Sept. 29, 1931. C. J. BRISTOL 1,824,866

SAFETY LATCH DEVICE

Filed July 30, 1929

Fig. 2

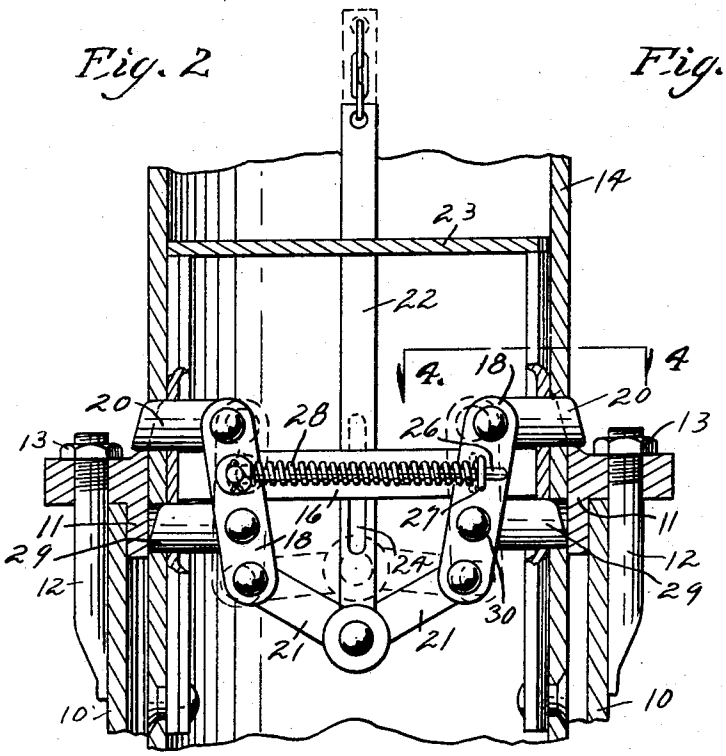


Fig. 1.

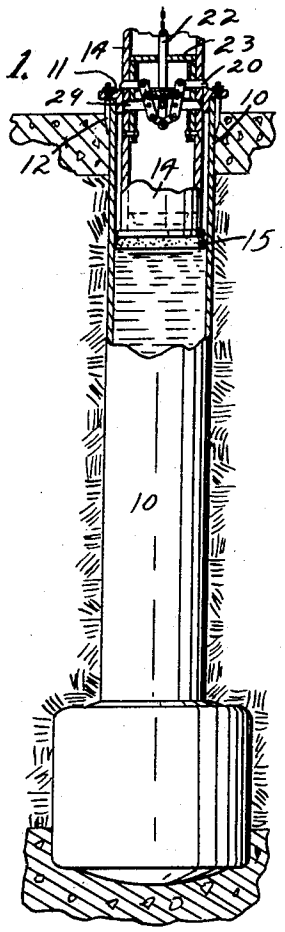


Fig. 3.

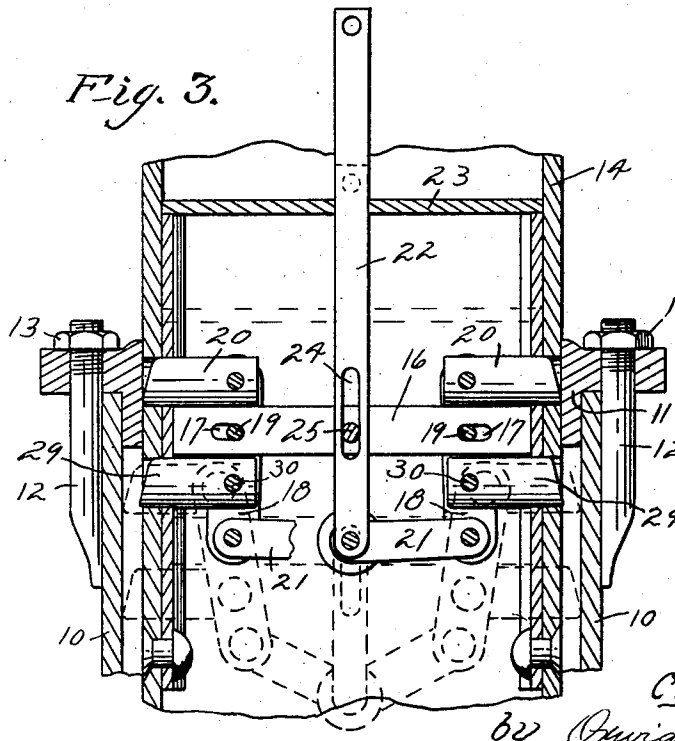
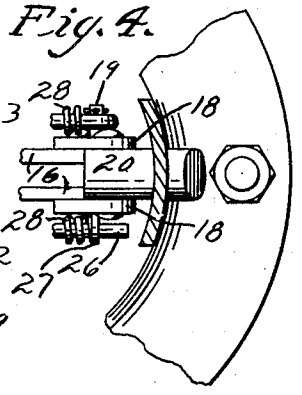


Fig. 4.



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Patented Sept. 29, 1931 1,824,866

UNITED STATES PATENT OFFICE

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SAFETY LATCH DEVICE

Application filed July 30, 1929. Serial No. 382,231.

The plunger type of lifts has gone into extensive use in connection with fluid pressure lift devices for servicing automobiles. In such devices the automobile is driven onto a platform device when near the ground level, and then fluid pressure is applied to the plunger to elevate the automobile to a point where an operator may conveniently and easily service the under part of the automobile.

The object of my invention is to provide a safety latch device of simple, durable and inexpensive construction and so arranged that it will automatically under all conditions lock the plunger against downward movement until the operator manually releases the latch device.

More specifically it is my object to provide a latch device of this general character in which, when the safety latch device has once been manually released by the operator and the plunger lowered either a slight distance or a full stroke, and the plunger again elevated, the latch device will automatically hold the plunger in its elevated position without any attention on the part of the operator.

My invention consists in the construction, arrangement and combination of the various parts of the device whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which:

Figure 1 shows a side elevation partly in section illustrating a conventional type cylinder and plunger having my improved latch device applied thereto, the plunger being shown in its elevated position.

Figure 2 shows an enlarged, detail, sectional view of a portion of the plunger, the upper portion of the cylinder and my improved latch device applied thereto and shown in position for locking the plunger against downward movement. The dotted lines in this figure illustrate the position of the parts when the operator has manually operated the latch device to permit the plunger to descend.

Figure 3 shows a similar view with the latch device in position where the latch bars engage the guide flange at the top of the cylinder, and in this figure the dotted lines show the position of the latch device when the latch bars are below the guide flange at the top of the cylinder.

Figure 4 is a detail sectional view on the line 4—4 of Figure 2.

Referring to the accompanying drawings I have used the reference numeral 10 to indicate generally a cylinder of the type now commonly used in automobile lifts. At the top of the cylinder there is a guide flange 11 firmly secured to the cylinder by a bolt 12 and nut 13. It will be noted upon reference to Figure 2 that the cylinder is fixed to the outer surface of the guide flange 11 and that hence the inner cylindrical surface of the guide flange is of considerably less diameter than that of the interior of the cylinder 10 below the guide flange.

The plunger is indicated generally by the reference numeral 14 and forms a close sliding fit with the interior of the guide flange 11, and has at its lower end a customary yielding packing 15.

My improved latch device is permanently secured near the bottom of the plunger by two parallel supporting bars 16, spaced apart from each other and extended transversely across the interior of the plunger and firmly fixed, preferably by spot welding, to the interior of the plunger.

These supporting bars 16 are each provided with slots 17 near their ends. Pivotally mounted upon the supporting bars 16 are levers 18, each having a fulcrum pin 19 extended through it and through the slots 17. These levers are arranged in pairs one pair on each end of the bar 16. Pivotally mounted between the upper ends of each pair of levers 18 are the latch bolts 20, their outer ends being beveled downwardly and outwardly. These latch bolts are extended through round openings in the plunger walls.

Pivoted to the lower end of each pair of levers 18 is a link 21. The inner ends of these links are pivotally connected to each other and to a vertically movable trip bar

22, which is slidingly mounted at its upper end in a cross piece 23 fixed to the plunger, which trip bar 22 has a slot 24 formed therein through which there is extended a pin 25 fixed to the stationary cross piece 16 to limit the up and down movement of the trip bar.

One of the fulcrum pins 19 has pivoted to it a rod 26 and the other pin 19 has a metal loop 27 fixed to it through which the rod 26 is slidingly extended, and mounted upon the rod 26 is an expansible coil spring 28 to normally hold the pivot pins 19 at their outer limits of movement in the slots 17. There is a similar rod 26 and spring 28 for each side of the latch device.

Each pair of levers 18 is provided with a fulcrum pin 29 mounted between the levers and pivotally connected to them by a pin 30. These fulcrum pins 29 are projected horizontally outwardly through openings formed in the walls of the plunger and their outer ends are inclined downwardly and outwardly.

In practical operation and assuming that the trip bar 22 is at its lower limit of movement, as shown by solid lines in Figure 2, then the levers 18 are held by the links 21 in position with the bolts 20 at their outer limits of movement, the pivot points of the levers 18 under such circumstances being on the pivot pins 19. Hence, the weight of the parts alone without any spring action will always hold the bolts 20 outwardly and prevent a downward movement of the plunger from its elevated position.

Furthermore, and assuming that the latch device on the plunger is elevated above the flange 11, then even if the operator should elevate the trip bar 22 and release it, the latch bolts 20 would still remain in an extended position. However, under the same circumstances, and assuming that the operator raised the trip bar and held it up, then the fulcrum pins 29 would project outwardly far enough to prevent the latch device from moving downwardly past the flange 11. This position is shown by dotted lines in Fig. 3. In this figure these fulcrum pins are shown below the flange 11, but it will be seen that if above the flange 11 they would prevent downward movement of the plunger.

Hence, no manipulation of any kind of the trip bar 22 can have any effect upon the latch device, unless and until the latch device is in its normal position supporting the plunger in elevated position, as shown by solid lines in Figure 2. When in this position, and assuming that the operator desires to lower the plunger, then the trip bar 22 is raised and this, as shown by dotted lines in Figure 2, will cause the fulcrum pins 29 to engage the inner surface of the flange 11, and thereby cause these pins 29 to serve as fulcrums for the levers 18, and when the links 21 are moved to their elevated position, as shown by dotted lines, then the upper ends of the levers 18 are moved inwardly to position where the bolts 20 are within the flange 11, and during this movement the springs 28 are considerably compressed, and this compression of the springs holds the links 21 upwardly past dead center, as shown by dotted lines in Figure 2. Hence the operator need only elevate the trip bar 22, and then may let go of it and the parts will remain in the position shown by dotted lines in Figure 2 until such time as the operator is ready to raise or lower the plunger.

If the operator in intending to lower the plunger should accidentally raise it for a slight distance, then so long as the fulcrum pins 29 are in engagement with the flange 11 the parts will all remain in the same position and the plunger can be raised, say for instance, an inch, and then lowered, but if the operator should raise the plunger far enough for the fulcrum pins 29 to clear the top of the flange 11, then the trip bar 22 will drop by gravity and the parts will assume the position shown by solid lines in Figure 2, and the plunger could not be lowered until the trip bar was again manipulated.

Assuming, however, that the operator lowers the plunger, then so long as the latch bars 20 are in engagement with the inner surface of the flange 11, the parts will all remain in the same position as that shown by dotted lines in Figure 2, and by solid lines in Figure 3. When, however, the latch bars 20 pass below the flange 11, then all tension of the springs 28 is relieved and the trip bar 22 will drop by gravity to the position shown by dotted lines in Figure 3, and all of the latch bars and pivot pins will be relieved of any spring tension and the plunger may freely move up and down in the cylinder. Then when the plunger is again elevated, the inclined faces of the latch bars 20 will cause them to move inwardly past the flange 11, and when they get above it, they will again be moved outwardly to the position shown by solid lines in Figure 1.

With my improved device, therefore, it is practically impossible for a careless operator to permit the plunger to drop, because there is only one position in which a pull upon the trip bar 22 will have any effect, and that is the position shown by solid lines in Figure 2, and then the operator must raise the plunger slightly until the latch bars clear the top of the flange and the fulcrum pins engage the interior of the flange. It is only when the parts are in said position that a pull upon the trip bar will permit a lowering of the plunger.

I claim as my invention:

1. In a safety latch device, the combination of a plunger, a flange through which the plunger is slidingly extended, a support carried by the plunger, a lever pivotally and slidingly mounted on the support, a latch bar pivoted to the lever on one side of the support, a fulcrum pin pivoted to the lever on the opposite side of the support, a spring for normally holding the lever at its outer limit of movement relative to its support, said parts being so shaped and proportioned that when the fulcrum pin engages said flange the latch bar will be held outwardly to engage the top of said flange and thereby prevent the downward movement of the plunger, and manually operated means for compressing the spring and withdrawing the latch bar.

2. In a safety latch device, the combination of a plunger, a cylinder in which the plunger is slidingly mounted, a guide flange at the top of the cylinder and through which the plunger is slidingly extended, said flange being projected inwardly farther than the interior of the cylinder, a support fixed to the plunger, two pairs of levers pivotally and slidingly connected to said supports, a latch bar pivoted to the upper end of each pair of levers and extended outwardly through the plunger, a fulcrum bar pivotally mounted between each pair of levers below the support and extended outwardly through the sides of the plunger, a link pivotally connected to the lower end of each pair of levers, a trip bar slidably supported within the plunger and pivotally connected at its lower end with said links, and a yielding pressure device for exerting an outward pressure upon the pivotal connections between said levers and the said support, for the purposes stated.

3. In a safety latch device, the combination of a hollow plunger, a lever pivotally supported within the hollow plunger, a latch bar carried by the lever at one side of its fulcrum and extended outwardly through the plunger, a fulcrum pin connected to the lever on the side of its fulcrum opposite from the latch bar and projected outwardly through the plunger, means for normally holding the lever in position with the latch bar projected outwardly, a flange arranged in the path of the fulcrum pin for forcing it inwardly when the plunger moves upwardly past the flange to thereby move the latch bar to its withdrawn position, and manually operated means for withdrawing the latch bar.

4. The combination in an automobile lift of an upright cylinder, a hollow piston rod closed at its lower end, a packing device on the lower end of the piston rod to form a seal between the lower end of the piston rod and the interior of the cylinder to prevent the entrance of the piston operating fluid above the lower end of the piston, a latch device supported within the hollow piston rod, the piston rod being formed with an opening through which the latch may project outwardly to engage and rest upon a stationary part at the upper portion of the cylinder when the piston rod is in an elevated position, and manually operated means connected with the latch and extended upwardly through the hollow piston rod for withdrawing the latch from its position projected beyond the piston rod.

5. In a fluid pressure automobile lift, the combination of a cylinder, a hollow piston rod slidingly mounted in the cylinder having its lower end closed, means for forming a fluid-tight connection between the lower end of the piston and the interior of the cylinder, a latch device mounted within the hollow piston, the piston being formed with a slot through which the latch may be projected outwardly through the piston to position where it will engage a stationary part at the upper portion of the cylinder when lowered, and means for forcing the latch inwardly to permit the piston to be lowered below the upper end of the cylinder.

Des Moines, Iowa, July 26, 1929.

CYRUS J. BRISTOL.