Sept. 14, 1965 D. M. GOLDZWIG ETAL 3,205,977

FRAME CONTACT LIFT

Filed June 9, 1961 3 Sheets-Sheet 1

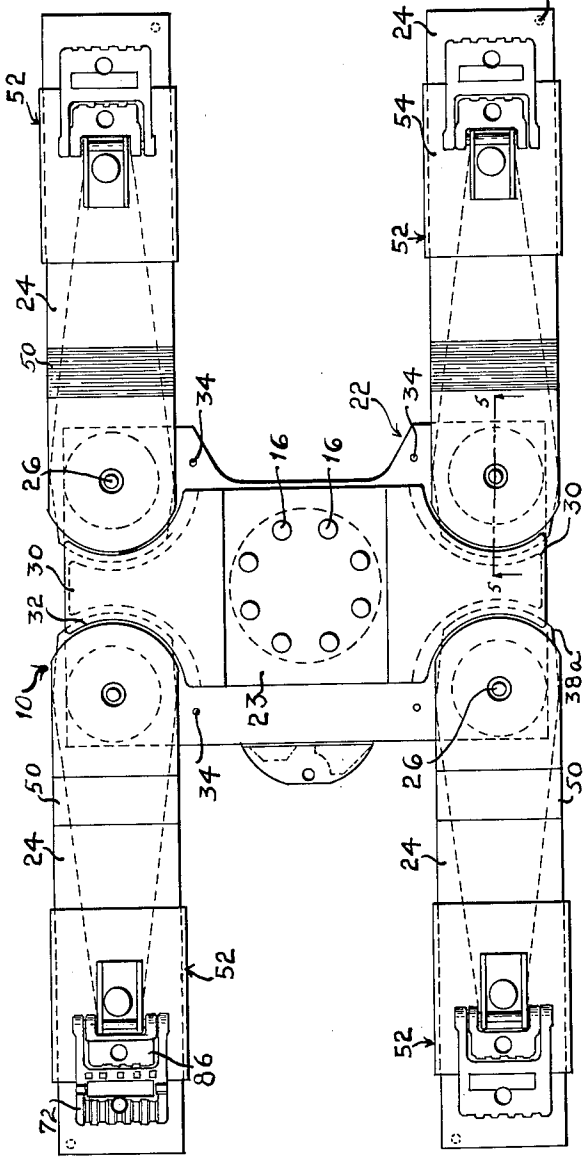


FIG. 1

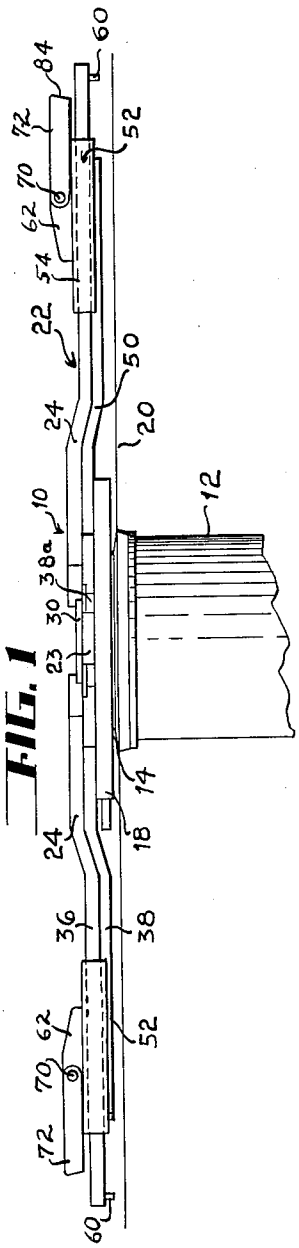


FIG. 2

INVENTORS
DAVID M. GOLDZWIG
DONALD C. DUFFY

BY Dybwig and Dybwig

THEIR ATTORNEYS

Sept. 14, 1965 D. M. GOLDZWIG ETAL 3,205,977

FRAME CONTACT LIFT

Filed June 9, 1961 3 Sheets-Sheet 2

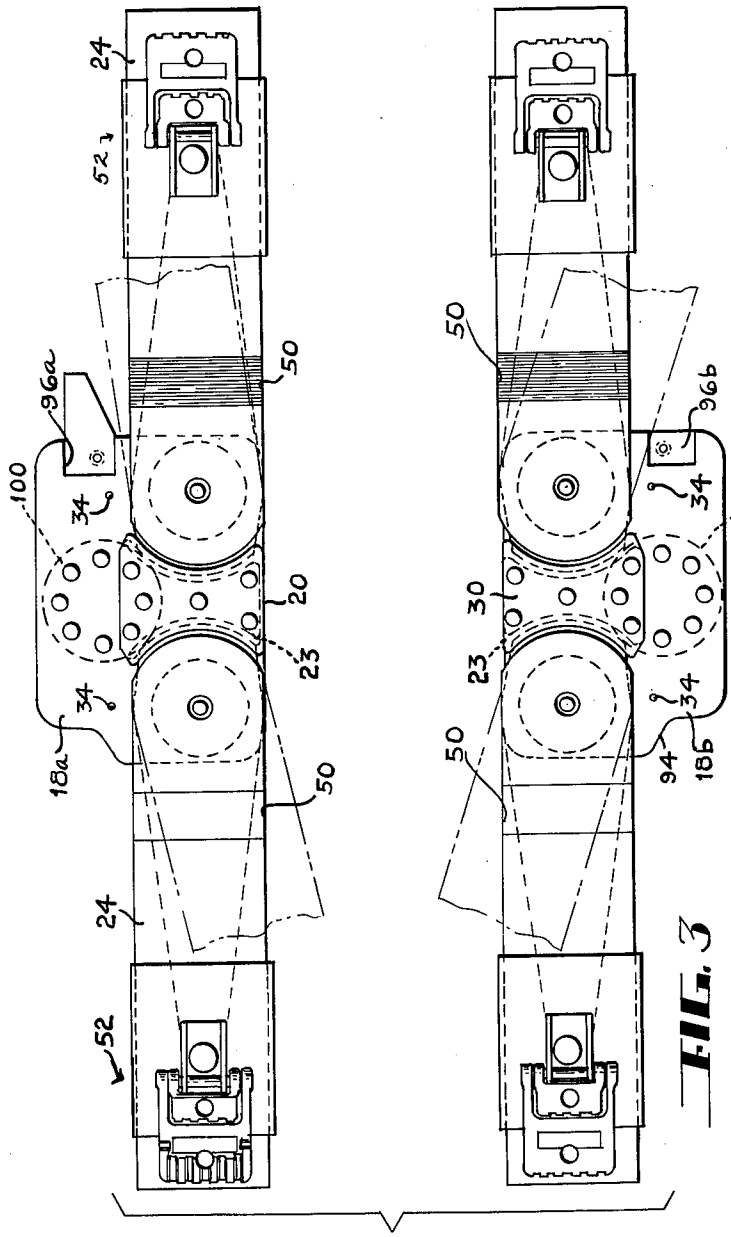


FIG. 3

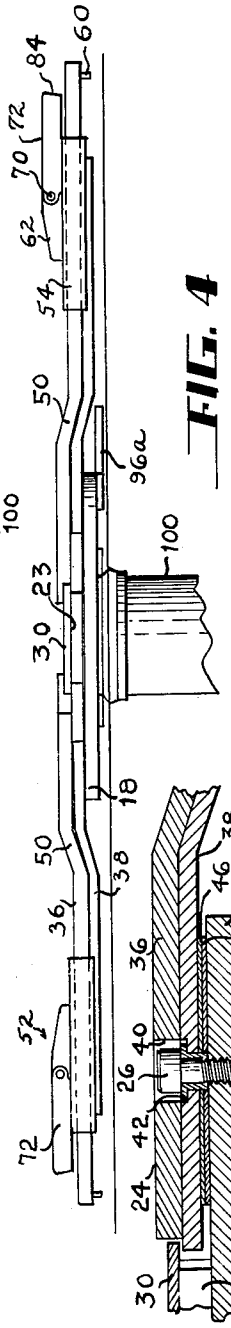


FIG. 4

FIG. 5

INVENTOR.
DAVID M. GOLDZWIG
DONALD C. DUFFY

BY Dybwig and Dybwig

THEIR ATTORNEYS

Sept. 14, 1965 D. M. GOLDZWIG ETAL 3,205,977

FRAME CONTACT LIFT

Filed June 9, 1961 3 Sheets-Sheet 3

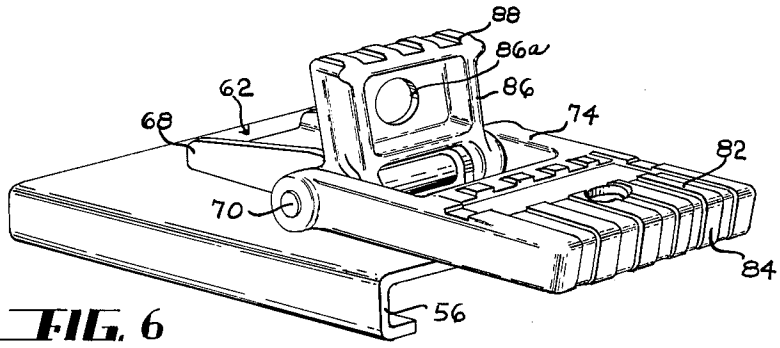


FIG. 6

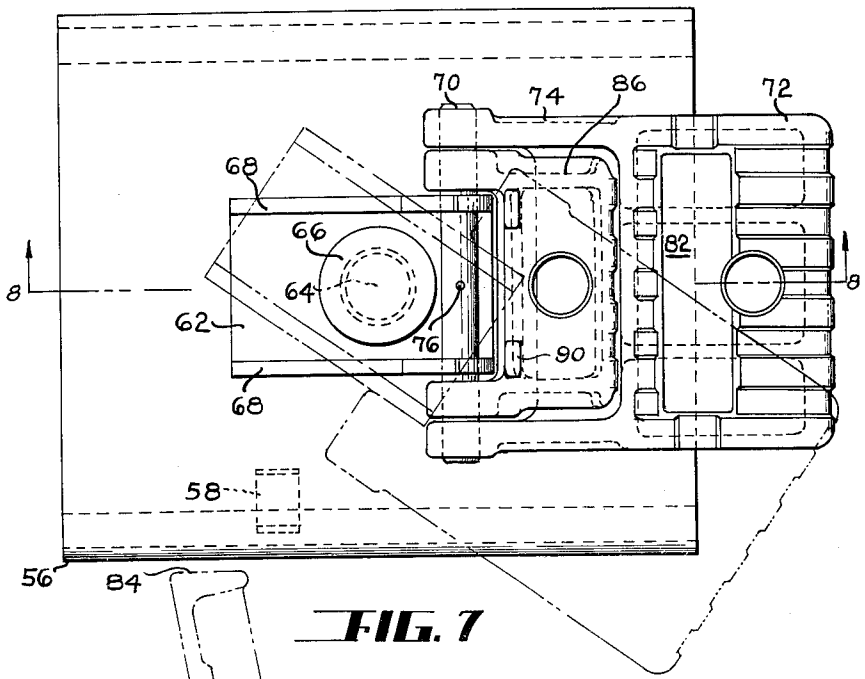


FIG. 7

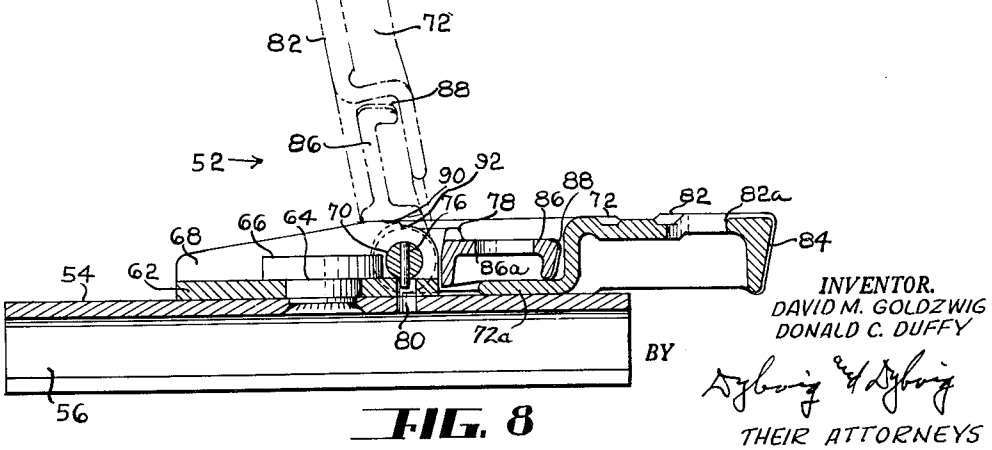


FIG. 8

INVENTOR.
DAVID M. GOLDZWIG
DONALD C. DUFFY

BY

Dyborig & Dyborig

THEIR ATTORNEYS

United States Patent Office 3,205,977 Patented Sept. 14, 1965

3,205,977

FRAME CONTACT LIFT

David M. Goldzwig and Donald C. Duffy, Dayton, Ohio, assignors to The Joyce-Cridland Company, Dayton, Ohio, a corporation of Ohio

Filed June 9, 1961, Ser. No. 116,139
2 Claims. (Cl. 187—8.75)

This invention relates to frame contact lifts of the type employing a plurality of support rails pivotally connected to a lift member.

An object of this invention is to provide an improved lift of the type adapted to engage the frame or other portions of an automobile.

In recent years, automotive lifts adapted to engage the frames of automobiles have become widely accepted. Frame contact lifts have been found superior to the roll-on or drive-on lifts since the springs of an automobile when raised by frame contact lifts are released from tension. The automobile may thus be more easily and more thoroughly lubricated. To accommodate the numerous sizes of automobiles presently in use, frame contact lifts have been developed employing lift rails pivotally mounted on plates attached to hydraulic lift posts. Normally, in a lift installation there are four lift rails each having an adapter slidable thereon for engaging portions of an automobile frame. The structure comprising a base plate attached to the top of a hydraulic or semi-hydraulic post, the rails pivoted thereto and the slidable adapters is termed a superstructure.

The present trend in automotive design indicates that automobile frames will become nearer to the ground. With some makes of automobiles, portions of the underbodies extend only 4 or 5 inches above the ground. Because the underbodies of modern automobiles are so low, it is necessary that the superstructures of frame contact lifts be as low as possible when the lift is in its lowest position. At the present time, lifts are commercially available that are only 4½ to 5½ inches above the ground when in a lowered position. Even with such low lifts, the superstructures are still too high for some automobiles, especially some models of sports cars. When it is desired to raise such a sports car by a frame contact lift, means to elevate the sports car with respect to the lift as it is being driven over the lift must often be provided. This, of course, is time consuming and bothersome.

Accordingly, a further object of this invention is to lower the height of the superstructure of a frame contact lift so that the lift may be used with practically all cars that are available today. Generally, there is little difficulty with the height of the base plate and the pivoted lift rails. The height difficulty is primarily encountered in the height of the slidable adapters since the adapters necessarily project above the rails upon which they slide. As will be discussed in greater detail below, the overall height of the superstructure is lowered in accordance with this invention by vertically lowering the portion of the rails upon which the adapters slide and by minimizing the height of the adapters.

A further object of this invention is to provide an improved adapter.

A further problem encountered in frame contact lifts resides in the manner of mounting the pivotal rails to the base plate or plates. To be effective, the rails must be freely pivotal when not engaged with the frame of an automobile. At the same time, the pivotal mounting must be as low as possible. When used in service stations and garages, the mounting may become dirty whereupon the rails would tend to bind and become immovable.

In the past, the problem has existed of providing a suitable pivotal mounting having a long life that is yet inexpensive to manufacture.

Accordingly, still another object of this invention is to provide an improved structure for pivotally mounting the lift rails on the base plate or plates.

Other objects and advantages reside in the construction of parts, the combination thereof, the method of manufacture and the mode of operation, as will become more apparent from the following description.

Referring to the drawings:

FIGURE 1 is a plan view of a lift made in accordance with this invention employing a single base plate mounted on a single lift post.

FIGURE 2 is a side elevational view of the lift of FIGURE 1.

FIGURE 3 is a plan view of a lift installation made in accordance with this invention employing a pair of base plates mounted on a pair of lift posts.

FIGURE 4 is a side elevational view of the lift installation of FIGURE 3.

FIGURE 5 is a cross-sectional view taken along line 5—5 of FIGURE 1 of an improved structure for pivotally mounting the load supporting rails on the base plate.

FIGURE 6 is a perspective view of an improved adapter made in accordance with this invention.

FIGURE 7 is a plan view of the adapter of FIGURE 6.

FIGURE 8 is a cross-sectional view of the adapter taken along line 8—8 of FIGURE 7.

Referring to FIGURES 1 and 2, a frame contact lift **10** made in accordance with this invention is illustrated. The lift **10** includes the usual casing or cylinder **12** submerged within a floor, designated **20**. The cylinder **12** slidably receives a piston or plunger **14** which supports a base plate **18** of a superstructure, generally designated **22**. The base plate **18** is rigidly attached to the top of the plunger **14** by bolts **16** in a manner well known in the art. In operation, hydraulic fluid within the casing **12** reciprocates the plunger or piston **14** up and down to raise and lower automobiles placed over the lift. The casing **12** and piston **14**, by convention, are collectively termed a lift post.

The superstructure **22** includes the base plate **18**, an intermediate or filler plate **23** and a plurality of lift rails **24** pivotally mounted at the corners of the base plate **18** by means of pivot pins **26**. A pair of cover plates **30** are welded to opposed side portions of the top surface of the filler plate **23** and the base plate **18**. The corners of the filler plate **23** are provided with arcuate cutout portions inwardly of the edges of the cover plates **30**. Therefore, the arcuate edge portions of the cover plates **30** project beyond the edges of the filler plate **23** to form overhanging lips **32**. Each of the arcuate edges in the filler and cover plates **23**, **30** form arcs having their centers at the pivotal axis about which the rails **24** are swingable. The pair of cover plates **30** could be integral, thus formed as one plate extending the entire length of the base plate. However, the added metal is unnecessary and, when lifting some types of vehicles, the center of the superstructure **22** is desirably as low as the rails **24**.

Each of the rails **24** comprises an elongate upper plate member **36** and an elongate lower plate member **38** welded together. The lower plate members **38** constitute reinforcing plates which are substantially as wide as the upper plate members **36** near their inner ends but taper or diminish toward the outer ends of the rails **24**. The extreme inner ends of the plate members **38** taper slightly and are rounded to form arcuate inner edges **38***a* concentric with the arcuate edge portions of the filler plate **23**.

The edges 38*a* project under the overhanging lips 32. As shown best in FIGURE 2, the outer ends of the plates 38 terminate short of the outer ends of the upper plates 36.

The structure for mounting the rails 24 upon the base plate 18 is illustrated in FIGURE 5. Since the mounting for each of the rails 24 is identical, only one will be described. The upper plate member 36 is provided with a circular aperture 40 while the plate member 38 is provided with a counterbored circular aperture concentric with but of a smaller diameter than the aperture 40. A case-hardened bushing 42 is mounted in the counterbored aperture in the plate member 38 and rests upon the base plate 18. The pivot pin 26, which may be a bolt as shown in FIGURE 5, projects through the aperture 40 and the bushing 42 and is in threaded engagement with an aperture in the base plate 18. Thus, the reinforcing plate 38 and the upper plate 36 welded thereto pivot about the pin 26 and the bushing 42. A pair of anti-friction discs 44, 46, which are provided with central apertures through which the lower portion of the bushing 42 projects, are sandwiched between the top surface of the base plate 18 and the bottom surface of the reinforcing plate 38. The anti-friction discs may be composed of nylon or a similar anti-friction plastic. Alternatively, one anti-friction disc may be tin plated steel while the other may be bronze. These discs may be as thin as 1/32" and accordingly do not appreciably raise the height of the rails 24 above the base plate 18. The base member 18 and the reinforcing plate 38 are made from hot rolled steel and therefore normally have a considerable amount of surface disparity due to the mill scale on their surfaces. The anti-friction disc installation illustrated in FIGURE 5 has a special value when used with hot rolled steel since the top surface of the disc 46 is effectively locked to the bottom surface of the plate 38 due to the interengagement of the mill scale and other surface disparity of the plate 38 with the relatively soft top surface of the disc 46. The disc 44 is similarly effectively locked to the top surface of the base plate 18. When the rails 24 are pivoted, there is a sliding or pivotal engagement between the two smooth mating surfaces of the discs 44, 46. The bushing 42 is made sufficiently large that the pin 26 cannot force the pivot assembly including the plate 38, the anti-friction discs 44, 46 and the base plate 18 into binding engagement. Since the bushing is case-hardened, the pivot assembly has a long useful life.

The pivot construction described above is much cheaper than many constructions used in the past yet has as long or longer life than many prior constructions. For example, spring loaded roller elements have been used to provide a freely sliding contact between the base member and the rails pivoted thereon. In use, however, the roller elements may become dirty or the springs may become rusted or wear out. If so, the rollers bind and it is very difficult to pivot the arms. In another prior art lift, a bearing ring is placed between the lift rail and the base plate. The opposed surfaces of the base plate and the lift rail are machined and polished to provide a seat for the ring. With the construction illustrated in FIGURE 5, however, machining of the reinforcing plate and the base plate is not only unnecessary, it would be undesirable. Since the mating surfaces of the two discs 44 and 46 are both polished, there is little opportunity for dirt or grit to become lodged between the discs. Even if particles should become lodged between the discs, the particles will become embedded in the comparatively soft surfaces of the discs whereupon there is substantially no impediment to the free sliding or pivoting characteristics of the discs.

The inner portion of each rail 24 extends horizontally over the corners of the base plate but each rail 24 is bent or angularly deflected downwardly at an intermediate portion, designated 50, so that the greater portion of each rail lies in a horizontal plane that is vertically lower than the horizontal plane of its inner portion. That is, the top surface of the inner end portion of each rail occupies one horizontal plane while the top surface of its outer end portion occupies a vertically lower horizontal plane. Desirably, the bent portion 50 of each rail is as close to the base plate as possible so that an adapter mounted thereon, which will be described in greater detail below, may slide over the greater portion of the rail. However, it is further desired that the rails may pivot through at least approximately 45° between limits determined by a plurality of stop pins 34 projecting upwardly from the base plate 18, there being one stop pin 34 adjacent each rail 24. If the bent portions 50 were immediately adjacent the edge of the base plate 18, pivotal movement of the lift rails 24 would be unduly restricted. Therefore, the bent portions 50 are spaced outwardly from the edges of the base plate 18 as clearly shown in FIGURES 1 and 2.

The outer portions of the lift rails 24 may be made vertically lower than the inner portions in numerous ways. Presently, however, the simplest procedure appears to be that of bending the plates 36 and 38 as described above. There are, of course, problems encountered in bending a lift rail of sufficient thickness to support a motor vehicle. Desirably, to insure accurate alignment between the plates 36 and 38, each pair of plates are bent together in a suitable press. To avoid destruction of the weld between the plates 36 and 38 while being bent, the following method is practiced. A pair of initially planar elongate plate members 36 and 38 are superimposed in face-to-face contact over a substantial length of both plates as illustrated in FIGURES 1 through 4. The plates are then welded at only a small portion thereof. For example, a small arc weld could be placed at the inner end of the plate 36 in order to accurately locate this end with respect to the end portion 38*a* of the plate 38 projecting under the lip 32. Subsequently, the plates are bent in unison in a suitable press to form the intermediate bent portions 50. After the pressing operation, the plates 36, 38 are then welded along substantially the entire superimposed length thereof. Manufacture of a lift rail 24 is thereafter completed by drilling the aligned apertures for the pivot pin 26 and the apertures for a stop pin 60 located at an outer corner of each rail. The purpose of the stop pin 60 will be discussed below. It will be appreciated by those versed in the art that lift rails having a bent portion therein may be made by this method with a considerably smaller press than would be required were the plates 36, 38 formed as an integral, one-piece construction, or were these plates welded throughout substantially their entire length before being pressed. Further, pressing of welded plates would almost certainly shear or otherwise destroy portions of the weld.

As mentioned above, an adapter, designated 52 herein, is mounted on each rail 24. Each adapter comprises a slide 54 having reentrant flanges 56 on its side edges for slidably engaging the sides and bottom edges of the upper plates 38. As indicated in FIGURE 7, a small stop plate 58, welded to the bottom edges of one of the reentrant flanges 56, is adapted to abut against the depending stop pin 60. Accordingly, the slides 54 may be positioned anywhere along the rails 24 between limits defined by the stop plate 58 and the pin 60 at the outer ends of the rails and by the angularly deflected portions 50 intermediate the rails 24.

A pivot arm 62 is pivotally mounted for rotation about a vertical axis by a pivot pin 64 centrally of the top of each slide 54. As shown in FIGURE 8, each pivot pin 64 has an enlarged head 66 overlying the periphery of an aperture located approximately centrally of the arm 62. The arm 62 includes a pair of upwardly projecting side portions 68 having aligned aperturess at one end thereof for reception of a pivot pin 70. A load supporting pad 72 is attached to the pivot pin 70 for pivotal movement

about a horizontal axis located at the center of the apertures in the arm **62**. The pad **72** includes a generally rectangular load supporting top surface portion **82** at the outer end thereof and a pair of arms **74** projecting forwardly therefrom. The arms **74** each have apertures therein aligned with the apertures in the side portions **68**. The pin **70** is slip fit within the apertures in the side portions **68** and the arms **74**, but held in a fixed position with respect to the arm **62** by a spring roll pin **76** press fit within a vertical aperture located centrally of the pin **70**. The roll pin **76** projects into an aperture **78** within the bottom of the arm **62**. If desired, an aperture **80** may be drilled in the slide **54** so that the pin **76** may be forced out of engagement with the pivot pin **70** for purposes of removing the pivot pin **70** and the pad **72**.

The load supporting top surface portion **82** is adapted to engage the frame of an automobile when the pad **72** is in the position shown in full lines in FIGURE 8. The pad **72**, when in this position, is directly in contact with the top surface of the slide **54**. Thus, there is no element separating the slide **54** and the pad **72**. The height of the pad above the slide is therefore as low as possible. As illustrated in FIGURE 7, the pivot arm **62** may be rotated by 360° about the pin **64**, whereby the pad **72** connected to one end of the arm **62** may be positioned where best suited to engage the frame or other portion of the underside of an automobile. Note that the pad **72** extends beyond the boundary of the slide **54** and accordingly beyond the boundary of its associated rail **24** so that the load supporting surface portion **82** of the pad **72** is not necessarily directly above the rail **24**. As indicated in phantom lines in FIGURE 8, a substantially normally extending end wall **84** of the pad **72** may be placed in an upright position for engagement with the frame or other portion of the underbody of an automobile by pivoting the pad about the pin **70** through slightly more than 90°. When a pad **72** is thus raised, greater clearance between its associated rail **24** and the frame of the vehicle is thus provided. An aperture **82***a* is cut in the surface **82** so that the pad **72** may be raised by a suitable tool engaged with the aperture **82***a*.

If desired, supplementary load supporting members **86** may be pivotally attached to the pins **70** in a manner similar to the pads **72**. Each supplementary supporting member **86**, as illustrated in FIGURE 6, is apertured at **86***a* so that it may be independently pivoted by slightly more than 90° to an upright position whereby its end surface, designated **88**, serves as the load supporting surface of the adapter. A pair of small support legs, designated **90**, project outwardly from the surface of each supplementary supporting member **86** opposite the surface **88**. The legs **90** rest upon a flat top surface portion of the arm **62**, as indicated by phantom lines in FIGURE 8. Each supplementary support member **86** is nested within a cavity formed by the arms **74** and a horizontal flange **72***a* at the base of the pad **72**. Note that the top surface of the supplementary support member **86** is below the support surface **82** of the pad **72**. Thus, when the pad **72** and the member **86** are in their lowered position shown in FIGURE 8, the only support surface is surface **82**. Accordingly, in some circumstances, it may be easier to align the support surface **82** with the frame of a vehicle. For example, the frame of the vehicle may have a lug depending therefrom which can project below the surface **82** over the member **86**. When a pad **72** is raised to its upright position, indicated by phantom lines in FIGURE 8, its associated supplementary support member **86** likewise is raised to provide support for the pad **72**. To insure that the small support legs **90** do not strike the adjacent front end of the pivot arm **62** when the member **86** is pivoted about the pin **70**, the front end of the arm **62** is machined to an arcuate configuration, as indicated at **92**. The top and opposite end of the arm side portions **68** are tapered and rounded to avoid the presence of sharp corners.

In operation, a vehicle is first driven over the lift installation. The lift rails **24** are then pivoted or swung to desired positions beneath the vehicle frame and the pads **72** are adjusted to properly engage the frame. Alternatively, the supplementary support members **86** could be pivoted about the pin **70** to provide upwardly projecting support surfaces. The lift is then raised by conventional hydraulic or semihydraulic mechanism whereupon the pads **72** or the members **86** engage the vehicle frame to lift the vehicle. While a vehicle is being lifted, the outer ends of the rails **24** pivot downwardly about a fulcrum provided by a portion of the antifriction discs **44** and **46**, which portion is placed under compression due to the weight of the vehicle. The compression of the discs **44** and **46** is not severe, however, due to the engagement of the inner edges **38***a* of the rails **24** with the bottom surfaces of the overhanging lips **32** at the corners of the cover plate **18**. The engagement between elements **38***a*, **32** serves also to frictionally lock the rails **24** from swinging about the pivot pins **26**. Thus, the lift rails **24** are freely pivotal about the pins **26** when not engaged with a load, but are effectively locked when engaged with a load.

A lift installation substantially identical to that described above is illustrated in FIGURES 3 and 4. In this case, however, two lift posts **100**, indicated by dotted lines in FIGURE 3, are employed, each of which supports a base plate **18***a* and **18***b*, each of which in turn supports a pair of rails **24**. A filler plate **23** and a cover plate **30** are mounted atop the base plates **18***a*, **18***b* to provide a lip or overhanging portion for the arcuate inner ends of the rails **24**. To provide clearance for the intermediate portions **50** of the rails **24**, one corner of each base plate is cut out as indicated at **94**. A rack mechanism (not shown) depends from adjacent the opposite corner of each base plate and is attached to the base plates **18***a*, **18***b* at recessed portions **96***a*, **96***b* thereof. The rack mechanism serves to synchronize the movement of the two posts as an automobile or other motor vehicle is being lifted. The details of this device are conventional and hence are not illustrated herein. It is desirable, however, that the bent portions **50** of each rail **24**, when pivoted, project into either a cutout corner **94** or one of the recessed portions **96***a*, **96***b* so that the extent of pivotal movement of the rails is limited only by the stop pins **34**. The construction of the two post lift, shown in FIGURES 3 and 4, is otherwise identical to the single post lift shown in FIGURES 1 and 2.

It is thus seen that, in accordance with this invention, a frame contact lift has been provided which is lower than any presently commercially available lift. The lower height of the lifts described herein is obtained primarily by providing the bent portion **50** in the rails **24** whereby the outer ends of the rails occupy a horizontal plane lower than the horizontal plane of the inner ends of the rails. Also, the lifts are low because the pads **72** are directly supported upon the surfaces of the slides **54**. With this construction, the top surfaces of the pads **72** when in their horizontal position shown in full lines in FIGURE 8, are only slightly higher than the top surfaces of the inner ends of the rails **24** and the top surfaces of the cover plates **30**. The peak height of lifts made in accordance with this invention may be 3¾" or less and yet the lifts meet the strength requirements necessary to safely lift all conventional automobiles and small trucks.

Although the presently preferred embodiment of the device has been described, it will be understood that within the purview of this invention various changes may be made in the form, details, proportion and arrangement of parts, the combination thereof and mode of operation, which generally stated consist in a device capable of carrying out the objects set forth, as disclosed and defined in the appended claims.

Having thus described our invention, we claim:

1. In a vehicle lift assembly of the type including a lift rail pivotally attached to a base member, pivot means for connecting said rail to said base member including: a pivot pin passing through aligned apertures in said rail and said base member, and a pair of relatively rotatable anti-friction discs sandwiched between said rail and said base member.

2. In a vehicle lift assembly of the type including a lift rail pivotally attached to a base member, pivot means for connecting said rail to said base member including: a pivot pin passing through aligned apertures in said rail and said base member, and a pair of relatively rotatable anti-friction discs sandwiched between said rail and said base member, said rail and said base member having surface disparities therein, the surface disparity of said rail interengaging the top surface of one of said anti-friction discs to retain said one of said anti-friction discs in a fixed position relative thereto, the other of said anti-friction discs being fixed relative to said base member by the surface disparity of said base member, whereby the contiguous surfaces of said discs are the only contacting surfaces which undergo relative rotation when said rail is pivoted with respect to said base member.

References Cited by the Examiner

UNITED STATES PATENTS

940,702	11/09	Murdock	29—480
1,766,956	6/30	Scull	29—480 X
2,158,399	5/39	Carter	187—8.75
2,471,663	5/49	Tietz	29—480
2,736,104	2/56	Sherman	187—8.75
2,815,252	12/57	Baker	308—3.6
2,878,897	3/59	Cochin	187—8.75
2,949,978	8/60	Halstead	187—8.75
2,956,645	10/60	Halstead	187—8.67
2,958,395	11/60	Wallace	187—8.75
2,989,352	6/61	Schmidt	308—3
3,002,588	10/61	Charpigny	187—8.75
3,052,322	9/62	Goldzwig	187—8.75

FOREIGN PATENTS

569,828	8/58	Belgium.
755,405	8/56	Great Britain.
828,444	2/60	Great Britain.
1,184,750	2/59	France.

SAMUEL F. COLEMAN, *Primary Examiner.*

CARL J. ALBRECHT, ANDRES H. NIELSEN, *Examiners.*