Feb. 17, 1959 F. T. JASKOWIAK 2,873,694

ROD TIGHTENER

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FIG. 1

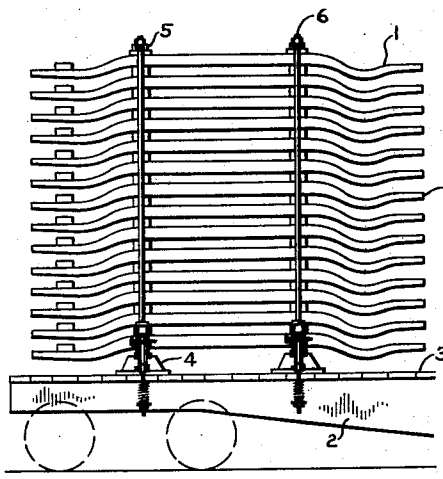
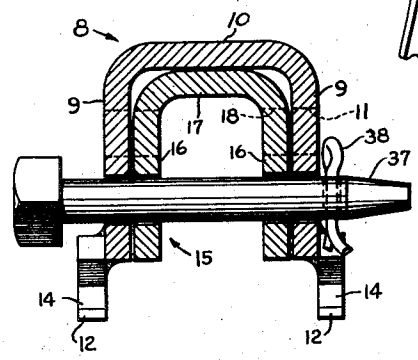


FIG. 4



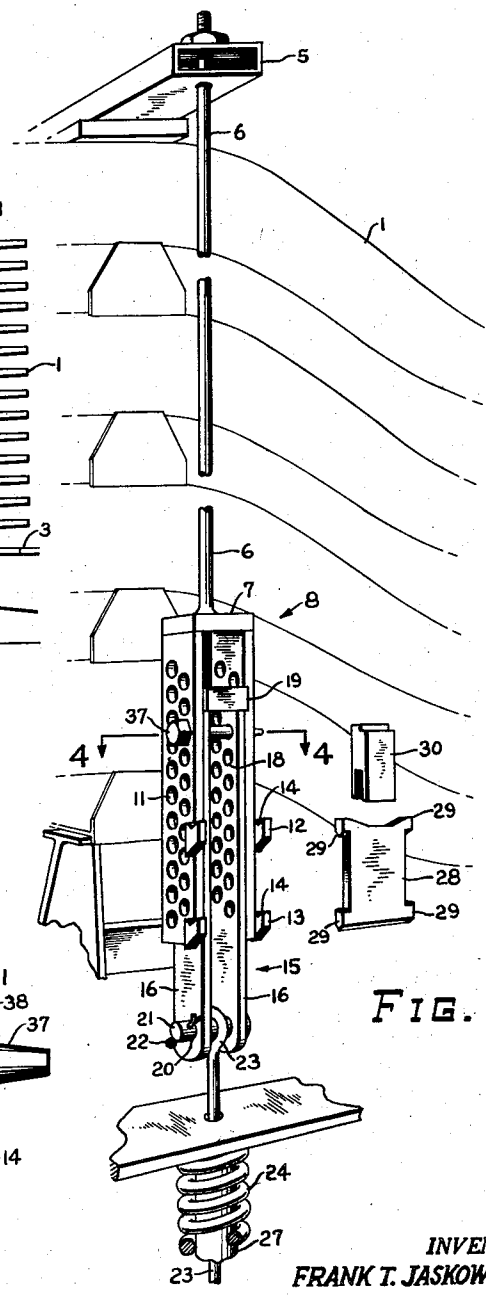


FIG. 3

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FIG. 2

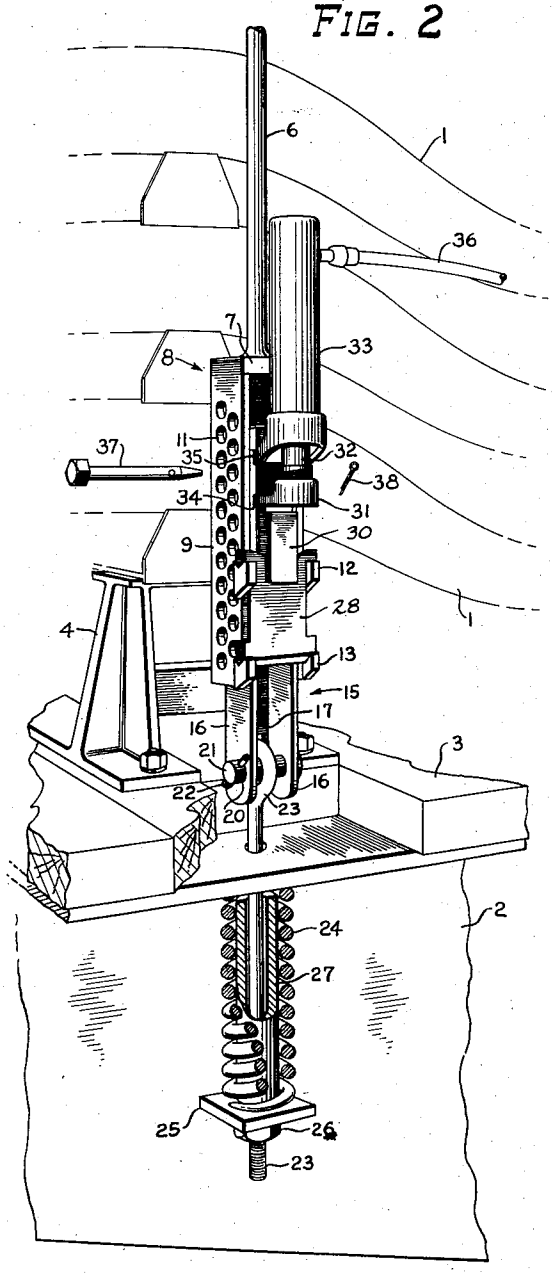
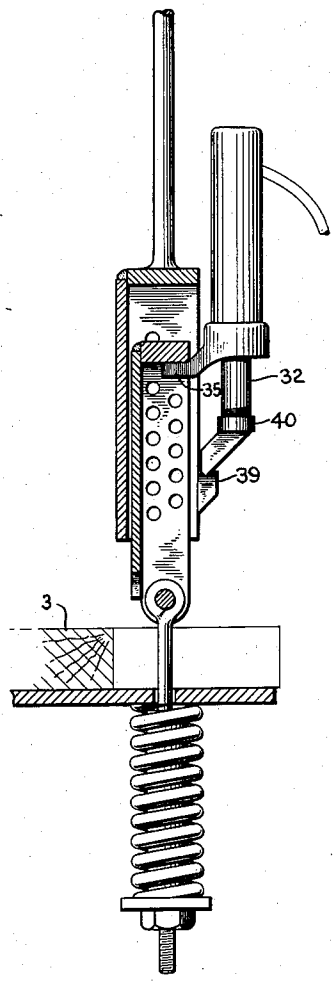


FIG. 5



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ROD TIGHTENER

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Application September 12, 1955, Serial No. 533,848

3 Claims. (Cl. 105—369)

This invention relates to rod tighteners, and more particularly to portable devices for tightening tie rods used to hold down stacks of automobile frames and the like during shipment on a flatcar or other vehicle.

Heretofore turnbuckles have been used almost exclusively to properly tension tie rods used in the shipment of automobile frames, heavy equipment or other bulky objects. The difficulty with turnbuckles has been that a substantial amount of time was consumed in adjusting them to the proper tension. In addition, a separate turnbuckle was necessary for each tie rod, which entailed considerable expense.

The present invention provides a novel apparatus which replaces the turnbuckle and comprises a hydraulically actuated mechanism which can tighten a tie rod in a fraction of the time previously required. The device is small and easily operated by one man. A substantial portion of the apparatus is portable and may be used to securely tighten a plurality of tie rods.

The accompanying drawings illustrate the best mode presently contemplated by the inventor for carrying out the invention.

In the drawings:

Figure 1 is a side elevation of a stack of automobile frames having hold-down members in which the invention is embodied;

Fig. 2 is an enlarged perspective view with parts broken away in section of the apparatus in position for tightening a tie rod employed to hold down a stack of frames;

Fig. 3 is a view similar to Fig. 2 showing the apparatus after tightening and with the portable portion removed;

Fig. 4 is a cross section of the apparatus taken on line 4—4 of Fig. 3; and

Fig. 5 is a side elevation of the apparatus with parts broken away in section and showing another embodiment of the invention.

As shown in the drawings, the invention may be utilized in securing a stack of flat-loaded vehicle frames 1 to a railroad flatcar 2. The bottom frame 1 of the stack is supported above the floor 3 of flatcar 2 by a plurality of suitable supports 4.

The stack is held down to flatcar 2 by a pair of parallel beams 5 which are disposed transversely across the uppermost frame in the stack. The ends of beams 5 are provided with suitable means for securing the upper end of a tie rod 6 thereto.

A horizontal rectangular metal plate 7 is secured at its center to the lower end of each tie rod 6 by welds or the like. In order to prevent shearing of plate 7 from the end of tie rod 6, it may be desirable to extend the lower end of tie rod 6 through a hole (not shown) in plate 7.

A channel member 8 extends downwardly from plate 7 and comprises a pair of spaced flanges 9 joined by a web member 10. The outer cross-sectional dimensions of channel 8 are approximately equal to the surface dimensions of plate 7 so that the upper end of channel

8 may be securely welded to the lower surface of plate 7.

Each flange 9 is provided with a plurality of holes 11 for purposes to be described hereinafter. Each hole 11 in one flange is in horizontal alignment with a corresponding hole in the other flange.

A pair of horizontally aligned lugs 12 is secured to the outer edges of flanges 9 approximately midway between the ends of each channel 8. A second pair of lugs 13 is similarly secured to flanges 9 but spaced beneath lugs 12. V-shaped grooves 14 are disposed in lugs 12 and 13 adjacent the outer edges of flanges 9 for purposes to be described.

A second channel member 15 is adapted to slidably fit within channel 8. Channel 15 comprises a pair of spaced flanges 16 joined by a web member 17. Flanges 16 are provided with a series of holes 18 complementing the holes 11 in flanges 9. A support plate 19 is welded to the upper end of inner channel 15 and serves to close the end thereof.

Holes 11 and 18 are so positioned that for every increment of relative longitudinal movement between channels 8 and 15, at least one series of four holes in the flanges 9 and 16 will be in horizontal alignment.

Horizontally aligned holes 20 are disposed in the lower ends of flanges 16 and are adapted to receive a pin 21 therethrough. Pin 21 is prevented from sliding out of holes 20 by the usual cotter pin 22 which passes transversely through the pin.

Pin 21 is designed to pass through the eye of an eyebolt 23 to lockingly secure the eyebolt between flanges 16. Eyebolt 23 extends downwardly and through the portion of flatcar floor 3 which extends outwardly of the side panels of flatcar 2.

A compression spring 24 is disposed over and concentric with eyebolt 23 and is positioned between the lower end of the eyebolt and the lower surface of floor 3. Spring 24 is compressed or held against the lower surface of floor 3 by spring seat 25 disposed at the lower end of the spring and secured in position by a nut 26 which is tack welded to eyebolt 23. Spring 24 normally tends to bias eyebolt 23 downwardly.

A thick-walled pipe or bushing 27 is disposed concentrically between eyebolt 23 and spring 24. Pipe 27 has an inside diameter slightly greater than the diameter of eyebolt 23, and an outside diameter approximately equal to the inside diameter of spring 24. The length of pipe 27 is less than the length of spring 24 when the spring is in its most extended position. This allows for contraction of the spring during tightening of tie rods 6.

The actuating means for the above described apparatus comprises a rectangular key 28 which is as wide as the distance between each respective pair of lugs 12 and 13. Key 28 is removable and provided with tongues 29 at each corner which are adapted to removably fit within grooves 14 in lugs 12 and 13 to lock key 28 in place and prevent any outward movement of the channel 15 with respect to outer channel 8.

A removable saddle member 30 fits down over the upper edge of key 28 and extends upwardly therefrom between flanges 16 of inner channel 15. Saddle member 30 supports and is adapted to be engaged by the ram head 31 of a ram 32 which is slidably housed in a suitable cylinder 33. Ram head 31 is slightly wider than the distance between the inner surfaces of flanges 16. The inner corners of ram head 31 are cut away at 34 so that a portion of the head may extend inwardly between flanges 16.

The lower end of cylinder 33 is provided with an inwardly extending flange 35 which extends underneath plate 19 and is in engagement therewith.

The upper end of cylinder 33 has an opening through

which hydraulic fluid is supplied. One end of a supply hose 36 is suitably connected to cylinder 33 at the opening, while the other end of hose 36 is connected to a suitable controlled pressure source, not shown.

The operation of the device is as follows:

After the stack of frames 1 is properly placed on flat-car 2, and beams 5 are positioned with tie rods 6 extending downwardly therefrom, the eye of eyebolt 23 is placed between the lower portions of flanges 16. Pin 21 is then pushed through holes 20 and the eye, and locked in position by cotter 22 to secure the compression spring 24 to inner channel 15.

Channel 15 is then placed within channel 8 to form a double-walled channel member with its open side facing outwardly of the stack of frames 1. Key 28 is placed with its tongues 29 in engagement with lugs 12 and 13 so that channel 15 is held within channel 8. Saddle 30 is fitted over the top edge of key 28, and cylinder 33 is disposed vertically thereabove so that flange 35 bears against the underside of plate 19. In addition, the ram head 31 is in engagement with the top edge of saddle 30.

To tighten each tie rod 6, hydraulic fluid is supplied to the upper portion of cylinder 33. This pushes ram 32 and therefore, ram head 31, key 28 and outer channel 8 downwardly. An upwardly extending counter force is exerted by flange 35 on the under side of plate 19. The action of the cylinder and piston telescopes channels 8 and 15 together against the force of compression spring 24. This acts to pull tie rod 6 and tighten beam 5 against the stack. Since pipe 27 is shorter than the length of extended spring 24, the spring may be compressed a substantial amount without interference from the pipe.

Saddle 30 confines the upper edge portion of key 28 and thereby prevents it from buckling under the pressure of the hydraulic actuating means. The saddle and key combined tend to keep the apparatus vertically aligned during its operation.

The amount of tightening of tie rod 6 will depend upon the hydraulic pressure applied and the strength of spring 24. Once the proper tensioning is produced, channels 8 and 15 are locked in position. This is accomplished by passing a pin 37 through a single set of horizontally aligned holes 11 and 18. No matter where the channels are in relation to each other, at least one set of four holes will be in substantial horizontal alignment, due to their spacing. If desired, more than one pin may be used to lock the channels. A cotter 38 may be used to lock pin 37 in place.

After locking of the channels, cylinder 33 and piston 32 are removed, together with saddle 30 and key 28. These members may then be used to tighten the other tie rods adjacent the stack in a manner similar to that described above.

While the channels remain locked, any relative axial movement thereof, either upwardly or downwardly, will be prevented, regardless of any change of load on the tie rods.

Another embodiment of my invention is shown in Fig. 5, in which only one pair of grooved lugs 39 is provided on the outer channel member 8. A flanged ram head 40 is secured to the lower end of piston 32 and is adapted to rest in the grooves of lugs 39. In this instance, the hydraulic force is brought to bear directly against the lugs, no key or saddle member being necessary. This construction is adequate where the amount of tension needed is not too great.

The tightener can be used to put members such as tie rods under a much higher tension than is possible with turnbuckles. Under certain circumstances, it may be desirable to utilize a tension gauge and/or automatic pressure shut-off device (not shown) to accurately control the tightening.

Each tie rod 6 and eyebolt 23 is initially secured against substantial axial movement by the beam 5 and spring 24 respectively. Tie rods 6 and eyebolts 23 are adjustably secured in tension by the apparatus of the invention.

The invention provides a novel means to tighten tie rods and the like which is far superior to turnbuckles, is less costly and requires much less time. The actuating parts of the device are removable and may be used to tighten any number of tie rods quickly and easily.

Various modes of carrying out the invention are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

I claim:

1. In an apparatus for securely holding articles to the floor of a flat car, a holddown member disposed across the top of said articles, a plurality of tie rods with each of said tie rods secured at one end to the opposite end portions of the holddown member and extending downwardly from the latter, an elongated channel member secured to the other end of each tie rod and being U-shaped in a plane transverse to the longitudinal length thereof, a plurality of lugs secured to each side portion of the U-shaped channel member, a second channel member of the same general U-shape as the first named channel member slidably disposed within the first named channel member, plate means secured across one end of the second channel member and connecting the sides of said second channel member, means resiliently connecting the other end of the second channel member to a flat car, means engageable with said lugs and said plate means to telescope the two channel members together against the force of said resilient means to urge each tie rod downwardly, and means to lock the channel members in telescope relation.

2. The apparatus of claim 1 in which the telescoping means comprises a removable key engageable with the lugs with downward movement of the key producing a corresponding downward movement of the upper channel member, a saddle member removably secured to the key, a hydraulic cylinder having a ram slidable therein, said ram adapted to be seated on the upper portion of the saddle, a flange secured to said cylinder and extending inwardly underneath said second named plate and in engagement therewith, and means to supply hydraulic fluid to said cylinder to push the ram downwardly against the saddle with an upward counterforce being exerted by said cylinder flange against said second named plate to telescope said channel members together.

3. The apparatus of claim 1 in which the telescoping means comprises, a hydraulic cylinder disposed adjacent said channel members with said cylinder having a ram slidable therein, said ram being adapted to be received by the lugs, a flange secured to said cylinder and extending inwardly underneath said second named plate and in engagement therewith, and means to extend the ram with respect to the cylinder to push the ram downwardly upon the lugs with an upward counterforce being exerted by said cylinder flange against said second named plate to telescope said channels together.

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