

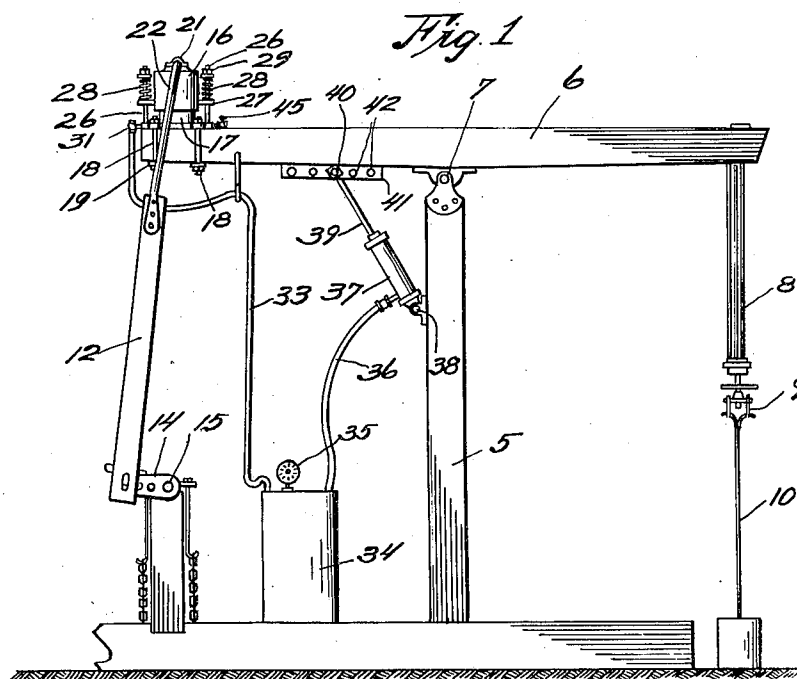
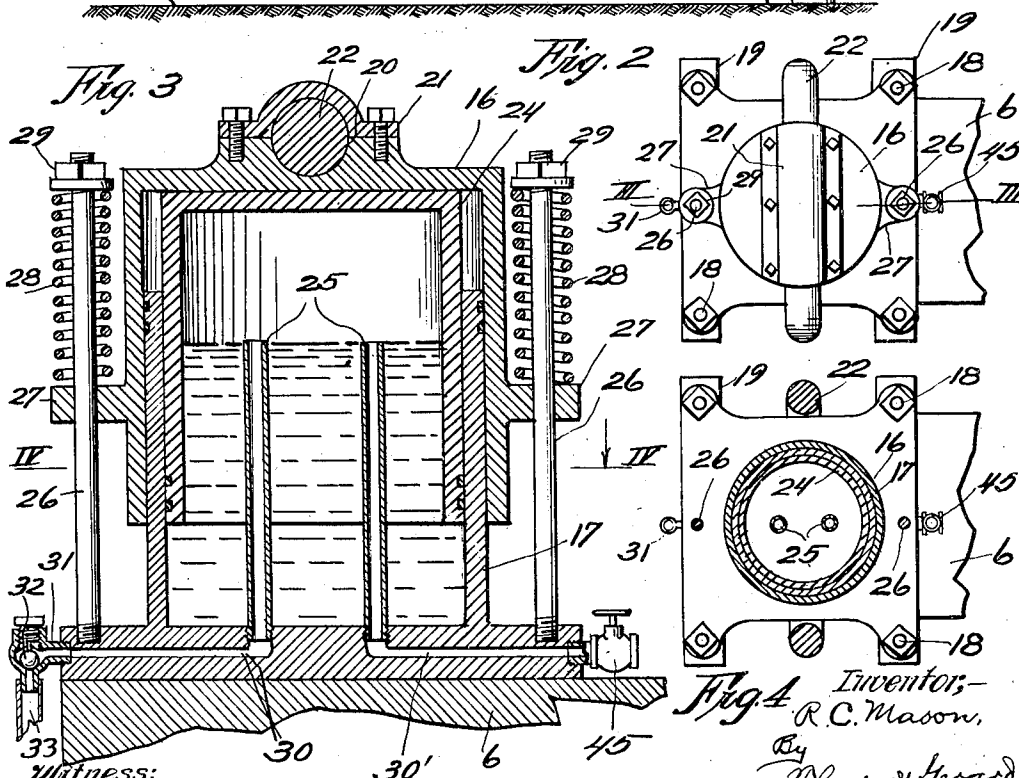
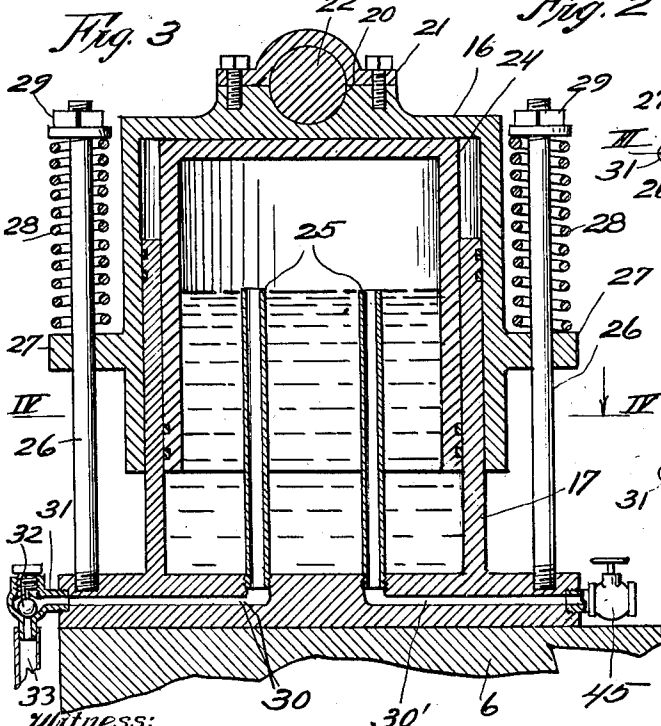
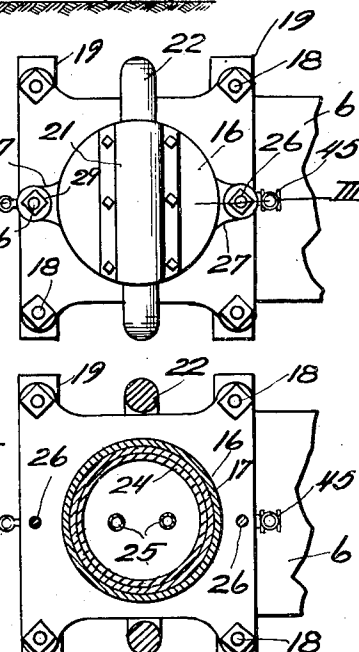
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R. C. MASON

SHOCK ABSORBING DEVICE FOR DRILLING AND PUMPING APPARATUS

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UNITED STATES PATENT OFFICE.

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SHOCK-ABSORBING DEVICE FOR DRILLING AND PUMPING APPARATUS.

Application filed May 15, 1922. Serial No. 561,159.

To all whom it may concern:

Be it known that I, RICHARD C. MASON, a citizen of the United States, and resident of Tulsa, county of Tulsa, State of Oklahoma, have invented a certain new and useful Improvement in Shock-Absorbing Devices for Drilling and Pumping Apparatus, of which the following is a complete specification.

The present invention relates to well drilling or pumping apparatus, and aims to provide a novel shock-absorbing appliance for relieving the parts of the drilling or pumping apparatus from undue strain and wear caused by excessive jars and vibrations incurred in the drilling or pumping operation.

Accordingly, I have devised a shock-absorbing device adapted for installation in conjunction with the walking beam and pitman member of such apparatus and in such a relation thereto that the excess load or strain due to shocks and jars transmitted from the working tools is absorbed in a most effective manner.

Preferably, I mount the improved device on one end of the walking beam and constitute it as the operative connection between the beam and pitman member, and make use of fluid pressure as the shock-absorbing medium.

I also make provision for suspending the shock-absorbing function of the device at times when it is desired to transmit a jarring effect to the tool line, as is occasionally required in the work of recovering tools that have become caught or locked in the well.

With the foregoing general objects in view, the invention will now be described by reference to the accompanying drawing illustrating that form of construction which I have devised for embodying the proposed improvements, after which the novel features therein will be particularly set forth and claimed.

In the drawing—

Figure 1 is an elevation illustrating a well drilling apparatus including a shock-absorbing device constructed in accordance with the present invention;

Figure 2 is a plan view, on an enlarged scale, of that end of the walking beam carrying said shock-absorbing device;

Figure 3 is an enlarged sectional view, taken on the line III—III of Figure 2; and

Figure 4 is a horizontal section taken on the line IV—IV of Figure 3, but on the same scale as Figure 2.

Referring now to the drawing in detail, this illustrates a common form of well drilling apparatus comprising a samson post 5 carrying a walking beam 6 rocking about a fulcrum 7 at the upper end of said post, one end of said beam being provided with the usual form of links 8 and attachments 9 for supporting the cable or tool carrying line 10 which is let down in the well in the usual manner. The other end of the walking beam 6 is provided with operative connection to a pitman member 12 which is reciprocated by means of a crank 14 carried by a shaft 15 driven from any suitable source of power (not shown) in a manner well known. The construction so far described is common practice, and the difficulty experienced in the operation of the same is on account of the constant jar and strain on the cable and other moving parts of the apparatus, because of the sharp, intermittent, pulling and jerking transmitted from the tool line, with the result that there is constant danger of stripping keyways and excessive wear is imposed upon the cable as well as all bearing parts and pivot connections. For this reason, the present improvement aims to provide a shock-absorbing structure arranged to eliminate as much as possible the principal wear and strain caused by the operation of an apparatus of this character.

The improved device consists of a telescoping fluid pressure cylinder structure made up of an upper cylinder member 16 mounted in exterior telescoping relation to a lower cylinder member 17, the base of which is mounted upon that end of the walking beam 6 to which connection is made with the pitman member 12, and secured in place by means of clamping bolts 18 and tie plates 19. The head of the cylinder member 16 is formed with a bearing 20 fitted with a bearing cap 21 for the purpose of journaling the intermediate portion of a yoke member 22, which in turn is secured to the upper end of the pitman 12, as shown in Figure 1. The shock-absorbing device thus constitutes the operating connection between the pitman and the adjacent end of the walking beam. A third cylinder member 24 is fitted in interior telescoping relation to the cylin-

der member 17, with the head of said interior member 24 in limiting engagement with the head of the cylinder member 16, as clearly illustrated in Figure 3. Preferably, a supply of liquid, such as oil or other suitable medium, is maintained within the cylinders 17 and 24, for sealing the same against the escape of the gas used as the shock absorbing medium as hereinafter explained, said liquid being maintained at a level corresponding to the upper ends of a pair of tubes 25, as shown in Figure 3. The base of the cylinder member 17 is provided at opposite sides of said cylinder with upright rods 26 in sliding engagement with guide lugs 27 projecting at opposite sides from the exterior cylinder member 16 and supporting a pair of compression springs 28 coiled about the upper ends of said rods 26 and retained in place by means of nuts 29. These springs 28 thus yieldingly limit the upward telescoping movement of the cylinder members 16 and 24 in response to the action of the fluid pressure maintained within the cylinder member 24 above the level of the liquid therein.

The lower end of one of the tubes 25 communicates with a passage 30 in the base of the cylinder 17, the outer end of which passage is fitted with an elbow 31 containing a check valve 32 adapted to open automatically to permit the charging of the shock-absorbing device with the fluid pressure medium, but preventing the escape of such medium out through the passage 30. The elbow 31 is connected by means of a suitable hose 33 with a pressure tank 34 fitted with an ordinary pressure gage 35 and also with a hose connection 36 leading from a suitable air pump 37 pivotally supported, as indicated at 38, upon the post 5, while the plunger rod 39 of the pump is pivotally connected, as indicated at 40, to a plate 41 attached to the under face of the adjacent portion of the walking beam 6. It is thus apparent that the oscillation of the beam 6 will serve to automatically actuate the pump 37 for maintaining the required supply of fluid under pressure within the tank 34 from which it is conducted past the valve 32 to the shock-absorbing device, and the plate 41 is provided with a series of openings for making adjustable connection with the plunger rod 39 and thereby varying the stroke of the pump.

The lower end of the other tube 25 is fitted in communication with a second passage 30' in the base of the cylinder member 17, the outer end of said passage being fitted with a valve 45 which may be used to relieve the compression within the upper portion of the cylinder member 24 whenever it is desired to dispense with the shock-absorbing function.

It will thus be apparent that I have de-

vised a practical and efficient device for carrying out the desired objects of the invention. The load upon the tool line 10 serves to maintain the cylindrical elements of the shock-absorbing device normally telescoped together as far as the fluid pressure therein will permit, this fluid pressure being maintained automatically by the action of the pump 37 operated by the oscillating motion of the walking beam 6. Hence, the force of all the downward strokes of the pitman member 12 is transmitted through the medium of the shock absorbing device, and likewise all downward pulls or jerks upon the other end of the beam 6 are counterbalanced with a shock-absorbing action through the medium of the improved device interposed between the other end of said beam and the yoke 22 connecting it with the pitman 12. By this means, any undue injury or damage to the cable working bearings and pivot connections is effectively avoided, in contrast to what is experienced in the usual construction, where practically the only element of the construction having any resiliency or give is the main drive belt from which the power is derived. In the present construction, provision is also made for conveniently and quickly dispensing with the shock-absorbing function, by simply opening the valve 45 for permitting the escape of compressed air inside the device by way of the passage 30', whereupon the usual jarring and vibrating effect may be obtained in what is called the fishing operation for jarring loose tools which sometimes get caught or stuck in the well.

While I have described what I now regard as the preferred form of construction for embodying the proposed improvements, I desire to reserve the right to make such changes or modifications as may fairly and properly fall within the scope of the appended claims.

What I claim is:

1. In an apparatus of the character described, the combination with the walking beam and pitman member for oscillating said beam, of a fluid-pressure shock-absorbing device connecting said pitman member with one end of said beam, and means for maintaining fluid pressure within said device.

2. In an apparatus of the character described, the combination with the walking beam and pitman member for oscillating said beam, of a fluid-pressure shock-absorbing device comprising a plurality of telescoping cylinders operatively interposed between said pitman member and one end of said beam.

3. In an apparatus of the character described, the combination with the walking beam and pitman member for oscillating said beam, of a fluid-pressure shock-absorb-

ing device interposed between said pitman member and one end of said beam and operating to sustain the excess force due to an abnormal downward pull upon the other
 5 end of said beam, and means for maintaining fluid pressure within said device.

4. In an apparatus of the character described, the combination with the walking beam and pitman member for oscillating
 10 said beam, of a fluid-pressure shock-absorbing device connecting said pitman member with one end of said beam, and means actuated by the movement of said beam for maintaining a supply of fluid under pressure
 15 to said shock-absorbing device.

5. In an apparatus of the character described, the combination with the samson post, walking beam and pitman member for oscillating said beam, of a fluid-pressure
 20 shock-absorbing device connecting said pitman member with one end of said beam, and a pump device pivotally supported by said post and beam and operating to maintain a supply of fluid under pressure to said shock-
 25 absorbing device.

6. In an apparatus of the character described, the combination with the walking beam and pitman member for oscillating
 30 said beam, of a fluid-pressure shock-absorbing device comprising a plurality of telescoping cylinders operatively interposed between said pitman member and one end of said beam and containing a quantity of
 35 liquid to form a seal against the escape of gas therefrom, and means for maintaining a supply of gas under pressure within said cylinders above the level of the liquid therein.

7. In an apparatus of the character described, the combination with the walking
 40 beam and pitman member for oscillating said beam, of a fluid-pressure shock-absorbing device comprising a plurality of telescoping cylinders operatively interposed between
 5 said pitman member and one end of said

beam and containing a quantity of liquid to form a seal against the escape of gas therefrom, means for maintaining a supply of
 50 gas under pressure within said cylinders above the level of the liquid therein, and a valved vent conduit communicating with the space above said liquid level within said cylinders.

8. In an apparatus of the character described, the combination with the walking
 55 beam and pitman member for oscillating said beam, of a fluid-pressure shock-absorbing device comprising a cylinder supported by one end of said beam, a second cylinder pivotally connected with said pitman and
 60 in telescoping engagement with the exterior of said first cylinder, and a freely movable cylinder in telescoping engagement with the interior of said first cylinder, a quantity of
 65 liquid contained within said device to form a gas seal between said cylinder members, and means for maintaining a supply of gas under pressure within said cylinders above the level of the liquid therein.

9. In an apparatus of the character described, the combination with the walking
 70 beam and pitman member for oscillating said beam, of a fluid-pressure shock-absorbing device comprising a cylinder supported by one end of said beam, a second cylinder pivotally connected with said pitman and in
 75 telescoping engagement with the exterior of said first cylinder, and a freely movable cylinder in telescoping engagement with the interior of said first cylinder, a quantity of
 80 liquid contained within said device to form a gas seal between said cylinder members, means for maintaining a supply of gas under pressure within said cylinders above the level of the liquid therein, and yielding
 85 means limiting the upward telescoping movement of said cylinders.

In witness whereof I hereunto affix my signature.

RICHARD COLBERT MASON.