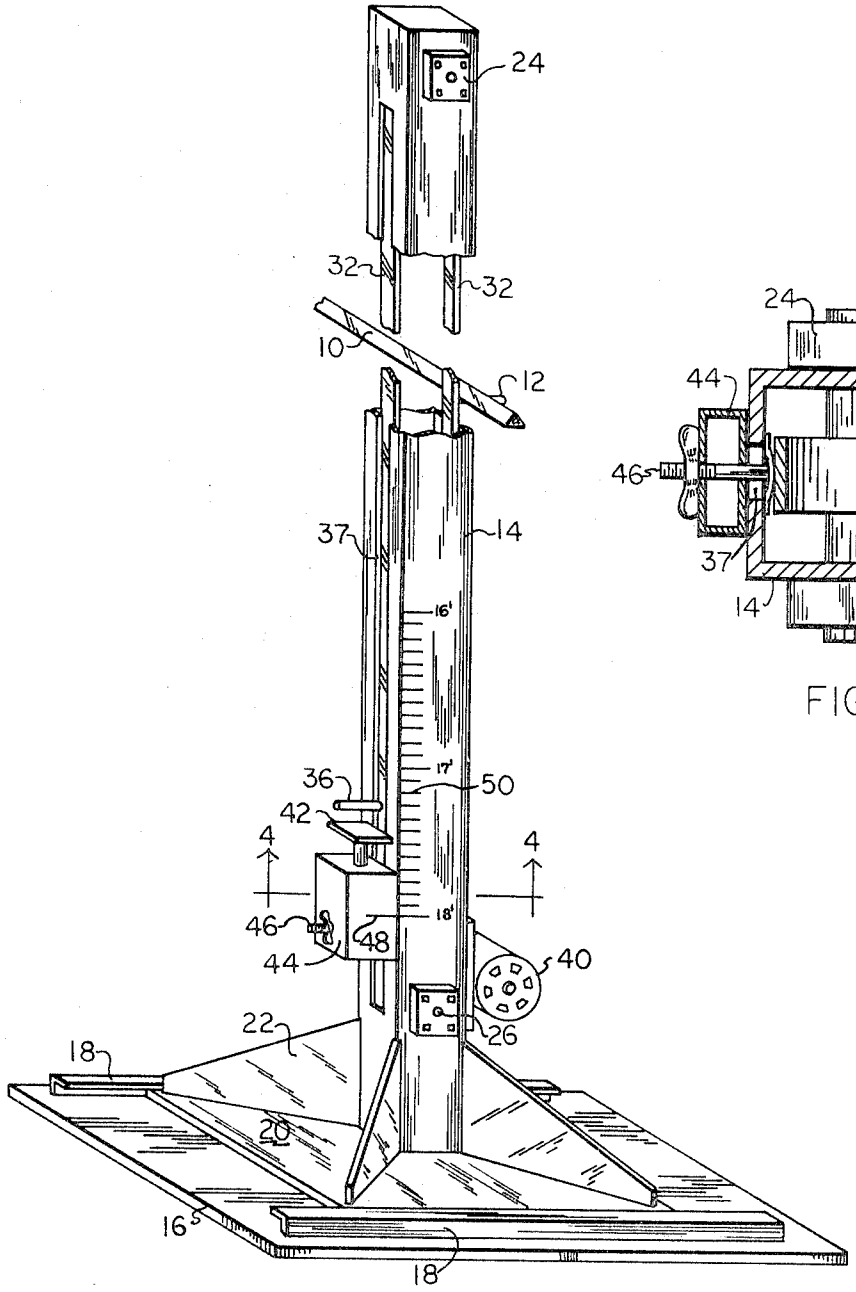


FIG. 3

FIG. 4

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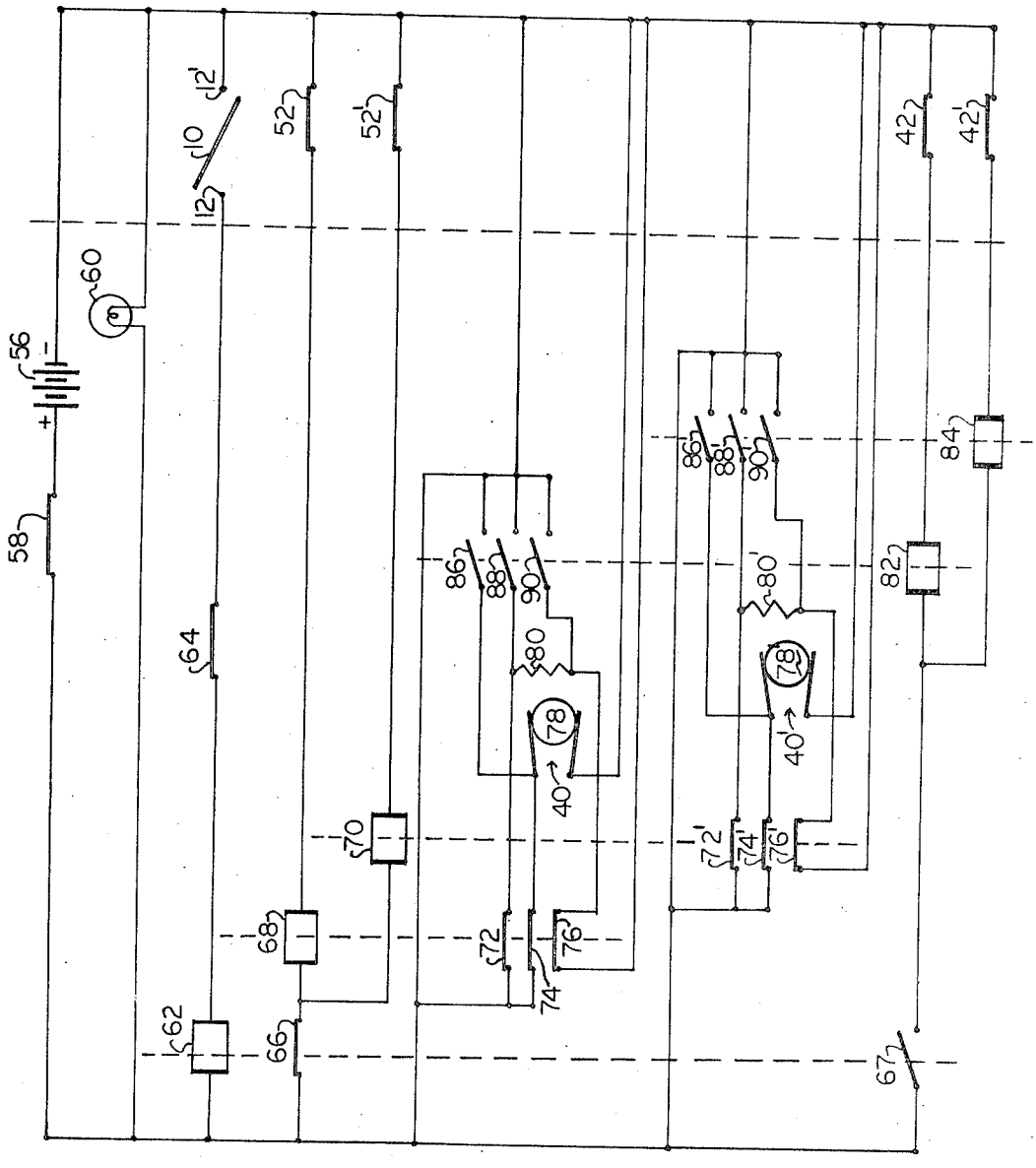


FIG. 5

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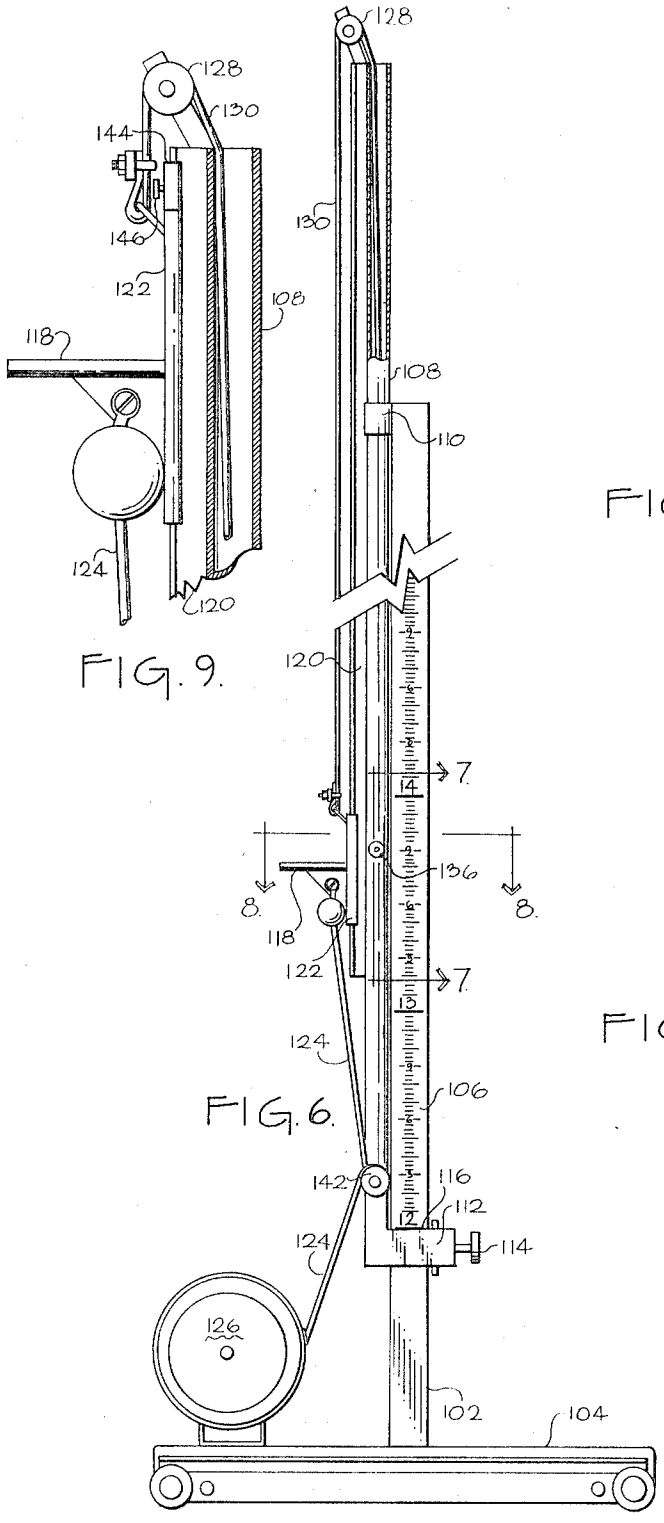


FIG. 9.

FIG. 6.

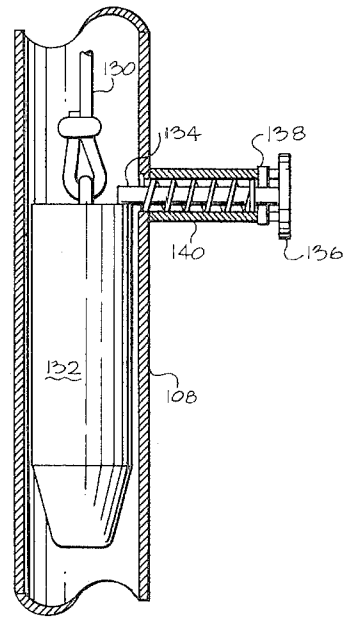


FIG. 7.

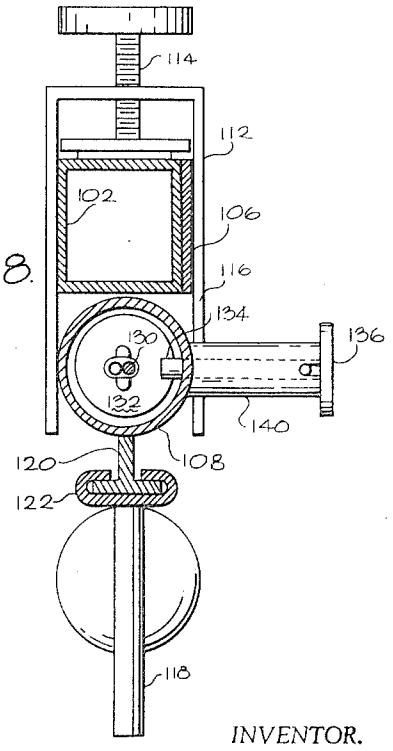


FIG. 8.

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POLE VAULT CROSSBAR APPARATUS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of my copending application entitled AUTOMATIC-SET POLE VAULT CROSSBAR, filed June 21, 1968, Ser. No. 738,952, now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to pole vaulting and more particularly to setting the crossbar at the desired height.

2. Description of the Prior Art

As pointed out in the U.S. Pat. to LANGTON, No. 3,222,064, the well trained athletes of today vault tremendous heights. Difficulty exists in setting the crossbar at these heights accurately. To set the crossbar manually, requires either the use of hand operated poles to elevate the crossbar to the 15- or 16-foot height or the use of stepladders. This is time consuming, increases the strain upon the performing athlete, and destroys the interest of the spectators. LANGTON's solution is to divide the crossbar in the middle and cantilever the parts from each standard.

CRAIG, U.S. Pat. No. 1,737,108, has suggested that the standard be comprised of telescoping sections and the sections be raised and lowered by a nut upon a hand-rotated screw.

SUMMARY OF THE INVENTION

I have solved the problem by mounting the crossbar-supporting pegs for vertical movement upon the standards. Each peg is raised by a halyard and lowered by a downhaul; the halyard passing over a pulley or wheel at the top of the standard. A stop, which is adjustable in height on the standard, is in operative relationship with a protuberance on the halyard so that it stops the movement of the halyard when the peg reaches the desired height.

For automatic operation, I have solved the problem by mounting the crossbar-supporting peg upon a belt or chain which is journaled over a wheel or sprocket at the top and bottom of the standard. The chain is driven by a reversible electric motor. The standard aluminum crossbar is electrically conducted and, therefore, if the crossbar is on the pegs, it will provide an electrically connected path which can be used to energize relay coils to control the motors. When the bar is knocked off, the change of current through the relay coil can be used to energize the motor to lower the pegs to a reasonable height wherein the crossbar may be laid across the pegs. When the crossbar is laid across the pegs, the pegs then again rise to the desired height. The height of the crossbar-supporting pegs is determined by a stop peg on the opposite side of the standard which operates a limit switch upon the standard.

An object of this invention is to set a crossbar for pole vaulting.

Further objects are to achieve the above with a device that is sturdy, compact, durable, lightweight, simple, safe, versatile, reliable and efficient yet inexpensive and easy to manufacture, transport, setup, operate and maintain.

Still further objects are to achieve the above with a method that is safe, rapid, efficient, and inexpensive and does not require skilled people to transport, setup, adjust, operate, and maintain.

The specific nature of the invention, as well as other objects, uses, and advantages thereof, will clearly appear from the following description and from the accompanying drawing, the different views of which are not necessarily to the same scale.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of pole vaulting standards and crossbar according to a first automatic embodiment of this invention.

FIG. 2 is a perspective view showing one standard of the first embodiment from the crossbar side, which has been broken and foreshortened for clarity.

FIG. 3 is a perspective view showing one standard of the first embodiment from the approach side, which has been foreshortened and cut away for clarity.

FIG. 4 is a sectional view showing details of construction of the first embodiment taken substantially on line 4—4 of FIG. 3.

FIG. 5 is a schematic representation of the electrical controls of the first embodiment.

FIG. 6 is a side elevational view according to a second manual embodiment of this invention, which has been broken away and foreshortened for clarity.

FIG. 7 is a sectional view showing details of construction of the second embodiment taken substantially on line 7—7 of FIG. 6.

FIG. 8 is a sectional view showing details of construction of the second embodiment taken substantially on line 8—8 of FIG. 6.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Describing the first embodiment and referring to the drawing, FIG. 1, it may be seen that a crossbar **10** is supported by pegs **12**. One of the crossbar-supporting pegs **12** extends from each of the standards **14** and **14'**. The standards themselves are supported upon base **16**.

The base **16** has a pair of angle members **18** attached to the upper surface thereof as by welding to form slots.

Foot **20** is attached as by welding as with suitable gussets **22** to the bottom of the standard **14**. The edges of the foot **20** fit into the slots formed by the angle members **18** thereby providing a suitable track by which the standard **14** may be moved and adjustably positioned. The reason for this is because that the rules of pole vaulting provide that the crossbar-carrying standards **14** and **14'** may be moved closer or further away from the pole trap "T."

LANGTON in his U.S. patent, noted above, shows other means for moving the standards back and forth.

Pillar blocks **24** are at the top and bottom of each of the standards **14** and **14'**. (FIGS. 2–4). Shaft **26** is journaled in the lower pillar block of each standard; carrying wheel in the form of a sprocket. This is within the standard **14** which has a hollow rectangular cross section. Also, wheel **30** in the form of a sprocket is journaled on shaft **28** in pillar blocks **24** at the top of each standard. (FIG. 4). Flexible tension member in the form of endless belt **32** is in the form of a light chain trained around the wheels which are in the form of sprockets. The crossbar-supporting peg **12** is attached to a special link in the belt **32** in the form of a chain. Peg **12** projects through slot **34** on one side of the standard. On the backside of the standard, protrusion or height peg **36** is also attached to a special link in the chain **32**.

The shaft **26** extends through the pillar block **24** to the outside of the standard **14** and has mounted thereon sprocket **38** which is chain driven from electrical motor **40**. (FIG. 2).

High-level limit switch or stop **42** is attached by housing **44**. (FIGS. 3 and 4). The housing is held to the standard by bolt **46** which extends through the slot **37** on the backside of the standard through which the peg **36** extends. The housing **44** carries pointer **48** which, in cooperation with indicia **50**, indicates the height at which the crossbar-supporting peg **12** is stopped by the limit switch **42**.

Limit switch **52** is permanently mounted at some convenient height such as about 5 feet. Operating lever **54** of the limit switch **52** is in the path of movement of the crossbar-supporting pegs **12**.

The crossbar **10** is customarily made of aluminum which is electrically conductive. Therefore, when the crossbar is knocked off by an unsuccessful athlete, there will be a change of electrical resistance between the two pegs **12**, inasmuch as the belt **32** is conductive. Electrical cable **55** connects the two

standards. Measurement of this change of electrical resistance can be used to detect whether or not the crossbar is upon the pegs **12**. If the crossbar has been knocked off, the motor **40** is activated to run in a direction which will rotate the shaft **26** in a direction to move the pegs **12** downward. If that part of the belt **32** downward between where it is attached to peg **12** and is trained around the shaft **26** is considered the downhaul and that part of the belt which is above the peg where it is also trained around the shaft **26** is considered the halyard, it may be seen that the action of the motor is to increase the tension on the downhaul so that it is more than the tension on the halyard, thereby lowering the peg. The peg moves downward until it strikes the reset limit switch **52**. At that time the electric motor is automatically stopped by the operation of the reset limit switch.

When the crossbar **10** is again placed across the pegs **12**, this change in electrical resistance is used to restart the motors **40** in an opposite direction so that the pegs **12** move upward and continue to do so until the height peg **36** strikes the high-level limit switch **42** at which time the motor **40** again stops, thus setting the crossbar **10** at the desired height. Again considering the belt **32** to be part halyard and part downhaul, it may be seen that the action of the motor **40** increases the tension on the halyard until it exceeds the tension on the downhaul, thereby causing the peg to be raised. If the athlete successfully vaults the height and it is desired that the bar **10** be raised, all that is necessary is to loosen the bolt **46** and move the housing **44** downward so that the pointer **48** points to the desired height upon the indicia **50**. As soon as the housing **44** is moved downward, the high-level limit switch **42** will cause the motor **40** to start again so that the bar will be moved upward to the desired height.

FIG. **5** shows a schematic representation of the electrical controls that accomplish the above operation. In the subsequent description and on FIG. **5**, the elements on one standard will be designated as prime (') for clarity. There is a source of supply of 24 volts, direct current, of electricity such as in the form of battery **56**. There is a master power switch **58**. Light **60** indicates that the power is turned on by the master switch **50**. The battery **56** is connected to each of the standards in series with control relay coil **62** and manual downswitch **64**. Manually opening the switch **64** will deenergize the coil **62** as will the removal of the bar **10**. Deenergizing the coil **62** will close its contact **66** and open its contact **68** as shown in FIG. **5**. Closing contact **66** will energize coil **68** and **70** assuming that the reset limit switches **52** and **52'** are closed. Energizing the coil **68** will close motor controlling contacts **72**, **74**, and **76**, for motor **40**. Closing the contact **74** will energize the armature **78**. The closing of the contact **72** and **76** will energize field winding **80** in a first direction. Likewise the energizing of the coil **70** will close motor control contacts **72'**, **74'**, and **76'**. Therefore, with the case of motor **40'**, the armature **78'** will be energized by the closing of contact **74'** and the field winding **80'** will be energized in a first direction by the closing of contact **72'** and **76'**. Therefore, the motors **40** and **40'** will rotate in a first direction until the peg **12** reaches the reset limit switch **52** and open same.

When the reset switch **52** is open, the coil **68** will be deenergized and the contacts **72**, **74**, and **76**, will open. The openings of this contact will deenergize the motor **40**, stopping the motor **40**. Likewise, when peg **12'** opens reset limit switch **52'**, this will deenergize the coil **70** which will open the contacts **72**, **74**, and **76'**, which will deenergize the motor **40'**. Therefore, the pegs **12** and **12'** will remain in the lower position until the crossbar **10** is again placed across the pegs **12** and **12'**.

When crossbar is placed upon pegs **12** and **12'**, the circuit will be completed through the coil **62**. The energizing of coil **62** will open contact **66** and close contact **67**. (Opposite the position shown in FIG. **5**). Inasmuch as limit switches **52** and **52'** are already open, the opening of the contact **66** will have no effect. However, the closing of the contact **67** will energize coil **82** through high-level limit switch **42** and coil **84** through high-level limit switch **42'**. When the coil **82** is energized, its contacts **86**, **88**, and **90**, will close. Likewise, the energizing of coil **84** will close its contacts **86'**, **88'**, and **90'**. Closing contact **86** will energize the armature **78** and motor **40**. The closing of contacts **88** and **90** will energize the field-winding **80** of motor **40**. It will be noted that when the field-winding **80** is energized by closing of contacts **88** and **90** in opposite polarity that it is being energized by the closing of contacts **72** and **76**. Likewise, energization of coil **84** will close contacts **86'**, **88'** and **90'**, which will in like manner cause motor **40'** to run in the reverse direction as the motor **40'** runs when it is energized by the closing of contacts **72'**, **74'**, and **76'**. Therefore, the motors **40** and **40'** will run in a direction causing the pegs **12** and **12'** to move upward, carrying with them the crossbar **10**. Upon the first movement of pegs **12** and **12'**, they will move away from the limit switches **52** and **52'** allowing them to close. However, inasmuch as contact **66** is open in this position, there will be no energization of the coils **68** and **70**.

Then the pegs **12** and **12'** continue to rise until peg **36** opens the high-level limit switch **42** and the peg **36'** opens the high-level limit switch of **42'**. When these two limit switches are open, the coils **82** and **84** will be deenergized, therefore causing the contacts to open, thus deenergizing motors **40** and **40'**. Therefore, the crossbar will remain in position with the pegs **12** and **12'** elevated.

If it is desired to move the crossbar higher, moving the housing **44** so that its pointer **48** moves to a higher numbered indicia **50** will move the switch **42** away from the height peg **36** causing the high-level limit switch **42** to close. The closing of the limit switch **42** will energize the coil **82** which will again start its motor **40** running to raise the peg **12**.

If upon an unsuccessful vault, the athlete knocks the crossbar **10** from the pegs **12** and **12'**, the coil **62** will be deenergized, causing the contact **67** to open, preventing either of the coils **82** and **84** from being energized, but also closing the contact **66** which will energize the coils **68** and **70**. This is the condition first described in the explanation of the operation of the electrical circuits.

Describing the second embodiment and referring to the drawing, (FIG. **6**), standard **102** is attached to foot **104**. The foot is mounted for horizontal adjustment on tracks, however this has not been shown on FIG. **6**. The standard **102** has indicia **106** attached to the side thereof.

Standard extension or riser **108** is attached to standard **102** by guide **110** at the top of standard **102** by clamp **112** at the bottom of the riser **108**. The clamp **112** is bolted to the bottom of the riser **108** and encircles the standard **102**. Bolt **114** threaded through the back of clamp **112** bears against the back of the standard **102** so the riser may be clamped in the desired position. Top edge **116** of one side of clamp **112** cooperates with the indicia **106** to indicate the height of the peg **118** when it is in its raised position.

Track **120** is attached as by welding to the front of riser **108**. The track is T-shaped in cross section. Slide **122** rides on the track **120** and moves up and down the track. Peg **118** is attached to the slide. Thus, the peg is mounted for vertical travel on the standard inasmuch as the riser **108** is an extension of the standard and a portion of the standard.

A flexible tension member is attached to the slide **122**. The lower portion of the flexible tension member is in the form of a fabric cord called downhaul **124**. This end of the flexible tension member is wound around spring-loaded reel **126** mounted at the bottom of the standard **102**, specifically, to the foot **104**. Spring-loaded reels **126** are commercially available upon the market for clothes line so that the clothes line may be retracted within the cover of the reel when not in use. The purpose of the reel is to prevent the downhaul **124** from becoming tangled as the slide **122** is raised and lowered.

Wheel or pulley **128** is journaled to the top of the standard specifically to the top of the riser **108**. Halyard **130**, which is that part of the flexible tension member extending upward from the peg **118**, in the form of a flexible steel cable of small diameter, is trained over the wheel **128**. Weight **132** is attached to the end of the halyard **130** and is inside the riser **108** which is tubular.

At the bottom of riser 108, detent 134 extends through the wall of the riser. The detent is spring biased inward and may be pulled from the interior of the riser by hand knob 136. By rotating the hand knob, the pins 138 rest upon the shoulder of the barrel 140 so the detent is withdrawn from the riser.

I use the expression that the detent 134 is on the bottom of the riser 108, although, as seen, it is spaced upward from the extreme bottom. It is on the lower section and for simplicity, the lower section will be referred to as the bottom. Disc cleat 142 is also located on the bottom of riser 108.

The crossbar is placed on the pegs 118 and the pegs raised until they are chock-a-block at the top of the standard. Each is raised until the cable connections run over the wheel 128. Alternately, clip 144 may be attached to the track 120 by a set-screw 146. If the clip 144 is used, the slide 122 is run chock-a-block to the clip. The clip 144 is adjusted to set the peg 118 so the edge 116 gives the proper reading upon the indicia 106 for any installation.

To raise the peg 118, all that is necessary is to release the downhaul 124 inasmuch as the weight 132 will overcome the bias of the spring-loaded reel 126 and the weight of the pegs and crossbar thereon. After the peg 118 is chock-a-block at the top, it is desirable to set the detent 134 above the top of the weight 132 to snugly hold it in place and snugly hold the halyard 130 with the peg chock-a-block to prevent accidental movement. In this regard the detent 134 itself could also be considered a stop. Actually, the adjustable stop is the clip 144 (or the wheel 128, whichever is used).

If the athlete vaults the height, the crossbar may be raised by loosening the bolt 114 and raising the riser 108. Raising the riser 108 in effect adjusts the stop (clip 144) against which the protuberance (slide 122) on the halyard 130 operates.

If the athlete fails to vault the crossbar and knocks it from the pegs 118, each is lowered by manually increasing the tension upon the downhaul 124 to exceed the tension exerted by the weight 132, pulling the peg downward. The downhaul is cleated to disc cleat 142 to hold the peg in the lower position while the crossbar is replaced upon the pegs. After the crossbar is replaced, the downhaul 124 may be released from the cleat 142, again allowing the weight 132 to pull the peg 118 and crossbar upward.

A variation of the above structure is that the end of the downhaul 124 could be attached to the bottom of the weight 132, eliminating the spring-loaded reel 126. Then, if dirt on the track 120 prevented the weight 132 from pulling the slide 122 up, added force could be exerted by pulling downward on the weight. As varied, that portion of the cord from the bottom of the riser 108 to the weight 132 would be a portion of the halyard, 130 which would be used to raise the pegs 118. Also, the peg could be secured chock-a-block by cleating the halyard extension to the cleat 142, thereby also eliminating the detent 134.

The embodiments shown and described above are only exemplary. I do not claim to have invented all the parts or elements described. Various modifications can be made in the construction, material, arrangement, and operation, and still be within the scope of my invention. The limits of the invention and the bounds of the patent protection are measured by and defined in the following claims. The restrictive description and drawing of the specific example above do not point out what an infringement of this patent would be, but are to enable the reader to make and use the invention.

SUBJECT MATTER CLAIMED FOR PROTECTION

I claim as my invention:

1. In an apparatus for supporting
a. a crossbar for pole vaulting having
b. two standards each having
c. a crossbar-supporting peg thereon,
d. the improvement comprising in combination with the above:
e. electrical means connected to the standards for detecting if the crossbar is on the pegs, and
f. means connected to the standards for automatically lowering the pegs responsive to the detection that the crossbar is not on the pegs.

2. The invention as defined in claim 1 with the additional limitation of said means for detecting including
g. said crossbar made of electrically conductive material and
h. an electrical circuit between the standards which is completed by said crossbar.

3. The invention as defined in claim 2 with the additional limitations of said means for lowering the pegs including
j. wheels journaled in the top and bottom of each standard,
k. an endless belt trained over the wheels of each standard, and
m. said pegs attached to said belts.

4. The invention as defined in claim 1 with the additional limitation of
g. means connected to the standards for raising the pegs to an adjustable position when the crossbar is placed on the pegs.

5. The invention as defined in claim 1 with the additional limitation of said means for lowering the pegs including
g. wheels journaled in the top and bottom of each standard,
h. an endless belt trained over the wheels of each standard, and
j. said pegs attached to said belts.

6. The invention as defined in claim 5 with the additional limitation of
k. a reversible electrical motor drivingly connected to the bottom wheel of each standard.

7. The invention as defined in claim 6 with the additional limitation of
m. means for supplying power to the motor responsive to the position of the pegs upon the standards.

8. The invention as defined in claim 6 with the additional limitation of
m. means for supplying power to the motor responsive to said means for detecting.

9. The invention as defined in claim 8 with the additional limitation of said means for detecting including
n. a crossbar of electrically conductive material and
o. an electrical circuit between the standards which is completed only by said crossbar.

10. In an apparatus for supporting
a. a crossbar for pole vaulting including
b. two standards having
c. crossbar-supporting pegs thereon,
d. the improved method of setting the crossbar to the desired height comprising:
e. detecting if the crossbar is on the pegs,
f. automatically lowering the pegs responsive to the detection that the crossbar is not on the pegs, and
g. automatically raising the pegs to an adjustable height responsive to the detection that the
c. crossbar is on the pegs.

11. The invention as defined in claim 10 with the additional limitation of
h. attaching each peg to an endless belt,
j. journaling each belt to one of the standards, and
k. raising and lowering the pegs by moving the endless belts.

12. The invention as defined in claim 10 with the additional limitation of
h. measuring the electrical resistance between the pegs to detect if the crossbar is on the pegs.

13. The invention as defined in claim 12 with the additional limitation of
j. attaching each peg to an endless belt,
k. journaling each belt to one of the standards, and
m. raising and lowering the pegs by moving the endless belts.

14. In an apparatus for supporting
a. a crossbar for pole vaulting including
b. two standards, each having
c. a crossbar-supporting peg thereon,

d. the improvement comprising in combination with the above:
e. each of said pegs being mounted for vertical travel up and down said standard,
f. a wheel at the top of each of the standards,
g. a flexible tension member extending from the bottom of each standard to and over the wheel,
h. said peg attached to said flexible tension member,
j. a standard extension of each standard called a riser,
k. said wheel at the top of said riser,
m. said riser vertically adjustable,
n. a halyard end of said flexible tension member extending from the peg over said wheel to within said riser,
o. a weight attached to said halyard end of the flexible tension member within said riser, and
p. a downhaul end of said flexible tension member extending down from said peg outside the riser.

15. The invention as defined in claim **14** with the additional limitations of

q. a detent attached to the bottom of the riser,
r. said detent extending into the riser in operative relationship to the top of the weight so that the detent engages the top of the weight and prevents the weight from rising when the detent is engaged.

16. The invention as defined in claim **14** with the additional limitations of

q. a spring-loaded reel attached to the bottom of said standard, and
r. said downhaul end of said flexible tension member wound around said reel.

* * * * *