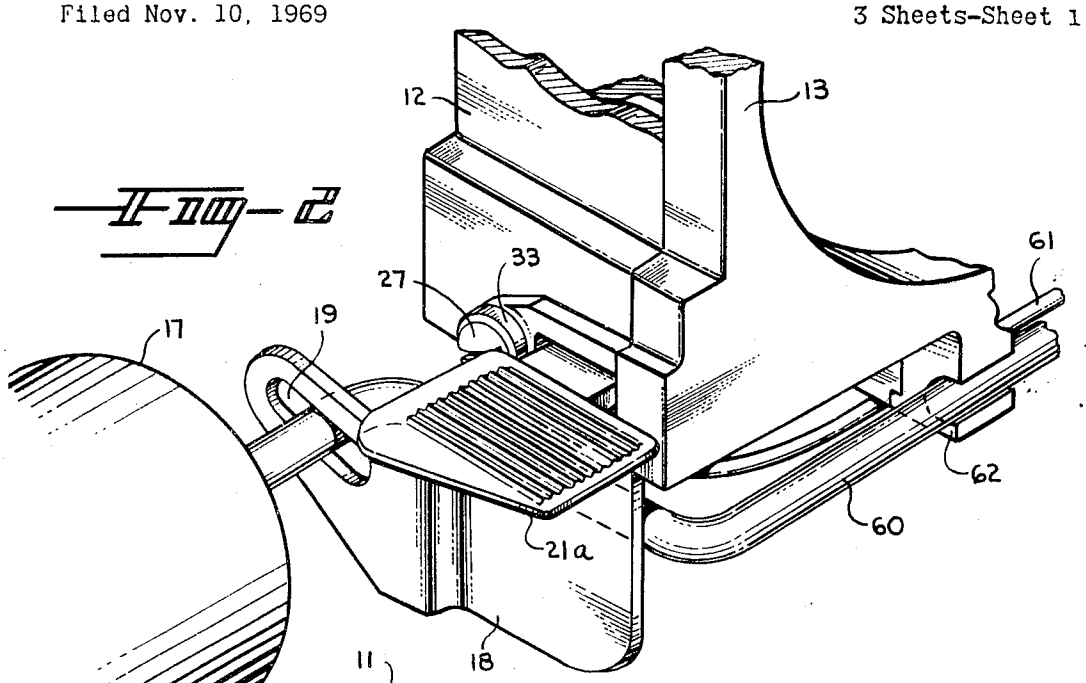
June 6, 1972 WILBUR-WEBB SELLEY 3,667,774

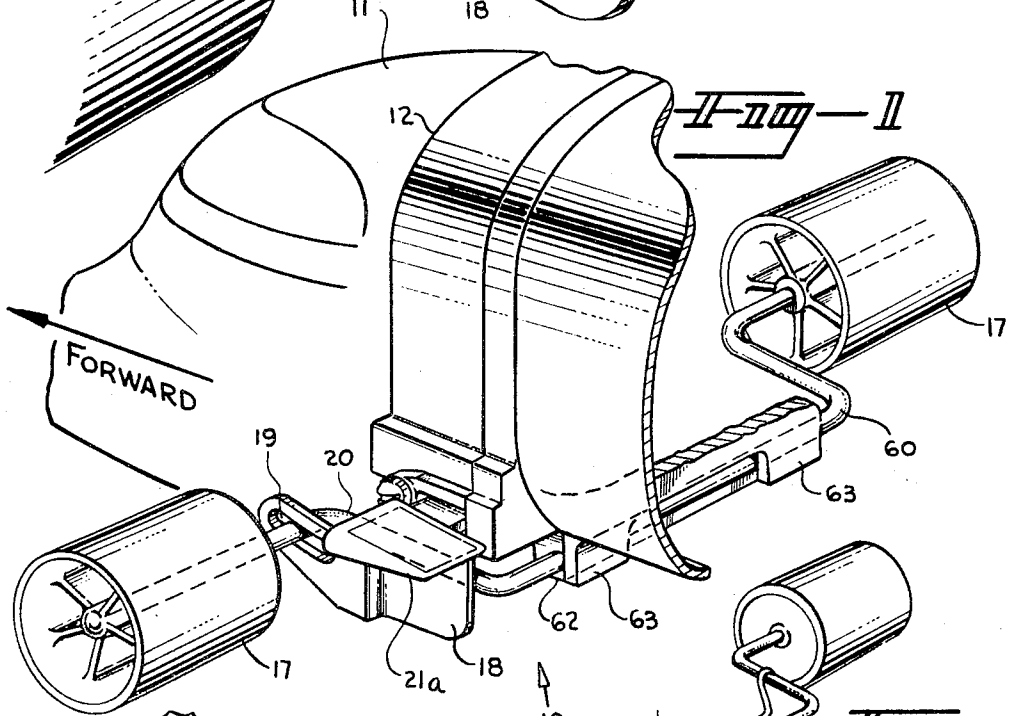
HEIGHT CHANGING MECHANISM

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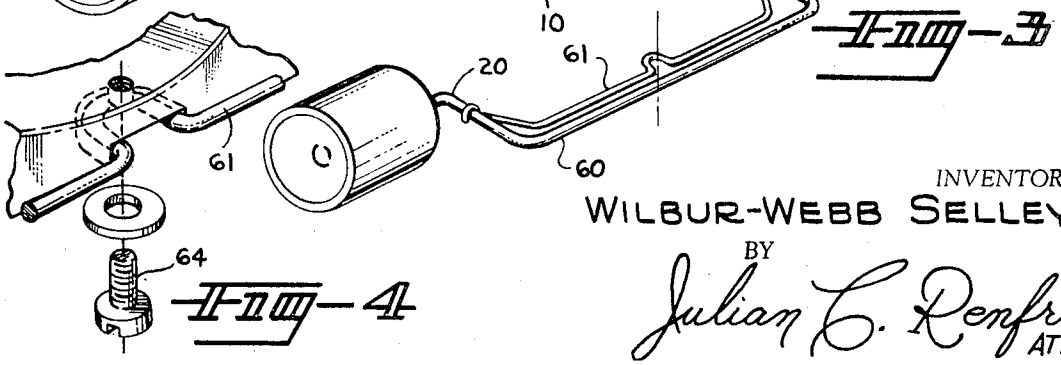
FIG—2



FIG—1



FIG—3



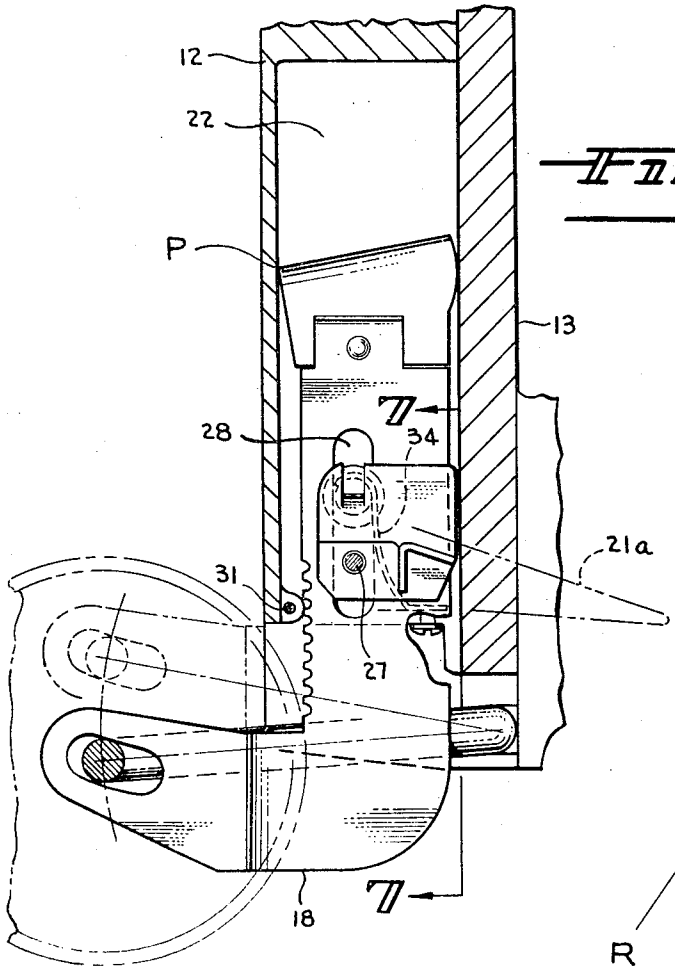
FIG—4

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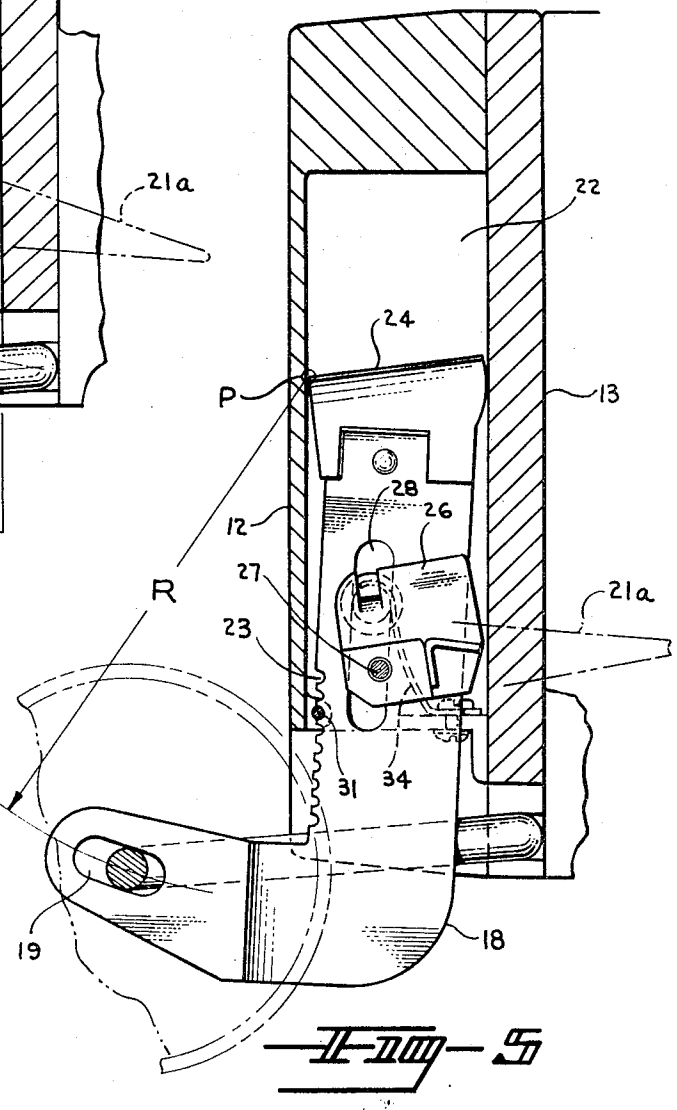
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HEIGHT CHANGING MECHANISM

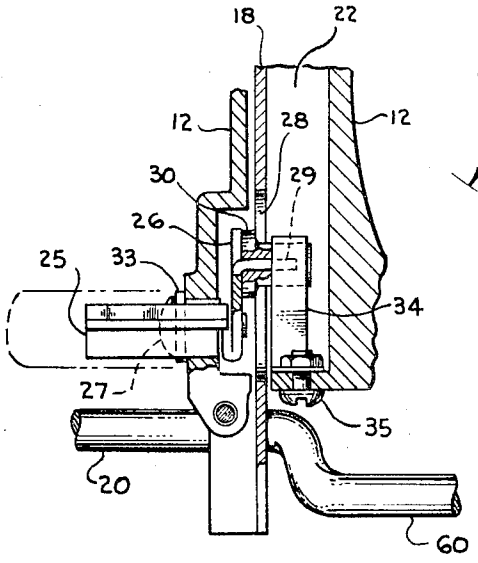
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Fig—6



Fig—5



Fig—7

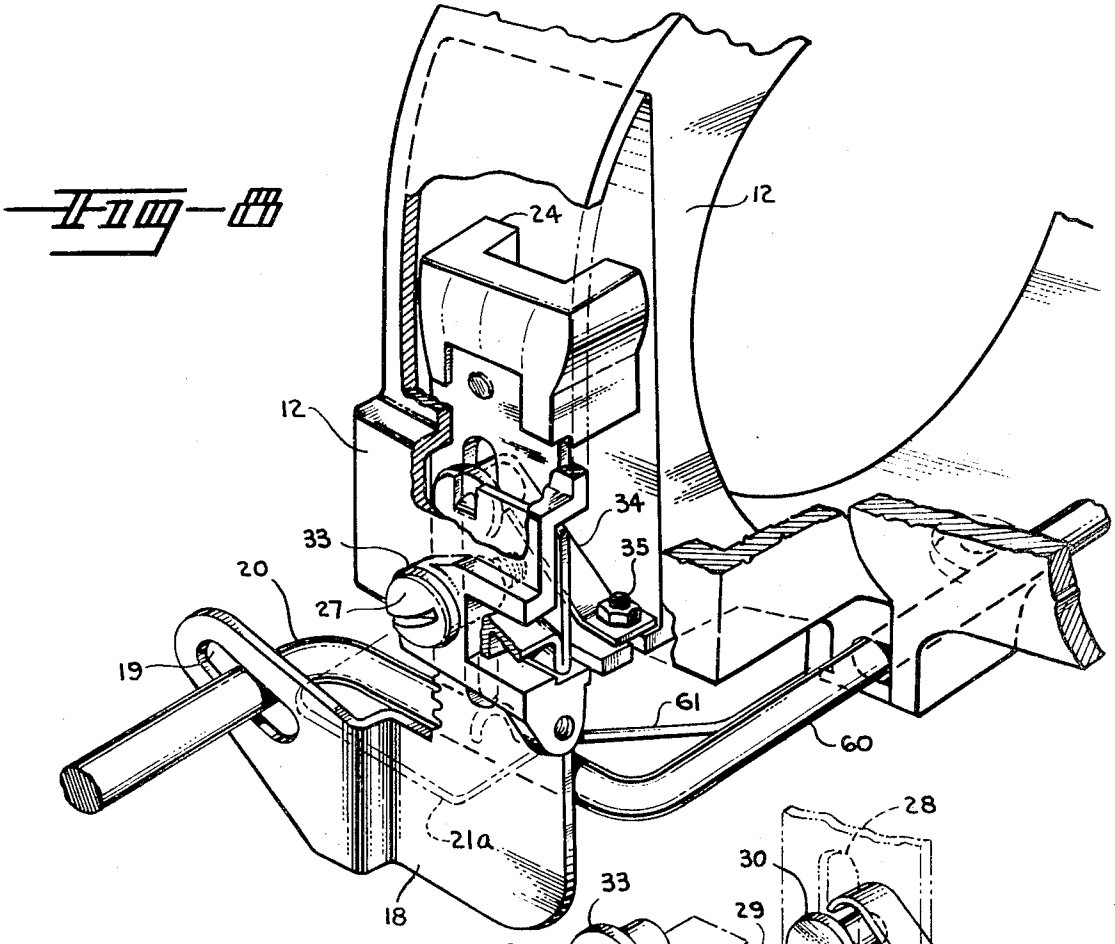
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HEIGHT CHANGING MECHANISM

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Fig-8



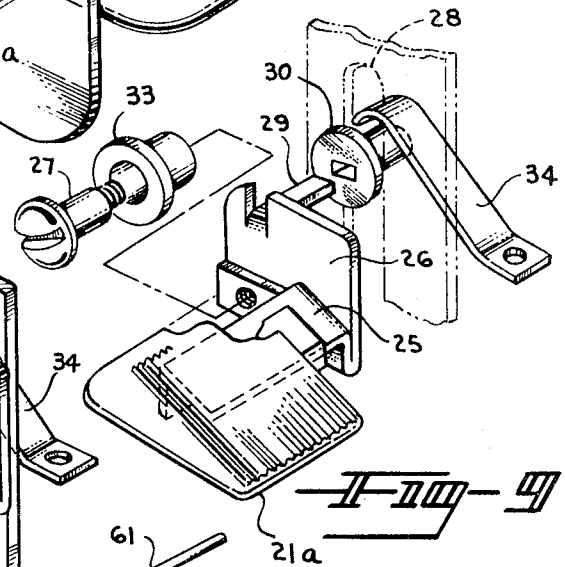


Fig-9

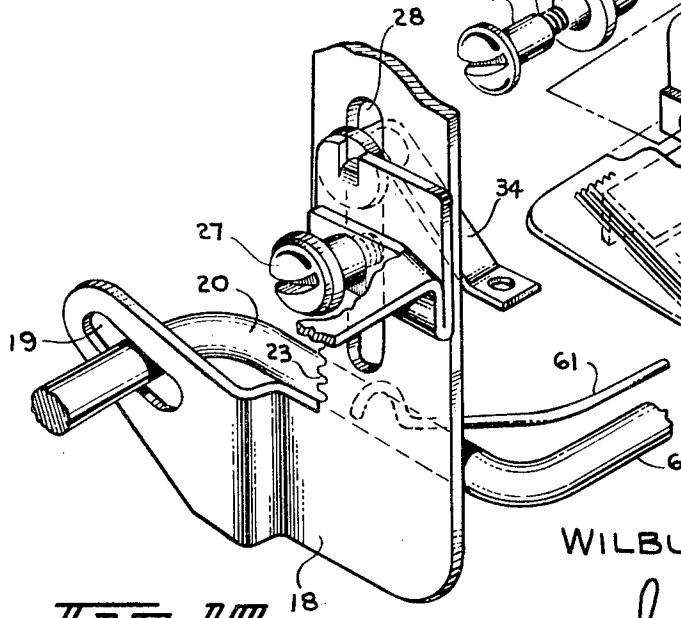


Fig-10

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3,667,774

HEIGHT CHANGING MECHANISM

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Filed Nov. 10, 1969, Ser. No. 875,436
Int. Cl. B62d 21/18
U.S. Cl. 280—43.17 5 Claims

ABSTRACT OF THE DISCLOSURE

A self-locking height changing mechanism particularly adapted for use with machines, tools, vehicles or the like equipped with a housing and having an axle whose operative position with respect to the housing is to be selectively changed. This novel mechanism includes the use of a height-controlling member associated with the axle, and capable of sliding movement as well as rocking movement in the housing. The height-controlling member is normally locked with respect to the housing, but which is easily unlocked by the operator in the course of selectively changing the height of the machine.

REFERENCE TO RELATED APPLICATIONS

This invention is related to the co-pending patent application entitled "Vacuum Cleaner and Power Unit" filed in the names of Wilbur-Webb Selley and Richard H. Schaffer on June 20, 1968, Ser. No. 738,595, now allowed, and to the patent application by the same inventors entitled "Height Adjustment Mechanism," filed Feb. 24, 1969, Ser. No. 801,610.

BACKGROUND OF THE INVENTION

(1) Field of the invention

This invention pertains to a height changing mechanism for a wheeled device in the general nature of a machine, tool, vehicle or the like, with the arrangement being such that the user can selectively move an operative portion of the device with respect to a supporting surface so as to be able to make the most advantageous use of the device.

(2) Description of the prior art

A number of height changing mechanisms have been taught by the prior art, but in all known instances these devices have suffered from several disadvantages. Often these devices have been of such a design and construction as to be committed to a definite direction of travel, such that once the user has started to adjust the height, he must continue continue in that direction and only in that direction until such time as the end of the adjustment range has been reached. Then, typically the mechanism does not ratchet back in the opposite direction, but rather moves back all the way to the opposite end of travel before the height changing procedure can be restarted in the first direction.

(3) Summary of this invention

This invention represents a low cost, highly satisfactory, all mechanical height changing mechanism principally comprising a height-controlling member capable of sliding movement as well as rocking movement and normally serving to lock the axle of the device with respect to the housing, thus to prevent undesirable height changes. A pedal member is associated with this height-controlling member and arranged when depressed to rock or rotate the height-controlling member away from a locking position and into a position in which it can slide so as to permit or bring about a height changing motion of the axle with respect to the housing. Upon the height controlling member reaching this unlocked position, the operator by continued pressure on the pedal can cause the height of the machine to change in a first desired direction, or alternatively he or she can, while continuing a certain amount of pressure on the pedal, bring about a height change in the opposite direction.

Spring bias means may be utilized in conjunction with the height-controlling member to assure that it is normally maintained in the locked position, and other spring bias means may be utilized for biasing the axle with respect to the housing so as to at least partially overcome the weight of the housing. It should be noted that the inter-relationships of these two bias means are such that the unlocking arrangement is much more quickly responsive to pedal movements than is the axle-biasing arrangement.

It is therefore a principal object of my invention to provide a novel height changing mechanism of low cost and dependable operation which can be moved in either direction away from a given setting or location merely by the selective operation of this device by the user.

It is another object of this invention to provide a height changing mechanism which is automatically biased into the locking position, thus tending to prevent undesired height changes even though it is bumped or misused.

Other objects, advantages, and features of this invention will be more apparent from a study of the appended drawings in which:

FIG. 1 is a fragmentary perspective view of a vacuum cleaner housing equipped with my novel height changing mechanism;

FIG. 2 is a fragmentary perspective view to a larger scale to show certain other details associated with this arrangement;

FIG. 3 is a perspective view to a smaller scale of the axle arrangement, revealing the type of bias spring used;

FIG. 4 is a fragmentary view of the center portion of the bias spring of FIG. 3;

FIG. 5 is an enlarged cross-sectional view of the height controlling member, shown in its normal, locked position;

FIG. 6 is a view similar to FIG. 5 but showing the height controlling member moved to the unlocked position that permits selective height changes;

FIG. 7 is a cross-sectional view taken along lines 7—7 in FIG. 6;

FIG. 8 is a perspective view to a large scale, with certain housing portions removed to reveal the inter-relationships of the height-controlling member, the axle, and the involved housing portions;

FIG. 9 is an exploded view showing the manner in which the cam is supported, and how it interrelates with the pedal and bias means; and

FIG. 10 is an exploded view revealing details of the upper portion of the cam with respect to a slot in the height-controlling member.

DETAILED DESCRIPTION

Turning first to FIG. 1, it will be noted that my height changing mechanism **10** is disposed in this instance in a housing **11** such as of a vacuum cleaner or the like. Across the underside of the housing extends an axle **60** from left to right, which axle can be regarded as being rotatably mounted in ears **62**. The axle is generally U-shaped, having arms **20** whose outer ends are bent so as to be essentially parallel with the mid-portion of the axle. Wheels **17** are rotatably secured on these outer ends of the axle, which wheels may be of substantial width as shown.

In accordance with this invention, I provide a generally L-shaped elevation arm or height-controlling member **18**, which appears only partially in FIGS. 1 and 2, but in its entirety in FIGS. 5 and 6. This member includes an essentially vertical portion that on occasion is movable in

channel or slot **22** vertically disposed in housing portion **12**, and a lateral portion in which a slot **19** is provided. The left arm **20** of the axle **60** extends through this slot **19**, with it being understood that controlled movements of the height-controlling member **18** bring about the rotation of the axle about the mounting points **62**, thus resulting in desirable height changes in the housing with respect to the floor. A member **63** prevents dislodgment of the axle from the locations **62**. A long torsion spring **61** is provided as shown in FIGS. 2, 3, 8 and 10, which serves to bias the wheels downwardly, which is of course equivalent to biasing the housing away from the floor. A screw **64** is provided for attaching the center of spring **61** to the underside of the housing at its midpoint.

The height-controlling member **18** normally resides in the locked position illustrated in FIG. 5, in which one tooth of its series of teeth **23** resides against a fixed pin **31** disposed in the housing adjacent the sidewall of slot or channel **22**. At the behest of the operator, the member **18** can be rocked to the right or essentially counterclockwise about its uppermost point P into the more nearly vertical portion shown in FIG. 6. It will be noted that at this point the teeth are spaced from the pin **31**, thus enabling the member **18** now to be moved either upwardly or downwardly in the slot **22**, thus to change the position the outer ends **20** of the axle bear to the midpoint of the axle.

Movements of the member **18** in the slot **22** are simplified by affixing a pivot head **24** such as of nylon at the upper end of the vertical portion of the memebr **18**, with it being understood that the rocking movements of the member **18** in effect cause pivoting about pivot point P, the point at which the pivot head **24** contacts the inner sidewall of channel **22**. It should be noted that the elongated slot **19** in the laterally extending portion of the member **18** is constructed so as to be on a constant radius R from the pivot point P, and of sufficient length that at no time does the arm of the axle **60** hit either end of the slot. The constant distance of the slot from the point P prevents undesirable vertical movements of the housing as the member **18** is rocked from one position to the other.

The aforementioned rocking movements of the member **18** are brought about by movements of a pedal **21***a*, revealed in FIGS. 1, 2, 5 and 6. This pedal is mounted upon a lateral extension **25** of an actuator cam **26**, which cam directly functions to bring about the rocking movements of the member **18**. This is accomplished by providing a projection **29** adjacent an upper portion of the cam, upon which projection is mounted a bushing **30** that is disposed in vertical slot **28** located in the vertical portion of the member **18**. The cam **26** is mounted upon a pivot screw **27** located in the housing portion **12**, and it is about this screw that the cam pivots when the operator steps upon the pedal **21***a*. As will be obvious, when the cam is caused to rotate in a clockwise direction from the position shown in FIG. 5 into the position shown in FIG. 6, this causes the projection **29** and bushing **30** to act against the right hand side of the slot **28**, and thus to cause the arm or member **18** to rock or pivot about the point P into the position shown in FIG. 6.

In order to bring about this, the operator has of course moved the pedal **21***a* from the up position shown in FIG. 5 into the down position shown in FIG. 6, and it should be noted that with the pedal in the position shown in FIG. 6, the operator can then bring about desired vertical movements. For example, at this point the operator can by only allowing a certain amount of force on the pedal, permit the force of the torsion spring **61** to move the housing **11** upwardly. Thereafter, the operator can remove his or her toe, allowing the member **18** to return to the locked position in which a new tooth **23** engages the pin **31**, and thus securing the housing **11** in a higher position in respect to the floor. Alternatively, the operator can continue to apply downward force on the pedal **21***a* while it is in the position shown in FIG. 6, thus to overcome the effect of the spring **61** and causing the member **18** to move upwardly in the channel **22** so as to allow a new tooth **23** to lock the housing in a lower position with respect to the floor.

Cam **26** normally resides in the position shown in FIG. 5, this being assured by the provision of a leaf spring **34**. The lower end of this spring is secured by a nut and bolt **35** to the housing **11**, but the upper end of this question-mark-shaped spring bears against the cam bushing **30** in the manner shown in FIGS. 5, 6 and 9 so as to hold it toward the left as viewed in these figures. Thus, this spring serves to hold the teeth **23** firmly engaging the pin **31**, in the height-locking position.

It is important to note that the question-mark-shaped spring **34** is sized to bring about a much faster reaction in the pedal-cam system than does the large torsion spring **61** concerned with the elevational bias of the machine. Because of this, it is comparatively a simple matter to "unlock" the height-setting arrangement and bring about any desired change in the height of the machine with respect to the floor, without being concerned with any particular "countering" effect of the spring **61**.

I claim:

1. A height changing mechanism for a machine, tool or the like comprising an axle rotatably attached to the housing of the machine, said housing having a channel therein in which a member can be caused to slide, a height-controlling member having a slidable portion disposed in said channel, and an axle-contacting portion, said height-controlling member being capable of undertaking a type of rocking movement about a pivot point of said height-controlling member with respect to said channel, but normally being biased into locking contact with a portion of the housing of the machine, in which position the axle is in fact locked to the housing from the height standpoint, means for momentarily rocking said height-controlling member about said pivot point and away from such locking contact with said housing so that it can slide in either direction in said channel, and thus bring about a desired height change by causing a movement of said axle with respect to said housing, and spring bias means normally biasing said axle with respect to said housing in a direction tending to raise said housing with respect to a supporting surface, and at the same time acting upon said height-controlling member, tending to move it along said channel when it has been rocked away from locking contact with said housing, and additional spring bias means tending to bias said slidable height-controlling member into the locking contact with the housing, the spring bias means concerned with moving said height-controlling member into its locking position bringing about much faster movement than the bias means associated with said axle.

2. A height changing mechanism for a housing comprising an axle rotatably secured to the housing, a height-controlling member slidably disposed in said housing, said height-controlling member having a portion in contact with said axle, with sliding movements of said height-controlling member in said housing controlling the positioning of said axle, and hence the position of the housing above a supporting surface, locking means on said height-controlling member, normally spring biased into contact with fixed means on said housing, thus to locate said axle and prevent undesired height changes, said height-controlling member also being capable of rocking movements about a pivot point related to said housing, and foot operated means for momentarily rocking said height-controlling member about such pivot point to bring about a movement of said locking means away from contact with said fixed means, thus to permit movement of said axle to bring about an elevation change of said housing.

3. A height changing mechanism for a housing comprising an axle, the ecntral portion of which is rotatably secured to the underside of the housing, and upon the ends

of which wheels are disposed, said axle being formed generally into a U-shaped configuration, with said wheels being disposed on arm portions that are generally parallel to the central portion of said axle, a height-controlling member slidably disposed in said housing, said height-controlling member having a laterally extending arm thereon, in which an axle-contacting portion is formed, with sliding movements of said height-controlling member in said housing controlling the rotative position of said axle, and hence the position said wheels bear to said housing, locking means on said height-controlling member, which member is normally biased into contact with fixed means on said housing, thus to locate the axle and prevent undesired rotation, and means for momentarily biasing said locking means away from said fixed means, thus to allow sliding movement of said height-controlling means, and hence a rotation of said axle to bring about an elevation change.

4. A height changing arrangement for use with a machine, tool or the like comprising a housing upon which an axle is movably attached, said housing having a channel therein in which a member can be caused to move, a height-controlling member disposed in said channel and being both slidable along said channel as well as pivotable therein for a limited extent, latter member also having an axle-contacting portion, means including a gravity bias normally biasing said height-controlling member into a locked relationship with respect to said housing, in which height changes are effectively prevented, means for selectively pivoting said height-controlling member against its bias and away from the locked relationship, and additional bias means normally acting to move said height-controlling member in the sliding direction along said channel at such time as said member has been moved away from the locked relationship, latter bias being in a direction tending to push said axle away from said housing and thus amounting to a bias in the height-increasing direction, said means for selectively pivoting said height-controlling member also enabling said additional bias means to be overcome to whatever extent may be desired, thereby to enable said axle to be moved closer to said housing before said height-controlling member is returned by its bias to the locked relationship, thus of course amounting to a decrease in height of said housing with respect to a supporting surface.

5. A height changing mechanism for a machine, tool or the like comprising a housing in which a channel is defined, said housing also having an axle whose height relationship to the housing can be changed, an L-shaped height-controlling member, the portion of latter member corresponding to the upper portion of the L being slidable in said channel, and the lower portion of the L being operatively connected to said axle, and spaced teeth disposed on that part of said upper portion of said L-shaped member adjacent said lower portion, with said teeth normally being biased into locking contact with a portion of said housing, thus to normally prevent a height change of said axle with respect to said housing, said upper portion being sufficiently smaller than said channel in which it is slidable as to enable it to undertake a rocking motion on occasion, means for bringing about such a rocking motion of said L-shaped member, so as to cause said teeth to be temporarily moved away from contact with said housing, thereby to permit a height change of said axle with respect to said housing, and a pair of bias means, one to normally bias said teeth into locking contact with said housing, and the other to normally bias said axle away from said housing, as well as to normally bias said L-shaped member in a sliding manner along said channel when said teeth are away from the locked position.

References Cited

UNITED STATES PATENTS

469,168	2/1892	Nicholson	280—43
605,316	6/1898	Kneeland	280—43.17
1,100,350	6/1914	Brown	280—43
2,172,973	9/1939	Hays et al.	280—43
2,214,855	9/1940	Holm-Hnsen	280—43
2,146,602	2/1939	Spooner, Jr.	280—43

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