May 27, 1952 W. F. BATES ET AL 2,598,099

METHOD AND APPARATUS FOR INSTALLING DRILLING EQUIPMENT

Filed March 15, 1948 3 Sheets-Sheet 1

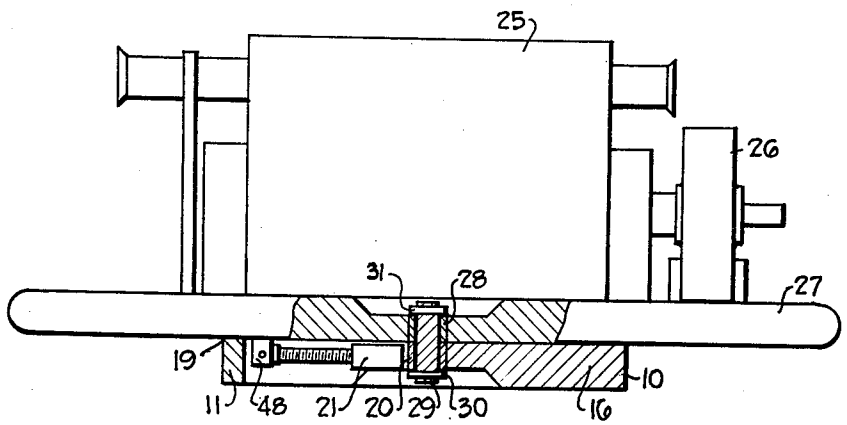


Fig. 1

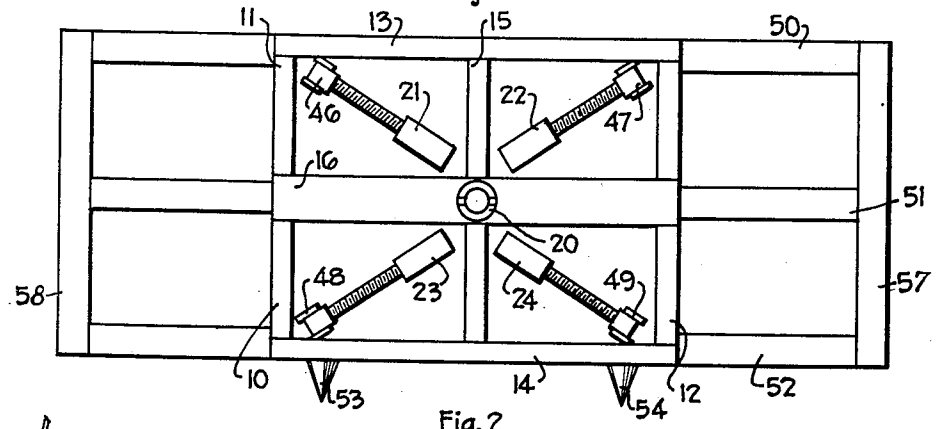


Fig. 2

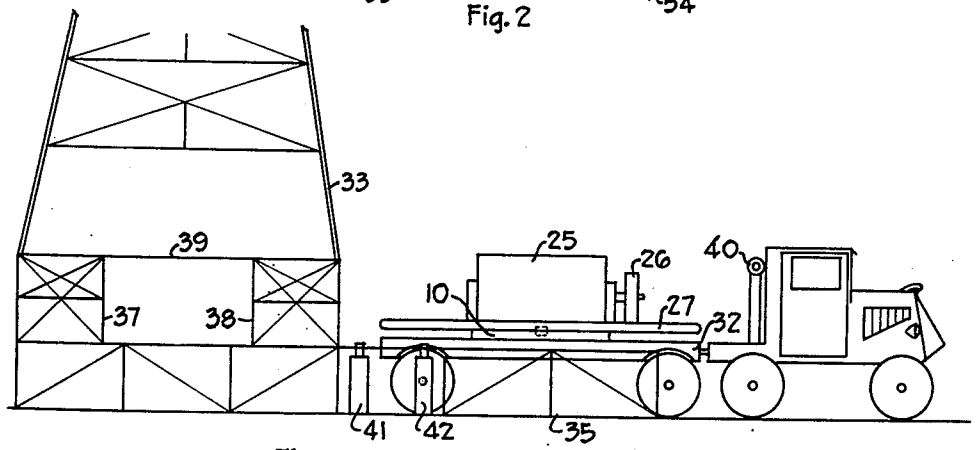


Fig. 3

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METHOD AND APPARATUS FOR INSTALLING DRILLING EQUIPMENT

Filed March 15, 1948 3 Sheets-Sheet 2

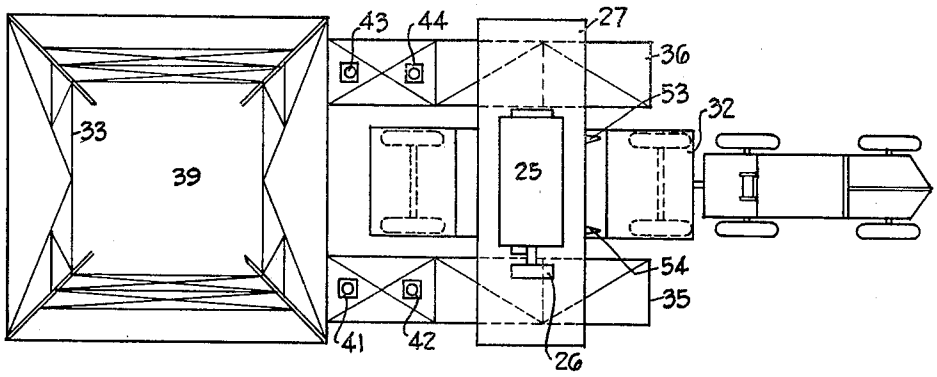


Fig. 4

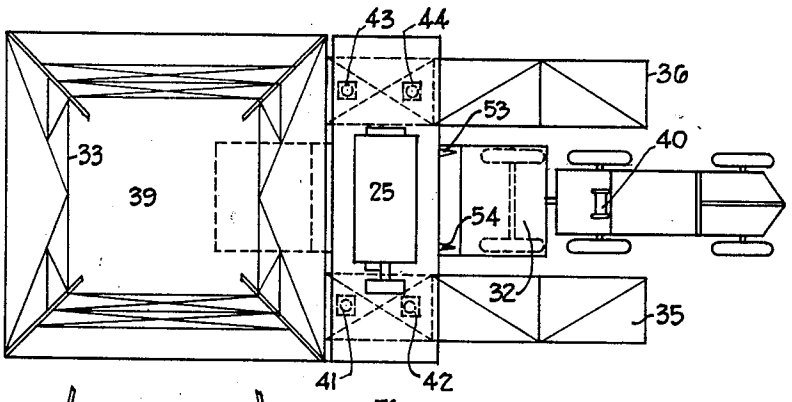


Fig. 5

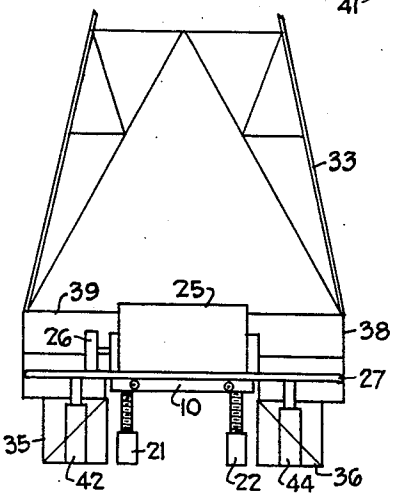


Fig. 6

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METHOD AND APPARATUS FOR INSTALLING DRILLING EQUIPMENT

Filed March 15, 1948 3 Sheets-Sheet 3

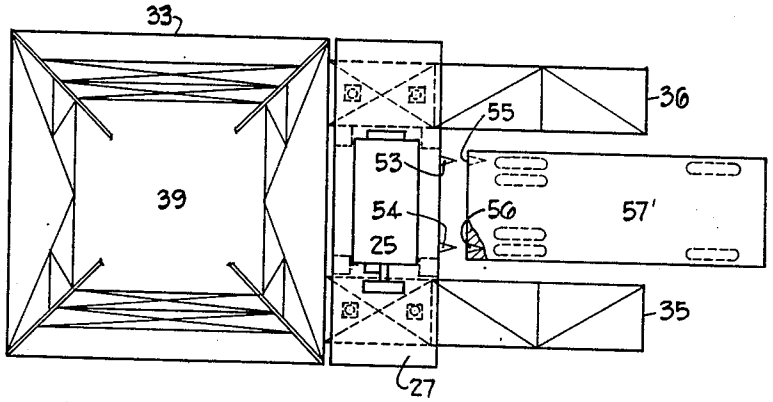


Fig. 7

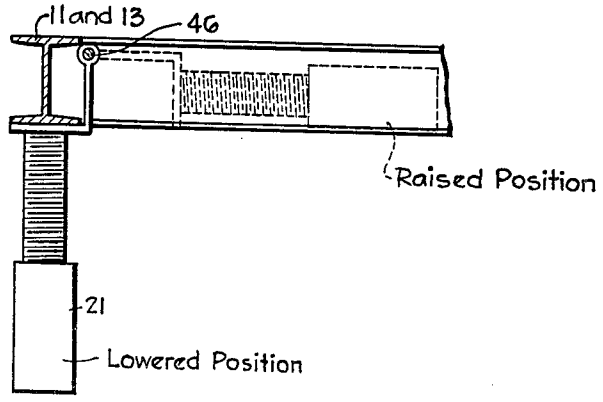


Fig. 8

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UNITED STATES PATENT OFFICE

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METHOD AND APPARATUS FOR INSTALLING DRILLING EQUIPMENT

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Application March 15, 1948, Serial No. 15,024

3 Claims. (Cl. 214—38)

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This invention relates to a method and apparatus for installing well drilling equipment at a well derrick and pertains more particularly to means and method for unloading heavy drilling equipment from trucks or trailers and installing it at a predetermined position on suitable foundations at the well site.

Modern well drilling operations require the use of many items of heavy and bulky equipment on and about the well derrick and its substructure. This auxiliary equipment may comprise drawworks, drawworks power units, hydromatic brakes, motors, pumps, engines, etc. Generally, several of these pieces of equipment are combined into operating units by mounting them on a frame or platform. For example, a drawworks may be mounted on a frame with its hydromatic brake, and the combination may be then transported and used as a unit. Such units may be 18 feet or more in length and as wide as a truck or trailer by which they are normally moved from one location to another. Since these equipment units are usually bulky and may weigh 20 tons or more, it is commonly necessary to unload them from trucks or trailers onto suitable foundations at the drilling site by a crane or derrick, which is sometimes difficult in rough drilling terrain and also involves the use of personnel experienced in rigging and in operating the crane. The dismantling of equipment into small units is both costly and time-consuming, and multiplies the number of pieces of equipment that must necessarily be re-aligned when the equipment is again assembled.

It is therefore a primary object of the present invention to provide a method for easily and quickly loading or unloading drilling equipment from any conveyance such as a truck or trailer to a foundation comprising separated bases.

It is also an object of the present invention to provide apparatus for loading or unloading heavy and bulky equipment as a single unit from any conveyance without use of special hoisting equipment.

Other objects and advantages of the invention will become apparent from the following detailed description taken with reference to the drawings, wherein:

Figure 1 is a front view, partially in cross section, of one embodiment of a turntable, according to the present invention when secured to the bottom of an equipment unit.

Figure 2 is a bottom view of the embodiment of the turntable shown in Figure 1.

Figure 3 is a view in side elevation illustrating

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an equipment unit and turntable mounted on a trailer positioned between equipment foundations adjacent a well derrick.

Figures 4 and 5 are top plan view of the equipment shown in Figure 3 when turned in its unloading position, showing the location of power jacks in the equipment foundation.

Figure 6 is a view in side elevation illustrating the equipment unit after removal from the trailer.

Figure 7 is a top plan view of a trailer of equipment being positioned adjacent and aligned with a previously positioned load of equipment, showing detail of alignment cones.

Figure 8 is a detailed view of one of the retractable legs or jacks of the turntable in its raised and lowered positions.

Briefly, the method of the present invention for transferring heavy loads from the bed of a truck to separated bases or foundations comprises the steps of placing the load lengthwise on the bed of a truck in a pivotal relationship therewith, moving the truck until it is positioned between specially provided properly spaced unloading bases, pivoting the load on the truck so that the ends of said load overhang the sides of the truck, transferring the load to the jacks provided in the unloading bases, withdrawing the truck from beneath the load, and lowering said load into a predetermined position on the bases.

The apparatus involved in using this method comprises a pair of spaced bases or supports, movable truck means with the load skids positioned higher than the bases upon which a load is to be transferred and turntable means between the truck bed and said load, upon which the load is carried in pivotal relationship with the turntable means.

A preferred embodiment of a turntable as shown in Figure 1 comprises upper and lower turntable plates, 27 and 10, respectively, mounted for sliding rotational motion with regard to each other, said turntable 10 comprising a rectangular outer framework of I-beams 11, 12 and 13 and 14 reinforced by cross members 15 and 16. The top 19 of the framework may or may not be covered with a solid piece of plate steel or the like to give a smooth surface upon which a load may turn. Formed or fastened in the center of the turntable plate 10 and preferably flush with the top thereof is a pivot bearing 20. If desired, legs 21, 22, 23 and 24 may be attached, as by hinge members 46, 47, 48 and 49, in a recessed manner under the top 19 of the turntable 10 as shown in Figures 2 and 8. These legs may be of unitary construc-

tion but are preferably adjustable, as for example, screw jacks. Thus the legs may be let down, anchored in a vertical position, and individually adjusted to any desired height as is described hereinbelow. The upper turntable plate 27 comprises an elongated rectangular framework of I-beams 50, 51, 52, 57 and 58. Formed or fastened in plate 27 in substantially the center thereof is a pivot bearing 28 adapted to receive a pivot pin 29.

A unit load of equipment, such as a drawworks 25 and its brake 26, may be secured in a fixed manner to a suitable frame base or load skid which forms the upper turntable plate 27, as shown in Figure 1. The load and the plate 27 are then mounted on the lower turntable plate 10 so that the pivot bearing 28 in the plate 27 is in alignment with the pivot bearing 20 in the lower turntable plate. A pivot pin 29 is then inserted through bearings 20 and 28 and rotatably fastened therein by any suitable means, as by holding nuts, pins 30 and 31, or the like. Preferably, the load is mounted on said upper turntable plate 27 so that the center of gravity of said load is located substantially over said pivot pin 29. The entire load and turntable is then loaded lengthwise on a truck or trailer 32 (Figure 3) and transported to the drilling site. The length of the load and its frame or base 27 is substantially greater than the width of the truck so that after the load has been pivoted ninety degrees in a horizontal plane on the truck it will extend outward from each side of the truck and over the foundation onto which it is to be installed.

By utilizing pivot means such as the above-described turntable it is possible to unload drilling equipment from the truck 32 to a suitable foundation adjacent a well derrick 33 and its substructure already erected over a well site. While any type of foundation made of any suitable material such as wood, steel, concrete, or the like may be used, it is essential that the foundation be in the form of spaced or separated piers or bases, preferably parallel to each other. The distance between the spaced piers should be great enough to permit the passage of a truck or trailer while the positioned height of the load on the truck or trailer should be higher than the top of the piers to permit overhanging equipment carried by said truck or trailer to pass and to be positioned over said piers. If desired, the piers may constitute extensions of the derrick substructure. This method of unloading equipment is especially adaptable for use with a drilling rig substructure as disclosed in copending application Serial No. 794,370, filed December 29, 1947, now Patent No. 2,594,847 granted April 29, 1952. The following description of the present method of unloading will be hereinafter described in conjunction with this type of substructure.

As shown in Figures 3, 4 and 5, the drilling rig substructure comprises two spaced parallel base trusses 35 and 36, upon which may be mounted spaced parallel floor trusses 37 and 38, a floor 39 and the derrick 33. The central section of said floor truss 38 may be arched or cut away to permit the back end of a truck to be partially positioned thereunder, if desired, during the unloading operation. It will be noted that the base trusses 35 and 36 are elongated, extending a considerable distance from the derrick, thus permitting the loading of equipment onto said base trusses. Load lifting means such as, for example, hydraulic jacks 41, 42, 43 and 44 are permanently or removably installed within or adjacent the base trusses 35 and 36. In transferring a load of drilling equipment from a truck 32, the truck 32 carrying said load and turntable is backed into position between the spaced base trusses 35 and 36, as shown in Figure 3. The load and its base or upper turntable plate 27, which have heretofore been positioned lengthwise on the truck, are now pivoted on the lower turntable 10 substantially 90 degrees (Figure 4) about the pivot pin 29 between said upper and lower turntable plates 27 and 10. Movement of the load on the turntable may be easily attained in any suitable manner. For example, a power winch 40, mounted on the back of the truck 32, may be used by connecting its cable to one far corner of the upper turntable plate 27. If desired, lubrication may be applied between the upper and lower turntable plates 27 and 10.

With the upper turntable plate 27 turned at 90 degrees to the truck 32, both ends of said load base 27 extend over the spaced base trusses 35 and 36, as shown in Figure 4. The truck 32 is then backed until the equipment load base is located at its desired position directly over the jacks 41, 42, 43 and 44 in said base trusses as shown in Figure 5. The load and turntable 10 may be then removed from the truck by raising it from the truck bed by any suitable means as by said hydraulic jacks 41, 42, 43 and 44. The truck is withdrawn from under the load after the load has been raised by the jacks and transferred thereto. With the truck 32 removed from beneath the load, the turntable plate 10 remains affixed to the load base 27 by means of the pivot pin 29. If desired, the lower turntable plate may be turned 90 degrees or until it is again parallel with the load base 27. This is necessary in the event that the length of the lower turntable plate 10 is greater than the width of the upper turntable plate 27 and another load is to be mounted immediately adjacent the first load. While the jacks 41, 42, 43 and 44 support the load, the hinged and retractable legs 21, 22, 23 and 24 in the bottom of the turntable 10 may be lowered and locked into vertical position by any suitable means. The jacks 41, 42, 43 and 44 may be lowered until the weight of the load is distributed evenly on the four legs and the base trusses 35 and 36. If the legs are of the adjustable type, they may be set to compensate for any unevenness of the ground. Or, if desired, the load may rest on legs 21, 22, 23 and 24 and the jacks 41, 42, 43 and 44 (as shown in Figure 6) or on the legs alone, and said jacks may be removed for use in unloading equipment from other trucks. The jacks may also be mounted in the turntable. With this alternate construction the base of the jacks would act on the truck bed and the load would be raised (prior to turning it 90°) to a height that would permit the load skids to clear the piers as the load is turned and backed into position. When the jacks are slacked off the ends of the load skids rest on the piers thereby removing the load from the truck bed. After the truck is removed the retractable legs may be set.

The sequence of steps in the above-described method may be reversed for loading any drilling equipment from spaced piers or foundations onto a truck. The load would be raised, as by jacks, and the turntable legs retracted after which the lower turntable plate 10 would be turned so as to be parallel with the bed of the truck 32 which would be then lowered until the turntable and its

load are resting on the truck, after which the load base or upper turntable plate **27** and its load would be turned substantially 90 degrees or until they were parallel with or positioned lengthwise on the bed of the truck.

Although the lower turntable plate **10** is preferably substantially wider than the width of the truck bed so as to furnish a broader base support for the load positioned on said turntable, if desired, the lower turntable plate **10** may be no wider than the truck bed thus eliminating any turning of the turntable with relation to the load base after unloading or before loading.

Although the above description is confined to transferring a load to and from a truck, it is to be understood that the term "truck" is meant to include trailers, semi-trailers, skids or any type of movable platform means. While the description was also confined to a turntable, the load may be mounted in pivotal relationship with the bed of the truck by any suitable means. For example, a pivot pin may be secured in the bed of the truck so that it projects a short height above the bed to engage a pivot bearing in the base of the load, said bearing preferably being located below the center of gravity of the load. Similarly, a downwardly extending pivot pin may be affixed to the base of the load while the pivot bearing may be recessed in the bed of the truck. If desired, both the base of the load and the bed of the truck may have tubular bearing means formed therein or securely affixed thereto, said bearing means being adapted to have a pivot pin inserted therein. Thus, after placing the load on the truck so that their bearings are in alignment, a pivot pin may be inserted about which said load may be pivoted. In all of the above examples the base of the load would pivot about the pivot pin but the weight of the load would pivot on the bed of the truck swept by the base of the load in its rotation.

The use of adjustable legs **21, 22, 23** and **24** also permits the raising or lowering of the plate **27** and its load **25** to the level of other pieces of equipment which may be brought in and positioned adjacent the equipment mounted on plate **27**. Since perfect alignment between related pieces of drilling equipment, as between drawworks and its transmission, is absolutely necessary, it is desirable to provide means for accomplishing this object. In order to secure the proper alignment between two pieces or loads of equipment, the face of the upper turntable plate **27** under the first piece of equipment has alignment cones **53** and **54** fixedly secured thereto, as shown in the drawing, Figures 2, 4, 5 and 7. The second load to be positioned adjacent the first may be mounted on a truck or trailer **57'**, as shown in Figure 7, which may be left in place during the drilling operations or the load may be removed from the truck or trailer and supported by any of various methods including the one outlined for the first equipment unit.

When the second load is to be left on the trailer (Figure 7) the rear end of the trailer to be positioned adjacent the first piece of equipment is equipped with cone-shaped recesses **55** and **56** which are properly spaced so that they mate with the cones **53** and **54** when the two pieces of equipment are in alignment. The equipment to be aligned is backed in between the spaced bases **35** and **36** until the cones **53** and **54** begin to engage the recesses **55** and **56**. An added advantage of mounting the first piece of equipment **25** on a turntable plate **27** is seen when one cone

engages its recess before the other. Since the first load is on the turntable plate **27**, the engagement of one cone causes plate **27** to pivot until both cones are in true engagement with their cooperating recesses. The two pieces of equipment may be then bolted together to be made secure.

We claim as our invention:

1. A method of transferring a load of drilling equipment from a truck to lower level spaced support means adjacent a well derrick, said load having a length substantially greater than the width of said truck and being mounted longitudinally on said truck in horizontal pivotal relationship thereto, said method comprising the steps of moving the truck into position between the spaced support means, pivoting the load about its center on the truck whereby the ends of said load overhang the truck substantially equal amounts and are positioned over the support means, lifting the load from the truck, withdrawing the truck from underneath said load, and lowering the load onto said spaced support means.

2. The hereindescribed method of transferring a load of drilling equipment from movable truck means to lower level spaced foundations adjacent a well derrick, said load having a length substantially greater than the width of said truck means and being mounted longitudinally on said truck means in horizontal pivotal relationship thereto, said method comprising the steps of moving the truck means into position between said spaced foundations, pivoting the load about its center on the truck means substantially 90 degrees in a horizontal plane whereby the ends of the load overhang the truck means substantially equal amounts and are positioned over the spaced foundations, providing temporary load-lifting apparatus under the overhanging ends of said load, raising said load from said truck means, withdrawing said truck means from underneath said load, and lowering said load onto said spaced foundations.

3. Equipment for transferring an elongated load of drilling equipment from movable truck means to a derrick installation, said equipment consisting of the combination of base support means forming part of the derrick installation and turntable means carried on the movable truck means, said base support means comprising two spaced pier members extending parallel to each other to one side of the derrick, the spacing between said pier members being in excess of the width of the truck means, and jack means within the periphery of each of said pier members adapted to be expanded vertically above the upper face of said pier members, and said turntable means comprising a lower plate member adapted to rest detachably on the truck means, said lower plate having retractable legs attached to its lower face, an upper plate member supported on the upper face of the lower plate member and adapted to support the load, said upper plate member having a length in excess of the spacing between said pier members and being mounted on the truck means at a level higher than that of the upper face of said pier members, and pivot means passing through said upper and lower plate members and affixing them together for sliding rotational motion with regard to each other whereby the truck means carrying a load on said turntable with said upper plate disposed co-longitudinally with the truck means can be placed between said pier members, the upper plate and the load rotated about said pivot means

through an angle of substantially 90 degrees to position the ends of said upper plate over the upper faces of said pier members, said turntable and the load thereon lifted by means of said jack means from the truck means, the truck means removed, the jack means collapsed to support the ends of said upper plate on said piers, the lower plate rotatably adjusted to a desired position with regard to the upper plate, and the retractable legs on said lower plate expanded against the ground to support the middle portion of said upper plate.

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