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W. L. BOROUGH

1,711,986

PITMAN

Filed Nov. 8, 1926

Fig. 1.

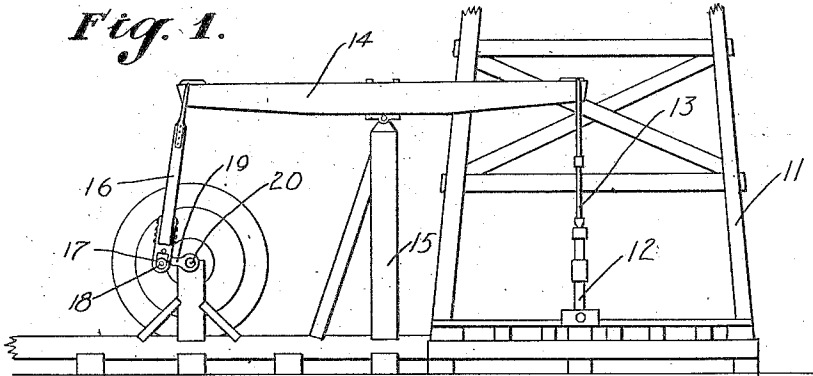


Fig. 2.

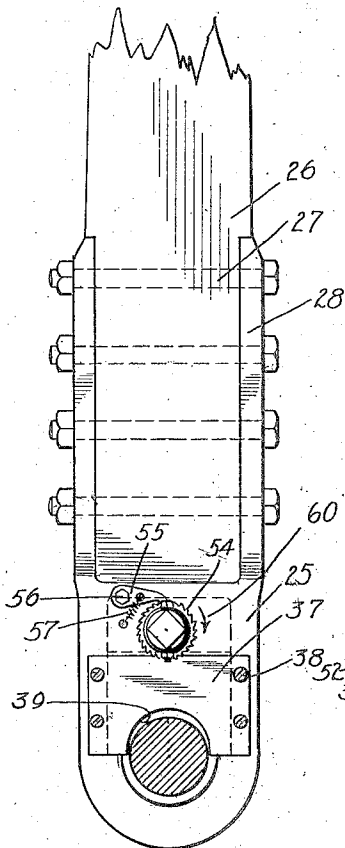


Fig. 3.

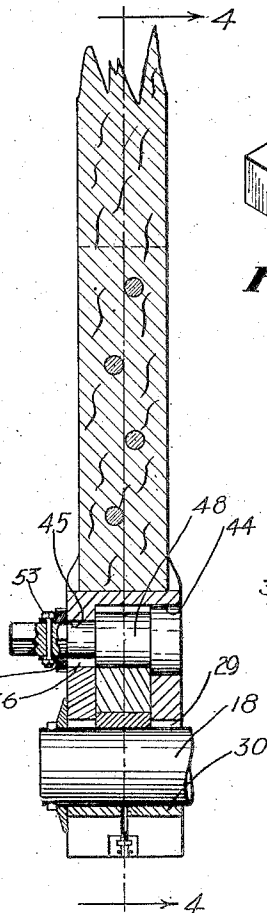


Fig. 6.

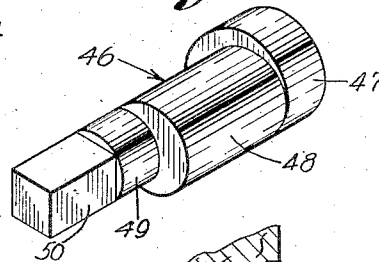


Fig. 4.

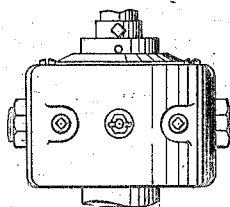
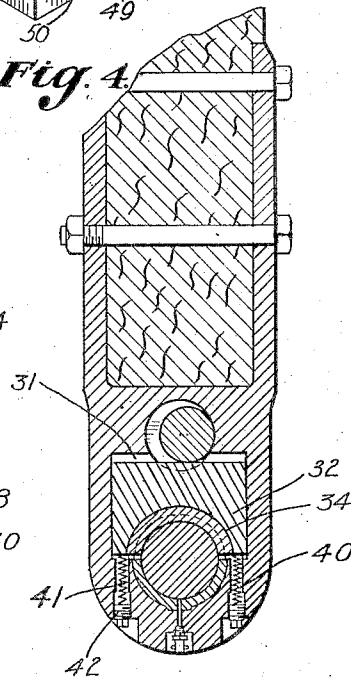


Fig. 5.

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PITMAN.

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This invention relates to derrick equipment and particularly to a novel pitman which forms a part of ordinary derrick equipment.

In the oil producing industry oil is pumped to the surface of the ground by means of a reciprocating pump which is situated near the lower end of the well. The plunger of the reciprocating pump is reciprocated by means of a string of sucker rods which extends upward therefrom and attaches to a walking beam located in the derrick of the well. The opposite end of the walking beam has a pitman attached thereto, by means of which the walking beam is oscillated. The lower end of the pitman is secured to a walking beam crank which is mounted on a band wheel shaft. The weight on the walking beam which consists of the weight of the plunger and string of sucker rods and also the oil being pumped is enormous; therefore, the bearing of the pitman, which journals a crank pin of the walking beam crank, is subjected to high strains. Such bearings ordinarily wear quickly so that there is considerable play which is undesirable.

It is an object of this invention to provide a pitman in which the bearing thereof is readily adjustable so that any play between the bearing and the walking beam crank pin may be eliminated.

Another object of this invention is to provide a novel form of bearing in which adjustment may be readily made by merely operating a cam.

Other objects and advantages of the invention will be made evident hereinafter.

Referring to the drawing in which I illustrate my invention:

Fig. 1 is a diagrammatic view illustrating the use of the pitman of this invention.

Fig. 2 is an enlarged face view showing the bearing construction of the pitman.

Fig. 3 is a vertical cross section of Fig. 2.

Fig. 4 is a vertical cross section taken as indicated by the line 4-4 of Fig. 3.

Fig. 5 is a bottom plan view of Fig. 2.

Fig. 6 is a perspective view of the cam pin of the invention.

Referring to Fig. 1 of the drawing, the numeral 11 represents a derrick, through the floor of which a pump tubing 12 extends. A string of sucker rods 13 extends upward from the oil tubing 12 and the upper end thereof is connected to a walking beam 14. The lower end of the string of sucker rods 13 is, according to ordinary practice, attached to the

plunger of a reciprocating pump situated at the lower end of a well. The walking beam 14 is pivotally mounted on the upper end of a samson post 15. Connected to the left end of the walking beam 14 is a pitman 16. At the lower end of the pitman 16 is a bearing 17 in which a crank pin 18 is journaled, the pin 18 being part of a walking beam crank 19 which is rigidly secured on a band wheel shaft 20. The band wheel shaft 20 is driven by means (not shown), and the walking beam crank 19 is revolved. The walking beam 14 is oscillated by means of the pitman 16 which is connected between the walking beam crank 19 and the walking beam 14 and in this manner the string of sucker rods 13 is reciprocated. It will be seen that any material play or looseness in the bearing 17 will cause an uneven oscillation of the walking beam 14, this detracting from the smooth operation of the equipment and placing undue strains on the equipment, especially the string of sucker rods.

In Figs. 2 to 6 inclusive I illustrate in detail the construction of the bearing 17. The bearing 17 has a body 25 which is secured to the lower end of an arm 26 of the pitman 16 by means of bolts 27 which extend through arms 28 of the body 25 and through the arm 26. Formed through the lower part of the body 25 is an opening 29 through which the crank pin 18 is extended. The lower part of the opening 29 is provided with a bearing 30 which contacts the crank pin 18. Connected to the upper part of the opening 29 and extended upward therefrom is a cavity 31 in which a bearing block 32 is placed. The side faces of the bearing block 32 engage the side walls of the cavity 31 so that it is retained in aligned position. The bearing block 32 is provided with a semicylindrical bearing portion 34 which is adapted to contact the crank pin 18.

Formed in the left side of the body 25 in Fig. 3 is an entrance opening 36 through which the bearing block 32 may be extended into the cavity 31. This entrance opening 36 is closed by a cover plate 37 which is secured in place by screws 38. The cover plate 37 is provided with a channel 39 which is of such a shape that a space is formed above the crank pin 18 so that there will be no engagement between the crank pin 18 and the cover plate 37. Referring to Fig. 4, vertical openings 40 are formed in the lower part of the body 25, these openings being placed at each

side of the opening 29 and connecting to the lower part of the cavity 31. Placed in the openings 40 are coil springs 41 which engage lower faces of the bearing block 32 and which are compressed by plugs 42 which are screwed into the lower ends of the openings 40.

Referring to Fig. 3, the body 25 is provided with a large bearing opening 44 and a small bearing opening 45 which are in axial alignment, the inner part of the large bearing opening 44 being connected with the cavity 31. Referring to Fig. 6 I show a cam pin 46 having a large bearing 47, a cam 48, a small bearing 49 and a squared portion 50. The large and small bearings and the squared portion 50 are in axial alignment, whereas the cam 48 is eccentric with respect to the other parts of the cam pin 46. The cam pin 46 is assembled in the body 25 as illustrated in Figs. 3 and 4. The large bearing 47 rests in the outer part of the large bearing opening 44 and the small bearing 49 rests in the small bearing opening 45. The cam 48 rests in the inner part of the bearing opening 45 which extends above the cavity 31 but which is in communication therewith as illustrated in Fig. 4. The squared portion 50 extends from the left side of the body 25 in Fig. 3, and placed thereon is a collar 52 which is secured in place by a bolt 53. The collar 52 retains the cam pin 46 in the position shown in Fig. 3. Formed integrally with the collar 52 is a ratchet 54, the teeth of which are engaged by a dog 55. The dog 55, as illustrated in Fig. 2, is pivoted to the body 25 by a bolt 56 and is caused to resiliently engage the ratchet 54 by means of a coil tension spring 57.

As shown in Fig. 4, the bearing block 32 is forced downward against the action of the springs 41 into journaling engagement with the crank pin 18. The bearing block 32 is held in this position by the cam 48 which engages an upper face thereof. The cam pin 46 is retained in the position shown by means of the dog 55 which engages the ratchet 54. It should be noted that the cam pin 46 is free to rotate in a direction indicated by the arrow 60 of Fig. 2 but cannot rotate in an opposite direction. When wear occurs on the bearing, this wear is eliminated or taken up by moving the bearing block 32 downward so that it again occupies the proper journaling position with respect to the crank pin 18. This adjustment is accomplished by applying a wrench (not shown) to the squared portion 50 of the cam pin 46 and by rotating the cam pin 46 in a direction indicated by the arrow 60 of Fig. 2. When the cam pin 46 is thus rotated, the cam 48 swings around the axis of the cam pin 46 and by reason of the fact that it is eccentric it will move downward, pressing against the bearing block 32. The ratchet 54 is provided with a great number of very small teeth so that the cam pin

46 need only be moved a very small fraction of a revolution. This permits a comparatively accurate adjustment of the bearing.

The bearing construction 17 is very simple and includes but very few parts. When the bearing 30 and the bearing block 32 are worn, it is only necessary to reline these two parts. For this reason the bearing 17, as a whole, will last indefinitely. A very important feature of the invention is that the bearing may be adjusted at any time and may be adjusted very easily. It is a very simple operation to rotate the cam pin 46 which is all that is necessary to adjust the bearing. The use of an adjustable bearing of this character on the pitman 16 is highly desirable and relieves the entire pump operating equipment of many unnecessary strains which result from the jerky action which is present when the bearing between the pitman and the walking beam crank is loose.

I claim as my invention:

1. In a device of the nature disclosed, the combination of: a body; a bearing formed in said body for journalling a shaft; a bearing block supported in a cavity in said body, said bearing block journalling said shaft; a cover plate closing an opening in said body through which said bearing block is extended into said cavity; an adjustable cam pin for holding said bearing block in journalling relationship, said cam pin comprising bearing portions resting in bearing openings of said body, a cam between the bearing portions of said cam pin, said cam engaging said bearing block, and a stem extending from one of said bearing portions whereby said cam pin may be operated; a ratchet non-rotatably attached to said cam pin; and a pawl pivoted to said body, said pawl being adapted to so engage said ratchet as to permit the rotation of said cam pin in one direction and prevent its rotation in the other direction.

2. In a device of the nature disclosed, the combination of: a body; a bearing formed in said body for journalling a shaft; a bearing block supported in a cavity in said body, said bearing block journalling said shaft; a cover plate closing an opening in said body through which said bearing block is extended into said cavity; an adjustable cam pin for holding said bearing block in journalling relationship, said cam pin comprising bearing portions of unequal size resting in bearing openings of said body, a cam between the bearing portions of said cam pin, said cam engaging said bearing block, and a stem extending from one of said bearing portions whereby said cam pin may be operated; a ratchet non-rotatably attached to said cam pin; and a pawl pivoted to said body, said pawl being adapted to so engage said ratchet as to permit the rotation of said cam pin in one direction and prevent its rotation in the other direction.

3. In a device of the nature disclosed the combination of: a body; a bearing formed in said body for journalling a shaft; a bearing block supported in a cavity in said body, said bearing block journalling said shaft; a cover plate closing an opening in said body through which said bearing block is extended into said cavity, said cover plate being adapted to slidably retain said bearing block in slidable engagement with said body so that it is properly aligned with said bearing in said body; an adjustable cam pin for holding said bearing block in journalling relationship, said cam pin comprising bearings resting in bearing portions openings of said body, a cam between the bearing portions of said cam pin, said cam engaging said bearing block, and a stem extending from one of said bearing portions whereby said cam pin may be operated; a ratchet non-rotatably attached to said cam pin; and a pawl pivoted to said body, said pawl being adapted to so engage said ratchet as to permit the rotation of said cam pin in one direction and prevent its rotation in the other direction.

4. In a device of the nature disclosed, the combination of: a body; a bearing formed in said body for journalling a shaft; a bearing block supported in a cavity in said body, said bearing block journalling said shaft; a bearing material lining the bearing surface in said bearing and said bearing block, said bearing material in said bearing block being thicker and over a shorter surface than said bearing material in said bearing in said body; a cover plate closing an opening in said body through which said bearing block is extended into said cavity; an adjustable cam pin for holding said bearing block in journalling relationship, said cam pin comprising bearing portions resting in bearing openings of said body, a cam between the bearing portions of said cam pin, said cam engaging said bearing block, and a stem extending from one of said bearing portions whereby said cam pin may be operated; a ratchet non-rotatably attached to said cam pin; and a pawl pivoted to said body, said pawl being adapted to so engage said ratchet as to permit the rotation of said cam pin in one direction and prevent its rotation in the other direction.

5. In a device of the nature disclosed, the combination of: a body; a bearing formed in said body for journalling a shaft; a bearing block supported in a cavity in said body, said bearing block journalling said shaft; a cover plate closing an opening in said body through which said bearing block is extended into said cavity, said cover plate being adapted to slidably retain said bearing block in slidable engagement with said body so that it is properly aligned with said bearing in said body; an adjustable cam pin for holding said bearing block in journalling rela-

tionship, said cam pin comprising bearing portions resting in bearing openings of said body, a cam between the bearing portions of said cam pin, said cam engaging said bearing block, and a stem extending from one of said bearing portions whereby said cam pin may be operated; a ratchet non-rotatably attached to said cam pin; and a pawl pivoted to said body, said pawl being resiliently urged to so engage said ratchet as to permit the rotation of said cam pin in one direction and prevent its rotation in the other direction.

6. In a device of the nature disclosed, the combination of: a body; a bearing formed in said body for journalling a shaft; a cover plate closing an opening to a cavity in said body; a bearing block adapted to be slidably mounted in said cavity so that said body and said cover plate retain said bearing block in alignment with said bearing in said body; an adjustable cam pin for holding said bearing block in journalling relationship with said shaft, said cam pin comprising bearing portions of unequal size resting in bearing openings in said body, the smaller of said bearing openings being so positioned relative to said cover plate that to remove said cam pin, bearing block and shaft from said body it is necessary to detach only said cover plate, a cam between the bearing portions of said cam pin, said cam engaging said bearing block, and a stem extending from one of said bearing portions whereby said cam pin may be operated; a ratchet non-rotatably attached to said cam pin; and a pawl pivoted to said body, said pawl being adapted to so engage said ratchet as to permit the rotation of said cam pin in one direction and prevent it in the other direction.

7. In a device of the nature disclosed, the combination of: a body; a bearing formed in said body for journalling a shaft; a lubricant port through said body to the middle of said bearing; a cover plate closing an opening to a cavity in said body; a bearing block adapted to be slidably mounted in said cavity so that said body and said cover plate retain said bearing block in alignment with said bearing in said body; an adjustable cam pin for holding said bearing block in journalling relationship with said shaft, said cam pin comprising bearing portions of unequal size resting in bearing openings in said body, the smaller of said bearing openings being so positioned relative to said cover plate that to remove said cam pin, bearing block and shaft from said body it is necessary to detach only said cover plate, a cam between the bearing portions of said cam pin, said cam engaging said bearing block, and a stem extending from one of said bearing portions whereby said cam pin may be operated; a ratchet non-rotatably attached to said cam pin; and a pawl pivoted to said body, said pawl being adapted to so engage said ratchet as to permit

the rotation of said cam pin in one direction and prevent it in the other direction.

8. In a device of the nature disclosed the combination of: a body; a bearing formed in
 5 said body for journalling a shaft; a lubricant port through said body to the middle of said bearing; a cover plate closing an opening to a cavity in said body; a bearing block adapted to be slidably mounted in said cavity so
 10 that said body and said cover plate retain said bearing block in alignment with said bearing in said body, said bearing block being resiliently urged away from said bearing in said body; an adjustable cam pin for holding
 15 said bearing block in journalling relationship with said shaft, said cam pin comprising bearing portions of unequal size resting in bearing openings in said body, the smaller of said bearing openings being so positioned
 20 relative to said cover plate that to remove said cam pin, bearing block and shaft from said body it is necessary to detach only said cover plate, a cam between the bearing portions of said cam pin, said cam engaging said
 25 bearing block, and a stem extending from one of said bearing portions whereby said cam pin may be operated; a ratchet non-rotatably attached to said cam pin; and a pawl pivoted to said body, said pawl being adapted to so engage said ratchet as to permit the
 30 rotation of said cam pin in one direction and prevent it in the other direction.

9. In a device of the nature disclosed the combination of: a body; a bearing formed in

said body for journalling a shaft; a lubricant port through said body to the middle
 35 of said bearing; a cover plate closing an opening to a cavity in said body; a bearing block adapted to be slidably mounted in said cavity so that said body and said cover plate retain
 40 said bearing block in alignment with said bearing in said body, said bearing block being resiliently urged away from the two sides of said bearing in said body; an adjustable cam pin for holding said bearing block
 45 in journalling relationship with said shaft, said cam pin comprising bearing portions of unequal size resting in bearing openings in said body, the smaller of said bearing openings being so positioned relative to said cover
 50 plate that to remove said cam pin, bearing block and shaft from said body it is necessary to detach only said cover plate, a cam between the bearing portions of said cam pin, said cam engaging said bearing block, and
 55 a stem extending from one of said bearing portions whereby said cam pin may be operated; a ratchet non-rotatably attached to said cam pin; and a pawl pivoted to said body, said pawl being adapted to so engage said
 60 ratchet as to permit the rotation of said cam pin in one direction and prevent it in the other direction.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 3rd
 65 day of November, 1926.

WILLARD L. BOROUGH.