

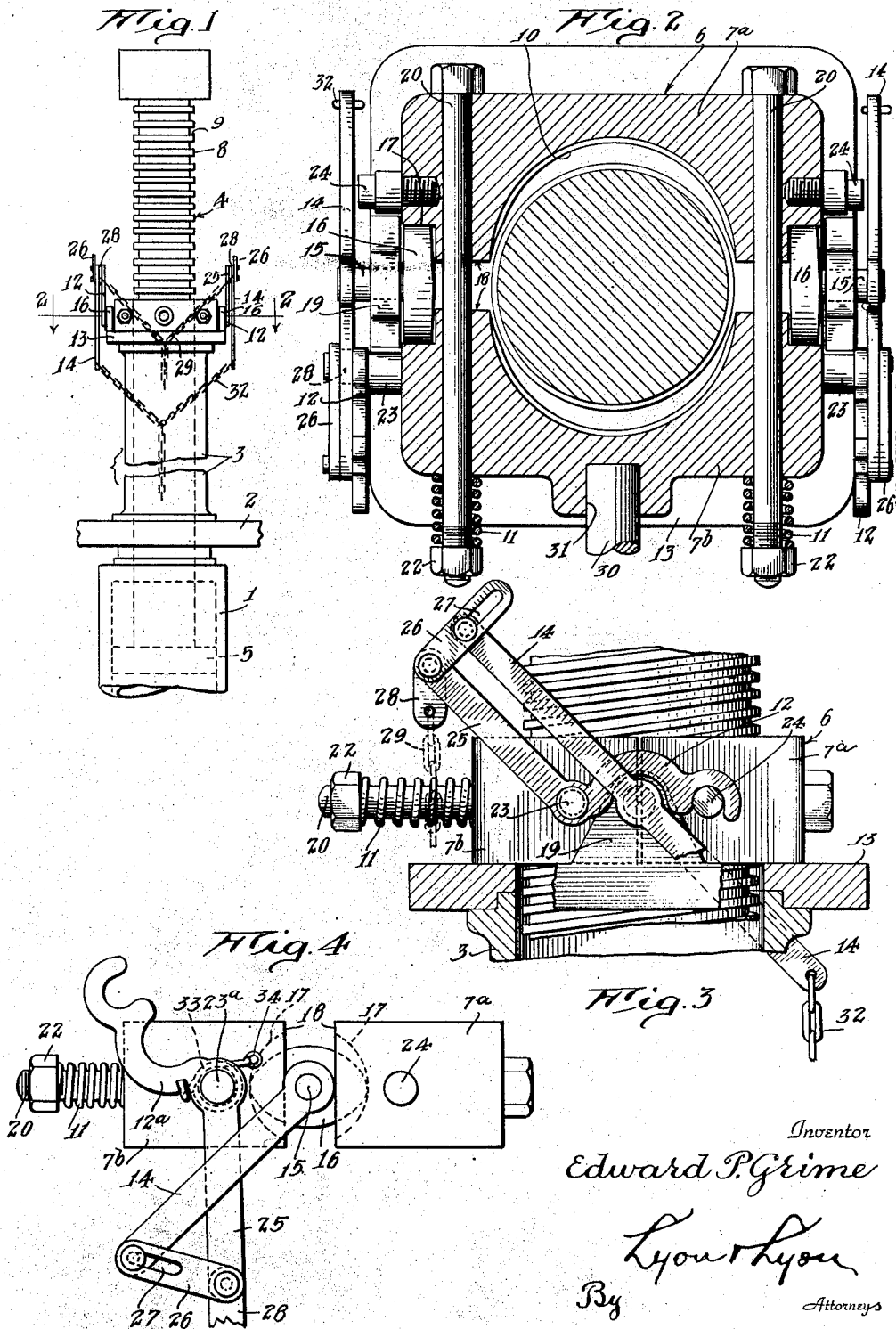
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HOLDING BRAKE

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HOLDING BRAKE

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This invention relates to a quick-action jack or shore, and while features of the invention may be employed in the construction of a jack or shore for any specific purpose, the invention is intended particularly to be employed in the construction of a quick-action jack or shore that is capable of use in lifting or shorting aeroplanes.

A jack for this purpose usually includes a fluid-operated cylinder in which a piston operates, and which is raised by a fluid pressure such as hydraulic pressure, or by compressed air. This piston is part of a plunger that is extended upwardly through a plunger guide. In the type of jack to which this invention relates, means is provided for engaging the corrugated side of the plunger for supporting the same in the position to which it has been raised by the fluid pressure, regardless of whether the fluid pressure is maintained. The means for supporting the plunger on the upper end of the jack frame, or on the plunger guide, constitutes substantially a nut, but such a nut if ordinarily constructed, would travel up with the plunger as it is raised by the fluid pressure, and if the lift was considerable, then considerable time would be required to screw the nut down on the thread to bring it to the level of the upper end of the plunger guide so that it could rest upon the frame and support the plunger.

One of the objects of this invention is to provide a jack or shore of this general type, in which the means such as the "nut" cooperating with the plunger to support it, is so constructed that it can be disengaged from the plunger while the plunger is rising, and so that it can be quickly brought into re-engagement with the plunger to support it in any position to which the plunger has been elevated.

In its general construction the improvement involves the use of a collar or nut that is split into sections which are guided to close together to engage the plunger to support the same on the upper end of the frame or plunger guide; and one of the objects of this invention is to provide improved means for guiding the sections of the nut or collar, and for positively holding them in their close-up position, thereby avoiding any possibility of the collar or nut accidentally opening up so as to permit the descent of the plunger with its load.

A further object of the invention is to provide simple means for effecting the separating or opening movement of the nut sections when they have been unlatched, and for automatically unlatching the sections to permit their being moved outwardly when the sections must be held open or

apart to permit the plunger to rise without raising the collar or nut.

A further object of the invention is to provide simple means for effecting these operations, and for insuring that as the nut sections move apart, they will maintain themselves centered with respect to the longitudinal axis of the plunger.

When the jack is to be used as a shore as well as a jack, the corrugations on the side of the plunger are preferably formed as a continuous thread; and one of the objects of this invention is to provide a construction for the nut, which will enable it to be readily disengaged from the thread while the plunger is rising, but which is so constructed that after the nut sections are replaced, the nut can be readily rotated like an ordinary nut to effect a slight but gradual adjustment of the plunger up or down. This feature is particularly advantageous in a situation where two or more jacks of this type have to be used, and where it may be necessary to adjust one of them up or down to "trim ship" that is to say, to raise or lower one side of the aircraft or other supported object, with respect to the other side.

Further objects of the invention will appear hereinafter.

The invention consists in the novel parts and combination of parts to be described hereinafter, all of which contribute to produce an efficient quick-action jack or shore.

A preferred embodiment of the invention is described in the following specification, while the broad scope of the invention is pointed out in the appended claims.

In the drawing:

Fig. 1 is a side elevation showing the upper portion of a jack or shore embodying this invention, certain parts being broken away. This view illustrates the upper end of the cylinder in which the fluid pressure operates to raise the plunger.

Fig. 2 is a horizontal section taken about on the line 2—2 of Fig. 1, passing through the nut and illustrating the same in its open position, that is to say, with the nut sections moved outwardly to their extreme open position, which will permit the plunger to rise through the collar or nut without lifting it from the upper end of the plunger guide on which it normally rests. In this view certain parts are broken away, and the view is represented upon a considerably larger scale than Fig. 1.

Fig. 3 is a side elevation showing the parts as viewed from the right side of Fig. 1. This view shows the collar or nut in its closed and latched position, certain parts being broken away.

Fig. 4 is a side elevation showing the nut sections in their open position, and illustrating the corresponding position for the operating levers and latches that control the nut sections. This view illustrates a slightly modified construction that includes a spring associated with each hook for facilitating the return of the hooks to their locking position.

In the present drawing and specification, the jack includes a fluid-operated cylinder 1 at the upper end of which a crosshead 2 may be provided, to which tie rods (not illustrated) may be secured for resisting the stresses developed by the jack. This crosshead supports the cylinder 1. The structure may include some elevated part upon which the nut may seat to support the plunger. The present drawing illustrates a plunger guide 3 for guiding the upper portion of the plunger 4 as it is elevated in the cylinder 1, by fluid pressure admitted under the piston 5 which constitutes the lower end of the plunger.

In applying my invention to such a jack, I provide a split collar or "nut" 6 which is preferably composed of two segmental sections 7a and 7b, the inner faces of which are formed so as to engage corrugations 8 on the exterior of the plunger 4 so as to enable the collar 6 to support the plunger on the upper end of the plunger guide 3, or other fixed part of the structure.

In Fig. 1 the corrugations 8 are in the form of a series of collars integral with the plunger body, and larger than the diameter of its body so that supporting shoulders 9 are formed to be engaged by the inner faces of the nut sections. However, instead of using simple corrugations such as this, I may employ a continuous thread as will be described hereinafter. Such a thread has certain advantages.

When the plunger is rising, it is necessary to hold the nut sections 7a and 7b in their open position such as illustrated in Fig. 2. In this position their inner faces 10, which may be corrugated if desired, like the corrugations 8, will clear the side of the plunger so as to permit its free upward movement.

Holding means is provided for holding the nut sections in their closed position illustrated in Fig. 4, and this holding means preferably includes resilient means such as coil springs 11, and latching means including a latch 12 located at each side of the nut.

Associated with the holding means I provide means for thrusting the nut sections 7a and 7b apart, and at the same time, maintaining them equidistant from the plunger. For this purpose I support the nut 6 on a base ring 13 that is secured on the upper end of the plunger guide 3, and on this base ring 13 I mount a cam lever having two diametrically opposite arms 14, and each of these cam levers is rigidly attached to the stub shaft 15 of a double cam 16 located at each side. These cams are located at cam recesses 17 formed in the adjacent faces 18 of the two nut sections, which faces are located near the vertical plane located at right angles to the direction of movement of the sections as they move in or out. These stub shafts 15 are preferably mounted rotatably in upwardly projecting lugs 19 located at diametrically opposite points on the base ring. The cams 16 are substantially oval in shape, and in the position of the parts shown in Fig. 3, their longitudinal axes are substantially vertical. When the lever 14 is pulled down as shown in Fig. 3, the cams, cooperating with the faces of the cam recesses 17, will cause the nut sections

7a and 7b to move apart, and in this movement they are guided on long guide bolts 20 that extend completely through them, the projecting ends of the bolts being provided with coil springs 11 which urge the nut sections toward their closed position. In other words, I provide resilient means for holding the nut sections in contact with the plunger. When the nut sections are moved apart, these springs 11 are compressed against the nuts 22 that retain them so that they thrust against the outer side of the adjacent nut section 7b.

The latches 12 referred to above, are pivotally mounted on a pin or pivot, as fixed pin 23 projecting out from the side of the nut section 7b, and the latches 12 have arcuate bodies as illustrated in Fig. 3, to offset them around the stub shafts 15 of the cams.

I provide means for releasing the latches from the latch pins 24 on which they are hooked, and this means, after unlatching the latches, operates its cam lever to separate the nut sections. The mechanism for this purpose preferably includes a lost-motion device, so that in the operation of releasing and opening the nut sections, the latches communicate motion to the lever arms 14 through a lost-motion connection. For this purpose, each latch is provided with a rigid latch lever 25 that may extend upwardly at an angle of approximately 45° from the axis of the pivot pin 23. Each of these levers 25 is connected by a lost-motion link 26 including a pin-and-slot connection 27, to its corresponding cam lever. The clevis 28 and chain 29 may be employed for operating each latch lever 25.

In Fig. 3 the plunger is illustrated as having a continuous square thread upon it instead of regular corrugations such as shown in Fig. 1. In that case the nut 6 is a true nut, and is threaded to engage with the thread. This construction is preferable to simple corrugations where it is desired to use the jack as an adjustable shore as well as a lifting pack. When the thread and a real nut is employed in this way, the nut may be rotated on the thread to effect an up or down adjustment of the plunger, and it is possible to rotate the sections 7a and 7b of the nut as an assembly, by reason of the fact that they are connected together by the guide bolts 20. In order to enable the nut to be rotated in this way, at will, I provide handle means which may include a removable bar or rod 30 that may be received in a socket 31 in the side of one of the nut sections, for example, the nut section 7b. The right arm 14 at each cam lever, is provided with a chain 32 for rotating the cams 16 back toward their normal position to permit the springs 11 to return the nut sections 7a and 7b to their closed position.

The mode of operation of the jack illustrated in Figs. 1 to 3, will now be briefly described. Before admitting the operating fluid to the cylinder 1, to force the piston 5 and plunger 4 upwardly, the nut sections 7a and 7b should be separated by pulling down on the chain 29. This chain 29 is preferably branched at its upper end to attach to the lever 25 at each side. When this lever 25 at each side is pulled down by the chain, the latches 12 swing upwardly and release the pins 24 that they hook onto. Soon after the hooks of the latches get clear of the latch pins 24, the link 26 through the medium of the slot connection 27, will commence to move the cam lever 14 at each side. When the parts arrive at substantially the relation in which they are indicated in

Fig. 4, the nut sections will be clear of the plunger and the plunger can then move upwardly freely and without raising the nut 5. This opening movement is, of course, resisted by the springs 11. As soon as the chain 29 is released, these springs 11 will exert their force to return the nut sections 7a and 7b into contact with the plunger, and in doing so, the faces of the cam recesses will engage the cams, and this will swing the cam levers 14 back to their normal position. In order to close the latches 12, the chain 32 should now be pulled downwardly to enable the lost-motion connection 27 to pull up on the levers 25 and thereby close the latches. When the chain 32 is released, the levers 14 will go back to their normal position. This latching movement may occasion a slight opening movement of the sections 7a and 7b but this, of course, is of no consequence.

It is preferable to operate the nut sections to enable them to close just before the plunger has completed its upward movement, because in this way the springs 11 will shove the nut sections into place as soon as the thread or corrugations on the plunger register with the threads or corrugations on the inner faces of the nut sections.

After the nut sections are gripping the plunger, then if it is necessary to adjust the plunger up or down, this can be accomplished by applying a force to the handle bar 30 to rotate the nut in the proper direction.

In the embodiment of the invention illustrated in Fig. 4, the construction is substantially the same as that described and illustrated in connection with Figs. 1 to 3, except that on the pin 23a that corresponds to pin 23, I provide a coil spring 33, one end of which is provided with a shank received in a socket 34 on the side of one of the nut sections, and the other end of this spring is hooked over the rear edge of the hook 12a. When the chain 29 is pulled to move the nut sections to their open position, this movement is resisted by the springs 33, and when the tension on the chain 29 ceases, the springs 33 will swing the hooks 12a over to their hooked position. If the springs 33 are employed, it is unnecessary to employ the tail arms on the levers 14 and also the chains 32.

Many other embodiments of the invention may be resorted to without departing from the spirit of the invention.

What I claim is:

1. In a quick-action jack, the combination of a frame including a fixed part, and a power-actuated plunger extending past the fixed part, said plunger having external corrugations, a split collar comprising segmental sections with inner faces capable of interlocking with the corrugations on the plunger while resting on the fixed part to support the plunger in any position to which it has advanced; and means for expanding the collar sections by moving each of the same substantially equal amounts away from the central axis of the plunger, and simultaneously maintaining the axis of the expanded collar in alignment with the axis of the plunger so as to enable the segments to clear the corrugations and permit the plunger to pass freely through the expanded collar.

2. A quick-action jack in accordance with claim 1, having means for urging the said sections toward the plunger.

3. A quick-action jack in accordance with claim 1, including resilient means associated with the

sections for urging the said sections inwardly to maintain the same normally in engagement with the corrugations so as to support the plunger on the fixed part.

4. In a quick-action jack, the combination of a frame including a fixed part, and a power-actuated plunger extending past the fixed part, said plunger having external corrugations, a split collar comprising segmental sections with inner faces capable of interlocking with the corrugations on the plunger, resilient means for normally urging the said sections toward each other to maintain the same in engagement with the corrugations so as to support the plunger on the fixed part in any position to which it has advanced, means for expanding the collar sections against the force exerted by the resilient means to clear the corrugations and permit the plunger to rise through the collar without raising it, and latching means for latching the sections against accidental outward movement.

5. In a quick-action jack, the combination of a frame including a fixed part, and a power-actuated plunger extending past the fixed part, said plunger having external corrugations, a split collar comprising segmental sections with inner faces capable of interlocking with the corrugations on the plunger, resilient means for normally urging the said sections toward each other to maintain the same in engagement with the corrugations so as to support the plunger on the fixed part, means for expanding the collar sections against the force exerted by the resilient means to clear the corrugations and permit the plunger to rise through the collar without raising it, latching means for latching the sections against accidental outward movement, and means for actuating the same automatically by the operating means that effects the separation of the sections.

6. In a quick-action jack, the combination of a frame including a fixed part, and a power-actuated plunger extending past the fixed part, said plunger having external corrugations, a split collar comprising segmental sections with inner faces capable of interlocking with the corrugations on the plunger, resilient means for normally holding the said sections in engagement with the corrugations to support the plunger on the fixed member, rotatable means supported on the fixed member including a part located at each side of the plunger for forcing the said sections apart against the action of the resilient means, and into a position to clear the corrugations and permit the plunger to rise through the collar without raising it.

7. In a quick-action jack, the combination of a frame including, a fixed part, and a power-actuated plunger extending past the fixed part, said plunger having external corrugations, a split collar having two diametrically opposite sections with inner faces capable of interlocking with the corrugations on the plunger, a pair of substantially parallel guide bolts, one on each side of the plunger for guiding said sections in a separating movement, springs associated with said guide bolts for normally holding the sections pressed against the opposite sides of the plunger and so as to support the plunger on the fixed part, a cam located at each side, means for operating said cams in unison at will, said collar sections having faces to cooperate with said cams to enable the cams to move the collar sections outwardly to disengage them from the corruga-

tions and permit the plunger to rise through the collar without raising it.

8. In a quick-action jack, the combination of a frame having, a fixed part, and a power-actuated plunger extending past the same, said plunger having external corrugations, a split collar having two diametrically opposite sections with inner faces capable of interlocking with the corrugations on the plunger, a pair of substantially parallel guide bolts, one on each side of the plunger for guiding said sections in a separating movement, springs associated with said guide bolts for normally holding the sections pressed against the opposite sides of the plunger and so as to support the plunger on the upper end of the fixed part, a cam located at each side, latches supported on the plunger-guide for latching the sections of the split collar against accidental opening, actuating means for releasing the latches, and a lost-motion connection for actuating the cams after the latches have been released, to move the collar sections outwardly and disengage them from the corrugations, thereby permitting the plunger to rise through the collar without raising it.

9. In a quick-action jack, the combination of a frame including, a fixed part, and a power-actuated plunger extending past the same, said plunger having external corrugations, a split collar comprising sections with inner faces capable of interlocking with the corrugations on the plunger to support the plunger on the plunger-guide, latching means for holding the collar sections in their closed position, and engaging the plunger, means for forcing the collar sections apart; and actuating means operating first to unlatch the latching means, then to operate the last-named means to effect separation of the sections.

10. In a quick-action jack, the combination of a frame including a fixed part, and a power-actuated plunger within the cylinder extending past the same, said plunger having external corrugations, a split collar comprising sections with inner faces capable of interlocking with the corrugations on the plunger to support the plunger on the plunger-guide, latching means for holding the collar sections in their closed position engaging the plunger, means for forcing the col-

lar sections apart; actuating means for the latching means, and a lost-motion connection connecting the same with the last-named means to delay the outward movement of the collar sections until they have been unlatched.

11. In a quick-action jack or shore, the combination of a frame including a fixed part and a power-actuated plunger within the cylinder extending past the same, said plunger having an external thread thereon, a collar in the form of a split nut comprising separable sections and running on the thread, said nut capable of resting on the fixed part to support the plunger, means for effecting separation of the nut sections to clear them from engagement with the thread to permit the plunger to rise through the collar, said means having means associated therewith for returning the nut sections into engagement with the thread to support the plunger again on the fixed part; and handle means associated with the nut enabling the same to be rotated on the thread to adjust the plunger upwardly gradually and raise it above the position to which it was elevated by the fluid pressure.

12. In a quick-action jack, the combination of a frame including a fixed part, and a power-actuated plunger extending past the same, said plunger having external corrugations, a split collar having two diametrically opposite sections with inner faces capable of interlocking with the corrugations on the plunger, a pair of substantially parallel guide bolts, one on each side of the plunger for guiding said sections in a separating movement, springs associated with said guide bolts for normally holding the sections pressed against the opposite sides of the plunger and so as to support the plunger on the fixed part, a cam located at each side, latches supported on the relatively fixed part for latching the sections of the split collar against accidental opening, actuating means for releasing the latches, and a lost-motion connection for actuating the cams after the latches have been released, to move the collar sections outwardly and disengage them from the corrugations, thereby permitting the plunger to rise through the collar without raising it; and springs urging the latches to their latching position.

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