Feb. 16, 1937. G. TREMOLADA 2,070,815

ONE-MAN RETRACTABLE WALKING BEAM

Filed Jan. 20, 1933 4 Sheets-Sheet 1

Fig. 1.

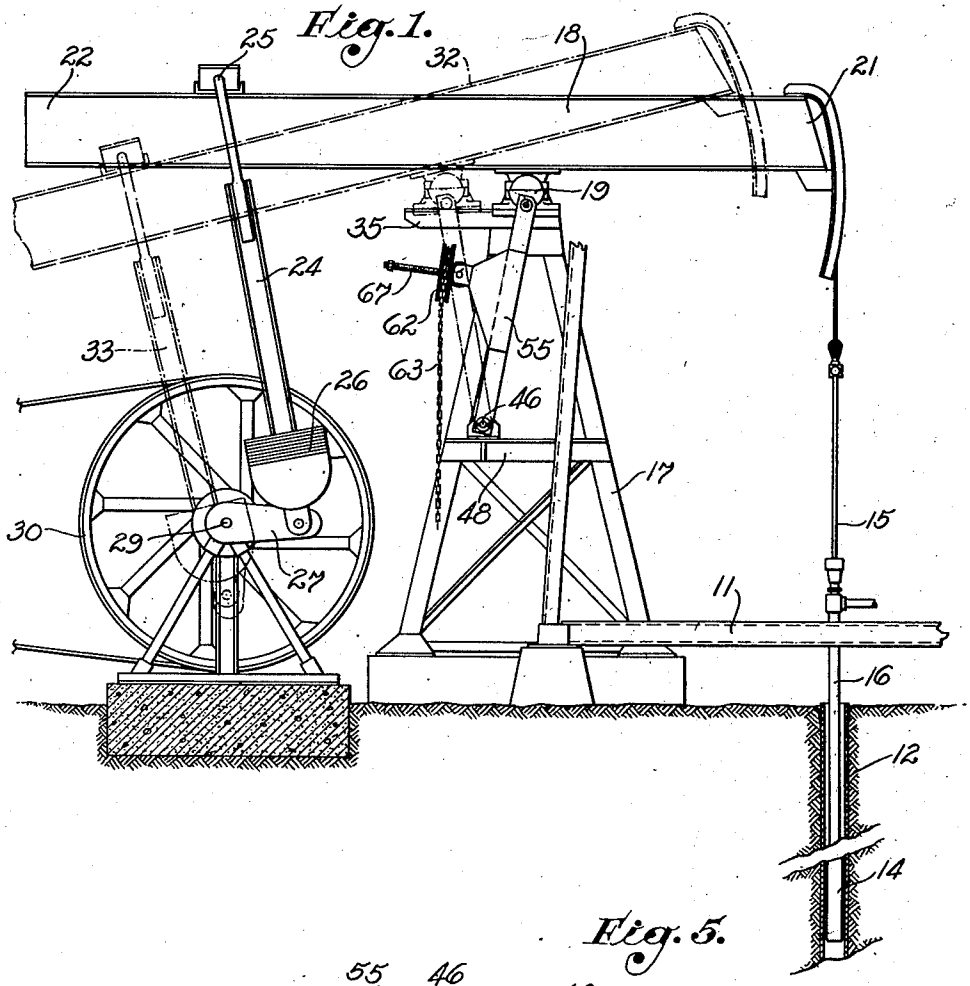
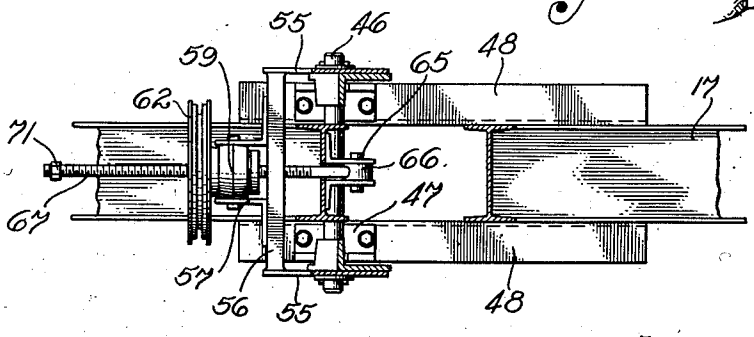


Fig. 5.



INVENTOR:
Guglielmo Tremolada,
BY
Fred Klauer
ATTORNEY.

Feb. 16, 1937. G. TREMOLADA 2,070,815

ONE-MAN RETRACTABLE WALKING BEAM

Filed Jan. 20, 1933 4 Sheets-Sheet 2

Fig. 2.

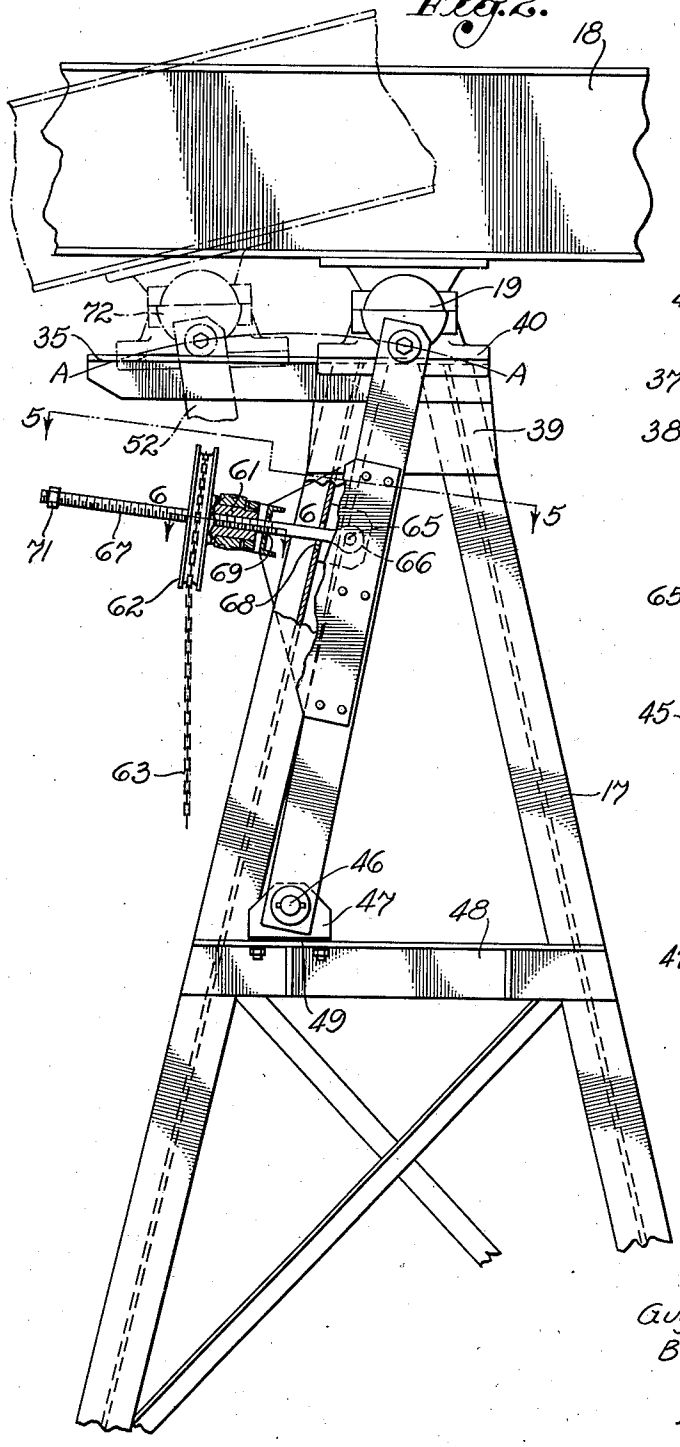
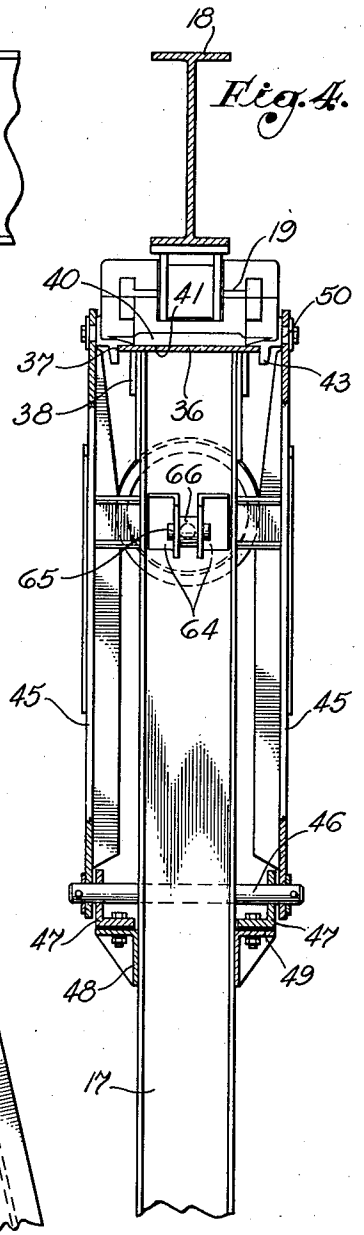


Fig. 4.



INVENTOR:
Guglielmo Tremolada,
By
Fred W. Kann
ATTORNEY.

Feb. 16, 1937. G. TREMOLADA 2,070,815

ONE-MAN RETRACTABLE WALKING BEAM

Filed Jan. 20, 1933 4 Sheets-Sheet 3

Fig. 3.

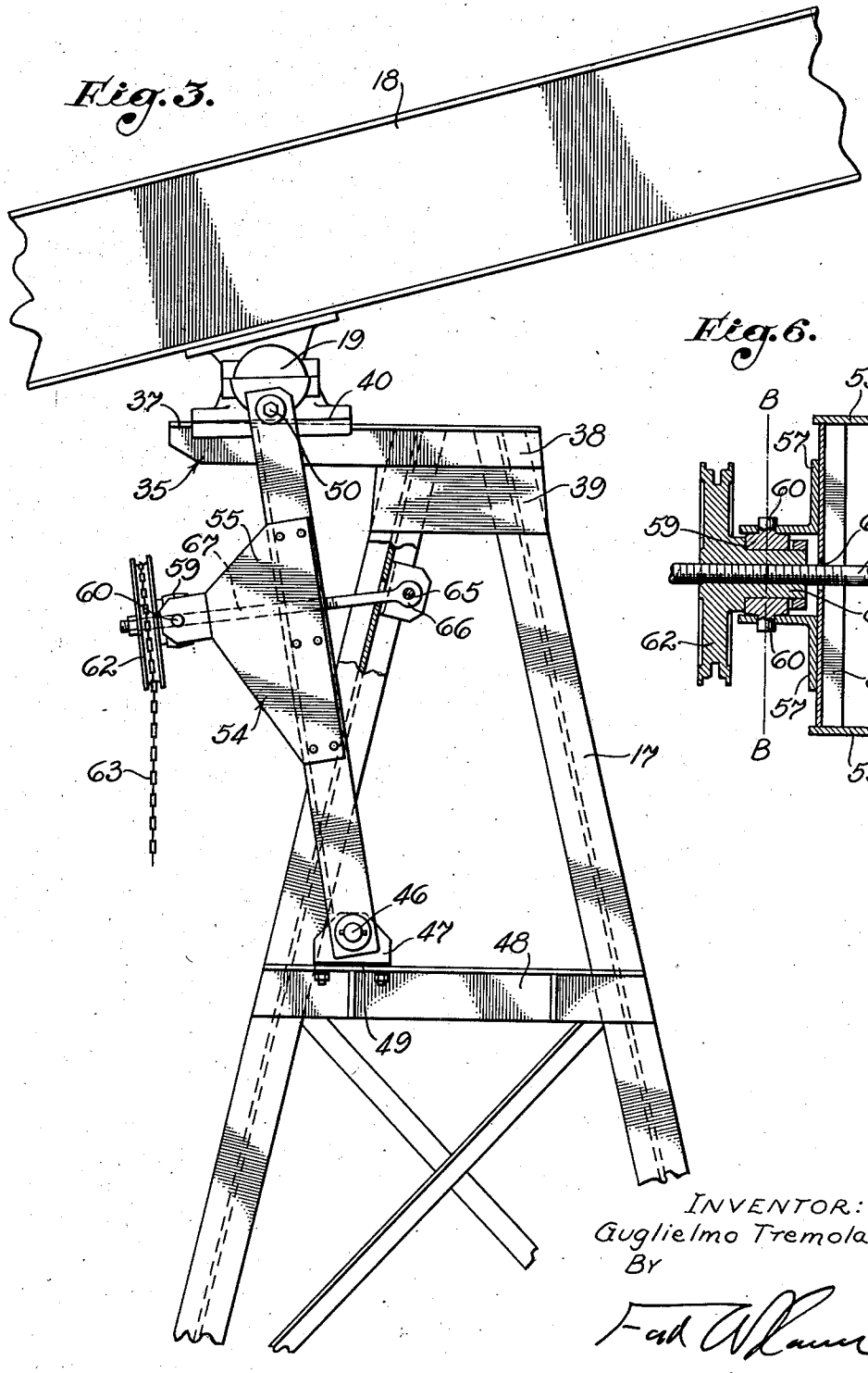


Fig. 6.

INVENTOR:
Guglielmo Tremolada,
BY

ATTORNEY.

Feb. 16, 1937. G. TREMOLADA 2,070,815

ONE-MAN RETRACTABLE WALKING BEAM

Filed Jan. 20, 1933 4 Sheets-Sheet 4

Fig. 7.

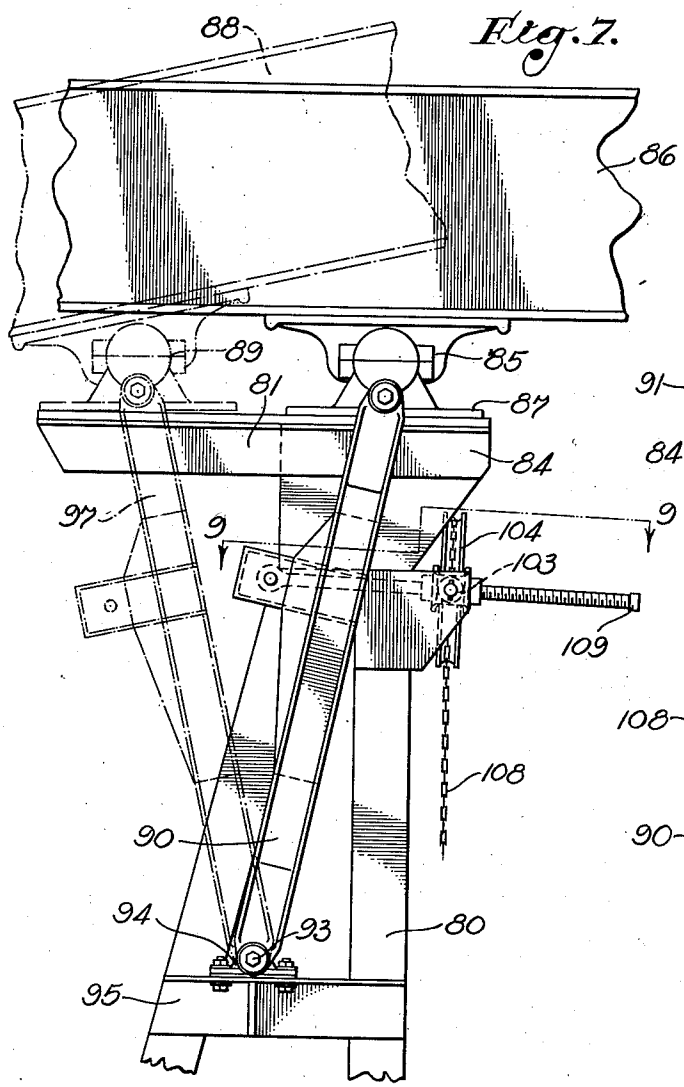


Fig. 8.

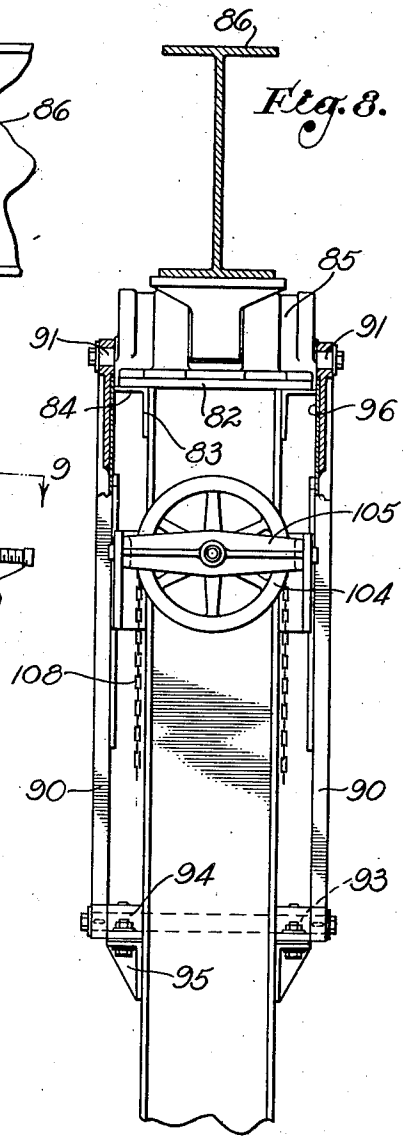
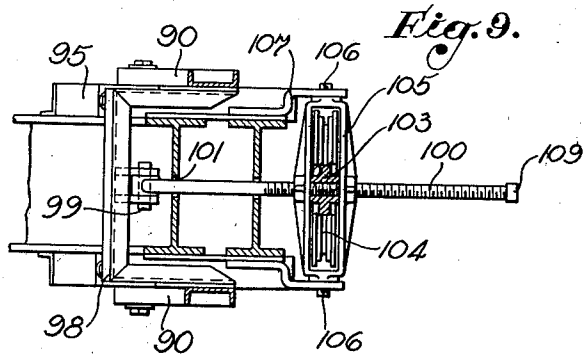


Fig. 9.



INVENTOR:
Guglielmo Tremolada,
BY
Fall & Kann
ATTORNEY.

Patented Feb. 16, 1937 2,070,815

UNITED STATES PATENT OFFICE

2,070,815

ONE-MAN RETRACTABLE WALKING-BEAM

Guglielmo Tremolada, Los Angeles, Calif., assignor to Emsco Derrick & Equipment Company, Los Angeles, Calif., a corporation of California

Application January 20, 1933, Serial No. 652,661

8 Claims. (Cl. 74—41)

My invention is a walking-beam construction for use in the oil-pumping industry, in which construction the walking-beam is moved from an operating position into a retracted position. Not only is my invention new in its entirety, but various combinations of elements less than the whole of the construction also incorporate novel features of my invention.

In order that the features of construction and advantages of my invention may be better appreciated, I shall briefly refer to the oil-pumping industry in which my invention has a marked utility. It is present practice to pump oil from a well by means of an oil pump situated in the well below the oil level. This oil pump includes a plunger which is reciprocated by means of a string of sucker rods, which string of sucker rods extends upwardly through the well to the surface of the ground. Mounted in the derrick as a part of the surface apparatus is an oscillatory walking-beam. This walking-beam is supported on a Samson post in order that it may oscillate. One end of the walking-beam is positioned directly above the well and the upper end of the string of sucker rods is connected thereto. Upon oscillation of the walking-beam the string of sucker rods is first raised and then lowered, and the pump plunger is caused to move therewith, thus elevating oil to the surface of the ground. The end of the walking-beam remote from the end which extends over the well is connected by means of a pitman to what is ordinarily called a walking-beam crank. This walking-beam crank is connected to a band wheel shaft which is rotated in a manner to rotate the crank, move the pitman, and thus cause the walking-beam to oscillate.

It is necessary at certain times to remove the sucker rods, the pump, or tubing from the well, and in order to conveniently do this it is necessary that the upper end of the well be conveniently accessible. It is, therefore, the practice to remove the walking-beam in order that the end to which the string of sucker rods ordinarily connects will not extend over the well and be in the way. This is ordinarily done by disconnecting the pitman and swinging the walking-beam in an upward and rearward direction.

It is an object of my invention to provide a combination in which the walking-beam may be readily removed from its regular operating position into a retracted position without the necessity of disconnecting the walking-beam from the pitman or any other apparatus other than disconnecting it from the string of sucker rods which must be done under any circumstances due to the fact that the sucker rods must be removed from the well.

In the preferred form of my invention I have a design of apparatus in which the movement of the walking-beam from operating position to retracted position and vice versa may be easily accomplished by one workman. I have arranged the parts so that this adjustment of the walking-beam may be easily accomplished from the floor of the derrick with but little manual labor and in a relatively short period of time.

It is another object of my invention to provide a combination of the character generally referred to in which the walking-beam is raised from engagement with the Samson post when it is being moved into retracted position and when it is being moved from retracted position into operating position in order that friction will be reduced to a minimum.

A further object of my invention is to provide a combination of the character mentioned in which the Samson post directly supports the weight of the walking-beam when the same is in operating position, and in which the means for moving the walking-beam into retracted position supports the weight of the walking-beam when the same is in retracted position. I find this to be a very economical construction due to the fact that it reduces to a large extent various bracing members which would otherwise be necessary.

It is a still further object of my invention to provide a combination of the character referred to in which the walking-beam is not rigidly secured to the Samson post by a permanent securing means in view of the fact that it is necessary that the same be movable from operating to retracted position, and in which the means which I provide for such movement of the walking-beam is employed to clamp the walking-beam rigidly in place when the same is in operating position. When this means is actuated, the walking-beam is automatically released from rigid securement to the Samson post and therefore may be readily moved into a retracted position.

A further object of this invention is to provide a means which permits the walking-beam to be readily movable from operating to retracted position and which at the same time prevents twisting of the walking-beam in a lateral direction.

In the forms of my invention disclosed herein, there are many important details of construction and arrangements of parts in which inventive

merit resides. In the following description of the particular embodiments of my invention which I choose to disclose, these various features as well as advantages will be pointed out.

Referring to the accompanying drawings,

Fig. 1 is a view illustrating one form of my invention as it is used in an oil derrick.

Fig. 2 is an enlarged fragmentary view which clearly shows details of the important parts of my invention, the walking-beam being shown in full lines in operating position.

Fig. 3 is a view corresponding to Fig. 2, but showing the walking-beam in retracted position.

Fig. 4 is an elevational sectional view of Fig. 2.

Fig. 5 is a section taken on the line 5—5 of Fig. 2.

Fig. 6 is a section taken on the line 6—6 of Fig. 2.

Fig. 7 is an elevational view similar to Fig. 2 which discloses an alternative form of my invention.

Fig. 8 is an elevational sectional view of Fig. 7.

Fig. 9 is a sectional view taken on the line 9—9 of Fig. 7.

As disclosed in Fig. 1, 11 is an oil well derrick which is built at the upper end of a well 12. In the lower part of the well 12 is a pump 14 having a plunger which is connected to a string of sucker rods 15. This string of sucker rods 15 extends upwardly through the well 12 to a point above the surface of the ground. There is also an oil tubing 16 by means of which the pumped oil is conveyed to the surface of the ground.

In the derrick 11 is a Samson post 17 which is adapted to support a walking-beam 18. The walking-beam 18 ordinarily has or includes a bearing 19 which is mounted on the Samson post 17 whereby the same may be oscillated. One end 21 of the walking-beam 18 extends above the well 12, and the upper end of the string of sucker rods 15 is secured thereto. The other end 22 of the walking-beam 18 extends outwardly from the derrick and is connected to a pitman 24 which is pivotally joined to the walking-beam by a pivot construction 25. The lower end of the pitman 24 may be provided with a counterweight 26 which counterbalances the weight of the oil in the oil tubing 16, and is connected to a walking-beam crank 27. The walking-beam crank 27 in accordance with usual practice is secured to a band wheel shaft 29 on which a band wheel 30 is secured. When the band wheel shaft 29 is rotated, the crank 27 is caused to rotate and the pitman 24 is moved up and down. This produces an oscillation of the walking-beam 18, and by reason of the connection of the string of sucker rods 15 to the end 21 of the walking-beam 18 the string of sucker rods is reciprocated which, of course, reciprocates the plunger of the pump 14 and raises oil to the surface of the ground.

It is an object of my invention to produce in combination with a walking-beam a means whereby the walking-beam 18 may be moved from an operating position, as shown in full lines in Fig. 1, into a retracted position, as shown by dotted lines 32 in Fig. 1. When the walking-beam is in such a retracted position, the end 21 is moved upwardly and leftwardly so that it does not prevent ready access to the upper end of the well 12. It will be understood that when the parts are being removed from or installed in a well, it is necessary to move elevating means directly above the well, and it will therefore be seen that if the end 21 of the walking-beam 18 projected over the well, such an operation of an elevator would not be possible. When the walking-beam is in retracted position, there will be no interference with the removal from or installation of parts in the well 12. When the walking-beam is disconnected from the string of sucker rods and is moved into retracted position 32, the pitman 24 and the crank 27 will by reason of the weight of the counterbalance 26 move into a position indicated by dotted lines 33 of Fig. 1.

Having outlined in general the combination in which my invention is used, I will now describe in detail the construction of the various forms of my invention in order that one skilled in the art may readily understand the manner in which the objects of this invention are accomplished.

Referring now to Figs. 2 to 6 inclusive, the upper end of the Samson post 17 is provided with a horizontally extended guide 35, this guide 35 extending outwardly from the derrick 11. The guide 35 includes a top plate 36 having parallel side walls 37 which are utilized in combination with other parts to form a twist restraining means for the walking-beam 18. The guide 35 includes vertical plates 38 and gussets 39 whereby the same is connected to the upper part of the Samson post 17. The bearing 19 has a base 40 provided with a lower face 41 adapted to rest on and engage the plate 36. Extended downwardly from the base 40 on opposite sides of the guide 35 are depending flanges 43 which, as shown clearly in Fig. 4, are positioned adjacent the side walls 37 of the plate 36. These depending flanges 43 cooperate with the side walls 37 to restrain a twisting of the walking-beam. These parts are designed so that they can oppose considerable twisting forces and are provided primarily for the purpose of relieving other parts of the apparatus from such twisting forces.

As a part of the means for moving the walking-beam 18 and the bearing 19 from operating to retracted position, I provide an arm means which includes a pair of arms 45, there being one arm positioned on each side of the Samson post 17. The lower ends of the arms 45 are pivotally supported on an arm fulcrum which is provided in the form of a cross shaft 46 supported by a pair of brackets 47. These brackets 47 are in turn supported by supporting angles 48 which are secured to the Samson post 17. Shim means 49 are provided for adjusting the vertical positions of the brackets 47 in order to adjust the fulcrum point of the arm fulcrum. The reason for this adjustment will be explained in due course. The upper ends of the arms 45 are pivotally mounted on pivots 50 which extend outwardly from the base 40 of the bearing 19. The arms 45 which constitute the arm means are swingable from full line position in Fig. 2 into full line position in Fig. 3, or into dotted line position 52 of Fig. 2. It will be seen that the upper ends of the arms 45 in moving from one position to the other are caused to move through an arcuate path, as indicated by the line A—A of Fig. 2. The reason for this is that the arms 45 swing around the arm fulcrum which is provided by the shaft 46. It will further be seen that when the bearing 19 is moved from operating position by the arms 45, it is moved not only to the left but in an upward direction in order that any friction between the base 40 of the bearing 19 and the plate 36 of the guide 35 will be eliminated. This conduces to an easier operation of the mechanism of my invention.

I will now point out the actuating means which I provide, causing the arms 45 to be moved as

explained. Connected to the arms 45 is a yoke 54. This yoke 54 includes a pair of plates 55, one of which is secured to the outer part of each arm 45. These plates extend outwardly with respect to the derrick 11. The two plates 55 are connected together by a cross-piece 56 which is in the form of a channel. The parts 55 and 56 provide the yoke construction. Supported by the cross-piece 56 of the yoke 54 is a pair of supporting brackets 57 which pivotally support a supporting sleeve or collar 59. The supporting sleeve 59 has, as clearly shown in Fig. 6, outwardly extending trunnions 60 which are pivotally supported by the brackets 57 and which therefore cause the supporting sleeve to be pivotally supported in a plane B—B, which is a horizontal plane. Rotatably supported by the supporting sleeve 59 is a nut 61. This nut 61 has a relatively large wheel or sheave 62 secured thereto or formed integrally therewith. Extending around this sheave 62 is an operating member in the form of an endless chain 63 which hangs downwardly therefrom, and the lower part thereof is accessible from the floor of the derrick. A workman on the floor of the derrick may rotate the sheave 62 and nut 61 by means of the endless chain 63. Secured to the Samson post 17 at a point substantially below the bearing 19 when it is in operating position is a pair of brackets 64 which support a short shaft 65. Pivotally supported on this shaft 65 is an eye 66 of a lead screw 67. This lead screw 67 extends outwardly from the Samson post and outwardly with respect to the derrick 11. It is extended through an opening 68 of the Samson post and an opening 69 of the cross-piece 56 of the yoke 54. The lead screw 67 has threads formed on the exterior thereof and it is extended through the nut 61 in threaded engagement therewith. It will therefore be appreciated that by operating the nut 61, a relative motion is produced between the nut and lead screw. Due to the fact that the lead screw is pivotally connected to the Samson post, the lead screw is not free to move; and, on the other hand, due to the fact that the nut 61 is connected by means of the supporting sleeve 59 and the yoke 54 to the arms 45, the nut is free to move and will move the arms 45 therewith. By rotating the sheave 62 and nut 61 the arms 45 will move between the positions shown by full lines in Figs. 2 and 3.

At the outer end of the lead screw 67 there is an adjustable stop means in the form of a collar 71 which is engaged by the nut 61 to restrain or limit the relative movement between the nut 61 and the lead screw 67. The stop 71 is so positioned that the arms 45 will be moved to such a position that the walking-beam 18 is moved into the retracted position shown by dotted lines 32 in Fig. 1, but at the same time to such a position that the weight of the walking-beam will be supported by the arms 45 and not by the guide 35. It will be seen that when in retracted position the bearing 19, as indicated by full lines in Fig. 3 and by dotted lines 72 in Fig. 2, is in a slightly raised position and is tilted due to the eccentricity of the weight of the walking-beam, and is not supported by the guide but is supported directly by the arms 45. This is a valuable feature of the invention because by supporting the walking-beam in retracted position, by use of the arms 45 it is unnecessary to provide a special reinforcing means for the outwardly extending end of the guide 35. The stop 71, therefore, is essential to this portion of my invention, as it provides a positive means for determining the retracted position of the walking-beam, bearing, and the arm, and precludes the weight of the walking-beam from being imposed on the guide 35.

I will now describe the mode of operation of the form of my invention just described.

When it is desired to have access to the upper end of the well and particularly to have access to the space above the well, the walking-beam 18 is moved into retracted position 32 as follows: The operator pulls upon the operating chain 63 and rotates the sheave and nut 61 in a direction to cause same to move leftwardly along the lead screw 67. This causes the arm 45 to move in a counter-clockwise direction and raises the bearing 19 from the guide 35, and the bearing as well as the walking-beam 18 is moved through the arcuate path indicated by the broken line A—A. This action is continued until the nut 61 engages the stop 71. At this time the parts will occupy the positions shown in dotted lines in Fig. 2 or shown in full lines in Fig. 3. It will be noted that the bearing 19 does not at this time rest squarely on the guide 35, but that the weight of the walking-beam and bearing is supported by the arms 45. The stop, as previously pointed out, is so arranged that the arms cannot swing far enough to place the weight of the walking-beam and bearing on the guide. The advantage, as pointed out heretofore, is that the guide will serve only as a guide and need not be reinforced or braced to support the weight of the walking-beam. When the parts are in the positions mentioned, the pitman 24 and the crank 27 rest in the dotted line position shown in Fig. 1. The end 21 of the walking-beam is now removed to the left of the oil well, and elevators and the like may be raised and lowered above the oil well and parts may be removed from or installed in the well as desired. When it is desired to return the walking-beam to operating position, the operator then pulls upon the chain 63 and causes the sheave 62 and nut 61 to rotate in order to advance the nut in a rightward direction and to swing the arms 45 in a clockwise direction. This will move the walking-beam and the bearing from dotted line position in Figs. 1 and 2 into full line positions in Figs. 1 and 2, and when in these positions the parts are in normal operating positions and upon connection of the walking-beam to the string of sucker rods and operation of the band wheel shaft 29, the pump 14 may again be operated. When the arms move into the position shown in full lines in Figs. 1 and 2, the base 40 of the bearing 19 is brought into engagement with the plate 36 and the weight of the walking-beam and all weight supported thereby is delivered directly through the bearing to the Samson post. The arms 45 at this time do not support the weight of the walking-beam or bearing. In fact, the arms are placed under a tension in order to clamp the bearing securely against the upper end of the Samson post 17. This is provided for by screwing the nut tightly to the right on the lead screw 67, thus forcing the bearing 19 in a rightward direction after contact has been made with the upper face of the plate 36. This places a tension on the arms 45. When assembling the parts, the shims 49 are employed in order that the distance between the arm fulcrum provided by the shaft 46 and the uper end of the Samson post 17 may be such that the arms 45 may be placed under tension in order to clamp the bearing properly in place.

The guide means, including the walls 37 and the depending flanges 43, acts as an aligning means for the bearing 19 and prevents twisting of the bearing or the walking-beam in a horizontal direction. The guide although it is not reinforced to support the weight of the walking-beam and bearing when the same are retracted has sufficient strength and rigidity in a horizontal plane to withstand the twisting forces which may be imposed on this guide. By this arrangement the arms 45 and parts associated therewith are not subjected to any of the twisting stresses and are called upon only to clamp the bearing 19 in operating position or to support the bearing 19 and the walking-beam 18 when these parts are in retracted position.

It will be noted that the walking-beam 18 may be moved from operating position into retracted position and vice versa without disconnecting any parts other than the string of sucker rods 15 from the end 21 of the walking-beam. It will furthermore be noted that the movement of the walking-beam from one of its positions to the other may be readily accomplished by one workman.

Referring now to Figs. 7, 8, and 9, I will describe an alternative form of my invention. In this form of my invention the parts are similar to those disclosed in the first described form of my invention. The principle of operation and the general combination of parts are identical. The two forms of the invention differ only in details. In this form of my invention there is a Samson post 80 having a guide 81 secured to the upper end thereof. This guide 81 consists of a plate 82 and angle members 83 which provide outwardly extending flanges 84. Adapted to be supported on the Samson post and to move along the guide 81 is a bearing 85 which supports a walking-beam 86, this walking-beam 86 being adapted to be positioned and being adapted to operate in the same manner as the walking-beam 18. The bearing 85 has a base plate 87 which when the parts are in operating position, as shown in full lines in Figs. 7 and 8, rests upon the portion of the guide 81 directly above the Samson post 80 and the weight of the walking-beam and all weight carried by the walking-beam is imposed directly on the Samson post.

For the purpose of moving the walking-beam 86 and the bearing 85 into retracted position which is indicated by dotted lines 88 for the walking-beam and 89 for the bearing, I provide a pair of arms 90 which are pivoted at 91 on opposite sides of the base plate 87 and which extend downwardly on opposite sides of the Samson post 80. The lower ends of these arms 90 are fulcrumed on a cross shaft 93 which is in turn supported by bearings 94, these bearings 94 being carried by brackets 95 secured to the Samson post 80. It will be noted that the arms 90 have inner walls 96 resting on each side of the flanges 84. The walls 96 and the flanges 84 act as a twist restraining means which functions in a manner similar to the walls 37 and the depending flanges 43 of the first form of my invention. For the purpose of swinging the arms 90 from the position shown by full lines in Fig. 7 into the position indicated by dotted lines 97 of that figure, I provide a lead screw and nut means which is constructed as follows:

Secured to the arms 90 is a yoke 98 which extends around the outer part of the Samson post 80. Pivotally connected to the yoke 98 by means of a pivot means 99 is a lead screw 100. The lead screw 100 extends inwardly through openings 101 formed in the members of the Samson post 80, and threadedly connected to the portion which projects rightwardly from the Samson post 80 is a nut 103 on which a sheave 104 is mounted. The nut and sheave 103 and 104 are supported by a supporting housing 105 which has outwardly extending trunnions 106 which are pivotally mounted in brackets or arms 107, these arms 107 being secured to the Samson post 80. Extending around the sheave 104 for operating same is an endless chain 108. Secured to the end of the lead screw 100 is a stop 109.

It will be seen that in this form of my invention the twist restraining means cooperates between the guide 81 and the arms 90 instead of between the bearing block and the guide as in the first form of my invention. It will further be seen that the sheave and nut 103 and 104 are supported by the Samson post 80 while the lead screw 100 is connected to the yoke 98 of the arms 90. This is exactly the reverse of the arrangement of the sheave and nut 61 and 62 and the lead screw 67 of the first form of my invention.

The parts of the form of my invention disclosed in Figs. 7, 8, and 9 operate in the same manner as the parts shown in Figs. 1 to 6 inclusive. It is, therefore, unnecessary to repeat the mode of operation or to dwell upon the advantages which result from this form of my invention.

Although I have only disclosed two embodiments of my invention, it will be recognized that the principle which is included in these two forms of my invention may be embodied in different constructions without departing from the spirit and scope of the invention. I do not wish to be limited to the details disclosed herein, but wish my invention to be construed in accordance with the appended claims.

I claim as my invention:

1. A combination as disclosed herein, which consists of: a Samson post; a walking-beam pivotally supported at the upper end of said Samson post and being horizontally movable relative to said Samson post; arm means connected to said walking-beam whereby said walking-beam may be moved from operating position into retracted position; fulcrum means for said arm means; and actuating means operative between said arm means and said Samson post for swinging said arm means.

2. A combination as disclosed herein, which consists of: a Samson post; a walking-beam pivotally supported at the upper end of said Samson post and being horizontally movable relative to said Samson post; arm means connected to said walking-beam whereby said walking-beam may be moved from operating position into retracted position, said arm means supporting said walking-beam when said walking-beam is in retracted position; fulcrum means for said arm means; and actuating means for swinging said arm means.

3. A combination as disclosed herein, which consists: of a Samson post; a guide supported at the upper end thereof; a walking-beam; a bearing for said walking-beam, said bearing resting above said guide; arm means whereby said walking-beam and bearing are movable substantially horizontal from operating position to retracted position along said guide, said arm means supporting a part of the weight of said walking-beam when same is in retracted position; and

actuating means for exerting a force to swing said arm means.

4. A combination as disclosed herein, which consists: of a Samson post; a guide supported at the upper end thereof; a walking-beam; a bearing for said walking-beam, said bearing resting above said guide; arm means whereby said walking-beam and bearing are movable substantially horizontally from operating position to retracted position along said guide, said arm means supporting a part of the weight of said walking-beam when same is in retracted position; actuating means for said arm means; and twist restraining means cooperating between said bearing and said guide for preventing said walking-beam from twisting.

5. A combination as disclosed herein, which consists of: a Samson post; a walking-beam supported thereon having an operating and a retracted position; and means connected to said walking-beam and operative to exert a force for moving said walking-beam transversely from operating position into retracted position, said means supporting said walking-beam when same is in retracted position.

6. A combination as disclosed herein, which consists: of a Samson post; a guide supported at the upper end thereof; a walking-beam; a bearing for said walking-beam, said bearing resting above said guide; arm means whereby said walking-beam and bearing are movable from operating position to retracted position along said guide, said arm means supporting a part of the weight of said walking-beam when same is in retracted position; and actuating means for said arm means, said actuating means including a nut and lead screw means operable from a remote point.

7. A combination as disclosed herein, which consists of: a Samson post; a walking-beam supported thereby; arm means whereby said walking-beam may be moved from operating position into retracted position; a fulcrum means secured to said Samson post whereby said arm means is pivotally supported; and a nut and lead screw means connected to said Samson post and said arm means whereby said arm means is actuated.

8. A retractable walking-beam structure of the character described, including: a support for a walking-beam; a walking-beam pivotally carried on said support and adapted to movement horizontally relative to said support from operating position to retracted position; arm means having one end movable in the direction of movement of said walking-beam from operating to retracted position and the other end thereof fulcrumed; means connecting said movable end of said arm means to said walking-beam; a stationary member; and means operative between said stationary member and said arm means to exert a force to swing said arm means so as to move said walking-beam between said operating and retracted positions.

GUGLIELMO TREMOLADA.