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ADJUSTABLE LIFT FORK MOUNTING

Filed June 25, 1959

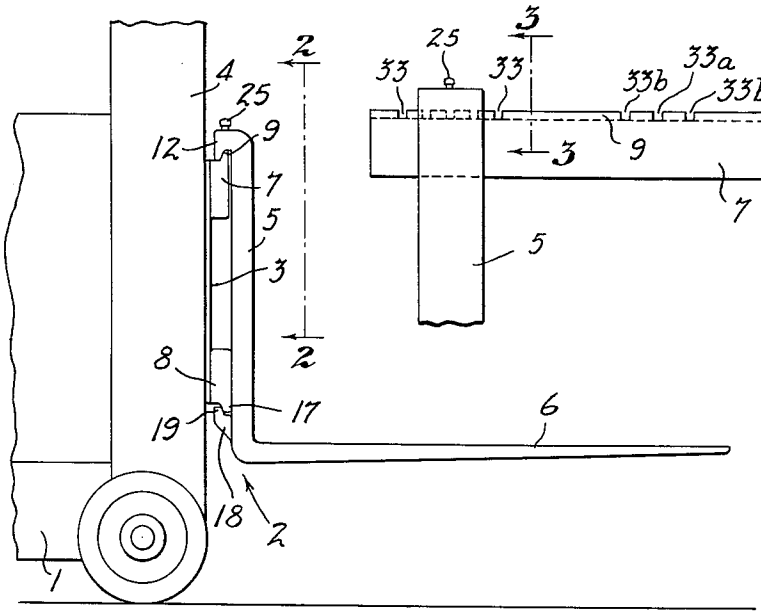


Fig. 2

Fig. 1

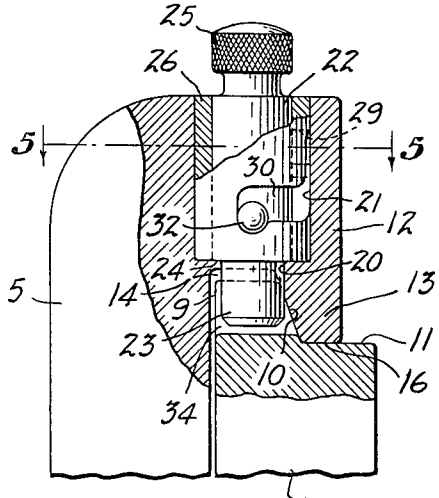


Fig. 3

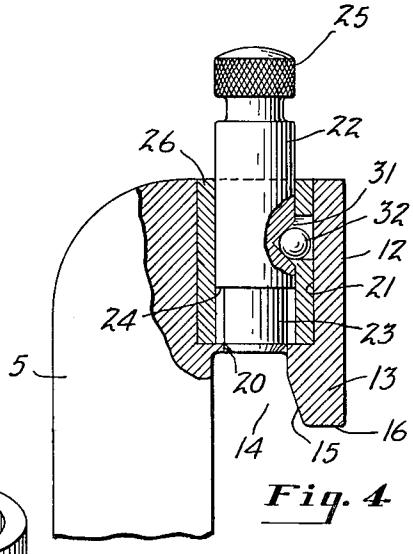


Fig. 4

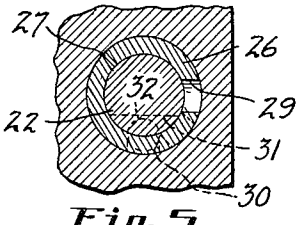


Fig. 5

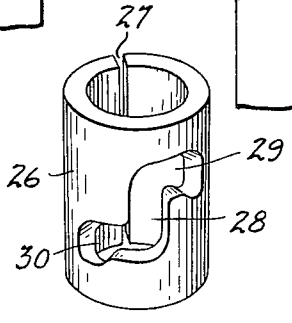


Fig. 6

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ADJUSTABLE LIFT FORK MOUNTING

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3 Claims. (Cl. 214—731)

This invention relates to industrial trucks and more particularly to a locking means for the transversely adjustable lift forks commonly used on such trucks. It is often desirable to adjustably and detachably mount the lift forks on the hoist carriage of an industrial truck to provide different spacings or to provide a single fork or a number of spaced forks of the proper size and shape to meet the requirements of the particular materials being handled.

The locking means of the present invention is applicable to forks having a hook type mounting in which the vertical supporting leg of each fork has rearwardly projecting hook shaped lugs that engage with upper and lower horizontal guide ribs each formed on a bar or plate attached to the lift carriage.

In order to facilitate removal and adjustment, the upper and lower guide lugs of the forks are spaced apart a distance slightly greater than the spacing of the guide ribs to provide the clearance necessary for easy adjustment. The load is imposed upon the upper lug of the fork which has a downwardly projecting inner end portion spaced from the rear face of the fork leg to receive the upper guide rib.

For securing the forks in adjusted positions, a vertically disposed locking pin is slidably mounted in the upper lug of the fork and axial movement into and out of the rib receiving recess. The locking pin is engageable with any one of a series of longitudinally spaced locking recesses in the upper guide rib.

The locking device of the present invention is provided with a simple and easily releasable means for positively holding the locking pin against axial movement, either in its locking position where it holds the fork against lateral movement or in its releasing position where it permits free lateral sliding movement of the fork on the guide rib.

Objects of the invention are to provide a pin retaining means that is easily releasable to permit axial shifting of the pin from its locking to its releasing position and vice versa, to provide a retainer that is positioned wholly within the pin sockets of the fork so that it is protected against damage by impacts and that is moved into and out of pin retaining position by turning movements of the pin.

Reference should be had to the accompanying drawings forming a part of this specification, in which:

Figure 1 is a fragmentary side elevation of the forward end of an industrial truck provided with a lift carriage and load carrying fork;

Fig. 2 is a fragmentary front elevation viewed as indicated at 2—2 in Fig. 1, showing the upper guide and a pair of lift forks supported thereon;

Fig. 3 is a fragmentary side elevation partially in vertical section showing the means for locking a fork in an adjusted position;

Fig. 4 is a view similar to Fig. 3 showing the fork only with the locking pin in retracted position;

Fig. 5 is a section taken on the line indicated at 5—5 in Fig. 3; and

Fig. 6 is a perspective view of the pin guiding sleeve.

Referring to the accompanying drawings, Fig. 1 shows the forward end of an industrial truck 1 upon which is mounted one or more lift forks 2 that are attached to a carriage 3 mounted for vertical travel on a standard 4 at the forward end of the truck. The lift forks 2 may be of conventional construction each provided with a vertical attaching leg 5 and a horizontal load supporting leg 6. The vertical leg of each fork is adjustably mounted on the carriage 3 by means of upper and lower horizontal guides 7 and 8 which may be formed on the top and bottom edges of a single plate or on spaced bars or plates. The upper guide 7 is formed to provide an upwardly projecting longitudinal rib 9 the front face of which is flush with the front face of the bar or plate forming the upper guide. The rib 9 has a downwardly and rearwardly inclined rear face 10 and the guide plate or bar has a horizontal top face 11 inwardly of the rib 9. The upper end of the attaching leg 5 of the fork has a rearwardly projecting hook-shaped portion 12 and a downwardly projecting portion 13 spaced from the rear face of the leg 5 to provide a rib receiving recess 14 that is of a depth greater than the height of the rib 9 and of a width greater than the thickness of the rib 9. As herein shown, the downwardly projecting portion 13 has an inclined face 15 that conforms to the inclined rear face 10 of the rib 9, the downwardly projecting portion 13 also having a horizontal end face 16 that engages the horizontal top face of the guide 7.

The lower guide 8 may be identical with the upper guide 7 except that its position is reversed, having a downwardly extending rib 17 corresponding to the rib 9 of the upper guide. The attaching leg 5 of the fork has a lower hook-shaped lug 18 reversely positioned with respect to the upper hook 12, being provided with an upwardly projecting portion 19 that corresponds to the downwardly projecting portion 13 of the upper hook and that is spaced from the rear face of the leg 5 to provide a recess to receive the lower guide rib 17.

The rearwardly projecting portion 12 of the attaching leg 5 is provided with a vertical bore 20 opening to the upper end of its recess 14 and has a counterbore 21 coaxial with the bore 20 and extending to the top face of the hook portion 12. A locking pin 22 is mounted for vertical sliding movement in the socket formed by the bore 20 and counterbore 21, having a reduced portion 23 that fits in the bore 20 and a shoulder 24 at the upper end of the reduced portion 23 that is engageable with the bottom of the counterbore 21 to limit the downward movement of the locking pin 22. The pin 22 projects above the top face of the hook portion 12 and is provided with an enlarged head 25 at its upper end that provides a convenient grip and that may be knurled to facilitate turning. Means is provided within the pin receiving socket of the fork for retaining the locking pin 22 either in its locking or its retracted position, the retaining means being controlled by turning movements of the pin. As herein shown the locking pin 22 is of a diameter less than that of the counterbore 21 and is guided by means of a resilient contractible sleeve 26 mounted in the counterbore 21. The sleeve 26 has a longitudinal split 27 which permits the sleeve to be contracted sufficiently to permit it to be entered into the counterbore 21 in which the sleeve is securely held by its expanding thrust on the wall of the counterbore. The sleeve has a vertical slot 28 intermediate its ends that is provided with upper and lower lateral extensions 29 and 30. A pin retaining means is provided that moves axially with the pin 22 and that also turns with the pin 22 and that engages in the lateral extension 29 to retain the pin in retracted position and in the lateral

extension 30 to retain the pin in locking position. As herein shown the locking pin 22 is provided with a recess 31 that may be formed by cutting a transverse V-shaped notch of a depth to accommodate a retaining member in the form of a spherical metal ball 32 between the walls of the notch and the interior of the counterbore 21. The width of the slot 28 is greater than the diameter of the ball 32, so that the ball, which is constrained by the recess 31 to move axially and angularly with the pin, can move vertically with the pin 22 or laterally into the end portions 29 or 30 of the slot by imparting a turning movement to the pin. The laterally extending end portions 29 and 30 provide means for retaining the pin 22 in its uppermost or lowermost position so that, to move the pin to its retracted position, the pin may be turned by means of the knurled head 25 to move the ball into alinement with the vertical portion 28 of the slot, which permits the pin to be lifted to its retracted position and retained in its retracted position by turning the pin to move the ball into the upper lateral extension 29 of the slot.

The upper guide rib 9 may be provided with a series of locking recesses in the form of notches 33 of identical width that extend across the ribs and that have parallel side walls 34 spaced apart a distance corresponding to the diameter of the reduced portion 23 of the locking pin. The pin receiving notches may be distributed in any suitable manner along the length of the guide rib 9. As herein shown a group of closely spaced notches 33 are provided adjacent each end of the rib to permit adjustment of the spacing of the forks. It is sometimes desirable to provide a single load carrying hook, in which case the hook should be mounted centrally of the supporting carriage 3. To enable a single hook to be centrally mounted, the rib 9 may be provided with a central pin receiving notch 33*a* and pin receiving notches 33*b* may be positioned on opposite sides of the notch 33*a* to enable two forks to be mounted side by side in abutting relation centrally of the carriage 3.

It is to be understood that in accordance with the provisions of the patent statutes, variations and modifications of the specific devices herein shown and described may be made without departing from the spirit of the invention.

What I claim is:

1. In an adjustable mounting for lift forks of the type in which a carriage is provided with a horizontally extending upwardly projecting guide rib that has longitudinally spaced upwardly opening locking recesses, in which a lift fork is provided with an upright attaching leg that has an enlarged upper end shaped to provide a top face and a rearwardly projecting hook portion provided with a downwardly opening recess beneath said top face that receives said rib, and in which said hook portion has a bore opening to said rib receiving recess and a counterbore opening to said top face and to said bore, fork locking means comprising an internally cylindrical bearing sleeve positioned in said counterbore and fitting within the same, said sleeve having a vertically extending slot with vertically spaced circumferentially extending portions within the counterbore, a locking pin slidably and rotatably fitting in said sleeve, said pin being movable downwardly to a fork locking position in which its lower end engages in a locking recess of said guide rib and upwardly to a fork releasing position where its lower end is above and clear of said rib, the upper end of said pin projecting above the top face of said leg and providing a hand grip for lifting and turning said pin, and a retaining member movable axially and angularly with said pin, said retaining member projecting into said slot and movable vertically with the pin from one circumferentially extending portion thereof to the other and angularly with the pin into either circumferentially extending portion, said circumferentally extending portion of the slot providing upper and lower shoulders for retaining the pin in an upper position clear of the rib or in a lower position where it engages in a locking recess of the rib.

2. A lift fork locking means according to claim 1 in which the bearing sleeve is formed of resilient metal, is normally of an external diameter greater than the internal diameter of the counterbore in which it is mounted and is longitudinally split so that it can be compressed to a smaller diameter for insertion into said counterbore and will exert an expanding thrust upon the wall of the counterbore to hold it in place.

3. A lift fork locking means according to claim 1 in which the retaining member movable with the locking pin is in the form of a ball of a diameter greater than the thickness of the sleeve and in which the ball is connected to the pin to move axially and angularly therewith by means of a notch in the pin into which the ball extends and in which the ball is retained by the wall of the counterbore.

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