Oct. 25, 1927. 1,646,948

R. R. BLOSS

PITMAN STRUCTURE

Filed April 25, 1925 2 Sheets-Sheet 1

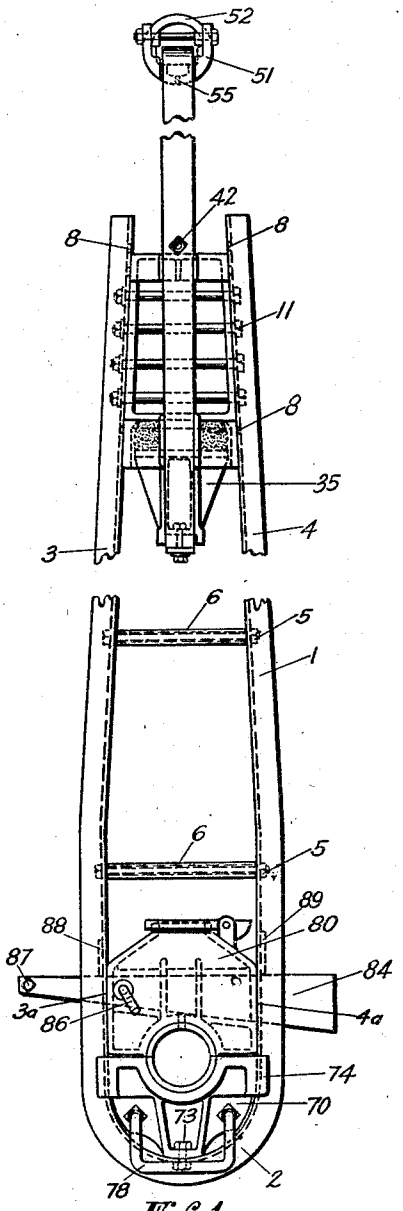

Fig. 1

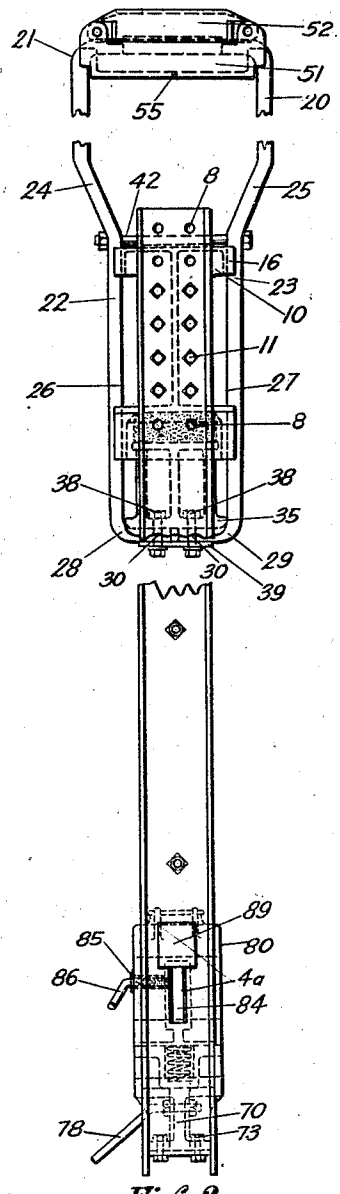

Fig. 2

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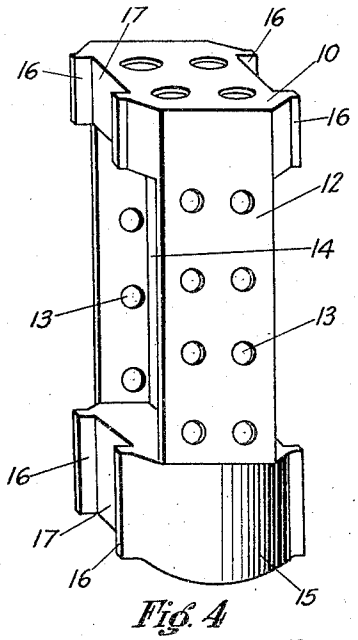

Fig. 4

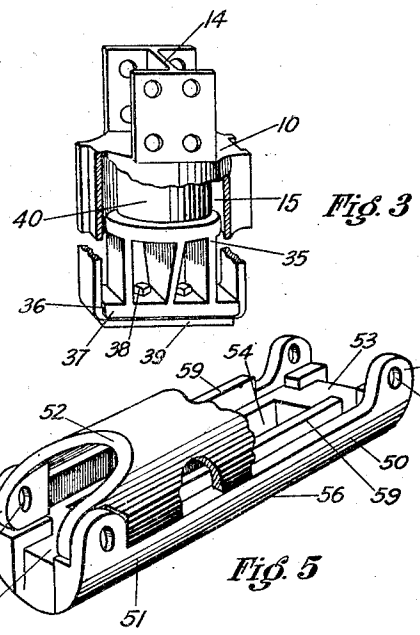

Fig. 3

Fig. 5

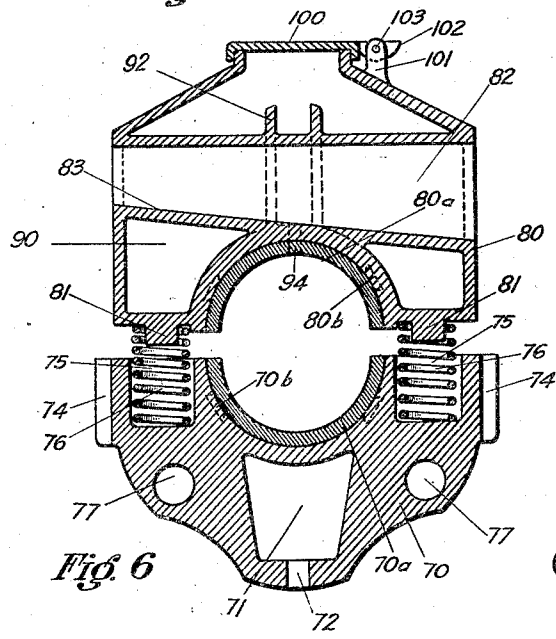

Fig. 6

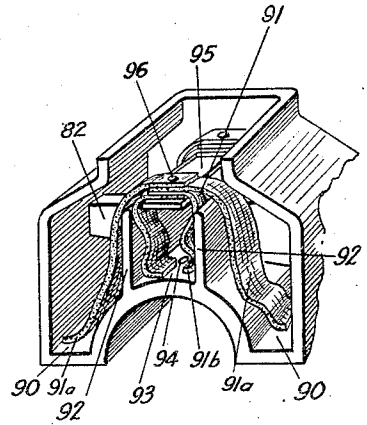

Fig. 7

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UNITED STATES PATENT OFFICE.

RICHARD R. BLOSS, OF COLUMBUS, OHIO, ASSIGNOR TO THE INTERNATIONAL DERRICK & EQUIPMENT COMPANY, OF COLUMBUS, OHIO, A CORPORATION OF OHIO.

PITMAN STRUCTURE.

Application filed April 25, 1925. Serial No. 25,911.

My invention relates to pitman structures. It has to do particularly with pitmen which are adapted for use in the drilling and pumping of oil, gas and artesian wells.

In the drilling of wells, the impact blows, or shocks, which are delivered from a string of tools, through the cable, walking beam and thence to the pitman, the wrist pin, the crank and crank-shaft are well known to those skilled in the art. These impact blows are delivered to the various parts of the well-drilling machinery on each stroke of the walking beam, and the resultant raising and lowering of the drilling tools. The constant repetition of the impact blows or shocks during the operation of the machine may cause a failure or breakage of the various parts of the well-drilling machinery, and result in an expense to the operator, and a loss of time and production. Also in the pumping of wells, the destruction of the sucker rods caused by the impact load applied to the sucker rods at each stroke of the walking beam is well known to those skilled in the art. Therefore, it is desirable that a shock-absorbing means be employed to reduce, or take up, the impact blows delivered to the machine parts in the drilling operation, and to compensate for the impact load which is applied to the sucker rods in pumping.

In the drilling operation, the pitman is required to be removed periodically from the wrist pin on the crank, and it is desirable that the wrist-pin bearing be so constructed that this periodical removal and replacement can be easily and quickly accomplished.

It has been experienced that in the placing and erecting of drilling rigs, the varied contour of the earth's surface, and the oft-time hurried operation of erection, among other reasons, often results in inaccurate and varied distances between various parts of the machine, such as the distance between the top of the jack post and the top of the Samson post, and it is very desirable to have some means provided to meet this inaccurate erection.

In carrying out my invention, I aim to provide the desired advantages heretofore named, and to overcome the difficulties heretofore encountered.

An object of my invention is the provision of a pitman so constructed that it will absorb, or take up, the impact blows or shocks which are transmitted thereto on each stroke of the walking beam in the drilling operation, so as to prevent the transmission of such blows or shocks to the different parts of the drilling machinery such as the crank-shaft, crank, or wrist pin.

Another object of my invention is the provision of a pitman so constructed as to compensate for the impact load applied to the sucker rods on each stroke of the walking beam in the pumping operation.

A further object of my invention is the provision of a pitman provided with a shock-absorbing element, and so constructed that the shock-absorbing element is completely housed, and protected from the sunlight, grease and oil, exposure to the weather or other factors which may tend to destroy its life.

Another object of my invention is the provision of a pitman so constructed that its length can be adjusted to meet various conditions and requirements.

Still another object of my invention is the provision of a wrist-pin bearing for a pitman, so constructed that the periodical removal of the pitman from the wrist pin can be quickly and easily accomplished.

A still further object of my invention is the provision of a pitman wherein all the parts which have frictional engagement with other portions of the machinery are automatically lubricated, so as to reduce the fire hazard, which accompanies, particularly, the drilling and pumping of oil wells.

Various other features of importance will appear as this description progresses and the nature of my invention becomes better understood. The preferred embodiment of my invention is shown in the accompanying drawings wherein similar characters of reference designate corresponding parts and wherein:

Figure 1 is a side elevation of my pitman structure, with parts broken, showing the general construction of the pitman.

Figure 2 is a side elevation of my pitman, with parts broken, taken at right angles to Figure 1.

Figure 3 is a detail view of the impact-absorbing unit, with parts cut away, showing the manner in which the housing, plunger and impact-absorbing member are arranged.

Figure 4 is a perspective of the housing member.

Figure 5 is a detail view of the stirrup

yoke, with parts broken away, showing the manner in which the two yoke parts are joined, and showing the lubricant reservoir.

Figure 6 is a sectional view in detail of the wrist pin bearing, showing the bearing base and cap, and the manner in which they are associated, and the manner in which they are attached to the pitman structure.

Figure 7 is a perspective of the bearing cap, with a side wall cut away, showing the manner in which the wrist-pin bearing is lubricated.

Referring now to the drawings and particularly to Figs. 1 and 2, my invention is shown as comprising a pitman, the body portion of which is preferably formed of a single strip of metal 1. This strip of metal 1 is preferably channel iron of suitable proportions, bent midway, as at 2, to form a bight portion, and having legs 3 and 4 extending from the bight portion 2 to form the shank of the pitman. The legs 3 and 4 are suitably braced and spaced by bolts 5 and spacer pipes 6. The legs 3 and 4 preferably extend substantially parallel to each other from the bight portion 2 for a distance and then preferably extend in a converging manner. The said legs are provided with a series of holes 8. There are preferably two rows of holes 8 in the legs 3 and 4, and each row of holes 8 have a common vertical axis, the purpose of which will presently appear.

A housing or socket member 10, as best shown in Fig. 4, is adapted to be secured as by means of bolts 11, between the leg portions 3 and 4. This housing member 10 is preferably of I-beam construction having faces 12 on opposite sides thereof, which faces are adapted to abut against the legs 3 and 4 when the housing is placed between the legs. Holes 13 are provided in each face of the housing, and the said holes 13 extend in rows on either side of the web 14 of the I-beam construction. The holes 13 have a common vertical axis and are adapted to align with the holes 8 in the members 3 and 4 for the reception of bolts, or the like, therethrough. By passing the bolts 11 through the bolt holes 13 in the housing member 10, and bolt holes 8 in the legs 3 and 4, the housing member may be secured between the two leg members adjacent the ends thereof. The bolt holes 8 in the legs 3 and 4 are greater in number than the holes 13 in the housing 10. It will thus be clearly seen that the housing 10 may be secured to the legs 3 and 4 at any desired point along the series of holes 8 in the said leg members, and that this construction provides for adjusting the length of the pitman.

The housing 10 is provided at its lowermost portion with a suitable socket 15. The housing 10 is also provided, adjacent its upper and lower ends, with extensions 16 on opposite sides thereof. These extensions 16 form channels or grooves 17 adapted to slidably receive the arms of the stirrup 20 as will later be more fully described.

The pitman stirrup 20 is preferably formed of a single length of metal, bent midway as at 21 and having downwardly extending legs 22 and 23 which converge as at 24 and 25 and then extend substantially parallel to each other as at 26 and 27. The lower ends of the arms 22 and 23 are bent inwardly as at 28 and 29 and are provided with holes 30 adjacent the ends of the inwardly bent portions.

Resting upon the inwardly bent ends of the arms 22 and 23 of the stirrup 20, is a plunger member 35, (Fig. 3). This plunger member has its base provided with a groove to receive the inwardly bent ends of the arms 22 and 23 of the stirrup, as shown at 36, this groove being formed by depending flanges 37 which extend downwardly on either side of the inwardly-bent ends of the arms 22 and 23.

The plunger 35 is preferably of open construction, as shown in Fig. 3, and has provided in its base, suitable holes adapted to align with holes 30 in the inwardly-bent portions of the arms 22 and 23 of the stirrup. The plunger 35 is securely fastened to the inwardly-bent portions as by means of bolts 38 passing through the holes in the plunger and in the arms. A suitable tie-plate 39 is placed beneath the inwardly-bent arms through which the bolts 38 pass and which braces and gives strength to the fastening of the plunger to the arms of the stirrup.

The stirrup 20 is associated with the body of the pitman, and the parallel portions 26 and 27 of the arms 22 and 23 of the stirrup extend on either side of the housing 10 and ride in the grooves 17 therein. The upstanding plunger 35 fits into the socket 15 of the housing member. Situated in the socket 15 is a member 40 which possesses, preferably, the property of hysteresis, such as rubber, as best shown in Fig. 3. The plunger 35 has a relatively close fit with the socket 15, but the member 40 is of somewhat smaller diameter. The purpose of this is to allow for the compression of the member 40 in the operation of the device, as will later appear. It will be observed that the shock-absorbing member 40 is completely housed by the socket 15 and plunger 35, and it is thus protected from elements which may tend to destroy its life, such as sunlight, grease and oil, or exposure to the weather.

A bolt 42 extends across the arms 22 and 23 of the stirrup through suitable holes provided in each arm of the stirrup. This bolt 42 braces the arms 22 and 23 and prevents the spreading thereof. The bolt 42 is positioned so that it makes contact with the top of the housing 10. When the bolt 42 is in

position, the plunger 35 is held within the socket 15 and against the member 40, without, however, compressing member 40. It will thus be seen that by this construction, when the shank 1 of the pitman is joined with the stirrup 20, and the bolt 42 placed into position, the two members 1 and 20 are securely associated with each other and will not become separated.

The member 40, which, preferably possesses the property of hysteresis, forms an impact-absorbing unit in the pitman structure. When the pitman is in operation, a downward pull upon the shank 1 likewise causes a downward pull of the housing 10. The housing 10 exerts a downward pressure on the plunger 35 through the elastic member 40. The downward pull is transmitted through the member 40 and plunger 35 to the stirrup member 20, through the inwardly-bent ends of the stirrup arms. The parallel portion 26 and 27 of the arms 22 and 23 of the stirrup 20 are free to slide in the grooves 17 of the housing, and the amount of sliding depends upon the degree to which the elastic member 40 is compressed. Thus it is, that in the operation of the pitman, the elastic member 40 absorbs whatever shocks or impacts may be delivered to the pitman, and that the shank 1 of the pitman and the stirrup 20 are slidable relative to each other to allow the member 40 to absorb such shocks or impacts.

The stirrup 20 is providedwith a stirrup yoke 50, as best shown in Fig. 5. The yoke 50 comprises a lower bearing member 51 and a cap member 52. The bearing member 51 is provided with a channel therethrough, as shown in 53, adapted to receive the bent end portion 21 of the stirrup 20. The bearing member 51 is also provided with a reservoir 54 which is adapted to receive a lubricant, or absorbent material containing lubricant. The reservoir 54 is provided with a suitable oil hole 55 (Fig. 2) which connects the reservoir 54 to the bearing surface 56 of the bearing member 51. From this it will be seen that the bearing surface 56, which contacts with the end of the walking beam, is automatically lubricated.

The bearing member 51 of the yoke is provided with upstanding ears 57 having holes 58 therein. The member 51 is also provided with upstanding flanges 59 extending lengthwise of the member and on either side of the reservoir 54.

The cap member 52 is provided with ears 60 having holes 61 therein, which ears 60 are adapted to fit within the ears 57 of the member 51, and the holes 61 align with holes 58 of the bearing member 51 for the passage of fastening means therethrough, such as bolts. The cap member 52 fits over the upstanding flanges 59 of the bearing member. This construction provides for securely fastening the yoke 50 to the stirrup 20, and the cap member 52 of the yoke prevents dust, water, or other extraneous matter from entering into the lubricant reservoir 54 and thence onto the bearing surface 56.

The wrist-pin bearing of my pitman structure is best shown in Figure 6. This bearing comprises a bearing base or block 70 and a bearing cap or block 80. The base 70 is of open construction, as shown in 71 and is provided in its lowermost portion with a bolt hole 72. The bolt hole 72 aligns with a suitable bolt hole in the bight portion 2 of the pitman body, and the base 70 is securely fastened in the bight portion 2, as by means of the bolt 73. The base 70 is also provided with flanges 74 which embrace either side of the legs 3 and 4 of the pitman body. The bearing base 70 is thus rigidly associated in the bight portion of the pitman structure.

The bearing base 70 is provided with recesses 75 in its upper face, which recesses are adapted to receive compressible members, such as the springs 76, the purpose of which will presently appear. Suitable openings 77 extend through the bearing base 70 and in said openings is fastened in any desired manner a handle member 78.

The cap 80 is provided with teats 81 adapted to align with the recesses 75 of the bearing base 70. The teats 81 are adapted to fit into the springs 76, which springs 76, in their normal position, hold the bearing cap 80 in spaced relation to the bearing base 70.

The bearing cap 80 is provided with a recess 82 extending therethrough, said recess 82 having a slanting surface 83. The leg members 3 and 4 of the pitman body are also provided with recesses or holes 3^a and 4^a which align with the recess 82 in the bearing cap 80. A suitable member 84, preferably in the form of a wedge, is adapted to extend through the recesses 3^a, 4^a and 82, and to contact with the slanting surface 83 of the cap. By means of this wedge 84, the bearing cap 80 can be adjusted to the wrist pin by compressing the members 76 which adjustment is accomplished by the proper positioning of the wedge 84. The cap 80 has an internally threaded hole 85 (see Fig. 2) in which is adapted to fit a set screw 86. This set screw contacts with the wedge member 84, whereby the member 84 is secured in desired position after such position has been once determined. A protuberance, such as the bolt 87, extends through the smaller end of the wedge member 84, as best shown in Fig. 1, the purpose of which will presently appear. The leg members 3 and 4 of the pitman are provided with reinforcements 88 and 89. These reinforcements are so situated as to form a thickened or reinforced wall of the openings 3^a and 4^a in the leg members, the purpose of which is to provide a

strengthened contact surface for the wedge member 84, when such wedge member is placed in position and the device in operation.

This construction of the wrist-pin bearing provides for quick and easy removal of the pitman from the wrist pin. To remove the pitman from the wrist pin, the set screw 86 is loosened and the wedge member 84 driven from left to right (see Fig. 1). When the wedge member is thus driven from left to right, the compressible members 76 force the bearing cap 80 upwardly and away from the bearing base. This leaves the wrist pin loosely associated with the bearing. The operator then grasps the handle 78 and pulls the pitman structure away from the wrist pin and thus removes the wrist pin bearing from the said wrist pin. The bolt 87 prevents the wedge member 84 from being driven completely out of place and keeps the wedge always associated with the pitman structure. Should it be desired to remove the bearing cap from the pitman, the member 87 may be taken out of the wedge, and the wedge may then be slipped out of place and the bearing cap removed.

When it is desired to replace the pitman on the wrist pin, the bearing, in open position, as shown in Fig. 6, is placed on the wrist pin, the wedge member 84 driven back into place until such time as the bearing is properly adjusted to the wrist pin, whereupon the screw 86 is tightened to maintain the wedge 84 in proper position and to maintain the proper adjustment of the bearing to the wrist pin.

The bearing cap 80 is provided with lubricant reservoirs 90, one reservoir located on either side of the bearing proper and preferably extending below the upper surface of the bearing. The reservoirs are separated from each other by walls 92, which walls form a chamber 93, immediately above the bearing proper. This chamber 93 communicates with the bearing surface by means of the oil hole 94. A suitable clip 95 is adapted to be secured in any desired manner to the top of the walls 92, and adjacent each end of the clip are secured wick members 91. The wick members may be formed in any desired manner but are preferably made up of four lengths of material 91^a and 91^b, all of which are secured together, and secured to the clip in any desired way, as by the rivet 96. The lengths of material 91^a are relatively long and extend into the lubricant reservoir, while the lengths 91^b are relatively short and extend into the chamber 93.

It will be observed that, by this construction, the wrist-pin bearing is automatically lubricated. The lubricant travels by capillary attraction upwardly through the members 91^a and then down the members 91^b into the chamber 93, from which point the lubricant seeps through the oil hole 94 into the bearing. By this construction, no absorbent material, such as wool felt, is in contact with the wrist pin.

The bearing cap 80 is provided with a closure 100 for the lubricant reservoir. The closure 100 is hinged upon suitable lugs 101 upon the bearing cap. This closure is provided with extensions 102, which protrude beyond the fulcrum point 103, and which are so proportioned as to contact with the top of the bearing cap 80 to prevent the closure 100 from being thrown completely back when it is opened. By means of these extensions 102, the closure 100 can be opened only to such an extent, so that it will fall to closed position after such opening.

The bearing base 70 and cap 80 are provided with a lining of suitable material, such as babbitt, for a bearing surface, as shown at 70^a and 80^a. The linings 70^a and 80^a are held in fixed relation to their respective housings by recesses 70^b and 80^b in the bearing base and cap.

In operation, the bearing base and cap are suitably adjusted to the wrist pin, and the yoke 50 extends over the end of the walking beam of the drilling or pumping apparatus. The circular motion of the wrist pin upon a crank imparts to the whole pitman structure a reciprocating motion and this, in turn, causes a rocking of the walking beam. Upon the downward stroke of the wrist pin, the body of the pitman is pulled downwardly, and the housing member 10, which is securely fastened to the legs 3 and 4, is also pulled downwardly. The housing exerts a downward pressure on the elastic member 40 which, in turn, communicates the pressure to the plunger 35, thence to the stirrup 20, and to one end of the walking beam. It will thus be seen that the pull of the wrist pin on the pitman is transmitted to the walking beam through the elastic member 40.

Upon this downward movement of the pitman, the string of tools in the well are raised. As set forth above, the string of tools ofttimes weight up into the thousands of pounds, and often, from their very weight, cause destructive impacts to the drilling machinery. In addition to the weight of the string of tools, unexpected impact blows are imparted to the various parts of the drilling machinery, through the rope, walking beam, and pitman, as the string of tools penetrate the different strata of earth, such as sand, clay or rock. It will be clearly seen that by my construction, these impacts or blows which are conducted through the walking beam to the pitman, must first travel through the shock-absorbing member 40 before reaching the more delicate parts of the machine. This elastic member absorbs or takes up, in a large measure, the destructive shocks before such shocks are imparted to the various

parts of the drilling machinery, such as the wrist pin, the crank, or crank-shaft, and thus prevents in a large measure the breakage of such parts and eliminates the constant worry and expense to the operator. Also, in the pumping operation, where a heavy impact load is applied to the sucker rods on each stroke of the walking beam, my shock-absorbing unit will compensate for such impact.

I have pointed out above, the manner in which the bearing of the pitman may be removed from the wrist pin. This removal is quite frequent in the drilling operation, and ofttimes results in an undue loss of time. By my construction, the bearing may be easily removed by merely loosening the set screw and driving the wedge member out of its set position, thus allowing the bearing cap to become separated from the bearing base by reason of the operation of the springs 76. The operator then grasps the handle 78 and the pitman is easily removed from the wrist pin.

While I have described my invention as being adaptable particularly to apparatus for the drilling and pumping of wells, I do not desire to limit my invention to such use but desire that my invention may be used generally wherever the use of pitmen or the like are required.

Having thus described my invention, I claim:

1. A pitman structure comprising a member bent midway to form a bight portion having legs extending to form a shank, a socket member secured to the legs adjacent the ends thereof, a stirrup interlinked with said socket and an interposed resilient member.

2. A pitman structure comprising a member bent midway to form a bight portion having legs extending to form a shank, a socket member secured to the legs adjacent the ends thereof, a resilient member in said socket, a stirrup, and a plunger secured to said stirrup, said stirrup and shank being interlinked so that the plunger attached to the stirrup interfits with the socket of said shank.

3. A pitman structure comprising a member bent midway to form a bight portion having legs extending to form a shank, a socket member secured to the legs adjacent the ends thereof, a stirrup, a plunger associated with said stirrup, said plunger adapted to cooperate with said socket, and a shock-absorbing element between said socket and said plunger.

4. A pitman structure comprising a member bent midway to form a bight portion having legs extending to form a shank, a socket member secured to the legs adjacent the ends thereof, a stirrup, a plunger associated with said stirrup, said plunger adapted to cooperate with said socket, and a resilient element in said socket adapted to space the plunger from the bottom of the socket.

5. A pitman structure for oil, gas and artesian wells comprising a body portion provided with a socket, a resilient member in said socket, a stirrup of bifurcated form and having its legs slidably embracing said body portion, a plunger complemental to the socket of said body portion and carried by said stirrup, and a slidable bracing connection between the legs of said stirrup and said body portion.

6. A pitman structure comprising a shank formed from a U-shaped member with spaced converging legs, a stirrup member, and a connecting structure intermediate said shank and stirrup member and disposed between the end portions of said legs.

7. A pitman structure for oil, gas and artesian wells comprising a body portion of general U-shape, a bearing mounted within the base of said U-shaped member, converging legs forming a part of said body portion, a stirrup member carrying a plunger, a socket member located between said converging legs and connected thereto in adjustable position, and a yieldable element within said socket member and resisting the telescoping of said socket and plunger members.

8. A pitman structure for oil, gas and artesian wells comprising a body portion having a downwardly open socket, a resilient member in said socket and a stirrup having an upwardly extending plunger cooperating with said socket.

9. A pitman structure for oil, gas and artesian wells comprising a body portion having a downwardly open socket, a stirrup structure having an upwardly extending plunger cooperating with said socket and a rubber cushion between the socket and said plunger.

In testimony whereof I hereby affix my signature.

RICHARD R. BLOSS.