March 25, 1930. J. B. SPERRY 1,751,767

PUMPING APPARATUS

Filed June 15, 1925 2 Sheets-Sheet 1

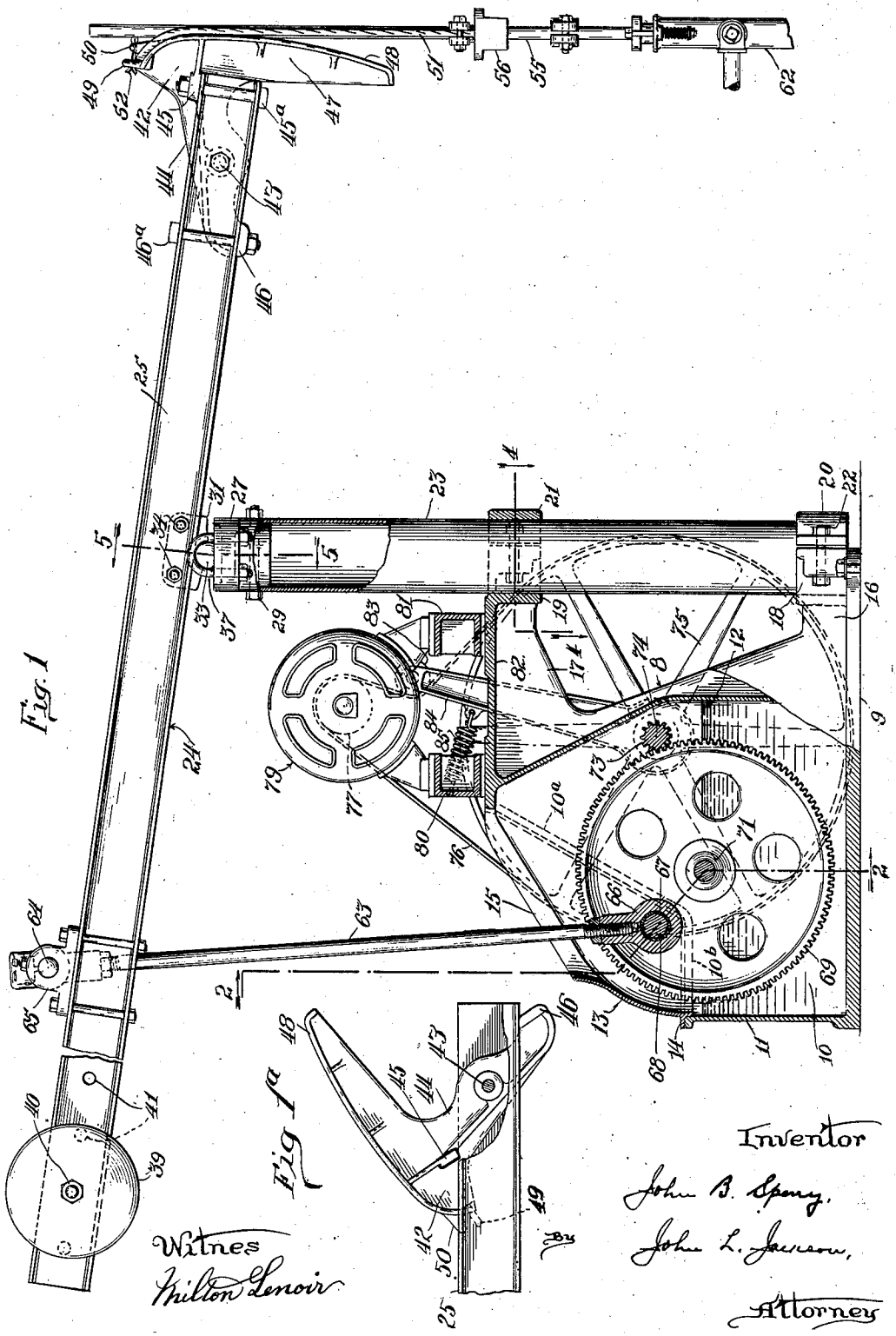


Fig. 1

Fig. 1a

Witnes
Milton Lenoir

Inventor
John B. Sperry.
By John L. Jackson,
Attorney

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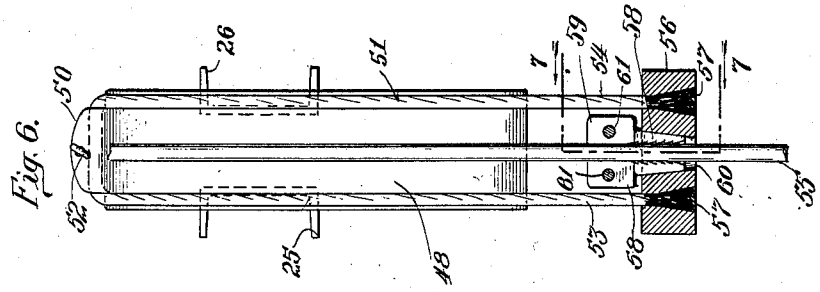


Fig. 6.

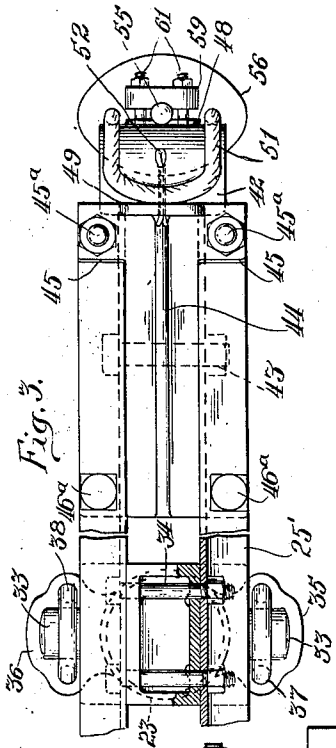


Fig. 3.

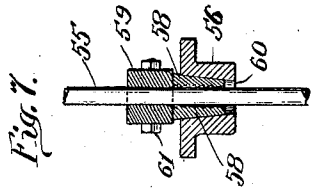


Fig. 7.

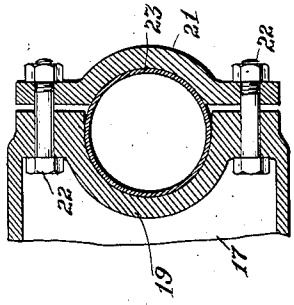


Fig. 4

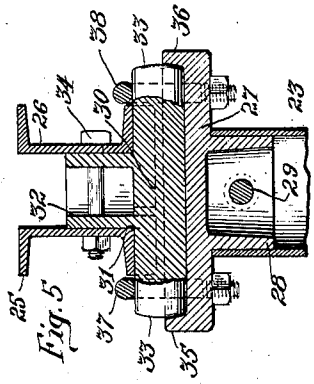


Fig. 5

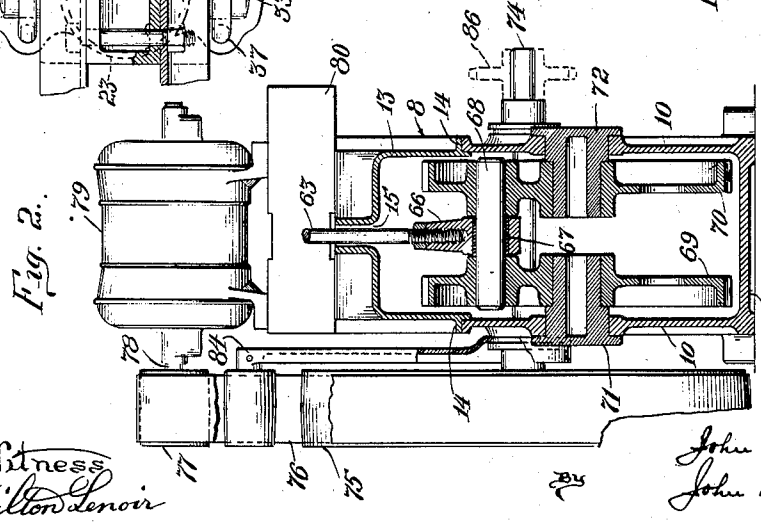


Fig. 2.

Witness
Milton Senoir

Inventor
John B. Sperry.
John L. Jackson.
Attorney

Patented Mar. 25, 1930 1,751,767

UNITED STATES PATENT OFFICE

JOHN B. SPERRY, OF AURORA, ILLINOIS, ASSIGNOR TO THE AMERICAN WELL WORKS, OF AURORA, ILLINOIS, A CORPORATION OF ILLINOIS

PUMPING APPARATUS

Application filed June 15, 1925. Serial No. 37,031.

My invention relates to deep well pumps of the walking beam type, which usually comprise a walking beam mounted to rock in a vertical plane, a pitman for actuating the same, a power head on which is mounted suitable mechanism for actuating the pitman, and connections at one end of the walking beam for reciprocating a pump rod vertically.

The object of my invention is to provide certain improvements in pumping apparatus of this type which will be particularly pointed out in connection with the accompanying drawings which illustrate my preferred embodiment thereof.

In the accompanying drawings,—

Fig. 1 is a view, partly in side elevation and partly in vertical section, illustrating a pumping apparatus embodying my improvements;

Fig. 1[a] is a detail showing a changed position of the cross-head to which the pump-rod cable is attached;

Fig. 2 is a partial vertical cross-section on line 2—2 of Fig. 1;

Fig. 3 is a view, partly in plan and partly in section, illustrating the pivotal mounting of the walking beam and the connections of the walking beam with the pump rod;

Fig. 4 is a partial horizontal section on line 4—4 of Fig. 1;

Fig. 5 is a partial vertical cross-section on line 5—5 of Fig. 1;

Fig. 6 is an enlarged end view of the cross-head through which the pump rod connections are attached to the walking beam, some parts being in section; and

Fig. 7 is a partial vertical section on line 7—7 of Fig. 6.

Referring to the drawings,—8 indicates the power head as an entirety, which comprises a base 9 which carries a housing having side walls 10 and end walls 11, 12. As indicated by the dotted lines 10[a] and 10[b] in Fig. 1, the side walls 10 are cut down at what may be termed the front end of the housing, and the front wall 11 is considerably lower than the back wall 12. The purpose of this arrangement is to enable the wrist pin hereinafter described to be removed conveniently, as will presently be more fully explained. A removable cover 13, arranged so that when in place it forms an upward extension of the side walls 10 and the front wall 11, is provided, said cover having a laterally projecting flange 14 which is adapted to rest on the upper marginal portions of said walls, as indicated in Figs. 1 and 2. The cover is also provided with a longitudinal slot 15 through which the pitman extends and in which it moves, as illustrated in said figures.

The power head housing is also provided with a lower horizontally extending bracket 16 adjacent to and integral with the base 9, and also with an upper horizontally extending bracket 17. These brackets are respectively provided with semi-circular members 18, 19, with which cooperate semi-circular clamping members 20, 21, respectively, adapted to be secured thereto by bolts 22, as best shown in Fig. 4. Each pair of members 18, 20 and 19, 21 together form a circular opening to receive a cylindrical or tubular standard 23 and support it firmly in a vertical position. It will be noted that the member 18 overlies the base 9 a projecting ledge of which forms the bottom of a pocket of which the members 18, 20 comprise the sides, so that when the standard 23 is fitted in said pocket its foot rests on the ledge of the base 9 and may be tightly clamped in position by the member 20. The opening provided by the members 19, 21 is in vertical alinement with that provided by the members 18, 20, and is so located that it supports the standard 23 about midway of its length. By this means the standard may be securely connected to the power head 8, but it may readily be removed when desired by detaching the members 20, 21.

The walking beam, hereinbefore referred to, is indicated generally by the reference numeral 24, and it comprises two channel bars 25, 26 arranged in parallelism with their marginal flanges extending outward. Said channel bars are spaced a short distance apart, and are suitably connected together and braced so as to form a unitary structure. The walking beam is fulcrumed or pivoted between its ends upon the standard 23 by

means which will now be described. Mounted upon the upper end of the standard 23 is a cap 27 which is disposed horizontally and is provided with a depending annular flange 28 which telescopes in the upper end of the standard 23, as shown in Fig. 5, and may be secured thereto by a cross-bolt 29. At its upper side the cap 27 is provided with a longitudinally extending recess of the proper shape to receive and form a bearing for the rocker element 30 of a fulcrum block 31 which is adapted to be secured to the channel bars 25, 26 with said rocker element disposed transversely at the under side thereof. Said fulcrum block comprises an upwardly projecting bracket 32 that is located midway of the length of the rocker element 30 and fits closely between the two channel bars 25, 26, the lower margins of which rest on the upper surface of the rocker element 30, as best shown in Fig. 5. A bolt 34 serves to secure the fulcrum block fixedly to the walking beam members. It will be noted that the ends 33 of the rocker element project laterally beyond the lower flanges of the bars 25, 26 and rest in the recess in the upper surface of the cap 27, so that a laterally extended rocker bearing is provided for the walking beam, and lateral movement thereof is prevented by the end portions 35, 36 of the cap 27 which extend up beyond the ends of the rocker element, as shown in Fig. 5. U-bolts 37, 38, which embrace the ends 33 and extend down through the cap 27, serve to hold the fulcrum block against upward displacement. Obviously it is a simple matter to remove the walking beam when desired, and also the cap 27 may easily be dismounted by simply withdrawing the bolt 29.

The walking beam is provided at its free end with a counterbalance weight 39 secured in place by a bolt 40 which may pass through any one of a series of holes 41 in the walking beam, so that the position of the counterbalance may be adjusted longitudinally of the walking beam. At its opposite end the walking beam is provided with a cross-head 42 pivotally secured thereto by a horizontal pivot 43 which supports a rearwardly extending arm 44 that forms a part of the cross-head and extends between the walking beam members 25, 26. The cross-head 42 is therefore adapted to swing vertically into or out of operative position. The arm 44 is provided with laterally extending lugs 45, 46 at opposite sides of the pivot 43, that bear against the upper and lower flanges respectively of the members of the walking beam and may be secured thereto by bolts 45^a, 46^a to hold the cross-head rigid with the walking beam when the cross-head is in use. Opposite the end of the walking beam the cross-head 42 is provided with a vertically disposed guide member 47 which extends above and below the longitudinal axis of the walking beam and has a convex or cam-like outer face 48, as best shown in Fig. 1. At the upper end of the guide member 47 the cross-head 42 is provided with transverse upwardly extending flanges 49, 50 which are set a short distance apart, so that the bight of a cable 51 may be fitted between them, as illustrated in Figs. 1 and 3, and after being hooked over the flange 50 the cable may extend down over the curved face 48 of the guide member 47 adjacent to the opposite side margins thereof, as best shown in Figs. 3 and 6. By means of a cotter pin 52 passing through the flanges 49, 50, as shown in Fig. 1, the bight of the cable can be prevented from jumping out of the groove in which it fits.

The lower ends 53, 54 of the cable are adapted to be secured to a pump rod 55 in any suitable way, but preferably by securing them to a disc 56 at opposite sides of the center thereof by wedge shaped lead heads 57, and securing the pump rod 55 to said disc by means of serrated wedges 58, which extend into a central passage 60 in the disc through which the pump rod 55 extends. A split collar 59 is clamped to the pump rod above said wedges by bolts 61, to prevent upward movement of said wedges, and the side walls of the passage 60 are so arranged that upward pull on the disc 56 tends to clamp said wedges tightly against the pump rod so that the disc 56 cannot be moved upward along the pump rod by upward pull applied to said disc incident to upward movement of the cross-head 42. The disc 56 may, however, be disconnected from the pump rod by supporting the latter and knocking the disc down along it sufficiently to loosen the wedges 58.

The pump rod is designed to operate in a well tube 62, and to be reciprocated therein by the rocking of the walking beam 24, which is so located with reference to the well that the cross-head 42 swings in an arc substantially over the well. The curved surface 48 of said cross-head is provided to hold the depending portions of the cable 51 in the vertical plane of the axis of the well, so that the pull upon the pump rod is always vertical. The curvature of that portion of the guide member 47 with which the cable engages during the operation of hoisting the pump rod should therefore be curved in the arc of a circle, the center of which is coincident with the axis of the rocker element 30.

The walking beam 24 is rocked by means of a pitman 63, the upper end of which is pivotally connected with one end portion of the walking beam by a pivot 64 journaled in a block 65 secured to the walking beam members, as best shown in Fig. 1. The lower end of said pitman is provided with a coupling sleeve 66 which is journaled on a spacer sleeve 67 mounted on a wrist pin 68 that is eccentrically connected with two gears 69, 70, as best shown in Fig. 2. Said gears are spaced

apart far enough to receive the spacer sleeve 67 between them, and are mounted on trunnions 71, 72, respectively, supported by the side walls 10 of the housing and projecting inwardly therefrom. These trunnions are located near enough to the marginal portions 10^a, 10^b of the side walls 10 so that the gears 69, 70 extend far enough beyond such side walls so that the wrist pin 68 may be brought to a position where it will lie beyond the margins 10^a, 10^b, or, in other words, will lie outside of the housing proper. The object of this arrangement is to facilitate the removal of the wrist pin 68, and it will be apparent that by removing the cover 13 and turning the gears 69, 70 so that the wrist pin 68 is carried to the position shown in Fig. 1, said wrist pin may be taken out for the purpose of disconnecting the pitman 63, after which the wrist pin and spacer sleeve 67 may be replaced, leaving the power head free to be used for other purposes. It is desirable that provision be made for disconnecting the pitman readily without disturbing the operating parts of the power head, because it often happens that the operator wishes to put the walking beam out of commission and use the power head for doing other work.

In the construction shown, the gears 69, 70 are arranged to be driven by means of a pinion 73 carried by a horizontal shaft 74 which extends into the power head housing, and on one end carries a pulley 75 driven by a belt 76 which is driven by a pulley 77 on the armature shaft 78 of an electric motor 79. Said motor, as shown in Figs. 1 and 2, is mounted on transverse beams 80, 81 carried by a platform 82 which is supported by the bracket 17 and forms a part of the power head housing. Preferably a belt tightener pulley 83 carried by a swinging arm 84, actuated by a spring 85, serves to keep the belt 76 at the proper tension. By this construction I provide a very compact and efficient power unit which may not only be employed for actuating a walking beam, as above described, but may also be used for many other purposes. Preferably the shaft 74 extends entirely through the housing, and at its end opposite that which carries the pulley 75 it is preferably provided with a sprocket wheel 86, indicated by dotted lines in Fig. 2, by which various power transmitting connections can be made. As shown, oil is placed in the housing for lubricating the gears and bearings.

What I claim as my invention and desire to secure by Letters Patent, is—

1. A power head of the type described, comprising a housing, driving gears mounted therein, a lower bracket projecting laterally from said housing, an upper bracket projecting from said housing over said lower bracket, and vertically alined semi-circular clamping members carried by said brackets adapted to receive and support a tubular standard.

2. A power head of the type described, comprising a housing, driving gears mounted therein, a lower bracket projecting laterally from said housing, an upper bracket projecting from said housing over said lower bracket, vertically alined semi-circular clamping members carried by said brackets adapted to receive and support a tubular standard, and a base for said housing extending under said lower clamping member and arranged to support the lower end of the standard.

3. A power head of the type described, comprising a housing, driving gears enclosed in said housing, upper and lower brackets projecting laterally from the housing and adapted to supoprt a vertical standard, a motor mounted on said upper bracket, and means operatively connecting said motor with said driving gears.

4. A power head of the type described, comprising a housing having side and end walls, a bracket projecting laterally from the upper portion of said housing, parallel driving gears mounted coaxially in said housing and spaced apart, a wrist pin eccentrically connected with said driving gears, the side and one of the end walls of said housing being cut away at one side of said bracket to permit the wrist pin to be withdrawn endwise at a point opposite the cutaway portions of said side walls, and a cover arranged to fit over the cutaway portions of said end and side walls.

5. A pumping apparatus comprising a power head, upper and lower brackets carried thereby, an upright tubular standard mounted in said brackets, a walking beam pivotally mounted on the upper end of said standard, a pitman connected with said walking beam for actuating the same, and means in said power head for actuating said pitman.

6. A pumping apparatus comprising a power head having a housing, upper and lower brackets projecting laterally from said housing and having vertically alined semi-circular clamping members at their outer ends, an upright tubular standard adapted to fit against said clamping members, means for clamping said standard to said clamping members, a walking beam pivotally mounted on the upper end of said standard, a pitman connected with said walking beam for actuating the same, and means in said power head for actuating said pitman.

7. A pumping apparatus comprising a power head having a base, a housing, and upper and lower brackets projecting laterally from said housing, said brackets having semi-circular clamping members at their outer ends, an upright tubular standard stepped on said base and supported by said clamping members, means for clamping said standard to

said clamping members, a walking beam pivotally mounted on the upper end of said standard, a pitman connected with said walking beam for actuating the same, and means in said power head for actuating said pitman.

8. In a pumping apparatus, the combination with an upright tubular standard and means for supporting the same, of a cap telescopically fitted to the upper end of said standard, means for securing the cap to the standard, a walking beam, a fulcrum block secured to said walking beam and having a rocker element disposed transversely at the under side of said walking beam, a recess in said cap adapted to receive and supoprt said rocker element, the end portions of said cap being extended up beyond the ends of said rocker element, and means for holding said rocker element in position on said cap.

9. In a pumping apparatus, the combination with an upright tubular standard and means for supporting the same, of a cap telescopically fitted to the upper end of said standard, means for securing the cap to the standard, a walking beam comprising oppositely disposed parallel channel bars spaced apart, a fulcrum block fitted between said bars and having a rocker element extending transversely of said walking beam at the under side thereof, and a recess in said cap to receive said rocker element.

10. In a pumping apparatus, the combination with an upright tubular standard and means for supporting the same, of a cap telescopically fitted to the upper end of said standard, a walking beam comprising parallel bars spaced apart, a fulcrum block fitted between said bars and having a rocker element extending transversely of said walking beam at the under side thereof, a recess in said cap to receive said rocker element, and U-bolts embracing the end portions of said rocker element and connected with said cap.

11. A pumping apparatus comprising a standard, a walking beam fulcrumed thereon composed of two laterally spaced members, means for rocking said walking beam in a vertical plane, a cross-head having a rearwardly extending arm pivotally mounted between the members of said walking beam at one end thereof to swing the cross-head vertically into or out of operative position, a vertically disposed guide carried by said cross-head and means for securing said cross-head in fixed relation to said walking beam.

12. A pumping apparatus comprising a standard, a walking beam fulcrumed thereon composed of two laterally spaced members, means for rocking said walking beam in a vertical plane, a cross-head pivotally mounted between the members of said walking beam at one end thereof to swing vertically, said cross-head having a vertically disposed guide member provided with a convex outer surface, and means for securing said cross-head in fixed relation to said walking beam.

13. A pumping apparatus comprising a standard, a walking beam fulcrumed thereon, means for rocking said walking beam in a vertical plane, and a cross-head carried by said walking beam at one end thereof, said cross-head having a rearwardly extending arm pivotally connected with the walking beam to swing vertically, and lugs carried by said arm at opposite sides of the pivot thereof adapted to engage the upper and lower marginal portions of the walking beam and to be secured thereto.

14. A power head of the type described, comprising a housing, driving gears enclosed in said housing, spaced fastening means projecting laterally from the housing, a vertical standard supported at its foot by the housing and secured by said fastening means to one side thereof, operating means mounted on said standard, and means operatively connecting said operating means, mounted on said housing, and means operatively connecting said motor with said driving gears.

15. A pumping apparatus comprising a power head having a housing, a bottom support and fastening means projecting laterally from said housing, an upright standard adapted to rest on said bottom support and to be supported at separated points by said fastening means, a walking beam pivotally mounted on the upper end of said standard, a pitman connected with said walking beam for actuating the same, and means in said housing for actuating said pitman.

16. A power head of the type described, comprising a housing, driving gears enclosed in said housing, means carried by said housing at one side thereof adapted to extend under and support a vertical standard, means for securing said standard at an outer side of said housing, and operating means mounted on said standard and operatively connected with said driving gears.

17. In a power head, the combination of a walking beam support, comprising a housing, a vertical member supported at its foot on said housing, means securing said member at one side of the housing, driving gears enclosed in said housing, a walking beam adapted to pivot on said vertical member, and means operatively connecting said walking beam with said driving gears.

18. A pumping apparatus comprising a standard, a walking beam fulcrumed thereon, means for rocking said walking beam in a vertical plane, and a cross-head carried by said walking beam at one end thereof, said cross-head having a rearwardly extending arm pivotally connected intermediately of its length with the walking beam to swing vertically, and means carried by said arm at one side of its pivot adapted to engage the said

walking beam and to be secured thereto to hold the cross-head against swinging.

19. In a power head, the combination of a housing having a horizontally projecting ledge at one side thereof, a vertical member secured to the side of said housing and resting on said ledge, driving gears enclosed in said housing, and a walking beam adapted to pivot on said vertical member.

20. A power head of the type described comprising a housing, driving gears enclosed in said housing, and means adapted to support a vertical standard against one side of said housing including means for securing said standard to one side of said housing, and means extending from the base of the housing under the lower end of said vertical standard to support the lower end thereof.

JOHN B. SPERRY.