Sept. 6, 1960 DE WITT M. VOLKERT 2,951,679

AUTOMATIC REVERSING JACK

Filed Dec. 11, 1958 3 Sheets-Sheet 1

Fig. 1.

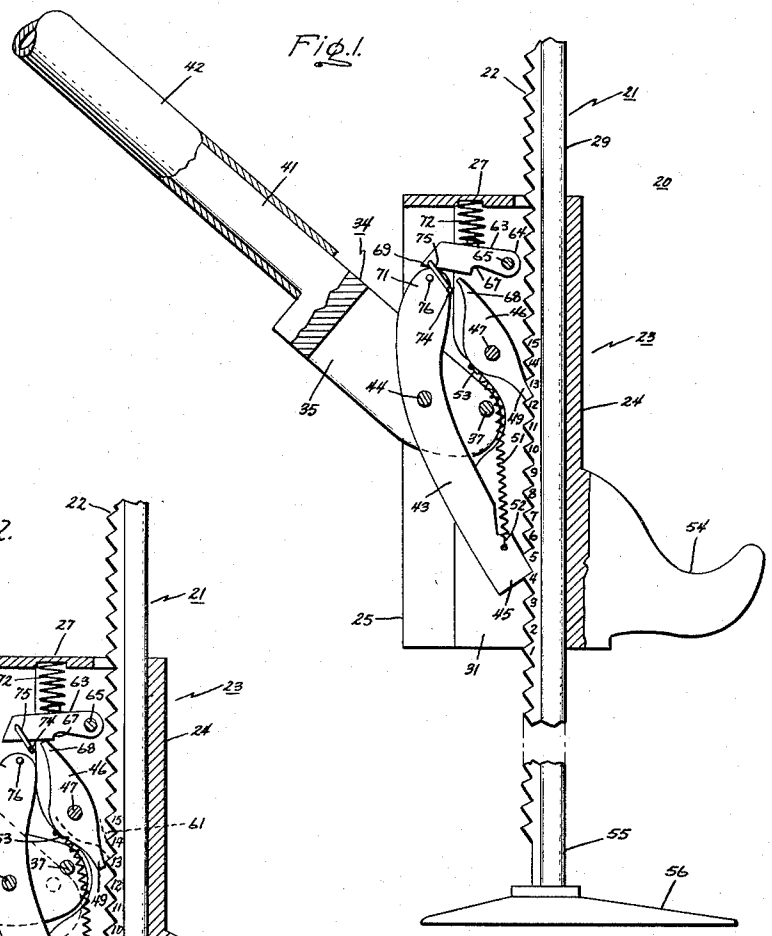
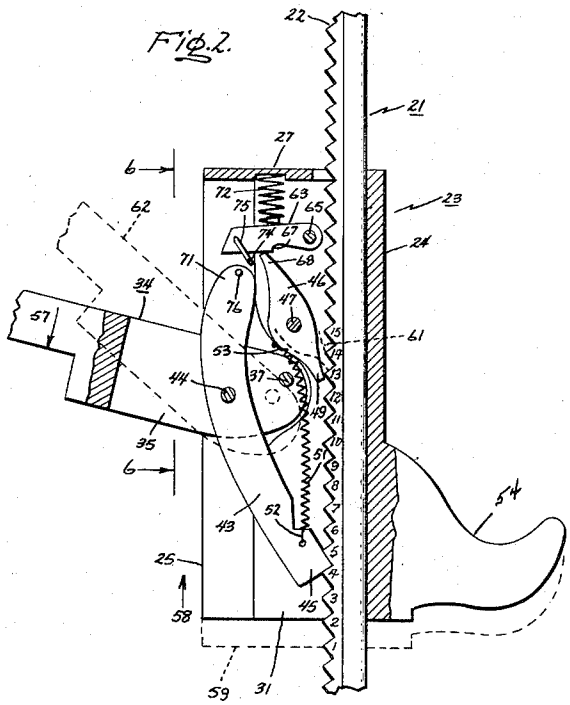


Fig. 2.



Inventor:
DeWitt M. Volkert,
by Gust & Dais
Attorneys.

Sept. 6, 1960 DE WITT M. VOLKERT 2,951,679

AUTOMATIC REVERSING JACK

Filed Dec. 11, 1958 3 Sheets-Sheet 2

Fig. 3.

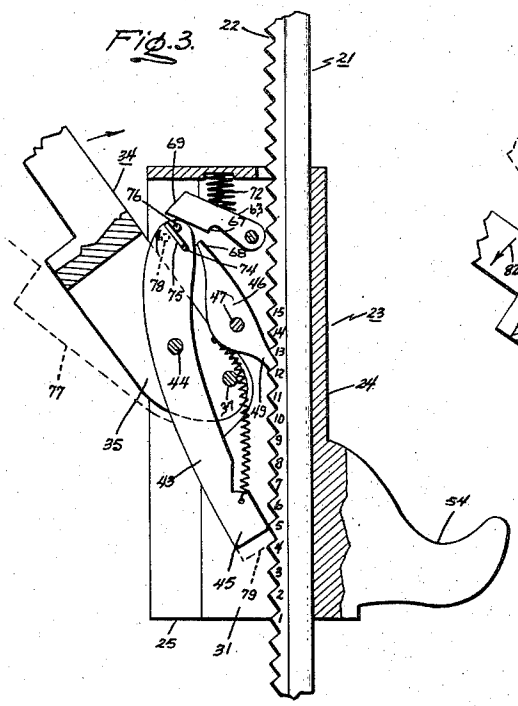


Fig. 4.

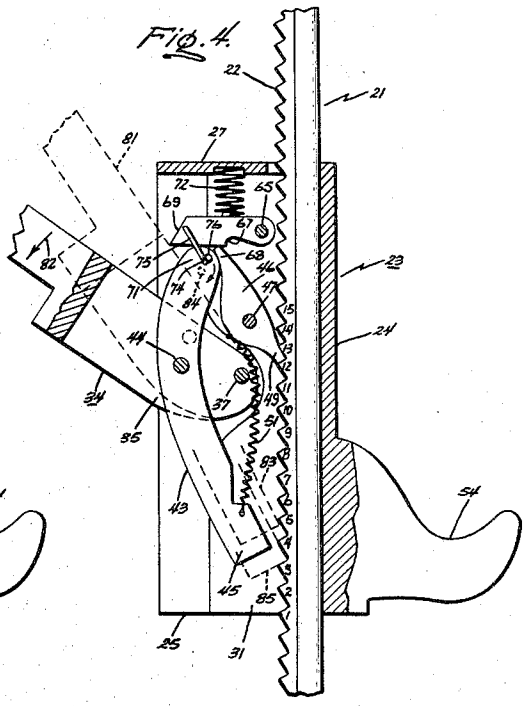
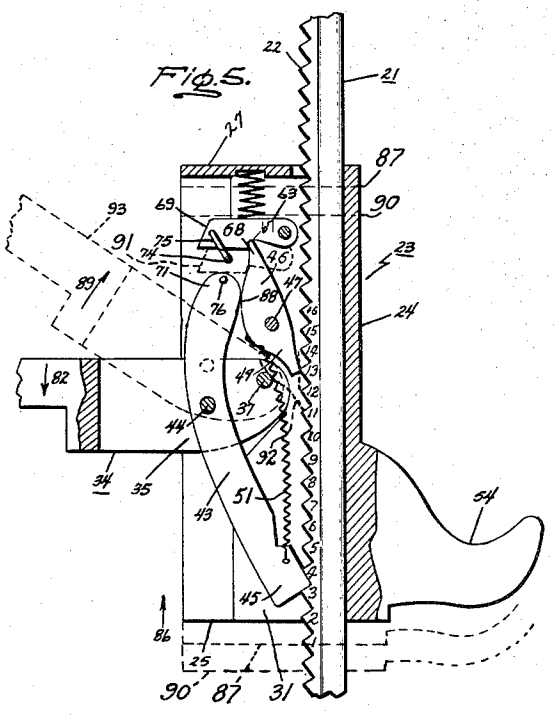


Fig. 5.



Inventor:
DeWitt M. Volkert,
by Just & Orisk
Attorneys.

Sept. 6, 1960 DE WITT M. VOLKERT 2,951,679

AUTOMATIC REVERSING JACK

Filed Dec. 11, 1958 3 Sheets-Sheet 3

Fig. 6.

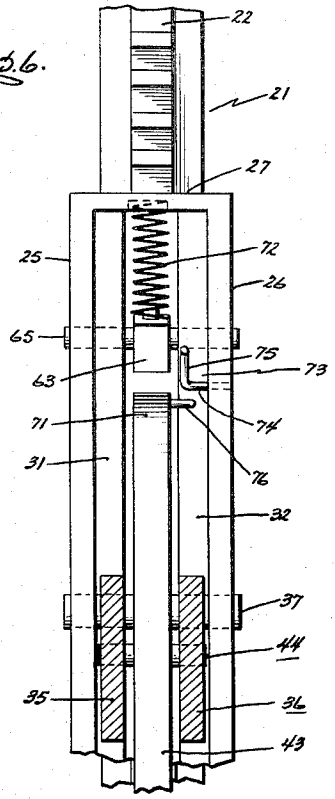
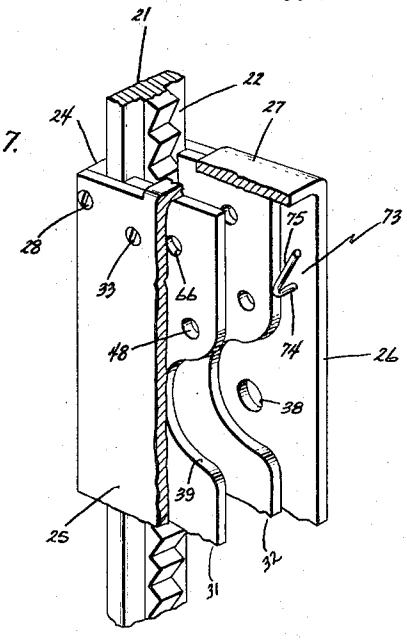


Fig. 7.



Inventor:
DeWitt M. Volkert,
by Gust & Orisk
Attorneys.

United States Patent Office 2,951,679 Patented Sept. 6, 1960

2,951,679

AUTOMATIC REVERSING JACK

De Witt M. Volkert, Grabill, Ind.

Filed Dec. 11, 1958, Ser. No. 779,685

4 Claims. (Cl. 254—111)

This invention relates generally to jacks, such as the type commonly employed for vehicular use, and more particularly to an automatic reversing jack construction.

Virtually all commercially available vehicular jacks, particularly of the bumper variety, known to the present applicant, have required manual actuation of a reversing lever in order to convert from raising to lowering operation. While jack constructions have been proposed in which reversing is effected automatically, i.e., which do not incorporate a manually actuated reversing lever, to the best of the present applicant's knowledge these constructions have been unduly complex and not suited for quantity production. It is therefore desirable to provide an automatic reversing jack construction which is simpler than prior arrangements and which incorporates a minimum number of readily assembled parts.

It is therefore an object of my invention to provide an improved automatic reversing jack construction.

Another object of my invention is to provide an improved automatic reversing jack construction incorporating a minimum number of readily assembled parts.

Further objects and advantages of my invention will become apparent by reference to the following description and the accompanying drawings, and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

My invention, in its broader aspects, provides an automatic reversing jack having an elongated toothed rack bar and a housing having a portion embracing the bar and being relatively slidable thereon. An actuating lever is provided pivotally mounted on the housing and a holding pawl is provided also pivotally mounted on the housing and being adapted to engage the teeth of the bar. A lifting pawl is provided pivotally mounted on the actuating lever and also adapted to engage the teeth of the bar and spring means urges the two pawls respectively into engagement with the teeth so that oscillation of the actuating lever between first and second intermediate positions alternately causes one pawl to engage a tooth and the other pawl to slide over one tooth and to engage the adjacent tooth, thereby moving the housing in one direction with respect to the bar. In order to provide automatic reversing operation, a latching member is provided pivotally mounted on the housing and having a portion adapted at times to engage the holding pawl thereby to hold the same out of engagement with the teeth of the bar. Means are provided cooperating with the lifting pawl causing the same to move out of engagement with one tooth and into engagement with another tooth of the bar responsive to movement of the actuating lever into and away from one extreme position. The lifting pawl is also adapted to move the holding pawl into engagement with the latching member responsive to movement of the lever to the other extreme position and the lifting pawl is further adapted to move the latching member out of engagement with the holding pawl responsive to movement of the lever away from the other extreme position so that oscillation of the

actuating lever between its extreme positions moves the housing in the opposite direction with respect to the bar.

In the drawings, Fig. 1 is a side-elevational view, partly in section, illustrating my improved reversing jack construction in its normal position;

Fig. 2 is another cross-sectional view illustrating the raising action of my improved jack construction;

Figs. 3, 4 and 5 are further cross-sectional views illustrating the lowering action of my improved jack construction;

Fig. 6 is a fragmentary end view of my jack construction viewed from the line 6—6 of Fig. 2; and

Fig. 7 is a fragmentary view in perspective, partly broken away, further illustrating my improved jack construction.

Referring now to the drawings, my improved jack construction, generally identified as **20**, includes an elongated, stationary, vertical rack bar **21** having upwardly facing rack teeth **22** formed on one side thereof, as shown. A housing member **23** is provided having an end wall **24** and spaced parallel side walls **25** and **26**. As best seen in Figs. 6 and 7, side walls **25** and **26** are preferably integrally joined by a top wall portion **27**; side walls **25** and **26** and top wall **27** may thus conveniently be integrally formed from suitable sheet steel, the end wall **24** being secured thereto in any suitable manner, as by threaded fastening members **28**, as shown. Rack bar **21** is arranged with its side **29** opposite from teeth **22** slidingly engaging the inner surface of the end wall **24** so that teeth **22** extend inwardly into the space between the side walls **25** and **26**, as shown. A pair of suitable bearing plates **31** and **32** are respectively arranged on the inner faces of the side walls **25** and **26** and secured thereto in any suitable manner, as by threaded fasteners **33**. The bearing plates **31** and **32** have their forward edges spaced from the end wall **24** thus retaining rack bar **21** with teeth **22** extending between the bearing plates **31** and **32**, as best seen in Figs. **6** and **7**.

The operating mechanism of my improved jack construciton includes an actuating lever **34** having a forked end with its arms **35** and **36** extending into the space between side walls **25** and **26** and being pivotally secured thereto by means of a pivot pin **37**; hole **38** in side wall **26** which accommodates pivot pin **37** is shown in Fig. 7, it being understood that a comparable aligned hole is provided in side wall **25**. It will be observed that bearing plates **31** and **32** respectively have cut-out portions **39** for accommodating arms **35** and **36** of actuating lever **34**. End **41** of actuating lever **34** extends out of housing **23** and is adapted to have a suitable jack handle **42** positioned thereon for manually oscillating actuating lever **34** up and down in order to actuate the operating mechanism, as will be hereinafter more fully described.

An elongated lifting pawl **43** is provided positioned between arms **35** and **36** of actuating lever **34** and being pivotally secured thereto by means of pivot pin **44**. Lifting pawl **43** has its lower end **45** arranged to engage the teeth **22** of rack bar **21**. A holding pawl **46** is provided positioned between bearing plates **31** and **32** on the side of actuating lever **34** remote from the lower end **45** of lifting pawl **43**, being pivotally secured between bearing plates **31** and **32** by means of a pivot pin **47**; pivot pin **47** is respectively seated in aligned holes **48** extending through the respective side walls and bearing members **25** and **31**, and **26** and **32**, as shown in Fig. 7. Holding pawl **46** has its lower end **49** adapted to engage teeth **22** of rack bar **21** as shown. A coil spring **51** is provided having its lower end **52** secured to lower end **45** of lifting pawl **43** and its upper end **53** secured to holding pawl **46**, spring **51** passing over pivot pin **37** of actuating lever **34** as shown; coil spring **51** thus urges lower ends

45 and 49 of lifting and holding pawls 43 and 46 into engagement with corresponding teeth 22 of rack bar 21.

Front wall 24 of housing member 23 is provided with a suitable lifting shoulder 54 adapted to engage an automotive bumper and the lower end 55 of rack bar 21 is seated in a suitable base member 56, as is well known in the art. It will now be readily understood that housing 23 together with its lifting shoulder 54 is raised and lowered relative to rack bar 21 by suitable action of actuating lever 34 and the operation of the lifting and holding pawls 43 and 46, as will now be described.

The raising action of my improved jack construction will now be described by reference to Figs. 1 and 2. Referring momentarily to Fig. 1, in which the normal position of the operating mechanism is shown, it will be observed that the lower end 45 of lifting pawl 43 is in engagement with tooth 4 whereas the lower end 49 of holding pawl 46 is in engagement with tooth 12. Referring now additionally to Fig. 2, it will be seen that lowering of actuating lever 34 in the direction shown by the arrow 57 causes lifting pawl 43 to raise the housing 23 in the direction shown by the arrow 58 from the position shown in dashed lines 59 in Fig. 2 to the position shown in solid lines. Raising of the housing 23 responsive to downward movement of actuating lever 34 causes end 49 of holding pawl 46 to slide upwardly along the bottom side of tooth 13, as shown in solid lines in Fig. 2, and eventually to snap into and engage tooth 13, as shown in dashed lines 61 in Fig. 2. Return of the actuating lever 34 to its normal position, as shown in dashed lines 62 in Fig. 2 will then cause end 45 of lifting pawl 43 to slide upwardly along the lower surface of tooth 5 and eventually snap into and engage tooth 5 so that at the conclusion of the upward movement of actuating lever 34, the lifting and holding pawls 43 and 46 are in the same position as shown in Fig. 1, being respectively in engagement with teeth 5 and 13, however. It is thus seen that each oscillation of actuating lever 34 between first and second intermediate positions as shown in Figs. 1 and 2 is accompanied by raising of the housing member 23 one tooth.

In order to provide for automatic reversing of my jack mechanism from raising to lowering operation, I provide a latching member 63 positioned between bearing plates 31 and 32 with its end 64 pivotally connected thereto by a pivot pin 65 having its ends seated in holes 66 in the side wall 25 and bearing plate 31, and side wall 26 and bearing plate 32, as best seen in Fig. 7. Latching member 63 extends outwardly between bearing plates 31 and 32 away from teeth 22 of rack bar 21 and has a notch 67 provided in its lower side for at times engaging end 68 of holding pawl 46, as will be hereinafter more fully described. Outer end 69 of latching member 63 is also adapted at times to engage the upper end 71 of lifting pawl 43, as will be hereinafter described. Latching member 63 is urged toward the upper ends 68 and 71 of holding and lifting pawls 46 and 43 by means of a suitable coil spring 72 arranged between the upper side of latching member 63 and the lower side of top wall portion 27, as shown.

I have further provided an elongated cam member 73 having one end 74 secured to side wall 26 outwardly from bearing plate 32 and having its other end 75 extending in spaced parallel relationship from the inner surface of side wall 26. It will further be observed that the free end 75 of the cam member 73, which is rod-like in shape, is inclined outwardly and upwardly away from the outer edge of the bearing plate 32. A cam follower pin 76 is secured to the upper end 71 of lifting pawl 43 extending toward the inner surface of side wall 26 and cooperating with the cam member 73, as will now be described.

Referring now to Figs. 3, 4, and 5, in order to convert from lifting to lowering operation, actuating lever 34 is moved upwardly from its normal position, as shown in dashed lines 77 in Fig. 3 to its extreme upper position, as shown in solid lines in Fig. 3. This upward movement of the actuating lever 34 from its normal to its extreme upward position is accompanied by upward movement of the lifting pawl 43. Close to the end of the upward stroke of actuating lever 34, the cam follower pin 76 engages the lower surface of free end 75 of cam member 73 and passes upwardly over the end to engage the upper surface thereof, i.e., from the position shown in dashed lines 78 to that shown in solid lines in Fig. 3. This motion is accompanied by raising of the lower end 45 of the pawl 43 along the underside of tooth 5 from the position shown in dashed lines 79 to that shown in solid lines in Fig. 3. It will be observed, however, that during this operation, lower end 49 of holding pawl 46 is still in engagement with tooth 12 thus retaining housing member 23 in its normal position. It will also be observed that the upper end 71 of lifting pawl 43 has engaged end 69 of latching member 63 and raised the same thus compressing coil spring 72, however, at this point, this action is only incidental.

Referring now specifically to Fig. 4, lowering of the actuating lever 34 from its extreme upward position, as shown in dashed lines 81 in Fig. 4 in the direction shown by the arrow 82 causes the cam follower pin 76 to move along the upper surface of free end 75 of cam follower member 73 thus pivoting lifting pawl 43 about its pivot pin 44 thereby moving its lower end 45 from the position of Fig. 3, shown in dashed lines 83 in Fig. 4 to a position away from teeth 22 as shown in solid lines in Fig. 4. Continued downward movement of actuating lever 34 in the direction 82 causes the cam follower pin 76 on upper end 71 of lifting pawl 43 to pass over the end 74 of cam member 73 to the position shown in dashed lines 84 in Fig. 4. With the upper end 71 of the lifting pawl 43 thus no longer restrained by cooperative engagement of cam follower pin 76 with free end 75 of cam member 73, lower end 45 will now, under the influence of coil spring 51, snap into engagement with the underside of tooth 4 and continued downward movement of actuating lever 34 in the direction 82 will result in lower end 45 of lifting pawl 43 being firmly engaged with the next lower tooth 3, as shown in dashed lines 85 in Fig. 4. It will now be seen that as a result of moving actuating lever upwardly to its extreme upward position and thereafter lowering the same, lifting pawl 43 will be disengaged from tooth 4 and reengaged with tooth 3, lower end 49 of holding pawl 46, however, at this point still remaining in engagement with tooth 12.

Referring now particularly to Fig. 5, continued downward movement of actuating lever 34 in the direction 82 to its extreme lower position as shown in solid lines in Fig. 5, causes the lifting pawl 43 to move housing 23 upwardly in the direction shown by the arrow 86 from the position shown in the dashed lines 87 in Fig. 5 to the position shown in solid lines. This upward movement of housing 23 causes the upper end 71 of lifting pawl 43 to engage surface 88 of holding pawl 46 intermediate its end 68 and its pivot 47 thus camming holding pawl 46 about pivot pin 47 so that its end 68 snaps into engagement with notch 67 of latching member 63, latching member 63 being urged downwardly by coil spring 72 so that end 68 of holding pawl 46 is retained in notch 67 under the influence of coil spring 51. It will now be observed that the lower end 49 of holding pawl 46 has been moved upwardly away from tooth 12, however, the lower end 45 of lifting pawl 43 is still firmly in engagement with tooth 3.

Upward movement of actuating lever 34 in the direction shown by arrow 89 away from its extreme lower position shown in solid lines to its position shown in dashed lines 93 in Fig. 5 results in again lowering housing 23 to a lower position shown in dashed lines 90. The initial downward movement of housing 23 and simultaneous upward movement of lifting pawl 43 responsive to upward movement of actuating lever 44 results in upper

end 71 of lifting pawl 43 moving into engagement with the underside of end 69 of latching member 63, as shown in dashed lines 91 in Fig. 5 when the housing 23 has lowered to about the position shown in dashed lines 87. Further downward movement of housing 23 and simultaneous upward movement of lifting pawl 43 results in lifting pawl 43 pivoting latching member 63 upwardly about pivot pin 65 against coil spring 72 until latching member 63 assumes nearly the position shown in Fig. 3 when housing 23 is lowered to the position shown in dashed lines 90. This upward pivoting of latching member 63 results in disengagement of notch 67 from upper end 68 of holding pawl 46. By virtue of the fact that lower end 45 of lifting pawl 43 is now in engagement with tooth 3 and housing 23 has been lowered to the position shown in dashed lines 90 in Fig. 5, lower end 49 of holding pawl 46 now snaps into engagement with tooth 11 as shown in dashed lines 92 in Fig. 5. It will be observed that the condition now existing, i.e., with actuating lever 34 in the position shown in dashed lines 93 in Fig. 5 with the lower ends 45 and 49 of lifting and holding pawls 43 and 46 in engagement with teeth 3 and 11 and with the upper end 71 of lifting pawl 43 in engagement with end 69 of latching member 63 is exactly the same as the position of the mechanism shown in Fig. 1, with, however, the lower ends of the pawls respectively engaging one lower tooth, i.e., 3 and 11. Still further, upward movement of actuating lever 34 to the position shown in solid lines in Fig. 3 results in pin 76 again engaging the lower surface of end 75 of cam 73, as shown in Fig. 3, thereby to initiate the next lowering cycle. It is thus seen that by virtue of one complete oscillation of operating lever 34 between its upper and lower extreme positions the housing member 23 is lowered by one tooth.

It will now be readily seen that raising or lifting action of my improved jack construction is accomplished by oscillatory motion of the actuating lever 34 between intermediate positions, i.e., short strokes of the jack handle 42, and that conversion to lowering action is accomplished merely by changing from the short intermediate strokes to long full strokes, thus oscillating the actuating lever 34 between its extreme upper and lower positions. Conversion from lowering to lifting action is accomplished in the same manner, i.e., by merely converting from long full strokes to short intermediate strokes of jack handle 42.

While I have illustrated a jack construction in which the rack bar 21 is stationary with the housing and operating mechanism assembly being moved upwardly and downwardly with respect to the bar, it will be readily apparent that the mechanism can readily be inverted with the housing having a base secured thereto and with the rack bar 21 being moved upwardly and downwardly by the operating mechanism; in this case, the upper end of the rack bar 21 will have a suitable pad secured thereto, as is well known in the art. Also, while my invention has been illustrated as specifically embodied in a vehicular-type jack, it will be readily comprehended that it is equally advantageously employed in other types of jacks.

It will now be seen that I have provided a simple automatically reversible jack construction incorporating only three major operating components, i.e., the lifting and hold pawls and the latching member, two springs, and the cooperating cam member and cam follower pin. It is thus seen that my jack construction is readily assembled and thus lends itself to quantity production.

While I have illustrated and described a specific embodiment of my invention, further modifications and improvements will occur to those skilled in the art and I desire, therefore, in the appended claims to cover all modifications which do not depart from the spirit and scope of this invention.

What is claimed is:

1. An automatic reversing jack comprising: an elongated toothed rack bar; a housing having a portion embracing said bar and relatively slidable thereon; an actuating lever pivotally mounted on said housing for manual oscillation between first and second extreme positions through first and second intermediate positions; a holding pawl pivotally mounted on said housing and having an end adapted to engage the teeth of said bar; a lifting pawl pivotally mounted on said lever and having an end adapted to engage said teeth; spring means urging said pawls into engagement with said teeth whereby oscillation of said lever between said first and second intermediate positions alternately causes one pawl to engage a tooth and the other pawl to slide over one tooth and to engage the next tooth thereby moving said housing in one direction with respect to said bar; a latching member pivotally mounted on said housing and having a portion adapted at times to engage said holding pawl thereby to hold the same out of engagement with said teeth; and means cooperating with said lifting pawl for causing the same to move out of engagement with one tooth and into engagement with another tooth responsive to movement of said lever into and away from one of said extreme positions; said lifting pawl being adapted to move said holding pawl into engagement with said latching member responsive to movement of said lever to the other of said extreme positions; said lifting pawl being further adapted to move said latching member out of engagement with said holding pawl responsive to movement of said lever away from said other extreme position whereby oscillation of said lever between said extreme positions moves said housing in the opposite direction with respect to said bar.

2. An automatic reversing jack comprising: an elongated toothed rack bar; a housing having a portion embracing said bar and relatively slidable thereon; an actuating lever pivotally mounted on said housing for manual oscillation between first and second extreme positions through first and second intermediate positions; a holding pawl pivotally mounted on said housing and having an end adapted to engage the teeth of said bar; a lifting pawl pivotally mounted on said lever and having an end adapted to engage said teeth; spring means urging said pawls into engagement with said teeth whereby oscillation of said lever between said first and second intermediate positions alternately causes one pawl to engage a tooth and the other pawl to slide over one tooth and to engage the next tooth thereby moving said housing in one direction with respect to said bar; a latching member pivotally mounted on said housing and having a portion adapted at times to engage said holding pawl thereby to hold the same out of engagement with said teeth; a cam member on said housing; and a cam follower member on said lifting pawl cooperatively engageable with said cam member responsive to movement of said lever to one of said extreme positions, said cam follower member cooperatively engaging said cam member during movement of said lever away from said one extreme position thereby causing said one end of said lifting pawl to move out of engagement with one tooth and to reengage an adjacent tooth; said lifting pawl being adapted to move said holding pawl into engagement with said latching member responsive to movement of said lever to the other of said extreme positions; said lifting pawl being further adapted to move said latching member out of engagement with said holding pawl responsive to movement of said lever away from said other extreme position whereby oscillation of said lever between said extreme positions moves said housing in the opposite direction with respect to said bar.

3. An automatic reversing jack comprising; an elongated toothed rack bar; a housing having a portion embracing said bar and relatively slidable thereon; an actuating lever pivotally mounted on said housing for manual oscillation between first and second extreme positions through first and second intermediate positions; a hold-

ing pawl pivotally mounted on said housing and having an end adapted to engage the teeth of said bar; a lifting pawl pivotally mounted on said lever and having an end adapted to engage said teeth; spring means urging said pawls into engagement with said teeth whereby oscillation of said lever between said first and second intermediate positions alternately causes one pawl to engage a tooth and the other pawl to slide over one tooth and to engage the next tooth thereby moving said housing in one direction with respect to said bar; a latching member pivotally mounted on said housing and having a portion adapted at times to engage said holding pawl thereby to hold the same out of engagement with said teeth; an elongated rod-like cam member having one end secured to said housing and its other end extending in spaced parallel relationship therewith; and a cam follower pin extending outwardly from said lifting pawl, said pin initially engaging one side of said other end of said cam member and moving thereover onto the other side thereof responsive to movement of said lever to one of said extreme positions, said pin initially following said other side of said other end of said cam member and thereafter disengaging the same responsive to movement of said lever away from said one extreme position thereby causing said one end of said lifting pawl to move out of engagement with one tooth and to reengage an adjacent tooth; said lifting pawl being adapted to move said holding pawl into engagement with said latching member responsive to movement of said lever to the other of said extreme positions; said lifting pawl being further adapted to move said latching member out of engagement with said holding pawl responsive to movement of said lever away from said other extreme position whereby oscillation of said lever between said extreme positions moves said housing in the opposite direction with respect to said bar.

4. An automatic reversing jack comprising: an elongated toothed rack bar; a housing having a portion embracing said bar and relatively slidable thereon; an actuating lever having one end pivotally connected to said housing and having its other end extending out of said housing and adapted to be manually oscillated between first and second extreme positions through first and second intermediate positions; a lifting pawl pivotally connected intermediate its ends to said lever at a point eccentric with respect to the connection of said lever to said housing, said lifting pawl having one end adapted to engage the teeth of said bar; a holding pawl pivotally connected intermediate its ends to said housing and having one end adapted to engage said teeth; spring means urging said pawls into engagement with said teeth whereby oscillation of said lever between said first and second intermediate positions alternately causes one pawl to engage a tooth and the other pawl to slide over one tooth and to engage the next tooth thereby moving said housing in one direction with respect to said bar; a latching member having one end pivotally connected to said housing and having a portion adapted at times to engage the other end of said holding pawl thereby to hold said one end thereof out of engagement with said teeth; a cam member on said housing; a cam follower member on the other end of said lifting pawl cooperatively engageable with said cam member responsive to movement of said lever to said first extreme position, said cam follower member cooperatively engaging said cam member during movement of said lever away from said first extreme position thereby causing said one end of said lifting pawl to move out of engagement with one tooth and to reengage an adjacent tooth; said other end of said lifting pawl being adapted to engage said holding pawl and to move the same so that the other end thereof engages said latching member portion responsive to movement of said lever to the second extreme position; said other end of said lifting pawl being further adapted to engage the other end of said latching member and to move the same out of engagement with the other end of said holding pawl responsive to movement of said lever away from said other extreme position whereby oscillation of said lever between said extreme positions moves said housing in the opposite direction with respect to said bar.

References Cited in the file of this patent

UNITED STATES PATENTS

2,450,596	Kais	Oct. 5, 1948
2,674,893	De Orlow	Apr. 13, 1954