Dec. 7, 1965 M. M. ROSS 3,221,569

WELL PUMP MEANS

Original Filed Nov. 12, 1957 4 Sheets-Sheet 1

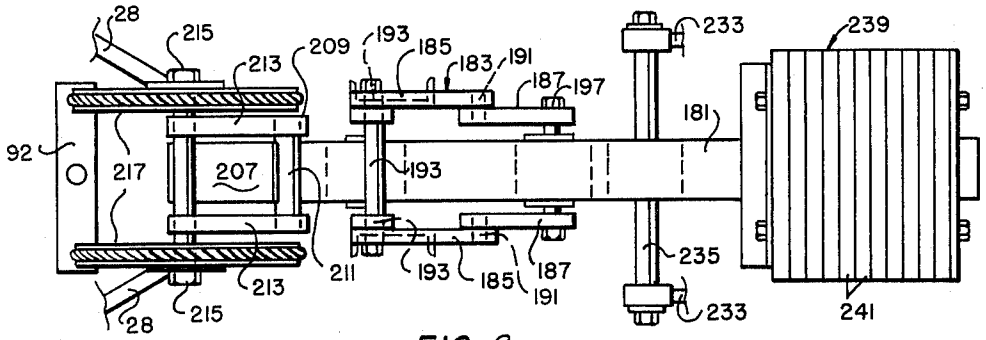

FIG. 2

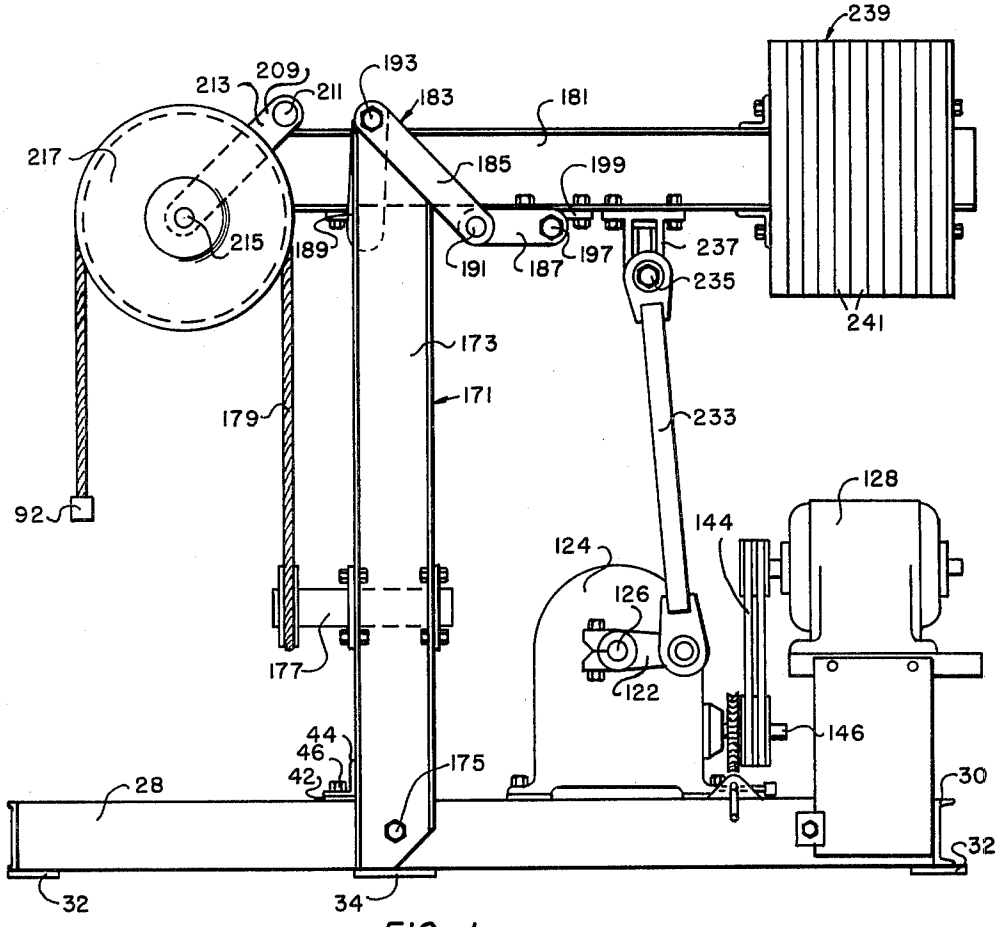

FIG. 1

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Dec. 7, 1965 M. M. ROSS 3,221,569

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Original Filed Nov. 12, 1957 4 Sheets-Sheet 2

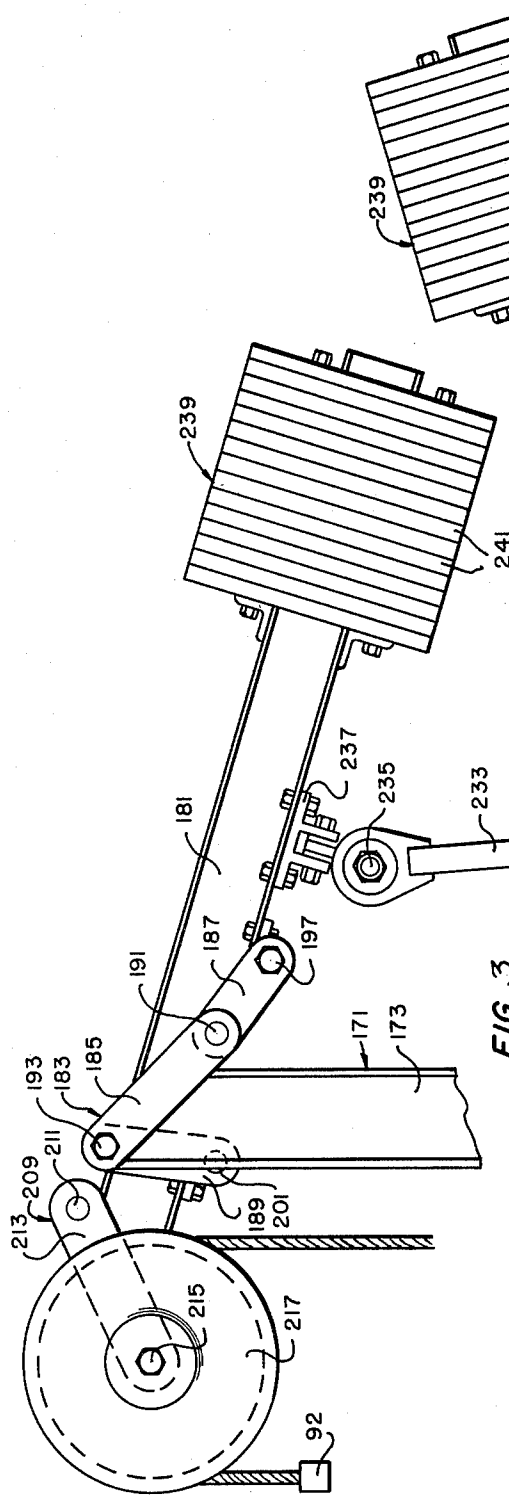

FIG. 3

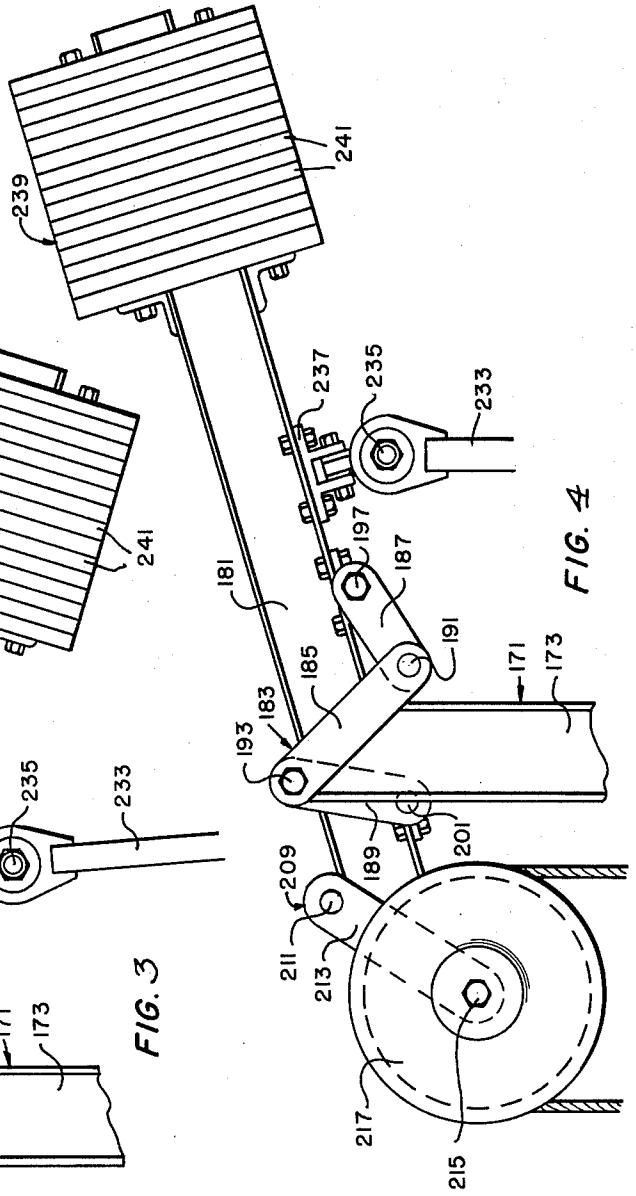

FIG. 4

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WELL PUMP MEANS

Original Filed Nov. 12, 1957 4 Sheets-Sheet 3

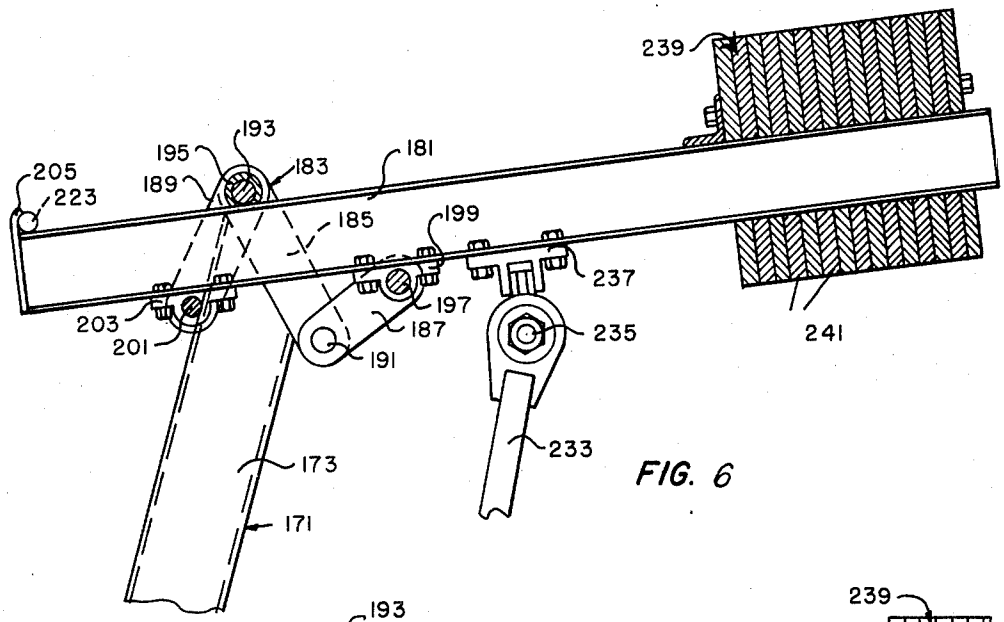

FIG. 6

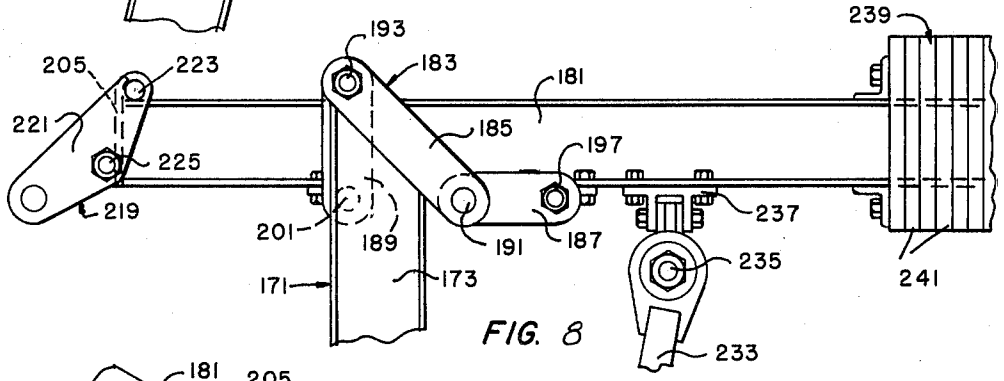

FIG. 8

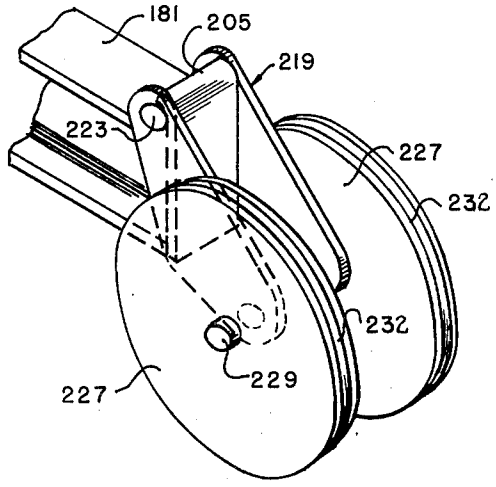

FIG. 5

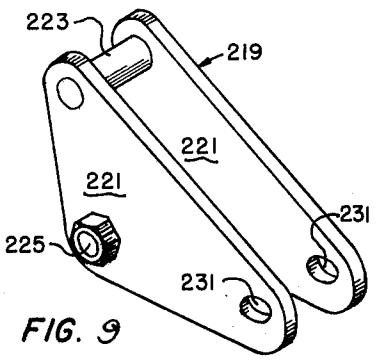

FIG. 9

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Dec. 7, 1965 M. M. ROSS 3,221,569

WELL PUMP MEANS

Original Filed Nov. 12, 1957 4 Sheets-Sheet 4

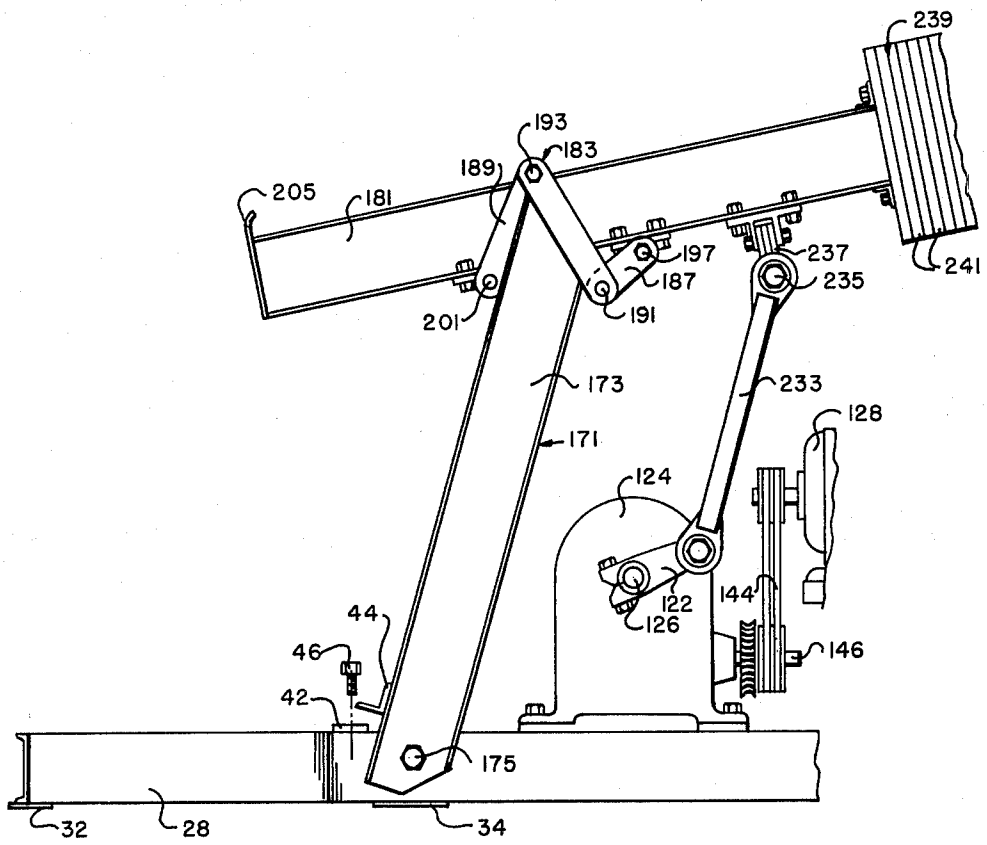

FIG. 7

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United States Patent Office 3,221,569 Patented Dec. 7, 1965

3,221,569

WELL PUMP MEANS

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Original application Nov. 12, 1957, Ser. No. 695,673, now Patent No. 3,006,201, dated Oct. 31, 1961. Divided and this application Sept. 11, 1961, Ser. No. 140,157
1 Claim. (Cl. 74—108)

This application is a division of application Serial No. 695,673, filed Nov. 12, 1957, now Patent No. 3,006,-201 issued Oct. 31, 1961, entitled Well Pump Means.

This invention relates to pumping. In a more specific aspect this invention relates to means for pumping wells, particularly oil wells. In still a more specific aspect this invention relates to pump jacks for pumping oil wells. In yet a more specific aspect this invention relates to new pump jack means for pumping oil wells, which utilizes a pivoted horsehead assembly to increase the travel of the pump polish rod relative to the distance of travel of the walking beam upon rocking, and which means provides for movement of the pump polish rod up and down in substantially a perpendicular or straight line.

Means for pumping wells have long been known in the art, and it is common in the prior art to use a pump jack having an upright Samson post mounted on a horizontally disposed base structure. A walking beam is commonly mounted on the top of this Samson post, the walking beam rocking up and down in operation. On one end of the common walking beam is mounted a horsehead to which is attached means connecting the horsehead and pump jack to the pump polish rod. The other end of the walking beam of the prior art mounts counterbalance weights, and this portion of the walking beam on one side of the Samson post is connected to power means which rocks the walking beam relative to the Samson post in operation. The usual powering means of the pump jack devices of the prior art consists of a motor or engine which is connected to the walking beam by gearing, normally a gear box assembly connected to the motor engine by pulley belts. In the common pump jacks of the prior art the polish rod of the pump moves up and down the same distance as the end of the walking beam to which the polish rod is attached. Means have been proposed to increase polish rod travel in relation to walking beam travel, but they have been unsuccessful either from a manufacturing standpoint or from an operational standpoint. Further, the usual pump jack means is inefficient and difficult to use and contend with when the well and auxiliary equipment must be worked, for example, the tubing pulled, the pump replaced, the well cleaned out, etc. The pump jack equipment, including the horsehead and walking beam, and even the Samson post, is in the way, making it difficult to use rod and tubing servicing equipment, and the like. Sometimes in working and repairing, it is necessary to completely move the pump jack back from the area of the well. Additional inefficiency and waste of energy and equipment is present in the common pump jack equipment known in the prior art. For example, it is common to use powering means much greater in potential output than is necessary to operate the pump jack during pumping operation, this being done so that the power is available to lift the weighting means when the counterbalance of the pump is not present or available. Such is experienced when repairing equipment, working the well to clean the same, and the like. I have invented new well pump means which overcomes all of the disadvantages experienced with the pump means known in the prior art, and common to well pumping operations. In the preferred embodiments of the new well pumping means of my invention, the travel of the pump polish rod is much

greater than the travel of the end of the walking beam which mounts the preferred pivoted horsehead assemblies of my invention. The new pump means of my invention in the preferred embodiments is easily and conveniently moved back out of the immediate well area, including the Samson post, the walking beam, and the preferred pivoted horsehead assembly. In the new well pump means of my invention the pump polish rod moves up and down in substantially a perpendicular or straight line during well pumping operations. This provides for long life, cuts down wear very substantially, and saves a great deal of energy which is commonly wasted by the known pump jack means. The new well pumping means of my invention is indeed a great step forward in the art.

The new pump means of my invention has a base. This base is normally horizontally disposed at the site of the oil or water well. A Samson post is mounted on the base. It is preferred that this Samson post be tiltably mounted on the base in the preferred specific embodiments of my new pump means. A walking beam is tiltably mounted on the upper end portion of the Samson post. One end portion of the walking beam is provided to receive and secure a pump rope or cable, which is in turn during operation connected to a pump polish rod or similar device. The other end portion of the walking beam mounts counterbalance means. Means are provided to rock the walking beam up and down in operation. The attachment means on the end portion of the walking beam are so constructed and the walking beam is pivotally mounted in a manner that the pump rope or cable or like means in operation remains substantially in a straight line upon rocking the walking beam. In preferred specific embodiments of the new pump means of my invention, I preferably pivotally mount pulley means on the well operating end of the walking beam to compound the stroke of same relative to the pump polish rod. In the preferred specific embodiments, connecting means operationally connect the pivoted horsehead assembly to the Samson post preferably.

It is an object of this invention to provide new pumping means.

It is another object of this invention to provide new pump jack means for the pumping of wells, particularly oil or water wells.

Another object of this invention is to provide new pump jack means for pumping oil wells which will compound the stroke of the walking beam upon operation relative to the travel of the well pump polish rod.

Still another object of this invention is to provide new pump jack means which is completely adjustable with regard to the travel of the well pump polish rod relative to the travel distance of the end of the walking beam to which it is connected.

A further object of this invention is to provide new pump jack means for pumping wells, the structural members of which can be easily and conveniently moved out of the immediate well area for working the well, particularly moving the Samson post, walking beam, and horsehead back out of the immediate well area.

Another object of this invention is to provide new pump jack means, which are easy and economical to build and install, efficient in operation, and convenient and economical to repair or replace the parts thereof, and which can conveniently be constructed mobile or portable.

Other objects and advantages of the new pump jack means of my invention will become apparent to those skilled in the art upon reading this disclosure.

Drawings accompany and are a part of this disclosure. These drawings depict preferred specific embodiments of the new pump jack means of my invention, and it is

to be understood that the drawings are not to unduly limit the scope of my invention. In the drawings,

FIG. 1 is a side elevation view of a preferred specific embodiment of the new pump jack means of my invention.

FIG. 2 is a top plan view of this embodiment of the pump jack means.

FIG. 3 is a side elevation view of this embodiment of pump jack means of my invention in up operating position, that is, with the walking beam and pulley assembly in that position.

FIG. 4 is a side elevation view with the walking beam and pulley assembly in down operating position.

FIG. 5 is a perspective view of the pulley and hanger assembly, in another preferred specific embodiment of the new pump jack means of my invention.

FIG. 6 is a side elevation view showing the walking beam attachment means, and the walking beam and Samson post in tilted back position, and partially in cross section to show in detail the walking beam mounting.

FIG. 7 is a side elevation view showing the pump jack means and power operating means in tilted back position for easy access to the immediate well vicinity.

FIG. 8 is a side elevation view showing the walking beam in central position and showing the hanger assembly for this pulley assembly, and the attachment means for the pump polish rod when the pump jack means is used without compounding the stroke of the walking beam.

FIG. 9 is a perspective view enlarged of the hanger member for this pivoted pulley assembly.

Following is a discussion and description of the new pump jack means of my invention made with reference to the drawings whereupon the same reference numbers are used to indicate the same or similar parts or structure. The discussion and description is of a preferred specific embodiment of the new pump jack means of my invention, and it is to be understood that such is not to unduly limit the scope of my invention.

Referring now to the drawings, wherein is depicted preferred specific embodiments of the new pump jack means of my invention, the pump jack is supported on the horizontally disposed base which is preferably formed of spaced channel beam members 28, which are bent outwardly in their forward end portions. The rear ends of the spaced channel beam members 28 are suitably secured, preferably by welding, to a transverse base member 30, which can conveniently be flat stock or a channel beam. Pad members 32, preferably of metal, are suitably mounted on the ends of channel beams 28, and transverse member 30. Base plate 34 is suitably secured to the bottom of base members 28. It serves to rest channel beams 28 on the usual concrete foundation (not shown) and to provide backing for the Samson post 171 when such is in pumping position (FIG. 1).

Samson post 171 is constructed of spaced and parallel channel beam members 173. These channel beam members 173 are tiltably mounted on channel beam members 28 on the outside thereof, the mounting being preferably done with a shaft 175 therethrough secured by nut means on the outer ends thereof. The rear bottom edges of beams 173 are cut away at an angle, as shown in the drawings, so that members 173 can be tilted backwardly to move Samson post 171 and the remainder of the front pump jack means back out of the immediate well area for servicing the well, and the like. A shoe 44 is secured to the front edges of channel beams 173 in any suitable manner, and a plate 42 is transversely mounted across the top of beams 28 in any suitable manner. Bolt means 46 passing through an aperture in shoe 44 and threadedly secured in plate 42 maintains Samson post 171 in upright position (FIG. 1), the position during pumping operation. If desired, plate 42 can be omitted with the bolt means passing through the channel beam 28 upper flanges and held therein with nut means. Bolt 46 is removed to allow tilting back of Samson post 171 (FIG. 7). A fixed pivot 177 is suitable secured to Samson post 171. This is shown at FIG. 1. This fixed pivot 177 receives rope or cable connecting means 179.

A walking beam 181 is pivotally mounted in an inner portion on the upper end portion of Samson post 171. This walking beam 181 is rocked up and down in pumping operation. A cradle assembly 183 mounts walking beam 181 on Samson post 171. This cradle assembly 183 has mounting members 185 which are rigidly secured to the upper ends of channel beams 173 at an angle as shown in the drawings, such securing being done in any suitable manner, preferably by welding members 185 to the upper cut away ends of channel beams 173. The end portions of members 185 pivotally mount connecting links 187 and 189 by shafts 191 and 193, respectively, passing therethrough. Shaft 193 is preferably fixed in members 185. This shaft 193 is in contact with the top surface of the walking beam when tilted back (FIGS. 6 and 7). The outer ends of connecting links 187 are pivotally mounted on shafts 197, and shaft 197 is journaled in preferably pillar bearing 199 which is mounted on the underside of the I-beam of walking beam 181. The outer ends of connecting links 189 are pivotally mounted on a shaft 201 which is journaled in preferably pillar bearing 203 which is mounted on the underneath side of the I-beam of walking beam 181 forward of pillar bearing 199. Thus, as shown in FIGS. 1, 3 and 4, the outer end of walking beam 181 moves up and down in substantially a straight and perpendicular line upon rocking walking beam 181 up and down in operation. In the drawings the up position of walking beam 181, referring to the outer end, is shown in FIG. 3. The neutral or central position is shown in FIG. 1. The down position is shown in FIG. 4. Also, as can been seen best in FIGS. 6 and 7, this specific preferred mounting of the invention of the applicant readily provides for tilting back Samson post 171 to move the pump jack means out of the immediate well area. The cradle assembly 183 is sized and positioned to provide for this straight up and down movement of the outer end of walking beam 181. The hook-shaped attachment member 205 is mounted on the outer end of walking beam 181 in any suitable manner, such as by welding, in the specific preferred embodiment depicted in the drawings, FIGS. 5 through 9. In the preferred specific embodiment shown in FIGS. 1 through 4 a similar attachment member 207 is secured at an angle on the outer end of walking beam 181 in any suitable manner, such as by welding member 207 thereto.

Hanger assembly 209 has an upper rod or shaft 211 which mounts side members 213. These side members 213 is position are spaced and on the outside of walking beam 181 (FIG. 1). The other and outer ends of members 213 mount a shaft or axle 215 on which pulleys 217 are rotatably mounted. Rod or shaft 211 rests on the top surface of walking beam 181 and is held thereon by the upper hook-shaped portion of attachment means 207, which is fixed to the outer end of walking beam 181. Shaft or axle 215 rests against the face of attachment member 207 in the lower end portion thereof. In this manner hanger assembly 209 is mounted and retained on the outer end of walking beam 181 for operation of the pump jack means in pumping the well. The pulleys 217 have rope or cable grooves therearound and these grooves receive connecting rope or cable 179. The ends of operating rope or cable 179 are attached to connecting means 92 which is adapted to receive the pump polish rod (not shown). Upon operation connecting member 92 moves up and down in substantially a straight and perpendicular line as the walking beam 181 is rocked up and down. Further, the pulleys 217 and operating rope or cable 179 provide for connecting member 92 to travel a greater distance than the outer end of the walking beam 181.

The hanger assembly 219 of FIGS. 5 and 9 is preferably

used with attachment means 205 and the outer end of walking beam 181. The hanger assembly 219 has spaced and parallel side members 221. These side members 221 are joined at the top by rod or shaft 223, and in the central portion by rod or shaft 225. When the hanger assembly 219 is mounted on the outer end of walking beam 181 rod or shaft 223 rides and lays on the top surface of walking beam 181 and is held thereon by the upper hook-spaced portion of attachment means 205. Rod or shaft 225 rests against the face of attachment means 205 in the lower portion thereof. See FIG. 8. Pulleys 227 are rotatably mounted on a shaft or axle 229 which is in turn mounted in the apertures 321 in side plates 221. The same or similar connecting and operating rope or cable 179 is attached to a fixed pivot, the same or similar to 177 shown in FIG. 1 of the drawings, such rope or cable 179 passing over and laying in grooves 232 of pulleys 227 and then being attached in their end portions to a connecting means the same or similar to 92. With the cradle hanging of walking beam 181 with cradle assembly 183, and pulleys 227 operating in conjunction with a cable or rope 179, this specific embodiment of the new pump jack means of my invention compounds the stroke of the walking beam relative to the pump polish rod, and the rope or cable 179 moves up and down in substantially a straight and perpendicular line during pumping operation.

FIGS. 6 and 7 show the pump jack means with the Samson post 171 tilted back to move the equipment out of the immediate well area, so that the well can be serviced as required, and the like.

Both of the specific embodiments of FIGS. 1 through 4, and FIGS. 5 through 9, are powered to operate with substantially the same powering equipment. Motor means 128 is preferably used to power the input shaft 146 of speed reduction gearing assembly 124. The output shaft 126 from speed reduction gearing 124 turns crank 122 which in turn operates crank arms 233 and to which the crank arms 122 are pivotally connected. Crank arms 233 are pivotally mounted on the outer ends of shaft 235, and shaft 235 is preferably adjustably connected to walking beam 181 by bracket means 237. Pulley belts 144 operatively connect motor 128 with speed reduction gearing 124, so that on operation of motor 128 the walking beam 181 is rocked up and down in pumping operation.

Counterbalance weight means 239 is mounted on the inner end portion of walking beam 181. I have found it desirable to removably mount individual weights 241 on walking beam 181 so that the amount of weight can be adjusted to the load on the pump jack. In the embodiments of the new pump jack means shown in FIGS. 1 through 9 of the drawings, if it is desired to operate without the feature of compounding the travel of the outer end of the walking beam 181 through the use of pulleys 217 or 227, the pump polish rod (not shown) can be suitably attached to the hanger assemblies 209 and 219, respectively. Shaft or axle 215 can conveniently mount connecting means to a mounting means the same or similar to 92, in turn member 92 can be attached to and receive the pump polish rod. Likewise, a shaft similar or the same as axle or shaft 229 can be mounted in apertures 231 in hanger assembly 219, and connecting means can be anchored thereto and a mounting member the same or similar to member 92, such in turn mounting and receiving the pump polish rod. In such a mounting and operation, the pump polish rod will move up and down in substantially a straight and perpendicular line, but will only travel the same distance as the end of the rocking beam 181. In these uses a pivot point or post 177 is not needed.

As will be evident to those skilled in the art, various modifications of this invention can be made, or followed, in the light of this disclosure and discussion without departing from the spirit or scope of the disclosure or form the scope of the claim.

I claim:

In well pumping means comprising, in combination, a base, a Samson post mounted on said base, a cradle linkage connecting between the upper end portion of said Samson post and said walking beam in a middle portion thereof and supporting said walking beam on said Samson post so that in operation the outer end of said walking beam moves in a straight line, power means operably connected to said walking beam for applying a rocking motion thereto, that improvement, comprising, in combination, a pulley, a vertically protruding hook member on said outer end of said walking beam, a hanger means removably mounted on said walking beam having spaced and substantially parallel side plates, a transverse hanger member secured to said plates and engaging said hook member, a transverse abutment means mounted between said plates abutting the end of said walking beam, and axle means mounted on said plates and spaced outwardly from said hanger member, said pulley rotatably mounted on said axle means, a cable passing over and supported on said pulley and having connecting means in one end portion for connecting said cable to a pump rod, and anchor means mounted on said pump means connecting and mounting the other end portion of said cable at a point below said pulley, the resulting improved stroke of said walking beam and maintaining the line of well pumping means in operation compounding the movement of the connecting means on said cable for connecting to a pump rod along a vertical line tangent to said pulley.

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