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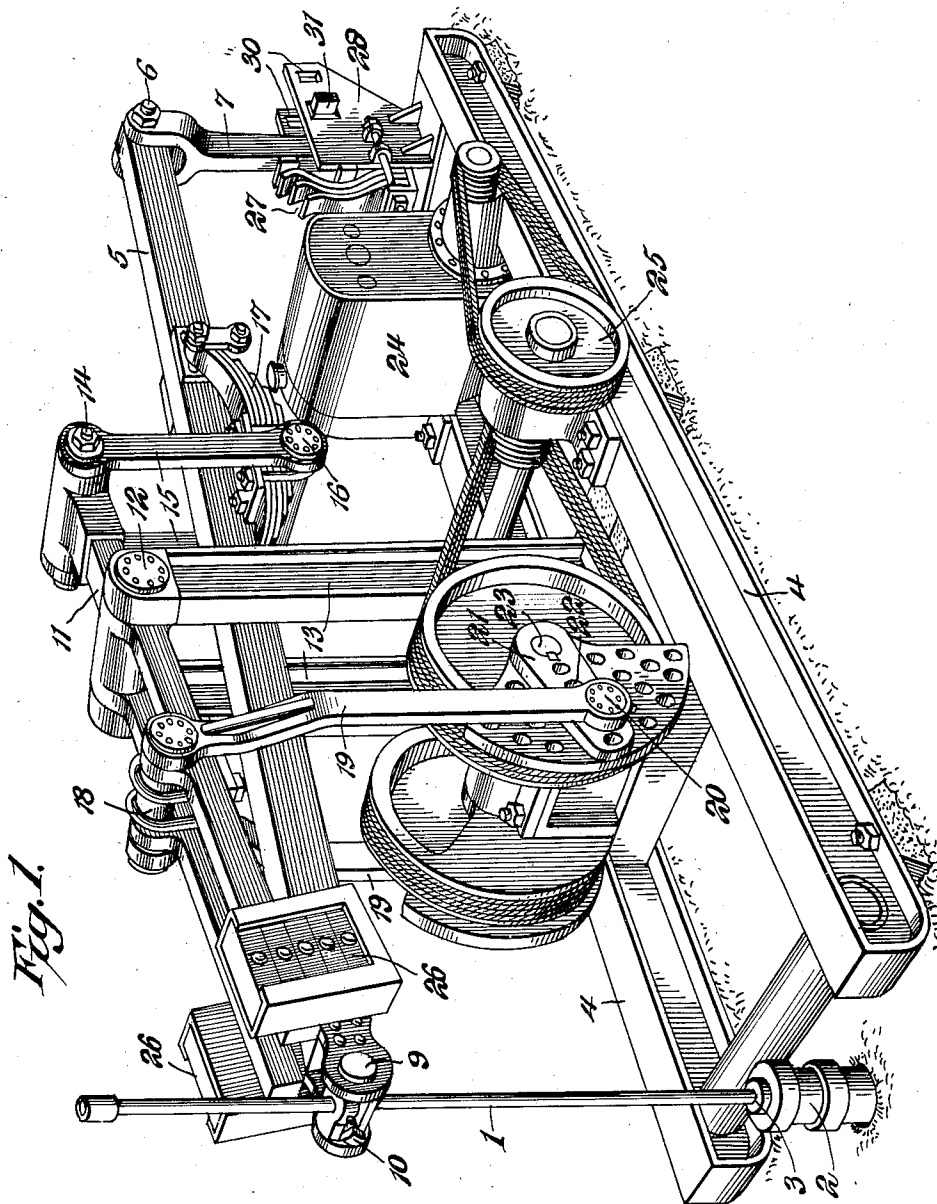
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PLUNGER OR THE LIKE OPERATING MECHANISM

Filed May 28, 1936

2 Sheets-Sheet 1



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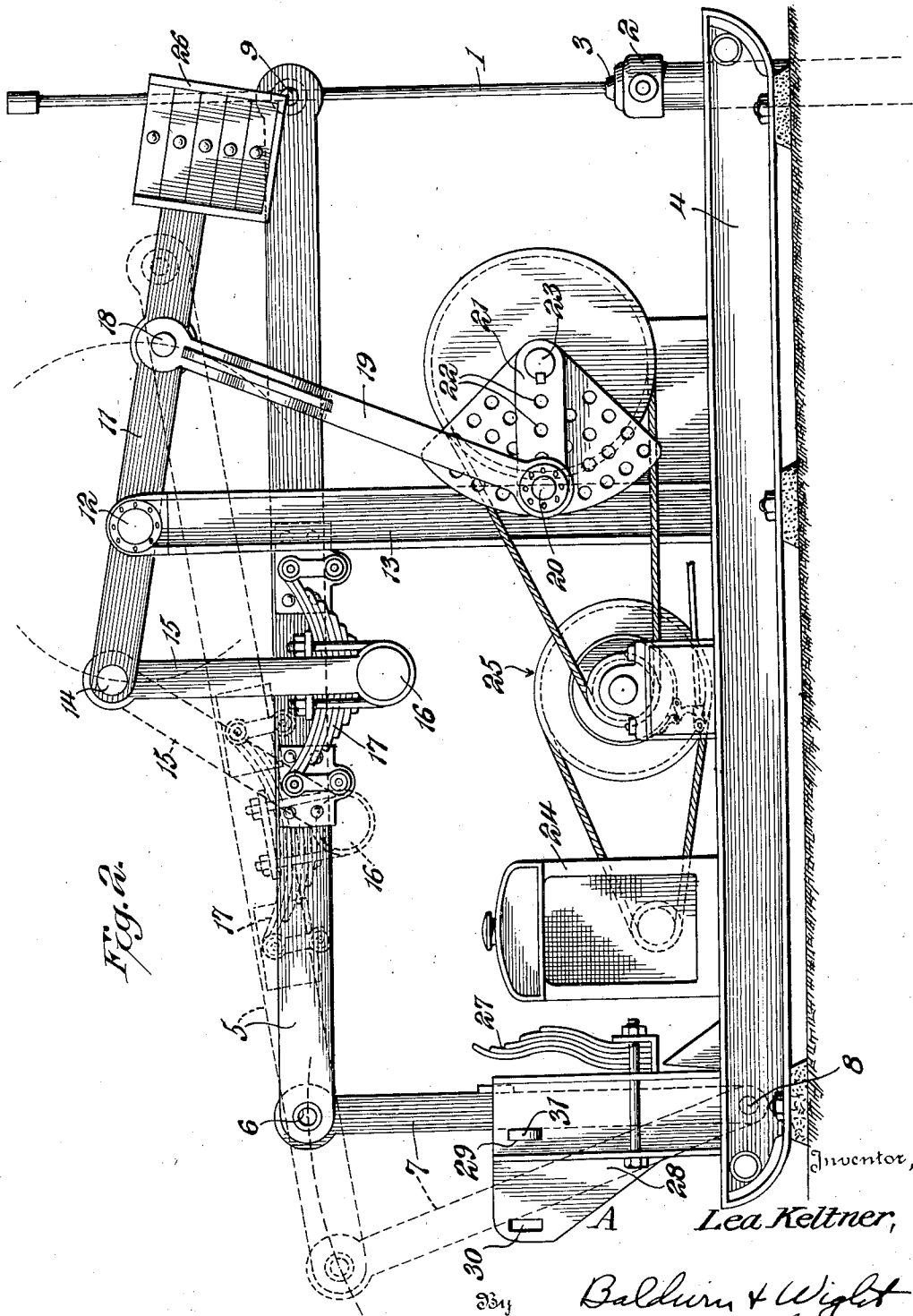
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UNITED STATES PATENT OFFICE

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PLUNGER OR THE LIKE OPERATING MECHANISM

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10 Claims. (Cl. 74-103)

This invention relates to plunger or the like operating mechanism and more particularly to mechanism of this kind which is adapted to impart straight-line movement to a pump plunger or other element.

An object of the invention is the provision of an improved mechanism of this class including an operating beam, lever or the like which is so mounted and driven that the end or other portion thereof which is connected to the plunger element will move in a straight line.

Another object is the provision of a mechanism of this kind including means for cushioning the load and for dampening out vibrations which otherwise might be caused by shock or peak loads, the cushioning means also serving to effect a harmonic or semi-harmonic movement of the plunger or other driven element.

A further object is the provision of a compact, self-contained, mobile pumping mechanism. Other objects will be apparent from a reading of the following description, the appended claims, and the accompanying drawings, in which:

Figure 1 is a perspective view of mechanism embodying the invention; and

Figure 2 is a side elevational view thereof.

For the purposes of illustration, the invention is shown and described as embodied in a well pumping mechanism for operating the plunger of a well equipped with a casing 2 provided with a stuffing box 3.

In the form shown, the entire mechanism is mounted upon a mobile skid base 4. The mechanism comprises a floating pumping beam 5, the left-hand end of which is pivoted at 6 to the upper end of a jack post or swinging fulcrum arm 7 having its lower end mounted on a fixed pivot 8 on the base 4. The right-hand end of the beam 5 is pivotally connected at 9 to the plunger 1, and preferably the pivotal connection 9 includes a clamp screw 10 for connecting the beam 5 to the plunger 1 at selected positions along the plunger.

An intermediate driving lever or reduction beam 11 is mounted on a fixed pivot 12 on posts or standards 13 extending upwardly from the base 4. To the left of the pivot 12 the reduction beam 11 is pivoted at 14 to the upper ends of links 15, the lower ends of which are pivoted at 16 to leaf spring assemblies 17 connected to the pumping beam 5. To the right of the pivot 12 the reduction beam 11 is pivoted as at 18 to the upper ends of pitmen 19, the lower ends of which are connected as at 20 to cranks 21. Preferably each crank is formed with a plurality of openings 22 for receiving the associated crank pin in a plurality of positions spaced at selected distances from the crank shaft 23. The crank shaft may be driven in any suitable manner, as by means of a gas engine 24 connected to the crank shaft through the medium of any suitable reduction gearing 25.

When the well is deep and the plunger 1 consequently is heavy, it is desirable to provide means for counterbalancing the weight of the plunger. In the form shown, such means comprises counter-weight devices mounted on the extreme right-hand end of the reduction beam 11.

A leaf spring buffer 27 is mounted on a bracket 28 extending upwardly from the base 4 adjacent the pivot 8 and is positioned to engage the swinging fulcrum arm 7, so as to cushion movement of the latter in a clockwise direction. The bracket 28 is formed with stop-receiving seats 29 and 30, each adapted to receive a stop pin 31. Normally the pin 31 is positioned in the seat 29 and serves to limit the normal operating movement of the fulcrum arm 7. When it is desired to remove the plunger rod 1 or the well casing 2, the pin 31 is removed from the seat 29 and placed in the seat 30. The pumping beam 9 is then disconnected from the plunger 1. The fulcrum arm 7 may then swing in a counter-clockwise direction until its movement is stopped by the pin 31 in the seat 30. When the fulcrum arm has moved to this position, the parts will be in the positions shown in dotted lines in Fig. 2, and the pumping beam will be clear of the pump rod and well casing, so that the latter may be removed or worked upon without interference.

In operation, rotation of the crank will cause the intermediate lever beam 11 to oscillate about the fixed pivot 12 which will cause the pump beam to move up and down about the floating fulcrum 6. The fulcrum 6 will move along the short arc x so that the pivot 9 on the pumping beam will move in a straight vertical line.

The spring assembly 17, being interposed between the driving link 15 and the pumping beam, will cushion the load so as to dispense with shocks and dampen the vibrations. I have found that the provision of the spring 17 results in imparting a harmonic motion to the pump rod, permitting the rod to vary in motion according to the load, and reducing the fatiguing stress when heavy loads are encountered.

Although the mechanism disclosed herein embodies the invention in its now preferred form, various changes may be made in the specific

construction and the relative arrangement of the parts without departing from the invention as defined in the claims.

I claim:

5 1. Plunger or the like operating mechanism comprising a reciprocatory driven member; a fulcrum arm mounted to swing about a fixed pivot; a fixed post positioned between said reciprocatory driven member and said fulcrum arm;
10 a floating beam having one end connected to said driven member and having its other end pivotally connected to the swinging end of the fulcrum arm; a reduction beam having unequal lever arms pivotally mounted intermediate its
15 ends on said post at a point above said floating beam; a link pivotally connected to the shorter or working arm of said reduction beam and pivotally connected to said floating beam; and driving means connected to the longer arm of
20 said reduction beam for operating the latter.

2. Plunger or the like operating mechanism comprising a reciprocatory driven member; a fulcrum arm mounted to swing about a fixed pivot; a fixed post positioned between said reciprocatory driven member and said fulcrum arm;
25 a floating beam having one end connected to said driven member and having its other end pivotally connected to the swinging end of the fulcrum arm; a reduction beam having unequal lever arms pivotally mounted intermediate its
30 ends on said post; a link connecting the shorter arm of said reduction beam to said floating beam; a counterweight on the longer arm of said reduction beam; a driving means connected to said
35 longer arm between said counterweight and said post and at a point further from the post than the point of connection of said link to said shorter arm.

3. Plunger or the like operating mechanism comprising a reciprocatory driven member; a floating member pivotally connected to said reciprocatory member; a fulcrum arm mounted to swing about a fixed pivot and being pivotally connected to said floating member; an intermediate
45 driving lever mounted to rock about a fixed pivot; a link pivotally connected to said intermediate lever; a resilient pivotal connection between said link and said floating member; and means for rocking said intermediate lever.

50 4. Plunger or the like operating mechanism comprising a reciprocatory driven member; a floating member pivotally connected to said reciprocatory member; a fulcrum arm mounted to swing about a fixed pivot and being pivotally connected to said floating member; a buffer positioned to cooperate with and cushion the swinging movement of the fulcrum arm; an intermediate driving lever mounted to rock about a fixed pivot; a link pivotally connected to said intermediate lever and to said floating member; and
60 means for rocking said intermediate lever.

5. Plunger or the like operating mechanism comprising a reciprocatory driven member; a fulcrum arm mounted to swing about a fixed pivot; a fixed post positioned between said re-

ciprocatory driven member and said fulcrum arm; a floating beam having one end connected to said driven member and having its other end pivotally connected to the swinging end of the fulcrum arm; a reduction beam having unequal
5 lever arms pivotally mounted intermediate its ends on said post at a point above said floating beam; a link pivotally connected to the shorter or working arm of said reduction beam and pivotally connected to said floating beam; and driving means connected to the longer arm of
10 said reduction beam for operating the latter, said reduction beam being connected to said link, said post, and said driving means only, the proportionate ratio of the connections on the reduction beam being such that the working end
15 of the reduction beam will describe an arc reversed to that described by the working end of the floating beam whereby the latter arc is neutralized or flattened out so that the working end
20 of the floating beam will perform substantially straight-line movement.

6. Mechanism as defined in claim 1 in combination with a skid base supporting the said mechanism.

7. The combination with a reciprocatory pump rod, of a pumping beam pivotally connected at one of its ends to said pump rod; a fulcrum arm mounted to swing about a fixed pivot; a pivotal connection between said fulcrum arm and said
30 pumping beam; a reduction beam mounted to rock about a fixed pivot; a link pivotally connected to said reduction beam and to said pumping beam; a spring interposed in the connection between said reduction beam and said pumping
35 beam; a crank; and a pitman connecting said crank to said reduction beam.

8. The combination with a reciprocatory pump rod, of a pumping beam pivotally connected at one of its ends to said pump rod; a fulcrum arm
40 mounted to swing about a fixed pivot; a pivotal connection between said fulcrum arm and said pumping beam; a reduction beam mounted to rock about a fixed pivot; a link pivotally connected to said reduction beam and to said pumping
45 beam; a crank; a pitman connecting said crank to said reduction beam; two spaced stop-receiving seats; and a removable stop member adapted when positioned in one of said seats to confine movement of said fulcrum arm to a
50 normal operating limit, and when positioned in the other seat to permit said fulcrum arm to swing beyond its normal operating range to thereby move said pumping beam and said reduction beam away from said pump rod.

9. The combination as defined in claim 1 and including a brake operatively connected with the crank for arresting movement of the mechanism at any position of the pump rod.

10. The combination as defined in claim 1 and including means for connecting the pumping beam to the pump rod at selected positions on the latter.

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