March 14, 1944. E. L. ALEXANDER ET AL 2,344,383

SHORING FOR PORTABLE DRILLING RIGS

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Fig. 1.

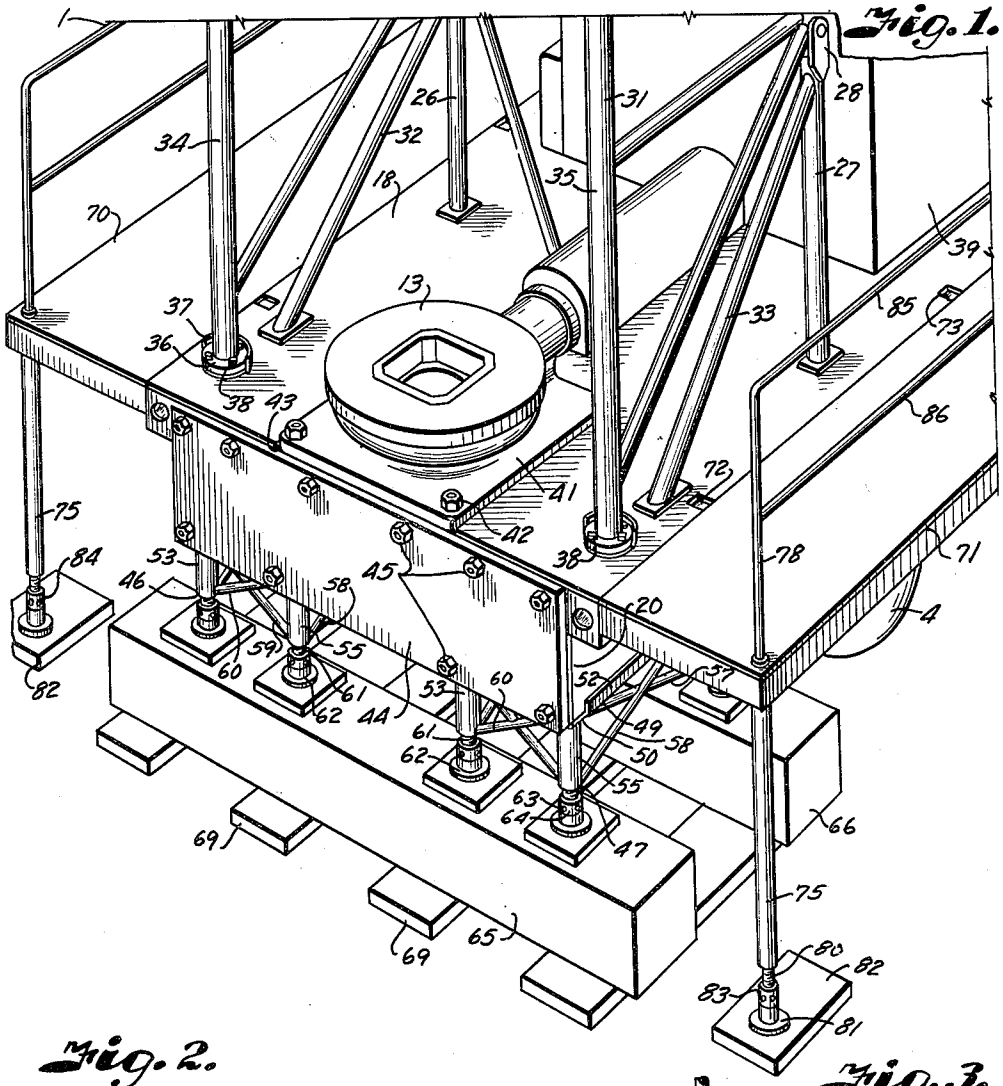


Fig. 2.

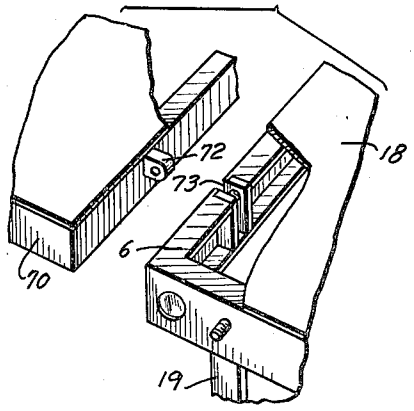
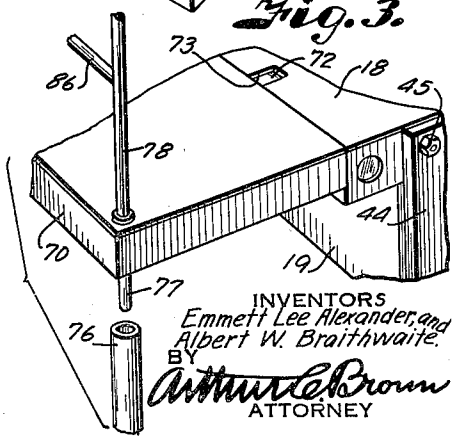


Fig. 3.



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Fig. 4.

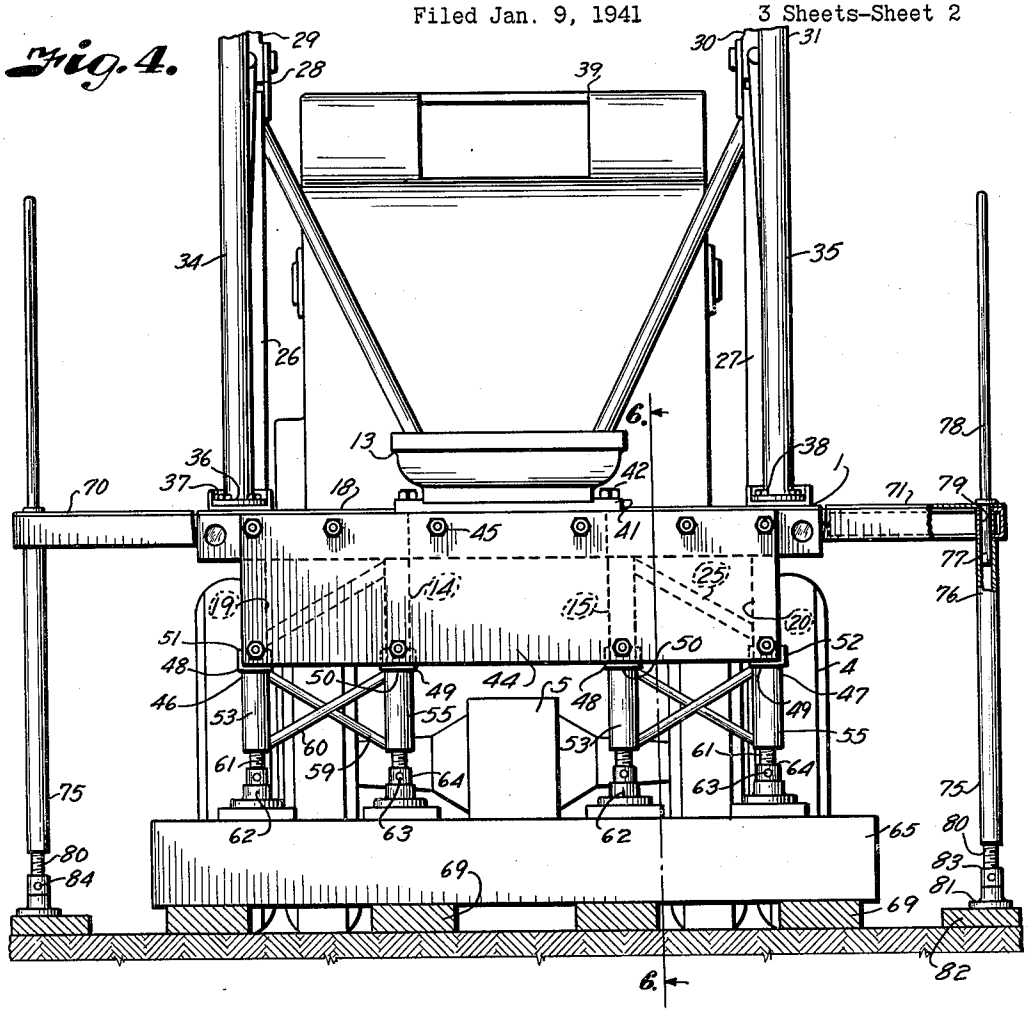
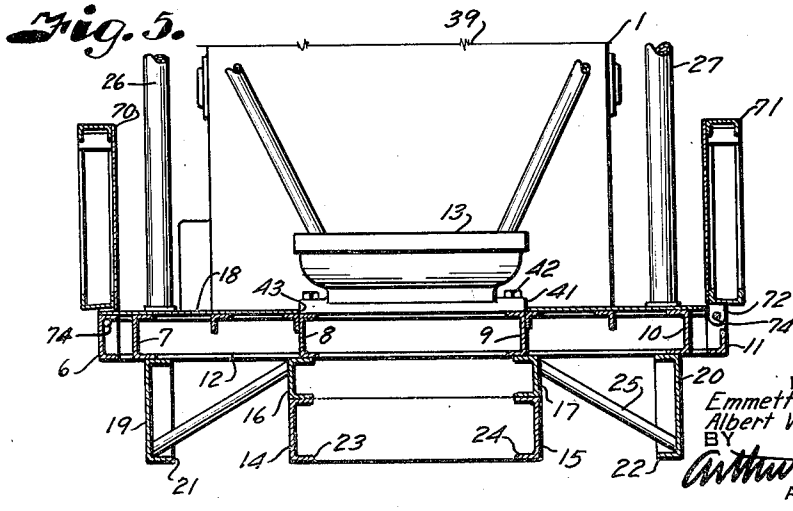


Fig. 5.



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Fig. 6.

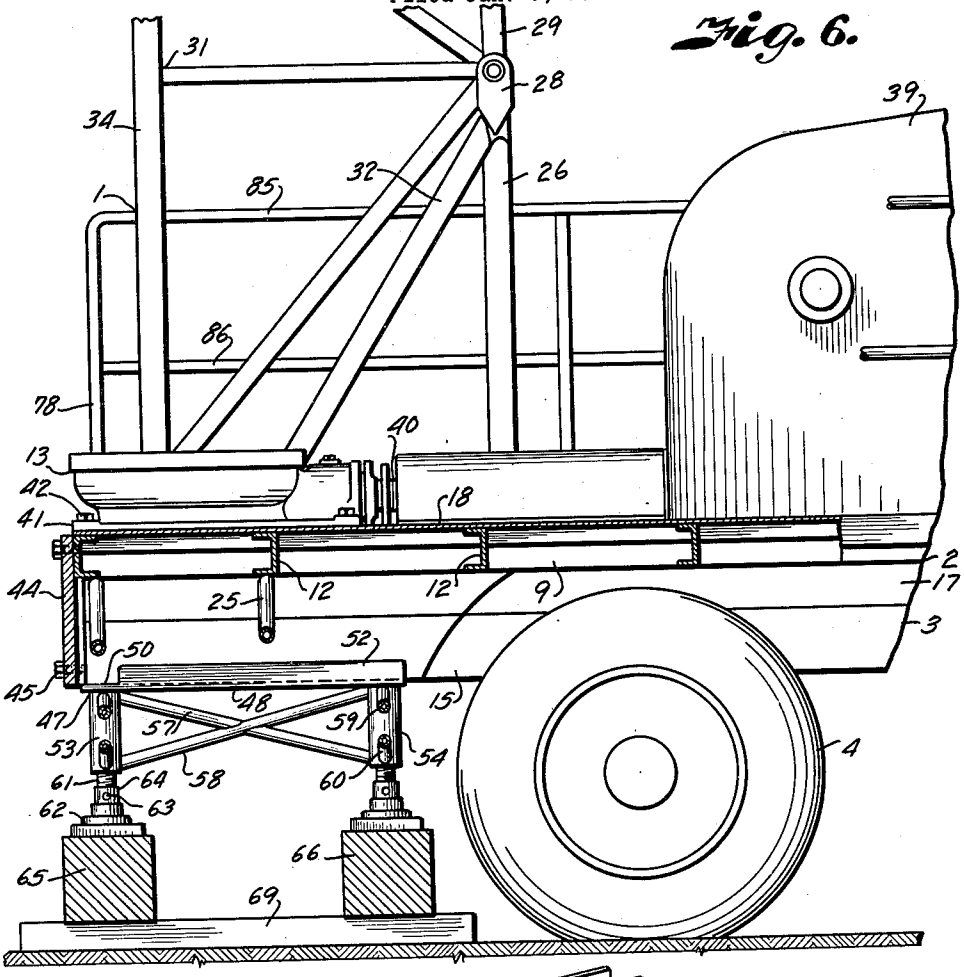
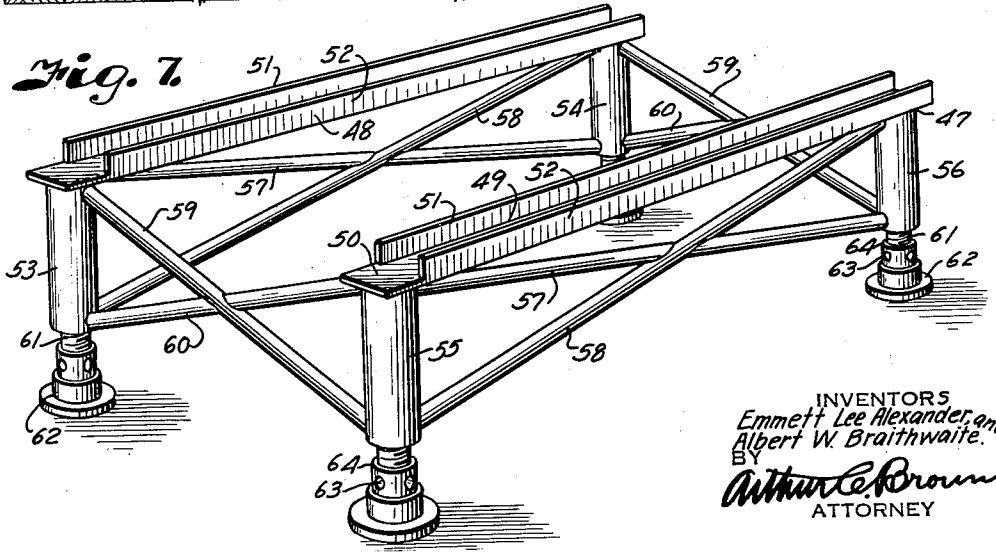


Fig. 7.



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Patented Mar. 14, 1944 2,344,383

UNITED STATES PATENT OFFICE

2,344,383

SHORING FOR PORTABLE DRILLING RIGS

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Application January 9, 1941, Serial No. 373,775

5 Claims. (Cl. 189—11)

This invention relates to drilling rigs, particularly those of portable type wherein the derrick platform, derrick, turntable, and draw-works are mounted on the chassis of a vehicle so that the rig may be readily transported from one drilling site to another and quickly set up for drilling operations. Since drilling loads are extremely great, especially those acting on the derrick when handling the drilling string, well casing, or the like, it is desirable to provide undershoring to support the rear of the vehicle frame directly from the ground independently of the wheels.

It is, therefore, a principal object of the present invention to provide a simple shoring structure that is readily assembled in position and adjusted so that all of the footing members thereof take their proportional share of the load when supporting the platform in level position.

Further objects of the invention are to provide shoring members which consist of built up units that are of strong, light weight construction and equipped with channel-like saddles for seating longitudinal members of the vehicle frame and/or platform; and to provide a portable rib with an undershoring and platform construction which facilitates disengagement of the rig from a finished well.

It is a further object of the invention to provide the platform with lateral extensions which are adapted for support by adjustable posts cooperating with the main undershoring units.

In accomplishing these and other objects of the invention, as hereinafter pointed out, we have provided improved structure, the preferred form of which is illustrated in the accompanying drawings, wherein:

Fig. 1 is a perspective view of the rear portion of a drilling rig embodying the features of the present invention.

Fig. 2 is a detail fragmentary view of a portion of the platform and one of the lateral extensions particularly illustrating the hinge connection therebetween, with the extension shown in spaced relation.

Fig. 3 is a similar view showing the platform extension connected with the platform and showing the upper end of one of the jack-posts therefor.

Fig. 4 is an end view of the drilling rig particularly illustrating the undershoring of the platform and platform extensions.

Fig. 5 is a cross-section through the platform showing the platform extensions in folded position.

Fig. 6 is a longitudinal section on the line 6—6 of Fig. 4.

Fig. 7 is a detail perspective view of one of the undershoring units.

Referring more in detail to the drawings:

1 designates a portable drilling rig including a vehicle 2 having a chassis comprising a frame 3 supported at the rear on wheels 4, the wheels being connected with an axle housing 5 carrying the frame 3 on springs (not shown), as in conventional automotive practice.

Mounted on the frame 3 is a platform including longitudinal rails 6, 7, 8, 9, 10 and 11, and cross rails 12 that are connected therewith. The central longitudinal rails 8 and 9 are spaced apart a sufficient distance to carry a turntable 13 which is supported directly above the longitudinal members of the chassis frame 3 and rearward extensions 14 and 15 thereof. The platform thus described is carried on longitudinal sills 16 and 17 which are supported directly on the vehicle frame. With the exception of the space between the rails 8 and 9 at the location of the turntable, the platform is covered with a sheet metal flooring 18 to provide a working space thereon. Secured to the under side of the platform, substantially in alignment with the rails 7 and 10, are sub-sills 19 and 20 having lower flanges 21 and 22 located substantially in plane with the lower flanges 23 and 24 of the extensions 14 and 15 as shown in Fig. 5. The sub-sills, being located substantially in alignment with the wheels of the vehicle, terminate short of the wheels and are braced from the platform frame by tubular braces 25 as shown in dotted lines in Fig. 4 and full lines in Fig. 5.

Mounted on the platform, directly over the forward ends of the sub-sills 19 and 20, are posts 26 and 27 carrying bearings 28 at their upper end for trunnioningly mounting the forward legs 29 and 30 of a derrick 31. The posts are retained in perpendicular position by braces 32 and 33 which connect with the platform as shown in Fig. 1. The front legs 34 and 35 of the derrick have flange ends 36 adapted to seat in sockets 37 which are carried on the floor of the derrick and are secured therein by fastening devices 38 extending through suitable openings in the flanges 36 and through registering openings in the frame of the platform. The derrick is thus adapted to be carried in a horizontal position during transport and to be moved to perpendicular or drilling position when the drilling rig is set up at a drilling site as in portable drilling rig practice.

Mounted forwardly of the derrick is a draw-

works 39 including a winding drum for raising and lowering the drilling string, and a power shaft 40 having operative connection with the turntable 13. The turntable includes a base plate 41 that is secured to the rails 8 and 9 by fastening devices 42 to close the opening 43 in the platform floor 18.

The rear ends of the sills 19, 14, 15 and 20 are connected by a removable plate 44, the plate being secured to the respective longitudinal sills and to the rearmost cross rails 12 by fastening devices such as bolts 45, the rearmost rail being divided at the rear edge of the opening 43. It is apparent that with removal of the turntable and plate 44, the space between the sills 23—24 is open so that when the well is completed the drilling rig may be moved away from the completed well casing and flow pipes.

As above mentioned, it is the purpose of the present invention to provide the drilling rig with an undershoring to support the rear of the platform independently of the spring and wheel mounting of the vehicle. This is accomplished by means of a pair of individual shoring units 46 and 47, one of which is shown in detail in Fig. 7. As illustrated in Fig. 7, a shoring unit includes longitudinal channels 48 and 49 arranged with the web portions 50 thereof in horizontal position to seat the sills 19 and 14 thereon in case of the shore unit 46 and the sills 15 and 20 in the case of the shore unit 47. The channels are also arranged so that the side flanges 51 and 52 thereof project upwardly over the sides of the longitudinal sills to prevent lateral movement thereof and assure proper placement of the units. Fixed to the respective ends of the channels and depending therefrom are tubular posts 53, 54, 55 and 56. The posts 53—54 and 55—56 are respectively connected by cross braces 57 and 58, and the posts 53—55 and 54—56 are connected by similar cross braces 59 and 60 respectively.

Threadedly mounted in each of the posts are externally threaded shafts 61 having swivel connections with footing flanges 62 in the manner of a jack. The shafts are rotated to effect levelling of the channels by inserting a bar (not shown) through openings 63 in collars 64 which are attached to the shafts. The units just described are carried on cross sills 65—66 which in turn are carried on longitudinally arranged mud sills 69.

Mounted on the sides of the platform are platform extensions 70 and 71 extending along the sides thereof and preferably hinged thereto by ears 72, the ears 72 being engaged in slots 73 formed in the outer longitudinal sills 6 and 11 and secured by hinge pins 74. The platform extensions are supported in the plane of the frame by jack-posts 75 located along the length thereof and which include tubular sections 76 engaging the terminals 77 of rail supporting posts 78, the rail posts extending through sockets 79 in the platform extension and into the open upper ends of tubular sections of the jack-posts. Threaded in the lower ends of the tubular sections of the jack-posts are threaded shafts 80 carrying foot flanges 81 similar to the foot flanges previously described, the shafts 80 being rotated to bring the foot flanges into engagement with supporting blocks 82 by means of collars 83 which are fixed on the shafts and have openings 84 therein for passing a turning bar (not shown). The posts 78 carry horizontal rails 85 and 86 which extend along the sides of the platform preferably to the forward end thereof.

When the drilling rig is being transported, the derrick is carried in horizontal position and the side rails are positioned between the draw-works and the platform extensions, with the platform extensions in vertical position, as shown in Fig. 5, to give a desired road clearance at the sides of the vehicle. The shoring units 46 and 47 may be carried on the platform at the forward end thereof along with the mud sills, or these parts may be transported on a separate service vehicle.

When the drilling rig reaches the drilling site, the mud sills are placed in proper position on the ground to support the cross sills 65 and 66. The shoring units are then placed in position on the cross sills so that the channel-like saddles thereof align with the platform sills 19, 14, 15 and 20. The threaded shafts are then adjusted to raise the channel-like saddles into seating engagement with the platform sills, whereupon the rear end of the platform is rigidly supported independently of the vehicle wheels. The platform extensions may then be lowered and supported by the jack-posts 75, the shaft extensions thereof being adjusted to bring the footing flanges into engagement with the blocks 82.

With the rig set up for drilling operations, the load acting upon the derrick is substantially the same load acting upon the rotary table, the load being the weight of the string. This load is alternated from the rotary table to the derrick; consequently, the load is distributed over the ground area occupied by the shoring units whether the load is acting upon the turntable or derrick. This is readily apparent when it is considered that the load on the turntable is transmitted through the inner longitudinal sills and the load when acting on the derrick is applied through the outer longitudinal sills to the vertical supports provided under each of the sills. The load is then transmitted from one set of supports to the other of each shoring unit by the braces by which they are interconnected.

When the drilling operation is completed, the bore-hole is cased and equipped with the usual flow control apparatus, while the drilling rig and derrick are in position. The upper portion of the well equipment will therefore extend through the floor of the platform, however, the rig may be disengaged upon removal of the turntable over the top of the casing, and disconnecting the plate 44 by removing the fastening devices 45. The opening in the platform is then clear so that the truck may be moved away from the drilling site after the shoring units have been removed.

From the foregoing it is obvious that we have provided a portable drilling rig wherein a platform is rigidly supported on undershoring that is readily placed and which adequately supports the derrick loads.

What we claim and desire to secure by Letters Patent is:

1. In an apparatus of the character described including, a wheel supported frame adapted to support a shiftable load, said frame having spaced inner portions arranged to support the load when the load acts intermediate said inner portions and having outer portions spaced from the inner portions and arranged to support the load when the load is shifted to act upon the sides of said frame, shoring units for said frame adapted to be disposed under opposite sides of said frame, each unit having vertical members located under

said supporting portions, and brace means connecting the vertical members disposed under the outer portions with the vertical members disposed under the inner portions whereby said shoring units provide common and direct ground supports for the load when shifted to either one of said positions.

2. In an apparatus of the character described including, a wheel supported frame adapted to support a shiftable load, said frame having spaced inner sills arranged to support the load when the load acts upon the frame intermediate said inner sills and having outer sills spaced from the inner sills and arranged to support the load when shifted to act upon sides of said frame, shoring units adapted to be disposed under opposite sides of said frame, each having vertical members located under said sills, and brace means connecting the vertical members disposed under the inner sills with the brace members disposed under the outer sills whereby said shoring units provide common and direct ground supports for said load when shifted to either one of said positions.

3. In an apparatus of the character described including, a wheel supported frame adapted to support a shiftable load, said frame having spaced inner sills arranged to support a load acting upon the frame intermediate said inner sills and having outer sills spaced from the inner sills and arranged to support the load when shifted to act upon the sides of said frame, shoring units adapted to be disposed under opposite sides of said frame, each having vertical members located under said sills, brace means connecting the vertical members that are disposed under the inner sills with the vertical members disposed under the outer sills whereby said shoring units provide common supports for the load in either of said positions, and means for adjusting length of the vertical members.

4. In an apparatus of the character described including, a wheel supported frame adapted to support a shiftable load having spaced longitudinal inner sills arranged to support the load when the load acts on the frame between said sills and having spaced longitudinal outer sills arranged to support the load when the load is shifted to act upon the sides of the frame, shoring units adapted to be disposed under opposite sides of the wheel supported frame, each having longitudinal members respectively engaging the spaced longitudinal sills, tubular posts fixed to ends of said longitudinal members, screw shafts adjustably positioned in said posts, bracing connecting the tubular posts in the respective units, and foot members having swivel connections with the screw shafts, said screw shafts being independently rotatable to bring said longitudinal members into supporting engagement with said sills whereby said units provide common supports for said load in either of said load positions.

5. In an apparatus of the character described including, a wheel supported frame adapted to support a shiftable load having spaced longitudinal inner sills arranged to support the load when the load acts upon the frame between said sills and having spaced longitudinal outer sills arranged to support the load when the load is shifted to act upon the sides of the frame, shoring units adapted to be disposed under opposite sides of the wheel supported frame, each having longitudinal channel members forming seats for seating longitudinal sills, tubular posts fixed to ends of said longitudinal members, means interconnecting the tubular posts, screw shafts, and foot members having swivel connections with the screw shafts, said screw shafts being independently rotatable to bring said longitudinal members into supporting engagement with said sills whereby said units provide common supports in either of said load positions.

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