April 13, 1954

S. DE ORLOW

RATCHET JACK

2,674,893

Filed Sept. 16, 1950

3 Sheets-Sheet 1

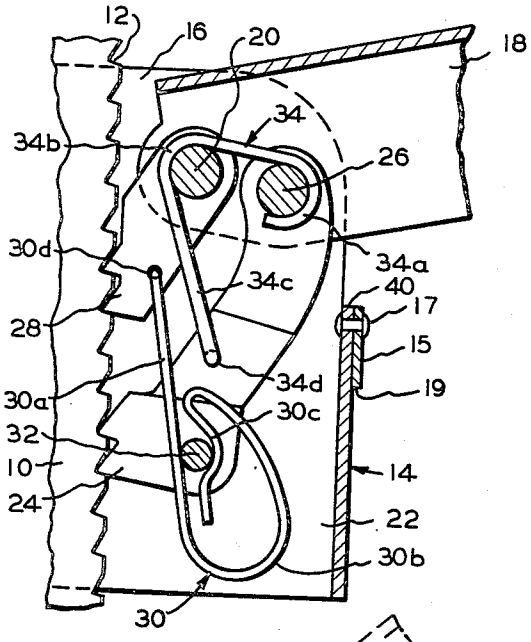


FIG. I.

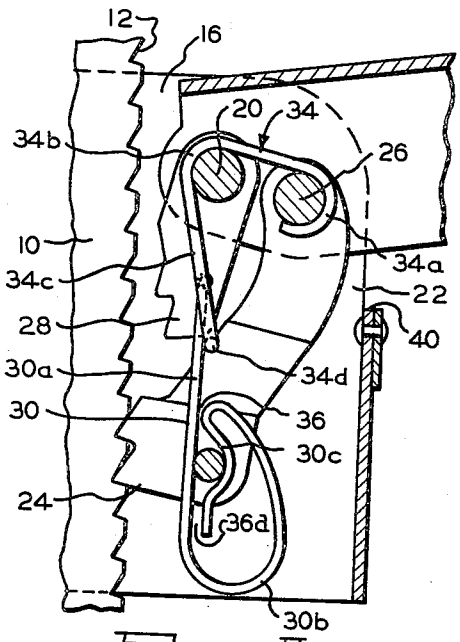


FIG. II.

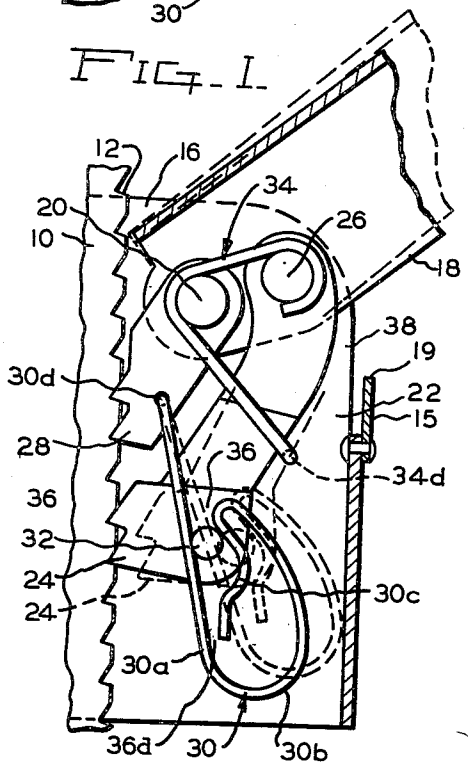


FIG. IV.

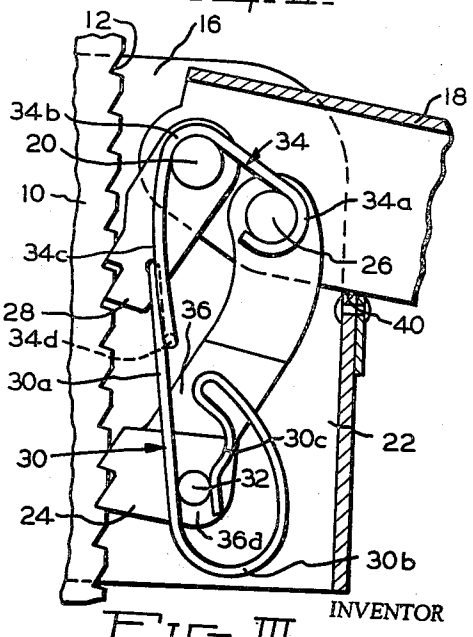


FIG. III.

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April 13, 1954 S. DE ORLOW 2,674,893

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3 Sheets-Sheet 2

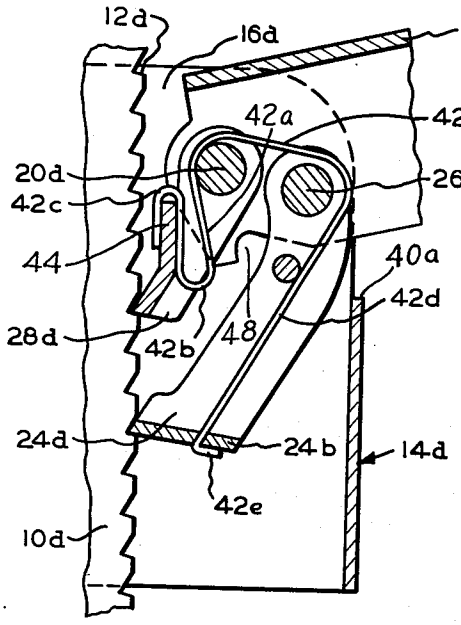


FIG. V.

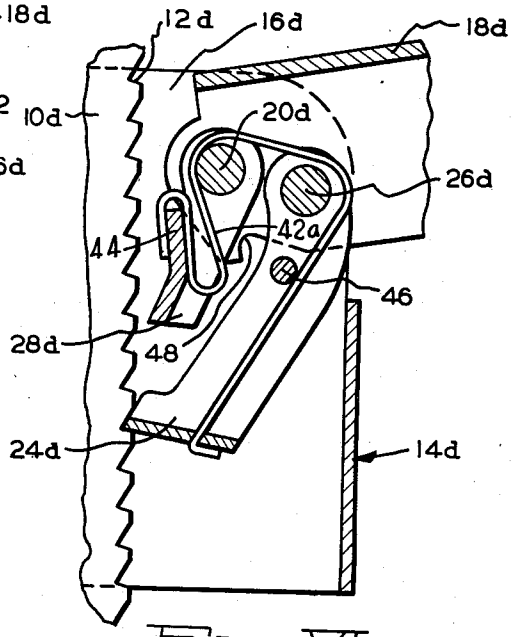


FIG. VI.

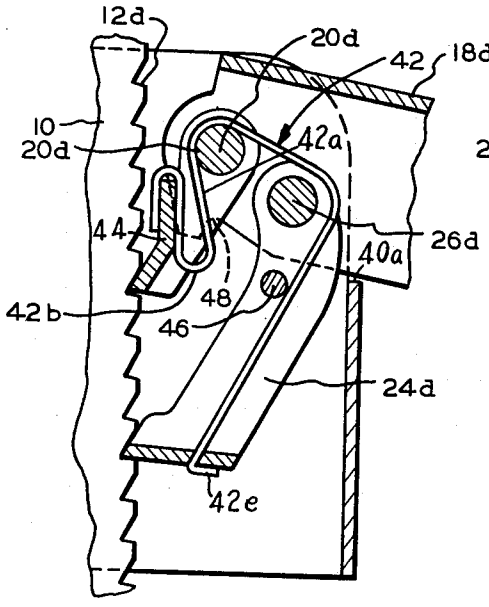


FIG. VII.

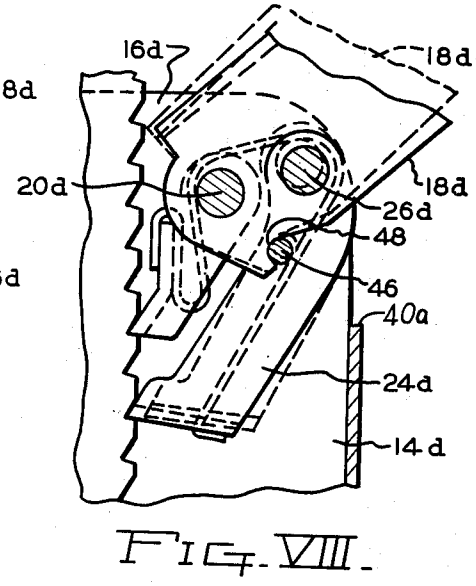


FIG. VIII.

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April 13, 1954 S. DE ORLOW 2,674,893

RATCHET JACK

Filed Sept. 16, 1950

3 Sheets-Sheet 3

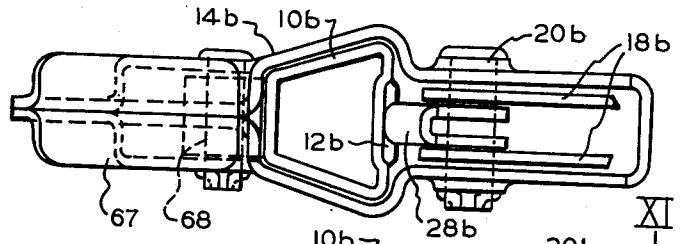


FIG. X.

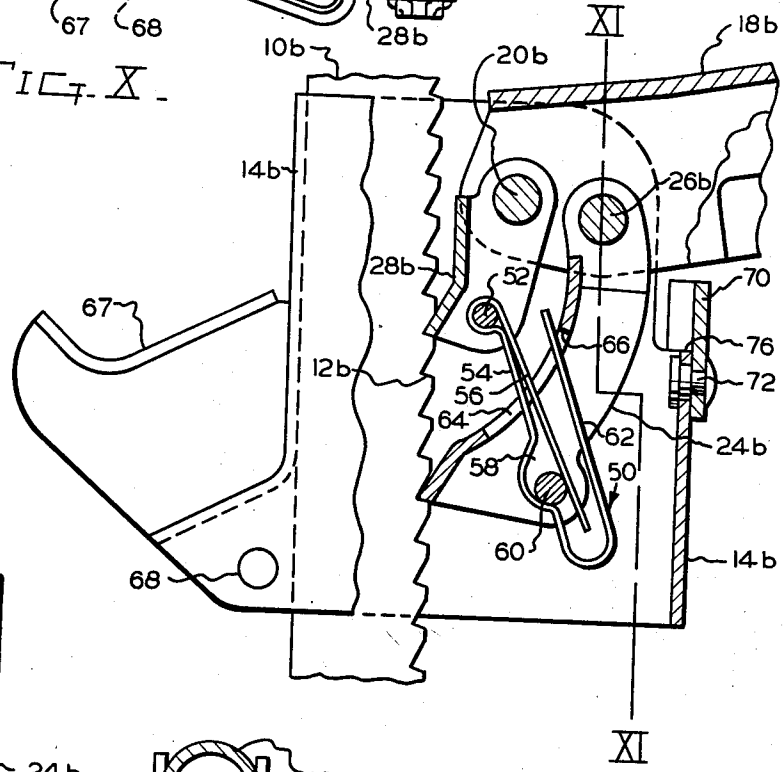


FIG. IX.

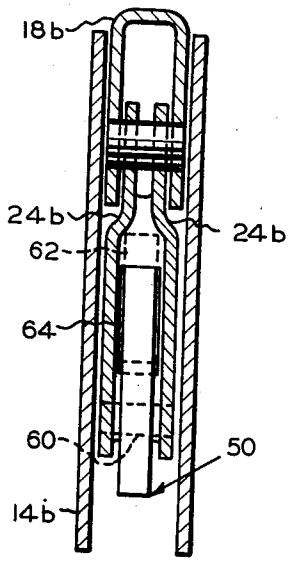


FIG. XI.

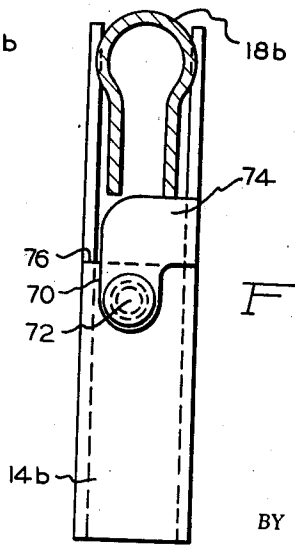


FIG. XII.

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UNITED STATES PATENT OFFICE

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RATCHET JACK

Stephen De Orlow, Jackson, Mich.

Application September 16, 1950, Serial No. 185,193

2 Claims. (Cl. 74—141.5)

1

This invention relates to vehicle jacks and particularly to such as are known as bumper jacks.

In connection with such jacks, it is usual to employ a toothed column structure along which a load supporting structure is movable, either upwardly or downwardly, to raise or lower the said structure, by the action of a pair of spring influenced pawls, constituting a lifting pawl and holding pawl alternatively engaged and disengaged with respect to the column teeth under the control of an actuating lever. In prior jack constructions, raising or lowering of the load supporting structure by actuation of the actuating lever is determined by the setting of a separately actuatable member, which is operable to change the setting of the pawl spring mechanism either to constrain the lifting pawl toward the column teeth in condition for climbing, when the actuating lever is operated, or to force the lifting pawl to move to an idling position to permit the load supporting structure to be lowered. These prior jack constructions, therefore, of necessity involve two distinct operations, both for lifting and lowering and, in addition, involve changing the spring setting to adapt the jack for lifting or lowering.

It is an object of the present invention to provide an improved jack construction of the above described character which will enable the load supporting structure to be raised or lowered automatically under the control of the actuating lever.

It is also an object of the invention to provide a vehicle jack of the above described character in which movement of the actuating lever in one sense, or direction, will effect lifting of the load supporting structure and movement of the lever in the opposite sense, or direction, will automatically effect lowering of the load supporting structure.

Another object of the invention is to provide a vehicle jack which is of strong, efficient, yet inexpensive construction and with which the required raising and lowering movements of the load supporting structure can be effected automatically under the control of a common actuating lever.

Yet another object of the invention is to provide a jack construction which while actuatable to raise or lower the load supporting structure merely by changing the direction of movement of the actuating lever, nevertheless involves a separately actuatable member which can be positioned at the will of the operator either to leave the actuating lever free to travel through the

2

entire operating range, for both raising or lowering of the load supporting structure, or which member can be adjusted into a position in which the actuating lever can only be moved for a limited range of movement corresponding to that in which the load supporting structure is lowered.

The above and further objects and advantages of the invention, residing in the construction and arrangement of parts, will be apparent from consideration of the following detailed description in conjunction with the accompanying drawings in which:

Figs. I to IV show in vertical section one form of pawl and associated actuating mechanism, according to the invention, with the column shown broken away for ease of illustration, and the pawls and associated mechanism shown in different operating positions,

Figs. V to VIII are similar views of a modified form of the invention,

Fig. IX is a vertical section of yet another modified form of the invention, involving hollow pawls which have the added function of serving to form housings for the controlling spring mechanism and which modified form of the invention also incorporates a separately actuatable member adapted to limit the movement of the actuating lever to set the jack for lowering movement only,

Fig. X is a transverse plan section of the construction as seen in Fig. IX,

Fig. XI is a vertical cross-section of Fig. IX substantially on the line XI—XI of Fig. IX, and

Fig. XII is an end view looking on the left hand end of Fig. IX and showing the member for controlling the range of movement of the operating lever of the jack set to limit such movement to that in which the load supporting structure is automatically lowered upon actuation of the operating lever.

Referring to the drawings, and first to Figs. I to IV, the jack comprises a vertical column structure 10 having teeth 12 along one side thereof and conveniently formed in accordance with the disclosure in U. S. Patent No. 2,041,376, patented May 19, 1936.

Slidably mounted upon the column 10 is a load supporting structure 14 which can be formed from sheet metal into the form of a substantially rectangular box open at its top and bottom ends and defining a housing 16 in which a pawl actuating lever 18 is pivotally mounted upon a pivot pin 20 secured in the opposite housing side walls (one of which is indicated at 22). Said housing also accommodates a pair of pawls, comprising a

lifting pawl 24, and a holding pawl 28 pivotally mounted about the aforesaid lever pivot pin 20.

An operative connection between the lifting pawl 24 and the holding pawl 28 is provided by a spring 30 which is bent into shape to provide a link arm 30a and a bowed portion 30b, which bowed portion provides a dell 30c with which a pin 32 fast on the pawl 24 is adapted to engage to control the movement of the pawls through the medium of the actuating lever 18 and an upper spring member 34, in a manner to be described.

The link portion 30a of the spring 30 is bent over at its upper end 30d and engaged in the pawl 28. In its free condition (as seen in Fig. II), the spring defines contracted gaps 36, 36d at the top and bottom, respectively, of the portion of the spring containing the dell 30c.

The spring 34 has a semi-circular end portion 34a which engages freely over the pin 26 and is also bent at 34b to pass freely over the pin 20, whence the spring provides a depending portion 34c having an inturned outer extremity 34d which lies in the path of the link portion 30a of the spring 30.

In its free condition, as seen in Fig. I, the spring arm 30c is in an unstressed state and is free to swing.

The load supporting structure 14 has an upper slot 38 through which the actuating lever 18 extends, which slot defines a stop 40 for limiting the downward movement of the lever 18.

Turning now to the operation of the mechanism as seen in Figs. I–IV, in Fig. I the mechanism is shown in position in which both pawls 24 and 28 are engaged with the column 10 and the lever 18 is positioned to be swung either downward or upward. In order to effect a climbing action, i. e., movement of the load supporting structure 14 upward with respect to the column 10, it is necessary that the lever 18 be swung downward from its position as seen in Fig. I and then upward, back to this position. With a load imposed upon the structure 14, downward movement of the lever 18 from the position of Fig. I will be attendant with pivotal movement of the lever about the pin 26, since in this condition, the pawl 24 is in tension and forms a rigid link between the column and the pin 26. Accordingly, the pin 20, as well as the structure 14, will rise. Spring 30 also rises with respect to pin 32. This means that the spring dell 30c lifts with respect to the pin 32, with the result that the spring 30 is stressed to the extent that the pin 32 becomes located toward the lower end of the dell 30c and the gaps 36, 36d are opened up, as seen in Fig. I, compared with their previous condition, as in Fig. II. With the mechanism thus conditioned, the entire load is on the lifting pawl 24 and the holding pawl 28 is free to swing clear of the column 10 by the upward movement imparted to the pin 20. The relative displacement of the pin 32 and the dell 30c gives rise to the condition that the spring 30 tends to close about the pin 32 and locate the pin in the center of the dell and is accompanied by a downward thrust upon the spring link arm 30a. When the holding pawl 28 is lifted, it is also snapped clear of the column teeth 12 by the action of this downward pull on the spring link arm 30a. Simultaneously therewith, the spring closes again at the gaps 36 and 36a to the position shown in Fig. II. In this condition of the parts, the load is still on the lifting pawl 24 and the pin 20 must still be regarded as moving upward. This movement is accompanied by a swinging of the spring arm 34c to the left, as seen in Fig. II, in which the turned-in end 34d of this spring arm is located directly in the path of, and in contact with, the spring link arm 30a. Continued downward movement of the lever 18 to the position seen in Fig. III will tension the spring arm 30a and constrain the holding pawl 28 to engage the column at the time the structure 12 has climbed a distance equivalent to one tooth and the lever 18 has reached the stop 40. At this time the pin 32 is again out of the dell 30c and is located in the gap 36a with the result that the pawl 24 is urged toward the column teeth 12 into its next climbing position when, upon movement of the lever 18, upward from the position of Fig. III the pin 26 is lifted, the lever 18 then swinging about the pin 20.

To lower the structure 14, the lever 18 is swung upward from the position seen in Fig. I. This cause the pin 26 to move upward with the lever 18 as the latter swings about the pin 20. In so doing, the spring 34 is rendered inactive by its arm 34c being swung to the right, as seen in Fig. IV. The pawl 28 then climbs down the column as the pawl 24 is intermittently swung out of and into engagement with the column by the action of the spring 30 and by the constraining action of the spring link arm 30a.

While the invention, as thus for described, provides for either raising or lowering movement of the load supporting structure automatically with the raising or lowering of the operating lever 18 with swinging motion in either direction, as above described, and automatically so without any previous adjustment it is, nevertheless, possible to set the jack mechanism so that when it is desired merely to lower the load supporting structure 14 the possibility of the operating lever 18 being moved farther downward than is necessary for this purpose, and which includes the range of movement of the operating lever for raising the jack, is positively precluded by the insertion of a stop device in the form of a lever member 15 pivotally mounted upon the load supporting structure 14, as indicated at 17. This lever member 15 can be disposed in the position as seen in Figs. I, II and III, in which it is inoperative and the operating lever 18 is free to be swung through its entire operating range of pivotal movement, both for raising and lowering the load supporting structure 14. However, if the lever member 15 is swung into the raised position, as seen in Fig. IV, it presents an abutment surface 19 which is located substantially at the position corresponding to the commencement of the upward raising movement of tht lever 18 to bring about the lowering of the load supporting structure 14 and forms a stop to prevent the operating lever 18 from being lowered beyond this position. In other wards, with the lever member 15 set as shown in Fig. IV it is impossible for actuation of the lever 18 to do otherwise than to lower the load supporting structure 14 with respect to the column structure 10.

Turning now to the embodiment of the invention illustrated in Figs. V to VIII, the jack construction comprises the vertical column 10d, with teeth 12d and slidable load supporting structure 14d, with its opening 16d for the passage of the actuating lever 18d and the stop 40a therefor.

The lifting and holding pawls are indicated at 24d and 28d, respectively, and are pivoted at 26d and 20d, respectively, the actuating lever 18d being pivoted to the structure 14d also at 20d

and the pawl 24d being pivoted upon the lever 18d at 26d.

In this embodiment, a single spring 42 performs the dual function of actuating the pawls for their lifting or lowering actions, consequent upon the lever 18d being swung downward from its position, as seen in Fig. V, or upward therefrom, respectively.

The spring 42 is freely looped across the pivot pins 20d and 26d and, on the one side, has a depending arm 42a which is bent back upon itself at 42b and then over to define a hook portion 42c by which this side of the spring is engaged with a lug 44 on the holding pawl 28d. On its opposite side, the spring has a depending link arm 42d which is passed through the bottom 24b of the pawl 24d and bent over at its extremity, as indicated at 42e.

The pawl 24d carries a pin 46 which is positioned for engagement by a hook 48 on the lever 18d when the lever is swung upward, as indicated in dotted lines in Fig. VIII to effect lowering of the structure 14d. With a load on the structure 14d and the lever 18d situated as seen in Fig. V (which is the normal or starting position) the pawl 24d will be in tension, as well as the spring 42. Now if the lever 18d is moved downward, it will pivot about 26d, lifting the pin 20d and structure 14d, thereby immediately releasing the holding pawl 28d to disengage the column 10d and rise to engage the next tooth above when the lever 18d is lifted back from the position seen in Fig. VII.

When it is desired to lower the load supporting structure 14d with respect to the column structure 10d the operating lever 18d is swung upwardly from its position, as seen in Fig. V, substantially into the dotted line position as seen in Fig. VIII. This has the effect of causing the notch 48 in the operating lever to be brought with pressure against the pin 46 of the lifting pawl 24d, with the result that the lifting pawl 24d is swung outwardly away from the column structure 10d and also upwardly simultaneously with the pivotal movement of the operating lever about the pivot 26d so that momentarily both pawls are disengaged from the teeth 12d on the column structure and the load supporting structure 14d is accordingly allowed to descend the column. This happens when the operating lever 18d is swung upwardly, whereas when it is swung downwardly the lifting pawl is again engaged with the column structure. The lowering operation proceeds with successive upward and downward movements of the operating lever, with the pawls climbing down the column structure and alternately engaging and disengaging the column teeth 12d in turn. During this operation the spring structure is alternatively stressed and unstressed in relation to the actuating pawls to insure that they are biased into engagement with the column teeth 12d when freed to do so, depending upon the position of the actuating lever 18d.

Turning now to the embodiment of the invention illustrated in Figs. IX to XII, wherein the loading supporting structure is indicated at 14b, the column at 10b with its teeth 12b, and the actuating lever at 18b, here the lifting and holding pawls 24b and 28b, respectively, are formed as hollow pressings of U-shaped cross-section and serve to house and enclose the centrally located spring element, indicated generally at 50. This spring element is of leaf or strip construction and is anchored at one end upon the cross

pin 52 within the pawl 28b. The spring is substantially of U-shape, as shown, and has one limb thereof bent into double formation to provide adjacent limbs 54, 56 which define between them a cavity 58 in which a pin 60 on the pawl 24b engages and functions in the same manner as disclosed and described with reference to Fig. I to IV.

The spring limbs 54, 56 and the other limb 62 of the U extend through a slot 64 in the pawl 24b, said slot defining an abutment surface 66 to the spring limb 62 corresponding to the spring arm 34c of the embodiment according to Fig. I to IV. As with this previously described embodiment, the hollow pawl 28b of the present embodiment is pivoted upon a cross pin 20b upon the load supporting structure 14b whereas the other hollow pawl 24b is pivoted upon a cross pin 26b on the actuating lever 18b.

The load supporting structure 14b is shown provided with a ledge 67 on which the load is taken and with a guide roller 68 which takes a bearing against the column 10b.

The operation of this jack construction, as illustrated in Figs. IX to XII follows that according to Figs. I to IV and will be apparent to those skilled in the art without further description. Also, as disclosed with reference to Figs. I to IV, the present jack construction is adapted to permit manual adjustment to be effected at the will of the operator to limit the stroke of the actuating lever 18b to that required to effect lowering of the load supporting structure 14b. This results from the manual setting of a lever element 70 pivoted at 72 upon the structure 14b and having a cross limb 74 which, when disposed to extend across the top surface 76 of the structure 14b as seen in Figs. IX and XII, forms a stop to limit downward movement of the actuating lever 18b and confine the swinging movement thereof to that required to effect lowering of the structure 14b. Normally, however, the lever element 70 will be swung into a lowered position in which the arm 74 is removed from the path of travel of the actuating lever 18b and the same is free to swing through its full operating range to effect either raising or lowering of the load supporting structure 14b.

The construction of Figs. IX to XII has the advantage that the spring 50 can be symmetrically enclosed within the hollow pawls, it being noted that access to the spring, after installation, is not necessary and that the lever element 70 is not required to actuate the spring in any way.

I claim:

1. A vehicle jack comprising a toothed column, a load supporting structure mounted on said column for sliding movement therealong, and mechanism for effecting such sliding movement, said mechanism comprising an actuating lever pivoted to said structure, a first pawl engageable with the column teeth and fixedly pivoted about the lever pivot, a second pawl pivoted on said lever and also engageable with said column teeth in vertical spaced relation to said first pawl, and spring means interconnecting said first and second pawls for alternately urging one pawl or the other into operative engagement with the column as the actuating lever is moved to lift or lower the said structure, said spring connecting means including a link connection between the two pawls and being energized in consequence of said lever movement, and spring abutment

means mounted about said pivots so as to be responsive to movement thereof, for biasing said spring means and indirectly biasing said pawls with said lever in one position.

2. In a vehicle jack, a toothed column, a load supporting structure mounted upon said column for sliding movement therealong, a first pawl engageable with said column and a second pawl also engageable with said column in vertically spaced relation thereto, an actuating lever, a first pivot mounting said lever upon said load supporting structure, said first pawl being pivoted on said pivot; a second pivot, said second pivot being on said lever in spaced relation to said first pivot, said second pawl being pivoted on said second pivot, and said lever being swingable alternatively about said pivots, depending upon the lever being swung in a downward or in an upward direction from a starting position, a spring link connecting said pawls toward the ends thereof, remote from their pivots, a stop on said second pawl in operative association with said spring link to adjust the tension thereof with respect to the said pawls, and abutment means mounted about said pivots to partake of movement therewith, as one or the other of said pivots is raised or lowered with the swinging movement of the actuating lever, said abutment arresting column disengaging movement of the first pawl in the lifting of the load supporting structure and tensioning this pawl for re-engagement with the column with the dis-engagement of the second pawl from the column, said abutment being rendered inactive when the actuating lever is moved to lower the load supporting structure, the construction and arrangement being such that the pawls are automatically set for climbing up or down the column with movement of the actuating lever in one direction or in the opposite direction from a starting position.

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