July 13, 1937. W. A. TROUT 2,086,650

DERRICK CONSTRUCTION

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Fig. 1.

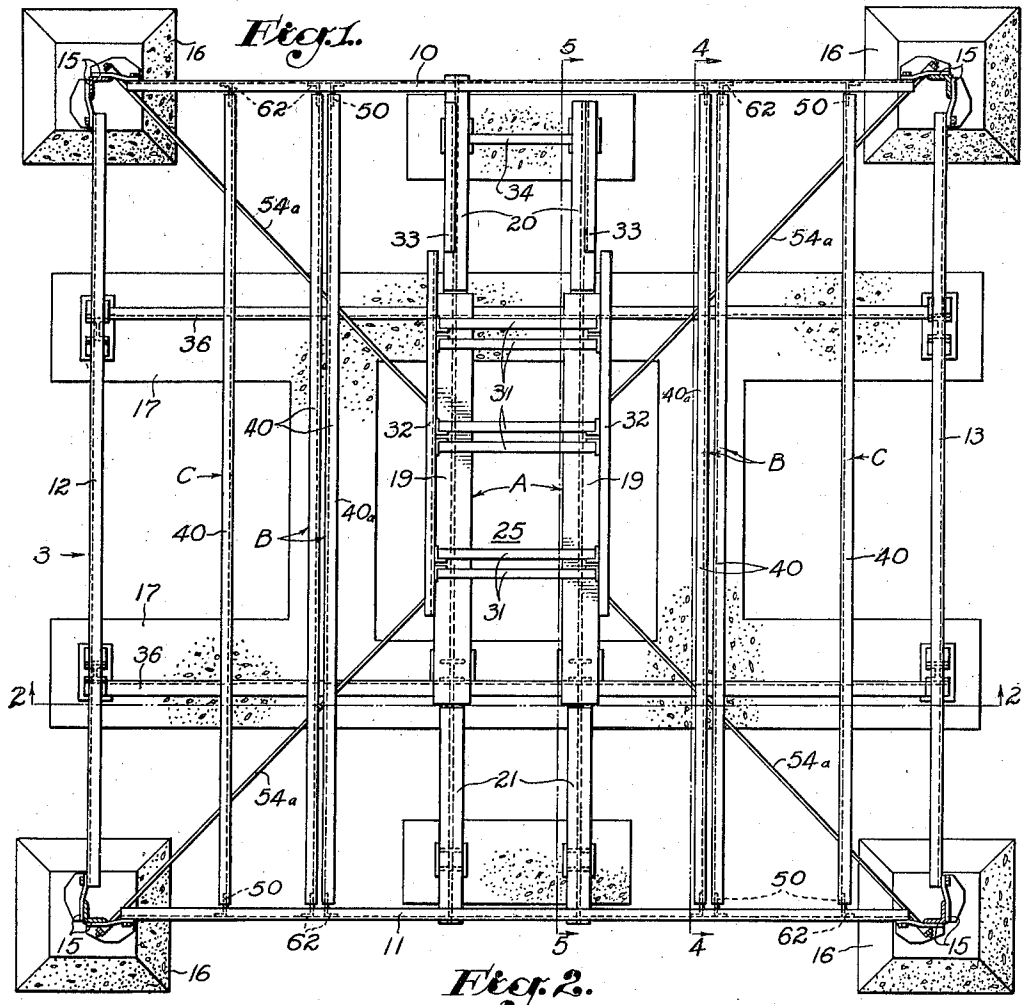
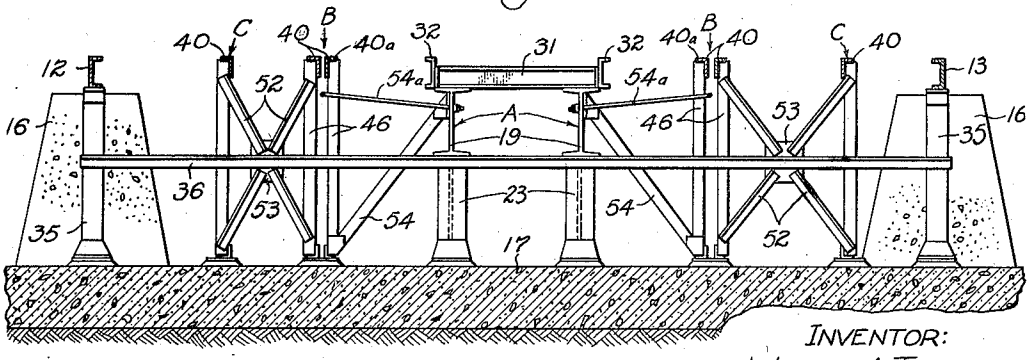


Fig. 2.



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Fig. 6.

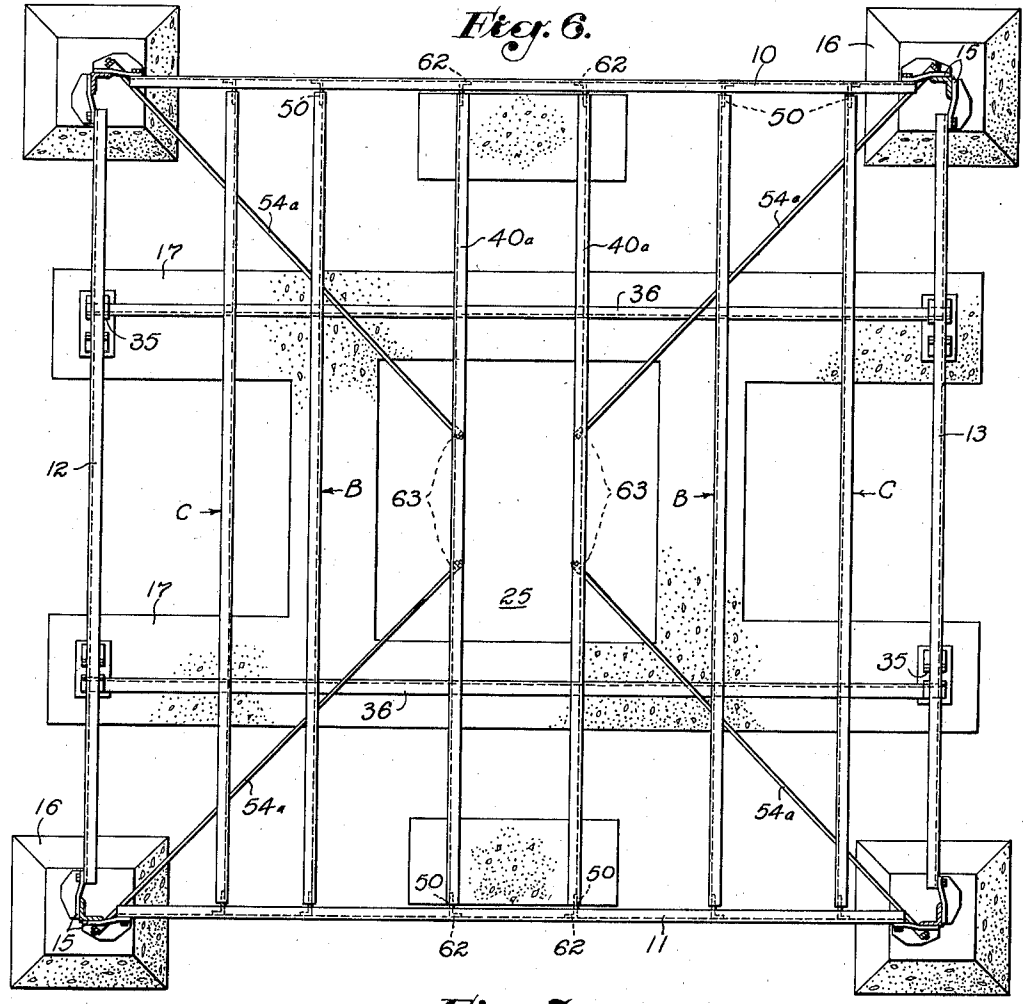
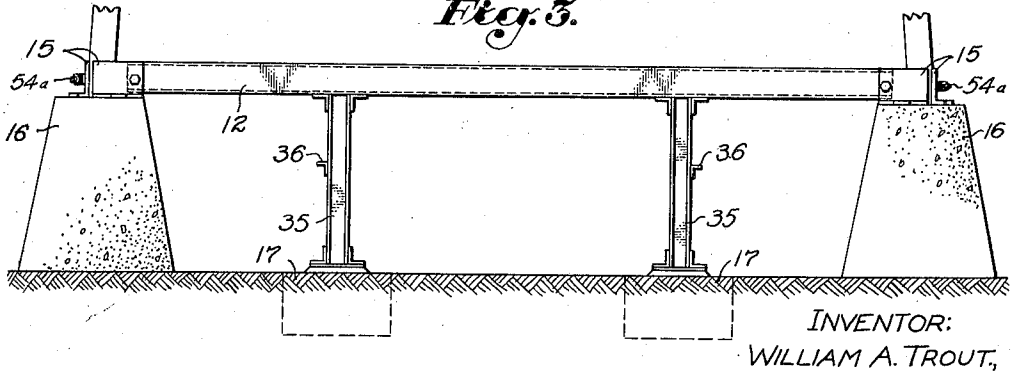


Fig. 5.



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DERRICK CONSTRUCTION

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Fig. 4.

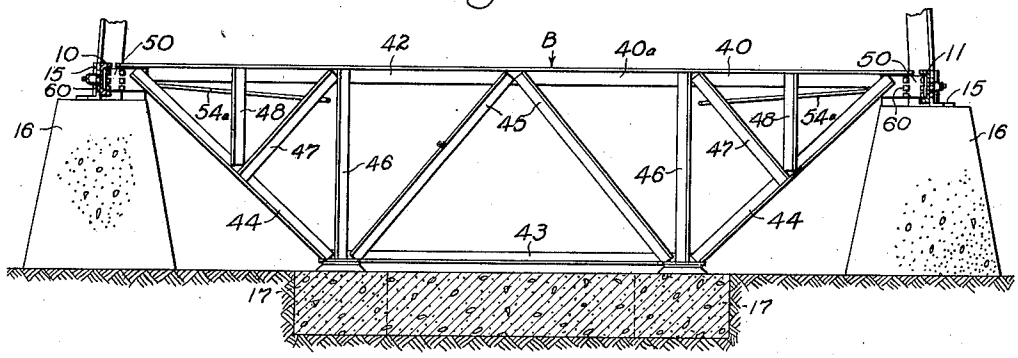
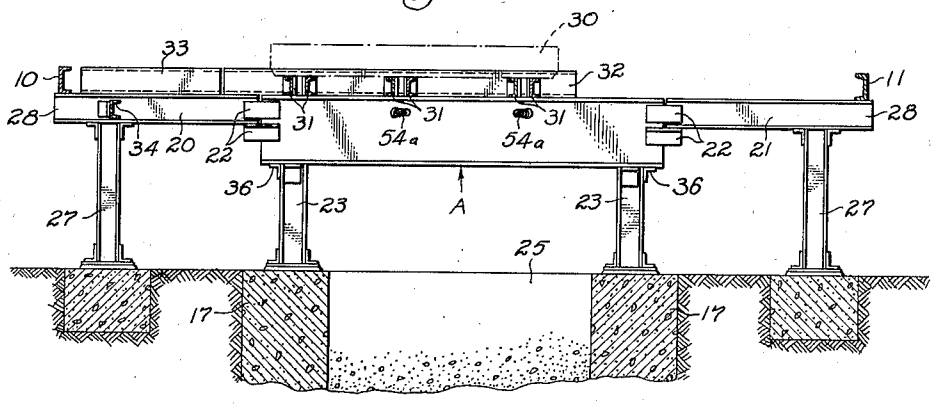


Fig. 5.



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UNITED STATES PATENT OFFICE

2,086,650

DERRICK CONSTRUCTION

William A. Trout, Clearwater, Calif.

Application September 18, 1936, Serial No. 101,471

10 Claims. (Cl. 189—21)

My invention relates to derrick construction and relates in particular to derricks of the type used for the drilling of oil wells and the subsequent operation incidental to the production of oil therefrom.

Since the invention has its principal utility in the oil producing industry, the preferred embodiment thereof will be hereinafter disclosed with relation to its principal use in conjunction with oil well derricks which are subjected to heavy loads during the drilling of a well and to light loads during the production period. These derricks may be classified as drilling derricks and production derricks, the first being used in connection with a drilling rig and being adapted to carry the heavy loads which are incurred in the drilling operation, and the second being used during the period of time the well is under production to carry the production equipment, such for example as the pumping device, and to serve as means for setting and pulling tubing, pumps, etc.

It is an object of the present invention to provide a derrick construction having a convertible base or floor structure which may be first used to support the heavy drilling equipment and the heavy loads attending the same, and then converted by the removal of and rearrangement of parts to serve merely as a support for such equipment as is used incidental to the production of oil from the well. The invention therefore contributes to the result of making a production rig or derrick from a drilling rig or derrick, and it also produces an economy over the common practice of erecting a costly derrick base for the purpose of drilling a well and then leaving the derrick base in place during the production period.

In my present invention the derrick base structure is provided with heavy supports for carrying the rotary table and the drilling loads which are imposed, and other members adjacent these rotary table supports for carrying the heavy loads which are applied to other parts of the derrick floor during the drilling of a well. After the well is completed, the heavy rotary table supports are removed from the derrick base structure, to be thereafter used in other derricks, and selected lighter or secondary supporting members of the base structure are moved over to the positions previously occupied by the rotary table supports. In this manner the heavy rotary table supports are salvaged, and the base structure of the derrick is converted with respect to its load carrying capacity to a lighter structure which nevertheless has ample capacity to carry the loads incidental to the production of oil from the well.

It is therefore a further object of the invention to provide a derrick base structure having removable heavy supporting members for carrying the rotary table and adjacent supporting members for carrying the heavy floor loads which are incurred during the drilling operation, certain of these adjacent supporting members being adapted and so secured as to be movable from their initial positions to positions occupied by the removed rotary table supporting members.

It is a further object of the invention to provide a derrick base structure which will have ample strength to support all of the loads carried thereby, but which may be made at a relatively low cost and which is designed to accomplish the economies elsewhere referred to herein.

Further objects and advantages of the invention will be brought out in the following part of the specification.

Referring to the drawings, which are for illustrative purposes only,

Fig. 1 is a plan view of a preferred form of the invention in its initial form wherein it may be employed in the carrying on of well drilling operations.

Fig. 2 is a cross section on a plane represented by the line 2—2 of Fig. 1.

Fig. 3 is a side elevation taken as indicated by the arrow 3 of Fig. 1.

Fig. 4 is a cross section on a plane represented by the line 4—4 of Fig. 1.

Fig. 5 is a cross section taken as indicated by the line 5—5 of Fig. 1.

Fig. 6 is a plan view of the derrick base converted to a form wherein it may be used throughout the production period following the completion of the drilling operations.

In the form of the invention shown in Fig. 1, the derrick base has peripheral members outlying a rectangular area, these peripheral members being front and rear end beams 10 and 11 and left and right side beams 12 and 13. These beams 10 to 13 inclusive are ordinarily referred to as the tower base beams, and the ends thereof are secured in some suitable manner, as by plates 15, with the lower ends of the tower legs which rest upon concrete corner pillars 16. For the purpose of description, it will be hereinafter assumed that the side beams 12 and 13 extend longitudinally of the derrick base, and the end beams 10 and 11 extend laterally. Between the end beams 10 and 11, but in a lowered plane, footing members 17, which may be made of concrete or heavy timbers, are placed in laterally extending relationship, these footing members 17 carrying

principally the loads of the derrick base or derrick floor supporting structure, and the pillars 16 carrying the derrick loads which are transmitted downwardly through the four legs of the derrick.

Between the end members 10 and 11 and preferably in parallel relationship to the side beams 12 and 13, a main support A is placed. This main support preferably consists of a pair of massive beams 19 which have extensions 20 and 21 secured to the ends thereof by means of plates 22 as shown in Fig. 5. The main beams 19 are heavy structural shapes, and the extensions 20 and 21 thereto are lighter structural beam members. The ends of the members 19 are carried upon posts 23 which rest upon the footing members 17 and at the sides of the pit or cellar 25 from which the well extends downwardly. Posts 27 are provided near the ends of the extensions 20 and 21, and these posts 27 support the members 20 and 21 at such elevations that the end portions 28 thereof project under intermediate portions of the front and rear end beams 10 and 11, so that the end beams 10 and 11 will rest upon the extremities of the members 20 and 21 and may be detachably bolted thereto.

The main supporting means A is adapted to carry the rotary table indicated by dotted lines 30 in Fig. 5, and for this purpose cross members are provided consisting of pairs of channels 31, the end portions of which rest upon the heavy beams 19 and are tied together by use of channels 32. Upon the extension members 20 channels 33 are mounted to act as filler pieces adjacent the front end of the derrick base where the calf wheel of the drilling rig is to be located. For the purpose of further reinforcement, the extension members 20 are tied together by a channel 34. Intermediate portions of the side beams 12 and 13 are supported by posts 35 which are laterally aligned with the post 23 carrying the heavy main beams 19, and tie members consisting preferably of structural angles 36 are extended laterally across the posts 23 and 35.

To carry the derrick base or derrick floor loads on opposite sides of the main support A, secondary supports B and C are provided. The secondary supports C each consists of a truss member 40, and the secondary supports B consist of a pair of truss members 40 placed together in close side-by-side relationship so that they will act together as a single truss of double strength. It will be noted that the secondary members B lie adjacent and on opposite sides of the main support A where heavy derrick floor loads are encountered. As best shown in Fig. 4, the trusses 40 each consist of an upper angle iron chord member 42 and a lower angle iron chord member 43 which is shorter than the chord member 42 and is of such length that the ends thereof may rest upon the footings 17.

Diagonal struts 44 extend upwardly and outwardly from the ends of the chord member 43 and are connected to the ends of the chord member 42. Struts 45 are carried diagonally downwardly from the center of the chord 42 to connect with the chord 43 near the ends thereof. Posts 46 extend upwardly from the ends of the chord 43 to the chord 42, and additional struts 47 and 48 are provided, as shown. Angle clips 50 are provided at the ends of the chords 42 for connecting the extremities of the trusses 40 with the end beams 10 and 11.

As best shown in Fig. 2, the secondary supports B and C are laterally braced by cross braces 52 which are placed in such positions that gusset plates 53 in the centers thereof may be connected to the lateral tie members 36. Additional lateral bracing for the main beams 19 are provided in the form of diagonal bracing members 54 which have their upper ends connected to the members 19 and extend diagonally downwardly and outwardly to the lower ends of the posts 46 of the adjacent trusses 40. Also, diagonal tie bolts 54a are extended from the main beam members 19 to the corners of the derrick base structure. As shown in Fig. 1, the outer ends of these diagonal tie rods 54a are connected to the corner plates 15.

In each secondary support B at least one of the trusses 40 forming the same, such as the truss indicated at 40a, is detachably secured in place, such purpose being preferably accomplished by the use of bolts for connecting the members 40a to the structural parts associated therewith. For example, the angle clips 50 at the ends of the members 40a are connected to the end beams 10 and 11 by use of bolts 60.

As previously herein indicated, the main supporting member A is very heavy or massive in character so that it will properly carry the rotary table indicated by dotted lines 30 and the accompanying loads encountered during the drilling of a well. The structural steel shapes used in the main supporting member A, being of such large size, represent a considerable investment which may be salvaged in the practice of my invention after the drilling operation has been completed. Accordingly, the beams 19 with their extensions 20 and 21 may be removed from the derrick base after the drilling of a well has been completed, and these members 19, 20, and 21 may be thereafter used in another derrick base. To provide a continuous support for the derrick floor, after removal of the main support or rotary table support A, to serve during the future activities around the well, the trusses indicated specifically as 40a are detached and are then moved inwardly from the positions in which they are shown in Fig. 1 to the positions in which they are shown in Fig. 6, wherein they occupy the positions previously occupied by the members 19. Means are provided for securing the truss members 40a in either their initial or original positions shown in Fig. 1 or the subsequent positions shown in Fig. 6, such means consisting in part of the angle clips 50, which may be bolted to the end members 10 and 11 at 62, and the diagonal tie bars 54a, the inner ends of which are now connected to central portions of the trusses 40a, as shown at 63 in Fig. 6.

Although I have herein shown and described my invention in simple and practical form, it is recognized that certain parts or elements thereof are representative of other parts, elements, or mechanisms which may be used in substantially the same manner to accomplish substantially the same results; therefore, it is to be understood that the invention is not to be limited to the details disclosed herein but is to be accorded the full scope of the following claims.

I claim as my invention:

1. In a derrick base of the character described, the combination of: a rotary table support having means removably securing it in operative position to carry a rotary table; a secondary supporting member disposed adjacent said rotary table support for supporting the floor load adjacent the rotary table; and detachable means holding said secondary supporting member in operative position adjacent said rotary table support and enabling the removal of said second-

ary member to the position of said rotary table support after the removal of said rotary table support from said base.

2. In a derrick base of the character described, the combination of: a rotary table support having means removably securing it in operative position to carry a rotary table; and secondary supporting members disposed on opposite sides of said rotary table support, at least one of said secondary supporting members being removably secured in operative position so as to be moved from its original position of operation to the position of said rotary table support after said rotary table support has been removed from its position of use as part of said base.

3. In a derrick base of the character described, the combination of: a pair of rotary table supports in side-by-side relation and having means removably securing the same in operative position to carry a rotary table; and secondary supporting members disposed on opposite sides of said rotary table supports, at least two of said secondary supporting members being removably secured in operative position so as to be moved from their original position of operation to the position of said rotary table supports after said rotary table supports have been removed from their positions of use in the derrick base.

4. In a derrick base of the character described, the combination of: a main support having means removably securing it in operative position, said main support being massive and adapted to carry heavy loads; secondary supporting members disposed on opposite sides of said main support, said secondary supporting members being of smaller load carrying capacity than said main support; and detachable means holding at least one of said secondary supporting members in operative position adjacent said main support so that said last named secondary supporting member may be moved to the position of said main support after the removal of said main support from said derrick base, there being means for securing said last named secondary supporting member in the position of said main support.

5. In a derrick base of the character described, the combination of: a pair of end members extending across the opposite ends of said base; a rotary table support having means removably securing it in a longitudinal position between said end members and in position to support a rotary table; a secondary supporting member secured in longitudinal position adjacent said rotary table support; means for removably securing said secondary member in its initial position and so that it may be moved to the position of said rotary table support; and means for connecting the ends of said secondary member to said end members either in its initial position or in the position of said rotary table support.

6. In a derrick base of the character described, the combination of: a pair of end members extending across the opposite ends of said base; a pair of table supporting members having means securing them in longitudinal position between said end members and in position to support a rotary table; a pair of secondary supporting members secured in longitudinal position and on opposite sides of said table supporting members; means for movably securing said secondary members in said position and so that they may be moved therefrom to the position of said table supporting members; and means for connecting the ends of said secondary members to said end members either in their initial position or in the position of said table supporting members.

7. In a derrick base of the character described, the combination of: a pair of table supports having means removably securing them in operative position so as to carry a rotary table; two pairs of secondary supporting members so placed that a pair of such secondary supporting members will be on each side of said table supports, the secondary supporting members of each pair being placed in side-by-side position and relatively close together so that they will operate as a single supporting means of double strength; means for detachably securing one secondary member of each of said pairs so that two secondary supporting members may be moved to the positions of table supports after the removal of said table supports; and means for securing said last named secondary supporting members in said positions of said table supports.

8. In a derrick base of the character described, the combination of: a pair of table supporting members having means securing them in place so as to carry a rotary table; two pairs of secondary floor beams in positions adjacent said table supporting members, the beams of each of said pairs being placed together in relatively close side-by-side relationship so as to serve as a single beam of double strength, and one beam of each of said pairs being movable from its original position of utility; means for securing said beams in said positions and so that at least one beam of each of said pairs may be removed to the position of one of said table supporting members; and means for securing two of said beams in the position of said table supporting members after said table supporting members have been removed from said derrick base.

9. In a derrick base of the character described, the combination of: a pair of end members extending across the opposite ends of said base; a pair of footing members disposed between said end members and extending across said base in substantially parallel relationship to said end members; a table supporting member disposed in longitudinal relationship between said end members and supported on the central portion of said footing members; two pairs of trusses disposed in longitudinal relationship between said end members, one of said pairs of trusses being on one side of said table supporting member, and the other pair of said trusses being on the opposite side of said table supporting member, each of said pairs comprising two of said trusses in close side-by-side position so as to serve as a single truss of double strength, the intermediate parts of said trusses resting upon said footing members; means for securing the ends of said trusses to said end members, one truss member of each of said pairs being detachably secured to said end members and being adapted to be moved into the position of said table supporting member after said table supporting member has been removed from said base; and means for securing the ends of said last named trusses to said end members in the position of said table supporting member.

10. In a derrick base of the character described, the combination of: a pair of end members extending across the opposite ends of said base; a pair of footing members disposed between said end members and extending across said base in substantially parallel relationship to said end members; a pair of table supporting beams disposed in side-by-side longitudinal relationship between said end members and supported on the

central portion of said footing members, the ends of said beams engaging said end members; two pairs of trusses disposed in longitudinal relationship between said end members, one of said pairs of trusses being on one side of said beams, and the other pair of said trusses being on the opposite side of said beams, each of said pairs comprising two of said trusses in close side-by-side position so as to serve as a single truss of double strength, the intermediate parts of said trusses resting upon said footing members; means for securing the ends of said trusses to said end members, one truss member of each of said pairs being detachably secured to said end members and being adapted to be moved into the positions of said beams after said beams have been removed from said base; and means for securing the ends of said last named trusses to said end members in the positions of said beams.

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